Wuppertal Institute for Climate, Environment and Energy

GERMANWATCH

Social CSP

Energy and development: exploring the local livelihood dimension of the Noor$_o$ I CSP project in Southern Morocco

Final report

to the German Federal Ministry for Economic Cooperation and Development (BMZ)

GZ: P5 E5001-0125/012

Wuppertal, Bonn, 30 June 2015

Financially supported by

BMZ Federal Ministry for Economic Cooperation and Development

based on a decision of the Parliament of the Federal Republic of Germany

Final report

The project on which this report is based was financially supported by the German Federal Ministry for Economic Cooperation and Development (BMZ) (business reference number P5 E5001-0125/012). The sole responsibility for the content of this report lies with the authors.

Elaborated by

Wuppertal Institute for Climate, Environment and Energy	*Germanwatch*
Dr. Julia Terrapon-Pfaff, Dr. Sylvia Borbonus (Project co-ordinators)	Boris Schinke
Dr. Peter Viebahn, Thomas Fink, Dr. Bernhard Brand	
Responsible for the chapters 4, 5, 6, 10, 14	Responsible for the chapters 1, 2, 3, 7, 8, 9, 11, 12, 13, 16

With subcontracts to (in alphabetical order)
Fatima Ahouli (Local researcher and translator, Morocco)
Zakaria Ait-El Bouhali (Local researcher, Morocco)
Mohamed Ait-El-Haj (Local researcher, Morocco)
Prof. Thami Ait-Taleb (L'Association Draa des Énergies Renouvelables, Morocco)
Ghizlane Atik (Local researcher, Morocco)
Prof. Yomn El Hamaky (Ain Shams University, ETHRAA, Egypt)
Prof. Hassan Chaib (L'Association Draa des Énergies Renouvelables, Morocco)
Prof. Yassine Darmane (L'Association Draa des Énergies Renouvelables, Morocco)
Mohamed Dharif (L'Association Draa des Énergies Renouvelables, Morocco)
Jens Klawitter (Independent consultant, Germany)
Christof Koegler (Bonn International Center for Conversion, Germany)
Dr. El Mostafa Jamea, (MENARES, MENA Renewables and Sustainability, Morocco)
Adel Lotfy (Independent consultant, Egypt)
Dr. Sharlissa Moore (Arizona State University, U.S.)
Prof. Otmane Ait Ouarasse (L'Association Draa des Énergies Renouvelables, Morocco)
Prof. Mohamed Oudada (L'Association Draa des Énergies Renouvelables, Morocco)
Souaad Ouzahim (Local researcher, Morocco)
Prof. Hsaine Zgou (L'Association Draa des Énergies Renouvelables, Morocco)

Translation of the summary
Arabic version: Dr. Dalal Arsuzi-Elamir (Germany)
French version: Anne-Marie Plet (LinguaConnect, Germany)

Assistance by
Björn Tschache (Wuppertal Institute for Climate, Environment and Energy, Germany)
Thassilo Görgens (Germanwatch, Germany)

Please cite the report as

Wuppertal Institute; Germanwatch (2015): Social CSP – Energy and development: exploring the local livelihood dimension of the Noor$_o$ I CSP project in Southern Morocco. Final report to the German Federal Ministry for Economic Cooperation and Development (BMZ). Wuppertal Institute for Climate, Environment and Energy: Wuppertal; Germanwatch: Bonn. www.wupperinst.org/en/projects/details/wi/p/s/pd/449/

Contact

Dr. Julia Terrapon-Pfaff Wuppertal Institute for Climate, Environment and Energy Research Group “Future Energy and Mobility Structures” Doeppersberg 19 42103 Wuppertal Germany Tel.: +49(0)202/2492-109 Fax: +49(0)202/2492-198 E-mail: julia.pfaff@wupperinst.org	Boris Schinke Germanwatch Team International Climate Policy Kaiserstraße 201 53113 Bonn Germany Tel.: +49(0)228/60492-32 Fax: +49(0)228/60492-19 E-mail: schinke@germanwatch.org

Table of contents

Index of tables

Index of figures

Executive summary

In this study the *Wuppertal Institute* and *Germanwatch* analyzed and assessed the livelihood dimension of Concentrating Solar Power (CSP) technology in the MENA (Middle East and North Africa) region based on a case study conducted on the 160 MW pilot CSP plant $Noor_o$ I in Ouarzazate, Morocco. The research was supported by the German *Bonn International Center for Conversion (BICC)*, the Moroccan research and consultancy institute *MENA Renewables and Sustainability (MENARES)* , the Moroccan *Association Draa pour les Énergies Renouvelables*, the Egyptian consultancy *ETHRAA,* as well as a team of independent researchers from Morocco, Egypt, Germany, and the United States.

Objectives

Two main objectives were pursued to develop answers to the following research question:

"*What are the positive and negative livelihood impacts at the local level stemming or anticipated from CSP projects, and how can livelihood co-benefits be maximized to achieve sustainable development in adjacent communities?*"

1. *Analyzing and assessing livelihood consequences*: By conducting a partly *ex-ante* empirical case study of the Moroccan $Noor_o$ I project, this study explored how the deployment of CSP technology evolves around the livelihood realities of local communities and could lead to both positive and negative livelihood consequences.

2. *Improving practice*: The insights gained from the case study were combined with the analysis of existing sustainability frameworks from other fields and translated into a preliminary set of applicable sustainability safeguards and best practice guidelines in order to match the future design and operation of CSP technology with the development needs and livelihood realities of local communities.

The first objective aimed to contribute to the weak body of empirical scientific literature on the livelihood dimension of CSP projects and to increase the knowledge base regarding the often polarized debate between the pursuit of sustainable development in local communities versus utility-scale CSP development in the MENA region. The second objective intended to direct decision-making in the field of CSP deployment toward equitable and sustainable development so that any future CSP projects in the MENA region may reflect the actual development needs and aspirations of local communities and achieve high degrees of community acceptance at the project-level.

Rationale

Since the transition to a new energy system in the MENA region is coinciding with the efforts to transition to more democratic systems of governance, scaling up CSP technologies could be seen as both a technological and a social challenge. In the context of the new development objectives stemming from the 'Arab Spring', it is increasingly important to ensure that investments in new energy infrastructures address the needs and aspirations of citizens. In this regard, the rationale behind the study's two objectives stemmed from two reasons.

1. *Insufficient scientific understanding of the local livelihood dimension of CSP:* While numerous macro-studies fueled the recent surge in CSP investments by promising mul-

tiple macro-scale social, economic, environmental, and even geopolitical benefits, public debates and discussions have raised considerable doubts and questioned whether these promises would also leave footprints at the local level. Despite these uncertainties, very little academic or practitioner research has been conducted to scientifically and empirically generate a sound understanding of the *social* or *human element* (defined as the livelihood dimension) of CSP at the local level. Considering the UNDP's 2011 Arab Development Challenges report, which states that "[…] there is need for a quick assessment of the social and economic benefits of potentially large infrastructural projects [such as the scale-up of CSP] and embarking on an open and transparent debate to decide on the most beneficial and viable projects" (UNDP, 2011:11), it is essential to address this knowledge gap by exploring CSP as a technology that could result in both livelihood benefits and adverse impacts in affected communities.

2. *Preventing a "race to the bottom" for CSP:* Furthermore, in the mid-term it is possible that concessional financing from Multilateral Development Banks (MDBs) will no longer be required as CSP technology comes down the cost-curve. In this case, private sector entities would finance the design, construction, and operation of projects. However, once MDB funding dries up or is not needed anymore, there could be a risk of a "race to the bottom" as international investors search for countries and locales with the least stringent environmental and social standards for project development. Just as the mining and forestry sectors and the Gold Standard for the Clean Development Mechanism (CDM) have addressed similar "race to the bottom" risks through the application of sustainability frameworks, it was found to be critical to initiate a discussion on how to complement existing safeguards with a comprehensive and balanced set of policies that go beyond the conventional economic objectives of private industry.

Report layout

In order to achieve the two main objectives, the study combined a top-down and bottom-up approach. In this combined approach, top-down knowledge drawn from the relevant academic and practitioner literature (sustainability and Social Impact Assessment (SIA)) was blended with the empirically derived bottom-up findings from the Noor$_o$ I case study in Ouarzazate. On the one hand, this ensured that the methodology reflected the relevant literature as well as existing approaches and that no issues covered in other sustainability frameworks were neglected at the beginning of the fieldwork. On the other hand, the combined approach ensured that locally specific issues identified in the field and community stakeholder perspectives were accounted for and reflected in the outcomes of the study.

The work was divided into five parts (Figure 0-1). In part A the essential theoretical foundations were set. Subsequently, part B provided the methodological basis for answering the research question including qualitative and quantitative methods applied during the empirical research and the data analysis. Part C provided thematic background information on CSP in general and the Noor$_o$ I project specifically. Part D comprised the results of the empirical analysis and assessment of Noor$_o$ I's livelihood dimension derived during two field visits to the Ouarzazate region. Based on the findings, part E translated the insights about the relationships between the Noor$_o$ I project and local livelihoods into project specific recommendations and a preliminary set of livelihood sustainability safeguards and best practice guidelines for future CSP projects.

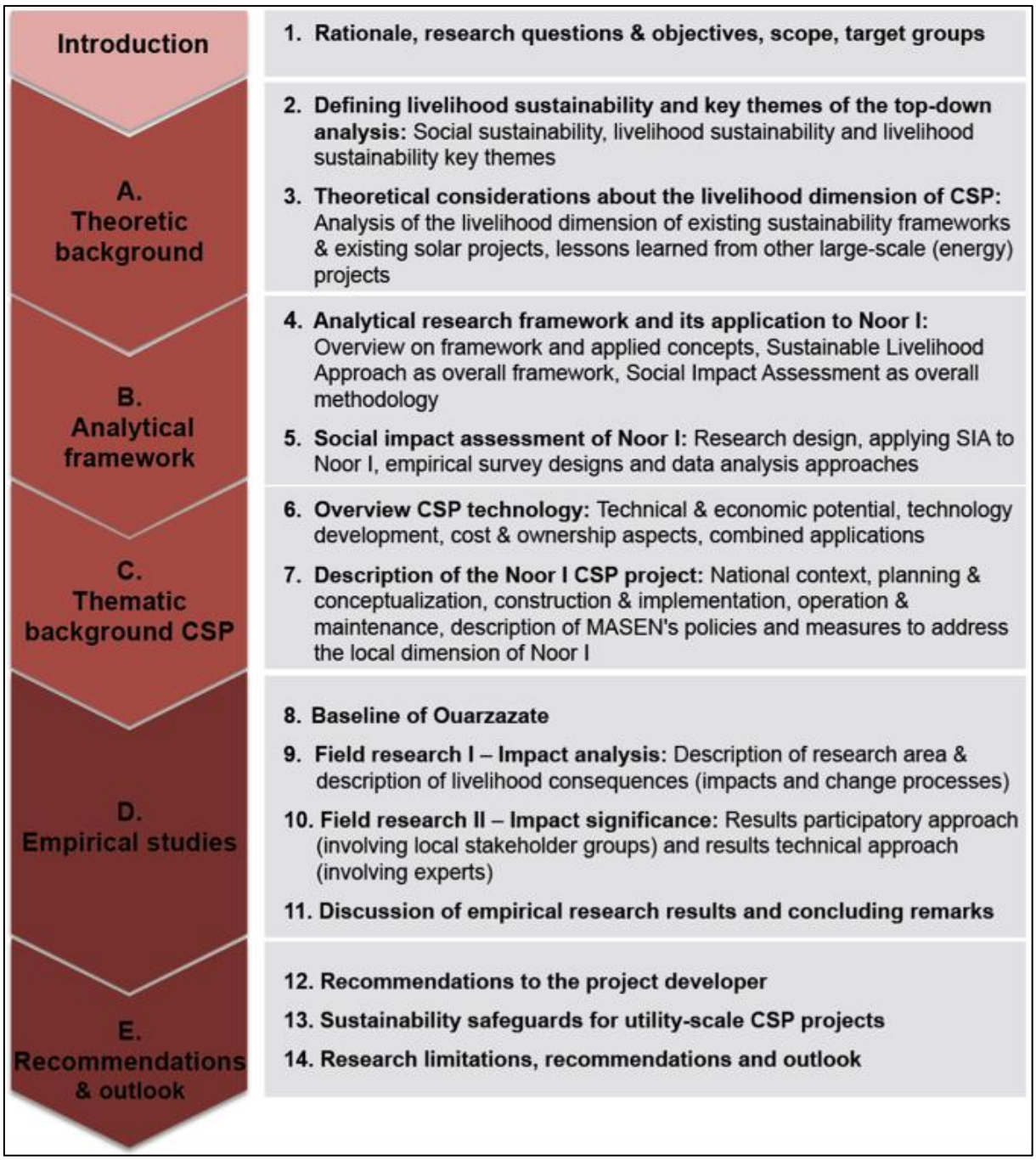


Figure 0-1: Overview of the report structure (parts and chapters)

A Theoretic background: sustainability frameworks, existing solar projects, and lessons learned from other large-scale (energy) projects

Safeguards from existing sustainability frameworks, international experiences with solar power plants, and lessons learned from other large-scale infrastructure projects all indicate potential processes of change in communities and their accompanying impacts on communities that could potentially materialize for the case of CSP in the MENA region. Hence, existing academic publications and practitioner experiences were reviewed to provide a theoretical starting point for the empirical impact analysis and assessment during the field research in Ouarzazate and to ensure that no issues covered in the literature were neglected at the beginning of the fieldwork.

In the first step, based on the review of existing sustainability frameworks from other fields, such as mining, the CDM, forestry or biomass trade (see Figure 0-2), an initial sustainability catalogue was developed to serve as a “development platform” to prove and anticipate social change processes and livelihood impacts during the field study, as well as to give guidance to the development of livelihood sustainability safeguards for CSP projects.

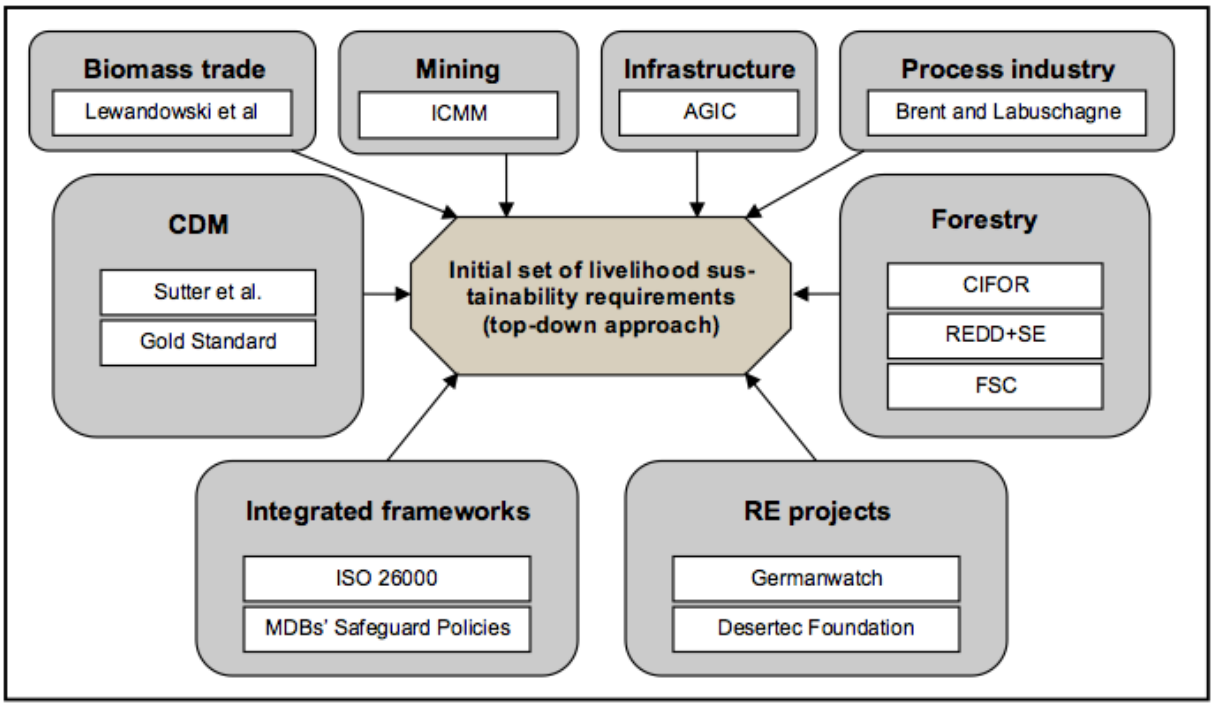


Figure 0-2: Schematic diagram of the screening process and its inputs from existing frameworks

In the second step, the initial sustainability catalogue was enriched by a review of the international experience with solar power plants (CSP and PV). Through the examination of the social consequences within existing Environmental Social Impact Assessment (ESIA) studies from South Africa, Egypt, and Morocco, a pool of social changes that could potentially stem from large-scale solar projects was derived to extend further the "development platform". Lastly, lessons learned from other large-scale energy infrastructure projects in Morocco and Egypt, as well as CSP plants in Spain and the United States, were taken into account to provide a third additional platform for the empirical analysis and assessment of Noor$_o$ I.

B Analytical research framework

CSP development does not occur in isolation but within socio-environmental systems. Therefore, exploring CSP's wide array of livelihood consequences is a complex task that cannot be based solely on technocratic, expert-led checklist approaches but on a combination of rational-scientific tools and the participation of local stakeholders. The research framework applied in this study, therefore, consists of two levels and their application to Noor$_o$ I as illustrated in Figure 0-3.

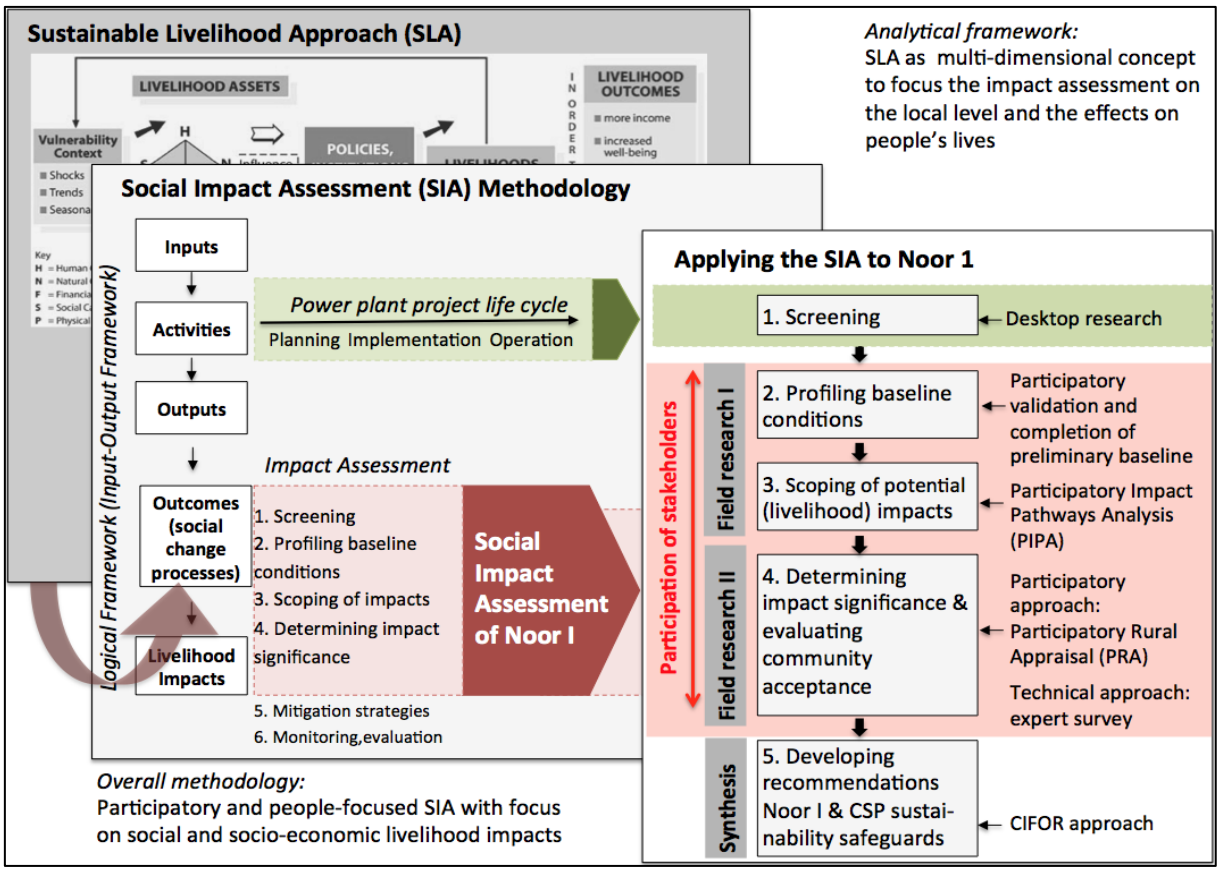


Figure 0-3: Two-level research framework of SocialCSP

At level 1, the *Sustainable Livelihood Approach (SLA)* was used as the overall framework for this study. It offers a conceptual framework to account for the complex social context in which infrastructure projects are implemented. At level 2, typical elements of a *Social Impact Assessment (SIA)* methodology were applied, providing an overarching concept with a number of consecutive steps to evaluate the social dimension of livelihood impacts. SIA allows for the broad involvement of local stakeholders, their context-specific local knowledge and local and international expert judgments at different levels of the research. Accordingly, participatory methods were applied at different stages of the assessment of $Noor_o$ I. Various local stakeholders and experts were involved during two field trips to the Ouarzazate region. During the first field trip, we conducted 87 exploratory interviews, 53 semi-structured interviews with community members, 13 key informant interviews, 16 community stakeholder interviews, 5 focus group discussions, and 1 validation workshop to identify and analyze the livelihood consequences stemming from $Noor_o$ I (from the 10th of January until the 08th of March, 2014). During the second field trip, 20 focus group discussions with a total of 106 local stakeholders and an expert survey with 25 local and international experts were conducted to assess and to determine the significance of the identified impacts (from the 26th of October until the 22nd of November, 2014).

C Thematic background: the case study of Noor$_o$ I in Ouarzazate, Morocco

As an early mover pioneering the feasibility of utility-scale CSP in the MENA region, Morocco is the first North African country to develop a stand-alone CSP project. As part of the national energy strategy, aiming to build 6 Gigawatt (GW) of utility-scale solar, wind and hydro projects, totalling in 42% of installed capacity by 2020, the 500 MW CSP complex near Ouarzazate under the Moroccan Solar Plan (MoSP) is a game changing step within the country's transition toward a more sustainable energy system. Due to its pioneering role, the project's success is widely regarded crucial to determine whether CSP technology will be embraced by other countries, both in the MENA region and globally, as an accessible low-carbon alternative needed to offset planned conventional electricity infrastructures. Coordinated by the Moroccan Agency for Solar Energy (MASEN), the first phase of the solar complex (Noor$_o$ I) is a 160 MW CSP plant with a parabolic mirror field and salt-based thermal storage system with three hours of capacity, and a water-cooled steam cycle. Noor$_o$ I, is currently under construction by the Saudi Energy and Water company, ACWA Power, and is slated to become operational by the end of 2015. The planned second phase is 200 MW parabolic trough, the third 150 MW CSP tower (both with dry cooling and a minimum of seven hours storage) and the fourth 50-70 MW photovoltaic (see Figure 0-4). When the third phase is complete, the Noor$_o$ solar complex will be among the largest CSP plants in the world.

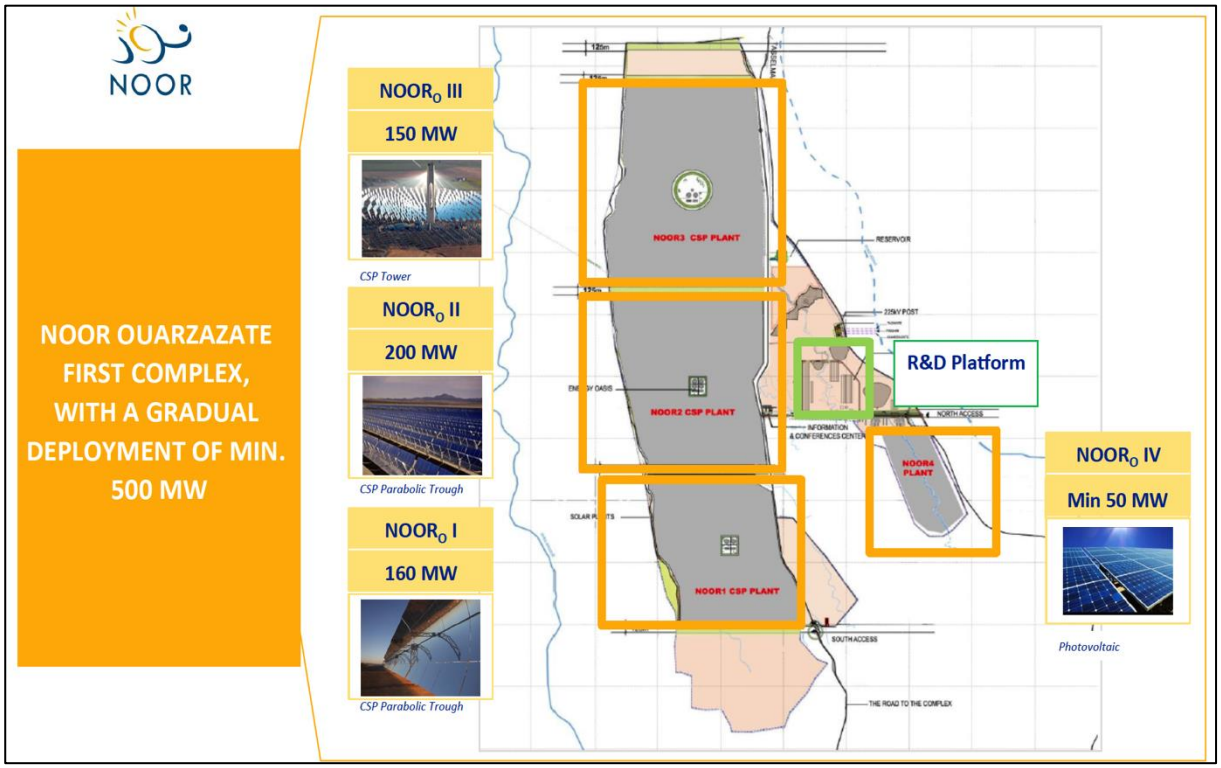


Figure 0-4: The different project stages of the Noor$_o$ solar complex
Source: MASEN, Personal Interview, 2014.

However, the Kingdom has not simply prioritized its solar ambitions out of concern for the climate, but rather as a means to secure climate-compatible and more inclusive development. As an *integrated solar development project,* the $Noor_o$ solar complex also intends to provide expertise and technological know-how and contribute to local and regional socio-economic development. MASEN's measures to address social and socio-economic aspects at the local level of $Noor_o$ I encompass, among others, a public consultation process, a Land Acquisition Plan (LAP), a Social Development Plan (SDP), and an Environmental and Social Management Plan (ESMP). Further positive socio-economic effects were addressed by efforts to increase skill development and training, research and development, and the industrial integration of the solar complex through a voluntary 30% to 35% local content target in order to develop a domestic industry base for the MoSP.

D The empirical study

The development of the $Noor_o$ I project in the Atlas Mountains of southern Morocco is situated within a complex livelihood context, characterized by a combination of environmental deterioration, social pressure, and economic marginalization. The communities included in the main research phase were selected in two stages. During a first internal workshop, based on the knowledge of the research team as well as a variety of regional, local, and project related maps, an initial research area and its geographical boundaries were drawn. During this process the research team selected eight communities in an area extending over a radius of 130 km that were likely to be affected either directly or indirectly by the $Noor_o$ I plant. While the definition of the research area was a precondition for the first round of interviews, the insights gained during the exploratory interviews in every community considered potentially relevant during the first internal team workshop required an adjustment for further research. In a second internal team workshop, the initial research area was then re-defined and each of the initial eight communities ranked according to specific project related and community specific criteria that emerged out of the analysis of the exploratory interviews and reflected how the communities might be affected by the project. Based on both the ranking and the predicted amount of time required per community, the research team decided to focus the subsequent research on the four most affected communities, extending over a radius of approximately 60 km. The final research area included the following communities (see Figure 0-4):

- the layered set of communities of the rural Commune of Ghassate immediately adjacent to $Noor_o$ I,
- the provincial capital of Ouarzazate (including Tabounte),
- the downstream oasis of Agdz, and
- the community of Idelsane.

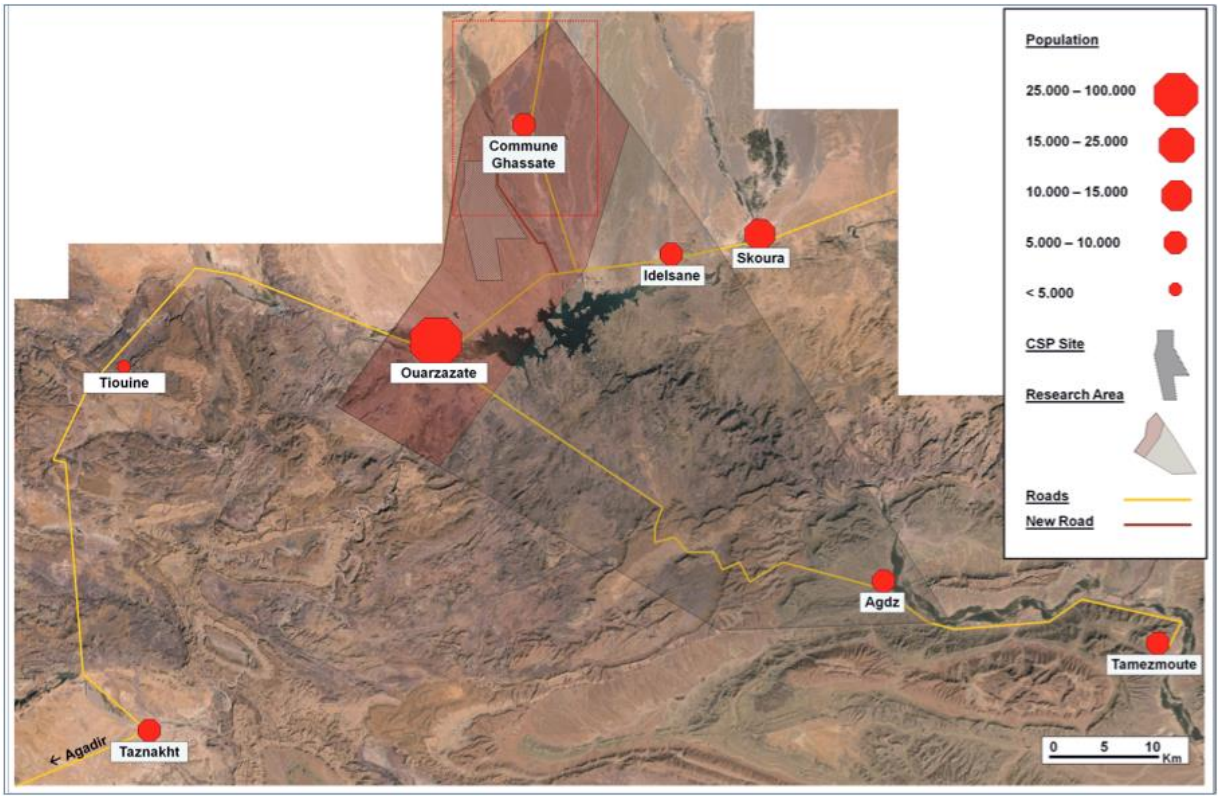


Figure 0-5: The final research area
Note: Red = primary area, grey = secondary area.

Key findings

Although Noor$_o$ I has yet to be commissioned, the planning and construction phases have already had positive and negative effects on people's livelihoods, varying within and between communities across the different project phases. While direct, indirect, and cumulative impacts could already be observed for the completed project phases, the assessment also included anticipated impacts for the operational phase based on local stakeholder input and expert judgments. Grouped under the six SLA capitals, the results of the field research and data analysis allowed for an illustration of the livelihood dimension of Noor$_o$ I (see Figure 0-5) and establishing a set of 30 impacts, many of them cutting across different livelihood dimensions (see positive impacts in Table 0–1 and negative impacts in Table 0–2). The significance level of each impact was also established.

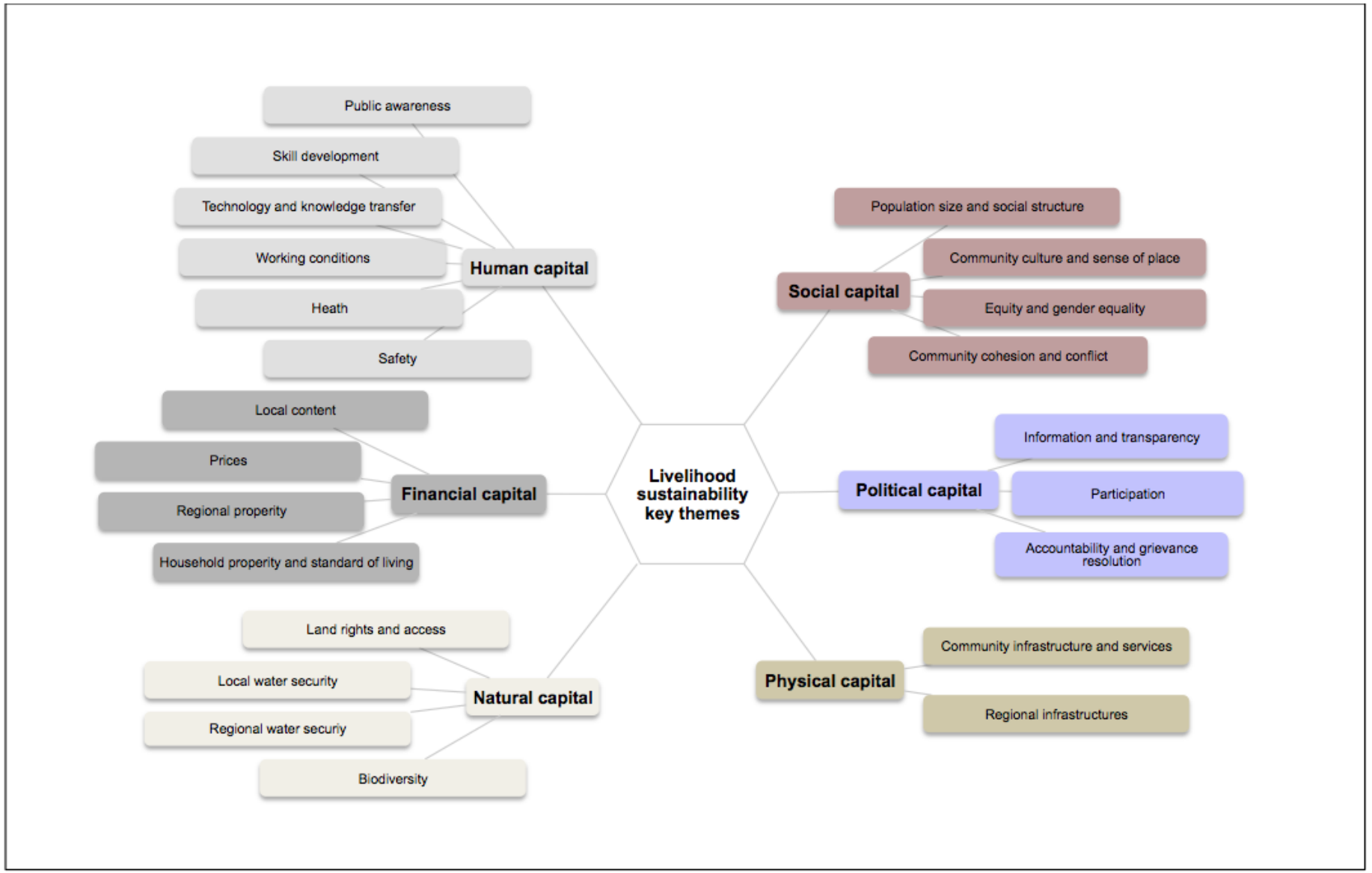


Figure 0-6: Livelihood sustainability key themes that emerged during the field research

While many renewable energy projects in Europe are faced with a *Not-In-My-Backyard (NIMBY)* attitude, the introduction of Noor$_o$ I was received very positively in the region of Ouarzazate. These findings contrast the skepticism and critique in the popular media and academia that usually arises from the typical "conflict-oriented" portrayal of deploying large-scale renewable energy projects in North Africa and the perception that exporting electricity from North Africa to Europe, or even from local communities to other parts of Morocco, would necessarily end in exploitative, neocolonial relationships. Because approval and support of community stakeholders cannot be taken for granted but is highly dependent upon the project developer's *social license to operate* at the local level, much of Noor$_o$ I's high degree of community acceptance can be attributed to MASEN's approach that addressed the livelihood dimension of the project. As the electricity generated at Noor$_o$ I will be routed to the country's southeastern cities in order to meet Morocco's growing electricity demand, MASEN has made great effort to align CSP deployment with the region's livelihood context to meet broader human development objectives and to integrate the project within the productive structure of the local economy. Yet, CSP technology is not a panacea to alleviate regional poverty and to deliver broader socio-economic development gains. Consequently, most of the benefits stemming from Noor$_o$ I were evaluated as being of low to moderate significance (see Table 0–1).

Apart from indirect positive effects, such as strengthened family ties and social support from reversed migratory flows and an increased public interest in renewable energy, the creation of local employment opportunities, strengthened capacity, and improvements to social infrastructure in adjacent communities were found to be the most significant ways for demonstrating shared value and providing direct development prospects.

SLA issues	Positive livelihood impacts	Status	Average significance evaluation	
			by community (stakeholder)	by experts
Population size and social structure	*Strengthened family ties and social support*	*Observed/ Anticipated*	Low	Low
Community culture and sense of place	*Intensified local pride and gains for regional reputation*	*Observed*	Low	Moderate
Equity and gender equality	*Preferential treatment of local communities and socio-economic inclusion of women*	*Observed*	Low	Low
Community infrastructure and services	*Improved living conditions in adjacent communities*	*Observed*	Moderate	Low
Regional infrastructure	*Spurred regional socio-economic and infrastructure development*	*Anticipated*	Low	Moderate
Local content	*Economic participation and benefits for local SMEs*	*Observed*	Very low	Low
Household prosperity and standard of living	*Improved socio-economic situation and standard of living*	*Observed*	Low	Moderate
Regional prosperity	*Increased regional prosperity and value added*	*Observed*	Low	Moderate
Public awareness	*Increased public interest in renewable energy systems and civil society engagement*	*Observed*	Low	Moderate
Skill development	*Benefits from skill development and knowledge transfer particularly among youth*	*Anticipated*	Low	Moderate
Technology and knowledge transfer	*Strengthened technological capacity of local firms*	*Anticipated*	Very low	Low

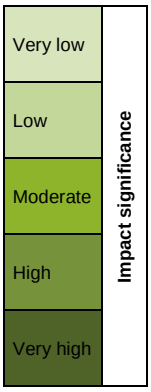


Table 0–1: Overview of positive livelihood impacts stemming from Noor$_o$ I

While community outcomes of large-scale investments are rarely the focus of governments or investors, and generally only marginally benefit the local population, MASEN's foresight and planning that sought to generate positive impacts from the country's first standalone CSP plant were commendable. Yet, the project also resulted in negative impacts (see Table 0–2).

SLA issues	Negative livelihood impacts	Status	Average significance evaluation	
			by community (stakeholder)	by experts
Population size and social structure	*Loss of social standing and political influence*	*Anticipated*	Very low	Low
Community culture and sense of place	*Accelerated change of community atmosphere and cultural identity*	*Anticipated*	Low	Very low
Community cohesion and conflict	*Social conflict, rivalry and feelings of envy*	*Observed*	Low	Low
Information and transparency	*Uncertainty, unrealistic expectations, and frustration*	*Observed*	Low	Moderate
Participation	*Social exclusion and powerlessness in decision-making*	*Observed*	Moderate	Low
Accountability and grievance resolution	*Suspicion towards the project, its developers as well as community protest*	*Observed*	Very low	Low
Regional infrastructure	*Strain on regional infrastructure and services*	*Anticipated*	Low	Very low
Land rights and access	*Decreased psychological well-being and loss of cultural attachment in adjacent communities*	*Observed*	Low	Low
Local water security	*Decreased water security in the community of Tasselmant*	*Observed*	Very low	Low
Regional water security	*Deprivation of farming livelihoods in Ouarzazate and cascading effects in the downstream oases of the Draa Valley*	*Anticipated*	High	Low
Biodiversity	*Deprivation of subsistence activities in adjacent communities*	*Anticipated*	Very low	Low
Local content	*Economic exclusion of micro-scale SMEs*	*Observed*	Moderate	Low
Household prosperity and standard of living	*Deteriorated socio-economic situation and standard of living in adjacent communities*	*Observed*	Very low	Low
Prices	*Erosion of local purchasing power and decreased standard of living among low-income groups*	*Anticipated*	Very low	Low
Skill development	*Mismatch between educational qualifications and labor market requirements*	*Observed*	Moderate	Moderate
Working conditions	*Poor and unequal labor conditions*	*Observed*	Moderate	Low
Health	*Influence of noise, dust and vibration on psychological well-being*	*Observed*	Low	Very low
	Environmental pollution	*Anticipated*	Very low	Very low
Safety	*Increased crime and fatal road accidents*	*Anticipated*	Very low	Very low

Impact significance
Very low
Low
Moderate
High
Very high

Table 0–2: Overview of negative livelihood impacts stemming from Noor$_o$ I

In light of the region's livelihood context, most of the negative effects stemming from Noor$_o$ I are only partially attributable to project activities, but must instead be interpreted as a magnification of the existing sustainability challenges in the project region. Additionally, the bulk of negative consequences are neither specifically attributable to CSP technology nor to the local context. Rather, these drawbacks are inevitably experienced with most utility-scale infrastructure projects in remote areas around the globe. Yet, unlike the potential harm associated with fossil fuel power plants, the negative footprint of Noor$_o$ I was found to be generally low and significantly lower in areas such as damage to public health, air and water pollution. However, serious concerns about the project's operational water demands, an education-labor market mismatch, unequal working conditions, unfulfilled expectations about positive livelihood opportunities and their intransparent distribution, as well as the perceived lack of community engagement (procedural justice) to give affected communities a stake in Noor$_o$ I and to obtain prior and informed community consent have all blurred community perceptions. As a consequence, especially the community protests during the construction phase and local opposition in communities directly neighboring the power plant can be explained by some of these shortcomings. Although community resentments had little to do with the CSP technology itself or Noor$_o$ I project - with the exception of the water concerns -, and despite being in full compliance with national laws and international procedures, we conclude, that if the procedural deficits remain unsolved, and the project's operational water demands would compete with future domestic uses, this could result in a scenario in which utility-scale CSP projects in general, and the Noor$_o$ solar complex in particular could become risky due to existing social conflict, decreasing community acceptance and increasing opposition in affected communities.

E Recommendations and sustainability safeguards

Based on both the results of the impact assessment and the suggestions provided by various local stakeholders, recommendations for the MoSP and sustainability safeguards for utility-scale CSP in the MENA region were derived.

Recommendations

Given that Noor$_o$ II, Noor$_o$ III and Noor$_o$ IV in the Ouarzazate region and other utility-scale solar projects in Morocco are currently in the planning phase (e.g., in Midelt and Tata), there is an opportunity now for MASEN to address some of these issues in the planning and implementation schemes for the next phases of the Noor$_o$ solar complex in Ouarzazate and to use them as a guidance for other CSP projects under the MoSP. As the impacts of Noor$_o$ I are mainly related to the procedural dimension, the recommendations particularly emphasize on shifting from a formal model of compliance-based community consultation towards the sphere of informal community engagement procedures with improved collaboration and shared decision-making among local authorities, project developers, and affected communities. Furthermore, aspects like distributional equity, mitigation of negative impacts, and enhancement of positive impacts are addressed.

1. *Establish a structured approach to conduct in-depth participatory stakeholder analysis:* By conducting a participatory stakeholder analysis prior to the development of any future CSP plant, the needs of affected and interested community groups could be identified prior to implementation. Ideally, this process would include a wide cross-section of the local population instead of just elected representatives or a select group of spokesmen.

2. *Move the "Environmental and Social Impact Assessment (ESIA)" beyond compliance with international standard procedures towards a participatory and community-oriented approach:* The ESIA provides only limited coverage of social impacts and lacks participatory elements. It is therefore not sufficient to assess all impacts on the local communities. Hence, a social impact assessment (SIA) should be conducted in addition to the required ESIA, focusing on local needs, capacities, concerns, and aspirations.

3. *Broaden the stakeholder engagement:* Informal participation should be added to the legal requirements of formal consultation measures to ensure that vulnerable groups that are difficult to reach or do not have the resources to voice their opinion are included.

4. *Adopt an ongoing communication and expectations management strategy*: Information should be publicly disclosed prior to decisions in culturally appropriate formats. Furthermore, because access to information does not mean the information is understood, a type of "community outreach task force" could be established to manage expectations and act as a link between authorities, project developers, and the local population.

5. *Empower local civil society associations and organizations as agents of change:* As important opinion leaders and multipliers, local civil society associations and nongovernmental organizations (NGOs) should be involved in the communication and community engagement processes, for example through feedback meetings, joint advocacy campaigns, or a jointly operated visitor center. Such a center could be a meeting point for exchange and public outreach to strengthen the relationships between the project and its neighboring communities. Moreover, it could increase awareness and become an interesting tourist destination with local economic opportunities (e.g., the sale of local handicrafts or organized tours in neighboring communities).

6. *Promote gender equality and women's empowerment:* Employment and income benefits are mostly captured by men. Moreover, women often have no say in decision-making processes. In order to contribute to gender equality, women should be included in the recruitment process and receive the opportunity to improve their skills and competencies through specific training.

7. *Adopt a precautionary approach that allows for technological flexibility to respond to changes in the Mansour Eddahbi reservoir's water capacity:* Due to the high uncertainties with regard to the effects of climate change and societal water demands on the Mansour Eddahbi reservoir, the operational water withdrawal of Noor$_o$ I has to be closely monitored. If the water security of the downstream oases cannot be guaranteed in the future due to a further decrease of the water levels, compensation should be provided to affected communities to prevent future impoverishment.

8. *Increase the absorptive capacities and integrate local industries and university graduates:* The development of competencies and skills among local SMEs and students should be further promoted. To do so, local SMEs should receive further vocational training and skill development opportunities. Additionally, the curricula of the university programs in Ouarzazate should be aligned to match the CSP market requirements.

9. *Allocate parts of the economic revenues, royalties, and taxes to local communities:* Instead of going to the central government, a share of revenues, royalties, and taxes should be decentralized and provided to local communities affected by the project.

10. *Accompany the MoSP with additional measures to foster sustainable development:* CSP projects can contribute to a region's development, but they cannot solve all existing social, environmental, and economic problems. Thus, efforts and commitments well beyond an energy infrastructure project are required. Development projects of the Moroccan government or international organizations should be aligned with the MoSP in order to enhance the socio-economic development of rural areas and to increase their resilience towards environmental pressures.

Social sustainability requirements CSP

Finally, a set of 18 livelihood sustainability safeguards and best practice guidelines was developed in order to help project developers, governments, and international lenders to address the needs and livelihood realities of local communities by building up CSP capacities in the MENA region (Table 0–3). The proposed safeguards are based on the research results of the impact assessment, the initially developed criteria catalogue, and a second screening process of existing sustainability frameworks. Five categories have been formulated to group the set of elaborated sustainability safeguards considering guiding principles, criteria and sub-criteria to specify principles and guidelines to operationalize the criteria. The following list summarizes the categories and briefly describes the guiding principles by mentioning intended key objectives of proposed criteria of the study:

(1) *Overarching safeguards:* With *human rights* and *vulnerable groups* as guiding principles, vulnerable groups should be addressed to protect their interests, rights, and needs. A comprehensive impact assessment helps to gain a clear picture about all community level impacts resulting from the project and to formulate mitigation measures for adverse impacts and enhancement measures for project benefits. To address vulnerable groups and to assess impacts of crosscutting issues, the acknowledgment of human rights forms the baseline criterion for the design and development of the project.

(2) *Procedural safeguards:* Based on the three guiding principles – *community engagement and information closure*, *accountability*, and *project governance* – stakeholders should be empowered in the decision-making process. Moreover, the community should consent to the development. Relevant groups of community stakeholders should be informed in a timely, clear, and transparent way about all aspects of the project. It should furthermore be guaranteed that project's outcomes and processes meet community expectations. Awareness about renewable energy and climate change mitigation in general and in connection to the specific project should be strengthened among relevant groups of stakeholders. Compliance with law is a precondition to enable rightsholders to realize their rights within the project. Grievances and disputes that arise during all project phases should be handled in a transparent and accountable way in order to identify, prevent, or mitigate conflicts resulting from the project. Finally, a comprehensive and transparent governance structure for the project and the prevention of any form of corruption associated with the project's outcomes and processes should be considered.

(3) *Distributional safeguards:* Based on the two guiding principles – *benefit sharing* and *compensation* – affected groups of community stakeholder should receive a reasonable share of benefits (distributional equity). It should further be ensured that women and men gain equal benefits from the project. In addition, a fair compensation of stakeholder groups who are adversely affected by the project should be guaranteed.

(4) *Mitigation safeguards:* According to the guiding principles *land, water, conservation, cultural heritage, infrastructure and services, health and safety, and working conditions*, any kind of livelihood depletion of affected community groups should be avoided. This includes loss of land or access to land, increase in potential water insecurity due to the project, or adverse effects on conservation values and biodiversity. Moreover, traditions, values, and cultural identity should be respected to prevent disruption of social cohesion within affected communities. It should further be ensured that the project and its associated processes like the influx of workers will neither constrain the availability and the access to local infrastructure and services nor negatively impact the health and safety of local residents. Finally, working conditions should respect international labor rights and standards, ensuring decent working conditions and a safe working environment while avoiding discrimination.

(5) *Enhancement safeguards:* Based on the guiding principles *local content and employment*, *capacity building*, and *combined applications and voluntary actions*, a reasonable share of the project's costs should be spent locally, guaranteeing local procurement of components and services. This should be combined with the maximization and prioritization of employment opportunities to the most affected communities. Moreover, local skills and absorptive capacities and the technology and knowledge transfer among local, regional and international companies and institutions should be enhanced.

Safeguards		
Category	**Guiding principle**	**Criteria**
(1) Overarching safeguards	**Principle 0** *Human rights*	0.1 Human rights acknowledge
	Principle 1 *Vulnerable groups*	1.1 Protection of vulnerable groups
	Principle 2 *Impact assessment*	2.1 Comprehensive impact assessment
(2) Procedural safeguards	**Principle 3** *Community engagement and information disclosure*	3.1 Comprehensive community stakeholder engagement 3.2 Transparency and information disclosure 3.3 Expectation management 3.4 Awareness raising
	Principle 4 *Accountability*	4.1 Compliance with law 4.2 Grievance resolution
	Principle 5 *Project governance*	5.1 Governance structure 5.2 Anti-corruption measures
(3) Distributional safeguards	**Principle 6** *Benefit sharing*	6.1 Distributional equity 6.2 Contributions towards gender equality and non-discrimination
	Principle 7 *Compensation*	7.1 Fair compensation
(4) Mitigation safeguards	**Principle 8** *Land*	8.1 Land use and access to land
	Principle 9 *Water*	9.1 Water security (water availability and access)
	Principle 10 *Conservation*	10.1 Protection of high conservation values and biodiversity
	Principle 11 *Cultural heritage*	11.1 Protection of cultural heritage
	Principle 12 *Infrastructure and services*	12.1 Availability of and access to infrastructure and services
	Principle 13 *Health and safety*	13.1 Safeguards of communal health and safety
	Principle 14 *Working conditions*	14.1 Decent work conditions 14.2 Occupational health
(5) Enhancement safeguards	**Principle 15** *Local content and employ-ment*	15.1 Economic participation of local industries 15.2 Locally sourced workers
	Principle 16 *Capacity building*	16.1 Skill development 16.2 Technology transfer 16.3 Knowledge transfer
	Principle 17 *Combined application and voluntary actions*	17.1 Combined applications 17.2 Identification and implementation of voluntary actions

Table 0–3: Overview of safeguard categories, guiding principles, and criteria

1 Introduction

1.1 Rationale

1.1.1 Insufficient scientific understanding of the local livelihood dimension of CSP

Although investments in new energy infrastructures are a precondition for economic growth and societal development, utility-scale CSP plants, like any other comparable large-scale infrastructure in the ballpark of 100 – 200 MW_{el}, have the potential to transform communities in the vicinity of the project site beyond the economic benefits of employment and income generation. This is because power plants are interwoven in a complex fashion with social, economic, political, and environmental dimensions at the local level. Poorly designed, they could prevent the pursuit of people's traditional ways of life, magnify the local vulnerability context of already stressed regions, and thereby exacerbate already prevailing local conflicts over scarce resources (Schilling et al., 2010; Link et al., 2010). On the local scale, for example, the water needed for cooling CSP plants in the case of wet-cooling could worsen the already critical water situation in some parts of the MENA region. Converting large areas of land into CSP plants could affect local ecosystems and restrict traditional land use practices. Further, social tensions could arise from distributional equity issues (i.e., who accepts the risks and benefits). Moreover, as experienced in the development process of oil and gas-fired power plants in the region, a non-participative, exclusive, top-down development process for large-scale energy projects could lead to significant community opposition and protest – varying from verbal disagreement to sabotage to violent confrontation. The vulnerable and marginalized, such as minority groups, women, children, and the already impoverished, e.g., small-scale farmers, are particularly sensitive to such changes.

In this context, and although the CSP deployment has raised high expectations in many MENA nation-states, there are a growing number of voices demanding that a sufficient portion of the benefits of CSP projects should be delivered to local communities (e.g. Friedman, 2011; Schinke, 2013).[1] As it can neither be assumed that positive returns at the local level will occur automatically as investments pour in, nor that absorptive capacities will be adequate as investors introduce new jobs and technologies, numerous public debates and discussions have emphasized that an economic and/or technocratic approach that focuses on reducing the risk for investors will bypass the opportunities to design energy systems and CSP plants in a way that contributes to sustainable development outcomes at the local level. The concern is that since the locally benefical outcomes of large-scale investments are rarely the focus of governments or investors, investments in new renewable energy infrastructures, such as CSP, will only marginally benefit the local population compared to what could be achieved with greater foresight and planning (Schinke and Klawitter, 2011; Schinke et al., 2012).

Furthermore, international civil society organizations have raised crucial questions about the risks of overlooking the potentially adverse social effects anticipated for utility-scale renewable energy projects on the local level, particularly on the most vulnerable groups in society (e.g., Erdle, 2010:42; Friedman, 2011; Schinke et al., 2012; Schinke and Klawitter, 2013).

[1] From the authors' experience attending numerous conferences, workshops, and presentations on the topic of scaling-up CSP investments in the MENA-region, there are always participants who critically raise concerns during the discussions.

Concerns have been expressed that the CSP development is still primarily discussed in terms of top-down technical parameters and that cost-benefit analyses are skewed toward macro-economic factors (mostly at the national level), while locally relevant aspects have not received comparable attention. Moreover, although industrial development in the MENA region is considered a key ingredient to economic growth, some people are concerned that the envisioned export of electricity to Europe is neocolonial and could result in a new form of the resource curse[2] (PWC, 2010:71; Eisgruber, 2013:429-440). From this perspective, the large-scale deployment of CSP technologies in the MENA region risks becoming another "white elephant project" (Kilian, 2011) with crushed hopes, unfulfilled expectations, and potentially multiple adverse impacts.[3]

Despite these concerns, very little academic or practitioner research has been conducted to scientifically and empirically investigate these concerns and generate a sound understanding of the local dimension of CSP. While local environmental or macro-economic impacts have been documented abundantly, other local impacts - mainly regarding what some call the *social or human element* and later will be framed as the livelihood dimension - largely have not. Since CSP power plants last over 20 years, and energy infrastructure often becomes locked-in or path dependent, potential drawbacks and inequities stemming from an inadequate consideration of the local dimension of CSP technology would be long lasting. The risk of this knowledge gap was emphasized in the UNDP's 2011 *Arab Development Challenges* report, which states that "[…] there is need for a quick assessment of the social and economic benefits of potentially large infrastructural projects and embarking on an open and transparent debate to decide on the most beneficial and viable projects" (UNDP, 2011:11). Consequently, it remains to be empirically proven whether CSP deployment in the MENA region will actually foster sustainable development or could lead to conditions where "a resource curse is indeed a threat to social and economic development", and, especially, whether local populations will benefit (PWC, 2010:71).

1.1.2 Preventing a "race to the bottom" for CSP

Currently, numerous CSP plants are in the planning or implementation phase in the MENA region. Therefore, in the mid-term, it is possible that concessional financing from Multilateral Development Banks (MDBs) will no longer be required as the technology comes down the cost-curve. In this case, private sector entities would finance the design, construction, and operation of projects. However, with the creation of a new energy pathway comes the responsibility to achieve commercial success in ways that uphold ethical values and respect people and their environments. Today, MDBs require national or private entities in charge of implementing large-scale infrastructure projects to conduct ESIAs in accordance with bank requirements and national laws before obtaining environmental permits and funding approvals. Requirements, such as the World Bank's Operational Policies are critical for ensuring

[2] The resource curse argues that countries with greater oil and mineral wealth are less democratic and do a poor job of socio-economic development, because the state depends on external rents for its revenue rather than the support of its citizens (Ross, 2001).

[3] The global record of comparable large-scale, export-oriented infrastructure projects provides examples in which strategically overestimated benefits and underestimated costs of technologies often result in inaccurate forecasts and inflated cost-benefit ratios. Several independent evaluations of controversial large infrastructure projects, particularly in the energy sector, illustrate their inability to deliver planned positive development outcomes due to overconfidence and insufficient attention to non-technical information. This often leads to significant social consequences and local protests against planned infrastructure development (Schinke and Klawitter, 2011:29).

that adequate attention is given to the environmental and socio-economic outcomes of large-scale infrastructure projects in order to prevent or mitigate adverse impacts on people and the environment. The sole reliance on them, however, is problematic. In many cases, ESIAs for MDB-financed projects have been criticized for not meeting the standards established by international human rights treaties, for marginalizing or oversimplifying the social dimension[4] (Tamufor et al., 2011:46), and for being conducted in a reactive and technocratic top-down manner. Because of a partial deficiency of social, participatory, and proactive standards in existing ESIA procedure, too many examples exist in emerging countries where approved projects have resulted in severe environmental damage, human rights violations, and social disapproval (Wood, 2003:2).

In addition to the shortcomings in existing safeguards required by MDBs or national laws, there is, however, another even more critical aspect in the deployment of CSP in the MENA region. Once MDB funding dries up or is no longer needed, there could be a risk of a "race to the bottom" as international investors search for countries and locales with the least stringent environmental and social standards for project development. Similar to experience from projects developed under climate finance mechanisms (e.g., the Clean Development Mechanism (CDM)) (Rindefjäll et al., 2010), competition within the MENA region to attract foreign direct investment could then lead to the neglect of essential regulations with standards that are less stringent than those that would prevail under an international funding regime. While it is the national governments that are primarily responsible for enforcing social-environmental standards, transnational corporations and business enterprises are also responsible for respecting human rights according to the *UN Guiding Principles on Business and Human Rights*. Although international companies regularly claim to respect human rights, only a few have mandatory or even voluntary standards in place that would enable them to substantiate this claim (e.g., OECD Guidelines for Multinational Enterprises, Equator Principles, UN Global Compact). Consequently, in states with weak human rights commitments, the enforcement of human right standards is left to corporate goodwill and, thus, lacks the necessary commitment to avoid a "race to the bottom" (Ruggie, 2009). And even in countries where safeguard mechanisms are included in legal frameworks, the implementation or enforcement of such mechanisms is lacking due to, for example, government corruption and the deterioration of government accountability.

In light of the "race to the bottom" risk and with socially lacking ESIA procedures under MDB requirements, an appropriate mechanism for CSP ought to be designed to mitigate adverse impacts and to enhance positive outcomes wherever feasible in order to improve outcomes for local livelihoods in project-adjacent communities in the best possible ways. Hence, once the knowledge about the consequences of CSP plants on local livelihoods has been improved, CSP projects could be guided (and evaluated) during all stages of development with an overarching sustainability framework based on economic, environmental, and social aspects of sustainability. Such a framework should be firmly embedded in the international treaties of social, economic, human rights, labor, and ecological standards and could be implemented in several ways:

a) Host country regulations in the MENA region;

[4] The current social safeguard policies of the World Bank have been criticized for their limited coverage of social dimensions. Out of the 10 Operational Policies, only two are concerned with social issues (Involuntary Resettlement Policy, Indigenous Peoples Policy) (Dani et al., 2011:10).

b) Extraterritorial state obligations of investing European countries;

c) Electricity import responsibilities of the European Union under Article 9 of the EU Renewables Directive 2009/28/EC;

d) Investment obligations of MDBs;

e) Private sector commitments to Corporate Social Responsibility (CSR).

As other sectors, such as the mining and forestry sector or the Gold Standard for the CDM, have addressed similar objectives through the application of sustainability frameworks, the establishment of a sound sustainability framework for CSP could also form an effective best practice guide for the deployment of CSP in the MENA region according to corporate interests and needs of local stakeholders. In the end, a commonly agreed upon sustainability framework that incorporates local stakeholder perspectives on CSP could evolve from a guiding instrument into a broader evaluation and certification framework for CSP projects.

1.2 Research questions, objectives and structure

The study assumes that the deployment of large-scale CSP plants can contribute to a sustainable development strategy that combines energy efficiency with decentralized and centralized renewable energies in the MENA region to address many of the region's socio-economic and environmental challenges. It is, of course, unrealistic to expect CSP plants alone to address all of society's needs and aspirations. However, the notion that CSP plants are merely physical renewable energy assets that provide mainly national-level energy, climate, and employment security benefits may obfuscate other important issues that affect sustainable development and that could contribute to the improvement of livelihood outcomes at the local level. As a consequence, whether or not the large-scale deployment of CSP technology in the MENA region develops into a success story significantly depends on how it is sited in the local livelihood context, as well as how its transformative effects impact, are distributed and perceived among local communities, plus on a fair and participatory decision-making process. As all this affects the community acceptance of CSP at the local level, optimizing the local livelihood dimension of the CSP deployment is just as important as solving the technological or regulatory questions around the CSP deployment in MENA countries.

1.2.1 Research questions

With few publications in the existing academic and practitioner literature and most of them focusing quite anecdotally on direct employment and income effects[5], many uncertainties remain about the wide array of other tangible and non-tangible effects of the large-scale deployment of CSP technology at the local level. Insufficient attention has yet been paid to the question:

What do we mean by "sustainable livelihood"?

A "sustainable livelihood" is broadly understood as the ability of a human unit (individual, household, or family) to "cope with and recover from stresses and shocks, to adapt to and exploit changes in its physical, social and economic environment, and maintain or enhance its capabilities and assets both now and in the future, while not undermining the natural resource base" (DFID, 1999:n. pag.).

"What are the positive and negative livelihood consequences stemming or anticipated from CSP development at the local level and how can livelihood co-benefits be maximized to achieve sustainable development in adjacent communities?"

In order to answer this question, the present study explores the case of the 160 MW CSP plant $Noor_o$ I in Ouarzazate, Morocco with regard to the following aspects:

a) Is the livelihood security of local communities respected by avoiding critical environmental and socio-economic threats possibly arising from the CSP technology ("do no harm")?

b) Are long-term livelihood opportunities provided for local communities by strengthening community resilience and well-being ("do good")?

While a) and b) relate to substantial aspects of sustainability, the process of developing and implementing a CSP plant also determines how it is perceived and whether it will be opposed or welcomed by affected communities. Hence, the study also investigates distributional and procedural aspects by asking

c) Are issues of distributional equity and procedural justice taken into account ("good process")?

1.2.2 Research objectives

In order to develop answers to the above mentioned questions, this study is based on a "development perspective" that analyzes and assesses the "human/social element" in CSP through the case of $Noor_o$ I with a special focus on the interests and needs of local communities. It goes without saying that the study is not intended to directly influence the development of $Noor_o$ I, but rather as a research project with the following detailed research objectives:

1. **Methodological objective:** To lay the conceptual groundwork for analyzing and assessing the complex relationships between CSP plants and their livelihood environment, focusing in particular on the social dimension of livelihood sustainability.

[5] An exception are two studies by Del Rio, P and M. Burguillo (2008 and 2009), in which the authors first developed a strong theoretical framework for assessing the impact of renewable energy deployment on local sustainability and secondly, applied the framework by empirically analyzing different renewable energy technologies. While the two studies provide important insights, the broad coverage of numerous technologies remains at a rather general level and thus deserves a more in-depth analysis. Also, despite encompassing many examples from Spain, the CSP technology was not covered in both studies.

2. **Analytical objective:** To theoretically (top-down approach) and, from the perspective of those directly affected, empirically (bottom-up approach) deepen the understanding of the positive and negative consequences of CSP deployment at the community level.
3. **Operational objective:** To draft empirically grounded livelihood sustainability safeguards and best-practice guidelines to help future project developers, governments and international lenders involved in the deployment of CSP in the MENA region match the design and operation of the CSP technology with the development needs and livelihood realities of local communities.

The accomplishment of all three objectives aims to contribute to the weak body of empirical scientific literature on the livelihood dimension of CSP projects and to increase the knowledge base regarding the often polarized debate between the pursuit of sustainable livelihoods in local communities versus utility-scale CSP development in the MENA region.

1.2.3 Research structure

In order to achieve the three methodological, analytical, and operational objectives, this study pursues a combination of a top-down and bottom-up approach. In this combined approach, top-down knowledge drawn from relevant academic and practitioner sustainability and Social Impact Assessment (SIA) literature is blended with the empirically derived bottom-up findings from the Noor$_o$ I case study in Ouarzazate. On the one hand this ensures that the methodology reflects the relevant literature and existing approaches and that no issues covered in other sustainability frameworks are neglected at the beginning of the fieldwork. On the other hand, the combined approach safeguards that locally specific issues from field realities and community stakeholders' perspectives are accounted for and reflected in the outcomes of the study.

The present work is divided into five parts (Figure 1-1). In part A the essential theoretical foundations are set. Subsequently, part B provides the methodological basis for answering the research questions. Part C sets the scene by providing thematic background information on CSP in general and the Noor$_o$ I project specifically, while part D compromises the empirical analysis and assessment. Based on the findings, part E outlines recommendations and sustainability safeguards and formulates the need for further research.

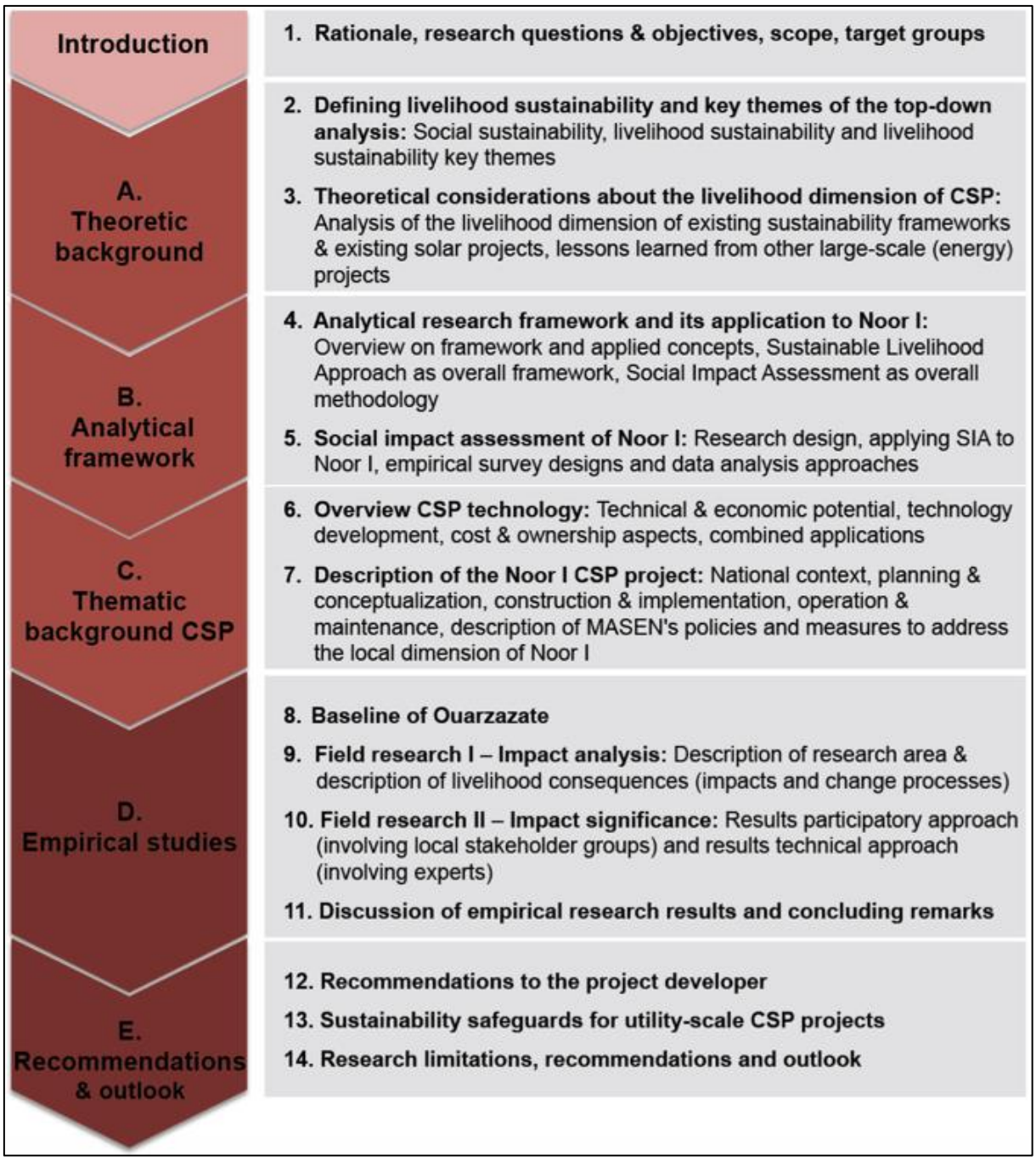


Figure 1-1: Overview of the report structure (parts and chapters)

The parts are organized in detail as follows. Prior to the empirical research, part A begins with a literature review providing the theoretical background, outlining the applicability of different definitions of sustainability to the study context (chapter 2). A number of livelihood key themes that are essential to achieve sustainable development are identified as a basis for the assessment of this study. In chapter 3, existing sustainability frameworks and lessons learned from other energy and infrastructure fields and projects are analyzed to derive a theoretical starting point and inspirational “development platform” for proving and anticipating livelihood consequences during the empirical fieldwork in Ouarzazate as well as giving guidance to the further development of livelihood sustainability safeguards for CSP projects.

After setting up the theoretical background, part B covers the conceptual and methodological framework for analyzing and assessing the livelihood dimension of Noor$_o$ I (i.e., Sustainable Livelihood Approach (SLA) as the overall framework and Social Impact Assessment (SIA) as the overall methodology). Further, it includes the different qualitative and quantitative methods applied during the empirical research, and the data analysis (chapter 4 and 5).

This is followed by part C that concerns the CSP technology itself. It starts with a description of the thematic background on CSP in chapter 6, focusing on technical aspects and economic potentials of the CSP technology. Based on this general overview on CSP, the details and different phases of the case study on Noor$_o$ I are described, including information on the national and local context for CSP in Morocco (chapter 7).

Part D covers the results of the empirical research that was conducted in two field studies. In chapter 8 the relevant socio-economic, environmental, and institutional baseline conditions that shape the livelihood conditions of Ouarzazate are assessed. Against this background, the potential livelihood consequences arising from the CSP plant under study are analyzed through a detailed and participative empirical field study. Its results are presented in chapter 9 in the form of a list of livelihood impacts, involving various local stakeholder groups and informants. Chapter 10 evaluates these impacts regarding their significance for the local context based on the data collected during the second empirical field study. The results of both empirical studies are then summarized and discussed in chapter 11, which also includes evidence on the level of community acceptance of the Noor$_o$ I project.

In the concluding part E, the insights about the relationships between the Noor$_o$ I project and local livelihoods are translated into a project specific recommendations (chapter 12) and a preliminary set of applicable livelihood sustainability safeguards best practice guidelines (chapter 13). Finally, an outlook including future research needs is given in chapter 14.

1.3 Scope of the study

Why focus on CSP?

This study focuses on CSP[6], but the findings may also be relevant to other future renewable energy or large-scale energy infrastructure projects with certain technology-specific amendments. CSP technology was selected for two main reasons.

First, CSP emits little to no carbon in the generation phase and is thus part of a sustainable energy future. An international partnership between the MENA region and the EU on the further deployment of CSP technologies offers both regions an alternative to their fossil fuel-dependent and carbon-intensive economies. It also sets the course for a low-carbon future and helps to achieve the main objective of the United Nations Framework on Climate Change (UNFCCC), which is the “stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system" (Article 2 of the UNFCCC, 1992:5). Furthermore, CSP has a high potential to address socio-economic challenges and to generate opportunities for foreign direct investment, livelihood improvement, socio-economic and industrial development, and political stability. Plus, it has the potential to meet skyrocketing electricity demand in the MENA

[6] The Noor I power plant under study uses parabolic trough technology, which was chosen because no other technology, such as linear Fresnel or central tower, is currently at a similarly advanced implementation stage in the MENA region.

region and to be exported to the EU. Although many of the opportunities associated with CSP could also be achieved with nuclear or fossil fuel projects, CSP is superior with regards to climate mitigation, environmental protection, and security. Catastrophic events, such as the nuclear disaster of Fukushima in 2011, illustrate this point. Furthermore, with the CSP deployment in the MENA region expected to accelerate, sustainability requirements can be developed up front to illustrate how the technology could become part of a sustainable and integrated power system across the whole EUMENA region.

The second reason for choosing CSP is that while the technology is in a relatively early stage of development, it has a number of distinguishing characteristics that make it a well-suited addition to the sustainable energy mix.

- Because CSP technology converts irradiance into heat, this heat can be stored overnight (with some losses) so CSP plants can deliver close to dispatchable electricity for peak and intermediate loads, reducing the intermittency problem of renewable energy;

- CSP with storage improves grid flexibility and increases the grid's capacity to accept intermittent renewable energy, such as wind and photovoltaics (PV), whose output varies with weather conditions;

- Residual heat from CSP plants may be efficiently combined with other innovative technologies, such as cogeneration for industrial processes and cooling purposes, seawater greenhouses, or saltwater desalination facilities, to improve the environmental sustainability of CSP plants;

- CSP uses relatively few high-end materials and therefore has the potential to develop regional value chains with local companies that manufacture CSP components to improve the local benefit during construction (World Bank, 2011a:5-25). This has been shown for the Integrated Solar Combined Cycle System (ISCCS) plant in Kuraymat, Egypt, where Egyptian companies supplied key components of the solar field.

Despite the promising outlook for CSP in the MENA region, it must be mentioned that the further expansion of CSP power plants is challenged by competing photovoltaic (PV) technology. The recent price drop in the PV sector make it likely that in the future developers and decision-makers might become inclined to develop PV projects instead of CSP projects. Nevertheless, many experts still consider CSP a better-suited technology for the MENA region.

Why use an *ex-ante* assessment as an input to future decision-making processes?

As the CSP deployment process has just started, there are no 100% CSP plants in the MENA region yet. This makes the precise assessment of the complex relationship between CSP technology and rural livelihoods difficult. Despite these challenges, an *ex-ante* impact assessment should be conducted to provide insight into the livelihoods, needs, and capabilities of relevant stakeholders. It is also needed to map the institutional arrangements relevant to CSP deployment and to anticipate the intended and unintended effects of future CSP plants. Recommendations can be made based on these results for improving the decision-making process.

Why the focus on the livelihood dimension?

The sustainable development debate acknowledges that more attention must be paid to the factors that constrain or enhance poor people's ability to make a sustainable living. However, there is general agreement that the social dimension of sustainability is poorly understood, whereas the environmental and economic dimensions have significant theoretical foundations (see for example: Patridge, 2005; Hutchins and Sutherland, 2008; Colantonio, 2009; Vallance et al. 2011). While, in comparison, environmental and economic indicators can be easily measured through numeric indicators, the social aspects are based on complex normative and qualitative indicators. Therefore, the social aspects are often overlooked, a gap which this study's methodology and results seek to address by analyzing the livelihood aspects of the Noor$_o$ I CSP project. To rectify this knowledge gap, the Sustainable Livelihood Approach (SLA) was chosen as the analytical research framework, because it encompasses both the triple bottom line of sustainability and human rights frameworks. It also shifts the focus from the economic aspects of poverty to include livelihood elments like equity, culture, and empowerment.

1.4 Target groups

Affected stakeholders

This study focuses on the villages in the vicinity of the Noor$_o$ I project close to the city of Ouarzazate, Morocco. It further aims to maximize positive impacts and minimize negative ones in communities affected by future CSP plants in MENA nation-states with a high solar potential.

Project stakeholders

This study's findings should be used to improve the planning process and project design for future CSP installations. Therefore, its target audience is decision-makers (international organizations, national governments, ministries, and technical departments of ministries) as well as project planners and developers concerned with the planning, implementation, and operation of CSP projects. The study also addresses decision-makers in development banks (e.g., EIB, WB, AfDB, KfW) interested in evaluating the sustainability of their programs.

Interested stakeholders

The participation of a) people affected by future CSP plants and b) relevant civil society organizations from the MENA region should be considered an integral part of the CSP deployment. Therefore, the project also addresses the wider public and civil society (e.g., NGOs, academia), which could provide useful input into the CSP development process.

A Theoretical background: exploring the livelihood dimension of CSP deployment

2 Defining livelihood sustainability and key themes of the top-down analysis

Before starting the empirical research, an extensive literature review is required in order to ensure that the empirical study builds on the relevant literature and that the process of analyzing and assessing livelihood consequences and developing sustainability requirements reflects with existing approaches. Since the study focuses on the social and socio-economic dimension of 'livelihood sustainability', this term requires an accurate definition. Although a definition of sustainability will never be complete and context specifics always differ from more general attempts to grasp what is to be sustained, the literature review required a certain theoretical framing.

Drawing on important aspects of the sustainability debate the authors derived several key livelihood sustainability themes. These themes provide a normative backbone to conceptualize the livelihood dimension of sustainability in order to guide the top-down process and give inspiration for the empirical field work during the bottom-up phase.

2.1 Social sustainability

Scholars and practitioners generally agree that the social pillar of sustainability is far less theoretically developed than the environmental and economic pillars (see, for example, Patridge, 2005; Hutchins and Sutherland, 2008; Colantonio, 2009; Vallance and Thompson et al. 2011). The social dimension of sustainability is overall vague. Recent attempts to define social sustainability have shifted from "hard" topics (such as employment and poverty alleviation) to "soft" topics, which are harder to measure (such as happiness, sense of place, and social mixing) (Colantonio, 2009:8). Although several scholars have attempted to define social sustainability, others question the utility and accuracy of a singular definition. Generally, however, there is a common understanding across disciplines that social sustainability relates to improving or maintaining people's quality of life. For example, McKenzie (2004) states that social sustainability occurs "...when the formal and informal processes, systems and relationships actively support the capacity of current and future generations to create healthy and livable communities which are equitable, diverse, connected, democratic and provide a good quality of life." (McKenzie, 2004:18).

2.2 Livelihood sustainability

As a livelihood comprises not only social aspects but also reflects the broader context of life, such as power relations, the environment or political structures, the authors decided to use the term "livelihood sustainability" instead of "social sustainability".

The sustainable livelihoods idea was first introduced by the Brundtland Commission on Environment and Development as a way of linking socio-economic and environmental considerations in a cohesive, policy-relevant structure. Accordingly, our study is based on the

Brundtland Commission's definition of sustainable development as "development which meets the needs of the present without compromising the ability of future generations to meet their own needs" (WCED, 1987:43). Also, the authors refer to Chamber's and Conway's (1992:5) definition of livelihoods as "a means of living and the capabilities, assets (including both material and social resources) and activities required for it."

Building on Chambers and Conway (1992) the authors also recognize that a "sustainable livelihood" is broadly understood as the ability of a human unit (individual, household, or community) to "cope with and recover from stresses and shocks, to adapt and exploit changes in its physical, social and economic environment, and maintain or enhance its capabilities and assets both now and in the future, while not undermining the natural resource base" (DFID, 1999:n. pag.).Finally, achiving a sustainable livelihood is understood in this study as "[…] the equitable realization of basic rights as defined by the Universal Declaration of Human Rights [...]" (ICCR, 2011:9), which also makes the SLA applied in this study in principle a rights-based approach.

2.3 Livelihood sustainability key themes

As both definitions of "social sustainability" and "livelihood sustainability" are far from being operative definitions, this research requires a more practical definition to sufficiently assess the livelihood dimension of CSP. In this regard, instead of developing one objective and generalizable definition, common key themes are identified that contribute to achieving a sustainable livelihood within a particular social context (e.g., a rural community).

Some of these themes are based on a previous study that used a human rights approach to theoretically assess the livelihood aspects of CSP in the MENA region and began to develop social sustainability principles for CSP (Schinke and Klawitter, 2011). Other key themes were taken from the existing literature (partly drawn from work by McKenzie, 2004:21; Patridge, 2005:9; Colantonio, 2009:6; Magis and Shinn, 2009:16). Also, ideas have been incorporated from the general sustainability assessment criteria developed by Gibson (2006 and 2011) for a broad range of applications in environmental and social planning.

Lastly, the defined themes are based on international declarations and agreements on sustainable development. Inspirations were taken in particular from the UN "Declaration of Human Rights (UDHR, ICESCR and ICCPR)", the UN "Protect, Respect, Remedy Framework", the OECD "Guidelines for Multinational Enterprises," the Millennium Development Goals (MDGs), the ILO "Tripartite Declaration of Principles Concerning Multinational Enterprises and Social Policy," and the "Report of the High-Level Panel of Eminent Persons on the Post-2015 Development Agenda" (UN, 2013a:30) that all address livelihood sustainability issues at a global scale.

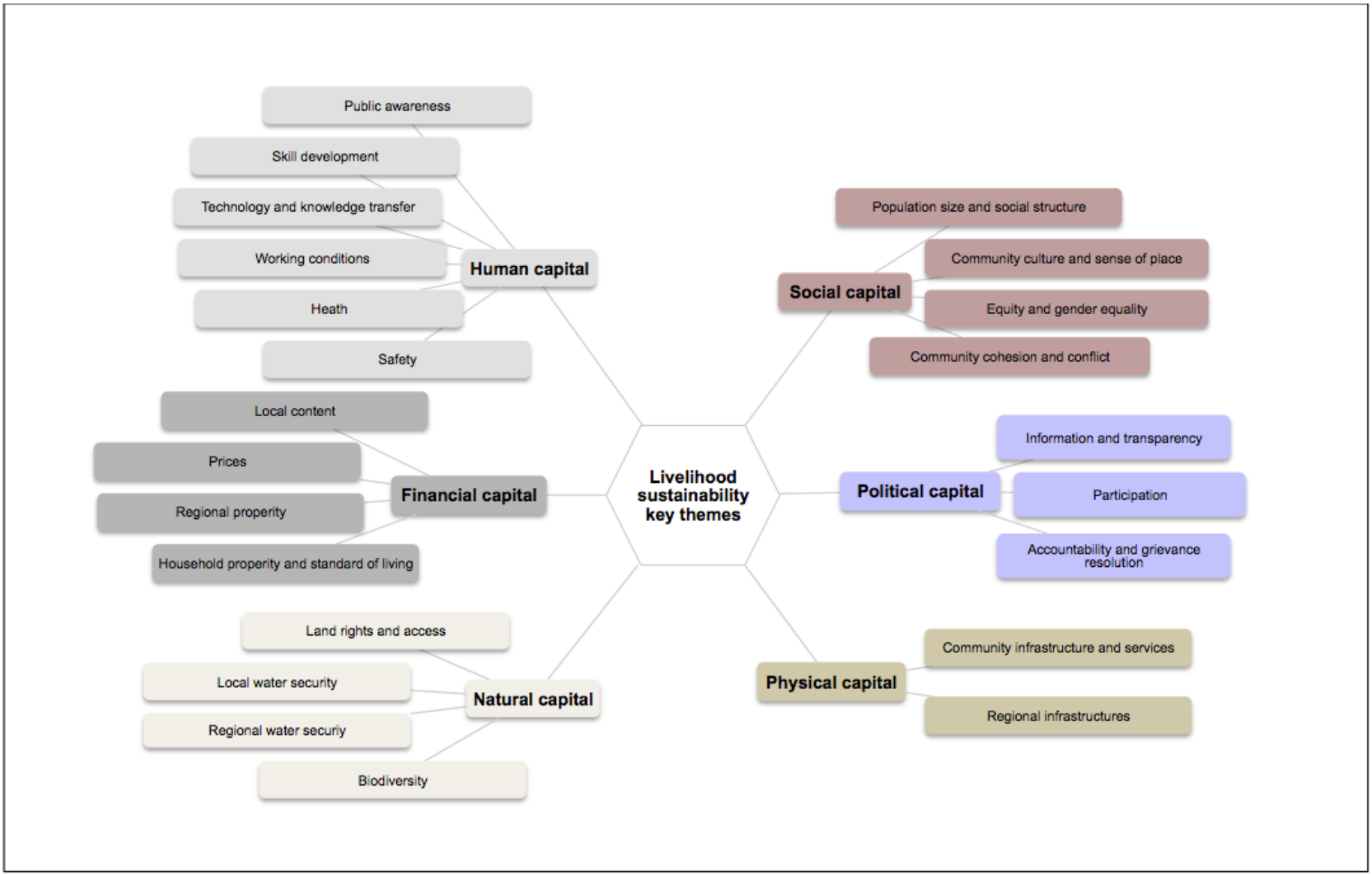


Figure 2-1: Livelihood sustainability key themes that emerged during the field research

Based on this background information, Figure 2-1 illustrates the selected, interlinked key themes as primary elements of livelihood sustainability at the project level. Revolving around the six livelihood capitals of the SLA, these key themes comprise the study's normative base for framing the literature review and inspiring the empirical research.

2.3.1 Social capital

Preservation and enhancement of social resources and social cohesion: Social resources, such as tolerance, solidarity, and common welfare, are crucial to guarantee all members of society options and security for future actions. This is also required to enhance the social cohesion of communities by minimizing exclusion and marginalization, creating a sense of belonging, promoting inter-communal trust, and offering its members the opportunity for upward mobility.

Vulnerable and marginalized groups: Vulnerable people or groups are those with high exposure to external stresses and shocks (e.g., climate change) and with low adaptive capacity for adjusting to actual or expected changes due to their lack of access to assets on which secure livelihoods are built.

Marginalized people or groups are those who have little or no influence over decision-making processes. Marginalization may relate to factors like different cultural, ethnical, racial, religious, sexual, geographical, or demographical affiliations. It is often connected to diverse viewpoints, beliefs, strengths, and values. At the same time, marginalized groups are often the least vocal members of a community.

Equity, fairness, and non-discrimination: Derived from the concept of social justice, these three themes highlight the importance of an intra- and intergenerational equity in order to achieve livelihood sustainability, as social inequity is linked to conflicts and instability and thus to unsustainable living conditions. Intergenerational equity is, for example, concerned with protecting essential resources for future generations. Intra-generational equity, in contrast, addresses equitable non-discriminatory distribution of generated benefits – such as income assets or employment - within a generation. Equity is also related to an adequate compensation of adverse impacts and the involvement of all generations in decision-making processes and future planning.

A "future focus": Livelihood sustainability also requires the creation of a just society in the present and the establishment of structures and processes that will also guarantee just social conditions for future generations. This includes maintaining long-term socio-ecological integrity and socio-economic opportunities by applying the precautionary principle.

2.3.2 Political capital

Social inclusion, participation and empowerment: Social inclusion encompasses access to public services and the benefits gained through the full participation of stakeholders in relevant decisions. Further, it focuses on improving public participation through better including disadvantaged communities, vulnerable or marginalized groups, and minorities in economic, social, and political life. This necessitates empowering people to take part in development processes to direct their own future.

Good governance: Transparency and accountability are central pillars of good governance. Transparency is a precondition for accountability because without public access to clear and relevant information, it is impossible to judge whether political obligations are met and promises kept. Accountability is required to engage stakeholders in meaningful ways and to hold public officials and public servants responsible for their actions. Together, transparency and accountability are also crucial for avoiding corruption and addressing potential conflicts through mechanisms for resolving corruption and grievances.

2.3.3 Physical capital

Availability of and access to basic livelihood needs and services: On a fundamental level, any process aiming to improve people's lives must satisfy basic human needs and services and protect against livelihood risks and shocks. This includes the level of access to and availability of, for example, an adequate standard of living; health, water and sanitation; food and nutrition; education; training and skill development; employment; and transport facilities. The protection of human security, or securing basic needs and services and safeguarding the core of human lives, is a precondition for achieving livelihood sustainability. Otherwise members of society cannot participate in and shape the development process.

2.3.4 Natural capital

Environmental protection: Environmental protection is about maintaining or restoring the quality of the environment in ecologically sensitive areas and preventing the degradation of the landscape, wildlife, and ecosystem services. In rural areas, where people often rely on the subsistence economy, this includes the availability and quality of water, arable land, and also natural habitats and biodiversity.

Land and water: Whereas land is vast in the desert areas of the MENA region, the amount of arable land is very limited. Moreover, a complex system of land tenure exists based on local cultural norms. Access to land and water are inseparable and have symbolic meaning in addition to their livelihood importance. The complicated "nexus" between access to water and land is rooted in traditions, Islamic law, and the social status of different groups.

Biodiversity: Maintaining biodiversity is necessary to protect watersheds and prevent land degradation. People living in rural, arid areas are usually cash poor, but if they are natural resource rich, they can maintain sustainable livelihood strategies. Thus, biodiversity is an important element of livelihood security, as it can help local people to cope with stressors like droughts. Any change in this finely tuned symbiosis between humans and biodiversity, such as increased competition for natural resources due to a governmentally imposed land acquisition (e.g., as it is the case for CSP), can create scarcities e.g., insufficient supplies of firewood, depleted aquifers, or soil erosion.

2.3.5 Financial capital

Poverty alleviation and income generation: Poverty alleviation is any process that improves a community's poverty level through the generation of direct, indirect, or induced incomes. It is now widely accepted that development projects must be consciously structured to achieve poverty alleviation because economic effects will not automatically 'trickle

down'. Poverty alleviation strategies should include various non-economic assets e.g., land, skills, or social networks.

Local development and employment opportunities: Economic growth is one option out of household poverty, but the nature of the economic growth matters. For example, impoverished communities must gain access to employment in order to sustain living.

2.3.6 Human capital

Health and safety: Occupational, personal, and community safety as well as health are important aspects of sustainable livelihoods as they encompass long-term well-being, including the prevention of illness, accidents, and fatalities.

Capacity building, skill development, and technology transfer: The ability of local communities to secure sustainable livelihoods is affected by the capacity, skills, and competencies of community members. It is critical to improve communities' capacities through, for example, vocational training, entrepreneurship, and meaningful technology transfer. These measures can improve the welfare of the citizens through increasing productivity, absorptive capacities, access to employment, and income.

Education, social learning, and awareness: Communities' ability to manage their natural resources depends on knowledge of environmental and socio-economic stressors as well as coping strategies. Therefore, formal and informal education is crucial for developing new behaviors, products, and processes that reduce socio-economic and environmental challenges and increase community resilience. It helps to foster social learning among community members and encourages citizens to engage in community activities and decision-making processes that enhance social cohesion and improve environmental management.

Considering these key themes of livelihood sustainability during the research helps to draw attention to the livelihood needs of local communities living near CSP plants and on delivering sustainable and equitable outcomes – especially those that cross social, economic, and environmental domains.

3 Theoretical considerations about the livelihood dimension of CSP

Safeguards from existing sustainability frameworks, international experiences with solar power plants, and lessons learned from other large-scale infrastructure projects in the MENA region and worldwide, all indicate potential processes of change in communities and their accompanying impacts on communities that could potentially materialize from developing CSP in MENA nation-states. Hence, by reflecting on existing academic publications and practitioner experiences, this chapter provides a theoretical starting point for the empirical impact investigation during the field research in Ouarzazate and ensures that no issues covered in the literature are neglected at the beginning of the fieldwork.

3.1 Analyzing and assessing the livelihood dimension of existing sustainability frameworks

Sustainability frameworks[7] have been used in different sectors, including the forestry sector, biomass trade, the mining and the process industry sector, and the CDM, to address the sustainable development dimensions of projects. In order to ensure that the empirical impact assessment and the further development of sustainability requirements take existing approaches into account, most relevant sector-specific (Annex 16.1.1) and integrated sustainability frameworks have been analyzed (Annex 16.1.2) according to their principles and criteria. The analyzed frameworks were not selected randomly, but through three selection criteria:

a) The framework's sector is similar to the CSP sector (e.g., the framework focuses on energy-related infrastructure projects);

b) The framework focuses explicitly on the livelihood dimension of sustainability;

c) The framework is very well-known or provides detailed methodological information.

Based on this review, an 'initial' sustainability catalogue will serve as "development platform" to prove and anticipate social change processes and livelihood impacts during the field study. This catalogue is intended to be a guideline for the development of livelihood sustainability requirements for CSP projects (see chapter 13).

Info Box: Structure of sustainability requirements

One method of developing large-scale CSP plants in the MENA region in a way that ensures the achievement of sustainable livelihood outcomes is to establish sustainability requirements or safeguards with **Principles, Criteria, and Indicators (PC&I)** within an overarching sustainability framework (Klawitter, 2010).

PC&I frameworks are thematic and hierarchical lists of principles and criteria with corresponding, measurable indicators. This universal and versatile tool has many applications (such as eco-certification and policy-evaluation)

[7] The literature does not distinguish between "sustainability framework," "sustainability scheme," or "sustainability standard". These terms are used synonymously and they all describe conditions or claims that are used to measure or evaluate the contribution of a particular issue to sustainability. However, most often a "sustainability framework," "sustainability scheme," or "sustainability standard" consists of a PC&I or another hierarchically ordered combination (e.g., C&I catalogue). However, in this chapter the term "sustainability framework" is used as a generic term, interchangeable with the terms "sustainability scheme" or "sustainability standard".

at both the regional and national levels (Van Cauwenbergh et al., 2007:230). Frameworks structure knowledge by transforming data into understandable information. Since a common framework is unlikely to apply to all sectors, it is necessary to develop specific frameworks for different purposes (Lyytimäki and Rosenström, 2008). A hierarchical framework is useful to break down an end goal (e.g., "a sustainability vision") into parameters that can be assessed and managed (Lammerts van Bueren and Blom, 1996:14). Furthermore, a hierarchical framework can group sets of information that can be used for evaluating sustainable development.

Van Cauwenbergh et al. (2007:239) define principles as the first hierarchical level and as general conditions for achieving the end goal of sustainability. They define sustainability using the classic three-pillar model. The second hierarchical level consists of criteria, which are more specific than principles. Criteria "[...] essentially indicate how the sustainability principles can be achieved" (Haywood and de Wet, 2009: 6) and are thus required conditions for meeting the principles.

As criteria are related to the conditions for meeting the principles, one can link them more easily to the third hierarchical level, which is formed by indicators. Indicators "[...] function by simplifying complex phenomena and information into quantifiable measures that can be readily communicated" (Khalifa and Connelly, 2009:1177).

In addition, PC&I Guidelines could help "[…] to translate criteria and indicators into practical guidance for actions to meet the requirements of criteria and indicators" (Lammerts van Bueren and Blom, 1996:14).

Initial set of potential livelihood sustainability requirements

This section presents the results of the screening of both sector-specific (Annex 16.1.1) and integrated sustainability frameworks (Annex 16.1.2.). Guided by the livelihood sustainability key themes defined in chapter 2.3 and grouped under the six SLA categories, an initial set of common livelihood issues, principles and criteria relevant in the context of CSP in the MENA region is selected.

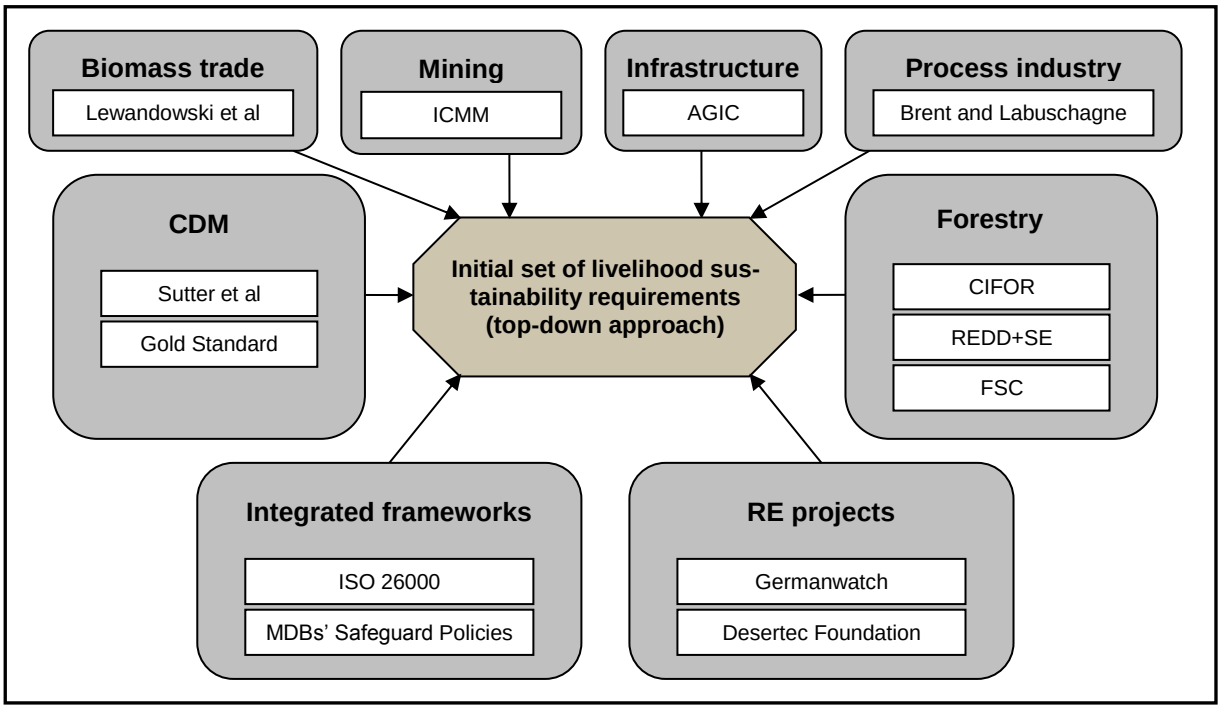


Figure 3-1: Schematic diagram of the PC&I screening process and its inputs from existing frameworks

The screening revealed that all of the frameworks emphasize a "do no harm" approach by applying the precautionary principle to environmental, social, and economic aspects. Some even require the project proponents to generate net positive impacts for the social and eco-

nomic well-being of communities. A synthesis of relevant livelihood issues, with accompanied principles and criteria, is presented below[8].

Social Principle: *The project maintains or enhances community resources of social value and ensures the fair, equal, and non-discriminative distribution of project effects, with special attention to vulnerable and marginalized groups*			
SLA capital	**Livelihood issue**	**Criteria**	**Description**
Social	Cultural heritage and resources	Maintain tangible and intangible forms of culture and cultural resources embodied in sites or traditions with unique social value in ways that satisfy asset delivery in the communities for which heritage is significant.	- Analysis and assessment of sites and traditions with special cultural, ecological, economic, archaeological, religious or spiritual significance through engagement with local stakeholders. - Recognition of sites and traditions in a way to ensure their conservation, promotion, and enhancement through engagement with local stakeholders.
	Vulnerable and marginalized groups	Take actions to ensure that the rights of vulnerable and marginalized groups are respected and that any disproportionate impact is avoided.	- Analysis and assessment of vulnerable, disadvantaged, marginalized, unrepresented, and under-represented people within different cultural, ethnic, racial, religious, sexual or demographic groups through engagement with local stakeholders. - Specification of mechanisms to identify indigenous peoples and consult with them and ensure that they participate in and benefit from projects in a culturally appropriate way. Ensure that adverse impacts on them are avoided, or where not feasible, minimized or mitigated. Promote the use of traditional knowledge and technologies of indigenous communities. - Specification of mechanisms that respect vulnerable groups and their customary and legal rights of tenure and access. Involve them in a way that expands their options and respect their rights through participatory engagement and by complying with the United Nations Declaration on the Rights of Indigenous Peoples.
	Social cohesion	Protect or strengthen the social cohesion of the affected communities.	- Analysis and assessment of project related issues that could impact the social and institutional relationships and networks of trust, solidarity, tolerance and typical characteristics of the community through engagement with local stakeholders. - Identification of measures that protect or strengthen the social cohesion of the community through engagement with local stakeholders.
	Gender equality	Promote opportunities and compensate adverse impacts in ways that both women and men (a) are able to participate fully and equally; (b) receive comparable social and economic benefits; and (c) do not suffer disproportionate adverse effects.	- Analysis and assessment of gender inequalities in the community through engagement with local stakeholders. - Analysis of special needs of indigenous women. - Identification of measures to promote opportunities and compensate adverse impacts for women and men equally through engagement with local stakeholders.
	Equity, non-discrimination, and access	Maintain or enhance fair, just, and non-discriminative inter- and intra-generational access to livelihood resources and services and to the share of livelihood benefits deriving from the project, with special attention to vulnerable and marginalized groups.	- Analysis and assessment of measures to ensure not to restrict, exclude and/or give preferential treatment to people's access to livelihood resources, services, and livelihood benefits deriving from the project based on race, color, gender, religion, sexual orientation, political opinion, social origin or physical or mental disability through engagement with local stakeholders. - Identification of ways to share livelihood benefits and compensate for the project's negative impacts in a fair and just manner through engagement with local stakeholders (i.e., equitable energy pricing).

Table 3–1: Social capital livelihood issues, principles and criteria

[8] Since the livelihood key themes developed in chapter 2.3 are strongly linked to human rights and the MDGs, the selected principles and criteria mirror this linkage. However, they do not include any aspects outside the livelihood lens such as technological appropriateness or economic viability.

Political Principle: *The project complies with the principle of free, prior and informed consent (FPIC) and implements accountable measures of meaningful community engagement, conflict resolution and anti-corruption*			
SLA capital	**Livelihood issue**	**Criteria**	**Description**
Political	Participation and social inclusion	Ensure meaningful, effective, culturally appropriate and socially inclusive participation of relevant stakeholders to incorporate their views and promote local decision-making during all project stages, with special attention to vulnerable and marginalized groups.	- Identification of relevant stakeholder groups through engagement with the local community, with special attention to marginalized and/or vulnerable groups. - Specification of a comprehensive, socially inclusive and culturally appropriate stakeholder engagement strategy to allow relevant stakeholders (civil society, industry, and local authorities) to express their views in meaningful ways at the earliest stage possible and to effectively incorporate them into decision making during all project stages - prior, during, and after project implementation - through engagement with local stakeholders. For example by: o Stakeholder involvement: Local stakeholders meet with sufficient frequency and high quality of interaction with representation of local diversity; o Stakeholder interests: Project developers recognize the legitimate interests, concerns, and rights of community stakeholders; o Stakeholder influence: The degree to which the decision-makers actually incorporate the stakeholders' views.
	Information	Provide timely, clear, relevant, culturally appropriate and understandable information about all environmental, social, and economic aspects of the project to all relevant stakeholders during all project stages.	- Analysis and assessment channels where information can be provided locally through engagement with local stakeholders. - Analysis and assessment of projected risks and benefits for each relevant stakeholder at all levels through engagement with local stakeholders. - Specification of a timely information provision strategy to guarantee that prior to consultation, clear, culturally appropriate, accessible and relevant information is shared with all relevant stakeholders about the project's purpose, duration, scale, benefits and adverse impacts, stakeholder involvement and other relevant environmental, social and economic aspects, Information should shared during all project stages - prior, during and after project implementation. - Specification of measures that ensure that all relevant stakeholders have a good understanding of the key issues related to the project and are able to participate effectively. Special attention should be given to most vulnerable groups and the free, prior, and informed consent.
	Conflict and accountability (rule of law)	Avoid conflict and establish grievance resolution mechanisms to provide fair compensation to affected stakeholders.	- Analysis and assessment of local issues that have the potential for conflict by local stakeholder engagement. - Specification of a conflict management strategy that includes grievance resolution mechanisms and addresses the provision of fair compensation to affected stakeholders in order to avoid any violence stemming from the project development.
	Free, prior and informed consent	Seek free, prior and informed consent of indigenous peoples and other project dependent stakeholders.	- Specification of measures to consult and cooperate in good faith with indigenous peoples and other project dependent stakeholders through their own representative institutions in order to obtain their free and informed consent prior to project approval that affects their lands, territories, or other resources, particularly in connection with the development, utilization or exploitation of mineral, water, or other resources.
	Laws and human rights	Develop the project and its performance in compliance with customary, national and international laws, as well as ratified conventions, such as for human rights.	- Identification of and compliance with laws relevant to the project (customary, national and international as well as ratified conventions, such as, human rights) - Specification of due diligence measures to identify, prevent, and address actual or potential human rights impacts resulting from activities or the activities of other involved project partners providing work, goods, or services; - Take particular care regarding the compliance with customary, national and international laws as well as ratified conventions dealing with circumstances including: o Conflict, extreme political instability, failure of the democratic, or judicial system; o Poverty, drought, extreme health challenges, or natural disasters; o Involvement in activities that might affect natural resources such as water, forests, the atmosphere, or disrupt communities; o Proximity of operations to communities of indigenous peoples; o Activities that can affect or involve children; o A culture of corruption.
	Legal advice	Ensure local stakeholders have access to legal advice.	- Specification of measures to advise stakeholders on relevant legal processes and legal implications related to the project.
	NGOs	Encourage partnerships with local NGOs.	- Analysis and assessment of local civil society organizations through engagement with local stakeholders. - Establish partnerships with NGOs to ensure that local development programs accompanying the project are well designed and effectively delivered according to communities' needs.
	Anti-corruption	Implement anti-corruption measures.	- Specification of measures that avoid any form of corruption in compliance with anti-corruption legislations. - Specification of measures to establish and maintain transparent relationships with government officials and political representatives, free from bribery or improper influence.

Table 3–2: Political capital livelihood issues, principles and criteria

Physical Principle: *The project maintains or enhances the availability and access to basic livelihood needs and services*			
SLA capital	**Livelihood issue**	**Criteria**	**Description**
Physical	Basic livelihood needs and services	Maintain or enhance well-being of local communities through increased local availability and affordable access to basic livelihood needs and services	- Analysis and assessment of essential livelihood needs and services in the community through engagement with local stakeholders. - Specification of measures of how the project could maintain or promote the well-being of local communities by increased local availability and affordable access to basic livelihood needs and services through engagement with local stakeholders. For example by supporting additional community infrastructure associated with the project, particularly in the fields of: o Electricity o Sanitation o Infrastructure, such as roads or housing o Health care facilities, such as hospitals o Waste management o Agricultural commodities o Drinking and domestic use water o Education, such as schools
	Community investment	Take into account the promotion of community development by supporting community projects.	- Analysis and assessment of programs and initiatives that aim to sustainably develop the communities including government, business or NGOs programs. Maximize synergies and make use of complementary resources, knowledge and skills through engagement with local stakeholders. - Consult representative community groups to determine priorities for social investment and community development activities. Special attention should be given to vulnerable, discriminated, marginalized, unrepresented and under-represented groups, to involve them in a way that helps to expand their options and respect their rights; - Specify how the project could support existing programs and initiatives through community investments, for example, by setting up a Social Development Plan.

Table 3–3: Physical capital livelihood issues, principles and criteria

Natural Principle: *The project maintains or enhances the availability, access and quality of environmental resources*			
SLA capital	**Livelihood issue**	**Criteria**	**Description**
Natural	Water security	Maintain or promote long-term water security by applying measures to minimize water use and achieve a neutral water balance of the project.	- Analysis and assessment of the ecological state and projected future (including climate change) of water bodies and evaluation of water availability and access through engagement with local stakeholders. - Specification of measures that would improve water security in the affected communities and achieve a neutral water balance of the project through engagement with local stakeholders in the fields of e.g., o Domestic water savings o Desalination o Water distribution systems o Sanitation o Waste water treatment o Irrigation systems
	Land rights, Involuntary resettlement	Ensure that rights to lands, territories and resources that local communities have traditionally owned, occupied, or otherwise used or acquired are recognized and respected that degradation and conversion of productive agricultural land and involuntary resettlement is avoided.	- Analysis and assessment of the ecological state and projected future (including climate change) of land resources and evaluation of land availability, access and existing land rights – customary and statutory – of local communities through engagement with local stakeholders. - Assessment of community and common property that emphasizes the need to the maintain social cohesion, community structures, and social inter-linkages that common property provides. - Specification of measures that would mitigate any damage to land through, e.g., sealing of soils, degradation, fragmentation of landscapes, salinization. - Specification of measures that uphold the principle of free, prior, and informed consent of local communities for any activity affecting their rights to lands, territories and resources. - Specification of measures that avoid involuntary resettlement and its adverse social and economic impacts through engagement with local stakeholders. - Specification of compensation and rehabilitation mechanisms in case of resettlement through engagement with local stakeholders. - Specification of measures to ensure participation of people in resettlement planning and implementation and to assist displaced persons in their efforts to improve or at least restore their incomes and standards of living after displacement and to ensure that potential aspects of social considerations, such as gender and age, do not disadvantage affected stakeholders.
	Biodiversity, natural resources and their services	Ensure that no threatened or endangered species, high conservation value habitats or ecosystem services are affected by the project and promote the long-term availability of natural resources.	- Analysis and assessment of endangered species, high conservation value habitats or ecosystem services on the project site through engagement with local stakeholders. - Specification of measures to protect endangered species, high conservation value habitats or ecosystem services, including those that are (a) legally protected, (b) officially proposed for protection, (c) identified (by authoritative sources) for their high conservation value or (d) recognized as protected by traditional local communities. - Specification measures to establish sustainable flora conservation and management practices to protect areas of high biological diversity.
	Waste, pollution, resource efficiency	Reduce, recycle and dispose of waste and pollutants in an environmentally responsible manner and minimize the material resource use.	- Specification of measures to reduce, recycle and dispose any kind of waste resulting from the project in an environmentally responsible manner through engagement with local stakeholders.

Table 3–4: Natural capital livelihood issues, principles and criteria

Financial Principle: *The project promotes economic welfare through employment and multiplier effects with a particular focus on local supply chain potentials, existing skills and local development priorities*			
SLA capital	**Livelihood issue**	**Criteria**	**Description**
Financial	Community welfare	Ensure that the affected community has a reasonable share in the economic benefits/financial returns derived from the project to achieve rural uplift and economic diversification.	- Analysis and assessment of how the community achieves its welfare and evaluate where the economic benefits/financial returns derived from the project could be invested meaningfully through engagement with local stakeholders. - Consider supporting organizations that bring needed products and services to the community, which can also generate local employment as well as linkages with local, regional and urban markets where this is beneficial for the welfare of the community; - Specification of measures to increase the economic welfare and value generated in the affected community – in particular for poorer parts of the community - and achieve rural uplift as well as economic diversification through engagement with local stakeholders by e.g., the collection of a sustainability tax for the support of sustainable development activities with the objective of contributing to the public good and the development goals of communities
	Sustainable development strategies	Ensure the coherence with and support of relevant objectives of broader sustainable development policies, strategies and plans established at national or local levels.	- Analysis and assessment of the sustainable development objectives, strategies, policies and plans in the affected region through engagement with local stakeholders. - Specification of measures how the project can be developed in coherence with and support of existing sustainable development policies, strategies and plans through engagement with local stakeholders.
	Poverty alleviation and income generation	Contribute to decreased poverty and increased income generation in the affected community	- Analysis and assessment of the poverty and income situation at the community level through engagement with local stakeholders. - Specification of measures to decrease the number of people living in poverty and generate sustainable incomes through engagement with local stakeholders. - Consider supporting appropriate initiatives to stimulate diversification of existing economic activity in the community;
	Local content	Ensure the inclusion and use of available local industries and businesses, skilled labor as well as traditional knowledge to meet the supply needs of the project and deliver required goods and services.	- Analysis and assessment of the local supply chain potentials and existing skills to contribute to the implementation and operation of the project through engagement with local stakeholders. - Consider giving preference to local suppliers of products and services and contributing to local supplier development. - Specification of measures to ensure the inclusion and use of available local industries, businesses, skilled labor, relevant organizations and traditional knowledge to meet the supply needs of the project and deliver required goods and services through engagement with local stakeholders. - Promote initiatives that strengthen the ability of and opportunities for locally based suppliers to contribute to value chains, giving special attention to disadvantaged groups within the community as well as finding appropriate ways to develop community-based associations of entrepreneurs
	Employment	Create high and low qualified employment opportunities predominately for the affected community	- Analysis and assessment of the employment situation at the community level through engagement with local stakeholders as well as analysis of the employment creation impact of the project. - Consider the impact of technology choice on employment and, where economically viable in the longer term, select technologies that maximize employment opportunities. - Specification of measures to ensure that both highly and less qualified, temporary and permanent jobs resulting from and needed for the project are predominantly sourced locally during all project phases. - Consider engaging in partnerships with organizations, such as universities or research laboratories, to enhance scientific and technological development with partners from the community, and employ local people in this work.
	Technology transfer	Ensure that any technology applied allows a significant share of equipment to be sourced from local supplies as well as to provide local stakeholders with opportunities to maintain and manage the technology in the long-term.	- Analysis and assessment of the local potential to manage and maintain new technologies through engagement with local stakeholders. - Specification of measures that help to increase the understanding, know-how and skills of local stakeholders about the transferred technologies in order to generate opportunities to maintain and manage the technology in the long-term on their own.

Table 3–5: Financial capital livelihood issues, principles and criteria

Human Principle: *The project promotes public health and safety and fosters capacity building, skill development and public outreach*			
SLA capital	**Livelihood issue**	**Principle**	**Description**
Human	Learning and awareness raising	Contribute to learning and awareness raising by providing educational activities related to the project's objectives and local sustainability context.	- Analysis and assessment of existing educational activities and facilities that could be linked to the project's objectives and the local sustainability context through engagement with local stakeholders. - Specification of educational activities that could be linked to existing educational initiatives to accompany the project development in order to raise awareness and learning in the field of specific sustainability issues related to the project's objectives, e.g., water management, renewable energy resources and climate change through construction of a school, running of educational and apprenticeship programs, site visits or tours. - Specification of educational activities related to the project's objectives and local sustainability context, which promote learning opportunities for vulnerable or discriminated groups.
	ILO standards and child labor	Ensure that the project is in compliance with ILO principles during all project phases and is not complicit in any form of child labor but instead complies with minimum age standards	- Analysis and assessment of the working conditions and child labor situation in the target area through engagement with local stakeholders. - Ensure that ILO conventions concerning workers' conditions and protection from abuse or exploitation are complied. - Specification of measures that ensure the compliance with minimum age standards set by the ILO Declaration on Fundamental Principles and Rights at Work and its convention 138 (minimum age) and convention 182 (worst form of child labor).
	Health and safety	Ensure that the project does not cause any negative impacts on community health and safety.	- Analysis and assessment of the health situation in the target area through engagement with local stakeholders. . - Specification of measures that seek to eliminate negative health impacts of any production process, product or service provided by the project.
	Capacity building and skill development	Increase the project-specific skill, competence and career development in the community to build a local skill base and increase the local content potential and technical innovations to deliver required goods and services.	- Analysis and assessment of existing training, skill development, and research activities and facilities that could be linked to the project's objectives through engagement with local stakeholders. - Consider taking initiatives to strengthen the ability of and opportunities for locally based suppliers to contribute to value chains, giving special attention to disadvantaged groups within the community; - Consider appropriate ways to make procurement opportunities more easily accessible to community organizations, including, for example capacity-building and making information about procurement opportunities available; - Specification of project-specific measures that could be linked to existing educational programs in schools/universities to develop the needed base for know-how, competencies, skills and careers in the communities to increase local content opportunities and the future self-reliance of the project, including apprenticeship programs, programs focused on particular disadvantaged groups, lifelong learning programs and skills recognition.

Table 3–6: Human capital livelihood issues, principles and criteria

The generic set of potentially relevant livelihood sustainability requirements provides an initial basis for the empirical part of this study, as it ensures that no issues covered in other sustainability frameworks are neglected at the beginning of the fieldwork. However, it must not be regarded as a strict list of issues that must be covered in a sustainability framework for CSP plants, but rather as an inspirational platform for the development of livelihood sustainability requirements for CSP plants. In the next step, specifications for case and context will be required to include context/case-specific issues and check the applicability of the theoretically developed set of requirements of this chapter against field realities. This is why the top-down analysis will be supplemented by the identification of potential social change processes and livelihood impacts emerging within the concrete example of the Noor$_o$ I CSP plant in Ouarzazate and thus will enhance the knowledge about livelihood sustainability requirements in a bottom-up manner.[9]

[9] Though out of the scope of this study, in an additional step indicators will have to be tailored to the country and technology context in order to make the developed principles and criteria measurable.

3.2 Analyzing and assessing the livelihood dimension of existing solar projects

Based on definitions by leading SIA experts on the difference between social variables and change processes (Vanclay, 2002), this section reviews international experiences with solar power plants (CSP and PV). By examining the social consequences identified within existing ESIAs from South Africa, Egypt, and Morocco this step aids in thinking about the potential positive and negative effects on local communities during our empirical case study.

Once again guided by the livelihood sustainability key themes defined in chapter 2.3, this sections summarizes the main social variables and change processes identified in these studies for solar plants and their associated infrastructure during the planning, construction, and operation phases.

The identified social variables and change processes have been drawn from the following case studies.

What do we mean by "social variables", "social change processes" and "livelihood impacts"?

"Social variables" are similar to the livelihood issues in existing sustainability frameworks and point to measurable change in communities resulting from a development project or policy change" (Vanclay, F., 2002, p.186). Examples include land use patterns, social cohesion or capacity building.

The effects that are expected to occur under these variables are not impacts themselves but so called *"social change processes"* that change the characteristics of a social setting and therefore may lead to livelihood impacts (Vanclay, 2002).

The term *"livelihood impact"* is understood interchangeably with "community, social or human impact" comprising a real (physical) or cognitive (perceptual) impact experienced by humans either at the individual level or at higher aggregation levels (household, community, society)". Impacts are therefore consequences that alter the ways in which people live, work, play, relate to one another, organize to meet their needs and generally cope as a member of society. The term also includes cultural changes to norms, values, beliefs and traditions (Vanclay, F. cited in Sutheerawatthana, P. and T. Minato, 2010:121).

An example: Under the social variable *population size* the *influx of temporary construction workers* is not a livelihood impact but a social change process. However under certain circumstances, the workers' presence could result in a range of livelihood impacts, such as a *breakdown of the social cohesion* of the affected community or an *annoyance* as an effect of the intervention.

In the study, *social change processes* and *livelihood impacts* are often summarized as *livelihood consequences.*

Kaalspruit (South Africa):

In 2011, a private consultant, *Sivest*, finalized the SEIA of a 50 MW combined Concentrated Photovoltaic Plant/Photovoltaic Plant (CPV/PV) in Kaalspruit, South Africa. The estimated land footprint was 2 km². No cooling was required (Byker and de Villiers, 2011).

Syianda (South Africa):

In 2010, a private consultant, *Bohlweki-SSI Environmental*, conducted an EIA study for a proposed 75 MW CSP plant in the Siyanda district of South Africa. The estimated land footprint was 250 ha. Wet-cooling was proposed (Benedek, 2011).

Droogfontein (South Africa):

In 2011, *Sivest* conducted a SEIA of a proposed 19 MW PV energy facility in the Kimberley District of South Africa. The proposed land area was approximately 180 ha. No cooling was required (Smith et al., 2011).

De Aar 1 (South Africa):

In 2011, *Savannah Environmental Ltd.* finalized an EIA of a proposed PV facility with a generating capacity of up to 400 MW on a site located 10 km east of the town De Aar, South Africa. The required land area was estimated to be 10 km². Cooling was not needed (Kruger and Thomas, 2011).

De Aar 2 (South Africa):

In 2011, *Savannah Environmental Ltd.* conducted an EIA of a PV Solar Energy Facility called Ilanga Lethemba with a generating capacity of 300 MW, located in the Farm Paarde Valley of South Africa. The required land area was estimated to be 7.87 km². Cooling was not needed (Khupe and Jodas, 2011).

Farm 267, Danielskuil (South Africa):

In 2012, *WorleyParsons RSA (Pty) Ltd.* presented a draft EIA of a 100 MW CSP plant to be built on the farm 267, near Danielskuil, South Africa. The proposed plant would use CSP power tower technology with 200-meter towers. The required land area was estimated to be 6 km². Both hybrid and dry cooling were suggested (Worley Parsons, 2012).

Kuraymat (Egypt):

In 2006, a private consultant, *Energy and Environment*, conducted an EIA of the 140 MW Integrated Solar Combined-Cycle (ISCC) plant in Al Kuraymat, Egypt. The solar field comprises 20-30 MW of the plant; the rest is natural gas. The plant is wet cooled. The land area is 2.8 km² (Energy and Environment Consultant, 2006).

Kom Ombo (Egypt):

In 2011, the *New & Renewable Energy Authority (NREA)*, under the Ministry of Electricity and Energy in Egypt, formulated the Terms of Reference (TORs) for an SEIA for a 100 MW CSP plant in area of the Kom Ombo, Egypt. The TORs include social issues. The proposal calls for wet cooling (NREA, 2011).

Noor$_o$ (Morocco):

In 2011, a private consultant, *Burgeap*, finalized the Framework Environmental and Social Impact Assessment (FESIA) for a proposed 500 MW solar project called Noor$_o$, to be sited near the city of Ouarzazate, Morocco. Besides the first project stage (Noor$_o$ I) being parabolic trough with wet-cooling, other technologies considered for the entire solar complex include dry-cooled tower technologies and PV. The required land area is 3,041 ha (Burgeap, 2011). In 2013, the FESIA was specified by an in-depth specific ESIA, conducted by the consultant *5 Capitals* focusing on Noor$_o$ I specifically (5 Capitals, 2012a-c).

Pool of potential social variables and change processes derived from finalized CSP/PV ESIAs

The review below cannot account for the full complexity of effects that could arise from the development of CSP plants. Rather it only intends to provide a preliminary list of potential social variables and change processes that were identified in finalized ESIAs and thus disregards any further distinction based on:

a) different project stages (planning, construction, operation),

b) technology types (CSP or PV),

c) geographic scale (radius covered),

d) significance of the impacts (direct, indirect)

e) social level (community, household, individual),

f) location (MENA or South Africa),

g) other criteria about duration, intensity, probability, or significance.

We did not find any standardized national or international guidelines for the development of ESIAs for solar power plants. Each assessment is different in scope and detail. There are, however, similarities across cases relating to livelihood sustainability. In compliance with the SLA capitals and guided by the taxonomies and categorizations suggested by F. Vanclay (2002), the various social variables and change processes associated with solar energy projects are categorized here by their effect on the livelihood security of people living in the target communities (Table 3–7).

SLA capitals	**Social variables** (adjusted by the authors based on the analysis of existing ESIAs and according to Vanclay, 2002)	**Social change processes** (adjusted by the authors based on the analysis of existing ESIAs and according to Vanclay, 2002)
Social	Sense of place	Change in the community atmosphere
	Mentality	Change of social well being and the traditions in communities
	Archaeological and cultural resources	Effects on culturally or archeologically valuable resources
	Daily living and movement patterns	Effects on daily living and movement patterns
	Vulnerable and indigenous populations	Marginalization of vulnerable groups
	Population size	Increase/decrease in population size
	Influx and outflow of temporary workers	Influx of construction workers
		Increase of mostly male newcomers
	Population structure	Introduction of people dissimilar to the community's demographic profile
	New social classes	Creation of new social classes with different social structures
	Family structures	Change in family cohesion and traditional family structures
	Racial, demographic, sexual, and ethnic composition and distribution	Change in social standing of marginalized groups
	Attitudes toward the project	Unrealistic expectations for benefits
	Social networks	Disruption of social networks
	Social cohesion	Creation of social differences within the community
	Gender equality	Change in chances of women
	Social equity	Change in chances of people and access of people to benefits
		Competition among community members for jobs
		Feeling of discrimination

Political	Participation	Community engagement
		Exclusion of community groups
	Information	Lack of information (access, quality, and availability)
	Accountability, remedy, and conflict	Grievance cases
		Protests and opposition
		Increase or decrease of existing conflicts
	Community agreement	Disagreement and non-acceptance of community decisions
	NGO involvement	NGO involvement in the project design
	Corruption and distribution of power characteristics and authority capabilities	Elites capturing the benefits because of privileged access
		Mistrust due to lack of transparency in information provision

Physical	Availability and access to community infrastructures	Change in access to and availability of community infrastructure, such as electricity
		Water
		Sanitation
		Housing
		Sewage
		Schools
		Health care
		Recreation
	Traffic	Change in traffic patterns and amount
	Transportation	Change in transportation and rural accessibility

Natural	Water access and availability	Change in water access and availability
	Relocations of individuals or families	Involuntary resettlement
	Drainage patterns	Disturbance of the land surface through construction facilities and soil sealing
	Landscape	Change in the character, and quality of the landscape from rural to industrial
	Land-use patterns	Competition over land
		Change in land-use due to fencing and changed land tenure
	Land acquisition and disposal	Change or sterilization of cultivated and grazing land due to power plant, water extraction infrastructure, access roads, and transmission lines
	Land value	Change of land value
	Biodiversity (flora and fauna)	Habitat disturbance, change in biodiversity and protected areas
	Dust and emissions	Change in air quality
	Noise	Change in noise levels
	Vibration	Vibration of ground from ground breaking and excavations
	Waste	Production of waste

Financial	Revenue characteristics	Change of revenues in the community
	Economic focus of the community	Diversification of economic activities in different sectors as well as local/regional/national/international linkages
	Investment environment	Change of the economic profile of the area and its visibility as an investment destination
	Revenue characteristics	Change in agricultural/industrial/tourism/informal sector revenue and local tax
	Development plans	Alteration of future development plans
	Income characteristics	Change of disposable income in agricultural/industrial/tourism/informal sector
	Prices (production, consumption, and wages)	Change of production, prices of goods/services, and wages
	Local economic capacities	Inclusion of local enterprises
	Employment characteristics	Change in employment opportunities (temporary or permanent) in the industry
		Construction
		Tourism
		Agriculture

		Commerce
	Employment equity	Change in the distribution of occupational opportunities
	Wages	Change in wage conditions
	Working conditions	Worker health and safety

Human	Awareness	Change in the awareness of environmental or social trends
	Labor conditions	Change in labor standards
	Health	Change in sexual transmitted infections, waterborne diseases, and pollution
	Community safety	Change of community risks associated with environmental stresses or social conflict
		Increase in prostitution
		Increase in alcohol and drug abuse
		Increase in risk of livestock theft, poaching, and damage to farm infrastructure
		Risk of violence associated with presence of construction workers on the site
		Loss of girlfriends or wives to construction workers
	Labor skills	Transfer of skills and knowledge
	Training possibilities	Change of training opportunities
	Technology	Import of technologies

Table 3–7: Pool of variables and change processes derived from finalized CSP/PV ESIAs

Combined with the findings of section 3.1. the social variables and change processes outlined above provide additional insight into the range of the livelihood consequences anticipated for CSP in general. These livelihood consequences could be found during the case study of the $Noor_o$ I project. Once again, however, the empirical investigation will not be limited to this pool but will depend on the local context and the nature of $Noor_o$ I.

3.3 Lessons learned from other large-scale (energy) projects in Egypt and Morocco, and CSP plants in Spain and the United States

Lessons learned from other large-scale energy infrastructure projects in Morocco and Egypt as well as CSP plants in Spain and the United States are valuable for this study, as they illustrate country- or technology-specific issues that have occurred in the development process of existing projects. Thus, they provide a third data source for analyzing $Noor_o$ I. Five case studies were selected either due to their regional or technological relevance.

- 750 MW Combined Cycle Plant (CCP) Project in Nuweiba, Egypt;
- 72 MW oil-fired power plant in Ait Melloul/Tiznit, Morocco;
- 150 MW CSP (Parabolic Trough) in Grenada, Spain;
- 392 MW CSP (Solar Tower) in Nevada, USA;

Even though they are not CSP plants, the CCP plant in Nuweiba and the oil-fired power plant in Ait Melloul/Tiznit were included because they were developed in the MENA region. With the selected CSP plants in Spain and California, two different CSP technology pathways have been selected. In addition, a non-energy related example was included because of its geographical proximity to $Noor_o$ I (around 170 km).

- 200 MT silver mine in Imider, Tinghir District, Morocco;

3.3.1 750 MW gas-fired CCP plant in Nuweiba (Egypt)

Developers originally sited this CCP plant in the South Sinai Governorate on the coast of the Gulf of Aqaba, close to the touristic city of Nuweiba and about 170 km north of Sharm El-Sheikh. The proposed site covered approximately 105,000 m² and was to be built in conjunction with other categories of properties 4 km from Nuweiba port, including commercial (shops, bazaars), tourist (hotels, dive centers), government (administrative buildings), and residential (bedouin suburbs, farms). Two nearby industrial facilities were planned - one for sewage treatment and the other for desalination (Furrer, 2009 and Zohny, 2010).

The plant's overall generating capacity was planned to be 750 MW. While the AfDB and EIB classified it as a category A project with highly adverse social and environmental impacts, the governmental agency in charge, the Egyptian Electricity Holding Company (EEHC), only considered it to be a category C project, without highly adverse impacts.

Planning for the CCP plant began in spring of 2009, and full operation was expected by 2012 or 2013. However, in June of 2009, the Compliance Review and Mediation Unit (CRMU) of the AfDB, which manages the organization responsible for complaints against AfDB projects, received a request from Hemayat, an Egyptian NGO related to Bedouins and touristic affairs, to relocate the project. Hemayat was concerned about the potential negative impacts on the livelihood of local communities, tourism, and marine life. People from the two Bedouin communities, whose main source of income is from tourism, as well as local business owners, supported their campaign. During CRMU's mediation process, it became clear that the concerns were well founded. However, the AfDB's management was unwilling to relocate the project, and the EIB announced in March 2010 that it was withdrawing financing from the project. Since then, the project has been on hold. The lessons learned from the Nuweiba project include the following.

Neglect of adverse social impacts and enhanced social benefits

- The AfDB's management emphasized the power plant's employment opportunities without accounting for potential employment losses in the tourism sector due to negative visual impacts on the landscape. This was especially important among indigenous groups like the Bedouins.
- The AfDB did not sufficiently consider the loss of livelihood security stemming from potential damage to the local tourism industry, possibly including the closure of hotels, dive centers, and other tourism service providers.
- Civil society groups raised concerns about how the influx of additional workers could change the traditional community structure, lead to a further marginalization of indigenous peoples, and put pressure on existing community infrastructure and services.

Neglect of adverse environmental impacts

- The proposed plant was sited in a run-off area with high flood risk.
- Significant impacts were expected on nearby marine life due to the release of hot water into the sea, with significant consequences for the marine ecosystem.

Technocratic and reactive top-down approach with weak public involvement and information provision

- The banks did not conduct project scoping within the local community; the local consultation process began after the ESIA was conducted.
- Project proponents held the scoping meetings in Sharm El-Sheikh, which is 170 km away from Nuweiba. Some local stakeholder groups were not notified and were therefore excluded.
- Civil society representatives found the ESIA's language to be overly technical and difficult to understand.
- The project proponents placed an advertisement in the *Al Ahram* Newspaper. It took up only one-eighth of a page. It included a brief overview of the project and instructed interested parties to visit offices either in Cairo, 470 km away, or Ismaileya, 400 km away.
- The project proponents essentially disregarded the local illiteracy rate of about 30% when distributing information mainly through local newspapers.
- The project proponents did not make serious attempts to advise, consult, or inform the local community.
- Lastly, access to the ESIA was insufficient, as some parts were unavailable online, and others were not distributed in Arabic (Furrer, 2010 and Zohny, 2010).

3.3.2 72 MW oil-fired power plant in Ait Melloul/Tiznit (Morocco)

In 2010, Morocco's grid operator, "L'Office National de l'Electricité et de l'Eau potable" (ONEE) decided to build a 72 MW thermal power plant using heavy oil, in the region of Souss Massa Drâa in central Morocco. The region is the country's biggest producer of fruits and vegetables for export, hosts an important fishing industry, and features new infrastructural projects including an industrial park for R&D and services in the fish industry. Electricity demand in the region is increasing by 10% annually. Electricity is mainly provided by one coal-fired power plant, Jorf Lasfar, located 350 km north of Agadir. ONEE's goal for the project was to secure the region's electricity supply to avoid future power shut downs and blackouts.

ONEE selected a site near Ait Melloul, a suburb of Agadir, on the southern bank of the Souss River. Ait Melloul's population is 130,105. The project started in 2011, and ONEE expected it would take 20 months. However, ONEE did not consult relevant stakeholders, including local administrations, the local population, and civil society groups, during the decision-making process. Therefore, civil society mobilized local groups to mount a campaign against the project due to concerns about environmental and social impacts. The project's opponents eventually convinced ONEE to relocate. An alternative site was chosen 90 km south in the province of Tiznit. However, local landowners adjacent to this site rejected the government's proposed payment for 6 ha of land, and the project was delayed for another year (L'economiste, 2011). After ONEE purchased a new plot of land, the project was again interrupted when a group of associations from Tiznit organized a social media backlash against the project through blogs, Facebook, and petitions. A group of Moroccans living in

France, who had supported other socio-economic projects in the province, endorsed the local community's campaign. Elected officials in Tiznit put a stop to the construction due to the environmental concerns raised by the campaign and the lack of public consultation. In total, the project was delayed for two years, longer than the project's estimated construction time. ONEE also had to pay to store the materials, which led to cost overruns. The relevant lessons learned from the project include the following.

Neglect of adverse social impacts

- ONEE focused on energy security goals rather than concentrating on potential conflicts stemming from siting the plant in a highly populated suburb (Ait Melloul) or an area with important cultural heritage and historical value (Tiznit).
- ONEE did not focus on how people's livelihoods would be affected from the loss of agricultural resources caused by the project.
- The proposed land compensation did not meet local landowner's expectations.

Neglect of adverse environmental impacts

- The initial site was near an agricultural and environmental training institute and a partridge farm. The second was near agricultural land and a river. Both sites raised concerns about air pollution, noise, and eventually accidental pollution to soil and water in case of contamination.

Technocratic and reactive top-down approach with weak public involvement and information provision

- ONEE did not consult relevant and interested stakeholders in Ait Melloul or in Tiznit prior to site selection and project development.
- ONEE ignored or declined the local populations' requests to hold public information and participation sessions.
- ONEE consulted the local population only after the protests.

Neglect of local policies and sustainable development plans

- ONEE did not consider local policies, such as the municipal charter relating to land of cultural value. They also did not take into account requests from Tiznit to use renewable energy rather than fossil fuels (all information based on Observatoire Regional de L'environnement et du Development Durable (OREDD), personal interview 2013) .

3.3.3 50 MW CSP plant, Andasol 1 (Spain)

The 50 MW Andasol 1 CSP plant is located near Aldeire in the province Grenada of Andalusia, Spain. The plant covers about 51 ha. Andasol 1 is the first of three phases of the Andasol solar complex, developed by Solar Millennium and ACS Cobra, with a total capacity of 150 MW.

Aldeire has only 696 inhabitants. It is highly dependent on an agricultural economy, especially fruits, vegetables, and cereals. It is also a semi-arid area suffering from significant water shortages. Therefore, local farmers protested the plant because of its water requirements for wet cooling (R.I. 2008). The citizens' other concerns included loss of land, loss of agricultural

jobs due to land and water loss, low compensation prices offered for the loss of land (EFE, 2007), and no planned employment opportunities for the local farmers. Altogether, local stakeholders feared a loss of income opportunities that would threaten their livelihoods. Around 100 farmers blocked two lanes of highway A-92, holding signs that said, “the land belongs to our ancestors”. Two farmers even went on hunger strike (Pérez, 2007). In the end, they received greater compensation for the land sale (EFE, 2007).

3.3.4 The 392 MW Ivanpah Solar Electric Generating System (United States)

Ivanpah is a 392 MW solar power tower plant that was completed in 2013 on public land in California, near the California-Nevada border, 69 kilometers from Las Vegas. The information presented here is based on a two-year study of the siting controversy, including interviews, analysis of the regulatory proceedings, and news analysis (Moore and Hackett, forthcoming). The Ivanpah case drew the attention of environmental groups across the United States because it brought to light a set of complex land use choices such as, what is the value of desert land and ecosystems, how is that value determined, and who has the power to change it? Both the Bureau of Land Management and the California Energy Commission (CEC) are responsible for conducting environmental reviews of solar and other power plants, and the CEC is responsible for holding public evidentiary hearings. Six environmental groups intervened in the CEC’s three year siting process, and more than 20 environmental groups and local activist organizations voiced opinions on the plant.

A complex debate transpired over the value and representation of both the Ivanpah site and the desert and whether large-scale solar ‘fits’ the desert landscape. The main areas of opposition related to the plant’s effects on flora and fauna, visual resources, the spiritual value of the land to Native Americans, and whether public land should be leased to private companies. The plant’s impacts to desert tortoises living on the site, classified as threatened under the U.S. Endangered Species Act, received the most media attention. However, the protestors concerns were much broader and more complex than just the tortoise. The tortoise received the most attention because the Endangered Species Act has stronger enforcement mechanisms than most other U.S. environmental laws. Therefore, the tortoises provided the strongest legal leverage for stopping the plant. Throughout the public siting process, the power plant was repeatedly reconfigured and redesigned, but these changes did not quell the opposition, which argued that Ivanpah was an inappropriate site for solar power generation regardless of the plant’s design. Even though the plant’s construction is complete, the controversy is not. The siting decision was made assuming there were 32 tortoises on the site. However, once wildlife managers began relocating the tortoises off site, the estimates were increased to 57-204 tortoises over 160 mm, 608 tortoises under 160mm, 236 eggs, as well as the harm or harassment of 203 tortoises of 160 mm and 1,514 tortoises under 160 mm on the lands on which the project tortoises were eventually relocated. They also admitted that some tortoises would be too small to see and relocate and would likely be killed by heavy machinery. Tortoise relocations have resulted in high mortality rates in other projects, and some of the Ivanpah tortoises have already died. Further, recent evidence shows that birds are dying from flying into the towers or mirrors.

The Ivanpah stakeholder gridlock can be partly traced to the available processes for public input. In the current U.S. siting process, comments on environmental impact statements for solar and other projects that fail to identify an error of law or evidence in the process are pushed aside as there is currently no procedure for integrating them into decision-making. Further, public comment periods often open up after companies invest significantly in selecting and surveying a site. Also, the Ivanpah tortoise debacle illustrates the uncertainty of environmental impact surveys. The process does allow for groups to influence the micro-scale design of a plant and mitigation of its environmental impacts, but it has no outlet for local activists who argue for a wholesale change in how electricity is generated and consumed, from solar mirrors papering the desert to solar panels papering rooftops. Other organizations argue for a multifaceted approach that combines large-scale solar with rooftop PV and other alternatives. But the Ivanpah case illustrated that such concerns are ill-suited to the public processes available to influence the design of energy infrastructure. Further, the barrier to input is high for the average person – sometimes requiring expert legal review of lengthy documents to influence a decision. For example, the solar environmental impact statement (Solar PEIS) draft for the U.S. Southwest region was 11,000 pages long. Leaner, stronger designs for public engagement in planning energy futures would produce more appropriate and effective technological systems and would reduce contentious opposition to innovative energy development in the United States (all information based on the experience the project researcher Sharlissa Moore conducted during her PhD studies).

3.3.5 200 MT silver mine in Imider, Tinghir District, Souss-Massa-Drâa (Morocco)

The silver mine in Imider is located around 170 km northeast northwest of Ouarzazate in the region Souss-Massa-Drâa of central Morocco. The community of Imider is located in an arid region southeast of the High Atlas Mountains, with a population of approximately 5,000 people, living in seven villages close to the mine. The region is one of the poorest in Morocco, with 47.23% of the inhabitants living on 272 MAD per month in 2004 and severe public health and education problems (Haut Commissariat de Plan, 2004). The mine opened in 1969 and is managed by the Société Metallurgique d' Imider (SMI), an association founded in 1969 by the national Bureau de Recherché et Participation Minière (BRPM). The SMI was privatized in 1996 and in 2012 the private mining Group MANAGEM owned 80.25% of SMI.

The SMI exploits and markets the silver resources based on hydro-thermological processes using cyanide (Fouguig, 2013). With an average output of over 200 metric tons (MT) annually, it is the most productive silver mine in Africa. Geological surveys from 2001 estimate the reserves in Imider at 3,723 MT but new discoveries have been made since then. The production rate has increased from 40 MT in 1987 to 300 MT in 2013. The mine is expected to operate until 2028 (Fouguig, 2013:6-7). Currently the mine employs approximately 1,000 people (MANAGEM, 2011) but only 14 % of the younger generation in Imider have been employed, often on an irregular basis (FAME, 2012).

Community citizens adjacent to the mine are mostly Amazigh and make a living on agriculture (Arrami, 2012). They are experiencing severe water shortages with the mine using up to 1,555 m³ per day, or twelve times the consumption of local people. According to a report to the UN High Commissioner for Human Rights, local farmers perceive a decrease

of water extraction from their local sources of up to 60% and the dehydration of fruit tree plantations (CMA & APMM, 2012). Other major disadvantages reported by the local population included, the disrespect to traditional land claims based on tribal rights; the loss of tribal property and its transfer to a private investor; pollution by cyanide and mercury from the mine's wastewater; the loss of livestock and increase in skin diseases (Fouguig, 2013; Arrami, 2012).

In 2011, several communities organized joint sit-ins in front of the mine requesting an independent scientific study on the environmental impact of the mine, reduction of pollution by SMI, reduction of water consumption by SMI, investments in social infrastructure (e.g. health, education, transport), and job priority for locals (Arrami, 2012).

Only a few weeks after the protests, the negotiations between the SMI and the local representatives ended without reaching an agreement. Then the protestors set up a protest camp at Mont Aleban, blocking one of the mine's major sources of water. Despite arrests and prison sentences of up to four years for some activists and regular harassment by official authorities, the protesters maintained the blockade. Numerous civil society movements and some human rights organizations supported them (Arrami, 2012). Fouguig (2013) estimated that the overall production loss in 2011 and 2012 was at 181.6 MT. The relevant lessons learned from the project include the following.

Neglect of adverse social impacts

- SMI/MANAGEM ignored the poverty of the region for years, investing very little in what locals call "fake projects";
- SMI/MANAGEM did not educate and employ local workers to create positive social impacts;
- SMI/MANAGEM did not use the negotiations with the local people to resolve the social conflict.

Neglect of adverse environmental impacts

- SMI is reported to have stored wastewater at the land surface, contaminating soil and groundwater;
- SMI did not conduct a neutral scientific study on environmental impacts or implement relevant impact mitigation measures.

3.3.6 Summary of lessons learned

In summary, the CCP project in Egypt failed, the oil-fired power plant in Ait Melloul/Tiznit experienced significant cost overruns and schedule slippage, the mine at Imider resulted in major conflict and disadvantaged the local population, and the local community protested the CSP plants in Spain and the United States. The overarching lesson is that affected communities should be involved in projects from the very beginning through meaningful discussions and dialogues. Relevant stakeholder groups should be identified and involved, especially vulnerable groups like women and ethnic or religious minorities, in order to satisfactorily address environmental and socio-economic issues. Public engagement processes should be designed in a way that is accessible to the general public and the public's input should be integrated into decision-making. Processes should be designed that allow the public to

provide input on broader decisions about a nation's energy infrastructure, not just micro-scale design issues for single power plants. This should build trust and acceptance within the local community and should help to site and design more socially robust projects and infra-structure.

B The research framework to analyze and assess the livelihood dimension of Noor$_o$ I

This part outlines the research framework (see chapter 4) and its application to the CSP project Noor$_o$ I (see chapter 5). It describes the concepts and the empirical methods applied during the field research and the evaluation tools chosen to assess the empirical results and to derive sustainability safeguards. Section 4.1 starts with a brief overview on the research framework, sections 4.2 and 4.3 describe the analytical framework and the applied methods in detail. Section 5.1 provides a short overview on the research design, while section 5.3 illustrates the detailed research application to Noor$_o$ I, and chapter 5.4 provides a closer look on the empirical research design and data analysis approaches applied during the two field trips.

4 Research framework

4.1 Overview on framework and methodologies and their application to Noor$_o$ I

The research framework developed for this study consists of three elements: the Sustainable Livelihood Appraoch (SLA) as the analytical framework, the generally applied Social Impact Assessment (SIA) structure as the overall methodology, and their application to the CSP plant Noor$_o$ I as illustrated in Figure 4-1.

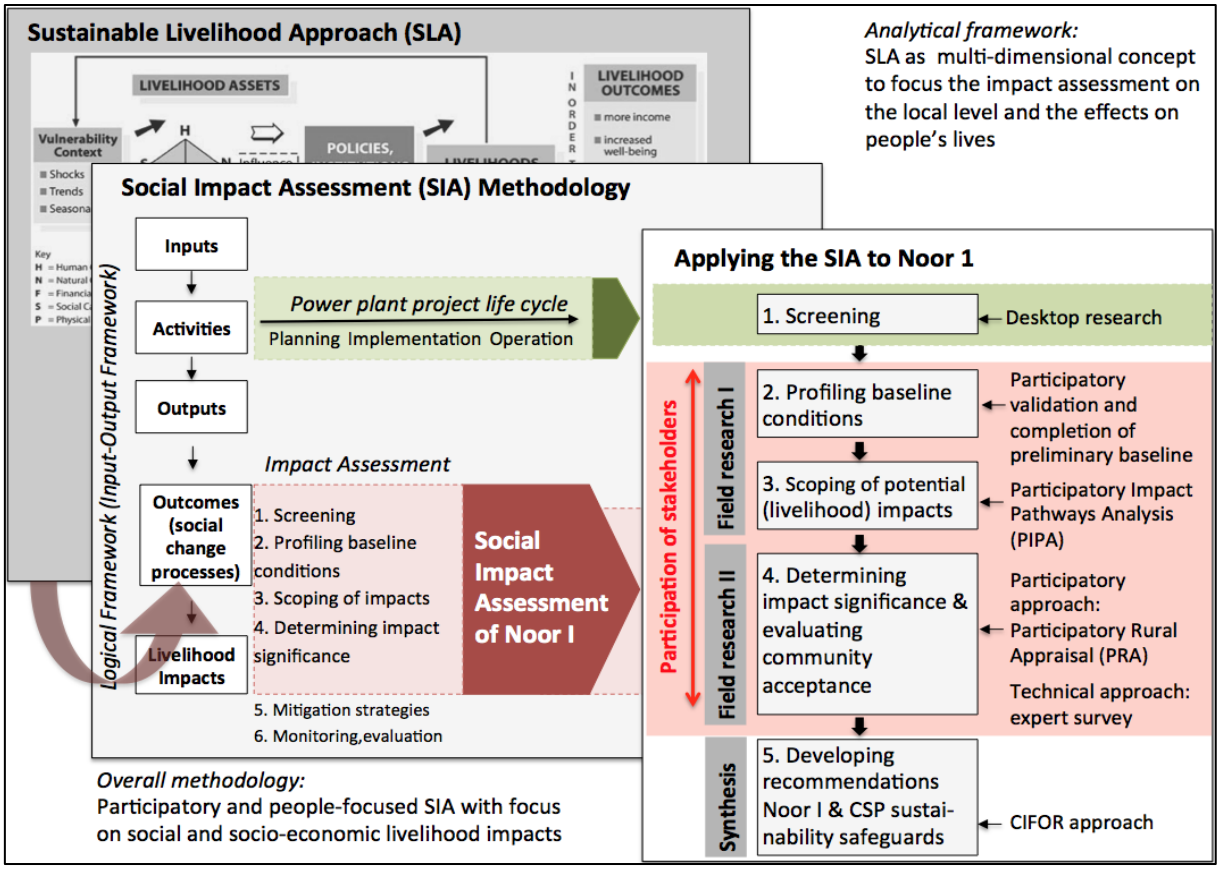


Figure 4-1: Research framework of Social CSP

Analytical framework: Sustainable Livelihood Approach (SLA)

With its focus on community capital, the SLA is particularly suitable to provide the conceptual basis for assessing influences on the livelihoods of local communities in emerging and developing economies. The SLA was applied as the analytical framework for this study to account for the complex livelihood context in which the Noor$_o$ project is being implemented. The framework focuses the research on the potential impacts that may arise from any changes caused by the project for the livelihoods of individuals, households, and communities in the research area.

Methodology: Social Impact Assessment (SIA)

Impact assessment (IA) is understood as the process of identifying the future livelihood impacts of a current or proposed action or project (IAIA, 2003:1). Although the conceptualization of social impacts provided by various scholars (see for example Vanclay (2003)) encompasses a relatively wide range of potential impacts, the authors decided to use the term "livelihood impact" based on the applied SLA framework. This illustrates that a livelihood comprises not only social aspects but reflects the broader context of life, such as power relations, the environment, or political structures. In order to assess the impacts of a project on local livelihoods, it is necessary to analyze the changes caused by the project and establish cause-and-effect relationships between these different types of changes (Maredia, 2009:3). The Input-Output Framework (IO framework) is a logical framework that provides a useful way to conceptualize the theory of change of a project by graphically illustrating the components and relationships among *inputs, activities, outputs, outcomes, and (livelihood) impacts.*

While it is important to take *inputs*, *activities,* and *outputs* along the project cycle into consideration in order to understand the impact development, the IA itself focuses primarily on the changes occurring at the *outcome* and *impact* level. Accordingly, this study focused on the social change processes and livelihood impacts caused by planning, building, and operating the CSP power plant Noor$_o$ I. The *Social Impact Assessment (SIA)* was used as an overarching methodology for analyzing and assessing livelihood impacts. An SIA consists of a number of consecutive steps encompassing screening, profiling baseline conditions, scoping impacts, and predicting and evaluating the significance of impacts. The last steps - the development of mitigation strategies and evaluation and monitoring - were not part of this study. Additionally, recommendations and sustainability criteria to safeguard future CSP projects were developed based on the results of the identified impacts and their significance.

Application to Noor$_o$ I: combined technical analysis and participatory approaches

CSP development does not occur in isolation but within socio-environmental systems. Therefore, exploring its wide array of livelihood impacts is a complex task that cannot be achieved solely by rational-scientific and technocratic checklist approaches but through the broad participation of local stakeholders. Although technical-orientated checklists are still widely applied in SIAs, new directions in SIAs have recently gained popularity and emphasized the need for more participatory approaches in the implementation of SIAs. While participatory approaches allow account for locally-specific characteristics, they have also been associated with certain challenges, e.g., conflicting views or exaggerated and biased opinions (Gomez, Donovan and Bedggood, 2012:2). As a consequence, today several authors propose inte-

grating both participatory and technical methods in SIA studies (Esteves and Vanclay, 2009:141; Becker et al., 2004:188). Reflecting on these new approaches, this study analyzed and assessed the livelihood dimension of $Noor_o$ I by combining quantitative technical analysis with qualitative participatory approaches to allow for the broad involvement of local stakeholders and expert judgments at different levels of the research.

4.2 Sustainable Livelihood Approach (SLA) as an analytical framework

4.2.1 Definitions

Originally developed based on conceptual work by Amartya Sen, the SLA has gained acceptance in development policy and practices since it was introduced in the 1990s (Chambers and Conway, 1992:5). Contrary to traditional IA tools with predominantly technical focuses, the people-centered and participatory SLA allows the researcher to capture multi-dimensional aspects of development interventions that are usually neglected in expert-led checklist approaches (Cherni, 2003; Muleguetta et al., 2005). By taking into account both material and non-material aspects of livelihoods, its key objective is to strengthen people's livelihoods by promoting their ability to cope with and recover from socio-environmental stress and shocks and, thus, to improve their living situation and well-being. Traditionally the SLA has been used successfully in agricultural and rural livelihood projects but has been applied lately with increasing frequency in evaluating and planning development and infrastructure projects, as well as in SIAs. The concepts of community resilience, vulnerability, and adaptive capacity have further been applied to inform resource management decision-making and analyzing projects in the energy sector. Examples include Favretto et al. (2012) who looked into livelihood impacts of jatropha curcus, Dyner et al. (2004) who applied the SLA to the provision of energy access, or Kurkeakoski (2009) who used the approach to assess the social impacts of micro hydropower.

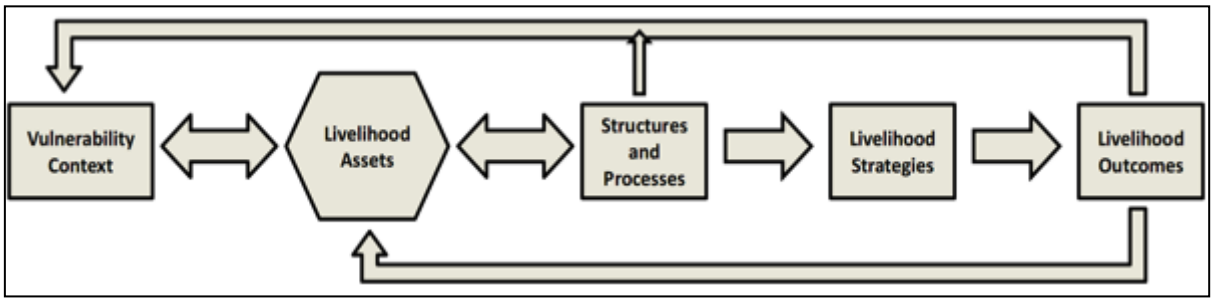


Figure 4-2: The sustainable livelihood framework

The SLA is founded on the perspective that people are operating in a specific context of vulnerability, which forms the external environment of their livelihoods. Within the vulnerability context, they have access to certain livelihood assets that are valued through the prevailing institutional structures and processes. All three components - vulnerability context, livelihood assets, and structures and processes - influence the livelihood strategies of the people in their pursuit of beneficial livelihood outcomes. In turn, the livelihood outcomes give feedback to the bundle of livelihood assets and affect the external vulnerability context (DFID, 1999:1) (see Figure 4-2).

In order to develop an understanding of the livelihood situation of the local communities in the research area, these interrelated dimensions of the SLA were researched (see Figure 4-2). The vulnerability context, which frames the external environment in which people live, was the starting point for the research. Within the vulnerability context, people require a range of livelihood assets to achieve positive livelihood outcomes for both the present and the future.

- **Vulnerability context:** physical, social, economic, and political trends, stresses, shocks and seasonalities that impact on people's livelihood situation (DFID, 1999:3).

Here, trends might refer to issues like rising fuel prices as a consequence of depleting fossil fuel resources. Stress denotes a long term pressure, such as , an economic downturn. Shocks denote a sudden pressure on livelihood such as a severe flood or an economic crisis. Seasonalities refer to livelihood threats, such as cyclical fluctuations in prices or employment.

- **Livelihood assets:** the human, social, natural, physical, financial, and political capitals that people own or to which they have access.

Although the abundance of just one form of livelihood assets is positive, it is very unlikely to lead to sustainable livelihood outcomes. With regards to CSP plants, the building of large-scale energy infrastructure - i.e., physical capital - would neither lead automatically to a sustainable endowment of other livelihood assets nor carry any intrinsic guarantee to ensure sustainable human development. Yet, social capital may be a precursor that could lead to sustainable livelihoods. By strengthening social capital through empowerment and social inclusion, social capital can stimulate the accumulation of other assets and support the diversification of sustainable livelihood strategies (Wilkinson, 2002:6-12). By including political capital, the SLA acknowledges that the robustness of livelihoods is not only constrained by its specific vulnerability context and the bundle of livelihood assets, but also by the prevailing social and institutional structures and processes that influence the asset endowments and entitlements.

- **Structures and processes**: private and public institutions as well as their policies, laws, and legislation determine the access to livelihood assets and, thus, directly impact people's livelihoods.

The link between structures,processes and livelihood assets respectively between citizens and decision-making through "the gate" of political capital can substantially reinforce or deplete the people's livelihood situation. A strong connection between the two is more likely to lead to positive livelihood outcomes that increase the endowment of livelihood assets for individuals, households, communities and social groups. On the negative side, weak or counteracting inter-linkages among these groups impede people's ability to cope with their surrounding vulnerability context and thus hinder their pursuit of certain livelihood strategies and the achievement of envisioned livelihood outcomes (DFID, 1999:6).

- **Livelihood strategies and outcomes**: the way individuals and households mobilize their assets to achieve their goals – and consequently the returns or outcomes of those strategies, such as improved food security or increased income.

A distinction must be made between coping and adaptive strategies. Coping strategies are short-term responses to a specific shock, such as a drought. Adaptive strategies are long-term changes in behavioral patterns as a result of a shock or stress, e.g., agro-pastoralists that adapt to environmental variability by optimizing the mix of cattle.

Although the SLA provided the conceptual basis for the baseline development, its elements, including vulnerability, policies, and structures, were not analyzed separately in this study, as they form the external context in which $Noor_o$ I is embedded and are thus variables that cannot be influenced directly by the CSP plant.

4.2.2 Application to development and infrastructure projects

In order to answer research questions on the impacts of power plants on the livelihoods in certain regions, the research approach has to be community-oriented and to consider all groups in society, especially local peoples' perspectives. These requirements are best met by the SLA. Other approaches would also serve the objective to be community-centered, such as the "community based agreement making approach" or the "local procurement management planning". Compared to these approaches, the SLA has the advantages of being applicable to different contexts and of integrating consultative and participatory processes. It recognizes that not everybody is equally impacted and allows for the identification of the most vulnerable livelihood systems.

However, despite these advantages, the SLA is not very helpful in the measurement of impacts, i.e., tracking the changes since the implementation of the project and identifying the cause of these changes. Nor does account for different levels of impact and for the potentially different levels of significance attached to impacts by stakeholder groups. In order to operationalize the SLA's conceptual framework for the assessment intended in this study, it is therefore necessary to couple it with

- An SIA methodology to be used in the identification of stakeholders, impacts, and their significance, and
- The IO framework that links the power plant's development to the impacts.

A detailed description of the applied methodology and framework for identifying and assessing impacts on the sustainable livelihood assets and strategies is provided in the next chapter.

4.3 Social Impact Assessment (SIA) as an overall methodology

4.3.1 History of Social Impact Assessment

While the analysis of social impacts has a long history, SIA specifically has its origins as part of project planning in the U.S. National Environmental Policy Act (NEPA), which formally established Environmental Impact Assessments (EIA) in 1970. While environmental factors were the main focus of NEPA, it also required the consideration of social issues in their environmental context (Vanclay, 2006:4). Since that time, EIA and SIA processes have been adopted by many countries, as well as international organizations, lending institutions, and consultancies, such as the World Bank Group, the Asian Development Bank (ADB), or the United Nations Development Program (UNDP) (Momtaz and Kabir, 2013:87). These are

often called “Environmental and Social Impact Assessment” (ESIA). Since its beginnings in the 1970s, the assessment of social impacts has become increasingly important as it has been recognized that managing social impacts can reduce project risks and benefit affected communities and project and businesses activities (Esteves et al., 2012:36). Furthermore, the understanding of SIA has shifted from being an *ex-ante* prediction of social impacts towards being an ongoing management and monitoring process, which should be applied at all stages of the project’s lifecycle (UNEP, 2007:II).

In line with these developments is the establishment of a new direction in SIA methodologies, which aim to promote community development and empowerment, build capacities, and develop social networks and trust (Vanclay, 2005:2). These new approaches focus on stakeholder engagement and participation instead of rational-scientific measurements of impacts (UNEP, 2002:472). While participatory approaches have many advantages and allow for the accounting of specific characteristics of the affected communities, they have also been associated with certain difficulties and risks like the integration of conflicting views or the danger of presenting exaggerated and biased opinions (Gomez et al., 2012:2). Therefore, today several authors propose integrating both participatory and technical approaches in SIA (ibid.; Esteves and Vanclay, 2009:141; Becker et al., 2004:188).

Although it is under development, SIA has become a more defined process, but still no commonly agreed upon definition of SIA exists. However, a widely applied definition, which will be applied in this study, is the one promoted by the International Association for Impact Assessment (IAIA) which was provided by Vanclay (2003): “…*the processes of analysing, monitoring and managing the intended and unintended social consequences, both positive and negative, of planned interventions (policies, programs, plans, projects) and any social change processes invoked by those interventions. Its primary purpose is to bring about a more sustainable and equitable biophysical and human environment*”.

Despite this enhanced definition and the new direction of SIA, in practice SIA's application continues to be limited to being a project planning tool (Esteves and Vanclay, 2009:138). Furthermore, there is a tendency to regard SIAs as an add-on component to EIAs. Hence, compared to biophysical matters, the amount of resources allocated to analyzing social issues are usually low (Esteves et al., 2012:36). The scope of SIA as part of EIA varies from country-to-country and study-to-study, sometimes being limited to analyzing social impacts only in the context of environmentally related changes. Recently, a study on the role of social impacts in IAs in Europe (TEP and CEPS, 2010) showed that the importance of social issues is not reflected in most IA studies. In nearly half of the analyzed studies, the focus was put entirely on economic impacts while the social dimension was not considered or only considered marginally (TEP and CEPS, 2010:51). Accordingly, some authors point out that the potential benefits SIA offers have not yet been fully achieved (Momtaz and Kabir, 2013:87; Esteves and Vanclay, 2009:140). Consequently, in order to reach a more sustainable development not only in the environmental but also the social dimension, there is a need to further and more holistically integrate the assessment of social aspects into research designs, project planning, and business activities.

One of the main reasons discussed for the limited application of SIA in practice is the missing normative framework (UNEP, 2007:II) and the lack of appropriate methods, tools, models, and data sources to assess social impacts (TEP and CEPS, 2010:55). According to Esteves

and Vanclay (2009:140), the main reasons for the limited theoretical and methodological foundation of SIA lies in the multidisciplinary nature of the research field. Furthermore, social impacts often can not be measured in quantitative terms but have to be analyzed on a qualitative basis. This poses difficulties especially for conventional IAs that often try to measure changes in terms of costs and benefits by counting or even monetizing impacts. Even if SIAs were understood as a process towards community development and empowerment, difficulties subsist in choosing among the numerous concepts, tools, and techniques that exist to assess social impacts. Vanclay (2005:3), for example, proposes that the ideal form for the SIA assessment process would be fully participatory and endogenous, but in SIA practice this is difficult to achieve.

As an orientation, Vanclay and Esteves (2011:11) propose a number of principles of good practice for SIA that can aid in selecting the frameworks, methods, and tools to be applied to evaluate social impacts. Based on these guidelines, SIA should include participatory processes that aim to understand the needs and interests of the communities likely to be affected (based on a stakeholder analysis) by collecting baseline data; scoping the key social issues; establishing the significance of the predicted changes; determining how the various affected groups and communities will likely respond; identifying ways to mitigate potential impacts; maximizing positive opportunities; and ensuring that principles of free, prior, and informed consent (FPIC) are taken into account and that human rights are respected (Vanclay and Esteves, 2011:11).

While the need for participation is emphasized by various authors and numerous theoretical reflections on the topic exist, the number of publications providing information and empirical evidence on the participatory implementation of SIAs is limited. One exception is the study presented by Becker et al. (2003) “A participatory approach to social impact assessment: the interactive community forum” in which alternatives for salmon recovery in the Snake River basin of the United States were assessed through a participatory approach that included citizens’ judgments about the anticipated impacts. The assessment was based on the assumption that instead of measuring impacts from a standardized list, residents of the local communities identified the impacts most relevant to them (Becker et al., 2004:179). Along with the participatory study a more technical SIA was carried out, based on secondary data sources and expert projections. Comparing the results, Becker et al. (2004) recommend applying a combination of participatory and technical approaches in SIA to provide robust findings on social impacts. This was also the approach used in this study.

4.3.2 Basic structure of a Social Impact Assessment

Generally, an SIA consists of a number of consecutive steps following approximately the steps of the EIA process. While the procedural order and the division among these different steps varies from study to study, the SIA process broadly compromises the phases illustrated in Figure 4-3 (based on Esteves et al., 2012:35; Gomez et al., 2012:3; Vanclay and Esteves, 2011:12; Vanclay, 2005:3; Rowan, 2009; Burdge et al., 2003:232; Becker et al., 2003; Vanclay, 2003:8). It should be noted that the particular steps chosen in this study vary from this general approach (see section 5.1).

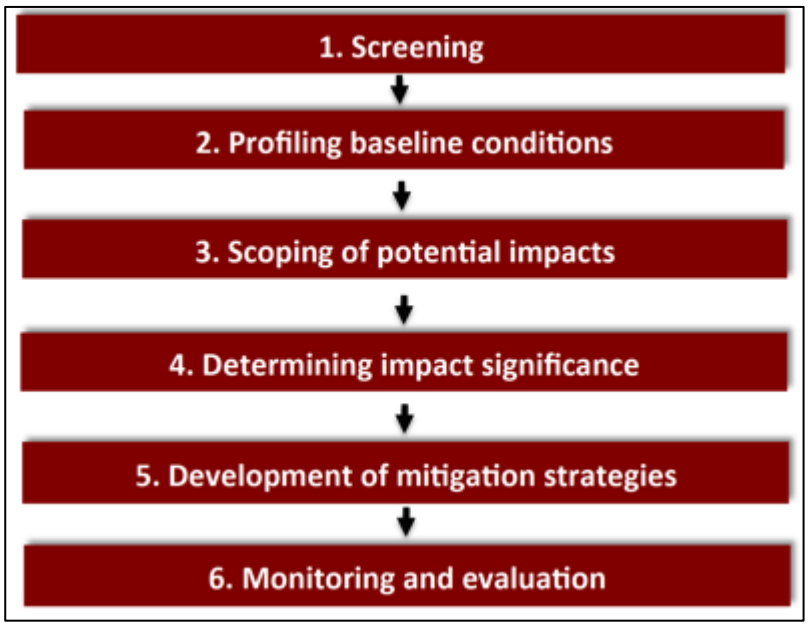


Figure 4-3: Steps within the Social Impact Assessment (SIA)

1. Screening: The objective of this initial step is to understand the potential impacts that a project could cause by collecting and reviewing *background information* and analyzing which *stakeholders* are likely to be affected. Additionally, if an SIA is conducted *ex-ante* to the project or policy implementation, it should be considered whether alternatives exist that would have fewer or less severe negative impacts. Based on this first analysis, it can also be decided whether a complete SIA is required or not.

1. *Background information*: The background information collected in this step covers the *inputs* (resources) required for a project, its *activities* (actions and processes performed to implement the project), and the *outputs* (products or services delivered through the project activities). Inputs, activities, and outputs are part of the IO framework as a "logical framework" that can help to establish and illustrate the causal relationships among inputs, activities, outputs, outcomes, and impacts, also known as impact value chain. Inputs in each development stage can trigger a set of activities that are designed to deliver certain outputs, which in turn cause a set of intended and unintended outcomes (i.e., social change processes). These outcomes will eventually result in livelihood impacts. While these relationships can appear to be relatively simple, they are in fact often complex issues that can only be simplified to a certain extent. The different elements of the impact value chain can be outlined as follows (see Figure 4-4).

   While inputs, activities and outputs are screened during this step, outcomes and impacts are part of step 3 described below.

   a) *Inputs*: The resources required to develop the project including human, financial, organizational, or material resources. Additionally, this study includes needs or demands and requirements as inputs as they represent the initial framework conditions of the CSP project and thus determine its activities, although these are not inputs in the traditional sense.

b) *Activities*: The actions and processes performed to implement the project and through which inputs are converted into outputs, such as developing a project proposal, communicating the project to stakeholders, or manufacturing components.
c) *Outputs*: The direct products or services delivered through the project activities, such as secured financing, informed stakeholders, or physical structures (Caldwell, 2002:11).

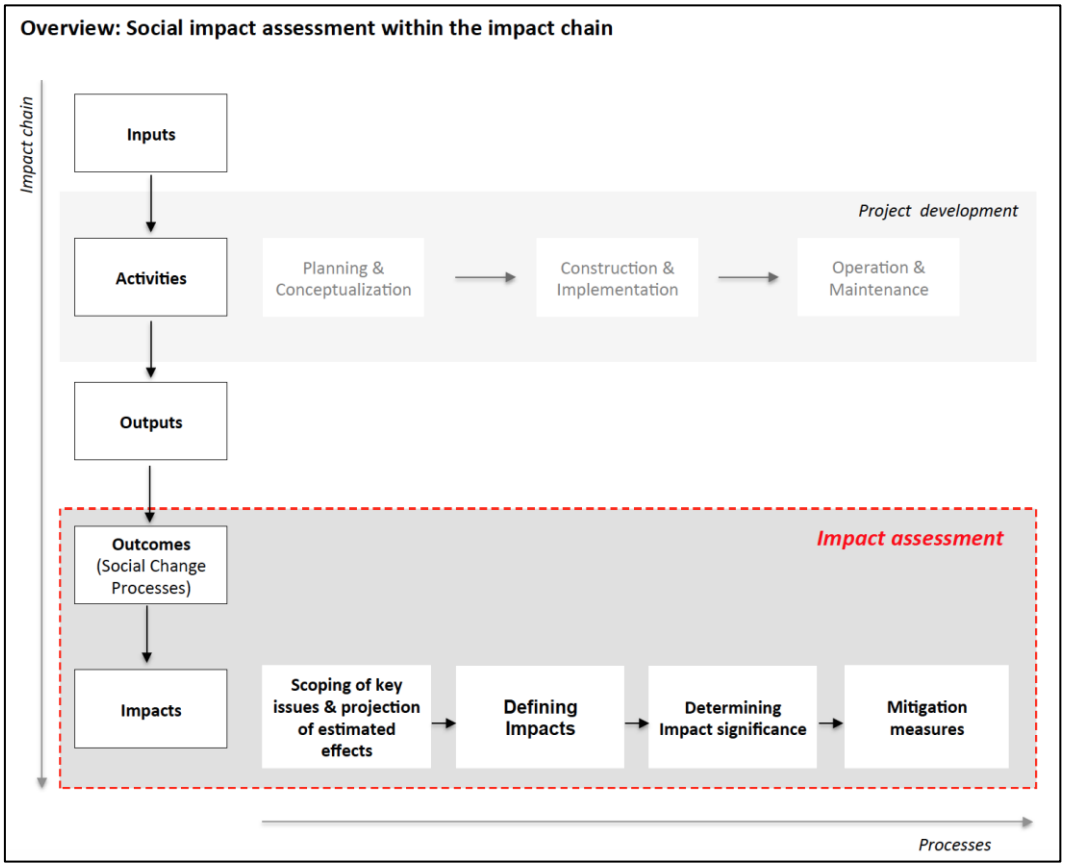


Figure 4-4: Impact assessment within the impact value chain, also called an Input-Output Framework

2. *Stakeholder analysis:* The stakeholder analysis is an essential step within the SIA process. It is an analytical tool that addresses the strategic questions of who the key stakeholders are that would be affected or that would affect the project (UNEP, 2002:489). Accordingly, the term "stakeholders" can be understood as those who affect or are affected by a decision or action (Freeman, 1984)[10]. Following this definition, being a stakeholder does not necessarily mean to be involved in the decision-making process. Especially for the assessment of social impacts it is therefore necessary to involve those stakeholders who usually do not have a say in project decisions. Based on the SLA framework, the stakeholder analysis should aim to identify marginalized and vulnerable groups to include their views and opinions on potential livelihood impacts. These are people without access to well-established social networks, those who are socially disadvantaged, and those who are not easily accessible (Reed et al., 2009:1935). Therefore, the stakeholder analysis applies a normative approach, emphasizing the need for stakeholder involvement and empowerment in decision-making processes (ibid.). The stakeholder analysis usually consists of at least two steps:

[10] Please find a more detailed explanation of "stakeholder" in section 13.

a) The identification of relevant stakeholders and
b) The differentiation and categorization of stakeholders according to their interests and influence.

2. Profiling baseline conditions: In this step, the state of the communities likely to be affected before any activity takes place is outlined in a baseline study. In order to establish the baseline, the social, economic, environmental, and cultural characteristics prior to the project's implementation have to be examined.

The objective of a baseline study is to understand and document the current livelihood situation of the communities and stakeholders, especially of those groups that have been defined as marginal or vulnerable, within the area likely to be affected by the project activities. The baseline study provides a benchmark of existing social conditions and trends at a given point of time against which potential impacts can be anticipated and change can be measured (Franks 2012, 6). According to UNEP (2007, VI), baseline studies should include information on:

"… the social environment (political context, institutional structure, arrangements and capacity, demographics, socio-economics, land-uses, current conditions and social trends); local and regional economics; descriptions and analyses of existing social and cultural values; and a framework and plan for the assessment of social effects ..."

Different data sources can be used for the collection of these types of baseline data. These could include primary or secondary statistical data, maps, observations, reports, and other types of literature on social, economic, or environmental factors. Additionally, baseline information could also be obtained from locally recruited project staff or interviews with local stakeholders (UNEP, 2007:VI). A baseline study includes several steps:

1. *Structuring the assessment and choice of indicators based on the SLA*: The baseline study should include information on the livelihood situation of all relevant stakeholders. This includes information on the vulnerability context, structures and policies, as well as livelihood capitals, strategies, and outcomes (according to the stakeholder groups). This implies:

   a) Identification of trends, stresses, shocks, and seasonality to define the vulnerability context;
   b) Identification of assets, capitals, and livelihood activities including adaptive and coping strategies;
   c) Analysis of macro, micro, and sectorial policies that impinge on people's livelihoods.

   Assessing whether a community (or a specific interest group or sector) will be resilient or vulnerable to specific changes or risks involves an initial identification of the current status of that community's (or group's) key assets and capitals. The result is a baseline degree of sensitivity/vulnerability. To measure this, a set of indicators needs to be established. This can be achieved by identifying the assets that people draw upon at various times (i.e., monthly, yearly) that form the backbone of their adaptive and coping strategies. By using this approach, it is possible to map particular livelihood systems, the assets that are used, and how these advance or hinder coping and adaptive strategies.

2. *Description of baseline assessment indicators*: Once the indicators are chosen, they are assigned to the different elements of the SLA framework:

   a) Vulnerability context (trends, stresses, shocks, and seasonality);
   b) livelihood assets and activities, adaptive and coping strategies;
   c) macro, micro, and sectorial policies.

3. *Conducting the baseline assessment*: The final baseline assessment is conducted by using information on the vulnerability context, structures, and policies and on the livelihood capitals.

3. Scoping of potential impacts: This phase of the SIA process aims to specify the direct and indirect impacts, whether intended or unintended, from each phase of the project activities. During the scoping phase, the full range of probable social change processes and livelihood impacts should be identified. In this step, outcomes and impacts of the "logical framework" illustrated in Figure 4-4 are considered:

- *Outcomes:* social change processes, that are caused by the project outputs. They are defined by changes within the livelihood environment. Following Vanclay (2002:193), outcomes in SIA can be defined as social change processes that are likely to comprise the following groupings:
  - *Demographic processes*: processes that result in a change in size and composition of the resident population;
  - *Economic processes*: processes that affect the ways in which people earn a living and the economic activities in the area;
  - *Geographical processes*: processes that result in changes in land use patterns;
  - *Environmental processes*: processes that result in a change of natural resources and their use;
  - *Institutional and legal processes*: processes that result in a change in the role, capacity, and activities of local authorities;
  - *Empowerment processes*: processes that affect the ability of people to participate in and influence decision-making;
  - *Socio-cultural processes*: processes that affect the culture and value systems of communities and society.

- *Impacts: Caused by social change processes, the term "livelihood impact" is understood interchangeably with "community, social or human impact" comprising a real (physical) or cognitive (perceptual) impact experienced by humans either at the individual level or at higher aggregation* levels" (Vanclay, F. cited in Sutheerawatthana, P. and T. Minato, 2010:121). Impacts are therefore consequences that alter the ways in which people live, work, play, relate to one another, organize to meet their needs, and generally cope as a member of society. The term also includes cultural changes to norms, values, beliefs, and traditions.

4. Determining impact significance: Once the potential impacts have been identified, the significance of the impacts has to be analyzed. To determine which impacts are likely to be significant, their scale and level of significance have to be evaluated. Based on the predictive assessment, the identified impacts can be classified and prioritized.

While the importance of determining the significance level of impacts has been stressed by numerous authors (e.g. Briggs, 2013; Rowan, 2009; Lawrence, 2007a-c; Duinker and Beanlands, 1986; Sadler, 1996), no common definition of "significance" exists. To date, determining significance has received limited attention within the IA process. This holds especially true for SIA, in which determining impact significance is often not mentioned and if it is mentioned, often no further information is given on how significance was or could be determined. Only Rowan (2009) has so far addressed the topic of determining impact significance explicitly within the context of SIA. The following section is therefore mainly based on the discussion and findings from EIA literature.

The term significance is used at different stages of the IA process. Accordingly, the understanding of the concept of significance varies depending on the stage of the assessment. Whereas significance in the screening and scoping phase usually refers to a selection mechanism (Kjellerup, 1999:4), significance in the prediction and evaluation phase typically makes judgments about what is important, desirable or acceptable and interprets the degrees of importance (Lawrence, 2007a:757). In this study, determining significance addresses the latter aspect.

Although different definitions of what significance is exist, many of them include at least one of the following two elements:

- Level of *significance / importance*[11] (significance is a value judgment, meaning significance depends upon the value that society places on an element);
- Level of *consequence / affectedness*[12] (degree and nature of the change caused in terms of measurable impacts).

While some authors like Thompson (1990:236) distinguish between these two elements, describing the former as impact significance in terms of the costs of an impact to society and the latter as prediction of the impact magnitude, most recent publications consider the predicted magnitude of impacts as one factor in determining impact significance (Lawrence, 2007a: 760). By recognizing the level of change and the value judgment as key properties of impact significance, any process that aims to determine the significance should try address and evaluate these two components. However, operationalizing these elements in the process of determining impact significance is a complex task. Accordingly, the answers to the question of how to determine the significance of impacts, the approaches and the extent to which impact significance is considered vary considerably (Lawrence, 2007a:766). The large number of different approaches, lack of standardization, inconsistency of their use and lack of transparency with regards to the methods applied make the comparison even more difficult (Briggs, et al. 2013:17; Thompson, 1990:237).

Lawrence (2007 a-c) has provided a framework for distinguishing and categorizing the different approaches into three general categories: the technical approach, the collaborative

[11] In the following the study uses the term *level of importance*.

[12] In the following the study uses the term *level of affectedness*

approach (often called the participatory approach) and the reasoned argumentation approach (Lawrence, 2007b). As for the overall SIA process, the technical approach focuses on scientific and technical aspects relying mainly on expert judgments and technical data and analysis. One example for the application of the *technical approach* can be found in Cloquell-Ballester et al. (2007), in which an expert group assigns the significance of each impact within a numerical or an ordinal scale.

The *participatory approach* on the other hand focuses on the relative importance that is placed on an impact by an individual or a group. As social values are characterized by a plurality of people (Wood, 2008:23) these types of judgment depend upon the specific context and are subjective, normative, and value-dependent (Lawrence, 2007a:766). The collaborative approach should aim to include all interested and affected parties and to integrate the diversity of perspectives and values of those potentially affected by the project in the process of impact significance determination.

The third category proposed by Lawrence (2007b) is the *reasoned argumentation approach*. The definition and allocation of approaches to this group is less explicit. According to Lawrence (2007b:747) this approach: "*starts from the premise that both technical and collaborative approaches are too narrow to provide an adequate foundation for value-based significance judgments about what is and is not important*." The reasoned argumentation approach integrates both technical and collaborative aspects and determines significance based on reasoned argumentation.

All three approaches have advantages and disadvantages; therefore, it is recommended for the general SIA process, to combine these approaches. For example, the participatory and the technical approach can be used to determine the significance of the identified impacts and then the results can be summarized based on reasoned argumentation.

So far, however, the majority of IA mainly applies the technical approach. This is especially surprising as one of the factors defining significance is widely recognized as the value society places on an element. Contrary to what might be expected, most studies also apply a technical approach instead of a participatory approach to determine the importance associated with an element by society in general or by specific groups. The value judgment is based, for example, on conpliance with established environmental, social, or health standards and legal principles, or the expected scope of impacts on publically protected goods. Assuming that different stakeholders have a different set of social values, relationships, histories and other attributes unique to their particular circumstances (Becker et al., 2004:179), SIA without public participation is insufficien.

5. Development of mitigation strategies: After the significant impacts have been identified, it is necessary to analyze whether it is possible to mitigate or reduce the predicted levels of impact. This includes establishing communication strategies to inform the communities likely to be affected and to facilitate an informed dialogue and decision-making process regarding mitigation and potential compensation measures.

6. Monitoring and evaluation: Monitoring is necessary to track the progress of the social impact management approaches and to address unanticipated issues. Eventually changes or additional mitigation measures need to be implemented. An evaluation process is required to review the SIA process to pinpoint lessons learned and areas that need further improvement.

Likewise, it is required to evaluate the management and communication processes of engaging with the local communities.

Within these six steps of a SIA process and depending on the scope of the study, a number of different tools and techniques have to be applied in each phase of the SIA analysis (UNEP, 2002:473). In most cases it is recommended to apply a combination of participatory and technical methods and tools using primary and secondary data to ensure that the impacts identified reflect the situation adequately and allow for local perspectives to be integrated through a range of qualitative and quantitative methods (Esteves and Vanclay, 2009:140). In practice, it is not always possible to assess every aspect in detail, so most SIAs do not apply more than two or three tools during the assessment process (UNEP, 2002:473). Nevertheless, following the SIA interpretation of Vanclay (2003), the assessment independent of the scope should aim to be as participatory as possible, involving affected local stakeholders directly in the process. At a minimum, the assessment should include the perspectives of those directly affected.

5 Social impact assessment of Noor$_o$ I

5.1 Research design

Taking the findings described above and the limited availability of documentation on the implementation of participatory SIA into consideration, this study was designed to address two goals:

- combining *technical analysis* with *participatory approaches,* and
- *involving the affected communities at different levels* of the IA.

The *technical analysis* included the analysis of secondary data sources, literature reviews, and expert projections. In contrast, the *participatory approach* was implemented during two extensive empirical studies in Ouarzazate, ensuring that location-specific issues and community stakeholders' perspectives were accounted for and reflected in the outcomes of this study.

It should be mentioned that the study was not designed as a project-planning tool but as a research project that aimed both to assess the livelihood impacts of Noor$_o$ I and to provide general recommendations for sustainability requirements for future CSP projects. The study did not aim to follow the CSP project in Ouarzazate from the beginning to the end, providing an *ex-ante* assessment and mitigation and monitoring plans. These tasks have been undertaken by the implementing and funding organizations. The EIA and SIA studies prior to the project were conducted on behalf of the World Bank, ACWA Power, and MASEN. Results of this assessment are provided in the 5 Capitals (2012) reports that are available online.[13] The same applies for planning and implementing mitigation measures. MASEN and ACWA Power were required to fund mitigation and compensation measures via the social development plan. In addition, both voluntarily funded a range of additional mitigation measures that included local stakeholders, to share benefits, and to address their concerns regarding the power plant.

Analytical and methodological framework

Figure 5-1 gives an overview of the analytical and methodological framework applied to assess the livelihood impacts of the CSP plant in Ouarzazate, based on the general structure of an SIA described in section 4.3.2. Due to limitations described above, steps 5 and 6 of the original SIA methodology (mitigation strategies, monitoring and evaluation) were not applied. Instead, recommendations and sustainability criteria to safeguard future CSP projects were developed, based on the results of the identified impacts and their significance.

[13] http://documents.worldbank.org/curated/en/docsearch/report/E2644 Morocco - Ouarzazate Concentrated Solar Power Project: environmental and social impact assessment framework / Etude d'impact potentiel environnemental et social (French).

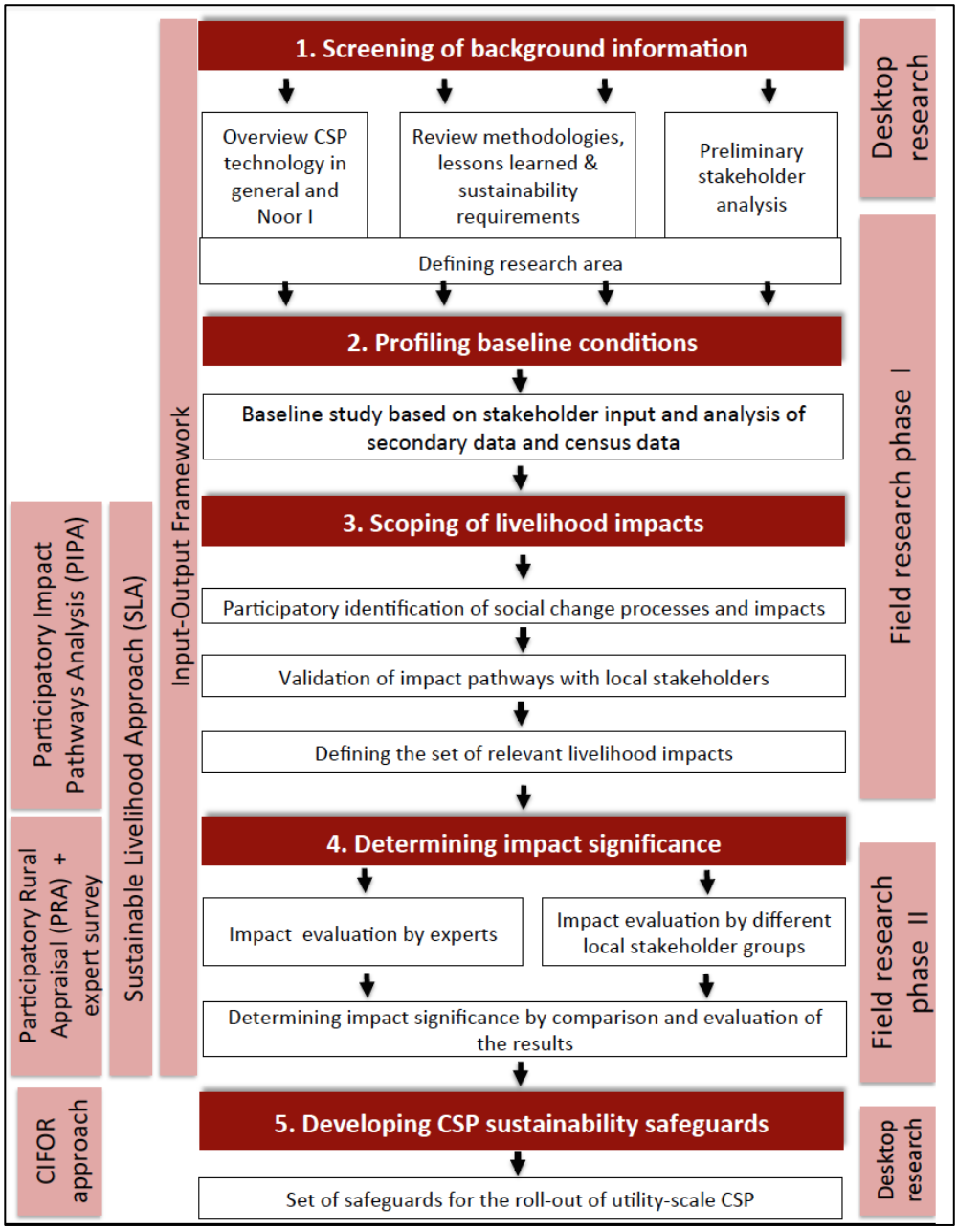


Figure 5-1: Overview of the applied analytical and methodological framework in this study

While the following paragraphs give a brief description of the different steps, sections 5.3 and 5.4 describe in detail the steps, the survey designs and data analysis.

1. Screening of background information

Based on the information gathered from secondary data sources and literature, an overview of the CSP technology, a detailed description of the Noor$_o$ I project, and a preliminary baseline profile of the affected Province of Ouarzazate was established. Furthermore, both a stakeholder analysis to identify relevant stakeholder groups and an ex-ante IA of anticipated livelihood impacts stemming from Nooro I were conducted. These analyses and data provided the basis for the empirical field research, which was conducted in two parts.

At the beginning of the first field research phase, the *research area was defined*, relevant stakeholders were identified, and the questionnaires were adapted to the regional context and the level of experience of the local research team.

2. Profiling baseline conditions

In order to *assess the livelihood situation of the communities in the research area*, the core part of this field research consisted of the collection of qualitative data on the interaction of interviewees with and their perceptions of the CSP plant. The survey methods applied comprised in-depth community, stakeholder, and key informant interviews, as well as focus group discussions in order to establish a livelihood baseline for the impact area and the IA for Noor$_o$ I. Finally, this qualitative data was combined with statistical data compiled prior to the field trip.

3. Scoping of potential impacts

Based on the interview results, a first *set of livelihood impacts* stemming from the CSP plant was identified by the research team. These preliminary results were afterwards discussed in a workshop with relevant local stakeholders to incorporate local stakeholders' perspectives and judgments.

4. Determining impact significance

In order to determine the significance placed on different impacts *from the perspective of local stakeholders,* in the second field research phase a set of rating and preference ranking tools were applied to obtain information on the perceptions of local stakeholder groups. The stakeholder groups were chosen based on the stakeholder analysis, including vulnerable groups such as women, youth, farmers, and unemployed as well as groups that either had specific knowledge or were especially connected to or affected by the CSP development, such as workers employed at the CSP project, students who moved to the region, SMEs, and community representatives.

In order to predict the significance of impacts *from an expert perspective,* an expert survey was conducted as a structured questionnaire to obtain empirical information from local and international experts who are from or who are active in the region or otherwise have expertise to evaluate the four significance criteria including intensity, geographic range, duration, and likelihood. Due to the wide range of impacts, it was essential to address experts from different fields (e.g., water, health, business sector, social development, project development, finance and banking) who were in a position to provide factual information and evaluate the identified impacts.

5. Developing recommendations on Noor$_o$ I and CSP sustainability safeguards

Based on the results from the empirical research, it was possible to define the most significant impacts, informing the development of guidelines and social sustainability criteria. In this last step, the pool of potential livelihood impacts and the initial set of sustainability requirements developed during the literature review are assessed against the empirical findings to establish a set of sustainability safeguards for future CSP plants. As a basic methodology, the CIFOR approach was used and adapted to CSP power plants. Although originally developed for the forest sector, CIFOR's methodological approach for providing a locally-specific

principles, criteria, and indicators (PC&I) catalogue is a promising way also for studying CSP projects.

5.2 Research team

In order to sincerely engage with local stakeholders and to reduce the risks of a cultural bias stemming from a German-led research project, the research was conducted in cooperation with a group of Moroccan research partners. Out of 11 members of the core research team, six were Moroccan; one senior researcher from Casablanca led the field research and five junior researchers from the Ouarzazate area participated. In addition, the field research was supported by the Draa Association, an initiative of professors from the Ouarzazate University to promote renewable energy in the region. While the local junior researchers conducted the majority of the on-the-ground interviews and the youth and women focus group discussions, the Draa Association organized the logistics and facilitated most of the high-level key expert and community stakeholder interviews. The seventh member of the core research team – an experienced political scientist, with significant experience in PRA methods from Egypt – supervised and monitored the interview data collection. The remaining four members were from Germanwatch, Wuppertal Institute, and BICC and mostly engaged in the data analysis. Additionally, the team was supported by an American PhD candidate, working on energy justice in Morocco and the Mediterranean and a German PhD student working on sustainability frameworks. Apart from the analytical framework, the multinational research team validated all elements of the research process. Some elements, for example the interview guidelines, were adapted and further developed during the field research in order to account for the experience and knowledge of the local researchers.

5.3 Applying the Social Impact Assessment to Noor$_o$ I

In the following sections, the methods and tools applied within the different stages are described in detail. The results of the empirical research and the analysis are presented in part D “Empirical studies: analysis and results” and the developed CSP sustainability safeguards in part E “Recommendations and outlook”.

Desktop research

5.3.1 Screening of background information

Overview of CSP technology and review of methodologies, lessons learned, and sustainability requirements

According to the described SIA process, the screening phase focused on analyzing background information and data in order to pinpoint possible livelihood impacts for the present study. The screening included an extensive literature review providing (a) a brief introduction on CSP technology, its market, and its potential cogeneration applications and (b) a review of methodologies and sustainability requirements from other fields e.g., clean development mechanisms (CDM), mining, process industry, and forestry. Based on the results from this screening process, a normative definition of “livelihood sustainability” was developed and a preliminary set of potentially relevant principles and criteria for CSP was identified. Additionally, a “pool” of potential livelihood impacts from finalized CSP/PV ESIAs was established,

along with an inventory of lessons learned from the development of other large-scale power plants in the MENA region and CSP development in Spain and the United States. Some of the collected information and background data have already been presented in chapter 3. In addition to the literature review on CSP technology and sustainability aspects of large infrastructure projects, the screening phase also involved the process of identifying stakeholders and defining the research area. These processes consisted of a number of analyses, which were based on reviews of literature, maps, and other background information combined with information that was gathered during the first phase of the field research.

Preliminary stakeholder analysis

Extending the conceptual approach described in section 4.3.2, the stakeholder analysis in this study was divided into two phases: a preliminary scan of stakeholders based on the results from the literature review, and a participatory extension of the identification and categorization process during the field research.

The *preliminary scan of stakeholders* was conducted based on the secondary literature. This process included the two steps described in section 4.3.2: first, the central stakeholders were identified and afterwards differentiated and categorized based on their level of affectedness and their geographical radius of influence. The resulting preliminary list of key stakeholders, comprising those actors who are involved in or affected by the CSP project in terms of significant negative and positive impacts on their livelihoods, provided the basis for the stakeholder identification process applied during the field research.

The *differentiation and categorization of stakeholders* aimed to identify community stakeholders (relevant key stakeholders living in the four communities under study who might have an influence over or are affected by Noor$_o$ I) and key informants (stakeholders with specific knowledge or high influence on relevant issues in the region or Noor$_o$ I). The process involved three steps:

1. A cross check with the local research team during an internal team workshop to validate the preliminary stakeholder list;
2. Snowball sampling to enrich the stakeholder list with additional names (snowball sampling is a commonly applied method that uses key informants or documents to locate one or two people. Those people are asked to identify relevant stakeholders and to recommend someone from these stakeholders to identify further stakeholders in a second round) (Bernard, 2006);
3. Enriching the list with subsequent information gathered through the rounds of exploratory and in-depth community interviews.

After the stakeholders were identified, they were grouped into three main categories: administrative stakeholders, societal stakeholders and project developers. The first two groups were further categorized regarding their relation to the SLA assets to ensure a sufficient coverage of the most important local to regional aspects, the actors' field of interest, and power relationships and potential conflicts of interests. In the last step, all stakeholders were ranked and the most relevant were selected according to their role as key informant in the context of the project in particular and the livelihood situation in the region in general. The overall results of the stakeholder analysis provided the foundation for the selection of individ-

ual stakeholders for the key informant and expert interviews and for the choice of stakeholder groups for the focus groups during the first and second field research.

Defining the research area

Based on data and information collected in preparation for the field research, it was initially planned to define the research area within a certain radius around the project site. But during the field research it became clear that it was more useful to determine the research area based on the affectedness of the communities by the CSP project. Based on this reasoning, the communities included in the main research phase were selected in two stages:

1. During a first internal workshop, based on the local knowledge of the research team as well as a variety of regional, local, and project-related maps, eight communities in an area extending over a radius of 130 km were selected that were likely to be affected either directly or indirectly by the Noor$_o$ I plant;
2. After exploratory interviews were conducted in these eight communities, a set of criteria was established that reflected how these communities might be affected by the project. Based on these criteria, the communities were ranked and the four most affected communities were chosen to be included in the main research phase.

Field research phase I: impact analysis

5.3.2 Profiling baseline conditions

According to the procedure described in section 4.3.2, the process of establishing the baseline consisted of the following steps. The baseline assessment was divided in two sub-steps, the preliminary and the final assessment.

1. *Structuring the assessment and choice of indicators based on the SLA***:** The indicators were selected in the following way:
   a) Pre-selection of core subjects by the project team;
   b) Validation of core subjects by focus group representatives in a validation workshop. The challenge for the workshop group was to determine how to measure whether these assets have been replenished or eroded and what factors contribute to these processes.
2. *Description of baseline assessment indicators***:** the indicators were assigned to the different elements of the SLA framework. A complete list of suggested criteria and indicators to guide the baseline assessment is attached in Annex 16.1.
3. *Preparation of a preliminary baseline assessment***:** the preliminary baseline assessment was based on available data and information gathered through desk research. This included information on the vulnerability context, structures, and policies, while information on the livelihood capitals was only partially available and accessible.
4. *Interview phase to complete the baseline assessment:* after the preliminary baseline assessment was established, knowledge gaps could be identified. Data and information on livelihood assets, activities, aspirations and strategies were particularly lacking. In order to close these gaps and complete the baseline, primary data were collected by adding respective questions to the stakeholder questionnaires.

5.3.3 Scoping of potential impacts

Application of the logical input-output framework

The Input-Output (IO) framework was applied in the present study to understand the potential linkages between CSP development and its impacts on local communities (GEF, 2009:1). By analyzing the different stages of the development of Noor$_o$ I, the potential impact pathways can be projected and social change processes (outcomes) and livelihood impacts can be identified.[14] The specific objectives were to

- Describe the inputs, activities, and outputs of Noor$_o$ I to understand potential linkages through which each stage of the CSP development could affect the livelihoods of the community stakeholders;
- Identify elements and mechanisms that could be influenced through sustainability principles and criteria to minimize negative and maximize positive implications of future CSP projects.

Starting with analyzing the inputs and activities, it becomes clear that each project development and implementation stage varies in scope, scale, and time and has different impacts on the affected communities, increasing the complexity of the analysis. A distinction can be made between impacts of the project planning process and the impacts of the construction and operating phases. In order to better comprehend these differences, it is necessary to take a closer look at the set-up of the different activity stages before analyzing social change processes and identifying livelihood impacts that result or could result from the Noor$_o$ I power plant in Ouarzazate. Below, the relevant aspects of the three main activity phases are described as a basis for the scoping process of the associated livelihood impacts at the local level:

- *Planning and conceptualization***:** Each activity that occurs before the project breaks ground is considered to be part of the project planning and conceptualization phase. In this phase, institutions and project developers must arrange project scoping, feasibility studies, and stakeholder negotiations. Once the conceptual design of the CSP project is completed, the permission process,the bid invitations and contract negotiations can begin. After the project is announced, it typically takes one to three years to conduct analysis, studies, and decision-making processes before ground can be broken. Unlike environmental and physical impacts, social, psychological, and economic impacts can start to occur with the announcement of the project. People can and do alter their behavior in anticipation of impacts (Lawrence, 2007c:781). For example, information about the project can raise expectations and concerns within the communities, possibly resulting in impacts like an increase in property prices due to speculation about demand for land or a preemptive influx of non-residents searching for employment. Local stakeholders may be fearful or worried about potential environmental impacts. Competition over limited natural resources may incite opposition to the project. It is not unusual that these reactions are based on misconceptions (ibid).
- *Construction and implementation***:** The construction and implementation stage starts after the project proposal has been approved and the project developer proceeds with the design and construction of the CSP project. The construction of Noor$_o$ I was antici-

[14] Inputs and Outputs according to the CSP project stages planning, construction, and operation have been identified and described in chapter 7.

pated to require about 24 months (5 Capitals, 2012a:29). Typically, construction includes recruiting workers; purchasing, importing, or manufacturing components; sourcing raw material; and installing and assembling the CSP facilities - including the construction camp. During construction, land, water, and electricity is consumed. Many livelihood impacts, both positive and negative, are anticipated to occur during this phase. On the positive side, for example, the most jobs will be created. On the negative side, for example, the local community may lose land and struggle to adapt to the influx of new residents as new residents may have different cultural practices and values, which can cause tension. The potentially increasing demands of livelihood services and physical infrastructure and potentially rising commodity prices might raise concerns in the local communities about the equitable distribution of costs and benefits.

- *Operation and maintenance***:** The operation and maintenance stage of the CSP plant begins after the construction is completed. This stage could have many potential benefits like the generation of electricity, long-term employment, or the use of process heat for industries. On the downside, long-term drawbacks can set in at this stage, such as visual impacts, waste disposal, competing water demands, or wastewater discharge. The benefits could also bypass the local community, as employment opportunities for construction are only temporary and the industrial and electricity benefits are realized elsewhere.

Livelihood impacts can result from each of these project activity phases. Therefore, the scoping of potential impacts will be aligned to these different phases along the IO framework within the analysis.

Identifying livelihood impacts

Within the structure of the SLA, the effort of identifying the livelihood impacts of Noor$_o$ was focused on the outcomes (social change processes) and livelihood impacts (see section 4.3.2). Three iterative steps were taken to explore the social change processes and livelihood impacts stemming from Noor$_o$ I. The primary source of information was the qualitative stakeholder input collected during the field research on the baseline conditions and the different impact perspectives and normative judgments of the communities surrounding the power plant. As a secondary source of information, the findings collected during the desktop research were used to ensure that the process reflected the conceptualization of the existing state-of-the-art SIA literature and that no relevant issues or local context-independent categorizations and taxonomies covered in similar fields were overlooked during the impact identification.[15]

Step 1 - Scoping of key issues: Grouped under the SLA structure, the starting point for the impact identification was the scoping of potential key issues based on field findings. Additionally, the scoping was complemented with the desktop findings on key themes of livelihood sustainability, the range of social variables deduced from the analysis of existing renewable energy ESIAs, and the livelihood issues described in existing sustainability frameworks (see Table 5–1).

[15] The interest in these lists is not in the details - for there are various objections one might raise to this on the grounds of overlaps or omissions - but in an attempt to reflect upon existing experiences in the field of SIA.

SLA capitals	**Livelihood sustainability key themes** (pre-defined by the authors)	**Livelihood issues** (derived from the pool of potential livelihood sustainability criteria)	**Social variables** (adjusted by the authors based on the analysis of existing ESIAs and according to Vanclay, 2002)
Social	Preservation and enhancement of social resources and social cohesion Vulnerable and marginalized groups Equity, fairness and non-discrimination A "future focus"	- Heritage and cultural resources - Social cohesion - Population size - Vulnerable and marginalized groups - Gender equality - Equity and non-discrimination	- Sense of place - Mentality - Archaeological and cultural resources - Daily living and movement patterns - Vulnerable and indigenous populations - Population size - Influx and outflow of temporary workers - Population structure - New social classes - Family structures - Racial, demographic, sexual, and ethnic composition and distribution - Attitudes toward the project - Social networks - Social cohesion - Gender equality - Social equity
Political	Social inclusion, participation and empowerment Good governance (transparency and accountability)	- Participation and social inclusion - NGOs - Information - Conflict and remedy mechanisms - Laws and human rights - Legal advice - Anti-corruption	- Participation - Information - Accountability, remedy, and conflict - Community agreement - NGO involvement - Corruption and distribution of power characteristics and authority capabilities
Physical	Availability of and access to basic livelihood needs and services	- Basic livelihood needs and services - Community investment	- Availability and access to community infrastructures - Traffic - Transportation
Natural	Environmental protection Land and water Biodiversity	- Waste - Land rights - Water security - Biodiversity resources and services	- Water access and availability - Relocations of individuals or families - Drainage patterns - Landscape - Land-use patterns - Land acquisition and disposal - Land value - Biodiversity (flora and fauna) - Dust and emissions - Noise - Vibration - Waste
Financial	Poverty alleviation and income generation Local economic impulses and employment opportunities	- Poverty alleviation and income generation - Employment - Community welfare - Sustainable development strategies - Local content	- Revenue characteristics - Economic focus of the community - Investment environment - Revenue characteristics - Development plans - Income characteristics - Prices (production, consumption, and wages) - Local economic capacities - Employment characteristics - Employment equity - Wages - Working conditions - Child labor
Human	Capacity building, skill development and technology transfer Education, social learning and awareness Health and safety	- Capacity building and skill development - Technology transfer - Learning and awareness raising - Health and Safety	- Awareness - Labor skills - Training possibilities - Technology - Health - Community safety

Table 5–1: Scoping of key issues

As an additional reference[16], ideas provided by the International Association for Impact Assessment (IAIA) for the Interorganizational Committee on Principles and Guidelines for Social Impact Assessment about what social impacts to expect in various areas were taken into account (IAIA, 2003:4).

- People's way of life – that is, how they live, work, play, and interact with one another on a daily basis;
- Their culture – that is, their shared beliefs, customs, values, and language or dialect;
- Their community – its cohesion, stability, character, services, and facilities;
- Their political systems – the extent to which people are able to participate in decisions that affect their lives, the level of democratization, and the resources provided for participation;
- Their environment – the quality of the air and water; the availability and quality of the food people eat; the level of hazard/risk, dust, and noise to which they are exposed; the adequacy of sanitation, physical safety, and access to and control over resources;
- Their health and wellbeing – that is, people's state of complete physical, mental, social, and spiritual wellbeing and not merely the absence of disease or infirmity;
- Their personal and property rights – particularly whether people are economically affected or experience personal disadvantage that may violate their civil liberties;
- Their fears and aspirations – their perceptions about their safety, their fears about the future of their community, and their aspirations for their future and the future of their children.

Step 2 - Identifying social change processes: After scoping the key issues, another specification of the impact identification was required in order to determine and differentiate social change processes and livelihood impacts. Many approaches are available to evaluate the trajectories or change processes through which actual impacts could occur. Two additional social change processes were added to the seven groupings Vanclay (2002) identified - community service processes and human capital processes – to fit the SLA lens of the assessment. While context specific insights gained during the SLA field research were once again the basis for identifying change processes, the combination of social variables already illustrated in the last column of Table 5–2 (see section 3.2 for the definition), the main social change processes defined by Vanclay (2002) and specific social change processes identified in the existing solar energy ESIAs (see section 3.2) informed and helped to structure the process.

SLA capitals	**Main social change processes** (Vanclay, F. 2002:193)	**Social variables** (adjusted by the authors based on the analysis of existing ESIAs and according to Vanclay, 2002)	**Specific social change processes** (adjusted by the authors based on the analysis of existing ESIAs and according to Vanclay, 2002)
Social	**Demographic processes:** Processes that result in a change in the demographics and size of the population **Socio-cultural processes:** Processes that affect the culture and value systems of communities and society	Sense of place	Change in the community atmosphere
		Mentality	Change of social well being and the traditions in communities
		Archaeological and cultural resources	Impacts on culturally or archeologically valuable resources
		Daily living and movement patterns	Impacts on daily living and movement patterns
		Vulnerable and indigenous populations	Marginalization of vulnerable groups
		Population size	Increase/Decrease in population size
		Influx and outflow of temporary	Influx of construction workers

[16] The World Bank's "User's Guide to Poverty and Social Impact Analysis (PSIA)" (World Bank, 2003) developed similar ideas by spelling out six "transmission channels". Because "employment, prices, access to goods and services, assets, transfers and taxes, and authority" all have a rather economic and policy reform focus we put the social dimension of Noor I to the center of our research and decided to use the suggestions provided by IAIA instead.

		workers	Increase of mostly male newcomers
		Population structure	Introduction of people dissimilar to the community's demographic profile
		New social classes	Creation of new social classes with different social structures
		Family structures	Change in family cohesion and traditional family structures
		Racial, demographic, sexual, and ethnic composition and distribution	Change in social standing of marginalized groups
		Attitudes toward the project	Unrealistic expectations for benefits
		Social networks	Disruption of social networks
		Social cohesion	Creation of social differences within the community
		Gender equality	Change in chances of women
		Social equity	Change in chances of people and access of people to benefits
			Competition among community members for jobs
			Feeling of discrimination

Political	**Institutional and legal processes:** Processes that result in a change in the role, capacity, functioning and activities of government (local, provincial and national) and other organizations **Empowerment processes:** Processes that affect the ability of people to participate in and influence decision-making	Participation	Community engagement
			Exclusion of community groups
		Information	Lack of information (access, quality, and availability)
		Accountability, remedy, and conflict	Grievance cases
			Protests and opposition
			Increase or decrease of existing conflicts
		Community agreement	Disagreement and non-acceptance of community decisions
		NGO involvement	NGO involvement in the project design
		Corruption and distribution of power characteristics and authority capabilities	Elites capturing the benefits because of privileged access
			Mistrust due to lack of transparency in information provision

Physical	**Community service processes:** Processes that affect the availability of and accessibility to community infrastructures	Availability and access to community infrastructures	Change in access to and availability of community infrastructure, such as electricity
			Water
			Sanitation
			Housing
			Sewage
			Schools
			Health care
			Recreation
		Traffic	Change in traffic patterns and amount
		Transportation	Change in transportation and rural accessibility

Natural	**Geographical processes:** Processes that result in a change of land use and land use patterns	Water access and availability	Change in water access and availability
		Relocations of individuals or families	Involuntary resettlement
		Drainage patterns	Disturbance of the land surface through construction facilities and soil sealing
		Landscape	Change in the character, and quality of the landscape from rural to industrial
		Land-use patterns	Competition over land
			Change in landuse due to fencing and changed land tenure
		Land acquisition and disposal	Change or sterilization of cultivated and grazing land due to power plant, water extraction infrastructure, access roads, and transmission lines
		Land value	Change of land value
		Biodiversity (flora and fauna)	Habitat disturbance, change in biodiversity, and protected areas
		Dust and emissions	Change in air quality
		Noise	Change in noise levels

		Vibration	Vibration of ground from ground breaking and excavations
		Waste	Production of waste

Financial	**Economic processes:** Processes that affect the way in which people earn a living and economic activities in the area	Revenue characteristics	Change of revenues in the community
		Economic focus of the community	Diversification of economic activities in different sectors as well as local/regional/national/international linkages
		Investment environment	Change of the economic profile of the area and its visibility as an investment destination
		Revenue characteristics	Change in agricultural/industrial/tourism/informal sector revenue and local tax
		Development plans	Alteration of future development plans
		Income characteristics	Change of disposable income in agricultur-al/industrial/tourism/informal sector
		Prices (production, consumption, and wages)	Change of production, prices of goods/services, and wages
		Local economic capacities	Inclusion of local enterprises
		Employment characteristics	Change in employment opportunities (temporary or permanent) in the industry
			Construction
			Tourism
			Agriculture
			Commerce
		Employment equity	Change in the distribution of occupational opportunities
		Wages	Change in wage conditions
		Working conditions	Worker health and safety

Human	**Human capital process-es:** Processes that affect the capabilities and human security of people	Awareness	Change in the awareness of environmental or social trends
		Labor conditions	Change in labor standards
		Health	Change in sexual transmitted infections, waterborne diseases, and pollution
		Community safety	Change of community risks associated with environmental stresses or social conflict
			Increase in prostitution
			Increase in alcohol and drug abuse
			Increase in risk of livestock theft, poaching, and damage to farm infrastructure
			Risk of violence associated with presence of construction workers on the site
			Loss of girlfriends or wives to construction workers
		Labor skills	Transfer of skills and knowledge
		Training possibilities	Change of training opportunities
		Technology	Import of technologies

Table 5–2: Identifying change processes

Step 3 - Determining livelihood impacts: By combining the information gathered during the previous two steps, a wide range of livelihood impacts could be determined. In addition to the insights gained during the SLA field research, an existing list of impacts was used as guidance for the impact identification and description. While regrouped under the different SLA capitals, this list was once again derived from Vanclay (2000), categorizing livelihood impacts at the individual/household level and the community/institutional level.

SLA capitals	**Individual and household level** (adjusted by the authors according to Vanclay (2000:6)	**Community and institutional level** (adjusted by the authors according to Vanclay (2000:6)
Social	- Uncertainty about impacts - Loss of aspirations about the future for self or children - Experience of stigmatization and deviance labeling - Moral outrage,, religious affront, violation of sacred sites - Objection/opposition to project, NIMBY - Dissatisfaction due to a project's failure to achieve high expectations - Annoyance (dust, noise, strangers, more people) - Disruption to daily life, way of life (having to do things differently) - Reduced perception of community cohesion and integration - Loss of community identification, connection to place (do I belong here?) - Change in attitude towards local community, level of satisfaction with the neighborhood - Disruption to social networks - Increased family violence - Deteriorating gender relations within the household - Changed cultural values - Worsening perceptions about personal health and safety - Reduced leisure opportunities - Reduced feeling of homeliness - Increased density and crowding - Reduced aesthetic quality, outlook, visual impacts	- Diminished cultural integrity(continuation of local culture, tradition, rites) - Destruction of, or other negative influences on, heritage and other sites of archaeological, cultural, or historical significance - Cultural violation – desecration of sacred sites, breaking taboos and other cultural mores. - Actions taken that are considered profane within the local culture - Increased inequity (economic, social, cultural) - Social justice issues in relation to minority or indigenous groups - Worsening gender relations in the community - Increased crime - Increased violence - Increased social tensions, conflict, or serious divisions within the community - Uncertainty - Annoyance - Dissatisfaction - failure to deliver promised benefits - Changed demographic structure of the community - Community identification and connection, sense of belonging, attachment to place
Political	- Reduced control over fertility (loss of availability of contraception, and lack of power to make decisions about birth control)	- Violation of human rights, freedom of speech - Increased workload on institutions, local government, regulatory bodies - Increased corruption, decreased credibility or integrity of government - Decreased level of community participation in decision-making, loss of empowerment - Access to government and/or other social services - Participation in decision-making
Physical	- Reduced quality of housing	- Reduced adequacy of physical infrastructure (water supply, sewage, services, and utilities) - Reduced adequacy of a community's social infrastructure, health, welfare, education, libraries, etc. - Reduced adequacy of housing in the community - Access to public goods and services
Natural	- Reduced availability of food and adequate nutrition - Reduction in ecosystem services	- Loss of rights over, and access to, resources - Impact on the social values about heritage and biodiversity - Perceived quality of the living environment (i.e.. work and home environment or neighborhood) – in terms of exposure to dust, noise, risk, odor, vibration, blasting, artificial light, safety, crowding, presence of strangers, commuting time etc. - Actual quality of the living environment - Property values
Financial	- Worsening of economic situation, level of income, property - Decreased autonomy, independence, security of livelihood - Change in status or type of employment, or becoming unemployed - Decrease in occupational opportunities, potential diversity, flexibility in employment	- Decreased economic prosperity - Increased dependency, reduced autonomy, reduced diversity, decreased viability of the community - Increased unemployment level in the community
Human	- Death, death of family member - Arrest, imprisonment, detention, torture, intimidation, or other abuse of human rights inflicted on an individual - Reduced level of health and fertility (ability to conceive) - Reduced mental health, increased stress, anxiety, alienation, apathy, depression - Reduced actual personal safety, increased hazard exposure - Reduction in perceived quality of life, subjective wellbeing, self-esteem, self-image - Nutrition – adequacy, security, and quality of food supply	- Death of people in the community

Table 5–3: Determining impacts

Scoping impact pathways

Based on the project description of $Noor_o$ I provided within the IO framework, the social change processes and livelihood impacts derived during the previous steps, and the linkages between $Noor_o$ I and the livelihood environment of local communities, the impact pathways were identified. In this step, the goal was to link specific project inputs, activities, and outputs of each development stage of $Noor_o$ I to the set of identified outcomes (social change processes) and livelihood impacts (see Table 5–3). Among a variety of approaches that could

have been used for this scoping process, the Participatory Impact Pathway Analysis (PIPA) was found to be a suitable tool (see: Alvarez, S. et al., 2010; Douthwaite, B. et al., 2008). Developed by the International Center for Tropical Agriculture (CIAT) and the International Potato Center (CIP) for development projects in the water and food sector, PIPA is a relatively new approach in the field of IA. Though originally intended for planning, monitoring, and evaluation, a slightly adjusted version of PIPA was applied for two reasons. First, as Catley (1999) illustrates, applying Participatory Rural Appraisal (PRA) methods and stakeholder validation emphasizes the inclusion of different stakeholders' perspectives by basing the study's investigations on the knowledge and judgments of relevant stakeholder groups, rather than exclusively on the researchers' perspectives. Second, reflecting upon Mackay and Horton's (2003) work, the focus on causal linkages between a power plant and its livelihood environment lends a more accurate depiction of the wide range of livelihood impacts stemming from the CSP plant during its different project phases.

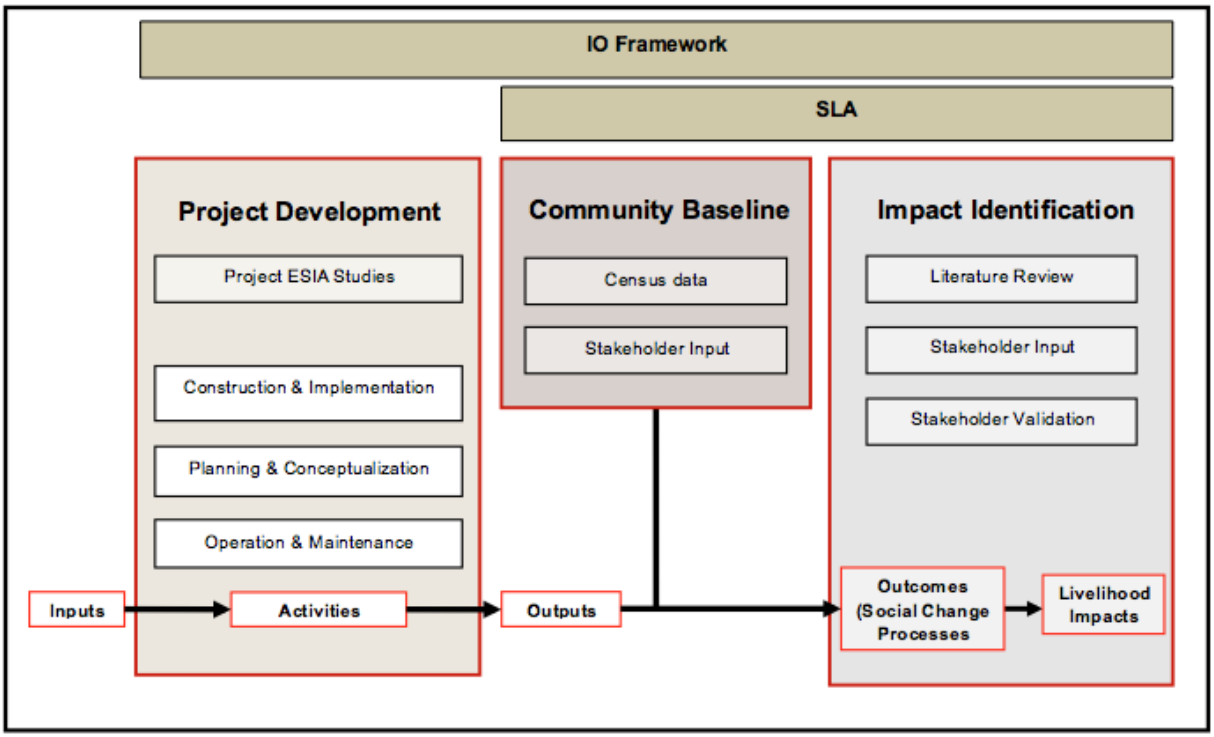


Figure 5-2: Identifying the impact pathways of Noor$_o$ I

Through both "participatory appraisal" and "impact pathways," PIPA allowed for people-centered and comprehensive findings. Additionally, the approach addressed the study's analytical and operational goals not only to prove or anticipate livelihood impacts but also to improve future CSP projects by identifying parts of the project's phases that could be altered in future CSP projects in order to enhance the development outcomes at the local level. With the aim to determine the impact pathways among the specific project inputs, activities, and outputs of each project development phase described through the IO framework and the identified social change processes and livelihood impacts, a series of three workshops were at the heart of operationalizing PIPA.

Team workshop - Identifying, discussing and agreeing on impact pathways: During the last week of the first field research trip, the collected field data on the livelihood baseline and the livelihood impacts stemming from Noor$_o$ I were brought together with the IO framework and

discussed during a three-day internal team workshop. Each of the identified social change processes and livelihood impacts were considered separately for each of the three project phases in order to develop narratives on the impact pathways. First, the team was divided into four groups, each responsible for one of the communities. Each group was provided a brief "livelihood landscape" for the community, as well as a summary of the activities connected with Noor$_o$ I in the planning, construction, and operation phases. Based on these documents, as well as their knowledge gained during the interview phase, each group identified and discussed the impact pathways between Noor$_o$ I and local communities. Second, based on this group exercise, the entire research team compiled a list of impact pathways for each of the phases of the Noor$_o$ I plant.

Local stakeholder workshop - Validating impact pathways: In order to reflect the local perspective, increase the reliability of the results, and validate the list of social change processes and livelihood impacts and the identified impact pathways derived from the internal team workshop, a second one-day workshop with a sample of local stakeholders was conducted at the end of the first field research trip. The workshop resulted in valuable feedback that was subsequently included in a final set of impact pathways.

Project developer workshop - Validating impact pathways: In a last step, the list of social change processes and livelihood impacts, as well as the identified impact pathways were discussed with representatives of MASEN, ACWA Power Ouarzazate, and KfW prior to the second field research and their views and judgments were incorporated into a final set of impact pathways.

Field research phase II: impact significance

5.3.4 Determining impact significance

Based upon the objectives of this study to combine technical and participatory approaches and to involve local stakeholders throughout the process, the approach applied to determine impact significance follows a twofold strategy: combining technical knowledge with the perspectives of different local stakeholder groups (Figure 5-3). The participatory approach involved different local stakeholder groups through focus groups, while the technical knowledge was acquired through an expert survey involving local and international experts. By combining the results through reasoned argumentation, the most significant impacts could be identified.

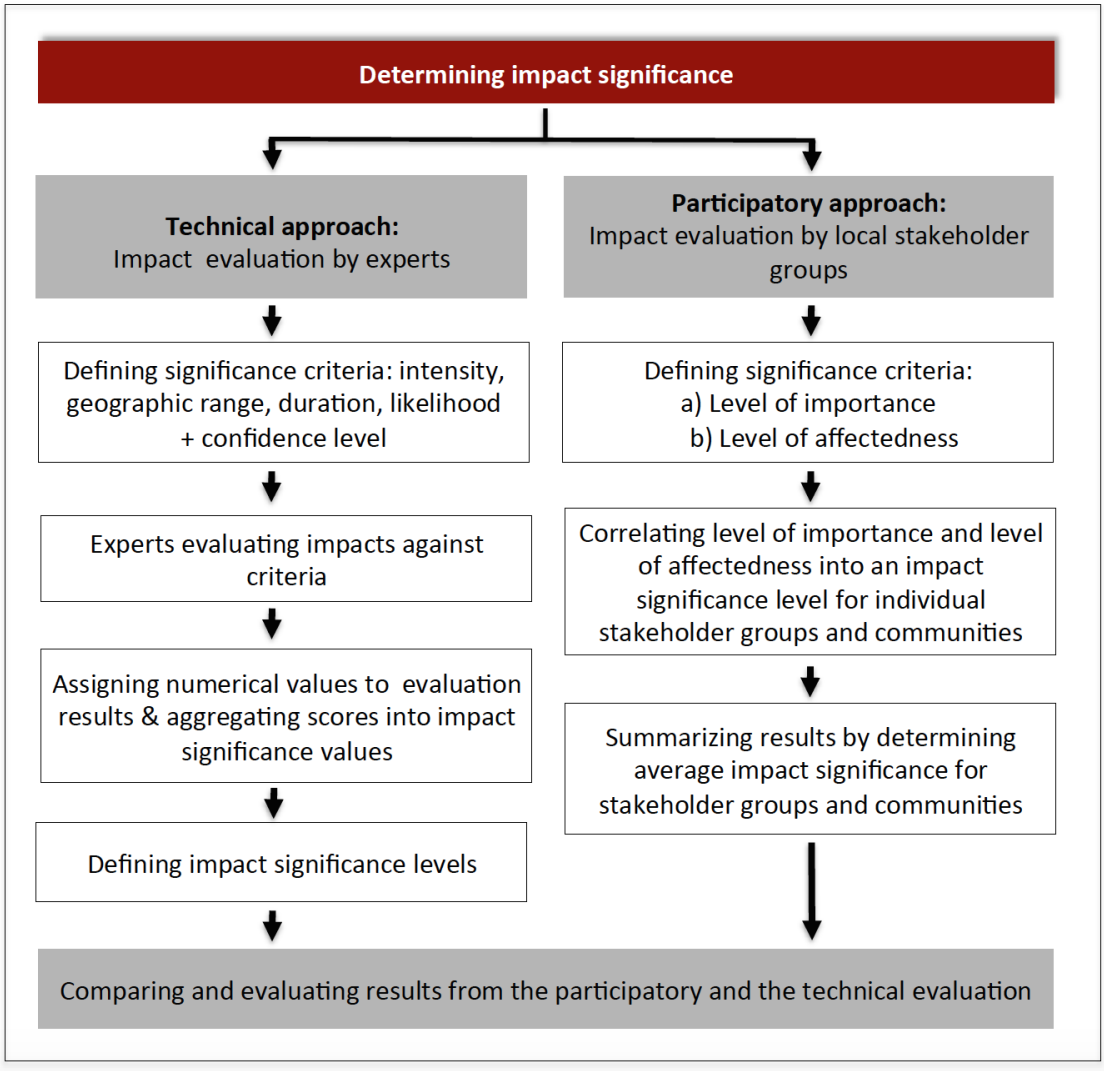


Figure 5-3: Applied approach to determine impact significance

In order to operationalize the concept of significance, criteria or characteristics need to be defined to evaluate the two dimensions of significance (level of importance and level of affectedness). In this context, a significance criterion can be understood as factor for evaluating impact significance (Lawrence, 2007c:785). Describing the impacts in terms of criteria provides a systematic basis for the comparison of their overall significance level. Common criteria to define significance applied in technical assessments include:

- Magnitude,
- Duration,
- Geographic range / spatial scale,
- Intensity / severity,
- Reversibility,
- Likelihood / probability,
- Frequency,
- Mitigation potential.

Furthermore a number of authors recommend that the degree of certainty in assessing the criteria should be integrated into the evaluation (Soares et al., 2006:653; Noh and Lee, 2003:635; Rossouw, 2003:45). Taking these recommendations into account, the following four criteria were applied in the expert survey:

- Intensity/severity,
- Geographic range / spatial scale,
- Duration,
- Likelihood/probability.

For each judgment, the level of confidence was assessed. These criteria usually cannot be evaluated prior to the occurrence of the impact without technical knowledge. Therefore, the same criteria could not be applied in the participatory process.

Despite the awareness within SIA of differences in perceptions among social groups and between experts and the affected communities, the SIA literature contains few criteria that could be used to determine the values associated with elements of the living environment (Stolp et al., 2002:11). The only paper that focuses on impact significance within the SIA process (Rowan, 2009) recommends evaluating the significance of an impact using the effect on the wellbeing (magnitude) and the vulnerability (sensitivity) of the affected groups as criteria. While the effect on the wellbeing seems to be a suitable criterion to be applied in a participatory approach to evaluate the level of affectedness, vulnerability is a complex concept that cannot easily be assessed by local stakeholders. Instead the value attached to a certain livelihood asset should be used as a criterion to measure the level of significance in this study. This is reasonable since only if the local stakeholders value a livelihood asset an impact with a sizable effect on the wellbeing, this will be regarded as significant. The term "value" can thereby be understood as the importance individuals or groups attach to particular attributes of their living environment (Stolp et al., 2002:12). Thus, the criteria applied in the participatory process to determine the significance of the identified impacts were

- The importance of the affected livelihood asset (level of importance) and
- The level of affect on the well-being of the different local stakeholders (level of affectedness).

According to the twofold strategy in this study, the significance determination consisted of two different processes:

1. *Expert survey to determine impact significance*: Because the participatory approach entails both the risk of providing biased judgments and the risk of overlooking the significance of certain impacts that have not occurred yet, an expert survey was conducted. In total, 25 local and international experts from different fields (e.g., water, health, business sector, social development, project development, finance and banking) were interviewed to provide an objective view on which impacts are likely to be or become significant. The experts only evaluated those impacts that fell into the fields of their expertise. All impacts were evaluated against the four criteria intensity, geographic range, duration and likelihood on five-point scales. The level of confidence for each expert judgment was assessed on a three-point scale to account for uncertainties in the evaluation.
2. *Participatory impact significance determination***:** In order to reflect the perspectives of those most affected by the CSP plant, including especially vulnerable groups like wom-

en, local farmers, and unemployed, 19 focus groups were conducted. Within these focus groups the significance was assessed in two steps:

a) The degree of importance attached to affected or potentially affected livelihood assets was assessed by ranking the different items according to their importance to the local stakeholder group;
b) In a second step, the current or expected affectedness was measured on a three-point scale for each impact. The results make it possible to analyze whether different stakeholder groups evaluate the significance of impacts differently, providing information on how and for whom mitigation measures are necessary.

While this chapter described the framework applied to determine significance, detailed information on the survey methods, implementation strategy, and data analysis approaches applied in the study can be found in section 5.3.2.

5.3.5 Developing recommendations on CSP plants and CSP sustainability safeguards

As sustainability frameworks have successfully developed safeguards to mitigate negative impacts and optimize positive outcomes in other fields, they lend valuable insight into the methodological approaches suitable for this study. In this regard, this section describes the methodological approach used for developing livelihood sustainability safeguards for CSP.

Three methodological approaches have been used over the last decade to develop sustainability frameworks (Benoit and Vickery-Niedermann, 2010):

1. Expert-led top-down approaches: Top-down approaches are used at the national level and are mostly derived from international agreements, national laws, and existing safeguards to obtain obligatory categories as minimum requirements;
2. Participatory bottom-up approaches: Bottom-up approaches are regularly applied at the local level and derived from a participatory assessment of local context specifics;
3. Combined approaches: In a combined approach, top-down knowledge is blended with empirically derived bottom-up findings. This ensures that issues of general importance, such as human rights and equity considerations, plus locally specific issues are accounted for in the development process of sustainability safeguards.

For this study, the overall methodology of a step-by-step guide for the development of PC&I in the forestry sector developed by the Center for International Forestry Research (CIFOR) in 1999, was decided to be most appropriate for guiding the development of livelihood sustainability safeguards for CSP projects, as it details a procedure for developing a locally specific PC&I catalogue through a combination of top-down and bottom-up approaches. Even though forestry and CSP development greatly differ, the methodology was found nevertheless relevant if adapted. The methodology of the CIFOR approach evolves around three steps:

1. *Developing a conceptual framework*: First the CIFOR approach provides a common frame of reference and defines terms, clarifies hierarchical links and relationships among concepts, and places them in context. Developing the conceptual framework is an iterative process that incorporates elements of the international sustainability debate and the results of field tests.

2. *Selecting an initial set of PC&I*: Second, the CIFOR approach selects an initial set of PC&I stemming from the already existing "sets" of PC&I in the forestry sector. This set provides a platform for the development of a final, site-specific set.
3. *Field test*: The third step tests the initial PC&I set against empirical data using four filters:
   - PC&I are maintained if they match the local circumstances;
   - PC&I are adjusted to reflect the specific local circumstances;
   - PC&I are deleted if not relevant to the local context;
   - PC&I are added if not reflected in the initial set but are relevant to the local context.

Despite some limitations, these steps were used within this study and detailed as illustrated by Figure 5-4.

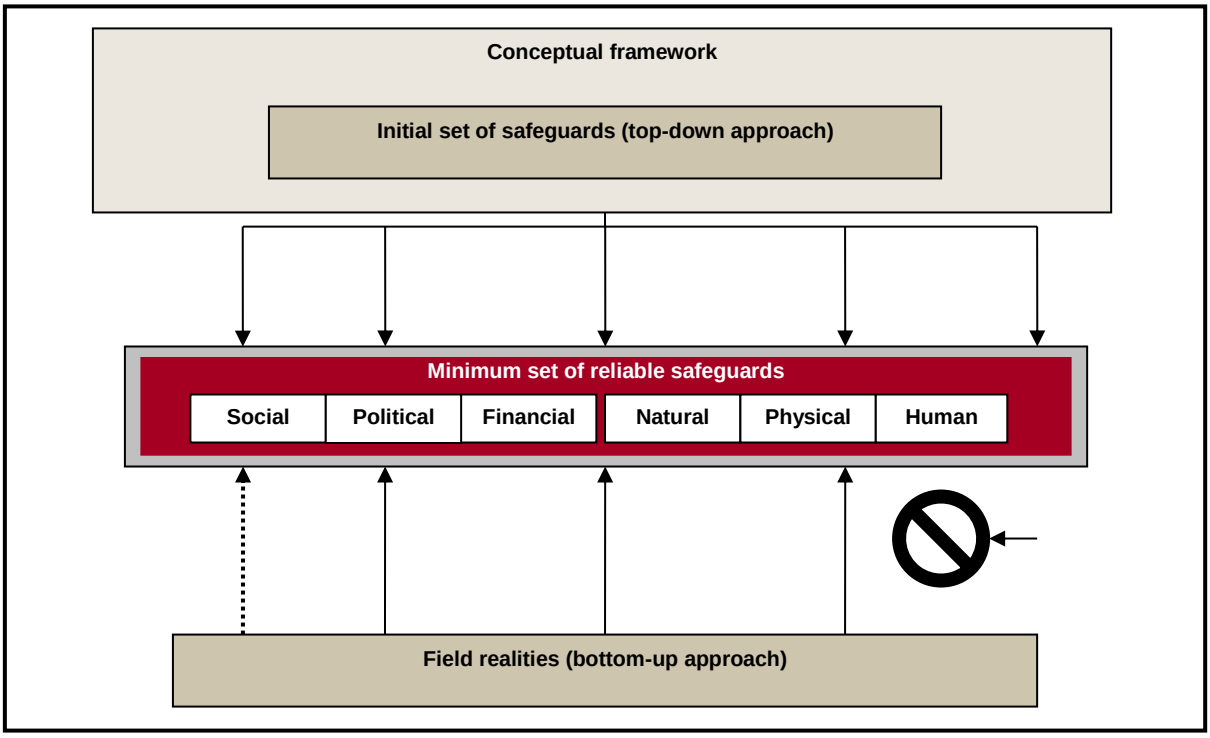


Figure 5-4: Overview methodology for guiding CSP sustainability safeguards

Note: The dotted arrow represents a criterion that was left out of the initial set of safeguards (safeguards added); the solid arrows represent matches between the initial set and findings of the field research (safeguards selected); the horizontal arrow on the right represents initial safeguards that were not relevant to the local context of CSP (safeguards rejected) (adapted and simplified after CIFOR, 1999:56).

1. *Defining the conceptual framework*: First, the research team defined livelihood sustainability as the core for developing safeguards according to the literature. This step, however, was an ongoing, iterative process that integrated information as new knowledge emerged and the study progressed (see Figure 5-4).
2. *Selection of initial sets of safeguards*: Other than the Desertec Foundation's preliminary efforts to establish a set of sustainability requirements for large-scale solar power projects, it is currently not possible to select initial sets of livelihood requirements specific to CSP projects. Therefore, an initial set of safeguards based on existing safeguards was established as an development platform by screening sustainability frameworks from other fields (see Figure 5-4).
3. *Integrating field realities*: Based on the results of the impact analysis and assessment of Noor$_o$ I, the initial set of safeguards developed under step 2 was tested and adjusted ac-

cording to the findings from the field research in order to derive a final set of sustainability safeguards for CSP based on issues of general importance, e.g., human rights and attention to vulnerable groups, and local and technology-specific issues.

5.4 Empirical research designs and data analysis approaches

5.4.1 Field research I: impact analysis

To collect valuable baseline data on the existing livelihood conditions in the region under study (see chapter 8), as well as to shed light on the livelihood impacts of Noor$_o$ I (see chapter 9), existing secondary information was blended with a wide array of primary sources derived from PRA data collection techniques.

5.4.1.1 Research timeline

The different data collection techniques started with a round of 87 semi-structured explorative interviews in the eight communities within the initial research area. Questions focused on the general situation in the Ouarzazate area and the overall impression the interviewees had of Noor$_o$ I, resulting in brief interviews of five to fifteen minutes. The results derived from the analysis of the exploratory interviews were used to redefine the research area (see section 9.1). They also helped to revise the questionnaires prepared for the in-depth community interviews according to context specifics.

Sources of data collection

- Secondary sources of census data, previous surveys, official statistics, and maps;
- Exploratory interviews in the eight communities of the initial research area;
- In-depth, semi-structured interviews with community members, community stakeholders, and key informants in the four communities of the final research area;
- Focus group discussions (7-13 members) in the four communities of the final research area;
- Observations of the daily routines and activities of community members;
- Field visits with community members;
- Stakeholder validation workshops;
- Team discussions to reflect on and monitor the research;

During the core part of the research, 53 semi-structured interviews with community members, 13 key informant interviews, and 16 community stakeholder interviews were conducted in the four communities of the final research area (see Figure 5-5).

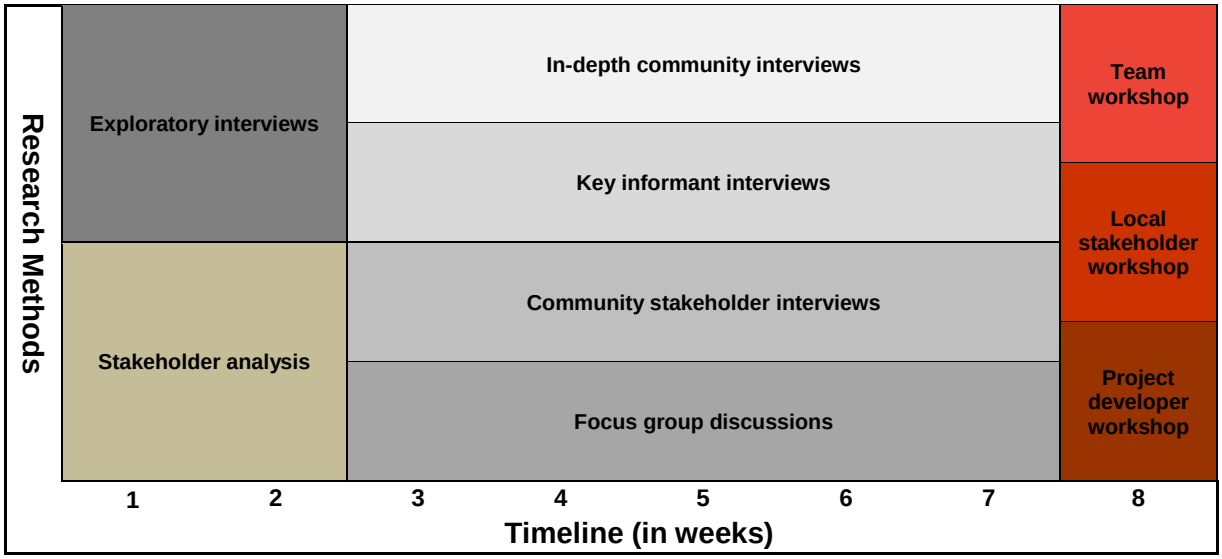


Figure 5-5: Timeline of the first field research

All interview protocols were divided into two main parts. The first part covered questions regarding the local vulnerability context, the livelihood assets and strategies, (e.g., education, occupation, income sources, spending priorities), use of natural resources and infrastructure, and community relationships and political rights. The second part covered all relevant aspects regarding Noor$_o$ I, including whether interviewees had been consulted on different aspects of the plant, when they hadfirst heard of it, whether they were affected by it in any way, and what expectations and concerns they had with regards to the plant. In all cases, however, the interviewees had the liberty to refuse to answer questions or to follow up on points they deemed important. The interviews were complemented by a series of five focus group discussions. These aimed to gain better insight into the situation of vulnerable groups in the Ouarzazate area. All focus groups were conducted by a team of two or three Arabic and Tamazight speaking members of the research team, with the women's focus groups being led by two of the female researchers. One researcher moderated the discussion while the remaining team members recorded the discussion and observed the group dynamic. All individual interviews generally lasted 60 minutes while the focus group discussions lasted 3-4 hours. The findings obtained from this process were discussed and validated during a series of final workshops with local stakeholders and project developers (see chapter 9).

The number and geographical distribution of all interviews, focus groups, and workshops is illustrated in Table 5–4. In total, 167 interviews were conducted in eight communities during this research phase.

	Exploratory Interviews	Community Interviews	Community Stakeholders	Key Informants	Focus Group Participants	Validation Workshop Participants
Primary research area						
Ghassate	17	17	4		16	2
Ouarzazate	28	19	4	11 + 2[17]	18	2
Secondary research area						
Idelsane	6	9	4		4	2
Agdz	8	8	4		6	1
Initial research area						
Tiouine	6					
Skoura	7					
Tamezmoute	8					
Taznakht	7					
Total	**87**	**53**	**16**	**13**	**44**	**7**

Table 5–4: Overview of the number and geographical distribution of interviews and focus group/workshop participants

5.4.1.2 The sample: selecting interviewees

Different techniques were utilized to sample interview, focus group, and workshop participants.

In-depth community Interviews: While the number of exploratory interviews was determined based upon the population size of each community, the in-depth community interviews needed to be sampled to ensure they represented the population and, thus, obtain representative results. Due to the exploratory approach of the research, the reliance on semi-structured interviews, and the absence of sufficient census data, a random sample was neither adequate nor feasible for the purpose of the research. Thus, instead of trying to give every individual an equal probability of being part of the sample, a purposive variation sample reflecting key characteristics of the population under study was chosen. The selection of interviewees for the in-depth community interviews was based on three criteria:

1. *Gender distribution in the communities of the research area:* According to the statistical baseline data on the gender distribution in the research area of 48% male and 52% female, the sample represented both genders equally.
2. *Employment characteristics by economic sectors:* The employment structure for each of the four communities was derived from the regional employment statistics of HCP (HCP, 2004). Due to the relatively small sample size for each community, onlythe largest categories were considered.

[17] Because MASEN and KfW are national and international actors they are counted separately in this column.

Communes	Employment by sector (in % of the active population)										
	Agriculture	Mining	Industry	Water and Energy	B.T.P.	Commerce	Transport and NTIC	Service	Administration	Expatriated	Unemployed
Ghassate	48.7	0.1	8	0.3	27	4.2	3.4	3.2	4.8	0.3	10.4
Ouarzazate	4.1	0.3	8.2	0.9	11.7	12	5.4	16.4	39.1	1.8	16.8
Idelsane	60.9	0.2	3.8	0	21.1	5.4	1.6	2.1	4.6	0.4	9.4
Agdz	No data available. Estimations based on local expert input										

Table 5–5: Employment by sector in the final research area

3. *Age distribution in the communities of the research area:* The age distribution of the research area was represented according to the regional distribution of the different age groups.

Age bracket	Percentage of overall population	Percentage of sample
15-24	21.4%	33.5%
25-34	14%	21.9%
35-54	18.4%	28.8%
>55	10.1%	15.8%

Table 5–6: Age distribution in the final research area

Based on these criteria, a sample was calculated for each of the four communities under study to ensure that a representative variation of people from both genders, the most relevant economic sectors, and different age groups were involved during this interview phase. Within this sample, the primary final research area (Ghassate and Ourazazate) was prioritized over the secondary (Idelsane and Agdz) by a ratio of 2:1.

Key informant and community stakeholder interviews: To complement the understanding of the four communities under study and the interests and relations of relevant community stakeholders in regards to Noor$_o$ I, a set of expert interviews was added to the community interviews. For this two groups of actors were included:

1. Community stakeholders: Relevant key stakeholders living in the four communities under study who might have an influence over or be affected by Noor$_o$ I;
2. Key informants: Stakeholders with specific knowledge and/or a high degree of influence on relevant issues in the region and/or Noor$_o$ I.

The actors from these two groups were selected based on the two-fold process of pre-selection and snowball sampling described in the stakeholder analysis (see section 5.3.1). As a result of this process, 13 key informants were interviewed in five fields: sustainable development, education, civil society, project development, and economy. For the community stakeholders, four groups emerged out of the first phase of data collection as the most relevant: local authorities, farmer's associations, civil society organizations, and small medium enterprise (SMEs) representatives. This led to a total of 16 community stakeholder interviews.

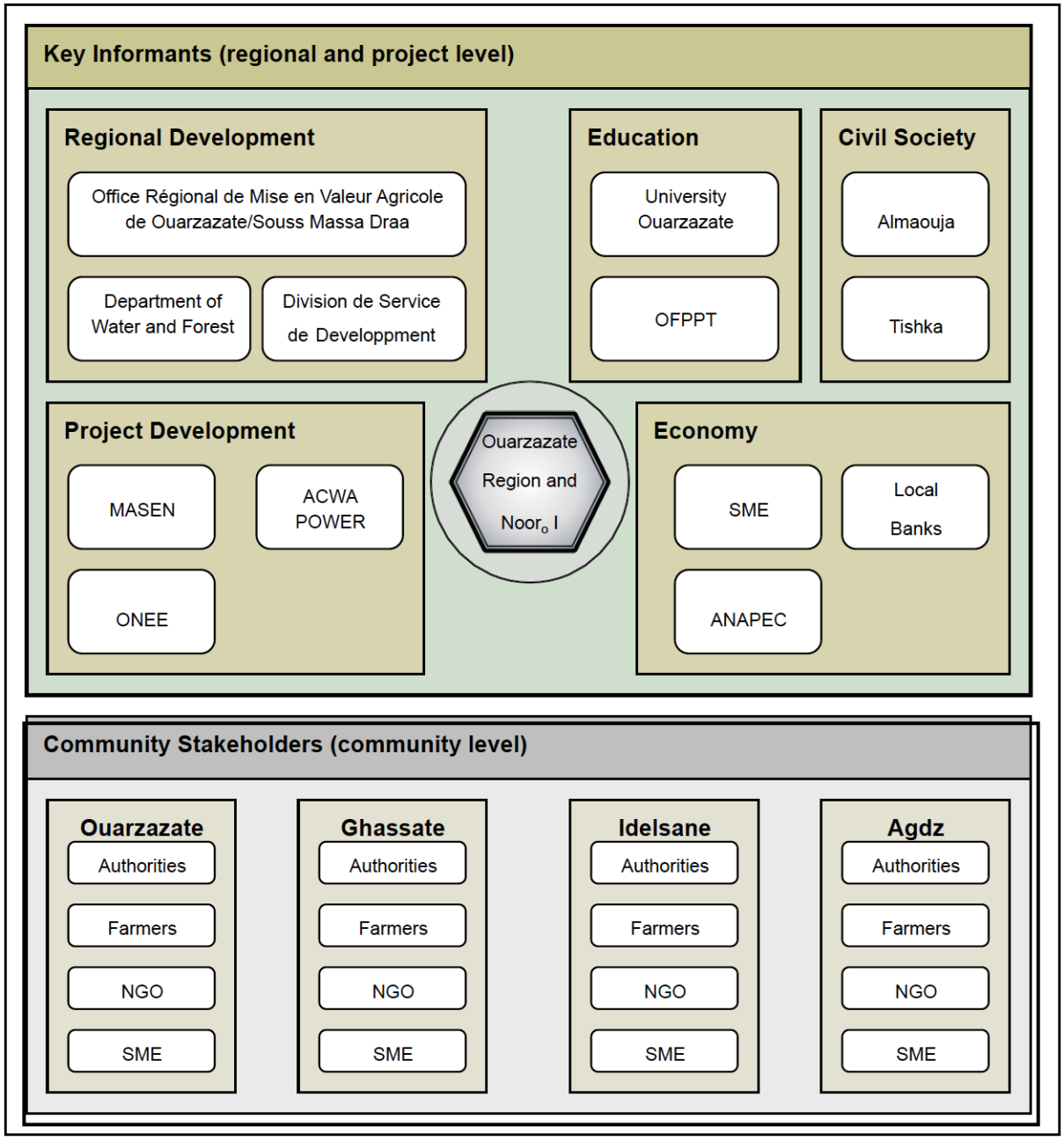


Figure 5-6: Mapping of key informants and key community stakeholders

Focus groups and final validation workshop participants: Based on the findings of the exploratory and in-depth community interviews, focus groups of homogenous stakeholder groups were organized in order to gather additional information, contrasting opinions and perceptions in specific areas. Through snowball sampling during the in-depth community interviews, as well as the judgment of the local research partners, 44 participants from all four communities were selected to participate in five focus groups: farmers (eight participants), SMEs (eight participants), youth (eight participants), women (13 participants) and citizens of the douars of Izerki and Tidgheste (seven participants). The latter were given particular priority because it appeared during the interviews that community specific and spatially limited impacts and community protests occurred only in these communities. For practical reasons, the final validation workshop was limited to seven participants who were former focus group participants and selected key informants covering all four communities.

5.4.1.3 Interview documentation and data analysis

Interview documentation: The language barrier between the English speaking researchers and the interviewees who spoke Arabic or Tamazight (local Berber dialects) presented a challenge for the research that required creative solutions. The exploratory and community interviews were conducted by the four local researchers, while members of the Draa association and the senior Moroccan and Egyptian researchers interviewed the key informants and community stakeholders. The vast majority of interviews were conducted in Tamazight, followed by a larger number of interviews in Arabic, and a very small number of interviews that were conducted in French or English. All interviews were audio recorded for documentation, supplemented by written notes. In order to protect the interviewees' identity, the audio recordings were deleted once a written interview summary had been produced.

The focus group discussions were filmed to facilitate documentation. In addition to the moderator of the focus group, there was a dedicated observer and notetaker. Where possible, these two roles were taken by separate researchers, but in some cases the functions had to be merged. The recording, as well as the notes of all researchers were compiled into a summary for further analysis.

For the individual interviews, the interviewers produced a summary on the same or the following day. This summary was in most cases in the language of the original interview and in a second step translated into English by a professional translator hired for this purpose.

Data analysis: The collected data were analyzed using a software assisted template analysis. The freeware R-based program RQDA was used for this purpose (http://rqda.r-forge.r-project.org/). The interviews conducted in the exploratory phase were coded according to themes arising from the interview texts in order to preserve the exploratory character of the process. The goal was to identify themes that had yet not been considered based on the secondary data and literature review in order to validate the draft interview guidelines for the main interview phase and support the scoping of key issues (see chapter 9). Two researchers coded the first interviews independently to identify as many themes as possible. The resulting lists of codes were then compared, discussed, and merged into one single list. Subsequent interviews were coded based on this merged list, but new codes were added as additional themes emerged.

For the community, the key informant and the community stakeholder interviews, as well as for the focus groups from the core research phase, the list of codes derived from the exploratory interviews was used, additional themes were added or previous codes reformulated. For consistency, the same researcher coded nearly all interviews from the main research phase. Once coded, the analysis was split into two parts. The first part of the interviews, focusing on the livelihood situation of the interviewees, was used to establish detailed descriptions of the livelihood situation in the four communities under study to develop a "livelihood landscape" for each community (see section 9.1). The second part of the interviews, focusing on Noor$_o$ I, was used to compile an initial set of multifaceted livelihood impacts that had already been observed, perceived, or were anticipated by the interviewees (see section 9.2).

5.4.2 Field research II: impact significance

A number of methods exist that can be used to evaluate impacts and determine their significance, such as expert interviews, literature reviews, or analysis of cause-effect relationships (UNEP, 2007:X). When selecting a methodology, it is important to consider its suitability for the set objectives. The selected processes should be practical and the results should allow for professional judgment to be made in evaluating the impacts (ibid). Based on these criteria, expert interviews and stakeholder focus groups were chosen as methods to acquire information on the significance of impacts.

5.4.2.1 Technical approach: expert survey

With the technical approach dominating SIA and the EIA research, expert consultations and surveys are the most commonly applied tool to evaluate impacts and to determine their significance. Even though the need for more participatory approaches to SIA has been emphasized, expert judgment remains an important tool to systematically evaluate impact significance. Expert evaluation is particularly useful in reducing the risks of participatory approaches, such as providing biased judgments or overlooking significant impacts. This study therefore complements the participatory assessment of impact significance with an expert survey.

An expert survey is a form of consultation in which the respondent is of interest for his/her capacity as an expert on a certain topic (Mayer, 2009:38). Experts are persons who have privileged access to information, have clear and accessible knowledge in a certain field, or play an important role in decision-making processes. The term “expert” does not exclusively refer to professionals but also includes local/traditional community members with a wealth of local knowledge, which should not be underestimated (UNEP, 2007:21).

There is no generally accepted procedure for the selection of experts. Usually experts are chosen by the research team without applying any verifiable criteria, which is one of the main criticisms of this method. This disadvantage is counterbalanced, however, by the advantages of expert interviews, which include low costs and their proven reliability and reproducibility of results as reflected by the widespread use of the method in scientific research.

The expert survey was set up as a structured questionnaire to obtain empirical information from local and international the experts who are from or are active in the region or who otherwise have expertise that allows them to evaluate the four significance criteria (intensity, geographic extent, duration, and likelihood). Due to the wide range of impacts, it was essential to address experts from different fields (water, health, business sector, social development, project development, finance and banking, etc.) who were in the position to provide factual information and to evaluate the identified impacts. The experts were asked only to evaluate those impacts that fell into their fields of their expertise. Ensuring that each impact was at least evaluated by two experts, 25 local and international experts were interviewed to provide an objective view on which impacts are likely to be or to become significant.

All impacts were evaluated based upon four criteria: intensity, geographic range, duration and likelihood on five-point scales as initially described in section 5.3.4. “Intensity” describes the degree to which an impact affects the livelihood of the local population, “geographic scale” relates to the scale of the area affected (e.g., local, regional), “duration” defines how

long the impact persists after the time of its appearance, and “likelihood” addresses the probability of an impact occurring, answering the question how likely it is that impact has occurred / will occur. Defining the impacts in terms of these criteria provides a consistent and systematic basis for the evaluation of impact significance. The five-point rating scales for these criteria are presented in Table 5–7. In order to account for uncertainty, the experts were further asked to provide information on their level of confidence in judging the criteria on a three-point scale.

In order to determine the impact significance based on the results from the expert survey, it is necessary to combine the raw data from the evaluations of these four criteria. This can be done either through a descriptive interpretation or by transforming the evaluation results into scores and aggregating these scores into one final result on which the classification of the significance level can be based. Transforming the data into scores and aggregating these scores into a final product has the advantage of reducing the complexity and the difficulties for decision-makers to understand and interpret the results. However, each aggregation also means that information is lost and trade-offs between the different criteria can occur while giving the impression of scientific accuracy (Thompson, 1990:240). In the present study, however, it makes sense to combine the data to define impact significance on a clear scale in order to better understand and compare the results from the expert survey with the results from the participatory assessment.

Intensity	
None	No impact/livelihoods not affected
Low	Low impact/no substantial impacts on livelihoods
Medium	Moderate impact/moderate impacts on livelihoods
High	High impact/substantial impacts on livelihoods
Very High	Very high impact/very extensive impacts on livelihoods
Geographic range	
Village	Communities of Tasselmant and Tidgehste
Communal	Rural Commune of Ghassate
Urban	Ouarzazate city
Provincial	Province of Ouarzazate (incl. Skoura)
Regional	South Draa Valley (incl. Agdz, Tamezmoute, Zagora)
Duration	
Momentary	less than one year
Short term	1 – 5 years
Medium term	5 – 10 years, less than the project lifespan
Long term	10– 20 years, lifespan of the project
Irreversible	permanent
Likelihood/probability	
None	Impact will not occur/has not occurred
Unlikely	Impact is unlikely to occur/it is unlikely that the impact occurred (less than 1:20 chance of occurrence)
Likely	Impact is likely to occur/it is likely that the impact occurred
Most likely	Impact is most likely to occur/it is most likely that the impact occurred (greater than 50:50 chance of occurrence)
Definite	Impact will definitely occur/impact has occurred
Confidence level	
High	Very confident
Medium	Confident
Low	Not confident

Table 5–7: Definition of significance criteria for the expert survey

Accordingly, the first step in the analysis of the data from the expert survey was to transform the evaluation results into scores, while accounting for the uncertainty in the form of the confidence level. No commonly accepted method exists for this procedure. This study followed the approach of Soares et al. (2006:654) who suggest dividing each level of the five-point scales used to evaluate the criteria into three intervals according to the answer certainty, so that the final value depends on the certainty of the judgment. The rationale behind this approach is that high certainty equals a higher validity of the state of knowledge regarding the criteria, while a low level of certainty suggests a lack of scientific certainty in the assessment. This model allows for a more systematic analysis and higher precision of the results. Accordingly, numerical values are assigned to each answer based on the prediction made for each of the criteria and the level of confidence. The underlying rating scales for this evaluation are shown in Table 5–8.

Intensity (I)	Confidence level			Geographic range (G)	Confidence level		
	High	Medium	Low		High	Medium	Low
None	0	1	1	**Village**	1	0.5	0.5
Low	2	1.5	1	**Communal**	2	1.5	1
Medium	3	2.5	2	**Urban**	3	2.5	2
High	4	3.5	3	**Provincial**	4	3.5	3
Very High	5	4.5	4	**Regional**	5	4.5	4
Duration (D)	**Confidence level**			**Likelihood (L)**	**Confidence level**		
	High	**Medium**	**Low**		**High**	**Medium**	**Low**
Momentary	1	0.5	0.5	**None**	0	1	1
Short term	2	1.5	1	**Unlikely**	2	1.5	1
Medium term	3	2.5	2	**Likely**	3	2.5	2
Long term	4	3.5	3	**Most likely**	4	3.5	3
Irreversible	5	4.5	4	**Definite**	5	4.5	4

Table 5–8: Rating scales criteria assessment expert survey

The next step, once all rating scores have been assigned, was to aggregate the scores for the different criteria into a final value representing the significance of the impacts. Various ways of computing the overall significance exist, applying different aggregation rules and mathematical procedures. No commonly accepted aggregation rule exists, and there are various arguments for and against the different methods applied by different authors. The most commonly applied approaches for computing cumulative scores are addition and multiplication (Block, 1999:29). In the present study, drawing on the social risk assessment research that focuses on the probability of events and the magnitude of specific consequences (Mahmoudi et al., 2013:4), it was decided to apply the following aggregation rule:

$$Significance = (I_i + G_i + D_i) \times L_i$$

with

I_i Intensity of impact *i*

G_i Geographic range of impact *i*

D_i Duration of impact *i*

L_i Likelihood of impact *i*

The values for intensity (I), duration (D), and geographic range (G) are summed and then multiplied with the value assigned to the likelihood (I) criteria, thereby giving more weight to the probability of impacts than to their potential magnitude. The rationale behind the decision to apply this function was that an impact can only be significant if it is likely to occur. If an impact does not occur, it is not significant independent of its scale, duration, or intensity. Applying the given function, a final significance score can be calculated for each impact. From this function it follows that the final score can range between 0 and 75.

Once the final scores are calculated, the scores have to be translated into impact significance levels. Normally, a higher score represents a higher significance. The difficulty is to denote where to draw the lines between the different significant levels. There are no clear rules, and the decision is always to some degree subjective (Block 1999:35). The results were classified according to the scores very high, high, moderate, low, or very low significance based on the score ranges presented in Table 5–9. In a simplified approach, for each group 15 scores were assigned.

Significance	Scores	Description
Very high	61- 75	High probability and very high level of impacts in a widespread area and with long-term impacts on the livelihoods of communities
High	46- 60	Probable high impacts on livelihoods of communities, affecting many people or being long-term
Moderate	31- 45	Medium level impact affecting a limited number of people in an small area for a limited timespan
Low	16 -30	Low impact; social, cultural and economic activities of communities continue unchanged
Very low	0-15	No impact or impact of very low order

Table 5–9: Scale and categories significance expert survey

5.4.2.2 Participatory approach: stakeholder focus groups

To determine the significance placed on different impacts by different stakeholders, the objective was

- To reflect upon the magnitude of the impact on the personal well-being;
- To assess the importance attributed to the livelihood asset affected.

For this purpose, a set of rating and preference ranking tools were applied to obtain information on the perceptions of different local stakeholder groups. The stakeholder groups were chosen based on the stakeholder analysis, including vulnerable groups such as women, youth, farmers, and unemployed and groups that either had specific knowledge or were especially connected to or affected by the CSP development, such as workers employed at the CSP project, students who moved to the region, SMEs, and community representatives. This resulted in a total of eight stakeholder groups: women, youth, farmers, community representatives, unemployed, SMEs, workers employed at the CSP project, and students who moved to the region. For the women, youth, farmers, and community representatives stakeholder groups, separate focus groups were organized for each of the four communities Ghassate, Ouarzazate, Idelsane/Skoura and Agdz, which were identified as the primary and secondary research areas during the first field research. This division allowed the researchers to analyze not only the differences and similarities among stakeholder groups but also between the different communities. For the unemployed, SMEs, workers employed at the CSP project, and students who moved to the region stakeholder groups, this division was not applicable or was impractical. For example, students who moved to the region usually live in Ouarzazate where the university is located, the same holds true for many SMEs that are mainly based in the city of Ouarzazate. Therefore, these groups were conducted jointly without focus on communities. Thus, a total of 20 stakeholder workshops were conducted. Table 5–10 provides an overview of the sample size.

Stakeholder groups	Number of cases (n)	Community	Number of cases (n)
Women	23	Ouarzazate	36
Youth	23	Ghassate	25
Farmers	20	Agdz	23
Community representa-tives	19	Idelsane / Skoura	21
Workers CSP	6		1
Unemployed	5		
SMEs	4		
Students who moved to Ouarzazate	6		
Total	106		106

Table 5–10: Sample size distribution based on local stakeholder groups and communities

The workshops were designed as focus groups. According to Krueger (1994:6) "*focus groups are a special type of group in terms of purpose, size, composition, and procedures (...) which are designed to obtain perceptions on a defined area of interest in a carefully planned discussion in a permissive, nonthreatening environment*". This qualitative research method is therefore particularly suitable for asking a group of people about their perceptions, opinions, beliefs, and attitudes toward a product, service, concept, advertisement, idea, or packaging. Questions are asked in an interactive group setting in which participants are free to talk with other group members. A focus group can be organized as an interview or be conducted by a trained moderator among a small group of respondents. In this study, focus groups were conducted in small groups of four to six people, moderated by a trained moderator and documented by at least one additional local researcher. The objective was to answer questions about how strongly the different groups and different communities were/are/will be affected by the different impacts and the importance (or value) that they assign to the livelihood characteristics / resources affected (Table 5–11).

Significance criteria	Evaluation questions
Importance (level of importance)	**a)** How important / valuable is the environmental or societal aspect for you (your family / business / community)? (Ranking)
Level of impact on wellbeing (level of affectedness)	**a)** Have you been/would you (your family/business/community) be affected by this impact? (Yes/No) **b)** If yes, how strongly/severely have/would you (your family / business / community) been affected? (Rating)

Table 5–11: Overview of participatory significance evaluation

Because it was assumed that not all impacts are applicable to all groups, each stakeholder group was assigned a limited number of impacts by which they were / are / would be affected or which they are best placed to evaluate. The research team selected the impacts for each group, based on both logical considerations and the results from the first research trip. The results of the focus groups were used to evaluate the significance of the different impacts and to compare preferences and priorities among the different stakeholder groups.

In the focus groups, different methods from the field of Participatory Rural Appraisal (PRA) were combined to assess the stakeholder perceptions. The term PRA describes a growing group of participatory approaches and methods that was originally designed in the 1970s and 1980s to enable rural people to share their knowledge and to make their own appraisal of their living conditions (Chambers, 1994; FAO, 1999). The techniques allow practitioners and researchers to work together with local people to plan, monitor, and evaluate interventions. While originally developed for rural areas, today the tools are applied successfully in a variety of settings at every stage of the project cycle (World Bank, 2011b).

In this study, ranking and scoring techniques from the set of PRA methods were used as these are particularly suitable for assessing people's perceptions, preferences, and priorities to understand their choices and decision-making processes (Cramb and Purcell, 2001:33). The focus groups, which lasted between two and four hours, started with a ranking of the living environment and societal values according to their importance for the individual stakeholders. The importance ranking was based on the concept of the Citizen Value Assessment (CVA), which was applied to provide an inventory of the values people in affected communities assign to their living environment and its various attributes (Stolp et al., 2002:12). Such a value assessment has the advantage that the judgment of importance is not directly connected to the intervention and the related fears, hopes, and expectations, providing more systematic and "neutral" information (ibid.) While the CVA is only designed to assess environmental values, in this study the assessment of importance was extended to social values, including the cultural, family, and community spheres. The information on the importance of different attributes of the living and societal environment provided the basis for the evaluation of the significance of impacts on those attributes. The list of living environment and societal values was associated by the research team with the list of identified impacts (see chapter 10), so that each environment and societal value represented one impact. Therefore, the importance attached to a value represents the level of importance of an impact as one of the dimensions used to evaluate the significance of the different impacts.

The other dimension, the level of affectedness of an impact, was evaluated by applying a scoring approach. Scoring enables researchers to measure perceptions of change and the strength of the impact (Abeyasekera, 2001:5). Various forms of scoring methods exist. In the present study, it was decided to first determine whether the stakeholders were / are / will be affected and, if so, a three-point scale was applied to assess the level of affectedness.

In practice, the actual process of assessing the level of importance and the level of affectedness during the focus groups consisted of different steps that are described below. All steps were first done individually and then discussed in the group to prevent stakeholders from being influenced by the ranking and rating of the other participants.

- ***Importance Ranking***
- **Step 1:** The different environmental and societal values were briefly explained, and the participants were then asked individually to rank the values according to their importance on a list in front of them. Ten ranks could be distributed, where rank "1" signified the highest importance and "10" the lowest rank. The number of ranks was limited to 10 in order to keep the ranking exercise simple.
- **Step 2:** The ranking lists were collected from the participants, and the results were transferred to a flip chart.

- **Step 3:** The rankings were discussed in order to understand cases of strongly differing rankings. Keywords were collected on why impacts were ranked high or low, noted on post-its, and put on the flip chart for further discussion. The discussions and keywords were documented and translated by the local researchers accompanying the workshop.

Affectedness Rating

- **Step 4:** Impact x was explained to the group.
- **Step 5:** The group was then asked if they (their family / business / community) have been or would be affected by impact x. The moderator asked participants to mark the relevant answer (Yes / No). If participants answered the question with "yes" they were asked to mark on a 3-point scale how strongly/severely they (their family / business / community) have/think they will be been affected by impact x. The procedure was repeated for all impacts that were to be evaluated by the particular stakeholder group.
- **Step 6:** The impact lists were collected from the participants and the results transferred to a flip chart.
- **Step 7:** The ratings were discussed to understand cases of strongly differing ratings. Keywords were collected on why impacts were rated to have high / low effects on well-being. The discussions and keywords were documented and translated by the local researchers accompanying the workshop.

The data collected from the focus groups was analyzed to determine the significance of the impacts. Descriptive data summaries and graphical presentations were used to analyze the data with regards to the agreement and disagreement within and between groups in terms of the importance of environmental and societal values and affectedness by the identified impacts.

While some attempts exist to evaluate data collected with participatory appraisal tools with statistical procedures and tests of significance (Paris et al., 2011; Abeyasekera, 2001; Bellon, 2001), the use of more elaborate statistical methods was not further pursued in this study. The reasons were that the sample size would have only been sufficient for a very limited number of statistical tests and that applying these methods would not have provided additional research insights.

For the analysis of results, the ranks were transferred into scores. The value ranked as most important on rank "1st" was assigned a score of "10", the item ranked second was assigned a score of "9" and so on (1=10th; 2=9th; 3=8th; 4=7th; 5=6th; 6=5th; 7=4th; 8=3rd; 9=2nd and 10=1st). As it is important to account for the non-responses, as in nearly all groups the list included more values than distributable ranks. Therefore, items omitted in the ranking were scored zero. After the transformation, the mean importance scores were calculated for each of the 20 stakeholder groups, across stakeholder groups for the four communities, and for the overall sample. For the overall assessment, the mean scores were grouped into high (scores over 6), medium (scores over 4) and low (scores under 4) importance. The ranking results of the different groups allowed for identifying which environmental and societal values were most important for a particular group or community (Cramb and Purcell, 2001:35).

The rating data from the impact rating were analyzed using a similar approach. The average ratings were used to compare the affectedness of the different groups by the different impacts and to rank the impacts in terms of their level of effect on the stakeholders. The mean

scores provide important summaries, indicating the most serious impacts from the viewpoint of the local stakeholders.

The results of the two analyses were combined and presented as scatterplots allowing for the analysis of the data trends with regards to the overall impact significance. Based on the comparison of the rating and ranking data represented by the graphical distribution, the impacts that have a high importance and a high level of effect could be identified as the most significant impacts.

5.5 Limitations of the analytical research framework

Despite the study's success in analyzing and assessing the livelihood dimension of Noor$_o$ I, the applied analytical research framework had some limitations in regards to the general approach, the impact analysis (first field research), the IA (second field research), and the development of recommendations and safeguards.

General limitations: The most important general limitation of the study was that the IA was only carried out during the construction phase of Noor$_o$ I, rather than being applied iteratively throughout the entire project cycle, as would have been ideal Therefore, the analysis and assessment of impacts for the operative phase had to be based on *ex-ante* anticipations.

Limitations of the impact analysis: First, due to budget and time constraints, choices had to be made in regards to interview partners as not every community affected by Noor$_o$ I could be visited. While broader consultations would have added to the legitimacy of the analysis and the plurality of local perspectives, the restriction of the final research area to four communities and the application of a purposive sample to select interviewees thus constrained the ability to obtain results that fully reflect the overall population under study and the coverage of impacts.

Second, the criterion of "regional age distribution" used to select interviewees through the purposive sampling is likely to differ from that of the individual communities. Specifically, the age distribution in rural areas (Ghassate, and to some extent Idelsane and Agdz) is likely to be skewed toward the older age brackets, while those of the urban areas are likely to be skewed in the opposite direction. However, as the data were only available on the aggregate level, this solution seemed adequate.

Third, in carrying out this research, the research team had to address several issues relevant to interpreting results. These included the debate about perceived, anticipated or observed impacts. Due to the research's participatory approach, the results are based on a large body of individual perceptions and opinions. The inherent uncertainties of this approach were addressed by including key informant inputs, secondary data records or different perspectives, such as interviewing project developers.

Fourth, the approach used to document the interviews led to a loss and distortion of the data. Ideally, qualitative data analysis relies on verbatim transcripts of the interviews. Due to the language barrier and limited resources, a transcription of the interviews was not feasible. This led to three uncertainties in the data:

1. The process of producing interview summaries inevitably led to a loss of information, as well as to the exposure of the data to researcher bias;

2. The translation of the interview summaries led to a potential further loss and distortion of the data;
3. The translated interview summaries were analyzed by a third set of researchers, who had in most cases not been present during the actual interview, introduced a third source of bias.

Limitations of the IA: First, as with all participatory approaches, there is a risk that the judgments made by the participants of the focus groups are biased, representing personal opinions instead of informed judgments. This might have resulted in the over- or underestimation of certain impacts.

Second, due to the selection of a limited number of focus groups and participants, the IA only reflects a narrow cross-section of community groups and may not represent the full range and diversity of impact significance.

Third, quantifying qualitative data inevitably encompasses substantial error bars. This is especially true for the participatory impact evaluation, in which the evaluation evolved around a subjective process of stakeholder perceptions and judgments.

Fourth, there is a risk that expert judgments were biased based on the experts' background and experiences.

Lastly, in the technical and participatory approach, impacts were selected and assigned to either specific experts or to specific stakeholder groups based on logical considerations and the findings of the first field research prior to the process. While this selection process was done prior to the focus group discussions, the impact evaluations within the expert survey were filtered according to the experts' field of experience only after they survey had been conducted.

Limitations of the development of recommendations and safeguards: Although it was attempted to include local community stakeholder input wherever possible, the recommendations and safeguards put forward in this study are largely based on the work and judgment of the research team, rather than originating primarily from the community stakeholders.

C Thematic background on CSP

6 Overview of CSP technology

This chapter provides a brief overview of the technological and economic potential of CSP at the global and MENA scales and the status of CSP technologies' market and industrial development.

6.1 Technical and economic potential of CSP

Global and regional technical and economic potential of CSP

Our planet's solar energy potential greatly exceeds worldwide energy demand. Rogner et al. (2000) estimate that the theoretically usable amount of solar irradiance at the Earth's surface (land and ocean) is $3.9 \cdot 10^6$ EJ/yr, while the world's current primary energy demand is only around 530 EJ/y (IEA, 2012:51).

Of the three main solar conversion technologies[18], CSP is the only technology that depends on the availability of direct normal irradiance (DNI) or "direct sunlight". The worldwide DNI distribution of Figure 6-1 illustrates that the highest level of solar irradiance is in the "sunbelt" regions of the Earth. In the northern hemisphere, this sunbelt stretches from the southern part of the United States and Mexico to North Africa, the Middle East, and parts of India and China. In the southern hemisphere, high DNI potential is noted in Australia, South Africa, and in parts of South America.

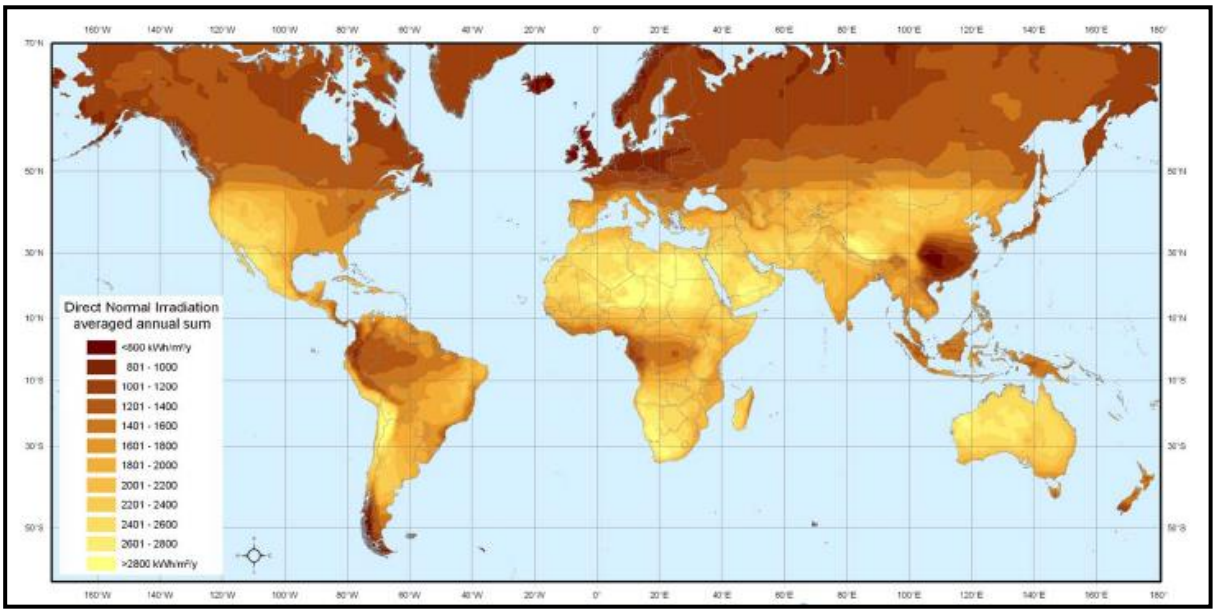


Figure 6-1: Worldwide DNI resources
Source: Trieb et al., 2009: 2.

Solar resource potential is defined as the amount of solar irradiance obtainable by full deployment of proven and feasible technologies (IPCC, 2011:341). According to Krewitt et al.

[18] The three technologies are photovoltaics (PV), concentrating solar power (CSP), and low temperature solar thermal technologies for hot water and process heating.

(2009:336), the solar electricity potential of CSP depends on the available solar irradiance, available land that meets certain criteria, and future improvements in technology. For CSP, just 20% of all land area with a high direct normal irradiance of 2,000 kWh/m^2/yr or higher was excluded from consideration, resulting in a potential of 8,043 EJ/yr in 2050. Obviously, there are technical and social constraints on the utilization of this physical solar resource potential. The technical potential of a renewable energy technology provides a more realistic view on achievable energy generation, taking into account technology-specific constraints, system performance, topographic limitations, and environmental and land-use constraints.

CSP has salient siting constraints including that it can only be installed in areas with relatively flat land and access to relevant infrastructure and ideally free from conflicts stemming from agricultural use, settlements, environmental protection zones, or cultural value. Coastal areas are not ideal for CSP, as DNI is often reduced due to high aerosol content in the air. Figure 6-2 depicts the technically suitable areas for CSP deployment. As illustrated, the deserts of North Africa and Australia offer particularly good conditions with vast areas of potentially suitable land for CSP power plants. However, very often these geographical methods of top-down mapping do not capture the ways that local people value and frame these places.

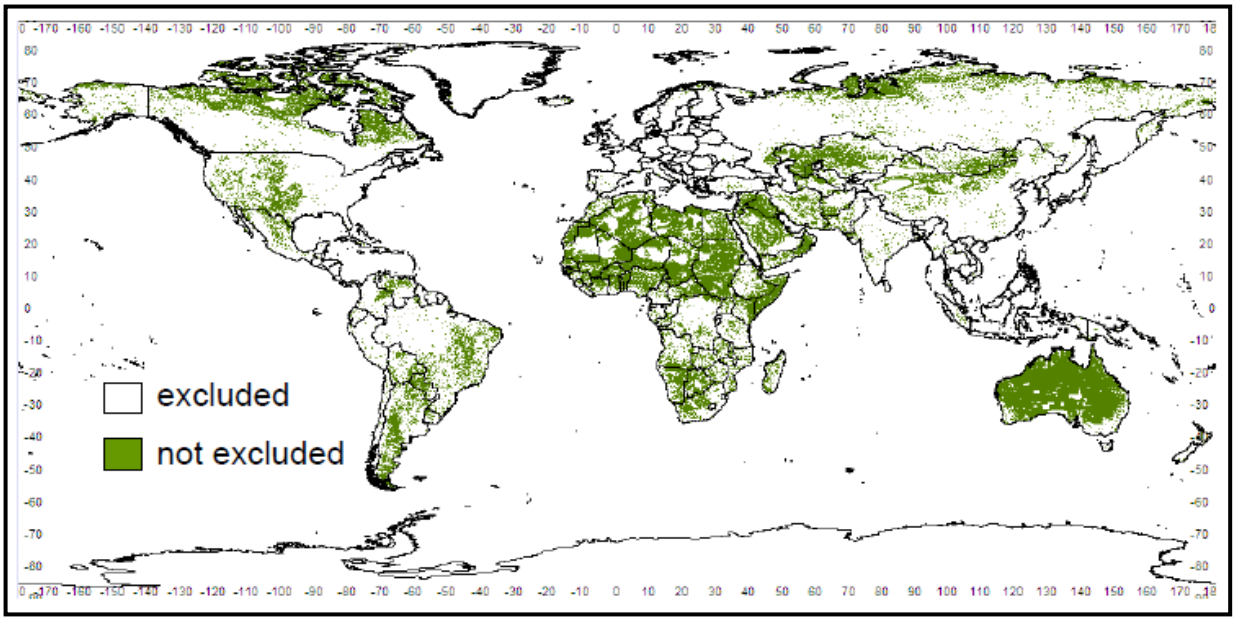


Figure 6-2: Land-use constraints limiting CSP's technical potential
Source: Trieb et al., 2009: 4.

Another constraint on harvesting high solar irradiance is, of course, cost. Assessing the economic potential of CSP technologies is complex because it involves assumptions of future costs, as well as the development of a baseline comparison for what counts as economically competitive. The German Aerospace Center (DLR) assumes that a minimum DNI of 2,000 kWh/m^2/yr is necessary for CSP plants to be economically competitive with other renewable and conventional power sources in the medium- to long-term (see Figure 6-3) (Trieb et al., 2005:55). Despite this restriction, the worldwide economic potential of CSP remains tremendous. Taking into account the above-mentioned land constraints, and assuming that a minimum DNI of 2,000 kWh/m^2/yr (7,200 MJ/m^2/yr) is necessary, Krewitt et al. (2009) calculated a global CSP potential of 8,043 EJ/yr in 2050.

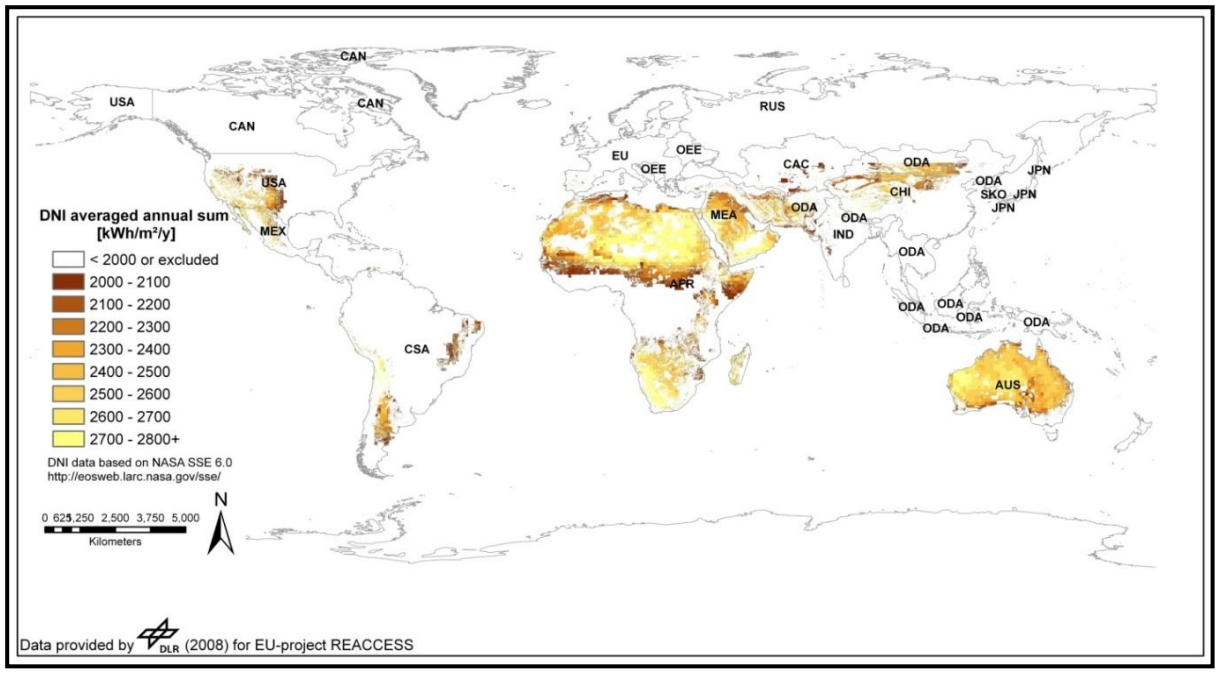


Figure 6-3: Economic potential for CSP power plants considering excluded areas and DNI>2000 kWh/m²/y
Source: Trieb et al., 2009: 5.

According to DLR (2005) the economic potential of CSP, for instance, in Egypt is 73,700 TWh/yr of electricity generation, and in Morocco it is 20,146 TWh/yr. Both values greatly exceed the current electricity demand of both countries: Egypt (157 TWh/yr; Egelec, 2012: 7) and Morocco (32 TWh/yr; ONEE, 2013:3). However, CSP's high economic potential[19] does not imply that it is competitive with other technologies. Solar PV, for instance, also exhibits a very high potential in Egypt and Morocco, but electricity generation costs are significantly lower.

[19] NREL (2012) mentions the market potential as an additional dimension of renewable energy potential. The market potential accounts for policy regulations, investor response, regulatory limits, and competition with other energy sources.

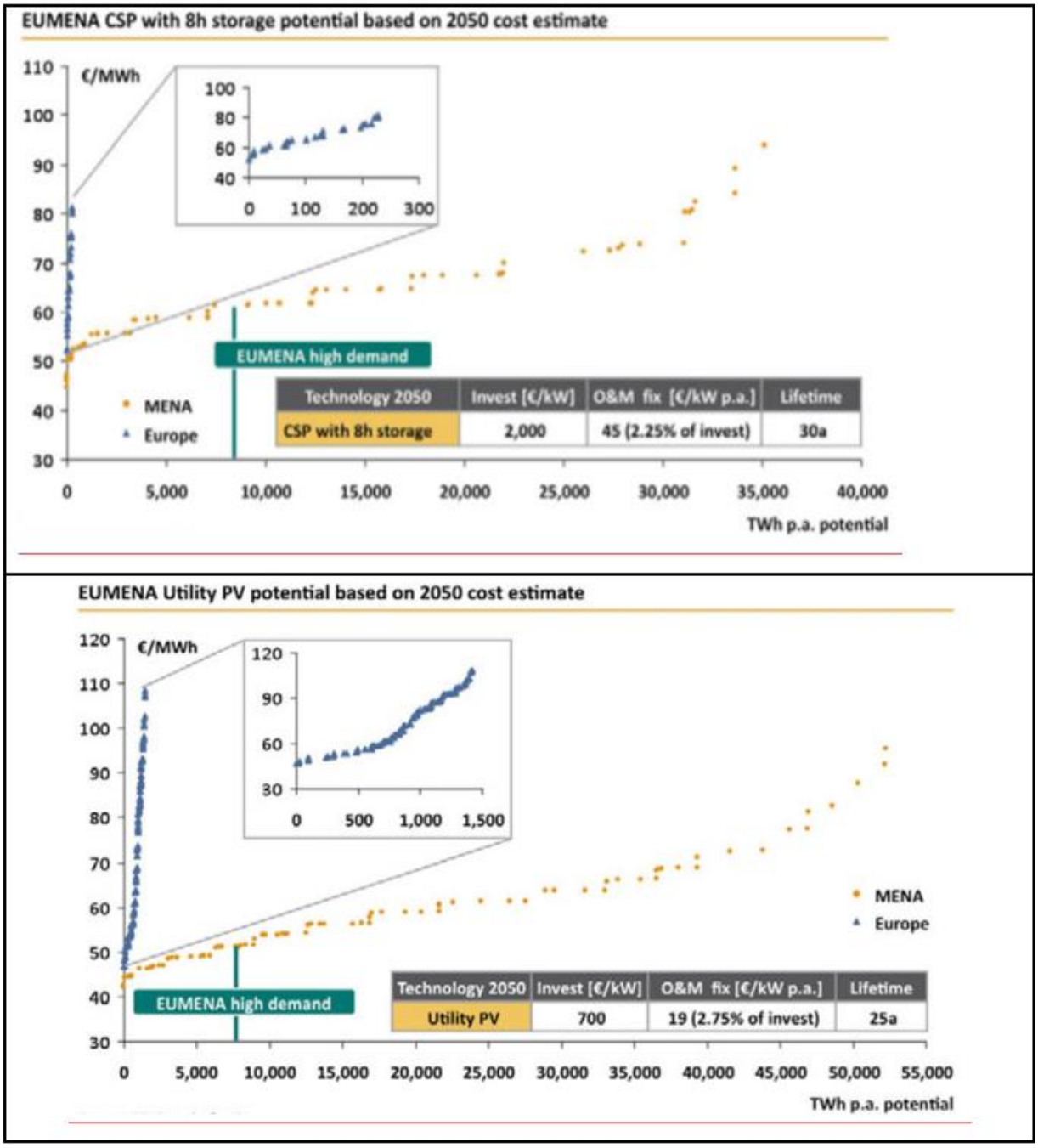


Figure 6-4 Cost plots of CSP (top) and PV potential (bottom) in the MENA region (yellow)
Source: Dii, 2012: 52-53.

A 2012 report by the industrial initiative, Dii, illustrates this. They compared the CSP and PV potentials in the MENA region on the basis of the levelized electricity generation costs (in €/MWh) (Dii, 2012:52).

Figure 6-4 illustrates that the PV cost curve is significantly "flatter" than the CSP curve. This means that the PV potential can be generally tapped at lower costs than the CSP potential[20].

[20] There are various reasons, why MENA countries are currently developing more CSP than PV projects. First, many of the current CSP projects were put on track 3-5 years ago, at a time when CSP technology was still significantly more cost-efficient than PV. A second reason relates to the technical advantages of CSP over PV, such as the possibility to store and dispatch electricity, making it easier to integrate these power plants into conventional electricity systems (see the next chapter on CSP technology).

Experts expect this effect will become more pronounced, as PV learning rates are generally higher than CSP learning rates. Several reports estimate that CSP learning rates are around 10%, while PV learning rates are roughly 18% (Dii, 2012:46; Hernandez-Moro, 2012:124; Junginger, 2010:117; Viebahn et al., 2010:4426). This is because most of CSP's materials and components are already mature, and the technology relies on well-known conventional mechanical and process engineering techniques (e.g., the steam cycle). This limits the potential for cost reductions. PV is a semiconductor technology with a higher potential for optimization and technological learning. This is due to improvements in manufacturing processes (e.g., automation) and because PV technology is related to fields with a higher potential for innovation, like material sciences, solid state physics, and nanotechnology. The recent emergence of incentive-based PV markets (e.g., Germany's feed-in tariff), triggered increased R&D activities resulting in important efficiency improvements and decreases in consumer prices for PV products. An additional driver of recent PV price reductions is strong market competition caused by manufacturing overcapacities.

In Europe, where solar radiation levels are lower and less land is available for large-scale solar power plants, potential cost curves (blue plots in Figure 6-4) are steeper and start at a much higher cost level, both for CSP and PV. This is a clear indicator that compared to Europe, CSP and PV technologies in the MENA region have a generally strong competitive advantage.

6.2 CSP technology development

Concentrating solar power technologies

CSP systems concentrate sunlight and convert it into heat and/or electricity. Most CSP systems use mirrors to reflect sunlight onto a receiver that absorbs heat. The thermal energy in the absorber produces steam or hot air driving a steam turbine, gas turbine, or a Stirling engine. CSP systems usually use a heat transfer medium that can be gaseous (hot air, steam) or a synthetic fluid (HTF oil) or molten salt. A unique feature of CSP power plants is that they can be outfitted with thermal energy storage systems to store solar heat for electricity generation at a later time. The possibility to store energy and dispatch it any desired time distinguishes CSP from other renewable power technologies, like wind and PV, whose electricity output is subjected to the intermittent availability of the wind or solar resources.

Because most CSP technologies use a conventional steam or gas turbine, they can also be hybridized with fossil-fuel fired power plants. For example, Integrated Solar Combined Cycle Systems (ISCCS) use a CSP collector field to provide additional thermal energy to a combined cycle gas power plant. Morocco and Egypt are pioneers of this technology and have been operating ISCCS technologies since 2011. A further advantage of CSP is that the heat can be used for applications other than electricity generation.

There are four main CSP technologies used for electricity generation:

- Parabolic trough
- Linear Fresnel reflector
- Solar tower (central receiver)
- Dish Stirling

Experts expect that parabolic trough and solar tower (central receiver) technologies will dominate the MENA CSP market in the near future. The existing CSP power plants in North Africa (Kuraymat in Egypt, Hassi R'Mel in Algeria, and Ain Beni Mathar in Morocco) use parabolic trough technology. The first large CSP project under construction in Morocco, Noor$_o$ I (160 MW), will use parabolic trough technology.

Parabolic trough

Parabolic trough power systems are the most proven CSP technology. Experience and high market shares guarantee bankability. Due to their modularity, parabolic trough power systems can be scaled up to several hundred megawatts, with 500 MW systems expected by 2025 (A. T. Kearney, 2010:28). A parabolic trough solar field consists of parallel rows of single-axis tracking parabolic collectors, which are usually aligned in a north-south direction. The concentrator's support structure rotates to track the sun. Parabolic-shaped mirrors concentrate sunlight onto a linear receiver tube that is located in the focal line of the parabola (see Figure 6-5). Inside the receiver, a synthetic heat transfer fluid is heated. The fluid carries the heat to a conventional steam turbine for electricity generation. Currently, the net efficiency of parabolic trough systems is about 13.5-14% (A.T. Kearney, 2010:2).

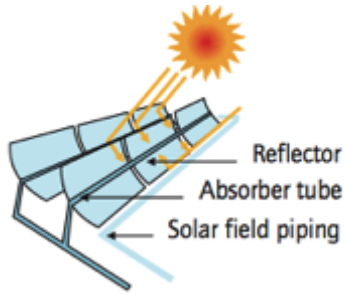


Figure 6-5: Schematic parabolic trough
Source: IEA, 2010:11.

Typically, synthetic oil is used as a heat transfer fluid; however, molten salt would allow for higher efficiencies due to higher operating temperatures (> 550°C). Researchers are also investigating the use of direct steam, which would do away with the need for a heat transfer fluid. Today, most parabolic trough systems are constructed with thermal storage.

Linear Fresnel

Linear Fresnel reflectors use flat instead of parabolic mirrors, but only a few demonstration projects have been developed and are in operation. In linear Fresnel systems, sun-tracking Fresnel mirrors reflect solar energy onto a stationary receiver several meters high, where direct steam drives a steam turbine (see Figure 6-6) (Novatec, 2012:1).

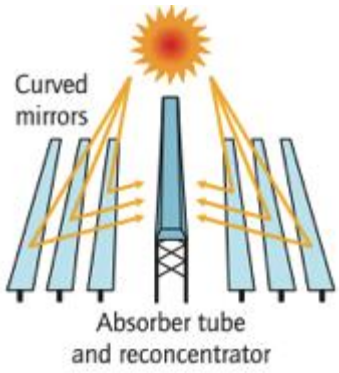


Figure 6-6: Schematic linear Fresnel
Source: IEA, 2010: 12.

Proponents of the Fresnel technology claim that compared to parabolic trough collectors Fresnel systems would allow for easier, faster, and cheaper construction. However, linear Fresnel reflectors have a lower optical efficiency and weaker performance under low DNI conditions. Their net efficiency ranges between 10.5-11%, which is the lowest among CSP technologies (A.T. Kearney, 2010:2). So far, due to the direct steam vaporization concept, Fresnel systems are designed without thermal storage, but experts are considering novel storage systems. The world's largest Linear Fresnel power plant is located in Inida and has a capacity of 100 MW (Solarserver 2013). In addition to several very small demonstration

projects, another large Fresnel technology plant of 30 MW is located in Spain (CSP World, 2013a:1). Due to the minimal experience with Fresnel technology, the financial sector is reluctant to finance large-scale projects.

Solar tower (central receiver)

Solar towers, or central receiver systems, are the second most proven CSP technology. Many sun-tracking mirrors, called heliostats, reflect sunlight onto a central receiver, or heat exchanger, which is mounted on a tower. Solar heat can be used to generate steam through heat transfer mediums like molten salt. Alternatively, hot air can drive a gas turbine. Depending on which heat transfer medium is used, the operating temperature of the heat transfer medium ranges from 500 to 600°C (see Figure 6-7) (ESTELA, 2009:22). The net efficiency of solar tower systems is about 16-17%, and capacities of tower plants are expected to reach 200 MW in 2025 (A.T. Kearney, 2010:2). New receiver concepts feature operating temperatures of more than 1,000°C, which would allow for higher efficiencies by using gas turbines and combined cycles in the future. However, these receiver concepts are not yet commercialized.

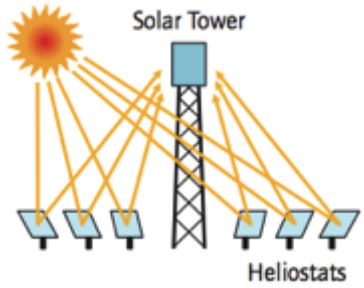


Figure 6-7: Schematic solar tower
Source: IEA, 2010: 12.

Unlike parabolic trough and linear Fresnel systems, central receiver systems do not require completely flat land. For example, the Ivanpah solar tower plant in the United States was built on a 3-5% slope. The field size of central receiver systems, however, is limited to a radius of about 1.5 km since longer distances between heliostats and tower would impede the collection of solar heat. This technology is already bankable and with increasing experience, it is becoming more attractive to financers.

Dish Stirling

Dish Stirling systems concentrate sunlight onto a receiver attached to a parabolic dish reflector. Inside the receiver, the sunlight is concentrated to heat and pressurize a hydrogen/helium fluid to power the Stirling engine (see Figure 6-8).

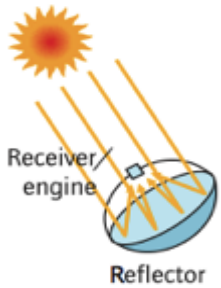


Figure 6-8: Schematic Dish Stirling
Source: IEA, 2010: 12.

Single Dish Stirling systems usually range in capacity from 5 – 25 kW. They can either be used for small, stand-alone and decentralized off-grid applications or assembled side-by-side to large arrays with capacities up to 500 MW. The technology has the highest net efficiency of all CSP technologies, ranging from 20.3% to 23.7% (A.T. Kearney, 2010:2). Furthermore, it uses very little water when cooled with air rather than water. Other CSP technologies can also use dry cooling, but their efficiency is not as high as dry-cooled Dish Stirling. The main drawback of Dish Stirling systems is their inability to store thermal energy. This significantly decreases the technology's attractiveness, because it does not offer any competitive advantage compared to PV. Dish Stirling has difficulties to find markets for large scale power plant projects. In 2011 and 2012, many Dish Stirling companies like Tessera Solar cancelled

their projects or filed for bankruptcy (Renewable Energy Focus, 2011:1, Renewable Energy World, 2013:1).

6.3 CSP market and industry development

Global market and industry development

Since the first large-scale parabolic trough plant in California's Mojave Desert went on-line in 1984, many CSP projects have been announced and developed. The United States and Spain are currently the largest markets for CSP projects and account for more than 95% of global installed CSP capacity. Spain has more than 1,900 MW of CSP capacity, and the United States has about 1,022 MW. Additionally, roughly 1.6 GW of capacity is under construction in both countries (CSP World, 2013a:1). The CSP market advanced in 2012, reaching a total global capacity of about 2,550 MW (see Figure 6-9; REN21, 2013b:45). Another 1 GW of CSP capacity is under construction in other parts of the world (CSP World, 2013a:1). The expansion of CSP projects is due in part to national support incentives like feed-in tariffs and tax reductions (e.g., in Spain and the United States. although they were recently cut), as well as support by international development banks and finance institutions.

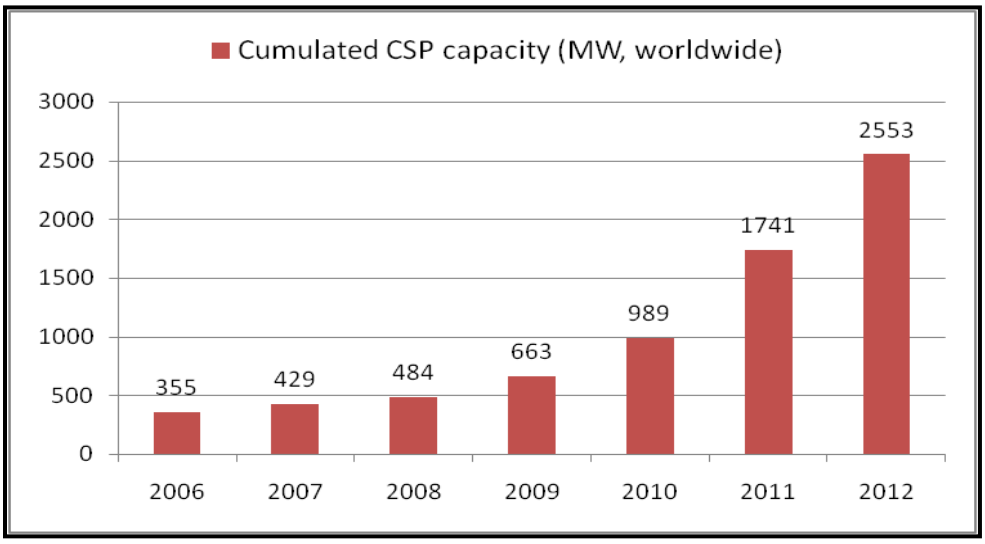


Figure 6-9: Development of cumulated worldwide CSP capacity
Source: CSP World, 2013a:1.

Today, the parabolic trough is the global leading technology and accounts for the bulk of the global installed CSP capacity. However, solar tower systems are advancing with the completion in 2013 of the 392 MW Ivanpah Solar Electric Generating System in the United States.

It remains unclear whether CSP markets will continue to grow. With only two main markets (Spain and the United States), the global CSP industry stands on shaky ground:

- In 2012, Spain's government eliminated the feed-in-tariff for future CSP and PV installations and may even cut the feed-in-tariff for existing plants (CSP World, 2013b:1)
- In the United States, support for CSP has weakened due to the end of federal loan guarantees and competition from PV. In 2011, nearly 4 GW of proposed CSP projects switched to PV or were cancelled because of falling PV prices (Hering, 2011:156).

In this difficult environment, companies have begun to withdraw from CSP. As early as 2011, Solar Millennium, a leading German CSP developer, as well as Stirling Energy Systems, a

U.S. company, filed for bankruptcy. The U.S. branch of Flabeg (US) filed for Chapter 11 bankruptcy in 2013. The German branch of Flabeg was later bought by the Saudi Company ACWA Power, which is developing Noor$_o$ I. Most prominently, Siemens closed its solar operations and withdrew from the Dii in 2012 (Greentechsolar, 2013:1).

Despite these challenges, many of the remaining industry players, as well as some analysts, remain optimistic. Industry proponents from the European Solar Initiative forecast that installed CSP capacity in Europe would reach 30 GW by 2020 and 60 GW by 2030 (IRENA, 2012:12). According to the worldwide CSP roadmap by the International Energy Agency (IEA, 2010:22), the total installed capacity could reach 148 GW by 2020 and 337 GW by 2030. A substantial portion of added capacity is expected from emerging CSP markets. Australia, South Africa, India, Brazil, and the MENA region are frequently heralded as emerging markets.

MENA region

In the MENA region, the first large-scale CSP projects have already been installed in Algeria, Egypt, Morocco, and Abu Dhabi. Except for the recent project in Abu Dhabi, all of other projects are ISCCS plants. The solar capacities of these projects total 165 MW (see Table 6–1).

Country	Plant name	Location	Total capacity (MW)	Solar capacity (MW)	Technology	Status
Algeria	ISCC SPP1	Hassi Rmel	150	25	Parabolic trough, ISCC	Operational
Egypt	ISCC Kuraymat	Kuraymat	140	20	Parabolic trough, ISCC	Operational
Morocco	ISCC Morocco	Ain Beni Mathar	470	20	Parabolic trough, ISCC	Operational
UAE	Shams – I	Madinat Zayed	100	100	Parabolic trough	Operational

Table 6–1: Overview of installed CSP power plants in MENA

CSP potentials for MENA are generally promising, due to excellent irradiation and land area. Electricity demand and population are growing rapidly. The International Energy Agency (IEA) estimates the CSP electricity potentials for MENA to be more than 580 TWh in 2030 (IEA, 2011:20). CSP projects that are already in the pipeline are shown in Table 6–2, with the 160 MW Noor$_o$ 1 CSP plant in Morocco being the frontrunner. All MENA countries have ambitious renewable energy targets, but many of them are driven by a ‘competition for prestige’ in the field of renewable energy. Therefore, analysts should carefully assess which projects are likely to be built. Moreover, the recent price drop in the PV market makes developers and decision makers more likely to develop PV projects. Most of the projects presented in Table 6–2 are parabolic trough projects.

Country	Plant name	Location	Total capacity (MW)	Technology	Status
Morocco	Noor$_o$ I	Ouarzazate	160	Parabolic trough	construction
Algeria	Megahir	Megahir	80	Unknown	planning
Algeria	Naama	Naama	70	Unknown	planning
Algeria	Hassi R'Mel	Hassi R'Mel	70	Unknown	planning
Egypt	Kom Ombo	Kom Ombo	70	Unknown	planning
Egypt	Marsa Alam	Marsa Alam	30	Unknown	planning
Egypt	Taqa Arabia	Unknown	250	Central Receiver	planning
Morocco	TanTan	TanTan	50	Unknown	planning
Morocco	Ain Beni Mathar	Ain Beni Mathar	125	Unknown	planning
Morocco	Ouarzazate II	Ouarzazate	100	Central receiver	tendering
Morocco	Ouarzazate III	Ouarzazate	200	Parabolic trough	tendering
Tunisia	ELMED-CSP	Unknown	100	unknown	planning
Tunisa	TN-STEG	Unknown	50	Parabolic trough	planning
Jordan	Maa'an CTF	Ma'an	100	unknown	planning
Jordan	Maa'an EIJRE	Ma'am	50	Parabolic trough	planning
Jordan	Mitsubishi	Unknown	50	Unknown	planning
Jordan	Abengoa	Unknown	25	Unknown	planning
Kuwait	Shagaya KISR	Shagaya	50	Parabolic trough	planning

Table 6–2: Selected projects under construction or planned in the MENA region
Source: CTF, 2013:5.

Other CSP projects not listed in the overview table include Dubai's CSP target of about 800 MW by 2030 (CSP Today, 2012:1) and Saudi Arabia's ambitious CSP development plan of 25 GW by 2032 (PV magazine, 2012:1).

Table 6–3 lists the 'official' CSP capacity expansion announcements of selected MENA countries (REN21, 2013a:19). Past experience shows that renewable energy targets are sometimes modified or not achieved. Therefore, they should be assessed carefully as they might become subject to revision if political or economic frameworks change.

Country	CSP capacity goal (MW)
Algeria	2020: 1,500 MW 2030: 7,200 MW
Egypt	2020: 1,100 MW 2027: 2,800 MW
Iraq	2016: 80 MW
Libya	2020: 600 MW 2025: 1,000 MW
Kuwait	2030: 3,100 MW
Qatar	2020: 720 MW (PV+CSP) *)
Saudi Arabia	2032: 25,000 MW
Syria	2025: 50 MW
Yemen	2025: 100 MW
Israel	2020: 1,750 MW (PV+CSP) *)
Jordan	2020: 300 MW
Morocco	2020: 2,000 MW (PV+CSP) *)
Palestine	2020: 20 MW
Tunisia	2030: 500 MW

*) CSP/PV proportion not yet defined

Table 6–3: CSP capacity targets in the MENA countries

Development of CSP manufacturing industries in the MENA region

Many governments in the region aim to develop a domestic industry to provide local content for national renewable energy development. Experts see CSP as a better match than PV for the MENA region's existing construction and manufacturing processes. CSP technologies require substantial civil, electrical, and mechanical engineering expertise in the construction and manufacturing process – which is often considered to match better with the current industry structure in MENA. However, the potential to create jobs is higher in PV and solar hot water and process heating sectors, particularly in the downstream stages of the value chain (Borbonus et al., 2013; Lehr et al., 2012).

Nevertheless, the local manufacturing of CSP components could provide regional and global opportunities, such as the export of certain components to Europe. According to an assessment of the local manufacturing potential for CSP conducted for the World Bank, the local value added for CSP plants in the MENA region can reach up to 60% on average by 2020, and the effects due to local value added in the region could be US $14.3 billion if sustainable, long-term demand is created i.e., if 5 GW are implemented in the domestic markets and 2 GW worth of components are exported by 2020 (Fraunhofer ISI and Ernst&Young, 2011:2). The job potential ranges between 4,500 and 34,000 employees, depending on the domestic market volume. The study includes the CSP markets in Egypt, Algeria, Jordan, Morocco, and Tunisia. Sixty percent of the materials for the ISCCS plant in Kuraymat, Egypt were produced locally. According to the authors, a promising approach would combine international coop-

eration to facilitate know-how transfer; the involvement of a local Engineering, Procurement, and Construction (EPC) contractor; and funds to compensate for the potential extra costs related to using local components. For example, MASEN included a voluntary local content clause in the tender for Noor$_o$ I, encouraging a minimum of 30% of plant's capital cost come from local companies (Fraunhofer ISI and Ernst and Young, 2011:11).

6.4 Cost and ownership aspects of CSP plants

This section will provide a short overview on the financial and ownership aspects associated with CSP plants with a focus on the MENA region. Even though these issues are not the focus of this study, a certain degree of background knowledge is nevertheless necessary as they represent framework conditions that should be kept in mind when evaluating the livelihood sustainability of CSP plants.

Costs

Providing clear cost estimates for CSP technologies is difficult. Unlike PV or wind technologies, which have become almost a 'commodity', priced on per-kW rates, CSP costs strongly depend on the chosen technology, the specific power plant configuration (e.g., mirror field sizing, storage capacity, power block), and other particularities inherent to the project. Even more difficult are cost forecasts. Though CSP costs are expected to fall since larger projects and mass production processes are underway, the pace of cost decreases is uncertain, as CSP learning rates are still not very well explored. A recent report by the International Renewable Energy Agency (IRENA, 2012:36) estimated the cost ranges of parabolic trough and central receiver (solar tower) systems (see Table 6–4).

	2011		**2015**	
	2010 $/kW	Capacity factor (%)	2010 $/kW	Capacity factor (%)
Parabolic trough				
No storage	4600	20-25	3900-4100	20-25
6h storage	7100-9800	40-53	6300-8300	30-53
Solar tower				
6-7.5 h storage	6300-7500	40-45	5700-6400	40-53
12-15 h storage	9000-10500	65-80	8100-9000	65-80

Table 6–4: Investment costs for parabolic trough and solar tower CSP systems
Source: IRENA, 2012:36.

With regard to the levelized costs of electricity generation (LCOE), CSP is no longer the most cost-efficient solar electricity generation technology. PV power plants have clearly overtaken CSP in terms of electricity production costs by more than 5 €-cents/kWh (see Figure 6-10).

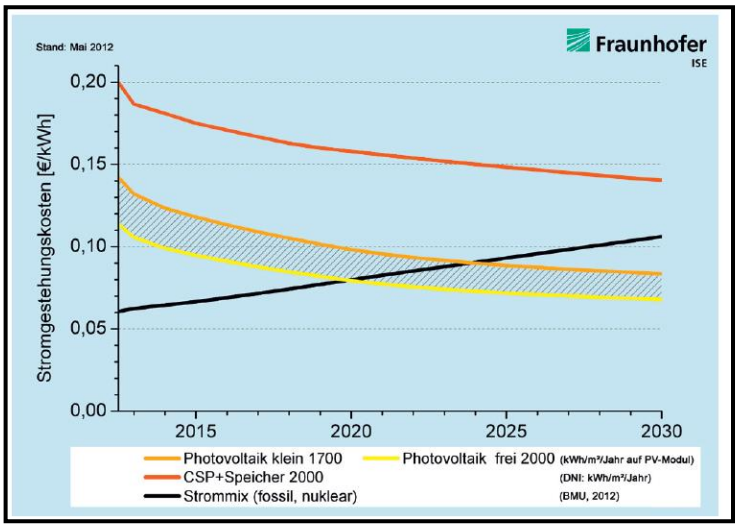


Figure 6-10: LCOE of large-scale CSP (red line) and PV (orange line) power plants under equal conditions in Spain
Source: ISE, 2012:4.

However, it is premature to base CSP's competitiveness only on LCOE comparisons. Unlike PV and wind technologies, CSP power plants have the advantage of being close to "dispatchable," that is to control their power output during their daily operation. Dispatchability is achieved with thermal storage systems that enable CSP to shift its power production into the evening and thus guarantee firm capacity at any time. Whether the economic advantages of dispatchability are sufficient to outweigh the general disadvantages in terms of LCOE costs is a matter of ongoing research (Brand et al., 2012:1). CSP also has clear advantages when it comes to alternative applications, such as its combination with other industrial processes like desalination (see section 2.3).

Ownership

While recent ISCC plants in the MENA region, like the ISCC plant in Kuraymat/Egypt, were designed as public sector projects, future CSP plants will likely be developed under a Private-Public Partnership (PPP) framework. In the context of CSP plants and PPP frameworks, a number of different operator models exist. Within these operator models, the state allocates the planning, financing, and operating of a power plant either temporarily or indefinitely to the private sector, aiming to take advantage of the private sector's resources, discipline, and efficiency.

The three most common operator models for CSP are:

- Build-Own-Operate (BOO): The private sector finances, builds, owns, and operates the plant permanently. After the concession period has ended, the private sector still owns the plant and can sell it to another private entity.
- Build-Own-Operate-Transfer (BOOT): Similar to BOO, but after the concession period has ended the contract transfers the plant's ownership to the government or another associated entity.
- Build-Own-Transfer (BOT): Similar to BOOT, but the transfer to the government starts at an earlier time (e.g., after 5 years instead of 20 to 30 years for BOOT contracts).

As the up-front investment in CSP projects is very high, project developers and investors often share the ownership of CSP plants, which minimizes the financial risks for each party in the project consortium. Therefore, Special Purpose Vehicles (SPV) will be founded in which the project consortium companies hold different shares in the SPV. In its simplest form, the SPV functions as an Independent Power Producer (IPP), which sells the electricity generated to the local utility based on a Power Purchase Agreement (PPA), as is the case for Noor$_o$ I. Hence, future CSP plants in the MENA region will most probably be in private hands.

6.5 Alternative / combined applications of CSP technology

Electricity generation is the main commercial application for CSP. However, CSP could theoretically offer other services. Many of these applications are speculative since the technology is in early development. One CSP application is co-generation, also called Combined Heat and Power (CHP), which uses CSP's excess heat for industrial or agricultural purposes. CSP can also contribute to water security through desalination and advanced irrigation technologies. Additionally, some argue that shaded areas around and underneath the CSP facilities could be used for grazing or for combating desertification in the communities around the CSP plant by using condensed water or waste water from mirror cleaning (see Figure 6-11).

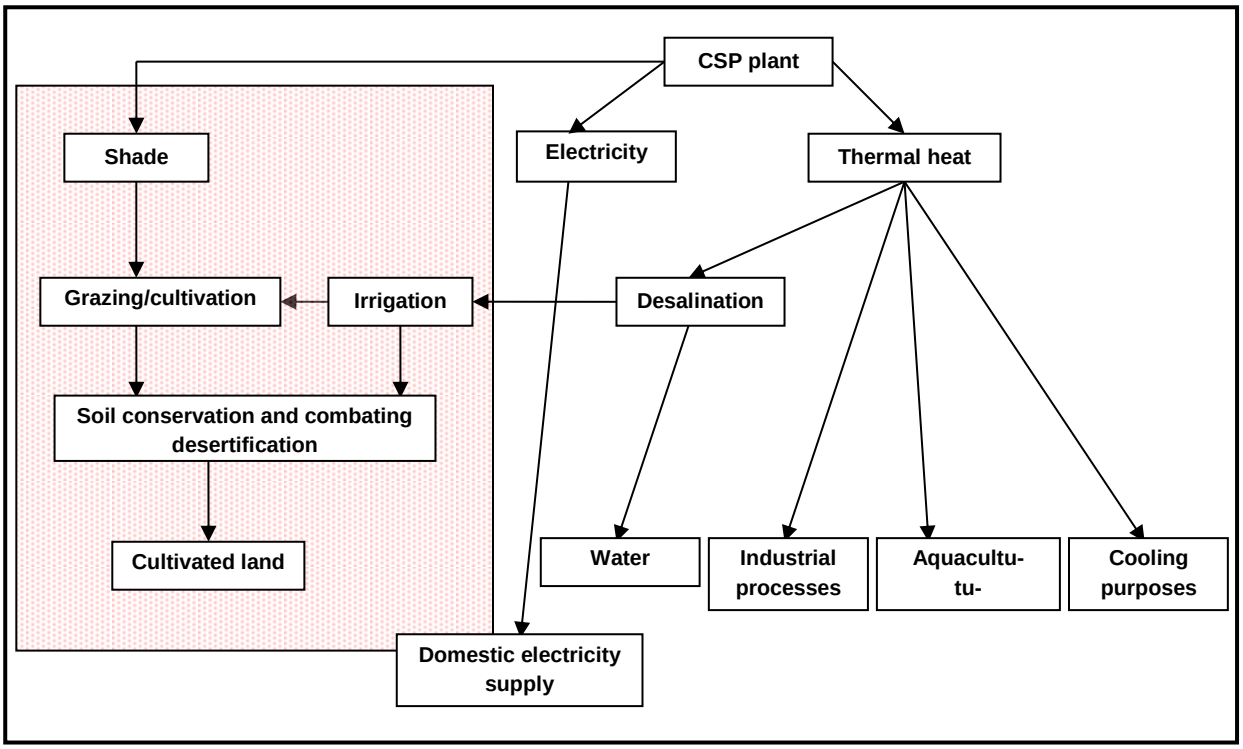


Figure 6-11: Co-generation potential of CSP plants to address the energy-water-food security nexus
Note: Red area covers highly speculative aspects.

Generally, the value of excess heat from CSP generation is underestimated in comparison to the value of the electricity. However, the value of excess heat is great. With proper planning, CSP plants can operate in co-generation mode. Co-generation uses the plant's excess heat to reduce its water usage, to increase its efficiency, and to provide heat for other purposes like industrial or agricultural processes and seawater desalination.

Heat for industrial processes / solar process heat

Nearly all industrial and manufacturing processes require what is called “process heating”, or heat that is necessary for manufacturing commodities ranging from steel to cosmetics to computer chips. Unlike electricity, heat cannot be transported efficiently over large distances and must be used close to where it is produced; therefore, CSP could be sited close to factories to make use of this heat. Which industrial processes can make use of solar heating depends on the temperature of the heat. CSP plants have operating temperatures between 350 to 550°C (DLR, 2007:28) and can deliver process heat up to 450ºC, allowing for a range of applications (Zahler, 2007:2).

Many industrial sectors require most of their process heat during daytime, in a temperature range from 50 - 300 °C (IEA, 2011:17) and could use excess heat from CSP plants. These sectors encompass food processing, tobacco, wastewater treatment, textiles manufacturing, mining and quarrying, machinery, pulp and paper, chemicals, and transport equipment. In contrast, non-metallic mineral and basic metal industries have temperature demands that exceed what solar heat can provide (Euroheat and Power, 2006:18). Solar co-generation is in an early stage with only a few demonstration facilities. However, technology improvements and higher operating temperatures may open up new applications for CSP process heat, especially at high temperatures.

Heat for greenhouses or aquaculture

CHP could also be used to heat greenhouses sited next to a power plant. The excess heat from a CSP plant could be fed into small-scale cement or water tanks, which act as heat sinks and connect to tubes in the floor of greenhouses. During the day, hot air from the power plant would be collected in these heat sinks. At night, a heat transfer-medium (air or water) would be pumped through the tubes to provide stable temperatures for 24 hours and to allow for favorable growing conditions. The same technique could be used in fish ponds to farm aquatic organisms.

Heat for air conditioning

In addition to using the excess heat directly, it could also run cooling processes, e.g., through the use of second-stage absorption chillers for air conditioning (IEA 2011:17). In MENA-countries, air conditioning contributes significant to electricity consumption. Therefore, CSP excess heat could be efficiently combined with cooling processes during peak cooling hours (DLR, 2005:20). A distributed cooling grid could supply residential areas, commercial centers, food industry, and hotels (DLR, 2007:35). The first CSP projects to use the excess heat for cooling and desalination are under development in the MENA region. For example, a CSP plant discussed in Jordan aims to provide both electricity and excess heat for power (10 MW) and cooling (40 MW) plus desalinated water (10,000 m³/day) for a large hotel resort in Aqaba (Trieb 2008:167).

Heat and electricity for desalination

Water scarcity in the MENA region is already a severe environmental challenge and will most likely intensify over the next 40 years due to economic and population growth. Therefore, the significant enhancement of efficient water use, wastewater recycling, and advanced irrigation systems is imperative. Additionally, seawater desalination is essential to cope with the future

water challenges. CSP co-generation power plants could efficiently combine desalination methods using excess heat or electricity (DLR, 2007:151).

(a) **Mechanical methods** are possible, such as Reverse Osmosis (RO), which uses electricity to filter seawater or brackish water through membranes. RO-desalination plants can be powered by CSP electricity, but generally they use the grid.

(b) **Thermal desalination,** such as Multi-Stage Flash Desalination (MSF) or Multi-Effect Desalination (MED), which uses heat (70 – 110 °C) to evaporate seawater into freshwater (IEA 2011:17). Heat for evaporation can be produced directly in the solar collector field or be drawn from the exhaust steam of the turbines (DLR, 2007:152).

There is a huge potential for CSP thermal desalination (CSP+D) in MENA countries. In Egypt, for example, 25% of the Mediterranean coast (900 km) and 40% of the Red Sea coast (1550 km) is considered suitable for CSP+D when taking into account solar radiation and landscape constraints. However, despite the potential benefits of combined power and water production, the literature addresses only a few cases of CSP+D (Al-Karaghouli, 2009:2407). No major project has been developed in any of the MENA countries. One major drawback of CSP+D is that coastal areas are often not the best sites for CSP plants because of the DNI-decreasing aerosols in the ambient air.

Oddly enough, solar thermal enhanced oil recovery (EOR) is another potential CSP application, as demonstrated by the Coalinga solar-to-steam project, the 21Z project completed in 2011 in California, and the petroleum development project in Oman.

Grazing and agriculture around and underneath CSP plants

Another potential CSP application is to water the shady areas underneath the mirrors with the mirror's cleaning water to halt or reverse desertification[21] and to allow for agriculture and grazing. However, environmental impact statements for CSP installations in the United States found that CSP plants cannot co-exist with grazing or agricultural uses because most of the flora and fauna must be removed to make way for heavy machinery and drainage processes and to reduce fire risk. (This is not a requirement for wind power plants, which can co-exist with grazing). This was demonstrated in the case of the Ivanpah solar power plant described in chapter 3.3.4. Although using CSP lands for grazing and agriculture is highly speculative, DLR identified several heat and drought resistant plants and shadow and salt tolerant plants that could be grown underneath and around CSP facilities including crops, vegetables, grasses, grains, pulses, shrubs, and trees (DLR, 2007:A56-A57).

[21] Provided that no chemicals are added to the cleaning water, which is currently the case in most mirror cleaning processes.

7 Description of the Noor$_o$ I CSP project

7.1 National context

Morocco's economy is facing intertwined and intractable challenges. Scenarios anticipate an increasing demand for electricity, water, and jobs. The population is set to double in the next decade and along with it electricity demand. Thirty percent of the population is already composed of young people, 49% of whom were neither in school nor in the workforce in 2012, compared to a 9% overall unemployment rate (World Bank, 2012b; CIA, 2014). Education reform is urgent, with an adult literacy rate of only 57% (UNICEF, n.d.). Roughly 10% of the population lives in poverty, placing Morocco among the lowest-ranking countries in the region on the Human Development Index – or 126 of 177 globally. Already, 57% of the population lives in urban areas, and this number is increasing annually with an average rate of 1.62% (CIA, 2014). The government is trying to limit migration to *bidonvilles* (shanty towns) in major cities, which are some of the poorest areas of the country, lack electricity, and have bred Islamic radicals (Howe, 2005). Finally, although the Arab Spring did not affect Morocco as much as it did the rest of the region, the government passed a new constitution in 2011 and the demographically young and disenfranchised population is demanding improvements in livelihoods, education, and jobs.

Long-term GDP growth and economic stability are fundamentally linked to energy security. Morocco's GDP per capita was US $2,960 in 2012 (World Bank, n.d.), with a growth rate of 3% in 2012 (CIA, 2014). The World Bank classifies it as a lower middle income country (World Bank, n.d.). While Morocco increased foreign direct investment from 1% in the 1990s to 4% in 2004 as part of overall neoliberal reforms, it lags behind in manufacturing due to low productivity rates, labor costs twice those of China, and high energy costs. Further, the trade deficit increased from $3 billion in 2001 to $18.7 billion in 2007 (ibid). Morocco is 97% dependent on energy and electricity imports and therefore vulnerable to the volatility of international energy markets. Morocco's large energy bill – MAD 62 billion, or US $7.3 billion in 2009 – is putting significant strain on the state's budget. Efforts to reduce energy subsidies have been met with public protest that puts the monarchy at risk of unrest, although recent reforms will reduce energy subsidies for all but the poorest segment of the population.

In the light of socio-economic and environmental challenges, e.g., desertification, water scarcity and climate change, the government of Morocco (GoM) has recently developed new policies and initiatives geared toward sustainable development and building a green economy. These initiatives and programs include the National Strategy for Environmental Protection and Sustainable Development (SNPEDD), the National Action Plan for the Environment (PANE), the 2020 Strategy for Rural Development, the National Initiative for Human Development (INDH), the Support Program for Civil Society (PASC), the National Action Plan against Global Warming, and the agricultural strategy called the Green Morocco Plan (Plan Maroc Vert). Morocco also introduced environmental legislation in 2010 relating to waste disposal, air pollution, and renewable energy. Most relevant for the present study is the law 13-09 on the country's renewable energy strategy aiming at four objectives:

- Securing energy supply
- Achieving universal access to electricity

- Rational use of energy
- Protection of the environment through clean energy

One core element of this strategy is the Moroccan Solar Plan (MoSP) developed in 2009 and implemented by the Moroccan Agency for Solar Energy (MASEN), a joint-stock company created in 2010 by King Mohammed VI, to put solar power on a level playing field with other renewable energy technologies. The MoSP aims to reach 2 GW of installed solar power capacity by 2020 at an estimated cost of US $9 billion. This will constitute 14% of Morocco's total installed capacity and 7.5% of electricity production. Originally five sites had been slated for the development on 10,000 ha of land. This five sites are Ouarzazte, Midelt, Tata, Laayoune and Boujdour.

Morocco's overall renewable energy strategy also includes 2 GW of wind and 2 GW of hydro power capacity by 2020. The overall renewable energy target is 42% of installed capacity by 2020, of which parts could be geared toward potential export to Europe in the medium- to long-term. The GoM also established an energy investment fund – Société D'Investissement Energétique (SIE) – and made renewable energy a priority of the existing Hassan II Fund for Social and Economic Development. Therefore, the MoSP can be considered as a "green stimulus", setting new priorities in socio-economic development with long-lasting dividends not just in terms of energy security but also in terms of economic growth and job creation through local manufacturing, training, education, and increased research and development activities[22]. Climate change mitigation is also a goal in Morocco, but it still receives less attention than in industrialized countries e.g., in Europe. The ESMAP study commissioned by the World Bank (2011a) estimates that by installing 2,000 MW CSP power plant capacity by 2020, Morocco's economy could profit from around 30% local content in 2015 and 50% in 2020. An estimated US $4.6 billion of added value could be generated, with 11,000 full-time equivalent jobs being be created. Additional revenues of US $3 billion could be generated by exporting Moroccan electricity through existing transmission lines connecting Morocco to Spain (World Bank, 2013:3). However, currently Morocco imports significant amounts of cheap electricity from the Spanish electricity market through a trans-Mediterranean power connection via the Strait of Gibraltar. Spanish support for importing electricity from Morocco was low at the time of this report's publication, due to a surplus of electricity in Spain, the economic crisis, and a lack of transmission capacity to funnel Moroccan electricity to other European countries.

[22] In 2011, a study was carried out to analyze the potential for local production of CSP and PV components. They identified civil works, electrical works, mounting structures, and power plant installation as low-hanging fruit for Moroccan companies. Yet, the interviews with industry representatives revealed concerns ranging from a required long-term solar strategy, an improved regulatory framework, smaller projects, and developing the training and cooperative research needed by industry (Kost et al., 2012).

7.2 The Noor$_o$ I CSP project

Morocco is the first North African country to develop a stand-alone CSP project. The 500 MW solar complex near Ouarzazate is the first project to be executed within the MoSP process. King Mohammed IV inaugurated the complex Noor$_o$ - which means “light” in Arabic - in 2013. Noor$_o$ will build on experience of other CSP projects in India, South Africa, and the Moroccan hybrid natural gas- CSP project Ain Beni Mathar (World Bank, 2011c:23). The first phase (Noor$_o$ I) is a 160 MW parabolic trough installation with three hours of molten salt thermal energy storage capacity and wet-cooling, the second is 200 MW parabolic trough, the third 150 MW CSP tower (both with dry cooling and a minimum of seven hours storage) and the fourth 50-70 MW photovoltaic (see Figure 7-1). When the third phase is complete, it will be among the largest CSP plants in the world.

Info box: Will Noor$_o$ export to Europe?

MASEN is clear that the Noor$_o$ complex will contribute to domestic energy needs. However, there has been much discussion about an additional pilot project near Ouarzazate to demonstrate the feasibility of export of renewable energy to Europe. Officials considered exporting a small quantity of electricity from Noor$_o$, but the plan was discarded when the price of carbon credits plummeted in Europe. Interviews with government officials in Rabat conducted by author S. Moore generally found strong support for long-term renewable energy export. According to sources in the energy ministry, Moroccan officials also have a strong preference for physical exports, rather than virtual exports in which European consumers pay a green electricity surcharge to finance renewable energy projects in Morocco. Short-term access to higher priced European electricity markets could reduce the subsidies and concessional financing needed for North African CSP and help to bring down the cost curve faster (CIF, 2013:15). However, the interviews revealed a low motivation of the decision-makers to support export projects as long as the skyrocketing domestic demand is not sufficiently met.

As an early mover in the latest attempt to develop CSP, Morocco seeks to attract private sector investment to reduce the need for concessional financing and subsidies for renewable energy. It also seeks to demonstrate CSP’s feasibility in the MENA region, and other countries are watching for the results. The Saudi energy and water company ACWA Power is developing Noor$_o$ I, and Saudi Arabia sees the Noor complex as a pilot for its ambitious domestic solar plan. The exact site location is shown in Figure 7-1.

Besides the technical objectives to build up CSP capacity, to develop transmission interconnections and a sizeable regional electricity market, the Noor solar complex also intends to meet national policy objectives of the Kingdom’s energy strategy:

- Energy security;
- Low-cost electricity supply to all households and businesses;
- Management of electricity demand;
- Promotion of national expertise and development of technological know-how;
- Environmental protection and climate change mitigation (AfDB, 2012a:1).

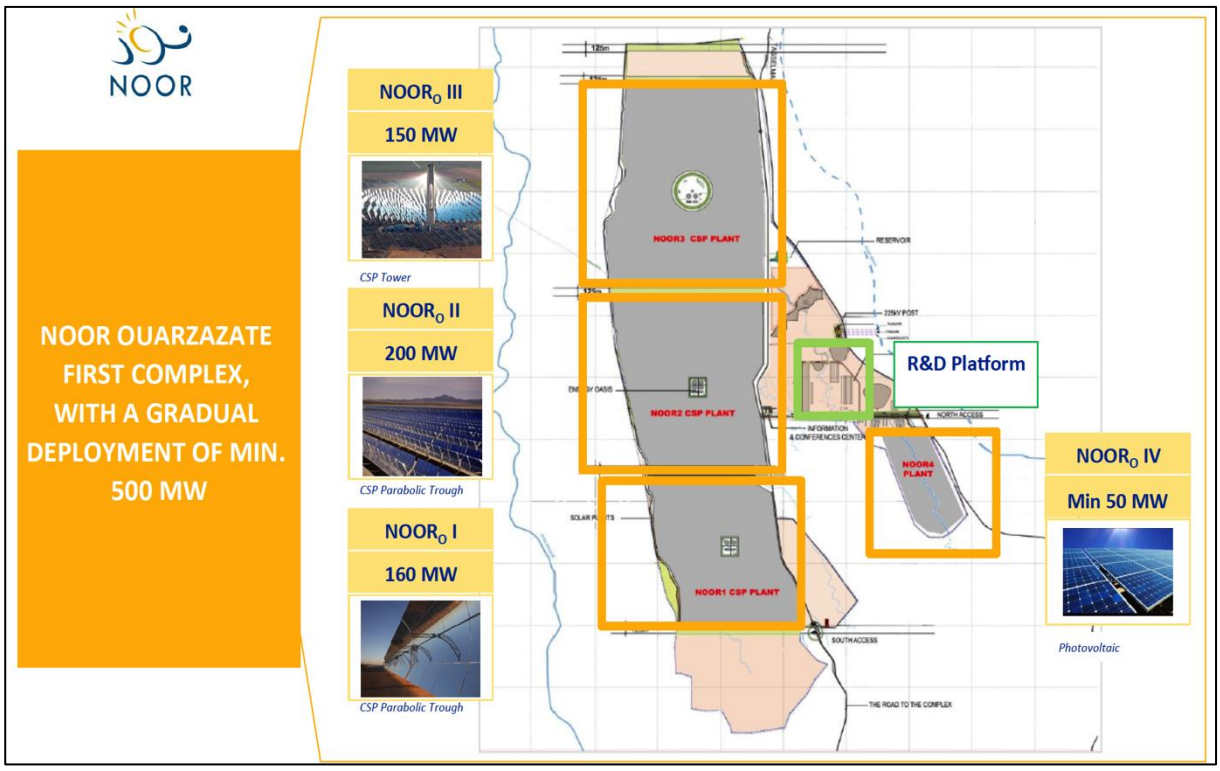


Figure 7-1: The different project stages of the Noor$_o$ solar complex
Source: MASEN, Personal Interview, 2014.

Furthermore, projects under the MoSP are "integrated solar development projects" meaning they aim not only to generate sustainable electricity but also to consider local/regional socio-economic impacts (see Figure 7-2). In this regard, the project developers claim to achieve a variety of positive socio-economic effects from the Noor$_o$ solar complex. These are highlighted in the multilateral development banks' lending approval reports (AfDB, 2012a), in the project documentation and validation reports that register Noor$_o$ I as a Clean Development Mechanism (CDM) project (MASEN, 2012a; DNV, 2012), and in the project's ESIAs (Burgeap 2011; 5 Capitals, 2012a-c).

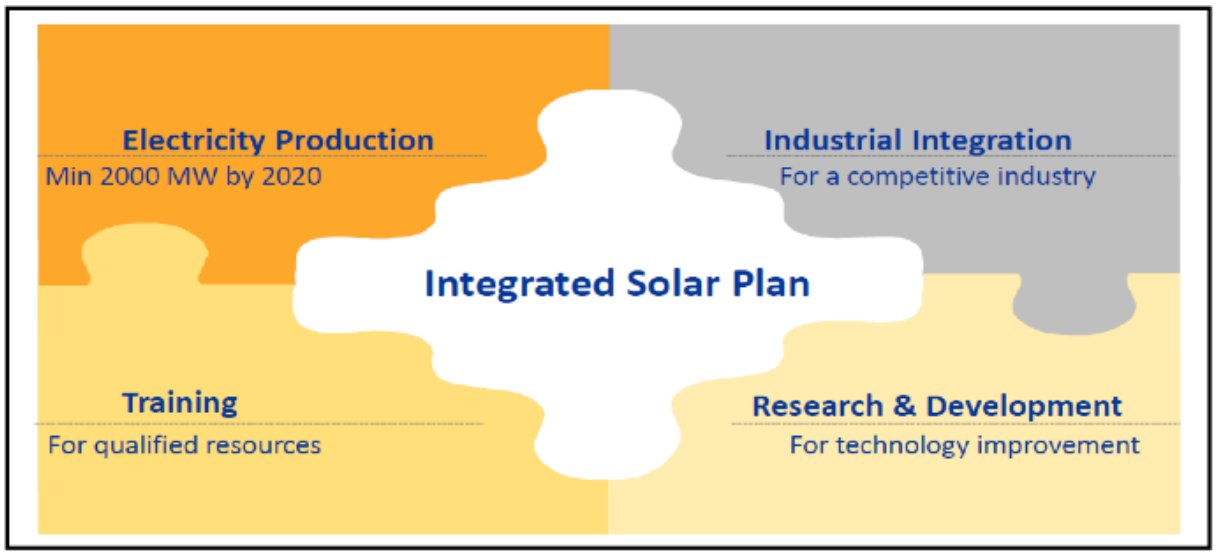


Figure 7-2: Implementation of Noor$_o$ through an integrated plan focused on solar resource valorization
Source: MASEN, Personal Interview, 2014.

Although some of the claims are still to be proven in reality, MASEN and the AfDB state that the project would specifically benefit people in the vicinity of the Noor$_o$ solar complex through positive socio-economic effects. These include especially:

- *Electrification*: By increasing the country's generation capacity, the Noor$_o$ solar complex seeks to improve electrification rates in rural and semi-urban areas and supply electricity to marginalized social groups. This will reduce the isolation of various regions and enhance security through, for example, improved street lighting (AfDB, 2012a:10).
- *Skill development and training*: The development of Noor$_o$ is part of a strategy to foster national skills and expertise. With the projects under the MoSP the GoM seeks to strengthen and improve the competitiveness of domestic manufacturing industry and local businesses (AfDB, 2012a:11 and 17) (see also: chapter 7.6 MASEN's policies).
- *Research and Development:* In addition to strengthening local industry, a new research platform and vocational training programs aim to boost the training and education of technicians and researchers in the field of CSP (AfDB, 2012a:17).
- *Industrial integration and local content*: Within the tender stipulations of Noor$_o$ I, MASEN set a voluntary target of 30% of the plant's capital costs from local content for Noor$_o$ I, and it may increase the target for the MoSP to 50% in 2020 and 60% in 2025 (World Bank, 2011c:18 and 106). In the bidding process, priority was given to bidders who promised to use a high percentage of local content[23]. The goal was to attract local companies to invest in new production lines and to encourage international investors to create local subsidiaries. The local content target for Noor$_o$ I could be met in three ways:
  a) Directly procuring 30% of the capital costs by using local material and services for the construction and operation of the power plant.
  b) Indirectly procuring local content by committing to invest 30% of the capital costs within 2 years of the PPA in local manufacturing facilities or a research and development facility.
  c) If direct procurement does not reach 30%, the rest could be complemented by indirect measures (World Bank, 2011c:67).

Additionally, the Noor$_o$ project addresses the following areas:

- *Employment and economic opportunities*: The government expects Noor$_o$ I to directly create jobs and indirectly generate other economic activity (AfDB, 2012a:11).
- *Social development:* Proceeds from the transfer of the community lands under the Land Acquisition Plan (LAP) are used in a Social Development Plan (SDP) to finance community projects for economic development and the socio-cultural enhancement of communities affected by the project (World Bank, 2011c:33; AfDB 2012a:19).

Marginalized groups: Job creation and economic development for women (in the SDP) and youth are prioritized (AfDB, 2012a:10 and 18).

[23] While local content requirements may improve local manufacturing costs, it could increase project costs and risks for investors. At the 2013 Dii conference in Rabat, the CEO of ACWA Power, however, claimed that they reduced their bid for Noor I by sourcing cheaper local content and that ACWA Power already has increased this value up to 50% for Noor I.

7.3 Planning and conceptualization of Noor$_o$ I

Prior to the construction of Noor$_o$ I, the GoM and development banks required detailed studies, stakeholder consultations and negotiations during the planning and conceptualization phase. These processes are summarized in Figure 7-3.

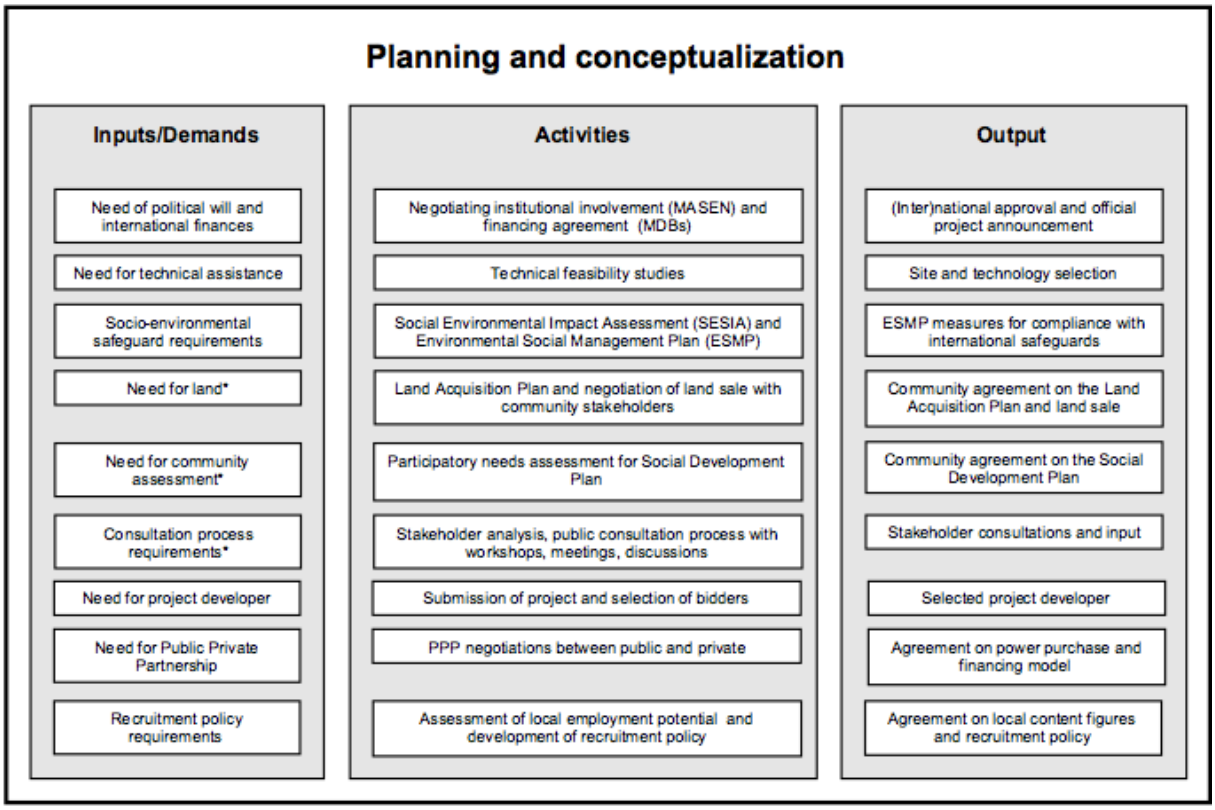


Figure 7-3: Input-Output framework for the planning and conceptualization stage of Noor$_o$ I
Note: Elements marked with * are described in chapter 7.6.2.

7.3.1 Financing and institutional involvement

Noor$_o$ I received national approval in 2009, and the multilateral banks involved in the MENA CSP investment plan have since announced their interest in funding additional projects (CIF, 2013:24). In 2011, the Clean Technology Fund (CTF) approved Noor$_o$ I as its first project under the MENA CSP investment plan (CIF, 2013:43). By 2013, nine international institutions approved the project. They pledged more than US $1 billion in concessional loans to support the development of Noor$_o$ I (CPI, 2012:4).[24] Furthermore, the GoM and MASEN are expected to contribute approximately US $883 million over 25 years, mostly in the form of operational subsidies to compensate the gap between the electricity grid price and the sale price. A consortium of private developers, led by ACWA Power International, contributes US $190 million of equity capital (Power Engineering International, 2013).

[24] The projected is supported by a CTF loan of US $197 million, a US $200 million loan from the International Bank for Reconstruction and Development (IBRD), and a €168 million loan from the African Development Bank (AfDB). Other loans are provided by the French Development Agency (AFD (€ 100 million), the European Investment Bank (EIB) (€ 100 million), and the KfW Development Bank (€ 100 million). The European Neighborhood Investment Facility (NIF) (€ 30 million), the German Ministries of Environment (€ 15 million) and Development Cooperation (through an interest rate subsidized by KfW) provided grants (CTF, 2013:13).

7.3.2 Site selection

In 2010, Lahmeyer International conducted a pre-feasibility study for the Noor$_o$ site under its "Enable and Motivate Sustainable Power" (EM-Power) program (The final technical feasibility study is still confidential). Lahmeyer found a 1,000 ha greenfield around 10 km northeast of Ouarzazate to be suitable for a 50 MW CSP project due to the following features:

- Favorable solar irradiation, with a DNI of about 2,635 kWh/m²/year (AfDB, 2011a:3);
- Flat topography with low seismic and flooding risks (AfDB, 2011a:3 and 5 Capitals, 2012a:7, 63 and 156);
- Availability of surface and groundwater resources (6 km north of the Mansour Eddahbi reservoir, with an estimated annual capacity of 250 million m³ (based on a 12-year annual average 2001-2013) (MASEN, Personal Interview, 2014)[25];
- Ease of site access (5 km from the paved road N10). Agadir's port could be used to import heavy equipment from abroad, thereby avoiding the dangerous Atlas Mountain passage (5 Capitals, 2012a:197 and 182);
- Proximity to the power grid (electricity generated by the plant will be supplied to the Ouarzazate 225/60 KV electrical sub-station located near the complex) (Lahmeyer International, 2010:4; and 5 Capitals, 2012a:1).

The actual project site is part of a vast steppe along the southeastern face of the Atlas Mountains "far from the main settlement (…), protected or touristic areas" (AfDB, 2011a:3) (see Figure 7-4). It is located on a "sparsely vegetated and flat rocky" plateau, which is crossed by several *wadis*, surrounded by canyons. Prior to its transfer, it was collectively owned by the Ait Ougrour ethnic community, within the administration of the rural Commune of Ghassate (5 Capitals, 2012a:7 and 174). MASEN conducted a Framework Environmental Social Impact Assessment (FESIA) for this site in 2011, updated in June 2014, which was followed by a Specific Environmental Social Impact Assessment (SESIA) conducted by ACWA Power in 2012. It was concluded that "the location, characteristics, and geomorphology of the chosen site lend themselves perfectly to the realization of this project" (Burgeap, 2011:23).

[25] Other sources, such as the SESIA study of 5 Capitals speak of 439 million m^3, which was the estimated volume of 1998 but also given for the year 2010 (5 Capitals, 2012:78). As, the numbers provided by MASEN reflect the annual average of the period 2001-2013, these numbers are found more accurate by the authors and thus are cited primarily in this report.

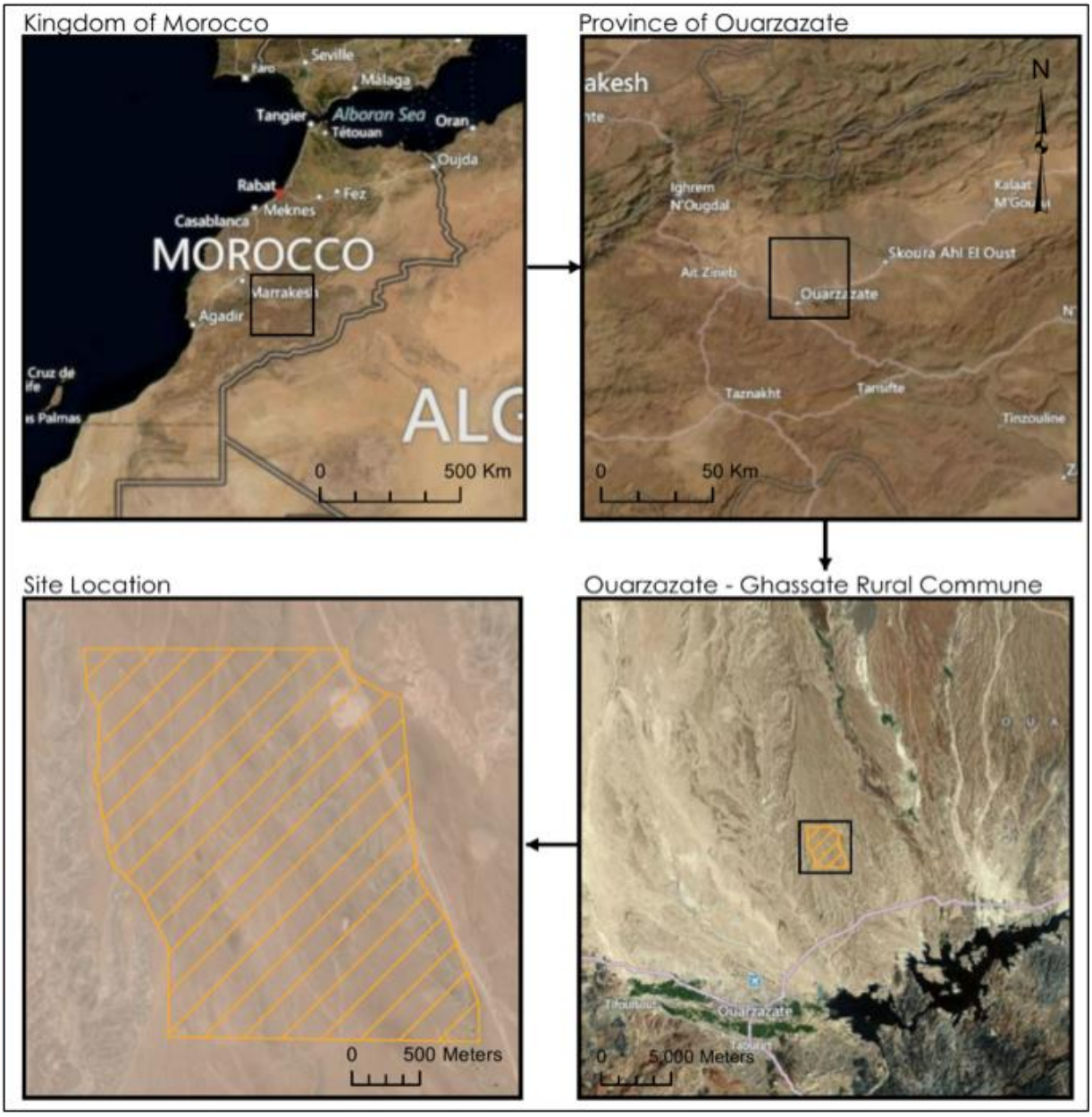


Figure 7-4: Noor$_o$ I site location
Source: 5 Capitals, 2012a:4.

7.3.3 Technology selection

The FESIA study also considered photovoltaic technology without tracking devices, photovoltaic with tracking devices, and CSP tower. But because the GoM preferred a commercially-proven, dispatchable technology for the first phase of Noor$_o$, they decided on the 160 MW parabolic trough plant with three hours of thermal storage and wet cooling (AfDB, 2012a:3).

7.3.4 Compliance with socio-environmental safeguards

Similar to many large-scale projects of other sectors, the World Bank classified the project as category A under its Operational Policy OP 4.01 on Environmental Assessment and OP 4.12 on Involuntary Resettlement because "it is likely to have significant environmental impacts that are sensitive, diverse and unprecedented" (5 Capitals, 2012a:31; World Bank,

2011c:34). To comply with the relevant national requirements and the conventional safeguard policies of the funding institutions, the in-depth project- and technology-specific SESIA study was conducted under the Equator Principles and the WB/IFC standards (5 Capitals, 2012a:33).

7.3.5 Project developer bidding process

In March 2010, MASEN released an expression of interest for companies to participate in a competitive tender process for Noor$_o$ I (MASEN, 2010) that attracted over 200 responses (CPI, 2012:4). This large response confirmed "an appetite in the private sector to participate in this type of project despite the inherent risks" (CIF, 2013:4). In fall of 2012, MASEN awarded the bid to a consortium led by ACWA Power. Their anticipated electricity price was 18.9 US cents /kWh, roughly 30% below the second bidder's offer. This is one of the lowest worldwide CSP cost projections based on levelized cost of electricity (LCOE) to date (CIF, 2013:13 and 43). In January 2013, Morocco opened bidding for the development and operation of Noor$_o$ II and III.

7.3.6 Power purchase agreement

In 2012, the GoM and the ACWA Power consortium signed a Public Private Partnership (PPP) agreement. It foresaw the creation of a special purpose company, called the Solar Project Company (SPC), to develop Noor$_o$ I (AfDB, 2012a: 12-13). MASEN holds 25% of the company's share capital, and ACWA Power holds 75%. Furthermore, MASEN signed a US $1 billion Power Purchase Agreement (PPA) for the entire electricity output of Noor$_o$ I over 25 years with ACWA Power on a Build, Own, Operate, and Transfer (BOOT) basis (World Bank, 2011c:64). MASEN will purchase the electricity from ACWA Power at the cost of the power generated. ONEE, the government-owned grid operator, and MASEN signed a second PPA in which ONEE will buy all of the electricity from MASEN at the grid price. The project will yield a net financial deficit because the generation cost is higher than the grid cost and because Moroccan electricity prices are projected to overall decrease over the next 25 years. This is why the GoM will subsidize the difference between the generation price and the grid price (World Bank, 2011c:20). This subsidy has led to resentment among the Moroccan population who worries that the state's tax revenues would be used to eventually balance the price difference (Thiam, 2013).

7.3.7 Assessment of local employment potential and recruitment policy

In order to comply with the voluntary local content target set for Noor$_o$ I, ACWA Power incorporated a recruitment policy to maximize the number of local workers hired and to increase the benefits for the local population (5 Capitals, 2012a:175; MASEN, Personal Interview, 2014). Within the recruitment policy, priority was given to adjacent communities, in particular to the rural Commune of Ghassate (75%). A commission was founded at the provincial level with a mission to manage the recruitment process transparently and to match job demand with job supply for the entire Noor$_o$ project. The commission supports the local *Agence Nationale de Promotion de l'Emploi et des Compétences (ANAPEC)* in coordinating the actors involved in the recruitment process (ANAPEC, Personal Interview, 2014). Besides ANAPEC, this commission includes local authorities of the rural Commune of Ghassate, local

authorities of Ouarzazate city and province, local associations, MASEN, and the project developers ACWA Power and Acciona. As one of its first activities, the commission carried out a study to analyze and estimate the employment potentials and the specific skills and competencies in the local communities adjacent to the CSP site. As a result of this study, a database for the recruitment process was developed and provided to the international firms engaged in the construction phase (ANAPEC, Personal Interview, 2014). Another important activity of the commission was the adoption of general recruitment guidelines in mid-2014 to improve the transparency of the recruitment policy (ACWA Power, Personal Interview, 2014).

7.4 Construction and implementation of Noor$_o$ I

The construction of the supporting infrastructure for Noor$_o$ I started in early 2013 and is expected to take around 24 months after the "Notice to Proceed". A summary of the mostly procurement-related processes is given in Figure 7-5.

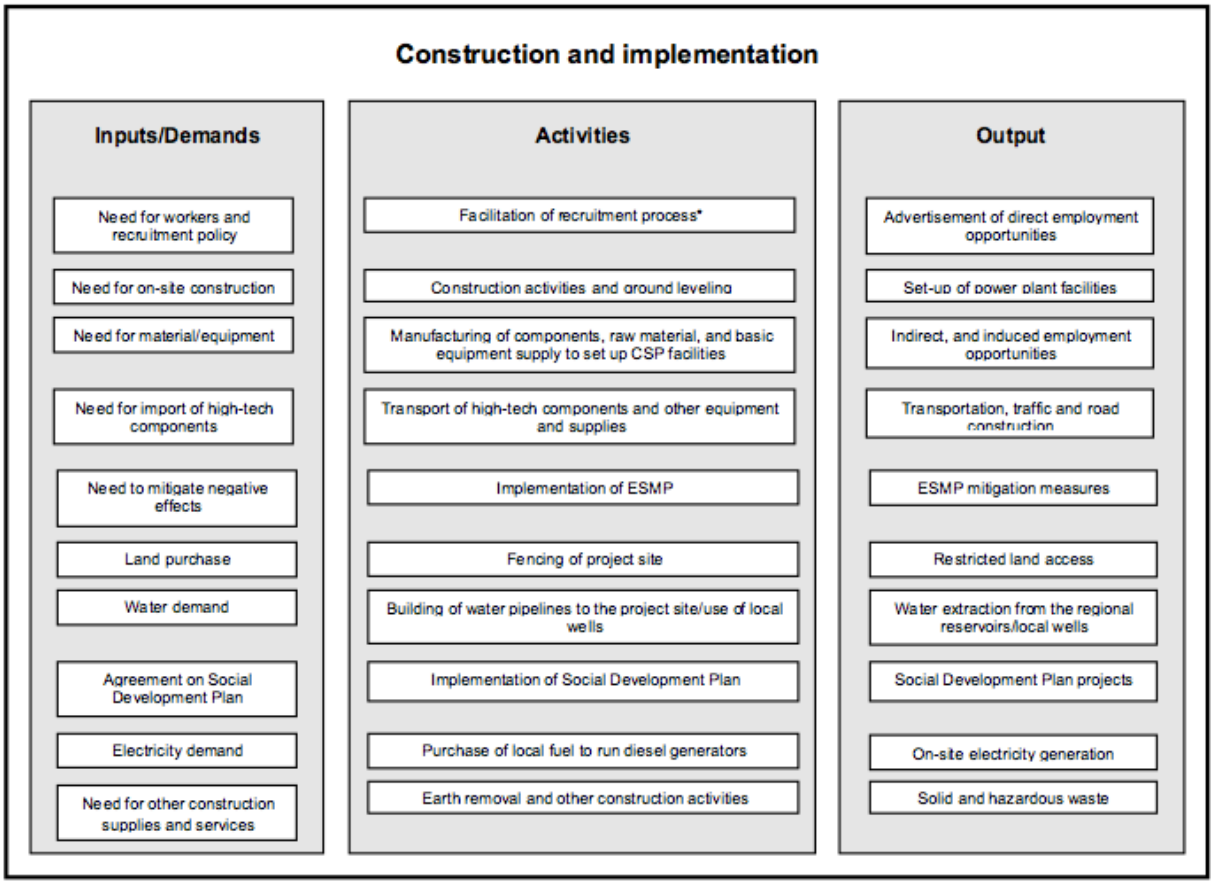


Figure 7-5: Input-Output framework for the construction and implementation stage of Noor$_o$ I
Note: Elements marked with * are described in chapter 7.6.2.

7.4.1 Components of the Noor$_o$ I project

The following description is based on the analysis of existing and planned CSP projects in chapter 6.3, and the Noor$_o$ I studies mentioned above. The project will consist of (a) the CSP plant and (b) associated infrastructure facilities (see. Figure 7-6).

a) CSP plant

Mirror field

According to the SESIA study, Noor$_o$ I will cover an estimated area of 1,308,000 m^2 in 14 sub-fields of various sizes. The plant will have steel solar collector assemblies that hold the mirrors and receivers in place, with 400 trough collector rows (5 Capitals, 2012a:5 and 22). The troughs will be 5-8 meters tall.

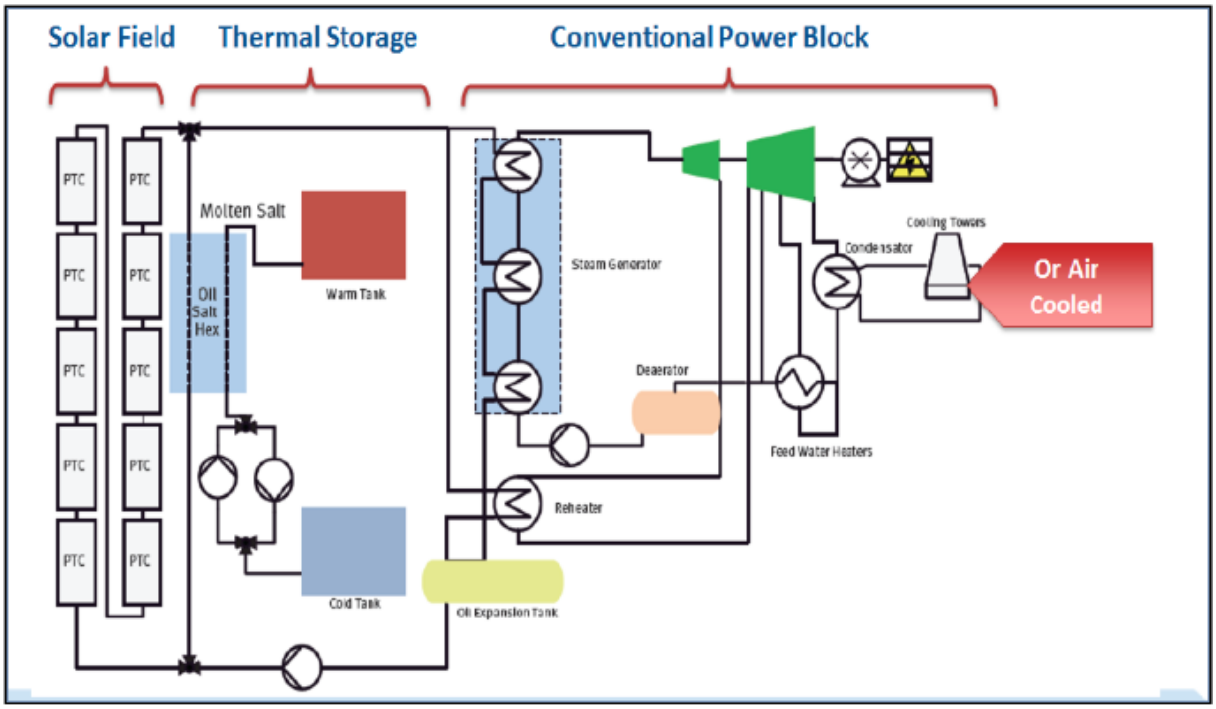


Figure 7-6: Illustration of a CSP plant with an integrated solar thermal energy storage system

Source: ACWA Power, 2013: 3.

Power block

The solar field will include a power block, in which solar heat will be converted into electricity. The principal components of the Noor$_o$ I power block include:

- *Steam generation system*: The heat from the solar field will be pumped and transferred through the Heated Transfer Fluid (HTF) system at 393°C to the steam turbine to generate electricity. The heat will eventually also feed into the thermal storage system (5 Capitals, 2012a:16).
- *Heat Transfer Fluid (HTF) system*: Because the HTF will undergo thermal expansion and contraction, an expansion tank and four overflow tanks will have to be constructed to buffer the volume changes (5 Capitals, 2012a:23).
- *Wet cooling/condensation system*: A wet cooling tower will be required to extract and condense the steam from the steam turbine by circulating it through cool water (5 Capitals, 2012a:16 and 25; ACWA Power, 2013:3).
- *Auxiliary fuel system*: The plant will require two thermal oil heaters that help start the plant in the morning, help generate the minimum load at which the turbines can operate, and ensure that the HTF does not drop below a minimum temperature when the sun is not shining. The auxiliary boilers will be run on diesel fuel and may also be used to pro-

duce steam to support the synchronization of the turbine, but will not be used to boost production when it is not sunny (5 Capitals, 2012a:25).

- *Auxiliary cooling system*: This cooling system will release waste heat that builds up during the use of equipment such as: electric generator coolers, air compressors coolers, feed water pumps, condensate pumps, and thermal oil pumps. The system will consist of an open cooling circuit, which will take water from the cooling tower and use it to cool especially the auxiliary cooling system (5 Capitals, 2012a:26).

Thermal storage system

Noor$_o$ I will use a hot and cold tank storage system with molten salt (potassium and sodium nitrate). The energy storage capacity of the tanks will be equivalent to three hours of maximum operation (5 Capitals, 2012a:16).

b) Common and associated infrastructure facilities

Buildings

The CSP plant will require on-site buildings e.g., administration buildings, a control room, and storage houses, for its construction and operation (5 Capitals, 2012a:29).

Water treatment facility

Wastewater generated by the various units at the solar plant will be treated at an on-site wastewater treatment plant. The treated water will be used for cleaning the solar mirrors, power plant cooling, service, and drinking water. Any unused treated water will be sent to evaporation ponds in the southern quadrant of the project (5 Capitals, 2012a:26, 72 and 83).

Water tanks

Water tanks with sufficient capacity to meet construction and maintenance water needs and to supply water in an emergency (e.g., pump failure, breach of pipeline, or fire) will be installed on-site (5 Capitals, 2012a:30).

Water supply and discharge pipelines

A water pipeline with parallel intake and discharge structures will be constructed mainly to transfer cooling water from the Mansour Eddahbi reservoir to the cooling tower and the water tanks of the CSP plant (5 Capitals, 2012a:72).

Electrical connections and transmission lines

A 225 kV distribution substation with accompanying transmission lines was constructed to connect the CSP plant to the national grid. Additional transmission lines with a length of 272 km for transporting the electricity will be built (ONEE, Personal Interview, 2013).

Additional municipal service facilities

The plant will require municipal service facilities to provide worker's services, such as a cafeteria, electricity and drinking water supply, sanitation, sewage conduits, and waste removal (5 Capitals, 2012a:29).

Roads

A new access road (6m width) that connects the site with the main road to Ouarzazate and also connects the village of Tasselmant to the main road was built (5 Capitals, 2012a:177 and 182). Additional unpaved roads for the construction traffic were built next to the site.

Construction camps

The developer will build equipment camps to temporarily store CSP plant components and construction equipment on the site (5 Capitals, 2012a:200). Both local and non-resident workers are expected to find lodging off-site in the Ouarzazate area (5 Capitals, 2012a:29).

7.4.2 Manufacturing and employment potential

Info box: CSP and jobs

The International Energy Agency (IEA) estimated that CSP could generate 8 to 10 jobs per MW built through component manufacturing and the construction of the plant and its associated infrastructure (IEA, 2009:2). This figure is based on evidence from existing CSP plants i.e. the 100 MW Andasol 1+2, which created 1,200 jobs per year during construction (NREL, 2011) and the 150 MW Kuraymat ISCCS plant with about 60% of the components and workload coming from local industry (World Bank, 2011c:11). However, these numbers always depend on whether local workers have the necessary skills needed during each project phase.

The GoM expects that the Noor$_o$ solar complex will generate numerous temporary employment opportunities during construction, including direct construction jobs and indirect opportunities from component manufacturing and raw material supply, as well as service provision. Insights gained from other projects (see info box) and the literature review in chapter 6.3 imply that around 1,200-1,600 construction jobs could be created by Noor$_o$ I - with around 80% low-skilled workers (construction laborers, drivers, security staff, etc.), 10% semi-skilled workers (equipment operators, etc.) and 10% skilled personnel (engineers, land surveyors, project managers, etc.). These numbers reflect MASEN's estimate that the number of construction workers would be around 600 people in the first and 1,200 people in the second year (5 Capitals, 2012a:29 and 176)[26]. However, the realities were reported to be significantly higher (see Figure 7-7).

[26] ANAPEC in its local employment assessment prior to the construction phase, estimated only 800 jobs (600 unqualified, 200 qualified) (ANAPEC, Personal Interview, 2014).

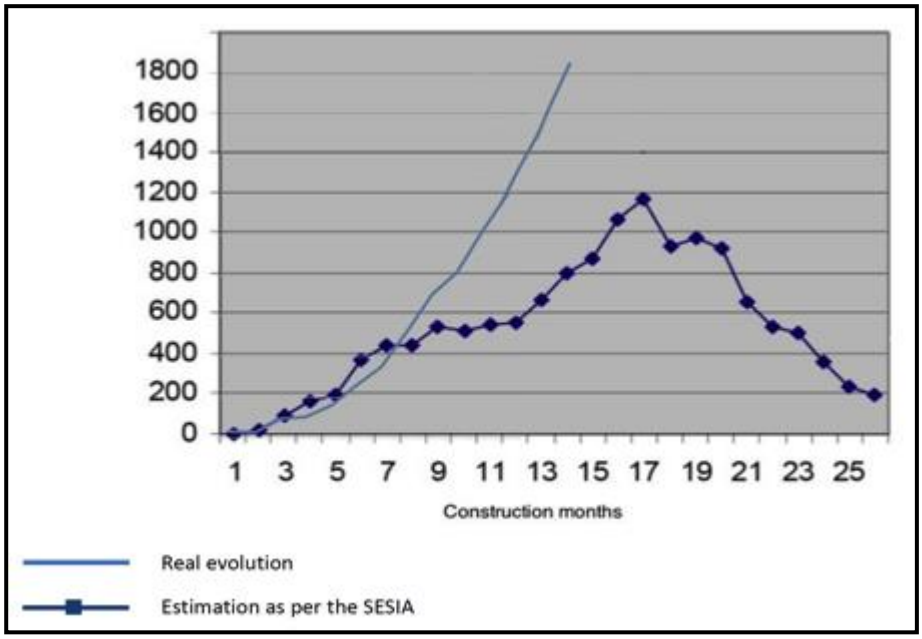


Figure 7-7: Workforce evolution for Noor$_o$ I during the construction phase
Source: ACWA Power Ouarzazate, Personal Interview, 2014.

In October 2014, ACWA Power explained that they had already exceeded these conservative estimates by hiring over 1,800 workers at the beginning of the second year of construction (ACWA Power Ouarzazate, Personal Interview, 2014). For the consecutive phases of the Noor$_o$ solar complex, the AfDB estimates that there would be 2,000-2,500 direct and 10,000 indirect jobs (AfDB, 2011:15).

7.4.3 Transport and traffic

During construction, traffic (heavy load vehicles and cars) will increase due to daily commuting and the transport of machinery, materials, water, and waste (5 Capitals, 2012a:29).

7.4.4 Land use and restricted land access

For security reasons, and to prohibit nomadic and seasonal pastoralists from crossing the site during the construction and operation, the CSP plant is fenced off from the surrounding environment (5 Capitals, 2012a:176).

7.4.5 Water consumption and water treatment

The total water consumption for construction is estimated to be 300,000 m^3 over the entire construction phase, with an estimated monthly peak consumption of 20,000 m^3 (5 Capitals, 2012a:78). The main water uses are expected to be earthworks (48%), domestic consumption (17%), commissioning (17%), civil works (9%) and dust control (8%) (5 Capitals, 2012a:79). Most of the water will not be recycled but will instead evaporate under the desert sun; however, some water used during the construction phase could be recycled in the water treatment facility (5 Capitals, 2012a:79). The water will be extracted and piped from the Mansour Eddahbi reservoir (5 Capitals, 2012a:72 and 78). MASEN estimates the water used

during construction to be 0.12% of the reservoirs annual average based on the 12-year average 2001-2013 (MASEN, Personal Interview, 2014).[27]

7.4.6 Electricity consumption

Diesel generators will most likely fuel the construction and facilities.

7.4.7 Solid and hazardous waste and air emissions

A significant amount of solid and hazardous waste could be generated on-site during construction. The solid waste includes excess construction material from earth removal (5 Capitals, 2012a:143 and 145). Hazardous waste includes used oil and filters, batteries, scrap steel or chemicals, and contaminated soils.

7.5 Operation and maintenance of Noor$_o$ I

Noor$_o$ I is expected to reach the stage of "final commercial operation" in October 2015 (MASEN, 2014). Activities during this stage, which will last at least 20 years, include electricity generation, water consumption, employment opportunities, traffic, and generation of waste (Figure 7-8).

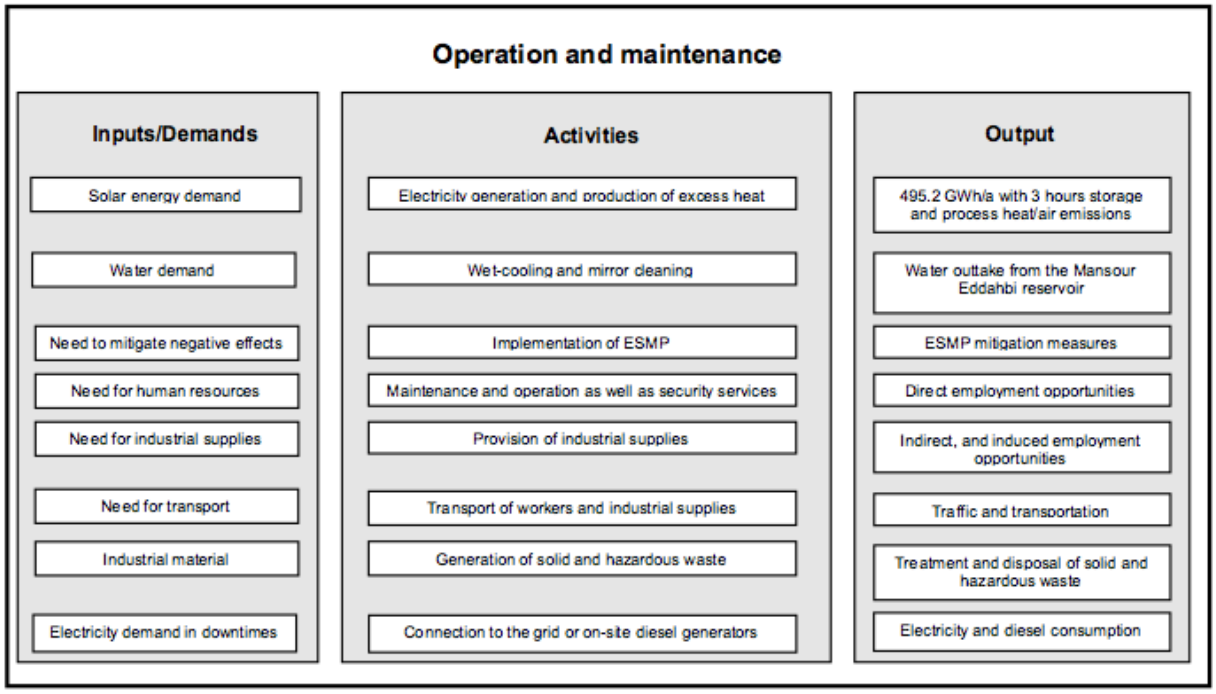


Figure 7-8: Input-Output framework for the operation and maintenance stage of Noor$_o$ I

7.5.1 Electricity generation

The project is expected to supply 495.2 GWh per year to the Moroccan electricity grid (DNV, 2012:11-12). According to Moroccan law, ONEE must give the renewable electricity priority in the grid, meaning in times of surplus generating capacity, they would take electricity from

[27] Based on the annual volume of 1998 (439 million m³) 5 Capitals expects the water used during construction to be 0.03% of the average contributions to the Mansour Eddahbi reservoir (and 0.19% of the lowest recorded yearly contribution to the reservoir, which was 68 million m^3) (5 Capitals, 2012a:80).

Noor$_o$ I rather than a fossil fuel plant. The law also allows MASEN to sell electricity to other public or private operators in national or international markets (World Bank, 2011c:91).

7.5.2 Process heat and air emissions

Just like any other steam turbine technology, Noor$_o$ I will produce high-temperature steam at 380°C, which will be used to drive a turbine to generate electricity. The outlet steam will be fed to a low-pressure turbine for condensation in the wet cooling tower; the condensed water is returned to the steam generation system to repeat the cycle (5 Capitals, 2012a:16). Additionally air emissions will include SO_x, NO_x, CO, CO_2, O_3, and PM10 (5 Capitals, 2012a:23).

7.5.3 Water consumption and treatment

During the steam cycle most of the water is recycled through a “closed-loop steam cycle” in which the steam is cooled and condensed into liquid water and then turned into steam again. The condenser must also be cooled with water in a separate water cycle. Some water is lost in both processes as drafts of air carry mist into the air, a water plume rises out of the cooling tower, and some dissolved solids must be removed from the water (i.e., blow-down). 5 Capitals estimates that, during operation, Noor$_o$ I will need 1.75 million m³ of water per year for cooling processes, mirror washing, and workforce needs (5 Capitals, 2012a:83) - equaling to approximately 3.5l water per produced kWh electricity. Water will be piped from the Mansour Eddahbi reservoir, using 0.7% of the reservoirs annual average volume based on the 12-year average of 2001-2013 (MASEN, Personal Interview, 2014).[28]

7.5.4 Waste water discharge and treatment

The plant will generate several wastewater discharge streams during operation, with higher temperature and possibly higher concentration of chemicals and minerals than the original water. These will include cooling tower blow down, floor drainage from the process buildings, wastewater from the reverse osmosis treatment process, and sewage from the workforce. All wastewater will be treated on site in closed wastewater treatment facilities, and the treated wastewater will either be recycled for use in the plant or sent to sealed on-site evaporation ponds (5 Capitals, 2012a:88).

7.5.5 Employment opportunities

Based on experience from Andasol 1 and 2 and the SESIA studies’ conclusions, Noor$_o$ I will employ approximately 60 permanent high-skilled staff members (i.e., electrical engineers) to operate, supervise and monitor the plant (NREL, 2011; 5 Capitals, 2012a:178). Furthermore, an unspecified number of local small and medium-sized enterprises are expected to deliver various services like maintenance, security, and mirror cleaning. These numbers are reflected by ACWA Power's estimates that they will employ 70 local workers during the operational phase (ACWA Power, 2013).

[28] In the SESIA study 5 Capitals estimate the operative water withdrawal to be 0.41% of the average annual contribution to the reservoir (based on the annual water volume of 1998, which was 439 million m³, and 2.57% of the lowest recorded yearly contribution (5 Capitals, 2012a:88).

7.5.6 Traffic and transport

In this phase, there will be less traffic than during the construction phase; however workers and material supplies still would need to be transported to the site.

7.5.7 Solid and hazardous waste

The operation and maintenance of Noor$_o$ I will use many oils, lubricants, solvents, and industrial components. The solid and hazardous waste generated from the use of these materials and other fluids and solids (e.g., sludge and chemicals from water treatment, HTF, broken mirrors, domestic waste) will be stored on site and then transported to local waste facilities (5 Capitals, 2012a:152).

7.5.8 Electricity consumption

The plant could require backup capacity through on-site diesel generators or the national grid when it is cloudy or there are technical difficulties. The required amount is unknown.

7.6 Description of MASEN's policies and measures to address the local dimension of Noor$_o$ I

This chapter describes MASEN's policies and measures taken to address the local dimension of the MoSP in general and of Noor$_o$ I in particular. These aspects are important for the understanding of our empirical impact assessment in order to derive lessons learned and craft sustainability requirements for the future CSP development in the MENA region.

7.6.1 Social and socio-economics aspects in MASEN's mandate

The Moroccan law 57/09 under which MASEN was founded is centered around the key mission to develop integrated solar projects with a minimum capacity of 2,000 MW by 2020. Following this mission, the agency focuses on four main objectives:

- To design technical and socio-economic studies to lay the groundwork for the implementation of the MoSP and its projects;
- To promote, market, finance, and implement solar power projects;
- To develop local expertise and research and industrial capacity to reinforce Morocco's leadership in African renewable energy markets;
- To assure the solar projects are monitored and evaluated.

An agreement between MASEN and the GoM further stipulates MASEN's key tasks (Bakkoury, 2013:222):

- To implement the MoSP;
- To acquire land;
- To operate solar power projects; and
- To secure finances for the MoSP.

The second agreement among the GoM, MASEN, and ONEE concerns the:

- Implementation and transfer of solar power plants through BOOT (see chapter 7.3.6);
- Connection of solar power plants to the grid;
- Assurance of the power plants' operations; and
- Sale of electricity generated by solar power plants.

With regards to Noor$_o$ I, MASEN's priorities are to test the large-scale deployment of CSP technology with storage and to probe a financial model for capital-intensive solar power projects.

7.6.2 MASEN's measures for public consultation, land acquisition, social development, impact mitigation, and capacity building

MASEN's measures to address social and socio-economic aspects of Noor$_o$ I encompass a public consultation process, a Land Acquisition Plan (LAP), a Social Development Plan (SDP), and an Environmental and Social Management Plan (ESMP). Furthermore, MASEN's engagement in vocational training, university programs, and research and development (R&D) was considered as part of its efforts to develop a domestic industry base for the MoSP.

Public consultation process

The project's classification as Category A required a comprehensive community involvement and consultation process with affected community stakeholders through the FESIA and the SESIA studies (5 Capitals, 2012a:50). According to both studies, a participatory approach was used at all stages of the project development. The extensive public consultation process occurred during three meetings between 2010 and 2012 (MASEN, Personal Interview, 2014) (see fig. 7-9).

Figure 7-9: The consultation process for Noor$_o$ I (MASEN, Personal Interview, 2014).
Source: MASEN, 2014.

"All consultation meetings were advertised through the publication of an [advertisement] in two national newspapers and the invitation of identified stakeholders in the province of Ouarzazate. […] Arabic and French were spoken during the meetings" (5 Capitals, 2012a:51). Furthermore, the FESIA and SESIA studies state, that various stakeholders were consulted including social and economic stakeholders, elected representatives of the municipalities, relevant ministerial departments (energy and mining, environment, agriculture and forests), the governor of the Ouarzazate region, ONEE, traditional representatives of the local communities, and women's and civil society associations (5 Capitals, 2012a:50-51). During these consultations, presentations were given and answers provided on the technical aspects of Noor$_o$ I, the impact assessment methodology and its objectives, and mitigation measures (5 Capitals. 2012a:51-54). Additionally, "the local population was provided with an opportunity to express their needs in the form of projects" to be financed by the SDP (AfDB, 2011:20).

The AfDB concluded that during the consultation process the local population had "a positive perception about the project […] with respect to employment, economic activity, and the reputation of the town" (AfDB, 2011:19). However, this majority view was accompanied by "high expectations" and "strong concerns" regarding different implications of the project (AfDB, 2011:19).

Expectations

- Local employment opportunities;
- Youth involvement in training opportunities;
- Support for local development in terms of services to industry;
- Spill-over effects on the local economy;
- Regular communication between project representatives and local stakeholders;
- Implementation of mitigation measures;

Concerns

- Influx of foreign workers;
- Inconveniences from the construction site (road traffic);
- Health, particularly relating to air emissions and wastewater discharges;
- Water use;
- Protection of the local environment in relation to the fauna and cultural environment;
- Delayed compensation for land acquisition (5 Capitals, 2012c:51-53 and AfDB, 2012:19).

In 2014, MASEN institutionalized its consultation and communication processes by establishing two concrete measures in order to distribute information about the project and to address concerns and discontent, and to deal with disputes:

- Local team: Located on site and "fully available to collect comments or complaints from population" including a social expert responsible for processing grievances and conflict management as well as the monitoring of local development projects (SDP);

- Mailbox: Installed in the premises of the MASEN office in Ouarzazate to collect, anonymously if needed, complaints from local stakeholders (MASEN, Personal Interview, 2014);

Land Acquisition Plan (LAP)

In 2010, MASEN developed a Land Acquisition Plan (LAP) for the total of 3,041 ha required for the entire 500 MW Noor$_o$ solar complex (out of a total area of 64,000 ha belonging to the tribe of Ait Ougrour) (World Bank, 2011c:33 and 69). While this number exceeds the ranges of existing CSP plants (see info box), which is due to the different technologies to be applied, the R&D platform on-site as well as additional space between the different project technologies, the projected 1,308,000 m² for the installation of the collector field and the 450 ha for the 160 MW Noor$_o$ I facility fall well within existing ranges (5 Capitals, 2012a:1 and 16).

Info box: CSP and land

CSP's land use depends largely on the total installed collector surface, the technology chosen, the space between rows of the solar collectors, and the area needed for associated infrastructure. Based on existing CSP installations, the total land requirement for parabolic trough power plants between 50 and 100 MW is around 2 to 4 km² (e.g, 50 MW Andasol 1-2 km²). The area for just the mirrors consumes between 500,000-1,000,000 m² (e.g. 50 MW Andasol 1, 510,120 m²) (NREL, 2011).

According to the SESIA study, the land was acquired in accordance with Moroccan and IFC standard procedures for similar voluntary land transactions between a local community and a public agency (5 Capitals, 2012:174). Further, the process complied with Article 6 of the Dahir dated April 27, 1919, which requires the involvement of public administration experts to determine a price for properties (Reyes, 2012). According to this Moroccan law, the expert commission was comprised of (i) the Pacha or Caid, president, (ii) a representative from the Ministry of Finance, (iii) two representatives of the Ministry of Agriculture, Trade and the High Commission for Water and Forests, and (iv) representatives from Ministry of Public Works. The price for the entire Noor$_o$ complex was 1 MAD per m^2 or 30.5 million MAD in total (MASEN, Personal Interview, 2014). Additionally, World Bank reports confirmed that the acquisition process strictly followed official regulations and that six representatives of the local tribes of the rural Commune of Ghassate (Ait Ougrour) and eight governmental/private authorities (including DAR, ONEE and MASEN) gave the formal approval in a "friendly settlement" for the transfer of the land according to the proposed LAP (World Bank, 2011c:69 and MASEN, Personal Interview, 2014).[29] Since MASEN is a limited company (*société anonyme*) and cannot directly purchase collective land, the land sale was first agreed upon and completed between the representatives of the rural Commune of Ghassate (Ait Ougrour) and the public utility ONEE on behalf of MASEN in early October 2010 prior to the King's visit to inaugurate Noor$_o$ I and was then transferred to the agency in mid-2011 (5 Capitals, 2012c: 174).

Social Development Plan (SDP)

As part of its approach to address the local dimension of Noor$_o$, MASEN emphasized its "benefit sharing" commitment to improve the living conditions in communities adjacent to the

[29] As a compensatory measure, the SESIA study states that, "pastoral activity will be organized in the spaces located between the solar collectors throughout the operation phase"[29] (5 Capitals, 2012c:43).

power plant (rural Commune of Ghassate) and to optimize the socio-economic impacts in the region by different actions.

- Social Development actions financed from the land acquisition: Based on a price of 1 MAD per m², 30.5 MAD million were allocated directly from the land transfer and put into a special fund with the Ministry of the Interior.[30] During the consultation process, selected local community stakeholders identified spending priorities for socio economic development projects (MASEN, Personal Interview, 2014). They identified "direct accompanying measures" in two primary areas:

    - *Basic amenities projects*, such as enhancing infrastructures to improve living conditions through, drinking water facilities (e.g., wells), lining of drainage and irrigation canals, protection of agricultural land, and distribution of seedlings (fruit, olive and almond trees) (Department of Rural Affairs Ouarzazate, Personal Interview, 2014);

    - *Socio-educational projects*, such as creating a multi-purpose town hall, improvements to a female students dormitory, the equipment of the local birth hospital, and a mobile ambulance (Department of Rural Affairs Ouarzazate, Personal Interview, 2014, World Bank, 2011c:69; AfDB, 2011:19-20).

- Voluntary actions taken by MASEN: In addition to the social development projects stemming from the land acquisition MASEN financed voluntary actions that were directly connected with the project, such as upgrading and constructing roads or directed to enhance development opportunities for local communities and companies in five areas: education, health, tourism, agriculture and entrepreneurship.

- CSR actions implemented by ACWA Power: Furthermore, ACWA Power undertook multiple CSR activities in order to increase the absorptive capacities in local communities, such as training for welding and weaving, enhance local development, i.e., fostering agricultural infrastructure, and to improve the living standard, i.e., provision of medical services (Department of Rural Affairs Ouarzazate, Personal Interview, 2014).

Furthermore, the construction of a youth holiday camp and plans to promote education and green tourism through an "Institute of Education on Renewable Energies" were mentioned (UNFCCC/CCNUCC, 2012: 35).

In addition to these direct accompanying measures, "structural projects" for regional development in the fields of education, water resources, forest and environment, infrastructure, culture, religion, urbanism, tourism, health, agriculture, drinking water, and youth and sport are envisaged, with financing to be provided by the Ministry of Interior (15-20 MAD million). They include, a highway connecting Ouarzazate and Skoura, a new road between Ghassate Centre and Skoura, a new dam in Asseghemou (close to Ghassate Centre), the creation of a new urban center in Ghassate Centre and the development of traditional cultural sites of touristic value (Department of Rural Affairs Ouarzazate, Personal Interview, 2014).

[30] The Department of Rural Affairs (DAR), which falls outside of the governance structures of local communities, manages the fund.

Environmental and Social Management Plan (ESMP)

In accordance with the lending institutions' requirements, the results of the FESIA and SESIA were translated into a specific Environmental and Social Management Plan (ESMP). The ESMP outlines the actions needed to implement mitigation and risk management measures and monitor them. All of the project developers are responsible for implementing the ESMP during construction and operation and ensuring that all environment and social impact mitigation measures are integrated into the project (World Bank, 2011c). In the context of community impacts, some of the relevant points included in the ESMP are procedures for recording complaints regarding social issues (5 Capitals, 2012c:2), procedures on monitoring and reporting site specific social aspects, a set of measures to mitigate potential negative impacts on employees and whenever relevant the surrounding communities, and the establishment of a means to "maintain open communication channels with local communities" (5 Capitals, 2012c:41-42).

Engagement in vocational training and research and development (R&D)

With its mission to reinforce Morocco's leadership in African renewable energy markets, MASEN is making numerous efforts to support the local industry's capacity to manufacture components of the solar supply chain and to carry out engineering services through vocational training, university programs, and R&D activities under the MoSP.

Vocational training

Under the umbrella of the Ministry of Energy, the Department of Energy, Mines, Water, and the Environment in Ouarzazate aims to established the *Instituts de Formation aux Métiers des Energies Renouvelables et de l'Efficacité Energétique* (IFMEREE) to accompany the Noor$_o$ solar complex with vocational training programs in the city of Ouarzazate and at the Noor$_o$ complex. By including stakeholder input in the planning phase of the IFMEREE (universities, researchers, industry associations, civil society organizations, and trade unions), the institute is regarded as an important element in MASEN's strategy to build up industrial capacities in Morocco and in Ouarzazate in particular. Once completed, the institute will train local workers to meet all of the solar project's needs (Ministry of Energy, Environment, Water and Mines in Ouarzazate, Personal Interview, 2014). These include:

- Technicians specialized in cooling;
- Technicians specialized in operation and maintenance;
- Technicians specialized in components installation;
- Technicians specialized in transmission lines;
- Technicians specialized in storage;
- Project managers and administrators.

University programs

In addition to plans for the IFMEREE, the University of Ouarzazate signed an agreement with other Moroccan universities to further develop its research activities in the field of renewable energy. The university has already received applications to its bachelor program on renewable energy and aspires to do more in this field by establishing collaborations with internation-

al universities. The university is also collaborating with ACWA Power Ouarzazate to enable their students to intern at Noor$_o$ in the short- to medium-term (University of Ouarzazate, Personal Interview, 2014).

R&D activities

In partnership with international research centers and R&D departments in private companies, MASEN aims to develop new courses and training programs in the field of renewable energy. The agency has a mandate to identify topics and projects for R&D, finance R&D projects, and create a platform and facilities for R&D. The *Institute de Recherche en Energie Solaire et Energies Nouvelles* (IRESEN) was also founded, which is a relatively new Moroccan agency that coordinates the establishment of the national R&D platform. MASEN signed an agreement with the German Aerospace Centre (DLR) to cooperate on the development of an R&D platform in Ouarzazate and to perform joint research activities in the field of solar energy to improve solar technology and CSP pilot plants in Morocco (DLR, 2013). Furthermore, two private companies, SOITEC and Schneider Electric signed a memorandum of understanding with MASEN for an integrated partnership on Concentrated Photovoltaics (CPV) in Morocco. The project aims to build CPV both for domestic use and for electricity export, to stabilize Moroccan electricity prices and to build a CPV manufacturing facility in Morocco. They plan to develop two CPV pilot projects at the R&D platform at MASEN's Ouarzazate site (SOITEC, 2013). Finally, ACWA Power undertook substantial efforts to support CSP training with a joint R&D program between the Saudi King Abdullah University of Science & Technology (KAUST) and the Université Internationale de Rabat (UIR). They have also hosted Moroccan high school graduates to join the solar program at the Higher Institute for Water and Power Technologies (HIWPT), a facility that was founded by ACWA Power in Rabigh, Saudi Arabia.

D Empirical studies: analysis and results

8 Baseline of Ouarzazate: livelihoods and vulnerability in the main research area

This chapter explores the 'livelihood landscapes' of the four communities under study: the city of Ouarzazate, the municipality of Agdz, Idelsane, and the municipality of Ghassate. It is based on the interviews[31] conducted during the first field research and supplemented with information sourced from the preliminary baseline study conducted prior to the field research phase (see appendix 16.2). The structure of this chapter includes the following: After a short overview of the region and its geographic and demographic characteristics, it describes the region's history and important formal and informal institutions. Then, the major social divisions within the four communities under study are investigated. In the next section, the vulnerability context including trends, shocks, and seasonalities is illustrated, followed by a detailed description of the livelihood capitals and the household expenses and income structure. The chapter closes with a description of people's main coping strategies with regard to crises and shocks.

8.1 Background

All communities under study are located in the southeast of Morocco in the eastern part of the administrative region of Souss-Massa-Drâa in the lower catchment of the Wadi Drâa at the edge of the Sahara Desert (see topography, which is formed mainly by the High Atlas in the north (up to 3,000 m), and the Figure 8-1). Three communities, the city of Ouarzazate, Idelsane, and the municipality of Ghassate lie within the Province of Ouarzazate. The fourth, the municipality of Agdz, belongs to the bordering Province of Zagora, south of Ouarzazate Province. The Province of Ouarzazate is characterized by the dominance of mountainous topography, which is formed mainly by the High Atlas in the north (up to 3,000 m), and the

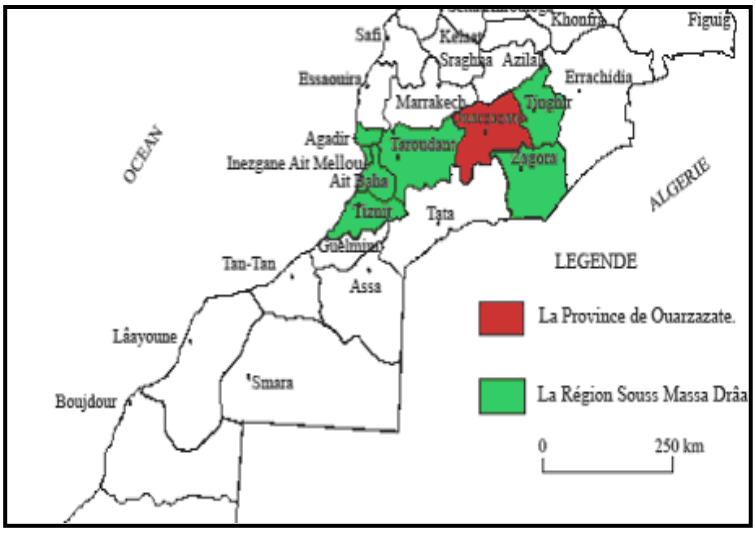


Figure 8-1: Location of Ouarzazate Province and the region of Souss-Massa-Drâa
Source: Oudada, 2008.

[31] For information regarding the methods of the interviews conducted see section 5.4 and for the selection process of the four communities within the research area see section 9.1.

Anti-Atlas in the south (up to 2,000 m). In between the two mountain ranges lies the relatively flat Ouarzazate Basin at an altitude of 1,000 to 1,500 m. The Agdz area can be described as an oasis valley along the Drâa River, which flows from the Mansour Eddahbi reservoir in the north towards the town of Zagora in the south.

The whole area is also known as the Drâa Valley, which is downstream from the Mansour Eddahbi dam in the north and extends south to the area of Tagounite (see Figure 8-2). The valley is more than 200 km long with a surface area of 23,000 km² (Chafik et al., 2003:16).

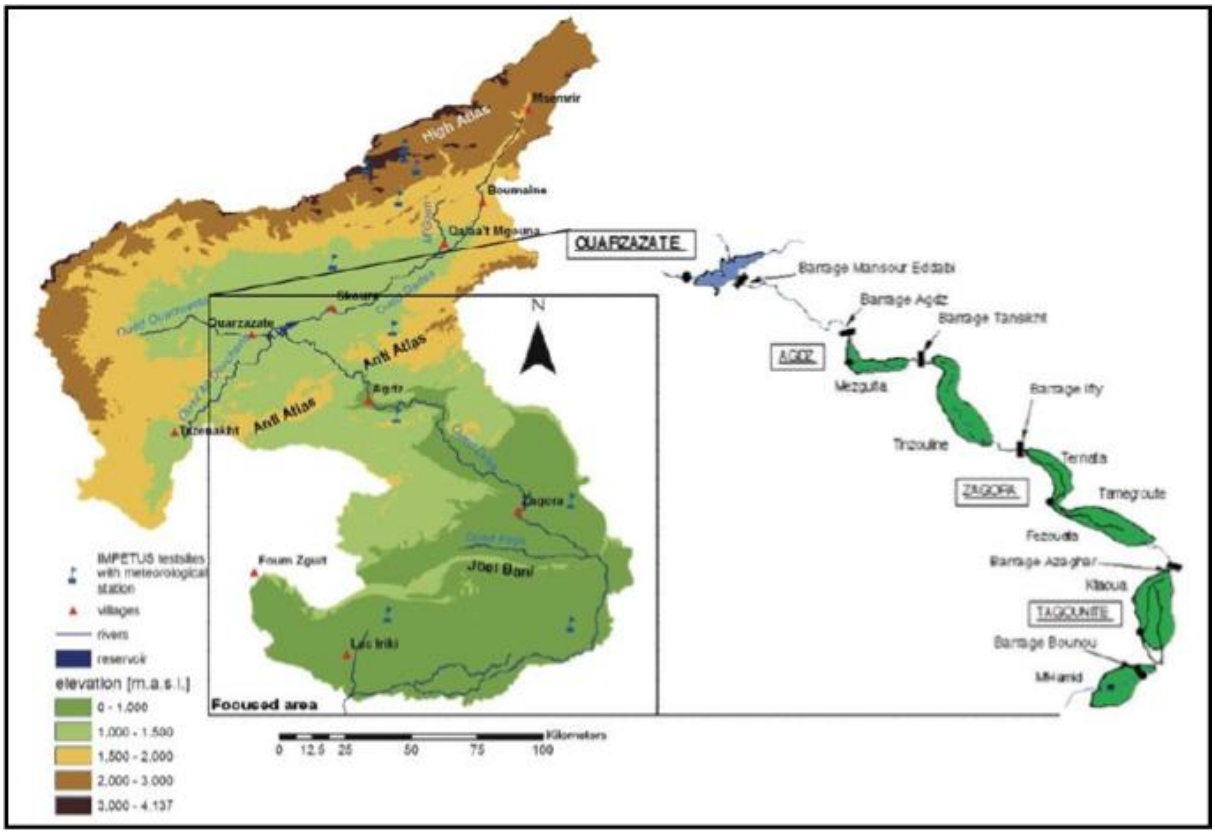


Figure 8-2: The Drâa catchment and the middle Drâa Valley

Source: Graf, 2010:16.

In the Province of Ouarzazate, the mountains of the High Atlas form an orographic barrier against the humid Atlantic currents coming from the north and west, providing it with semi-arid to arid climate conditions. Additionally, the climate of the Province of Ouarzazate is classified as Saharan, with cool winter and hot summer temperatures. Precipitation levels are relatively low with 150 mm received annually in urban areas and up to 250 mm in nearby mountains (by comparison Cologne, Germany receives around 800 mm annually) (Heidecke, 2009:13). This is significantly less than the national average of 346 mm per year (World Bank, 2013). The region is characterized by extreme evaporation, which ranges from 2,000 to 3,000 mm per year (Département de l'eau, 2013:327). As a result of the highly variable precipitation and large evaporation rates, the Drâa Valley is among the ten most arid catchments in the world and has suffered regularly from long lasting droughts historically causing major water availability problems (De Jong et al., 2006:1). Agdz is characterized by its aridi climate with an average of 80 mm of rainfall per year (Chafik et al., 2003:16). Due to the limited water availability in the region, the entire research area is characterized as semi-desert and rock steppe. Vegetation density is generally low in the region due to climatic

conditions, the extensive extraction of firewood, and severe overgrazing (Diekkrüger et al., 2012:23).

According to the general census of 2004, Ouarzazate Province has a population of 292,750, of which more than 63% live in rural areas. While the fertility rate is one of the highest in the country (HCP, 2004), the annual population growth rate is estimated to be 0.95%, lower than the national average. This paradox can be explained by the high out-migration and high child mortality rate[32]. The actual growth rates for the rural and urban population are 0.6% and 4.1% respectively (Busche, 2012:19). The gender distribution of the population in the Province of Ouarzazate is 48% males and 52% females (HCP, 2012).

The administrative district of Agdz has a total population of 58,936 including several rural communities, as well as the municipality of Agdz. Only 11% of the total population (5,870 people) live in the urban area of the municipality of Agdz. The district's population is skyrocketing, with a 9.09% mean annual growth and a population density of 13.2 inhabitants per km² (Chafik et al., 2003:18).

Although many people – especially youth – migrate from the Drâa region to Moroccan cities in search of employment, Graf (2010) describes the region of the middle Drâa Valley as overpopulated, with more than eight inhabitants per irrigated hectare in 2009. To illustrate, the population of the Drâa Valley more than doubled in size from 122,291 in 1971 to 283,368 in 2004.Morocco's population is very young; the median age is estimated to be 26.5 years, with higher rates of young people in the rural areas (CIA, 2010). This is also true for the Province of Ouarzazate, where more than 43% of the population is under 18, and 57.6% is under 25.

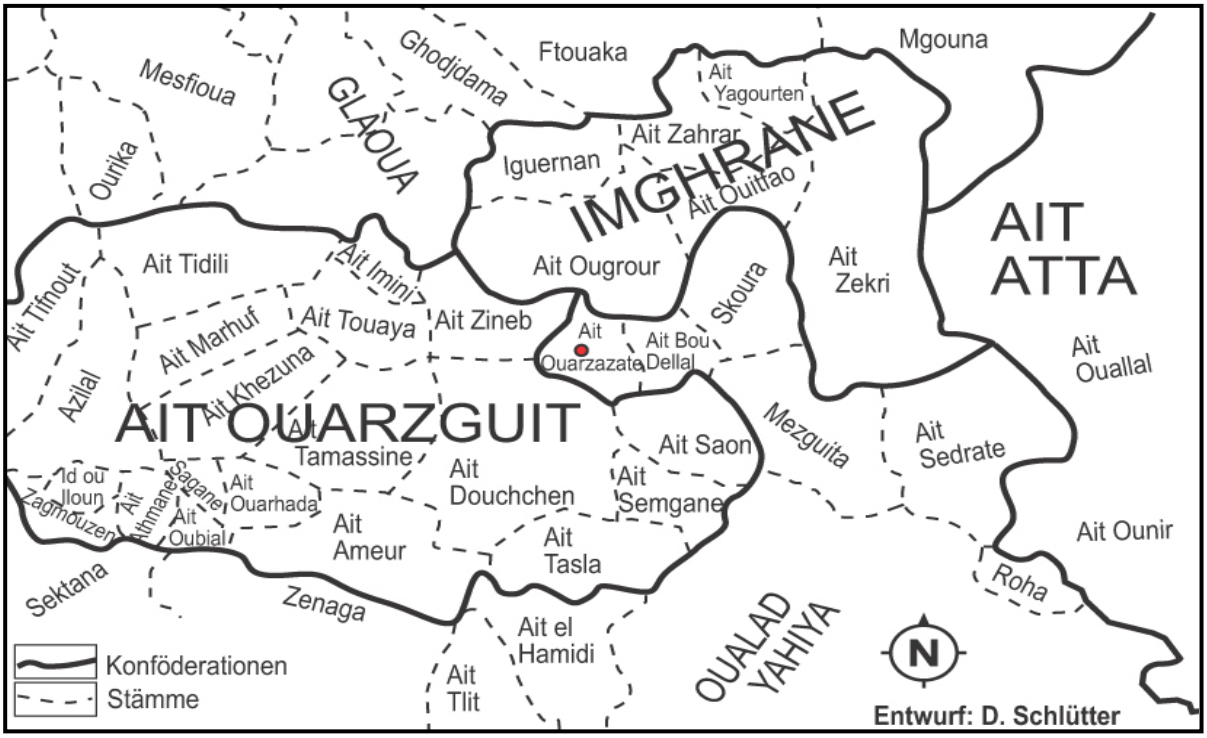


Figure 8-3: Berber tribes in the region of Ouarzazate

Source: Schlütter, 2006:44.

[32] Child mortality rate (the death of infants and children under the age of five per 1,000 people annually) in the Province of Ouarzazate is as high as 171.4 in rural areas and 20.9 for the urban area of Ouarzazate city (HCP, 2004).

The bulk of the population in the Ouarzazate Province is of Berber ethnicity, with some minorities and migrants from other provinces and parts of the country (Schlütter, 2006:43). The configuration of the Berber tribes living in the Province of Ouarzazate is illustrated in Figure 8-3. Members of the Ait Ouarzazate Berber tribe are concentrated around the city of Ouarzazate. Near the eastern borders lies the territory of the small Ait Bou Dellal Berber tribe, to the west is the land of the Ait Zineb, which is part of the confederation of the Ait Ouarzguit, and to the north the Ait Ougrour[33], which are part of the large Imghrane federation (Schlütter, 2006:44).

Farther south in the Drâa Valley, the population is very diverse with three main ethnic groups (Chafik et al., 2003:19):

- *The Draoua.* This group is the majority in the Drâa Valley and in most *douars*. It belongs to the Haratines people, descendants of slaves from Senegal and Sudan. The Draoua were among the first sedentary farmers of the region.
- *Arab groups.* At least seven Arab groups coexist in the Drâa Valley. They arrived as nomads between the 13th and 16th centuries. Today, the majority have become sedentary farmers.
- *Imazignene or Berber groups.* The Ait Atta tribe has been present in the valley for more than 1,000 years, but the second tribe Ait Sederat settled in the region as recently as the 18th century. While they arrived as nomads, the Imazignene mostly switched to sedentary farming.

8.2 History and institutions

The city of Ouarzazate was founded from a former military camp, which the French colonists established in 1928 to control the southeast of Morocco. However, the history of the region dates back to more than 3,000 years to the glories of the Berber era. In fact, many historic monuments, such as the famous *kasbahs*, or fortified castles, bear testimony to the times when the historic region of Ouarzazate was home to powerful dynasties reigning over Morocco. In contrast, since Morocco's independence in 1956, the research area has suffered from political neglect and economic isolation. This marginalization relates to the region's geographic situation and infrastructure – i.e., semi-desert with a winding road to the nearest major city of Marrakech – the scarcity of its natural resources, and its severe weather. In the 1980s, the international movie industry flourished in the Province of Ouarzazate, but it is now in decline. However, one important event that was supposed to improve regional development, and that still effects people's relationships with regard to tensions and conflicts was the construction of the Mansour Eddhabi dam under King Hassan II's *Grande Hydraulique* policy between 1970 and 1973 (Popp, 1983:38). The construction of Mansour Eddahbi divided the catchment area of the Drâa River to provide water to new beneficiaries. Despite having some positive effects, it did not result in integrated sustainable development for the region (Ait Hamza, 2002:139). While regional urban centers like Ouarzazate received public investment in infrastructure for urban and touristic development (Pérennès, 1992:34), Schlütter (2006:85) asserts that the dam had negative social consequences for the residents living in adjacent communities. About 1,340 families that lived next to the rivers Oued Dadès and

[33] The land on which the Noor complex is being constructed belongs to the ethnic community Ait Ougrour, which is part of the rural municipality of Ghassate.

Oued Ouarzazate in 1971 (Riser, 1973:176) were displaced from their homes. Government resettlement and compensation measures were poorly received, and many of the displaced emigrated outside of the Ouarzazate region. According to Riser (1973) the displaced viewed the governmental compensation as unjust, the areas of land provided as compensation were not profitable, and public housing was rejected. An informal property market grew around certain villages. Hence, only the wealthy and landowners benefited from the dam's construction. Social tensions increased, as did inequalities between landowners and landless (Akiouh, 1994:45). This is particularly relevant, as one of the communities in this study's research area, Idelsane, received many of the displaced, and conflicts around land and water rights continue to simmer there.

Overall, the state has significant influence in Morocco for different reasons: First, public administration is a significant source of jobs, providing the better-educated urban population with a viable source of income. Second, many development projects at communal, provincial, and regional levels are launched by the GoM and managed by central agencies or institutions. However, Moroccan society is characterized by high ethnic and social heterogeneity. Powerful elites are traditionally the core decision-makers in the country. Most politicians own large farms or companies that work with public administration, and they sometimes have a monopoly over public projects. This affects many aspects of the livelihood of the Moroccan people. As a result, Schlütter (2006) argues that the distribution of water and land entitlements in the Province of Ouarzazate is mainly based on the interests of influential elites. Corruption and nepotism are visible problems in Moroccan society that often threaten social cohesion. Third, the strong role of the state often extends down to the rural level, as the Moqadim, the local representative of the national government, is often the only source of information. Finally, even though the village association is an influential body, it reflects existing power structures – and omits women. Hence, access to it is exclusive and very limited.

Consequently, there is mistrust towards local authorities and a feeling of powerlessness among the local population. This is exacerbated by the almost complete lack of an open public dialogue between the authorities and civil society organizations. Due to these effects, overall engagement and interest in politics is low, and people often fear oppression by authorities when they speak up, which was reflected in the interviews conducted in all four main communities included in this study.

Although they lack resources and are poorly equipped to secure financial aid, there are many associations and NGOs in the Province of Ouarzazate that are mostly concerned with the management of water supply, energy, installation of equipment, or services.

The tribal and ethnic origins of customs and institutions in the Drâa Valley are reflected in the region's social structure. Most popular decisions, such as choosing selected representatives or members of informal, but powerful, associations, are made on the basis of tribal structures. During droughts and other times of stress, these social institutions discriminate against marginalized groups (Schlütter, 2006:240). While customary laws, related to, for example, water usage and land rights, vary greatly from one community to another for geographical, historical, and political reasons, they still rely on Berber rules and traditions. Several centuries ago, the Islamic religious scholars (*tolba*) and Marabouts changed some aspects of Berber customary law without banning it completely. These customary rules, which structure all levels of community life, reveal the legal basis of the social contract and the anchoring of practices in the distant past. Paul Roché (1965:66–67) shows that the implementation of

Islamic law could not claim to solve all problems, including the ownership and management of water. It was adapted to allow for customary law if it did not conflict with the guidelines of Sharia. However, there are also attempts to challenge customary water ownership rules through legal mechanisms, but sometimes policymakers end up taxing the dispossessed beneficiaries and forcing them to pay for water that was rightfully theirs.

Short overview of the four communities within the research area:

The city of **Ouarzazate** is the urban heart of the region. Like most cities, agriculture is not of major importance. It is also the city of administration – more than 40% of the active population work in that sector – and of small and medium enterprises. More than 70,000 people inhabit the city, whose literacy rate is comparatively high, particularly among youth.

The municipality of **Agdz** is the community with the highest diversity of livelihood strategies in the region. It has some urban characteristics as a densely settled center. For example, the population density in the city of Agdz is comparably high with 76.2 inhabitants/km^2. At the same time there are small *douars,* with only 6.53 inhabitants/km^{2,} where farming is still the dominant activity. Since 2006 the influx of miners to Agdz has triggered some change in the community, for example, rising rents in the central part.

The situation in **Idelsane** is in many ways similar to that of Ghassate. However, in nearly all aspects, the people in this semi-rural commune are better off than those in Ghassate: Transportation is still very difficult, but better than in Ghassate; water for irrigation is limited, but not as scarce as in Ghassate. Therefore, households in Idelsane can still engage in agriculture. Should they need to adapt they can do so more easily.

Overall, the livelihood situation in the municipality of **Ghassate** is the most difficult and vulnerable of all the main research areas. People are most affected by negative trends like drought, and they have the least resources (e.g., infrastructure, education or financial means) to adapt to the situation. As with Idelsane, the population in Ghassate is declining, reflecting the observable trend of out-migration to the larger cities in the whole area.

8.3 Major social divisions

The social spectrum of the research area can be illustrated using a matrix with four separate, but interrelated, dimensions or axes. The positioning of a group in this matrix determines the degree to which it is exposed to vulnerabilities and can access and make use of available livelihood capitals[34].

Likely the most prominent among these is the urban-rural axis, as it affects livelihood capitals and resulting strategies most strongly. The four communities under study can be located on this axis as follows: Ouarzazate (urban) – Agdz (semi-urban) – Idelsane (semi-rural) – Ghassate (rural) (see Table 8–1).

[34] The order in which the four communities are presented is different than in the other chapters of the study. This is because the data analysis showed that the livelihoods and vulnerabilities could better be explained in this order.

Urban	**Ouarzazate**	**Agdz**	**Idelsane**	**Ghassate**	Rural
Population structure: young					Population structure: old
Education level: high					Education level: low
Economic opportunities: high					Economic opportunities: low
Availability of and access to infrastructure: high					Availability of and access to infrastructure: low
Chances for women: high					Chances for women: low
Alignment with non-traditional values: strong					Alignment with non-traditional values: weak

Table 8–1: Urban–rural divide of the four communities within the research area

Source: Based on the interviews.

The urban end of the spectrum is characterized by a younger population, a higher level of education, a wider range of economic opportunities, better availability of and access to infrastructure, a wider range of opportunities for women, and a stronger alignment with non-traditional values. Rural communities, in contrast, typically have an aging population, lower levels of education, few economic opportunities especially for women, low availability and poor access to infrastructure, stronger alignment with traditional values, and a stronger reliance on subsistence farming.

Gender differences form the second axis fanning out the social spectrum. Traditionally, women are restricted to household activities, where responsibilities include housework, child rearing, fieldwork, handicrafts, and collecting firewood for cooking and forage for the animals (mostly goats). Access to education and work outside the household is traditionally restricted to males. The same holds true for decision-making structures. As in many other places, the steady pressure of (post-)modernization is beginning to whittle away this traditional gender division. A significant number of interviewees report that the role of women has changed or is in the process of changing. Most importantly, women have entered the workforce, can contribute more to household livelihood, and have a much wider range of opportunities available. Young women can move to other cities in order to study, and the marriage age has increased. Women organize in associations and improve their literacy skills through these organizations. Overall, gender equality and women's rights are on the increase.

However, opportunities are influenced by age, location on the urban-rural axis, and most importantly the interviewee's gender: While many women reported changes in the role of women, the vast majority of men still see the woman's place as being in the household. This is particularly pronounced in rural areas, where few women and virtually no men reported such developments, and among the elderly population. On one end of the gender axis are thus found young, urban women who perceive and live their lives in a new and more empowered way, and on the other end are found elderly, rural men who think and act in line within traditional gender conceptions.

Closely related is the third axis, which is defined by the age of the population. Rural exodus – caused by deteriorating natural resources, such as lack of water for irrigation, the absence of

employment opportunities for youth in the hinterland and better opportunities to make a living in the urban centers, has led to an aging population in the periphery, while urban centers, including both Ouarzazate and larger cities, experience an influx of young Moroccans. In an already very young population – the median age in Morocco is estimated at 26.5 years – this leads to an overabundance of youth and young adults in the cities. While they are better educated than their parents' generation, they compete for limited jobs and educational opportunities.

Unsurprisingly, young people in the Ouarzazate area are also more receptive to and influenced by non-traditional values and practices, exacerbating inter-generational tensions. However, conflicts and tensions along the fourth axis of tradition–modernity are not restricted to those between the generations. As mentioned above, women are more open to Western values than their male counterparts, particularly, but not only, with regard to the role of women.

8.4 Vulnerability context

This section examines the vulnerability context of the research area with regard to the main trends, shocks and seasonalities and their impacts on the four communities under study. Generally, the region is characterized by high vulnerability to environmental pressures. This vulnerability is caused by the harsh environmental conditions in the region and is amplified by the effects of climate change. The most pressing environmental challenges include: precipitation and temperature changes, soil degradation, salinization, diminishing water resources, and persistent droughts.

8.4.1 Trends

8.4.1.1 Environmental trends

Precipitation and temperature changes

The main trend regarding natural resources is the decrease in rainfall over the last decade, leading to a lasting drought. It is expected that this trend will most likely intensify in the coming decades: According to the IPCC, North Africa's temperatures during March and November are likely to rise between 2°C and 3°C while precipitation is likely to decrease between 10% and 20% by the year 2050 (IPCC, 2007b:443). Additionally, the temperature could rise by more than 5°C by 2080 in the eastern part and the mountainous zones of Morocco (World Bank, 2009:4) with a reduction in rainfall by 40% compared to the period of 1961 to 1990 in the most pessimistic scenario (World Bank, 2009:4). The increase in temperature would also involve an increase in evapotranspiration of about 20% from now through 2050 and 40% by 2080 (A2 scenario) (World Bank, 2009:4). This would decrease the snow in the High Atlas Mountains, resulting in a loss of water storage for runoff.

Higher temperatures and less reliable precipitation will likely decrease the overall availability of water in the region and result in significantly adverse impacts on the water situation due to the insufficient recharge capacities of the water reservoirs and groundwater tables. Already, low levels of precipitation are one of the limiting factors for agricultural activities in the research area. The change in rainfall, as well as other environmental and socio-economic pressures, has already affected water levels in the Mansour Eddahbi reservoir.

Soil degradation

Some of the worst land and soil degradation is occurring in the southern, pre-Saharan regions of Morocco. Ninety-three percent of Morocco's dry weather areas (arid to sub-humid) are vulnerable to desertification due to overexploitation of natural resources and soils, including the Province of Ouarzazate (ICARDA, 2012:10). With a projected increase in rainfall in southern Morocco, as well as reduced vegetation coverage due to higher temperatures and less precipitation and socio-economic pressures, erosion rates of fertile land are likely to increase in the future (Linstädter et al., 2010:567).

Salinization

Irrigated soils in Morocco are expected to lose more than 50% of their productivity within 20 years (Badraoui et al., 2000:227-234). This trend could worsen due to the impacts of climate change, specifically resulting in a decrease in precipitation levels and higher temperatures.

Diminishing water resources

As almost no natural water flow system exists, the water availability of the research area is almost completely dependent upon the releases from the Mansour Eddahbi reservoir. However, since its construction in 1972 until 1999, the reservoir's capacity has been reduced by by more than 25% (Diekkrüger et al., 2010:7). More recent numbers provided by MASEN estimate the current annual average to be only 250 million m³ on a worst case scenario, which represents a reduction of more than 50% compared to the reservoirs original capacity (MASEN, Personal Interview, 2014). This is due to less rainfall, high evaporation losses, poor farming practices, increasing water demands, and soil erosion that results in reservoir silting, making the dam's capacity to meet the required amounts of water for drinking and agricultural usage frequently insufficient (Diekkrüger et al., 2012:23).

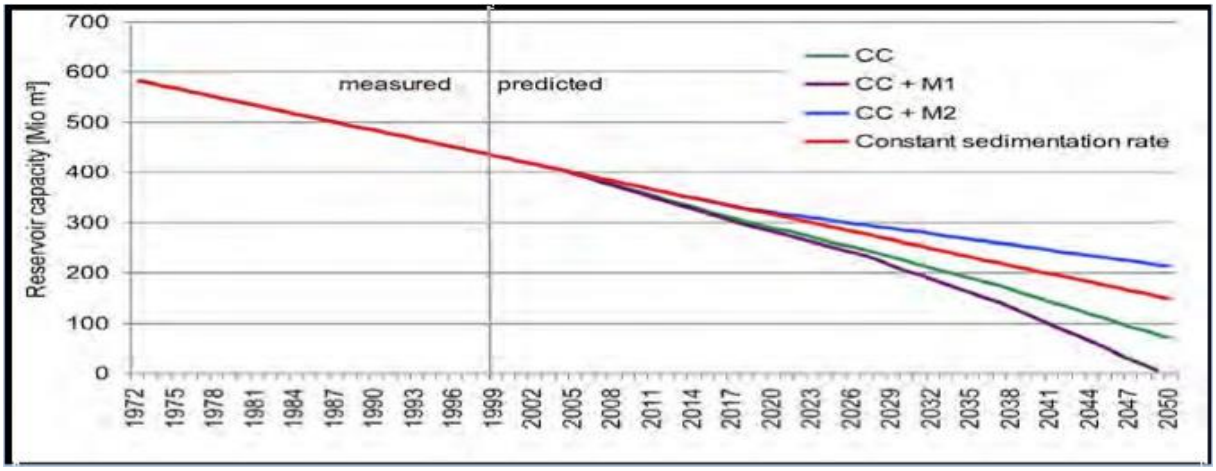


Figure 8-4: Simulated development of the capacity of the Mansour Eddahbi reservoir

Source: Diekkrüger et al., 2010:12.

Note: Simulated development of the capacity of the Mansour Eddahbi reservoir under socio-economic scenario M1 "marginalization" and M2 "rural development" as well as climate change scenario. A volume of 250 million m^3 is required to satisfy water demand of the middle Drâa Valley.

Even worse: different future scenarios developed within the GLOWA-IMPETUS project that included assumptions about climate change, anticipated socio-economic developmement, and environmental degradation simulate a signifcant reduction of the reservoir's water capacity for the next decades, with the worst-case scenario calculating that the Mansour Eddahbi reservoir could become inoperable between 2030 and 2042 and thus would no longer be able to supply enough water for drinking and agricultural demands in the Ouarzazate area (Diekkrüger et al., 2012:10). In their conclusions, the authors of this study state that in any case of their scenarios "the remaining reservoir is between nearly 0 and 200 million m^3 in 2050 which will severely threaten water management for the middle Drâa Valley" (Diekkrüger et al., 2010:11) (see Figure 8-4). Although the assumptions which frame the outcomes of these scenarios are somewhat speculative and thus connected to uncertainties, the already observed decline in the reservoir's capacity to a current annual average of 250 million m³ (MASEN, Personal Interview, 2014), is reason for concern as this value is already signifcantly lower than what had been previously estimated by the IMPETUS-GLOWA project for 2015 based on their base year of 1998.

A 53-year-old male interviewee from the municipality of Ghassate, working as a farmer and well driller, said that, starting four years ago, all water resources dried up and precipitation became rare. He mentioned that the lasting drought is the main natural disaster in the region that threatens the livelihoods of the rural population. Before the drought, families relied on farming and animal husbandry, but now they mostly rely on remittances. While the center of Ghassate has enough drinking water, the surrounding villages suffer from drinking water shortages. In his opinion the drought also leads to increasing prices, which strains the family's already tight budget.

Droughts

The Province of Ouarzazate was particularity affected by droughts during the early 1970s, the early 1980s, and the late 1990s to the beginning of the 21st century (Klose, 2009:56).

According to state-of-the-art climate projections, the trend of increasing temperatures and decreasing precipitation levels will substantially raise both the risk and duration of droughts in the future. Räisänen et al. (2004) even conclude that in the future there will be fewer precipitation days rather than reduced precipitation intensity, making lengthy droughts more likely. Similarly, Voss et al. (2002) project a significant prolongation of very long dry spells for North Africa (10-year return values of annual maximum dry spells) for the period from 2060 to 2089 compared to 1970 to 1999, resulting in increased dryness over western North Africa (Schilling et al., 2012:7).

8.4.1.2 Affectedness of environmental trends in the four communities under study

The urban population of Ouarzazate is less affected by environmental trends as it relies more strongly on activities in the secondary and tertiary sectors.

In Agdz the interviews reflected the main trend regarding the decrease in rainfall and groundwater level, constant drought, lack of irrigation water from wells and from the dam, and trees dying. Despite some wastewater problems, the general drinking water supply is described as good and sufficient. The decrease in water available for irrigation from wells and from the three to four times a year (15-20 days) that the dam is opened to send water down the Drâa valley, puts pressure on some farmers. The main consequences are higher costs for irrigation with natural gas or petrol-driven pumping systems, less access for poorer

(and often landless) people to private farming land, and a greater potential for conflicts over water and land rights within and between villages. For poorer and landless people, the decrease in natural resources is even more severe. They rely, for example, on palm fronds for cooking because gas is too expensive. One interviewee reports that, in the past, landless people could harvest herbs and grass in other people's fields. This is no longer the case due to the drought.

In Idelsane too, the lasting drought and the resulting decline in water availability was the most frequently mentioned change in natural resources. The main impact is a decline of irrigation agriculture, as water for irrigation is only available for two hours every one or two weeks. Additionally, forage and firewood is no longer easily available, and households need to supplement what they have collected with fodder bought on the market. Another result is that gas has replaced firewood as the source of energy for cooking. Vegetable farming has declined as well. Yet, farmers have planted olive and almond trees despite the continued drought.

In contrast to the situation in the city of Ouarzazate, the decline in water availability has had dramatic consequences for the municipality of Ghassate, as the population has relied almost exclusively on agriculture for their livelihoods. Not only has the lack of water led to the death of almond trees, but also to that of some of the more resilient olive and palm trees, of which a few were between 200 and 300 years old. This means, on the one hand, a loss of crops for the farmers, and on the other the loss of an important source of firewood. Other shrubs and plants used for firewood are equally affected by the lasting drought. Some households now need to buy firewood to supplement what they collect. The same is true for forage used to feed their livestock, which is increasingly harder to gather. Women have to walk longer distances to find materials, and farmers are forced to buy additional forage at the market. Farmers who rely on irrigation farming no longer have access to a sufficient amount of water and only those who can afford water pumps can continue irrigation. Finally, the drought has also reduced the availability of medicinal plants used by the villagers.

8.4.1.3 Economic trends

Another observable trend in the Ouarzazate region is the overall economic decline. The research area is characterized by high economic vulnerability including poverty, unemployment and declining agricultural yields due to environmental challenges. In the rural areas, which historically were more dependent on agriculture activities, the lasting drought has a strong influence on these trends.

Poverty

Poverty is high in the rural areas of Morocco, with 15% of the Moroccan population living below the poverty line. In the Province of Ouarzazate, three out of four families live below the poverty line (HCP, 2012). Overgrazing, overexploitation of water resources, and other soil degrading activities can be considered to be a result of poverty.

Unemployment

The unemployment rate in Morocco is high, especially among youth (CIA, 2010). According to the HCP (2012:68), the unemployment rate in the Province of Ouarzazate is about 3.9% (10.4% in urban areas, and 1.7% in rural areas), and on average 54.3% of the workforce is

active (42.8% in urban areas and 60% in rural areas). This figure masks many realities, such as unpaid work done by family members in rural areas and temporary jobs in cities.

Loss of yields

The effects of climate change are likely to cause a decrease in the primary agricultural production in some African countries of up to 50% by 2020 (IPCC, 2007b:13). Considering that many African countries rely significantly on agriculture as the most importance source of national income and employment, this decrease in production could have severe effects on economic growth and poverty alleviation. Morocco could be among the countries with a projected 39% reduction in average agricultural productivity from 2003 to 2080 (Schilling et al., 2012:11, see Table 8–2).

State	Percentage of water withdrawals used for agricultural purposes (2000)	Rain fed land as a percent of total agricultural area (2003)	Percent impact of climate change on agricultural productivity by 2080 (compared to 2003), without carbon fertilization	Percent impact of climate change on agricultural productivity by 2080 (compared to 2003), with carbon fertilization
Algeria	65	98.6	-36	-26.4
Egypt	86	0.1	11.3	28
Libya	83	97	NA	NA
Morocco	87	95.2	-39	-29.9
Tunisia	82	96	NA	NA

Table 8–2: Agriculture and climate change impact in North Africa
Source: Schilling et al., 2012:11.

Loss of agricultural income

Decreasing yields would result in declining incomes. Freier (2012) estimates that a 20% reduction in average precipitation would decrease total income from pastoralism by 15-37% in Morocco. The same scenario, however, also shows that increasing the share of pasture area and fodder used for mobile pastoralism would reduce the potential impacts of droughts in total income by 11% (Freier, 2012:2).

8.4.1.4 Affectedness of economic trends in the four communities under study

The city of Ouarzazate's economic sector has shrunk in the last decade. This is particularly true for the film industry, but also for the tourism sector. The only positive trend in the economic sector mentioned by the interviewees is an increase in commerce and the availability of goods. Interviewees, furthermore, reported a noticeable increase in prices of consumer goods with stagnating income development. The electricity bill in particular is perceived to have risen, even though objectively the electricity price has been stable for the past decade.

In general, the economy in Agdz was described as weak in the majority of the interviews. People work in the tourism sector, which is highly dependent on the seasons, or in agriculture, especially the production of dates. Similar to the city of Ouarzazate, some interviewees reported an increase in prices for staple goods, including, for example, tea, sugar, oil and flour as well as water and electricity.

Idelsane's economy is characterized by the changing role of agriculture. Although agriculture had already lost importance after the resettlement of the residents from the dam in the 1970s, it was still one of the main livelihood strategies in Idelsane, next to remittances from out-migrants. The drought has taken its toll on agriculture, but agriculture still seems to be more viable than in Ghassate, with farmers planting olive and even almond trees. But there is no denying the sense of an overall decline in the economy, leading to out-migration and an increasing reliance on remittances. It is clear that financial resources are limited – many shops allow for transactions on credit (*Lkridi*) until the end of the month.

The interviewees in Ghassate felt that there was no economy to start with, so it could not decline much further. The decline in agriculture has led to out-migration and an increasing reliance on remittances, which for some has even led to an improved economic situation. In Ghassate, the electricity prices have also risen, as the result of an increased consumption and progressive pricing for electricity.

8.4.1.5 Social trends

There are also different trends with regard to the social fabric of the research area. These trends are partly interrelated and particularly concern the out-migration patterns of the region, the changing status of women and the changing mentality of youth as well as an overall decline of local traditions.

Migration

One of the reasons for the relatively low population growth is migration, which is a common phenomenon in the southern provinces of Morocco. Already, the region of Ouarzazate suffers from high emigration rates to large cities such as Casablanca, Marrakech, and Rabat, and emigration to foreign countries, especially France.

Gender inequity

Moroccan society is characterized by social and economic inequality between men and women, particularly in rural areas. Although the situtaion has improved significantly during the last years, there is still a large proportion of women who are unable to exercise specific human rights, such as the right to education, employment, property ownership, and a life free from violence and coercion. Until recently, women were largely excluded from political decision-making processes (Schlütter, 2006). Moroccan women's rights legislation is among the most progressive in Africa and the Middle East; however, these laws are not always enforced or followed due to cultural norms.

8.4.1.6 Affectedness of social trends on the four communities under study

The fact that local youth suffer from high unemployment rates and the overall lack of opportunities for higher education in the rural areas, has led to their out-migration from the rural communities to the cities. While out-migration has had a negative impact on population growth in the provinces and, consequently, has led to an aging rural population, it has also contributed substantially to its socio-economic development through remittances that were spent on community facilities and services. A prime example for this trend is the municipality of Ghassate, where most of the interviewees rely on remittances.

The role of women has changed noticeably. The change is most pronounced in the urban areas, such as in the city of Ouarzazate where women have entered the work force, have contributed to household livelihood, and have a much wider range of opportunities. Young women can move to other cities in order to study, and the marriage age has increased. Women organize in associations where they improve their literacy skills thus contributing to an increase in gender equality and women's rights. To a lesser degree, the changing role of women is also visible in Agdz and Idelsane. However, another picture evolves in the rural municipality of Ghassate. The vast majority of interviewees see the role of women as unchanged. Women remain responsible for housework, including childcare and collecting firewood and forage to feed livestock. Being connected to the electricity grid has made some of this work easier, though. Only a few interviewees, all of them female, find that the role of women has changed or is beginning to change. They take part in literacy programs, start their own commercial projects, and look for jobs outside the house. In rural areas, girls are still often forced to drop out of school for financial reasons.

With regard to trends, a 43-year-old female interviewee from the city of Ouarzazate, who works as a primary school teacher, reported a significant improvement for women. In the past, women either married and went to their husband's house or they went to their grave. But nowadays, women have the same rights as men and work in the same fields as men. She also mentioned that some habits have changed: in the past the inhabitants of Ouarzazate would not allow outsiders to live in the city, but now the city is open to all cultures. Additionally, it has become a mixture of Berbers and Arabs.

In contrast, a 31-year-old female interviewee from the municipality of Ghassate recognized very little change in the status of women. However, the fact that associations have been established for women was seen as a step forward, especially because villagers are still clinging to the idea that women do not have the right to do other things besides domestic work and child raising.

Asked for the role of traditions, a 30-year-old female interviewee (housewife) from the small *douar* of Tasselmante, which belongs to the municipality of Ghassate, responded that the community no longer practices many traditions. For example, weddings lasted for eight days, but now they last only one night. She also mentioned that they used to celebrate circumcisions by inviting all the inhabitants of the area, but no longer do so because it costs too much. According to her, the younger generation often no longer lives with their parents and grand parents, but always tries to maintain and strengthen family cohesion, as they gather for holidays and feasts.

Many interviewees especially in the city of Ouarzazate observed a change of mentality with the Ouarzazate youth. The interviewees described this change with positive as well as negative connotations. In Idelsane, too, the change in youth mentality was discussed, but sentiments regarding the negative influence of modernity were much more pronounced. However, changes regarding the youth were not brought up by interviewees living in the municipality of Ghassate.

Finally, interviewees in all research areas stated that traditions had lost importance. Yet the interviewees' evaluation of this trend is different from community to community While people from the more urban areas, like Agdz, see no negative impact in this trend, some interviewees from Idelsane spoke of this trend as a decline, others described it more neutrally as a change. There was even strong agreement that traditions had declined in the municipality of Ghassate. In addition, there is some indication that religion has gained importance and, hence, interviewees from Agdz often explained the change of customs and traditions due to these traditions being against Islam.

8.4.2 Shocks

The interviewed households are affected by three kinds of shocks.

The first are natural disasters. Aside from the drought, which is now so pervasive that it can no longer be seen as a mere shock, crops have suffered (ironically) from heavy rainfall and hail. In addition, locust plagues have led to heavy losses in crop yields in the past. Floods resulting from heavy rainfalls have also damaged or destroyed infrastructure, such as roads, bridges and wells. The area is characterized by light seismic activity. Some years ago an earthquake hit the region, but it was not strong enough to cause any major damage.

The second kind of shock stems from extra expenses at times of festivities, such as marriages or Ramadan, at childbirth or at the beginning of the school year. Particularly in the rural areas, the cost of school causes many parents to withdraw their daughters; therefore, many girls only have a rudimentary education.

Finally, sudden expenses can occur in cases of traffic accidents or medical emergencies, as many people in the Ouarzazate region are not insured. In Agdz, for example, shocks to single households or individuals may include sickness, the death of a family member or conflicts arising over landownership.

8.4.3 Seasonalities

Interviewees from Agdz mentioned that work in the tourism sector and in construction are highly seasonal. The dependence on seasons is also true for agriculture activities in Agdz as well as in the municipality of Ghassate. The seasonal *wadis* and their corresponding alluvial aquifers from the High Atlas represent the only natural water flow in the region. Furthermore, the main health problems in Ghassate are seasonal. Afflictions associated by the interviewees with the cold winter climate in the Ouarzazate region include the common cold, often accompanied by fever, and influenza.

8.5 Livelihood capitals

The previous sections described contextual factors in which the households in the research area earn their livelihoods. In this section, the authors investigate their concrete livelihood capitals, as defined by the SLA framework, the main household expenses, and the household income structure.

8.5.1 Natural capital

The scarcest resource in the Ouarzazate area is water. Water availability *per capita* in the region is significantly lower than the national average at 360 m^3/y in the region of Souss-Massa-Drâa (Choukr-Allah, 2011:182), which is severely below the critical threshold for water scarcity of 1,000 m^3/y (WWAP, 2012:799).

The importance of natural resources for people throughout the Ouarzazate region depends on their position along the urban–rural axis, with minor importance for urban, and major importance for rural communities, as well as their reliance on agricultural activities as a source of income.

Correspondingly, natural resources play only a minor role for the people of Ouarzazate city as they do not work as farmers and rely on employment in urban infrastructure for their livelihoods. However, many people are not satisfied with the quality of drinking water. This adds a strain to the people's budget, as anyone who can afford it buys bottled water. Those who cannot afford it may suffer from health problems.

In contrast, a part of the community of Agdz remains strongly dependent on natural resources, for example fertile soils, water for irrigation, palm trees, herbs and firewood. From the stakeholder interviews conducted, the authors learned that the community of Agdz is catagorized as an urban community because of its population growth and density. However, large parts of Agdz can be considered rural where farming is still a dominant activity. Accordingly, water is a key concern for Agdz. Agriculture in Agdz relies on water from the Mansour Eddahbi reservoir, which is released several times a year and partly refills the water resources of Agdz. This water is mostly used for irrigation, and it is free. As a consequence, landownership and water rights are very important for people's lives and can be a source of conflict within the community, especially because the basic law of farmers associations replaced customary law. Farmers have deep wells and use groundwater for irrigation. This is connected to additional costs because pumps for irrigation run on gas or petrol; some farmers also try to use solar energy. The most important product is dates, followed by beans, barley, and corn. Agriculture in Agdz seems to be under less stress than in Ghassate or Idelsane, but there is a shortage of labor for agriculture. Young people especially do not want to work in agriculture because it does not offer real prospects for the future.

Similar to Agdz, but even more dramatic, is the situation regarding land rights in Idelsane. Although families were compensated with land when they were resettled from the dam, it seems that property rights have not yet been settled. This situation limits the livelihood options of the inhabitants. They cannot easily buy and sell land. In addition, this issue is a constant source of conflict between the residents and the authorities, leading to an even higher level of distrust in authorities than usual. This is not the only issue. Water, firewood, and forage are scarce and have decreased steadily due to the lasting drought. Firewood is used for preparing the traditional bread and for heating water. This scarcity has an impact especially on women, as they are responsible for collecting firewood and forage. In order to adapt to the situation, households to some degree substitute firewood with gas for cooking except for bread, adding considerable extra expenses to the residents' budget.

> A 64-year-old farmer from Idelsane mentioned in an interview that one of his biggest problems is the documentation of property rights for his land. He said that his father got the land from the authorities when his tribe was displaced for the construction of the dam in the 1970s. Although he owns the house on the land, he or his father never received proper documentation for the land.

The rural municipality of Ghassate is even more severely affected by the drought and its impacts, as natural resources are a crucial element of people's livelihoods. The resource most frequently named is firewood, which is strongly declining in the Ghassate area, followed by water and forage. Due to the outage of these resources, many households now have to buy firewood and forage.

In summary, rural communities are more exposed to the already mentioned natural trends, i.e., less precipitation, the lasting drought and diminishing water resources and accompanied effects like the loss of yields and income from agriculture, than urban communities.

8.5.2 Financial capital

The major economic activities in the Province of Ouarzazate include agriculture, tourism, small handicrafts, and other small industrial activities, such as dairy production and the processing of date palm fruits. The region is also known for its mining industry (Heidecke, 2009:19), and the cinematography sector attracts investments in the region. Since 61% of the population lives in rural areas, agriculture – mainly farming and pastoral livestock husbandry – is the dominant sector in the Province, making important contributions to household income and food security. In order to cope with variable and low precipitation levels, the people use a mixed system of agro-pastoralism, combining irrigation agriculture in river oases with transhumant livestock grazing (based on seasonal movement) on natural rangelands. Outside the oases, pastoralism is the only agricultural activity. Most farming is for family subsistence purposes. Due to regional isolation, the industrial sector of the Province of Ouarzazate is very small and does not contribute significant added value to the economy. However, the commercial trade sector is very important for the economy of the Province. Due to its famous landscape, its proximity to desert dunes, its handicrafts, its film studios, and the UNESCO World Heritage kasbahs, Ouarzazate is also a popular destination for tourists benefiting mostly the urban centers of Zagora and Agdz.

The majority of the interviewees in the city of Ouarzazate rely on employment or self-employment as their income source. The main places of employment are administration and services, as well as handcrafts or construction. Direct dependency from agricultural activities is very low, and only a few people supplement their income with subsistence farming. While it was mentioned in the interviews that it is hard to find work, because of the overall weak economy, strong competition among workers and high unemployment rates, many interviewees rely on one or two sources of income only, which leaves them vulnerable to economic crises. However, a crucial trend especially within Ouarzazate city is that women work in jobs outside of the house.

The community of Agdz can be characterized by a high diversity of multiple income sources. Most households have one main income source, but all reported additional incomes like seasonal work in tourism or work in construction as well as handcrafts, while the majority also receive remittances from their children or family members working in bigger cities like Marrakech and Casablanca. The mine of Bouazar employs approximately 5% of the population. Additionally, and despite its partly urban characteristics, most people in Agdz gain part of their income from agriculture. However, in many cases agricultural activities are reported as just one and not the main important source of income. The weak economy leaves many people unemployed, and at least some of the interviewees are unable to cover their basic needs. The income situation of widows and single women is described by some as very difficult as they often depend on unstable sources of income.

The income situation in Idelsane is characterized by the adaptation to the decline of agriculture as the main source of income caused by worsened conditions. Although most households farm or raise animals, agriculture does not provide the main portion of the income of most households. As one interviewee put it, the people of Agdz practice agriculture “more for entertainment.” Maintaining agricultural practices may also be supported by an irrigation system in Idelsane where farmers do not have to pay the electricity for pumping water. All interviewees but one rely on up to five income sources while the main income source is employment or self-employment in small businesses, like tailoring, butchery, or carpentry. As

a result, remittances only play a side role in people's livelihoods. Overall, the vast majority in Idelsane can make ends meet, although the income is in many cases only enough to cover basic expenses.

In contrast to the situation in the other researched communities, remittances from relatives constitute the main income source for the people in the municipality of Ghassate. This result is, particularly surprising as, prior to the field research, the authors viewed of Ghassate as an agricultural community. The present situation can be explained by the dramatically worsened conditions for agriculture due to the lasting drought. Ghassate sources its water from wells and from a small river flowing from the mountains. Due to the decreasing rainfall, farmers need more water for irrigaton. For this, the water needs to be pumped onto the fields, which is very expensive. Therefore, agriculture is no longer a viable source of income in the Ghassate area; the head of Ghassate's farming association sees this as the main reason for out-migration of mostly youth. Another effect of this is the shrinking and aging population of Ghassate. Most households in Ghassate rely on two or more income sources. In addition to remittances, many supplement their income with employment and subsistence or commercial agriculture, while only one of the interviewed households relies exclusively on agriculture, resulting in an inability to meet all livelihood needs.

In general, it can be said that households with multiple (more than two) and diverse income sources are less exposed to the overall economic decline and the worsened agriculture conditions of the research area as well as to shocks. The rural population, which is more exposed to natural trends, has already shifted their income sources to a certain extent from agricultural activities to a stronger reliance on remittances. The urban population, however, is more exposed to the overall economic situation in the area, as they are more dependent on (self-) employment as an income source.

8.5.3 Physical capital

A 64-year-old male from Agdz said in the interview that he stopped studying early and then migrated and worked in many cities, eventually choosing agriculture as his profession. He described farming as the main income source of the family, but he also works for people in the village as a day laborer where he is paid 60 MAD per day. As he rents the agricultural land on which he farms, he sells the yield (clover, dates, and some wheat) at the local market. He also owns 12 sheep that he sells when in need. However, his income alone does not cover the needs of his family. Additionally, he has two sons – one of whom works in Casablanca – contributing to the family's income, while the other one has finished his studies, but has not found a job, yet.

The Province of Ouarzazate hosts four women's centers, two youth houses, one poly-sport center, one cultural and sports complex, a municipal swimming pool, a zoo park, an recreation park, a cultural and congress palace, seven sport centers, and nine libraries (CGEM Souss Massa Drâa, 2010:14). Most of the urban centers in the Province of Ouarzazate have access to sanitation services (Province of Ouarzazate, 2009:15). In the rural areas, residents manage their sanitation services by themselves. Almost all (96%) of the households in the Province have access to electricity via the electricity grid or via solar home systems (3,521 households) (Province of Ouarzazate, 2009:16-17).

In the city of Ouarzazate, the availability of physical infrastructure is comparatively good. Interviewees agreed that roads and transportation have improved remarkably in the past years. All kinds of education facilities are available, from primary school to universi-

ty. Furthermore, healthcare facilities are available, but the personnel and the management of the hospitals restrict access to good healthcare. While overall healthcare is better than in the surrounding communities, people especially complained about the lack of specialists and of corruption. The water network nearly completely covers the city area, but the water sourced from the nearby Mansour Eddahbi dam is of low quality. As a result, interviewees unanimously criticize the quality of the tap water, which is widely considered as undrinkable. The sewage system has been extended in the past years, but it does not cover the entire city yet. The electricity grid is perceived as stable and reliable, and electricity is virtually available everywhere. Regarding housing, Ouarzazatis own their houses; only a very small minority rent. Interviewees paid rents ranging from 400 to 1500 MAD, depending on the location and quality of the house.

The general infrastructure situation in Agdz concerning roads, the electricity grid, and housing is good. However, the people of Agdz have only very limited health infrastructure available, and it is often very hard for them to gain access to medical personnel without an intermediate, which makes them dependent on healthcare facilities in the city of Ouarzazate. Furthermore, interviewees described overcrowded health centers as a serious problem. Another problem stems from the very limited sewage system only available in central Agdz; no functioning sewage system exists in most *douars*. While the quality of groundwater is very important for this community as it is used for both irrigation and drinking water interviewees have repeatedly described problems with its contamination. In the stakeholder interviews in Agdz, the high rents and the tight local real estate market was mentioned. The cost for 1 m² for construction land is approximately 1,000 MAD. Similar to the city of Ouarzazate, the majority of the people in Agdz own their houses and until recently the rents were reasonable. This changed due to the population growth because of mineworkers and their families. Most interviewees are satisfied with their housing. Yet, individual interviewees report damage to their clay houses and poor health conditions because they have to live too close to their livestock.

> A 34-year-old female interviewee (housewife) from the center of Idelsane mentioned the poor state of the infrastructure in her community. For example, due to the absence of a sewage system, the people in her community have to dig cesspits in the street to dispose of the sewage. By now, there is so little space for new pits that they move ever closer to residents' houses. Furthermore, the main road of Idelsane is too narrow leading to a lot of accidents. In addition, there is only one dispensary and one nurse in Idelsane; this does not meet all needs. The interviewee stated that diabetics have to wait up to four hours for a check-up. The only available doctor left the hospital and has not been replaced.

The availability of infrastructure in Idelsane is very limited – especially with regard to healthcare, roads, and the sewage system – and only better than Ghassate with regard to schools. Although it is situated on the national road connecting Ouarzazate and Skoura, Idelsane suffers from poor road conditions, and the very limited and unreliable modes of transportation present a problem for education and healthcare. In contrast, the quality of drinking water sourced from a well in the Drâa valley is good, and electricity is available and reliable. All interviewees in Idelsane owned their own houses. For those who do want to rent, monthly rents are as low as 300 to 500 MAD and, hence considerably lower than in the urban areas. The vast majority of interviewees feel that their living space is sufficient; however it is costly to expand it when desired.

In terms of physical infrastructure, the municipality of Ghassate is clearly worst off compared to the other communities under study. First and foremost, this is due to the fact that some

infrastructure such as schools, healthcare facilities and a sewage system does not exist. Notably, while roads have improved in general much less in the rural than in the urban areas, only Ghassate and Tasselmante benefit from two new roads that were built in connection with the CSP plant, though they extend only to the center of the main villages. However, the benefit for the people in Ghassate resulting from this improvement is very limited as the lack of public transportation is one key problem. Most villages in the municipality of Ghassate have access to sufficient and clean drinking water and are connected to the electricity grid. One important exception is the village of Tasselmante, where the water is too salty to be consumed. Regarding housing, the situation in the municipality of Ghassate is very homogenous. Each household owns its house, which wasbuilt in traditional fashion from clay.

The rural population of the research area is more exposed to shocks (e.g., serious health problems or childbirth) and suffers most from the low availability of and accessibility to infrastructure in comparison with inhabitants of urban areas.

8.5.4 Human capital

The educational system in the Province of Ouarzazate was neglected during the 1970s and 1980s. It was only in the 1990s that the Moroccan government made significant efforts to build rural schools and assign teachers to work there. Today, the city of Ouarzazate has one satellite university, which belongs to Ibn Zohr University of Agadir. The illiteracy rate in the province of Ouarzazate is higher compared to the national level of less than 30%; it reaches 67.77% overall, and 84.65% among women (Semkaski, 2013). Almost 70% of the total population in the Drâa valley is illiterate: 47% of men and almost 89% of women. Concerning women, the total number hides an unequal distribution between rural areas (91.7 %) and urban areas (68.9 %) in the Drâa valley (Chafik et al., 2003). Overall, there is a severe shortage of educational infrastructure in rural areas, while the availability in urban areas is much better.

The interviewees living in the city of Ouarzazate have the highest level of education among the communities under study. Investment in the education of their children is one of the priorities of households, and many send their children to private schools in other parts of Morocco, which consumes a significant amount of their income. Most people are literate, although many did not finish school and even fewer graduated from university. In addition to schools, the university, and different vocational training centers, there are also possibilities for other qualifications, for example, at the OFPPT (Office de la Formation Professionnelle et de la Promotion du Travail). However, the youth focus group agreed that the services offered by OFPPT are insufficient and that the overall quality of the educational facilities is insufficient. Moreover, it was mentioned that it is very difficult for graduates to find work in the field of their expertise. The majority of interviewees do not suffer from serious health problems. The only region-specific health issue is leishmaniasis, an infection spread by sand flies, which appeared when the Mansour Eddahbi dam was built.

The majority of interviewees are satisfied with the school infrastructure in Agdz, which covers primary, secondary and high school. However, the educational level in Agdz is low as most of the interviewees dropped out of school between the third and fifth grade of primary school and only some have learned a trade or studied at university. One reason for the lack of graduates might be that people have to leave Agdz and at least migrate to Ouarzazate to study. The low level of education seems to be especially true for women among whom

illiteracy is, for example, widespread. Likewise, girls are most affected by the decision made by some households to withdraw their children from school and let them look for work. The particularly difficult situation for women is recognized by the women's association, which fights illiteracy and promotes the production of henna in order to create income for widows and single women.

Idelsane has an elementary and a secondary school, although they are some distance from the town and children need to walk in order to reach them as public transportation is not available. All of the interviewees went to school and only two did not complete elementary school. Again, there is a difference between the sexes. While the women dropped out in elementary or junior high school, all men completed at least elementary school, two finished high school, and one of them went on to study geography at university. Despite having less education, women contribute to the livelihood income through employment and self-employment.

Most villages in the municipality of Ghassate have an elementary school in their vicinity, although in some cases it is 2 to 3 km away from the village. A secondary school was built four years ago in Ghassate center. The educational level in Ghassate is the lowest of the communities under study. Overall, education is seen as a luxury. In order to cope with the financial pressure, many households decide to withdraw their children from school. Nearly half of the interviewees, both men and women, did not attend school at all. However, those men who did not attend school are all 50 years and older, while some of the women are in their thirties, reflecting the persistent discrimination of women with regard to education. Only two interviewees completed high school; none attended university. All others dropped out of school between elementary and high school. It is striking that of the nine interviewees who went to school, five dropped out before obtaining a certificate. It is equally striking that nearly all women who attended school dropped out during elementary school, while the men dropped out in secondary or high school. Concerning health, there clearly is a lack of healthcare services in the municipality of Ghassate resulting in problems similar to those in Idelsane. However, one interviewee even reported an increased vulnerability of children from malnourishment, and another said that the contamination of wells especially threatens children's health.

Influenced by the individual financial situation of the households, children in the area, especially girls, are at high risk of dropping out of school. Limited financial means often result in strategies that promise short-term benefits to affected households, while compromising sustainable long-term strategies (see chapter 8.6 coping strategies).

8.5.5 Social capital

The customs and institutions based on tribal and ethnic origins in the Drâa Valley are reflected in the region's social structure. Most popular decisions, such as choosing elected representatives, are made on this basis. During droughts and other times of stress, these social institutions result in discrimination against marginalized groups (Schlütter, 2006:240). Increasing competition over waterland endowments and entitlements, plus discontent over the compensation for resettlement, has led to numerous rallies and conflicts between the local administration and citizens (Schlütter, 2006).

A 19-year-old male interviewee from the city of Ouarzazate who works in construction stated that he does not know anything about the authorities' decisions and how they are made. He went on to explain that the only chance he sees to change something is during elections, but things do not change in general. The only improvements he recognizes are when a member of the royal family visits the area. Only then are the streets cleaned up. He thinks that most people are not interested in political decisions and there are no rallies or strikes because people are afraid of the authorities.

Social cohesion in the city of Ouarzazate is strong. Interviewees emphasized the strong sense of solidarity in the community. Neighbors and community provide moral, physical, and financial help for community members in need. Also, the change in the role of women is most pronounced in Ouarzazate. Women are more educated, work outside of the house, and can even move to different cities to find work and send remittances. It is very interesting that women recognize this change more than men. While nearly all women reported considerable changes, some men still viewed women as housewifes only. As the city of Ouarzazate also attracts many people from other cities in Morocco and even from abroad, outsiders bring in new ideas and accelerate change in the mentality of young people. Many welcome the influence of outsiders and modernity, but others are concerned that bad habits, such as smoking and drug abuse, have increased.

While interviewees in Agdz also emphasized the strong sense of solidarity in the community, some conflicts still occur over water rights. While, similar to Ouarzazate, community members help each other when someone is in need, being in a cycle of debt is described as one of the main threats to poorer community households. The changes in the role of women may not be as obvious as in Ouarzazate, but they are existent in Agdz too, with all their positive outcomes.

A 59-year-old male interviewee from the *douar* of Tasselmante (part of the municipality of Ghassate), who works as a farmer, said in the interview that the majority of the region's population is illiterate – especially people between 30 and 70. With regard to the distance children have to cover to get to elementary school, he mentioned that children suffer during winter when it gets cold and, hence, they often stay at home instead. Because there is no college in Tasselmante, people have to send their children to Ghassate center or Ouarzazate for higher education. According to him, it is very hard to send girls to the city, because he does not want to leave them alone, and there is also no dorm for girls in Ghassate.

In Idelsane as well, interviewees agreed that the community spirit was strong. Interviewees in Idelsane are in a position to provide not only moral but also financial support for each other. Some interviewees observed an increasing separation of households, i.e., that more families were "doing their own thing." This may include young couples moving out as soon as they are married, rather than staying with their parents as was traditionally the case. In Idelsane more than in the other communities, the change in youth mentality has upset many in the older generation and led to tension between the generations.

The residents in the municipality of Ghassate have an overwhelmingly positive image of their communities, and social cohesion is very strong with no noticeable decline in the past years. However, while solidarity remains strong, it is mostly limited to moral aid as financial aid is uncommon, reflecting the difficult financial situation in this rural community. Contrary to the situation in Ouarzazate and Agdz, in Ghassate, a change in the role of women is practically non-existent.

8.5.6 Political capital

Communal elections for representatives in the rural or urban communes are held every five years. These representatives form the rural or urban Communal Council, which is responsible for managing local development and governing the commune. The elected communal representatives choose the Provincial Council members and the Regional Council members.

As with the whole region, the political capital in the city of Ouarzazate is low. Even more so than in the rural communities, Ouarzazatis feel unable to participate in political decisions at the local level, and there is a pervasive sense of powerlessness. When asked about their options to react to policies they are unhappy with, interviewees not only said there was nothing they could do, but some voiced a veritable fear of the local authorities. Very few considered other options, such as protesting or organizing in associations to pursue their interests. Some young people seem to refuse to engage in political activities while others voice a strong wish for political participation of young people. In contrast, police and the courts are trusted institutions in conflicts between citizens. There is a lack of quality news sources at the local level. Hence, local news spreads mostly by word of mouth, resulting in an equally severe lack of public debate about issues of local interest. A different picture evolves concerning the Ouarzazati youth, who not only use the Internet and social media but also communicate with foreigners to become informed. Consequently, this raises a certain awareness at least among the urban youth.

The majority of the interviewees in Agdz described themselves as powerless in political terms, and they do not participate in local decision-making. Some interviewees even said that people would fear speaking up because of the authorities. The availability of local news is also low, and interviewees reported that information comes only via the Moqadim, or they are spread by word of mouth between people at the mosque or in shops. The stakeholder interviews revealed that civil society is seen to be strong in the area of Agdz with more than 50 associations. One interviewee said that help from the state could only be acquired through associations, and another said that if the local authorities took a more participatory approach this could solve many of the problems in their community.

> A 53-year-old male interviewee from the city of Ouarzazate, who works as a carpenter, feels that there is a strong solidarity among the people in his neighborhood. During monthly meetings they discuss whether anyone in the community is in need or facing a problem. He also mentioned that traditions are decreasing, not because the people do not like them, but because they are against their religion. So, from his point of view, shedding traditions does not harm society, but instead reforms it.

In Idelsane as well, political capital is low, and people found that they could not participate in decision-making. Two additional noteworthy factors come into play in Idelsane: First, the chronic conflict about land rights with the authorities has led to even higher levels of distrust than in any other researched community. Second, more often than in other communities, interviewees mentioned the mosque's loudspeaker as the key source of community news.

The situation concerning political capital is no different in the municipality of Ghassate than in the other researched communities. Moreover, people feel completely powerless towards decisions that have been taken by the authorities, and many are afraid even to voice any criticism. The protests of the people of Tasselmante had been an obvious exception, and they died down quickly after three protesters were arrested. Consequently, there is a sense

of resignation about influencing decisions made by the authorities. As in the other rural communities, the main information sources are other villagers or the local Moqadim.

8.6 Household expenses and income structure

According to the Moroccan High Planning Commission (HCP) (2011:77), the annual household expenditure in the Province of Ouarzazate is 36,461 MAD (50,034 MAD in urban areas and 31,996 MAD in rural areas). About half covers food and clothes, 27.2% household equipment and services, and 22.5% other goods and services.

8.6.1 Household expenses

Although few of our interviewees said that their income was insufficient, many felt that prices were too high or that living in Ouarzazate was unaffordable. There is a general agreement that prices have increased noticeably. Interviewees mentioned housing and food as particularly expensive. When asked which items they spend the most on, food, education, and clothes were most frequently named, closely followed by healthcare, and water and electricity.

In Agdz, spending priorities are slightly different than in the city of Ouarzazate. Electricity, water and food (not necessarily in that order) were mentioned as the top spending items. Some people also added clothes or children's education to the list of their main expenses, but electricity and water bills were always included. The majority of the interviewees describe an increase in electricity costs, and some argue that the electricity bills are unreasonable and that their electricity consumption is not measured correctly.

Interviewees in Idelsane agreed overwhelmingly that the living costs were too high. People have to manage their expenses carefully and many take credit from the stores. The top three spending items by a wide margin are food and the water and electricity bills. Medical expenses and gas for cooking were two other items that were mentioned. Expenses that were important elsewhere, such as for fodder for livestock, education, or clothing were only mentioned by single interviewees or not at all.

Similar to Idelsane, interviewees from the municipality of Ghassate were unanimous in perceiving that prices are very high. In contrast to Ouarzazate, however, interviewees did not talk about an increase in prices, but rather about the overall high level. Many singled out food in particular as very expensive. Some stated that they abstain from buying vegetables or fruit, as they are too expensive. Other spending items that were identified as very expensive were fodder for livestock and gas to pump water for irrigation. Several interviewees noted that the prices were further increased by the necessity to travel to Ouarzazate to buy food. When asked explicitly about their top three spending items, households in Ghassate had different priorities than those in the urban areas, namely the city of Ouarzazate. Only food was the undisputed number one item in both communities. Costs

A 21-year-old male interviewee from the municipality of Ghassate explained that he dropped out of school and works plowing fields for 70 MAD per day and in construction where he earns between 60 and 70 MAD per day. Furthermore, he said that one of his brothers is a soldier, and that he sends between 1500 and 2000 MAD every two months to support the family. His father works in the fields and sells onions, carrots, almonds and olives at the nearby weekly market of Souk. He also mentioned that market conditions are not stable and change all the time. The monthly electricity bill is about 100 MAD, which they pay via prepaid cards.

for water and electricity bills took second place in Ghassate, but had a lower rank in the city of Ouarzazate. Education and clothing which were important in the city of Ouarzazate, figured much further down the list of spending priorities in Ghassate. Fodder for livestock followed third in Ghassate, having been completely absent in Ouarzazate. Only then did clothing and education follow, as well as gas for pumping water for irrigation, which again is absent in the city of Ouarzazate.

Overall, interviewees stressed that it had become increasingly harder to make a living, particularly without the help of remittances. One interviewee stated that the high prices made it impossible to live in dignity in Ghassate and the head of the community administration in Idelsane said that the electricity bills take a huge part of the small financial income of the inhabitants.

8.6.2 Income structure

One can observe that most households depend on more than one source of income. In general it can be stated that households with multiple (2-5) and more diverse incomes have a better livelihood outcome than those only relying on a single income.

Furthermore, in the city of Ouarzazate, employment and self-employment is the dominant source of income. Agricultural activities gain some more importance in the other researched areas, while only a minority of the interviewees relies solely on agriculture as their main income source. Surprisingly, this is also true for the rural municipality of Ghassate, where only two of the interviewees rely on agriculture as their main source of income, although they supplement it with other work. However, agriculture was often mentioned as an additional source of income even in Agdz, which can be characterized as semi-urban. The decline in the importance of agriculture as a source of income is contrasted by an increased reliance on remittances. In the municipality of Ghassate, nearly all families rely on remittances for their livelihoods, and in Agdz the majority of interviewees receives remittances. In the city of Ouarzazate and in Idelsane, the reliance on remittances is not as pronounced as in the other two areas. The abandonment of agriculture likely is influenced by the lasting drought and the resulting loss of yields.

The changing role of women, especially in urban areas, results also in more diversified sources of income for households, as women now are able to work outside of the house and contribute to household livelihood. However, this change cannot be observed in the municipality of Ghassate where women remain responsible for housework.

8.7 Coping strategies

The authors observed different coping strategies of the interviewed households in response to crises and shocks. In short-term crises Ouarzazatis borrow money. Like elsewhere they borrow from their friends, but unlike in the rural communities, people take loans from the banks more often. Selling livestock is not an option for most people in Ouarzazate. In addition, women sometimes organize “dart,” i.e., they collect small contributions from all members each month and pay the full amount to one of them who is in need. Since the global financial crisis, many women have taken out microcredit loans with short repayment times. A more long-term strategy is to send children to work in other cities or abroad in order to re-

ceive remittances. A more long-term strategy is to invest in the education of a family's children, so that they have more opportunities to earn a livelihood in the future.

In Agdz, the coping mechanisms are similar to those in other communities including borrowing money from family and friends, selling livestock or land, and migrating to bigger cities. Sometimes people borrow money from banks, for example Credit Agricole, but because banks ask for guarantees and take interest, people try to avoid them.

To cope with short-term crises, people in Idelsane also borrow money from friends or sell sheep. Although they prefer not to take credit from the banks, it is very common to buy what one needs on credit and to pay at the end of the month when the paycheck arrives. It is also common to withdraw children from school in order to make ends meet. The strategy for the long-term crisis – the drought – is to abandon agriculture as the main income source. People in Idelsane have more resources to do this than their neighbors in Ghassate, which also may reflect the fact that women in Idelsane contribute to the livelihood income. In most cases people in Idelsane do not need to resort to out-migration and remittances.

When people in the municipality of Ghassate are faced with unexpected costs they either sell sheep, sell land or borrow money from relatives of friends in order to cope. Clearly, this is only a temporary strategy. It cannot solve the long-term problem of declining agriculture. A more radical approach is to withdraw children from school and send them to work. This is especially true for girls and gives a short and mid-term gain, but a long-term loss as it limits the opportunities of these children to find better paid jobs in the future. Additionally, women in Ghassate are not supposed to work in jobs outside the house, further limiting the flexibility of households to respond to the decline of agriculture. The long-term strategy for a more secure livelihood in Ghassate is to send family members away to work in other cities and send money home. While people in the city of Ouarzazate have realized that giving their children a solid education is a very useful investment in their own future, this does not reflect the reality in the municipality of Ghassate.

9 Field research I: impact analysis

This chapter summarizes the main results of the first 2-month field visits to the region of Ouarzazate. The research was conducted from 10th of January through the 08th of March 2014 in order to identify and analyze the most relevant livelihood consequences stemming from the $Noor_o$ I project. It was divided into three main stages:

a) In the first two weeks the research team defined the research area, identified relevant stakeholders, and revised the questionnaires based on the knowledge of the local researchers and regional context specifics.

b) During the core part of the field visit the research team collected qualitative data on (a) the livelihood situation of the communities in the research area and on (b) the interaction of interviewees with and their perceptions of the $Noor_o$ I project. The data were collected through in-depth community, stakeholder, and key informant interviews, as well as focus group discussions. The collected data were then combined with local statistics (survey data) compiled prior to the field trip, in order to establish a livelihood baseline for the impact area and the further assessment of $Noor_o$ I.

c) In the final stage, social change processes and livelihood impacts of $Noor_o$ I, as well as impact pathways between the power plant and local communities were identified from the interview results. The preliminary results were afterwards discussed in a final workshop with relevant local stakeholders and project developers to incorporate local stakeholders' perspectives and expert judgments.

9.1 Defining the research area: selecting communities (receptors)

While the research team initially considered confining the first field research to a radius of 50 km around the project site, it became clear that it would be more useful to determine the research area on the basis of the main research question, by choosing communities that would likely be affected by the CSP project in one way or another. The communities included in the main research phase were selected in two stages. During a first internal workshop, based on the local knowledge of the research team as well as a variety of regional, local, and project related maps, the geographical boundaries of the *initial* research area were defined. During this process, the research team selected eight communities in an area extending over a radius of 130 km that were likely to be affected either directly or indirectly by the $Noor_o$ I plant (see Figure 9-1). These eight communities included:

1. The rural Commune of Ghassate: The municipality of Ghassate, consisting of almost a dozen villages, provided the land for the $Noor_o$ I plant and is closest to the project site. In addition, it seemed likely that many of the construction workers would be from Ghassate.
2. Ouarzazate: The provincial capital of Ouarzazate, including the neighboring community Tabounte, is the administrational and economic center of the region.
3. Agdz: The oasis of Agdz in the Draa Valley relies on water from the Mansour Eddahbi reservoir for irrigation agriculture. As the $Noor_o$ I plant draws its cooling water from the reservoir, the Draa Valley is likely to be affected.

4. Tamezmoute: As oasis community situated in the Draa Valley as well, Tamezmoute is one of the more rural communities. As such the researchers aimed to explore whether it might be affected differently than the semi-urban community of Agdz.
5. Idelsane: Situated next to the Mansour Eddahbi reservoir and in proximity to the Noor$_o$ I project site, the rural community of Idelsane could be affected directly and indirectly. In addition, it seemed particularly relevant due to its history of resettlement to make way for the Mansour Eddahbi dam, with potentially persisting conflicts over water and land rights.
6. Skoura: Skoura was found to be potentially relevant in relationship to the recruitment of skilled construction workers as well as the supply of equipment.
7. Tiouine: Because of rumors of an intended relationship between the new dam in Tiouine and the water use of the CSP project[35] at the very beginning of the research phase, the community of Tiouine was also included in the initial research area.
8. Taznakht: South of Tiouine, Taznakht is situated on the road connecting Agadir and Ouarzazate and thus appeared to be relevant due to potentially increased traffic from Agadir.

[35] This information was proven false during the exploratory research phase

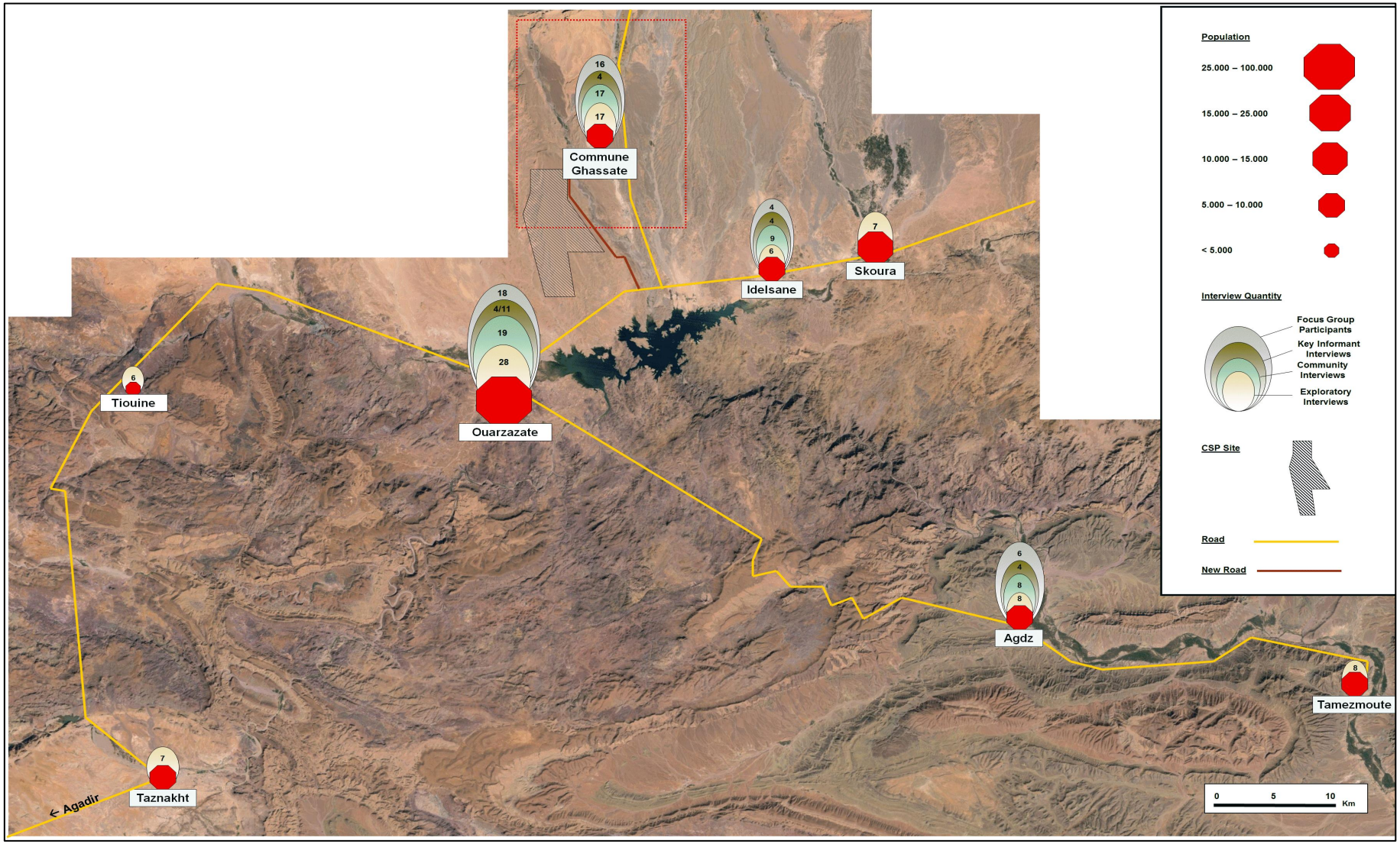


Figure 9-1: The initial research area

	Ghassate	Ouarzazate	Idelsane	Agdz	Skoura	Tiouine	Tamezmoute	Taznakht
Geography:								
Proximity to plant	3	3	2	1	1			
Administration:								
Administrative responsibility	3	3						
Environment:								
Land rights in relation to project site (land aquisition process)	3	1						
Water rights in relation to Mansour Eddahbi dam	2	2	2	3			3	
History of ressource conflicts in relation to Mansour Eddahbi dam			3	3			3	
Land rights in relation to Tiwouine dam						3		
Water rights in relation to Tiwouine dam		1				3		2
Climate change impact on water levels in dams	2	2	2	3		3	3	2
History of resettlement in relation to Mansour Eddahbi dam			3					
Land rights in relation to transmission line	3		1		2			
Socio-Economics:								
New roads and transportation services	3	2						
Supply of services, materials and equipment	3	3	1		1			
Supply of workforce (recruitment process)	3	2	1		1			
Supply of housing	2	3		1				
Logistics and traffic	2	3	1		1			3
Impact of RE tourism	3	3		1	1			
Education and research	2	3						
Positive discriminiation of communities by local affirmative actions		1	3		1			
Expectations	3	3	2	1	1			
Community attractiveness and reputation	3	3	1	1				
Impact of the Social Development Plan	3	1						
Participation in decision-making (public consulation process)	3	3						
Information	3	3	2	1	1	1		1
Accountability	3	3						
Sum	**52**	**48**	**24**	**15**	**10**	**10**	**9**	**8**

Impact Severity
High (3) > 30
Medium (2) 11 - 30
Low (1) 1 - 10
None (0) 0

Table 9–1: Key issues for defining the impact area

While a timely definition of the research area was necessary prior to the first round of interviews, the insights gained during the exploratory interviews in every community initially considered potentially relevant required an adjustment of the research area. In a second internal team workshop the *initial* research area was re-defined and each of the initial eight communities were ranked according to specific project-related and community specific criteria that emerged out of the analysis of the exploratory interviews, which provided data on how the communities might by affected by the project (see Table 9-1). Based on both the ranking and time constraints, it was decided to focus the subsequent research on the four most affected communities, which extended over a radius of approximately 60 km. The *final* research area included the following communities (see Figure 9-2):

- the grouping of communities within the rural Commune of Ghassate immediately adjacent to Noor$_o$ I,
- the provincial capital of Ouarzazate (including Tabounte),
- the downstream oasis of Agdz, and
- the community of Idelsane.

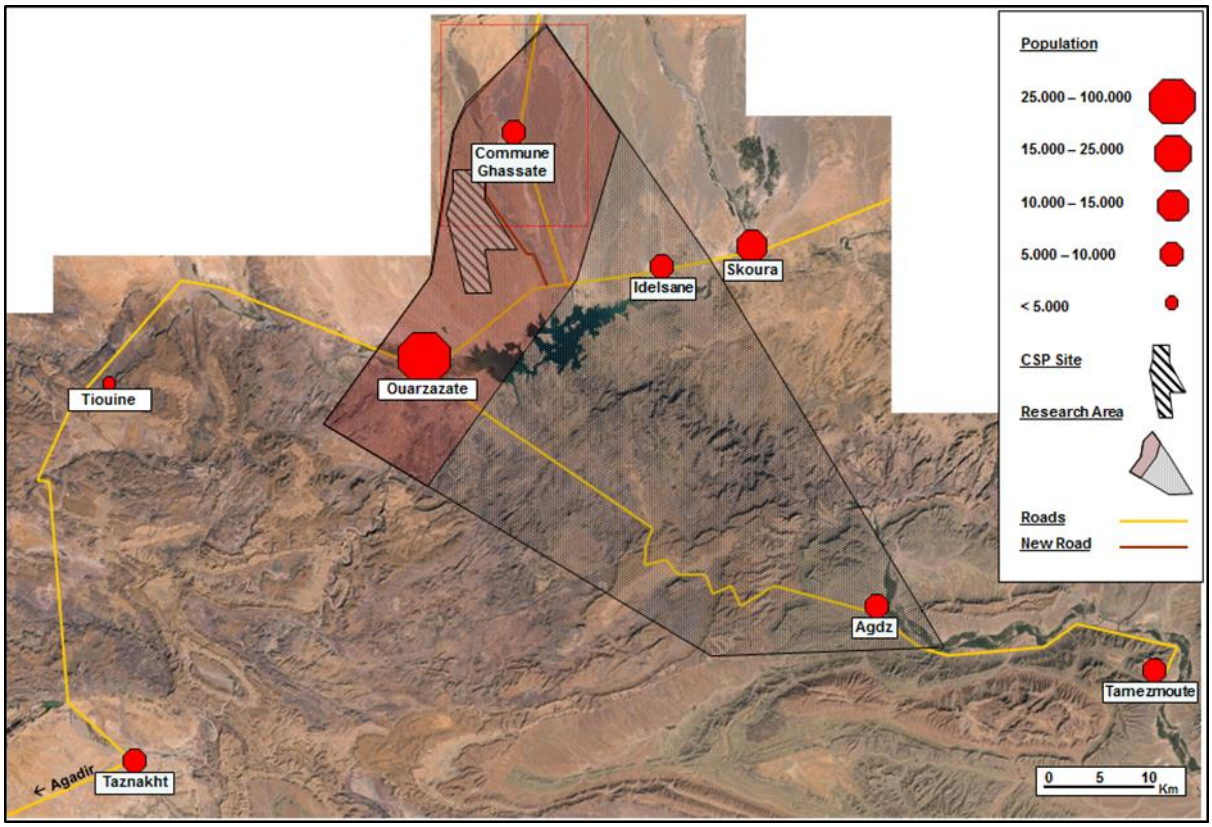


Figure 9-2: The final research area
Note: Red = primary area, grey = secondary area.

Despite the fact that significant impacts could also occur in communities that were either not considered at all or that were excluded following the narrowing of the research area, the rural Commune of Ghassate and Ouarzazate city were defined as the primary impact area (shaded in red), while Idelsane and Agdz were considered as the secondary impact area (shaded in grey).

Because the grouping of communities within the rural Commune of Ghassate included all the communities directly adjacent to Noor$_o$ I, the researchers had to decide which communities to focus on in the next research steps. In this regard, it was decided to focus on the Centre of Commune Ghassate because of its administrative relevance and important role within the LAP, SDP, and recruitment process. The communities of Tasselmant, Agouddim Izerki, Tiflite and Tidgheste were chosen for further investigation because of their proximity to the north-east and east of Noor$_o$ I and because they are most populated parts of the southern community clusters of the rural Commune of Ghassate (Figure 9-3).

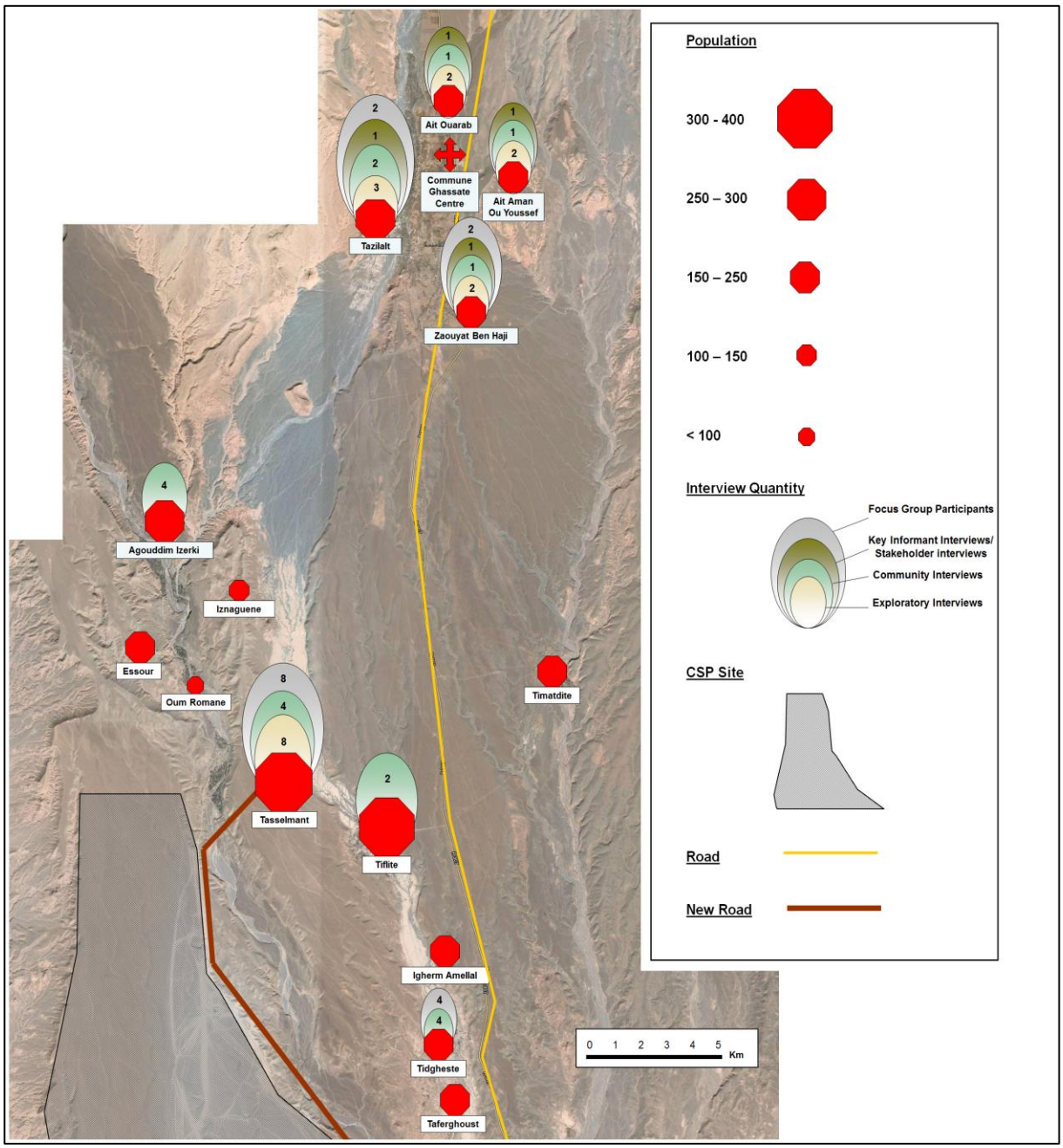


Figure 9-3: The layered set of communities in the rural Commune of Ghassate

9.2 Identifying livelihood consequences and impact pathways

This section summarizes the findings of the first field research aimed at identifying and describing how the activities and outputs of $Noor_o$ I in the project's three development phases – planning, implementation and operation – affect and are anticipated to affect people's livelihoods at the community level in the Ouarzazate region (see fig. 9-4).[36] Although $Noor_o$ I is not commissioned yet, the planning and construction phases have already resulted in positive and negative effects on people's livelihoods, varying widely within and between communities and households across the project phases.

The livelihood consequences for the completed / ongoing project phases - planning and construction - could already be studied, and the majority of SLA issues identified during the literature review (see chapter 2.3) reemerged during the field research (see Figure 9-5). Anticipated impacts were projected or assumed for the operational phase based on the patterns that appeared during the first two project phases of $Noor_o$ I, interview data, and the literature review conducted in chapters 6, 7, and 8. Because the analysis involved *ex-ante* elements based on local stakeholders' judgments, a complex local livelihood situation; and interwoven direct, indirect, and cumulative effects, this section does not claim to provide a definitive or exhaustive compilation of all livelihood consequences resulting from $Noor_o$ I. Furthermore, limitations resulted from the fact that it was impossible to represent all community groups and opinions in the sample despite the authors' best efforts. Therefore, the assessment of $Noor_o$ I should be taken as a portrayal of the observed impacts, perceptions, and anticipations for an uncertain future that could be identified during the fieldwork. Despite multiple overlaps and livelihood consequences cutting across different livelihood dimensions, the social change processes and livelihood impacts of $Noor_o$ I were grouped under the six SLA capitals and described according to the SLA structure defined in chapter 2.3. In carrying out this research, the research team had to address several issues relevant to interpreting the results. These included the debate about perceived, anticipated or observed livelihood consequences which we decided to be immaterial as every perceived or anticipated impact will ultimately result in psychological effects on the affected people. Furthermore, and due to our participatory approach in conducting the research, the results presented here are based on a large body of individual stakeholder opinions. However, in order to balance people's perceptions we also included other data sources wherever possible, such as census data, key informant interviews or the perspectives of the project developers. Lastly, we adopted a stance that unless more than two individual stakeholders reported the same livelihood consequence, or unless a stakeholder's answer could be backed up by an independent source of information, the effect would not be reported in detail or omitted overall.

[36] Given that this research focuses on the social dimension of CSP, environmental aspects are not considered here in depth, although, of course, they are very relevant to the sustainability of CSP projects at the local level and are mutually interrelated with the social aspects.

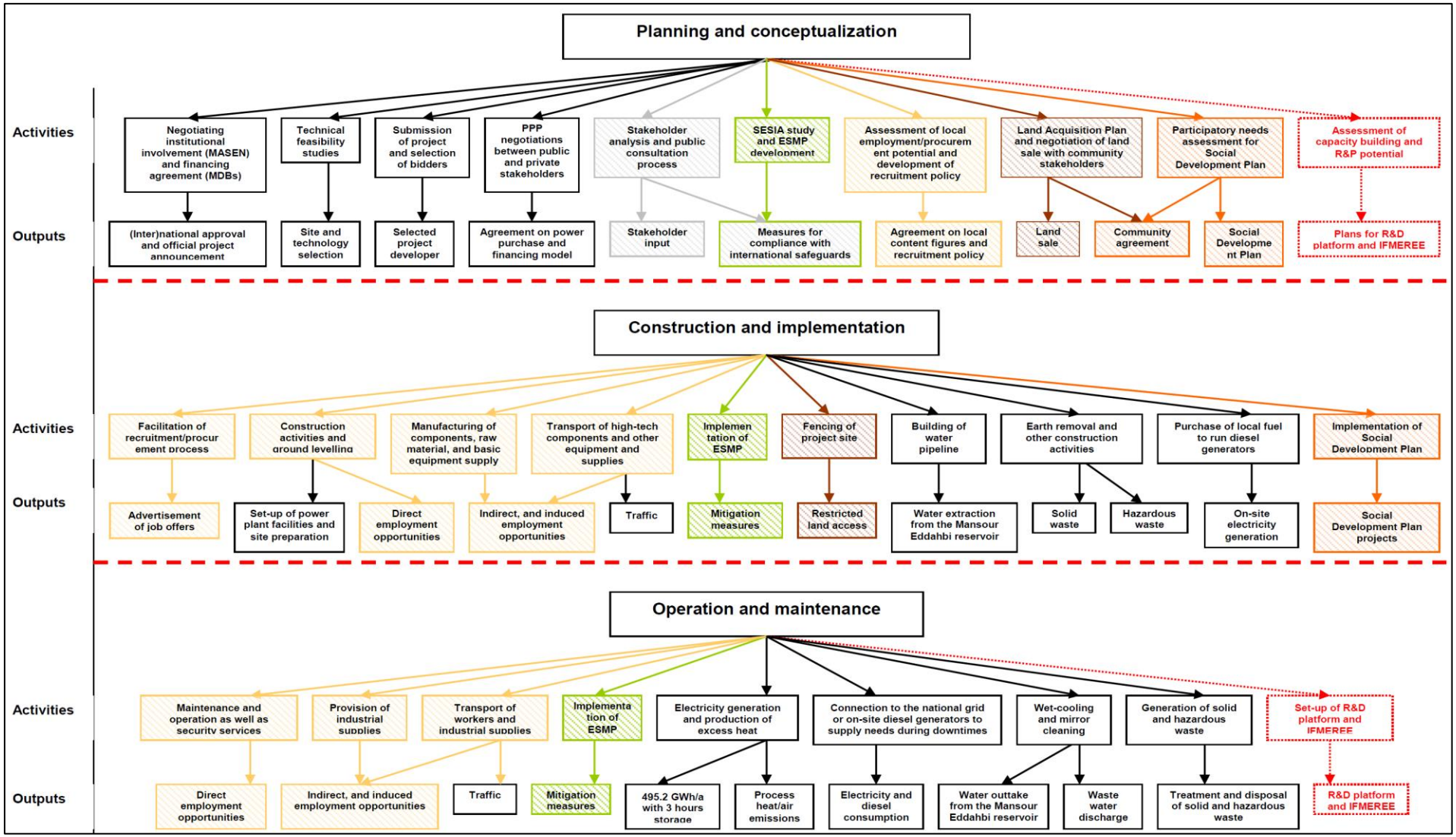


Figure 9-4: Impact pathways of Noor$_o$ I
Note: grey = consultation process, green = ESMP, yellow = recruitment/procurement process, brown = LAP, orange = SDP, red = capacity building programs.

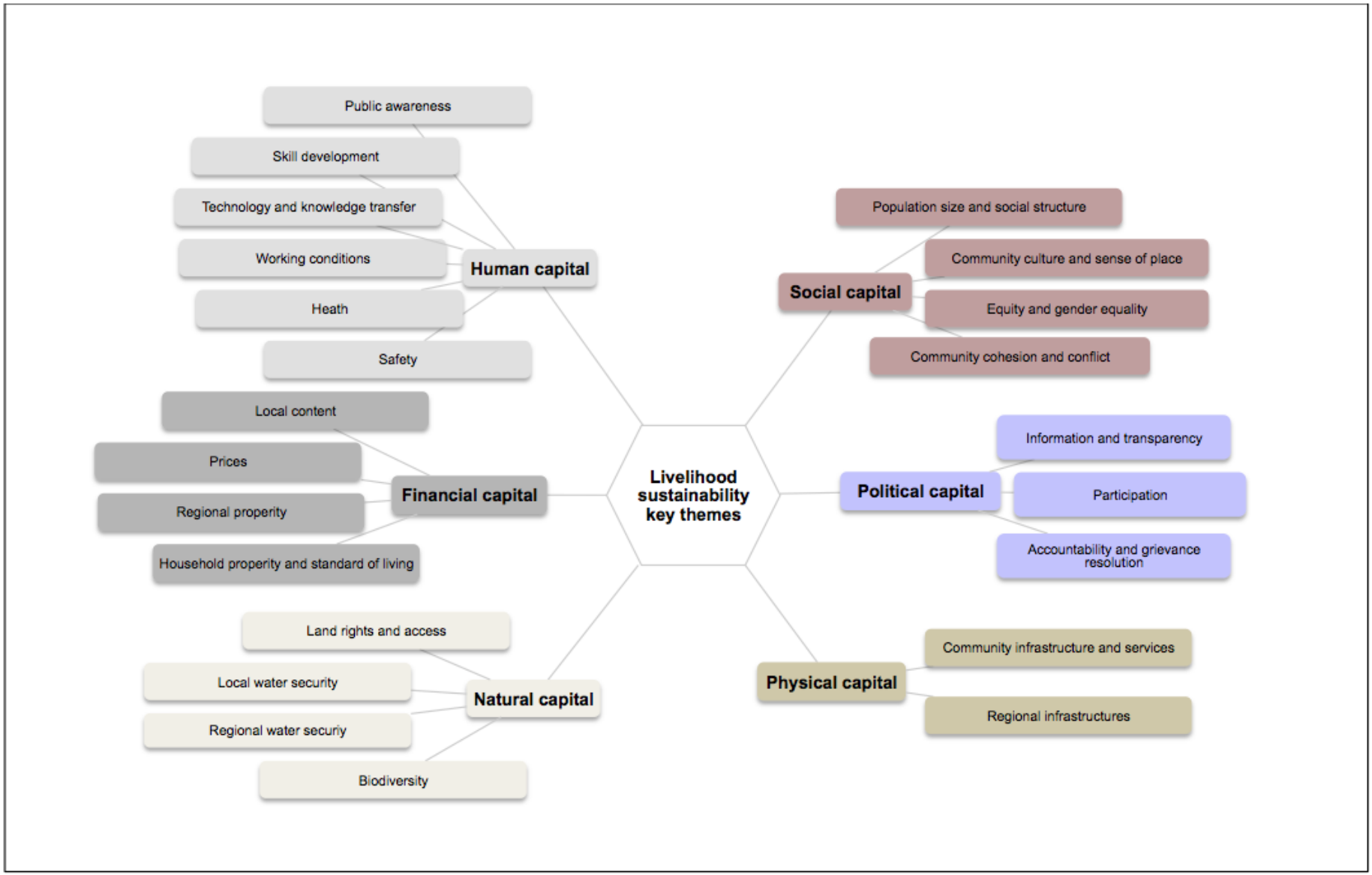


Figure 9-5: Livelihood sustainability key themes that merged during the field research

9.2.1 Social capital

9.2.1.1 Population size and social structure

Livelihood impact	**1**	*Strengthened family ties and social support*	Observed/ Anticipated
Social change process		• *Influx of outsiders and foreigners* • *Change in family cohesion*	
Project stage		**Project activity / output**	
Planning			
Construction		Advertisement of job offers	
Operation		University programs and IFMEREE	

Migration from the rural areas to the cities, especially among young people who leave their communities in search of mostly low-skilled construction jobs, is a significant socio-cultural challenge in the Ouarzazate region. In contrast to the general trend of rural exodus, interviewees in the rural Commune of Ghassate[37] and in Ouarzazate city reported that many people had returned to their communities hoping to find jobs during the construction phase of Noor$_o$ I. Due to the increased in-migration, particularly from young people who returned to their families in order to reduce living costs, people reported stronger family ties and social support among family members - both in quantity and quality. Furthermore, they hoped that the introduction of new university programs and the IFMEREE would persuade even more young people to stay in or return to the region.

Livelihood impact	**2**	*Loss of social standing and political influence*	Anticipated
Social change process		• *Influx of outsiders and foreigners* • *Marginalization of communities and social groups* • *Change of social structure and communal power dynamics*	
Project stage		**Project activity / output**	
Planning			
Construction		Direct, indirect and induced employment opportunities	
Operation		Direct, indirect and induced employment opportunities; university programs and IFMEREE	

Members of the rural Commune of Ghassate and Ouarzazate city expressed concern that increased in-migration could lead to adverse changes in the social structure and power dynamics of their communities. The interviewees were concerned that migrants - especially outsiders and foreigners - or local people who obtained benefits from the project would have increased political influence, access to community resources and services, and improved social standing in communities and within family groups in the future. These persons are worried that this could intensify the socio-economic marginalization of rural communities and vulnerable groups, such as the unemployed, illiterate, women, or farmers.

[37] The rural Commune of Ghassate or Ghassate municipality encompasses 38 villages (douars) and roughly 1,230 households.

9.2.1.2 Community culture and sense of place

Livelihood impact	**3**	*Intensified local pride and gains for regional reputation*	Observed
Social change process		• *Change in economic profile and revenue characteristics of the region* • *Change in sense of place*	
Project stage		**Project activity / output**	
Planning		Project announcement	
Construction		Throughout all project activities	
Operation		Throughout all project activities	

Due to high public interest (e.g., media coverage) the King's visit to inaugurate the plant, and the project's national value, members of all communities associated the development of Noor$_o$ I with an intensified local pride and improved reputation for the Ouarzazate region. People recognized the project's contribution to regional economic development as a means of overcoming the existing socio-economic marginalization under which the region has suffered due to political neglect and economic isolation (see impact 21). Even interviewees who did not think they would benefit personally from the project's economic or educational opportunities or who had actually experienced negative effects – like some citizens of the douars Izerki and Tidgheste[38] (see impact 13) – acknowledged that the project is in the best interests of the region and the state.

Villager from Izerki:

"All in all, the CSP project is good for the region, it gives a certain honor to our area, and we would say that it is not only a local project, it is a national project."

Livelihood impact	**4**	*Accelerated change in the community atmosphere and cultural identity*	Anticipated
Social change process		• *Influx of outsiders and foreigners* • *Change in sense of place*	
Project stage		**Project activity / output**	
Planning			
Construction		Direct, indirect and induced employment opportunities	
Operation		Direct, indirect and induced employment opportunities; university programs and IFMEREE	

Interview results illustrated the strong attachment of the local population to traditional customs and cultural heritage. Although the region has already experienced outside or foreign influences because it is a well-known destination for tourism ("the gate to the desert") and the film industry ("Morocco's Hollywood") the interviewees were ambivalent about the influx of new employees at the Noor$_o$ project. Young people embraced the increasing prominence of their region as sign of modernization and new socio-economic opportunities, but others were concerned about the increasing influence of Western values on rural lifestyles. Some

[38] The nearest communities to the project are the douars of Izerki (i.e., Tasselmant, Oum Romane, Essour, Agouddim Izerki and Iznaguene). The douars of Tidgheste (i.e., Igherm Amellal, Zaouiat Tidgheste and Taferghouste) represent the second nearest community to the project.

community members in Ouarzazate and the Commune of Ghassate raised such concerns. They worried that a high influx of outside and foreign male workers and students with different cultural traditions, behaviors, and weak social ties could dilute people's multifaceted sense of place, such as *community atmosphere* and *place attachment* and thereby result in negative effects on the region's traditional practices, touristic potential ("*Berber charm"*), social cohesion (see impact 6), and safety ("famous tranquility", see also impact 30). Members from the rural Commune of Ghassate perceived the transformation of the rural landscape into a privately owned industrial zone as a loss to their *cultural identity* (see impact 13).

9.2.1.3 Equity and gender equality

Livelihood impact	**5**	*Preferential treatment of local communities and socio-economic inclusion of women*	Observed
Social change process		• *Fair and equitable benefit sharing* • *Change in employment, disposable income and financial spending*	
Project stage		**Project activity / output**	
Planning		Agreement on SDP; Agreement on local content	
Construction		Direct, indirect and induced employment opportunities; Implementation of SDP projects	
Operation		Direct, indirect and induced employment opportunities; IFMEREE and university programs	

In regard to distributional equity, people in the rural Commune of Ghassate and Ouarzazate welcomed the benefit sharing arrangements applied by MASEN. Interviewees appreciated the specific benefits that were provided to the communities neighboring the project site in order to compensate a wide cross-section of local villagers for any inconvenience or social, economic, and environmental hardship stemming from Noor$_o$. These benefits, particularly local procurement and recruitment obligations and SDP projects, skill development, and technology transfer are described in the following sections in more detail. MASEN's commitment to share these benefits in a fair and equitable way, especially among the rural Commune of Ghassate villages, exceeded legal obligations.

Although the lack of information provided on the exact distribution of these benefits led to significant misperceptions and feelings of discrimination among some marginalized social groups (e.g., youth) and villages (e.g., in Idelsane), the majority of interviewees perceived the preferential treatment in sourcing labor, goods, and services from the local communities of Ghassate and the city of Ouarzazate as well as the numerous SDP projects as a means of giving local communities a stake in the project. According to ACWA Power Ouarzazate, of the 1,800 employees working in the construction phase at the Noor$_o$ site in September 2014, over 700 were recruited from the rural Commune of Ghassate and the city of Ouarzazate, reflecting the recruitment priorities given to the local workforce (MASEN, Personal Interview, 2014) (see Figure 9-6 and also impact 17 and 19).

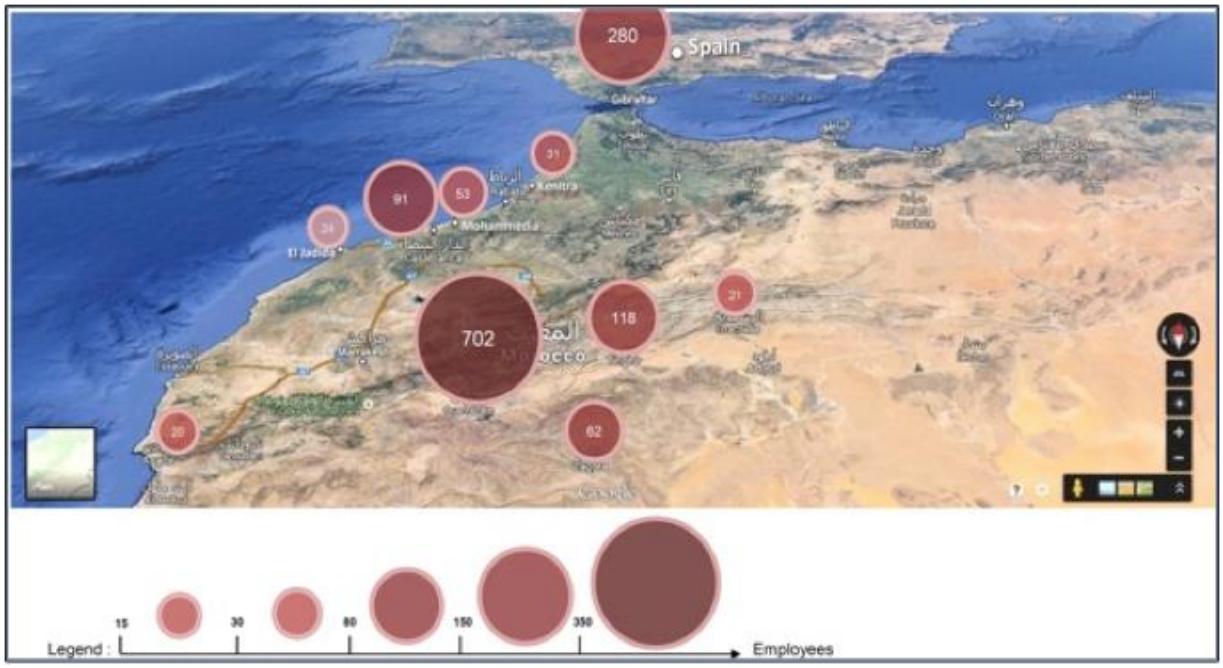


Figure 9-6: Breakdown of Moroccan and local employees working at Noor$_o$ I in September 2014
Source: ACWA Power Ouarzazate, Personal Interview, 2014.

Concerning gender equality, MASEN and ACWA Power Ouarzazate committed themselves to encouraging the development of socio-economic opportunities for women through the SDP (AfDB, 2012a:10 and 18). In the focus group discussion with women from the rural Commune of Ghassate, many participants mentioned gender-specific SDP measures, such as the improvement of the female dormitory in Ouarzazate or the equipment provided to the birth house in Ghassate Center.

Situation in early September 2014	Number	%	Situation in the previous month	Evolution
Female Employees				
Total Female Employees	**63**	3.4%	65	- 3%
Quality Control	*14*	-	*13*	-
Cleaning	*9*	-	*10*	-
Catering	*12*	-	*24*	-
Administrator	*11*	-	*9*	-
HSE	*5*	-	*3*	-
Technical department	*8*	-	*3*	-
Topographer	*3*	-	*2*	-
Commercial	*1*	-	*1*	
Total Moroccan Female Employees	**43**	2.3%	48	- 11%
Total Expatriate Female Employees	**20**	1.1%	17	+ 17%

Figure 9-7: Employment of women in September 2014
Source: ACWA Power Ouarzazate, Personal Interview, 2014.

Women in rural areas of Morocco are generally underrepresented if not excluded from construction work due to cultural norms, lack of skills, and high levels of illiteracy. Illiteracy averages 90% among women in the rural areas of the Ouarzazate province. This gender disparity is also reflected in the employment statistics of women working at Noor$_o$ I. Figure

9-7 illustrates, that women comprised only 3.4% of the total share of employees in September 2014 (ACWA Power Ouarzazate, Personal Interview, 2014).

Nevertheless, ACWA Power Ouarzazate made efforts to identify women as a distinct group of stakeholders by including them in the project activities through promoting the sale of local products in the workers' canteen, such as bread and cakes baked by women (this action, however is now suspended due to unknown reasons), recruiting low-qualified women for on-site services and high-qualified women for administrative and technical jobs, as well as training local women in sewing and knitting (see also the SDP section). ACWA Power Ouarzazate expected that these services and opportunities would continue and even increase in future project stages.

9.2.1.4 Community cohesion and conflict

Livelihood impact	**6**	*Social conflict, rivalry and feelings of envy*	Observed
Social change process		• *Marginalization of communities and social groups* • *Change in community cohesion*	
Project stage		**Project activity / output**	
Planning		Agreement on LAP; Agreement on SDP; Agreement on local content	
Construction		Direct, indirect, and induced employment opportunities; Implementation of SDP projects	
Operation		Water withdrawal from Mansour Eddahbi reservoir	

Considering that diminishing water resources and land degradation have increased competition over water-land endowments and entitlements and have already led to numerous conflicts in rural communities, any change to the access and availability of water and land may exacerbate social, economic and political disparities and increase the potential for social conflict in the region. Despite Noor$_o$ I's benefits, it has already generated social tension and conflict among community factions and villages, which eventually led to protest (see impact 9). Fueled by procedural shortcomings (i.e., lack of accurate information, sufficient communication and community engagement) and differing expectations for socio-economic benefit, the community members of Izerki and Tidgheste especially reported tensions. According to the interviews, these community members thought that the land-tenure procedures were unclear (see impact 8), the process of how projects under the SDP were chosen lacked transparency, and competition for jobs had caused rivalry within and among communities competing for benefits.

Villager from Tidgheste:

"You know there are many disputes among the village members. If you take the examples of our two communities Izerki and Tidgheste and ask about the limits of the collective land owned by each village, there would be a serious conflict between these villages. The authorities have not taken into consideration such factors. Local communes and local authorities created disputes among villages."

Based on the interview results, future social conflict could also potentially stem from the power plant's strain on natural resources and increased in-migration. Citizens from Ouarzazate city and the rural Commune of Ghassate expressed concern that the decreased

availability of and access to basic services and facilities (e.g., hospitals, schools, recreation) due to the anticipated influx of foreigners and outsiders during construction, including recruits to the IFMEREE and the university programs (see also impact 24), could result in competition over limited resources and decrease social solidarity among community members and increase ill will towards newcomers (see also impact 4).

Villages farther from the project site also reported negative impacts on community solidarity among villagers and towards other communities. The nearby village of Idelsane is especially sensitive to the effects of infrastructure projects as it is still recovering from being displaced from its land when the Mansour Eddahbi reservoir was built in 1971. Because this community does not belong to the community of Ait Ougrour and thus was not part of the land acquisition process, local villagers were envious of other communities because they did not benefit from SDP projects and were not included in the preferential recruitment/procurement process despite their proximity to the project site.

Sixty kilometers southeast of the project site, citizens of Agdz were concerned that a possible increase in water scarcity due to Noor$_o$ I's water withdrawal from the Mansour Eddahbi reservoir, exacerbated by climate change, could decrease agricultural productivity and thereby increase conflicts among downstream farmers over access to irrigation water, especially during droughts or summer (see also impact 15). Oasis villagers were also envious since the downstream oasis was not compensated for the water withdrawal. They feared that they would be burdened by the future water demands of the entire Noor$_o$ complex. Compensation for this water withdrawal was not legally required.

Villager from Adgz:

"Tasselmant people were compensated for the land, but we the people of Agdz that belong to the Draa Valley did not receive any compensation for the water that will be taken from the dam."

9.2.2 Political capital

9.2.2.1 Information and transparency (access, availability, and quality)

Livelihood impact	**7**	*Uncertainty, unrealistic expectations, and frustration*	Observed
Social change process		• *Marginalization of communities and social groups* • *Change in community expectations* • *Change in attitudes and trust towards the project and authorities*	
Project stage		**Project activity / output**	
Planning		Stakeholder consultation and ESMP; Agreement on LAP; Land transfer; Agreement on SDP	
Construction		Restricted land access; Implementation of SDP projects; ESMP measures; Advertisement of job offers	
Operation		Implementation of ESMP; Water withdrawal from Mansour Eddahbi reservoir	

Information, transparency, and participation are crosscutting themes. However, in order to illustrate the resulting impacts comprehensively, each aspect is assessed separately for how it relates to the consultation process and the ESMP, the LAP, the SDP, and the local procurement and recruitment processes.

In regards to information and transparency, the evidence from the interviews clearly indicates that the local population thought that information disclosure on the project, the acquired land, the SDP projects, and the recruitment/procurement process was lacking and that information transparency was insufficient.

Consultation process and the ESMP

Although the majority of people knew about the project from mass media sources, villagers in the most affected communities of the rural Commune of Ghassate stated that the information provided neither sufficiently explained the scope of the project nor did it explain how to participate in the siting process. The selected community representatives who attended MASEN's consultation meetings also thought that they were not provided with sufficient information and that three consultation rounds were not enough to participate meaningfully and make an informed judgment about the project. Likely because participants of the consultation meetings lacked understanding or did not distribute the received information widely in their communities, the information disclosure to villagers was also found to be insufficient. Villagers that tried to get more information complained that the information in the SE-SIA/FESIA studies was neither communicated in Darija (Moroccan Arabic) nor in the local Berber dialects (Tamazight and Tashelhit). Instead, overly technical information was provided in English, French, and Modern Standard Arabic and was mostly only available online. As illiteracy rates are high (up to 70%) (see the baseline chapter) and Internet access is low in the rural Commune of Ghassate, few villagers were able to obtain detailed information online.

Therefore, interviewees were uncertain about the activities and outcomes of the Noor$_o$ I project. The lack of understanding among community representatives and villagers fostered misunderstandings, such as rumors of radiation releases or heat island effects. Furthermore, villagers accused local authorities of having made false promises and having created a range of unrealistic expectations (see info box). These spread largely through word of mouth and culminated not only in negative social perceptions of the project but in social tensions, opposition, and protest (see also impact 6 and 9).

Info box: Community expectations

Employment opportunities: In general, the interviewees were not fully aware that the employment opportunities would be limited in number and only of short duration. Some interviewees anticipated about 10,000 new jobs; this figure could possibly be attributed to a statement made by the AfDB, estimating that there would be 2,000-2,500 direct and 10,000 indirect jobs locally (AfDB, 2011:15) from the entire Noor$_o$ solar complex. Other interviewees said they did not expect any employment opportunities for their communities because all jobs would either be offered to the communities of the rural Commune of Ghassate or to outsiders/foreigners.

Electricity prices: A widespread misperception was found that the project would lower electricity bills or even provide free electricity to fulfill community and regional power demand. As electricity rates are determined by the GoM and the national agency in charge (ONEE) cannot change them, these are unrealistic expectations that cannot and will not be met.

Access to water: Access to piped water for household needs and for irrigation and sanitation purposes was expected as a compensatory measure by communities adjacent to the water pipe and the power plant. More generally, people expected upgrades to their water infrastructure and services as a spin-off from project activities.

Grid reliability: People in the local industry hoped for improved grid reliability and the end of blackouts since their activities depend on a reliable electricity grid.

Land acquisition process (LAP)

While people outside the rural Commune of Ghassate were widely indifferent about the land transfer, villagers in adjacent communities expressed dissatisfaction with the LAP.[39] Some thought that the loss of the land itself was unacceptable, while the majority were frustrated with the procedural aspects of the LAP. Although the land transfer was legally sound, many interviewees of the communities of Ghassate had learned of it only after the land had already been transferred, which did not allow them to participate or consult with the collective land representatives. Even a few Nouabs, or representatives, who signed the land transfer stated that they did not fully understand the agreement and relevant details (e.g., duration, geographic extent, proceeds). The six community representatives who signed the LAP, local citizens, and other collective land representatives[40] who did not attend the LAP consultation questioned whether the land transfer was based on informed community consent. This was probably due to both insufficient information and a lack of dialogue among governmental authorities including DAR, ONEE, and MASEN, community sentatives and local citizens. Furthermore, the community representatives misunderstood that the village would receive the proceeds of the land transfer directly instead of through SDP projects, and thus were frustrated not to see this expectation materialize. Similarly Rignall (2012), who had already studied $Noor_o$, stated, "[people did not] understand that the money from the transfer was not going to be handed over to people in individual allocations. People expected to receive monetary compensation for the project and village residents close by felt they deserved more" (Rignall, 2012:20).

Collective land representative from the douars of Izerki:

"The local authorities met with the representatives, who also lacked information and insufficiently discussed the sale of the land with their advisors and the affected populations."

Social Development Plan (SDP)

Although citizens from the rural Commune of Ghassate noted improvements to the physical infrastructure in their area (see also impact 10), they did not link them directly to the SDP or voluntary measures taken by MASEN and ACWA Power. Villagers who were familiar with the SDP argued that the information provided to them by local authorities did not fully reveal its scope, spending priorities, and funding criteria. Most interviewees thought that the project selection process under the SDP was unclear and lacked transparency; therefore, they had difficulties judging the adequacy and fairness of the SDP project selection. Further, since there was no publically available list of projects, people worried that no projects would be developed.

[39] For the transmission lines, ONEE also bought land, but no complaints about it were noted.
[40] There are two kinds of representatives: a) **Collective land representatives**, who are representatives for the community land of Ait Ougrour. These are the representatives who were involved in the LAP b) **Community representatives**: these are the political representatives in the commune of Ghassate. They were **not** involved in the LAP.

Local procurement and recruitment process

Representatives in our focus group on small and medium sized enterprises (SMEs) agreed that ANAPEC had conducted a comprehensive local procurement study and had registered almost all community businesses in Ouarzazate, the rural Commune of Ghassate, and Skoura. Yet, many interviewees pointed out that the recruitment and procurement opportunities were unclear to them, especially relating to information on the application and tender procedures, job eligibility requirements (e.g., skills and experience), and how local jobs would be distributed among communities. Interviewees complained about a lack of transparency in the job recruitment process. According to them, there were no advertisements or informational meetings, and community representatives did not explain who would be eligible to receive jobs and how to apply. Several interviewees knew of applicants who applied but were not hired and did not receive rejection letters.

As a result of both high unemployment rates and the perceived lack of information and transparency in the local procurement and recruitment process, unrealistic expectations led to the number of job seekers significantly exceeding project demands, particularly in Ghassate and Ouarzazate. In mid-2014, the established commission responded to community protests (see also impact 9) by adopting general recruitment guidelines to improve transparency and mitigate the high levels of frustration and rivalry between communities (see also impact 6) and the suspicion towards outside or foreign workers (see also impact 4).

9.2.2.2 Participation (community engagement and communication)

Livelihood impact	**8**	*Social exclusion and powerlessness in decision-making*	Observed
Social change process		• *Marginalization of communities and social groups* • *Elite capturing* • *Change in attitudes and trust towards the project and authorities*	
Project stage		**Project activity / output**	
Planning		Stakeholder consultation and ESMP; Agreement on LAP; Agreement on SDP	
Construction		Restricted land access; Implementation of SDP projects; ESMP measures; Advertisement of job offers	
Operation		Implementation of ESMP	

Consultation process and the ESMP

A clear relationship was observed between people's perceptions of inadequate information disclosure and the ability of community members to participate meaningfully in the consultation process through community representatives. Although the process complied with the law, many interviewees had hoped to have been invited to the consultation meetings or that their community representatives would have contacted them beforehand to gather community input and consent.

While people in Agdz and Ouarzazate were indifferent about community engagement because of their geographical distance from the project, villagers in the communities of Ghassate and Idelsane complained about a lack of participatory community engagement through their local representatives within the consultation process. They expected to have an active role in the decision-making process and thought that local authorities were not recog-

nizing them as legitimate participants in the consultation process. For example, interviewees from the rural Commune of Ghassate reported that although the Noor$_o$ complex was sited on "their" lands, they were not consulted by their community representatives to provide feedback in the decision-making process and that attendance at the consultation meetings was exclusively granted to administration officials, community leaders, and selected NGO representatives (see also Rignall, 2012:24).

Community members who did attend the consultation meetings for the SESIA/FESIA studies for discussing the project and in particular the measures under the ESMP, stated that a) the community engagement process only started after the decision to implement the project was made, giving local residents no chance to reject the project or suggest alternatives (see also Rignall, 2012:24), and b) the limited number of meetings did not enable them to familiarize themselves with the project details in order to express their views meaningfully. Several attendees remarked that they voiced questions and concerns about potential impacts but did not receive answers either during or after the meetings, even though they said that officials promised to contact them. Furthermore, consultation meetings were held in hotels, which some villagers perceived as an intimidating environment and a culturally inappropriate setting.

According to the statements made in the interviews and discussions, perceptions of exclusion and disempowerment increased when the community engagement period ended and communication channels were closed at the beginning of the construction phase. This was improved when MASEN institutionalized the consultation process in 2014 by establishing “open communication channels with local communities" (5 Capitals, 2012c:37) to enable an on-going trilateral dialogue and to allow for meaningful community feedback (e.g., local team on-site, mailbox) among MASEN, local authorities, and the residents of the rural Commune of Ghassate.

Land acquisition process (LAP)

Although MASEN acquired the land in accordance with standard Moroccan procedures and IFC policies (i.e., OP 4.12 of the World Bank) for voluntary land transactions between a local community and a public agency, interviewees in the rural Commune of Ghassate claimed that the process of the LAP did not offer sufficient opportunities for local community members to participate in the negotiation in order to influence its terms and conditions or reject the land transfer. In particular, villagers in the adjacent communities to the power plant site were dissatisfied with the process, while people outside of the rural Commune of Ghassate were indifferent about the land transfer. One exception was Idelsane, where interviewees’ perceptions were influenced by their displacement from their land by the Mansour Eddahbi reservoir in 1971. They thought their displacement was unfair and imposed upon them, and they expected the same for the CSP plant.

Collective land representative from the douars of Izerki:

"They [local authorities] made a lot of promises, such as supplying the local population with drinking water, free electricity and many other services"

Although none of the villagers in the Ghassate area claimed to have wanted direct involvement in the LAP negotiations, there was significant confusion among local villagers about how the six collective land representatives had been selected to negotiate the LAP. They questioned whether the six collective land representatives who signed the land agreement

fully represented their communities in accordance with local practices[41]. Other villagers thought that the collective land representatives only signed the land transfer after they were promised that the rural Commune of Ghassate would receive certain benefits (see also impact 7). Although these expectations were not justified, the empirical research showed that they were widespread within the communities.

Interviewees also expressed discontent about the agreed upon land price, which was established by an expert commission based on similar land transactions in the region (see also 7.6.2). According to government officials, the price was unprecedented for collective land in the Ouarzazate area (Rignall, 2012:19), but villagers thought the price was inadequate and unfair. According to local farmers, collective land in the Ouarzazate area is usually sold at a market price of 6 -12 MAD per m^2, while MASEN paid 1 MAD per m^2 or 30.5 million MAD in total. This money was allocated into the SDP fund operated by the Department of Rural Affairs (DAR). According to MASEN, the price was lower because the site's rocky terrain rendered it unsuitable for agriculture and that it was three times above the average price (MASEN, Personal Interview, 2014). From the standpoint of local villagers, however, the price paid was neither based on the market value nor on the transformation of the collectively utilized and culturally valuable land into private property (i.e., a replacement value), which would deprive them of traditional livelihoods for decades or even generations (see also impact 13, 16 and 20).

Protester from Tidgheste:

"The objective of the demonstration was […] not against the project itself, but to protest against the procedure that was adopted to sell the land."

Local villagers concluded that the process of community engagement within the LAP was not meaningful to them, inclusive, or timely and that the agreed upon land transfer lacked informed consent from their communities. Several interviewees from the rural Commune of Ghassate expressed that they felt powerless and that local representatives and the signing parties had not accounted for their interests. This led to the first protest march (impact 9).

Social development plan (SDP)

Villagers in the rural Commune of Ghassate reported that they thought that the procedure for identifying SDP projects governed by the DAR was inadequate. An exhaustive list of suggestions about where to invest the land transfer proceeds was collected from the communities based on locally defined needs. But according to a representative of the *Rural Development Department of the Province of Ouarzazate*, only a handful of community representatives - especially from the Center of Ghassate - participated in the decision-making process on the investment priorities and did so without consulting the majority of the community members in their customary spaces (communal assemblies).

Although the SDP was widely positively perceived and some SDP projects reflected the vulnerability context and needs of the villages in the rural Commune of Ghassate (see also impact 10), villagers felt frustrated and were skeptical about the fair distribution and the appropriateness of the social investments stemming from the land transfer. This was because they lacked a voice for their opinions in the implementation of the SDP. People from the douars of Izerki and Tidgheste were discontent and suspicious of other communities and

[41] According to the LAP document provided by MASEN, these six land representatives came from the following communities: Iznaguene, Taferghouste, Igherm Amellal, Tidgheste, Tasselmant-Izerki and Tiflite (MASEN, 2014:40).

perceived they had been discriminated against in the decision-making process. During a focus group discussion, villagers from the douars of Izerki and Tidgheste reported that the leaders of the rural Commune of Ghassate had channeled disproportionate SDP benefits to elites living in the villages of the central Commune of Ghassate who had favorable connections, rather than to the villages directly neighboring the CSP plant. Furthermore, citizens throughout the rural Commune of Ghassate expressed that the approved infrastructural improvements in the Commune and communities only partly reflected their priorities or compensated them for losing "their" land. Instead of infrastructure investments in a new road, fast-track irrigation canals, or improvements to the local cemetery, they would have preferred more investments in education, healthcare, agriculture (e.g., improving arable land and drip irrigation systems), or eco-tourism (e.g., restoring cultural artifacts like kasbahs and improving infrastructure to reach them).

Finally, when asked whether the decisions about the SDP were made in a timely manner, several interviewees supposed that some of the structural projects suggested for the SDP came from a pre-existing national development plan - the *Plans Communaux de Développement* - and were not new projects. Rignall's interviews with local authorities also reflect this (Rignall, 2012:26). However, this finding could be a misunderstanding because some of the SDP projects led to complementarities between the SDP and other regional development projects, such as the highway from Ouarzazate to Skoura or the planned Asmou water reservoir near Ghassate, thereby triggering even more infrastructural development.

9.2.2.3 Accountability and grievance resolution

Livelihood impact	**9**	*Suspicion towards the project and its developers as well as community protest*	Observed
Social change process		• *Marginalization of communities and social groups* • *Elite capturing* • *Change of attitudes and trust towards the project and authorities*	
Project stage		**Project activity / output**	
Planning		Stakeholder consultation and ESMP; Agreement on LAP; Land transfer; Agreement on SDP; Agreement on local content	
Construction		Restricted land access; Implementation of SDP projects; ESMP measures; Advertisement of job offers	
Operation		Implementation of ESMP; Water withdrawal from Mansour Eddahbi reservoir	

Although none of the communities investigated indicated that they had been initially against the Noor$_o$ solar complex in their neighborhood, the shortcomings they perceived in how local authorities had informed and engaged local communities, acquired the land, invested money into SDP projects, and implemented the recruitment/procurement policy not only led to discontent and social tension but also to project opposition (see also impact 6). Regardless of the number of jobs and community development projects, many villagers still thought that the Noor$_o$ project was unfairly imposed and lacked informed community consent. The general perception among the communities was dominated by the impression that local authorities were primarily beholden to their own interests instead of representing the interests of local communities. This significantly reduced the communities' trust in elected representatives and

local authorities, increased concerns about nepotism (see also impact 8), and led to resentment towards MASEN.

In the absence of community grievance mechanisms and options for timely dispute resolution (see also impact 8), members of adjacent communities sought other channels to vent their frustration regarding "the way the government was approaching the project" (Rignall, 2012:25) and to advance their claims to benefit from the project. As result of the high expectations for social and economic benefits that went unfulfilled, and intensified by the lack of public engagement, several communities from the rural Commune of Ghassate – including the douars of Izerki and Tidgheste – launched four joint protest campaigns, which escalated into conflict and confrontation towards local authorities. As a consequence of these social tensions in the communities, construction activities were disrupted several times, which eventually led the World Bank to suspend the project for 19 days in 2013. Four protests occurred.

- The first protest march to the administrative center of Ouarzazate was organized around the non-inclusive decision-making processes for the land transfer in 2013. It resulted when the local population saw how close the power plant would come to the village. They had agreed on three kilometers with MASEN, but the project fence came much closer to the village. Shortly after this protest, three community members from the douars of Izerki were jailed for a week after threatening a topographer who was conducting studies next to their village without having informed the community. They were released after fellow villagers sold livestock to pay the fine.

- During the second protest in 2013, community members demonstrated in front of the ANAPEC office questioning the distributional aspects of the recruitment/procurement process and asking for more and equally distributed jobs and equal employment benefits, e.g., insurance and retirement benefits.

- A third and fourth protests occurred on the project site when roughly 70 villagers from the douars Izerki and Tidgheste once again demonstrated to receive a fair share of jobs in early 2014. When people started to block construction activities, this protest ended with the arrest of eight protesters for two months.

In response to these protests, MASEN institutionalized its consultation and communication process by establishing a local team on-site and a mailbox at the MASEN office in Ouarzazate (see also impact 8). Both measures were intended to provide robust channels of dialogue and collaboration as they aim to manage frustration and expectations about community benefits by distributing relevant information about the project, resolving grievances, and building community trust throughout the next development stages of the Noor$_o$ solar complex (see also impact 7 and 8). Furthermore, ANAPEC's development of the general recruitment guidelines in mid-2014 aimed to improve the transparency of the recruitment process and to further mitigate misperceptions among local people hoping to find a job. Since the implementation of these mitigation measures, community protests have ceased.

Although protests and lack of trust have so far been observed only during the planning and construction phases, opposition could easily arise again in the future and challenge the project's development. During the operational phase, potential points of controversy could

include water access and rights in Adgz and other downstream oases that would be impacted by the project's upstream water demands or unintended environmental impacts not properly managed under the ESMP (see also impact 15). Community opposition could grow further if prospects of jobs and economic benefits do not materialize as expected because educational qualifications do not match the labor market requirements (see also impact 25).

9.2.3 Physical capital

9.2.3.1 Community infrastructure and services

Livelihood impact	**10**	*Improved living conditions in adjacent communities*	Observed
Social change process		• *Change in availability of and access to infrastructure and services*	
Project stage		**Project activity / output**	
Planning		Agreement on SDP	
Construction		Implementation of SDP projects	
Operation		Throughout all project activities	

Since basic community infrastructure and services, such as access to clean water, sanitation, and sufficient health care, are lacking in the communities adjacent to the power plant, local interviewees from the rural Commune of Ghassate welcomed the SDP investments[42] (Department of Rural Affairs, personal interview, 2014). While the money generated for the SDP coming out of the land acquisition would not have been enough to finance all the projects listed below, numerous projects received co-financing by the Ministry of Interior. Furthermore, MASEN and ACWA Power Ouarzazate financed various activities to the benefit of local people, such as voluntary investments addressing the needs of the local population (MASEN) and CSR actions (ACWA Power) (MASEN, 2014; ACWA Power Ouarzazate, 2014) (see below).

Despite the discontent about the procedural aspects of the SDP (see also impact 7 and 8), there was widespread recognition among interviewees that these investments had improved living conditions by providing access to many important livelihood services and facilities. However, many of these projects still have to be completed.

[42] Although uncertainties remain about the exact amount spent under the SDP, the added sum of the listed projects seems to confirm that the overall budget of the SDP was 30.5 million MAD and that parts of the additional 15-20 million MAD pledged by the Ministry of Interior had already invested in further projects.

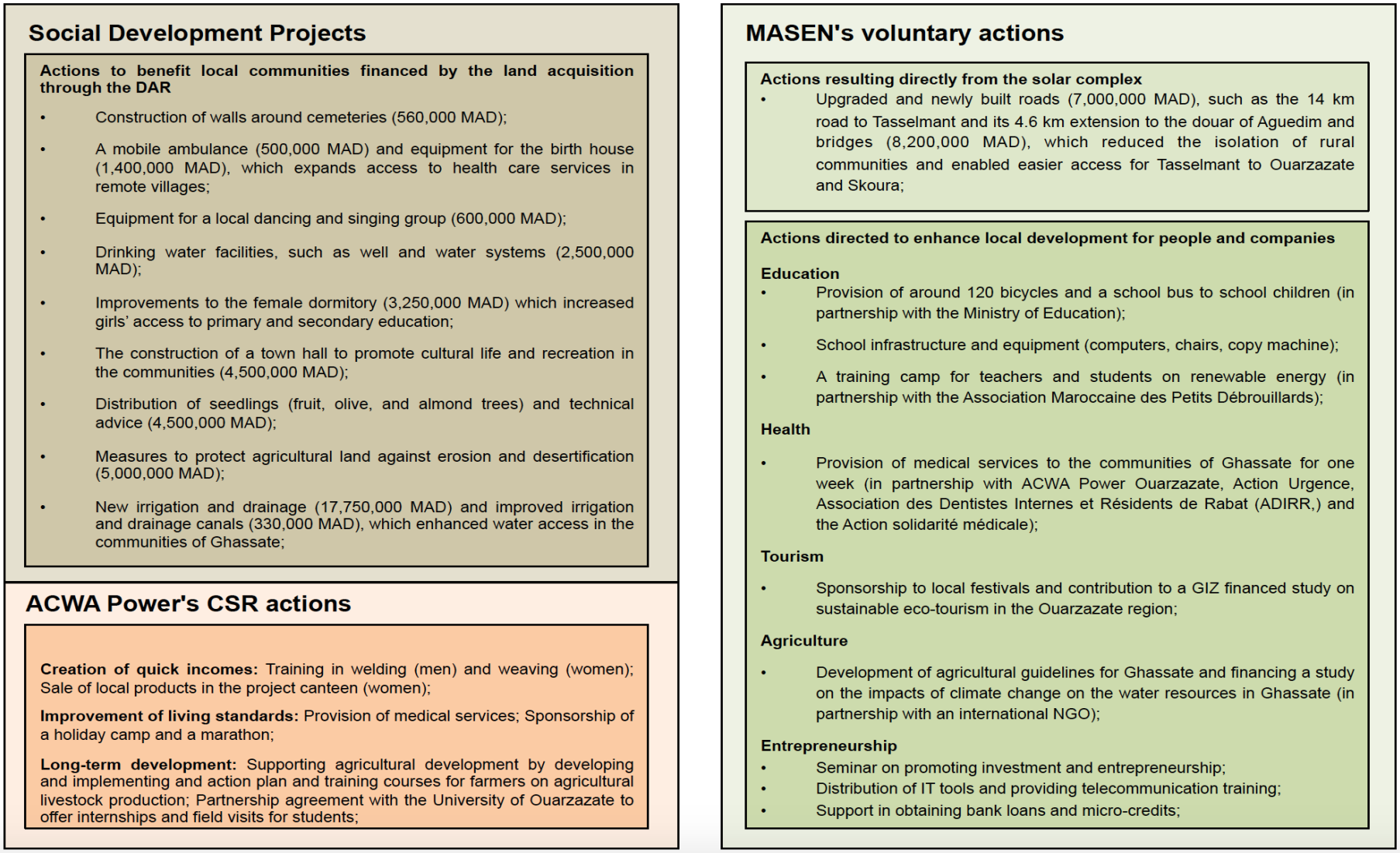


Figure 9-8: Livelihood sustainability key themes that emerged during the field research

9.2.3.2 Regional infrastructure

Livelihood impact	**11**	*Spurred regional socio-economic and infrastructure development*	Anticipated
Social change process		• *Change in availability of and access to infrastructure and services*	
Project stage		**Project activity / output**	
Planning		Announcement of project; Agreement on SDP	
Construction		Implementation of SDP projects	
Operation		Throughout all project activities	

Since the region suffers from some of the country's poorest infrastructure, the investments and potential multiplier effects of Noor$_o$ I raised hopes for spurred regional infrastructure development. Regional administration representatives mentioned that the involvement of local authorities in the design of the SDP led to complementarities between the SDP and other regional development plans. Initiatives, such as the highway from Ouarzazate to Skoura, the planned Asmou water reservoir near Ghassate, improvements of the Tishka road to Marrakesh or potentially a tunnel through the Atlas Mountains, were cumulatively expected to become drivers for socio-economic development in the region and eventually trigger even more infrastructural improvements.

Livelihood impact	**12**	*Strain on regional infrastructure and services*	Anticipated
Social change process		• *Influx of outsiders and foreigners* • *Change in availability of and access to infrastructure and services*	
Project stage		**Project activity / output**	
Planning			
Construction		Direct, indirect and induced employment opportunities; Transportation and traffic	
Operation		Transportation and traffic; IFMEREE and university programs	

Given the scale of the project, Noor$_o$ I may result in a temporary or possibly permanent increase in the population due to construction jobs, the new university programs, and the IFMEREE. Citizens from the rural Commune of Ghassate and Ouarzazate city were concerned that increasing social demands could further strain their inadequate public infrastructure and services (including sanitation, healthcare, and education) leaving them unable to cope with even a temporary population surge (see also impact 4). Furthermore, since the project developers would have to transport the majority of materials and the workforce by road, people were concerned about traffic congestion and the deterioration of roads and bridges in the region (in particular on the Agadir-Ouarzazate-Errachidia route).

9.2.4 Natural capital

9.2.4.1 Land rights and access

Livelihood impact	**13**	*Decreased psychological well-being and loss of cultural attachment in adjacent communities*	Observed
Social change process		• *Change in land availability and accessibility* • *Change in character and quality of the landscape*	
Project stage		**Project activity / output**	
Planning		Agreement on SDP; Land transfer	
Construction		Restricted land access	
Operation		Throughout all project activities	

Besides the procedural shortcomings in the LAP, another consequence of Noor$_o$ I relates to land use and access claims. The widespread assumption that the Ouarzazate region consists mainly of barren, unused, and marginal lands suitable for the siting of a CSP plant and that land requirements for Noor$_o$ would be "insignificant in relation to the large amount of open land that supports a similar or better vegetation of pastoralists' herds" (MASEN, 2011:4) does not hold completely true.

The project site was indeed found as an unpopulated, "sparsely vegetated and flat rocky plateau" (5 Capitals, 2012a:7), reflecting the Berber meaning of its name *Ait Ougrour* or rocky land. No resettlement was required,[43] and no sacred or culturally important sites were disturbed (5 Capitals, 2012a:174 and 191). However, the site was not free of land use claims. In contrast to the SESIA study's assertion that the land acquisition would not displace any economic activity, (5 Capitals, 2012a:174) the land had an economic and cultural value for the citizens of the rural Commune of Ghassate. Interviewees stated that even land that appeared to be unfertile sustained the livelihoods of the local communities adjacent to Noor$_o$ I by providing a variety of environmental services and income to villagers in the douars of Izerki and Tidgheste, stemming from occasional subsistence farming and other livelihood activities, such as grazing and collecting fodder, firewood, or medicinal herbs.

Info box: What about pastoralists/nomads?

A widespread critique raised in regards to utility-scale CSP plants is that the land acquisition could deprive pastoralists from their livelihoods by restricting their traditional migratory routes or grazing grounds. While pastoralists in the project area are facing serious challenges to their nomadic lifestyles, they did not consider the land use from the Noor$_o$ complex to be among these challenges. Instead, given their dependence on the whims of the climate, pastoralists are threatened by back-to-back droughts, decreasing groundwater levels, and bleak economic prospects for their children. When asked about possible restrictions to their mobility due to the Noor$_o$ project, they noted the rather infertile condition of the project site and the other vast grounds available in the area for traditional nomadism and adaptive migration.

[43] In comparison former infrastructure projects in Ouarzazate, mostly in the course of the development of the Mansour Eddahbi reservoir during the 1970s, required forced resettlements of local population. Approximately, 8,000 people were relocated and 1,000 ha of arable land were lost. The government's resettlement policy at that time did not address the needs of the relocated local population and was not well accepted and adopted by those affected. According to Schlütter (2006) compensatory measures were found to be inequitable and were the cause of social unrest.

Furthermore, land tenure claims in the area are complex, reflecting local cultural norms and the influence of European colonialism (Swearingen, 1988). In the communities adjacent to the project site, the complexity of the existing land tenure system relates to "legal pluralism," in which informal user rights exist alongside formal state or collective tenure systems defined by national legislation (*Land of Jmaa*). Adding to this complexity is the fact that despite the overlapping land entitlements, most of the land in the area is used collectively and individual land users are not the formal landowners. Because existing land uses and claims were not fully acknowledged by the signatories to the LAP - allocating 3,041 ha of communal land and transforming it into the property of a private entity (MASEN) - local communities thought that they were deprived of important subsistence activities. While economic impacts of the land transfer are covered in impact 20, community members associated the loss of land and transformation of the rural landscape into an industrial zone with negative effects on their psychological well-being because of their emotional ties and cultural attachments to the ancestral land (see also impact 4).

9.2.4.2 Local water security

Livelihood impact	**14**	*Decreased water security in the community of Tasselmant*	Observed
Social change process		• *Change in water availability and accessibility*	
Project stage		**Project activity / output**	
Planning			
Construction		Water withdrawal from local wells	
Operation			

Communities adjacent to Noor$_o$ I depend highly on the seasonal waters from the Atlas Mountains to replenish the groundwater in the community wells. According to villagers from Tasselmant, project developers rented a well from a farmer in the Tasselmant area and pumped large volumes of groundwater for construction purposes, which reduced the availability of local water resources. An accusation which was however challenged by MASEN, saying that water during construction was brought to the project site by trucks and not by using local wells.

9.2.4.3 Regional water security

Livelihood impact	**15**	*Deprivation of farming livelihoods in the Ouarzazate area and cascading effects in the downstream oases of the Draa Valley*	Anticipated
Social change process		• *Change in water availability and accessibility*	
Project stage		**Project activity / output**	
Planning			
Construction		Water withdrawal from the Mansour Eddahbi reservoir	
Operation		Water withdrawal from the Mansour Eddahbi reservoir	

Noor$_o$ I will not affect the water security of adjacent communities, Idelsane, or Ouarzazate during operation[44]. However, future water withdrawals from the Mansour Eddahbi reservoir could potentially have severe effects on the downstream oases of the Draa Valley [45]. The water availability per capita in the region of Souss-Massa-Drâa is only 360 m³/y (Choukr-Allah, 2011:182), which is just over one third of the threshold for *water scarcity* (1,000 m³/y). The operational water demands of Noor$_o$ I for cooling, mirror cleaning, and workers' use could threaten the region's water security in the future. The capacity of the Mansour Eddahbi reservoir has already experienced significant fluctuations over the years, ranging from 12% to 40% to 90% of its original capacity since construction in 1972 (5 Capitals, 2012a:78). In the period 1972-1998, the reservoir has lost more than 25% of its original capacity and MASEN currently even estimates the loss to be more than 50% with a present yearly average of 250 million m³ compared to the original 560 million m³ in the 1970s. Even worse: different future scenarios developed within the GLOWA-IMPETUS project simulate a signifcant reduction of the reservoir's water capacity for the next decades, with the worst-case scenario calculating that the Mansour Eddahbi reservoir could become inoperable between 2030 and 2042 plummeting to 0-200 million m³ due to climate change, societal and agricultural demands, and reservoir silting (Diekkrüger et al., 2010:11 and Diekkrüger et al., 2012:10). Already today, the reservoir provides only about 35-40 million m³/year for irrigation, which is only a sixth of the originally planned 245-250 million m³/year and, according to representatives of the farmers' focus group, is insufficient to sustain agriculture in this region. Consequently, farmers from Agdz expressed concern that any additional water withdrawals from the reservoir could have direct impacts on water availability in the Draa Valley. Noor$_o$ I will have a relatively small water consumption of 1.75 million m³/year in operation mode, which would account for an estimated 0.7% of the total water extraction from the reservoir (depending on the yearly input) (MASEN, Personal Interview, 2014).[46] Because the water levels in the reservoir are declining already due to consecutive years of drought and water intensive agriculture, this could, however, have unforeseen future impacts on the water availability, despite the SESIA study's categorization of these impacts as "negligible to moderate". Especially as droughts are expected to become more severe (Voss et al, 2002; Schilling et al., 2012:7), citizens from all communities worried that a cascade of negative impacts on the downstream oases of the Draa Valley could occur in the long term. As core livelihood and agricultural activities along the Draa Valley depend on the annual water from the Mansour Eddahbi reservoir to replenish groundwater and fill community reservoirs, effects including the project's operational water consumption on the reservoir's future capacity bear risks of livelihood impoverishment, adverse health impacts (see also impact 28 and 29), and socio-economic deprivation for the oases communities of the Draa Valley such as Agdz. While in the short-term, diminishing reservoir releases could be substituted with groundwater, an unsustainable depletion of groundwater reservoirs and diminishing water tables could cause aquifer levels to decrease and agricultural land to be abandoned. The availability of

[44] The rural Commune of Ghassate receives its water from various streams from the Atlas Mountains, Idelsane is located upstream from the Mansour Eddahbi reservoir and Ouarzazate depends partly on the Tiouine water reservoir in the west and has priority access to the Mansour Eddahbi for its drinking water demands.

[45] Estimates and scenarios made in the SESIA study predict a demand of 1.75 million m³/year for the wet cooling of Noor I, whereas the FESIA study estimated 6 million m³/year for a fictional and fully wet cooled 500 MW CSP power plant.

[46] Closed-loop systems recirculate cooling water and remove excess heat through a cooling tower or pond. Although closed-loop systems withdraw less water than once-through systems, they consume more through higher evaporation rates. Therefore, the actual withdrawal of Noor I could be higher than the consumption in order to compensate for losses (e.g., evaporation, leaking etc.).

and access to water in the Ouarzazate region is closely related to food security and other essential livelihood activities. Therefore, any additional stress on the valley's water security could not only reduce the region's capacity to cope with the projected climate variability and the associated desiccation of the downstream oases of the Draa Valley but could also risk increasing the potential for social conflict over access to water and land resources (see also impact 6). As Houdret (2012) showed, such risk could increase even further if in addition to water withdrawals for the project, irrigated agriculture keeps expanding, permitting the growing of water intensive fruits like watermelons for export.

9.2.4.4 Biodiversity

Livelihood impact	**16**	*Long-term deprivation of subsistence activities in adjacent communities*	Anticipated
Social change process		• *Change in availability of and accessibility to ecosystem resources and services*	
Project stage		**Project activity / output**	
Planning			
Construction		Restricted land access; Set-up of power plant facilities and site preparation	
Operation		Throughout all project activities	

Potential impacts stemming from the site clearance for $Noor_o$ I are discussed here (for economic impacts of loss of flora/fauna and land see impact 20). People in adjacent villages expressed concerns that the clearance of the site for Noor I and the associated activities of soil sealing and fencing of the 3,041 ha (30.5 km²) site may result in future decreases of essential ecosystem services in the rural Commune of Ghassate due to the loss of the natural seed variety and breeding grounds. Although these concerns are speculative, any decrease in the local biodiversity could intensify the degradation of the local dryland ecosystem by reducing the soil's ability to store seasonal rainfall,[47] increasing firewood extraction, and overgrazing in the other areas. As a result, hardship for local villagers who practice subsistence agriculture could increase as the availability of essential ecosystem resources, such as fodder, firewood, or herbs, could be reduced in the long-term.

[47] This effect could, however, be positive if the cleaning water for the mirrors were used also to water the shady areas underneath the mirrors.

9.2.5 Financial capital

9.2.5.1 Local content

Livelihood impact	**17**	*Economic participation and benefits for local SMEs*	Observed
Social change process		• *Change in employment, disposable income and financial spending* • *Change in economic profile and revenue characteristics of the region*	
Project stage		**Project activity / output**	
Planning		Agreement on local content	
Construction		Direct, indirect and induced employment opportunities	
Operation		Direct, indirect and induced employment opportunities	

Despite previously described complaints about the procedural aspects of the local recruitment and procurement processes (see impact 7 and 8), the majority of our interviewees generally welcomed MASEN's local content commitment. In view of the rather underdeveloped, small industry sector that does not contribute significantly to the regional economy in terms of added value and employment, the voluntary 30% local content target set for Noor$_o$ I was associated positively as means of fostering sustainable development. Specifically, interviewees hoped that sourcing local labor, goods, and services and integrating local SMEs into the project's value chain could pave the way for a more prosperous regional economy, sustainable livelihood opportunities, the development of local entrepreneurship, and the buy-in of local communities in the project (see also impact 5, 24 and 26).

The general perception was that MASEN's voluntary local content target – based on ANAPEC's assessment of the domestic supplier capabilities – and business linkages with the foreign project developers would promote a competitive local industry base for CSP (e.g., construction and supplying companies) and ensure added value to related economic sectors. The local SME focus group representatives expected to benefit even more from the next stages of the Noor$_o$ complex through continuously increased local content targets and investments in a regional cluster for capacity and skill development. As a result of this expectation, several small firms had taken out loans to develop commercially sustainable businesses, infrastructures, and capabilities that would enable them to contribute to the future development of other solar projects under the MoSP, including the operation phases.

Livelihood impact	**18**	*Economic exclusion of micro-scale SMEs*	Observed
Social change process		• *Change in employment, disposable income, and financial spending* • *Change in economic profile and revenue characteristics of the region* • *Marginalization of communities and social groups*	
Project stage		**Project activity / output**	
Planning		Agreement on local content	
Construction		Direct, indirect and induced employment opportunities	
Operation		Direct, indirect and induced employment opportunities; IFMEREE and university programs	

Although the voluntary local content target was generally perceived as beneficial, many micro-scale SMEs complained that their opportunities for employment and procurement during construction and operation were low due to their lack of capacities compared to foreign or higher skilled outside firms and workers.

Based on the interviews with local SME representatives, the following constraints to their involvement during the construction phase could be identified:

- Lacking the required skills and competencies to fulfill the local content target, even for low-level positions. For example, ANAPEC required a BAC+2 to work as a security officer, and most of the population could not meet this requirement. When a foreign firm involved in the project's construction hired steel workers from Skoura because of their more advanced skills instead of prioritizing workers from Ghassate, people from the rural Commune of Ghassate protested in front of the ANAPEC office (see also impact 9);
- Lacking the investment security to justify the acquisition of capital and equipment because of insufficient contract periods with foreign firms as well as the traditional risk aversion of small scale competitors;
- Lacking information on the recruitment and procurement requirements to access tendering processes and establish new business opportunities;
- Lacking the financial resources for up-front investment in new equipment and hiring additional workers to satisfy the demands of the project developers;
- Lacking the cash flow necessary to wait the stipulated three months for payments from the project developer.

Because larger local SMEs were less affected by these constraints and thus had a competitive advantage over smaller ones, the foreign project developers mainly subcontracted with already well-established large companies. As a high percentage of the goods, services, and workers used during the construction of $Noor_o$ I was provided by only a handful of large local SMEs, micro-scale enterprises felt excluded. Hence, the majority of the employment opportunities offered to local villagers and small SMEs were of low quality and short-term, preventing them from the skill development needed to contribute to the operational phase. The discontent among local SMEs could intensify during operation due to the limited amount of supplies and workers needed.

As a mitigation measure, SMEs recommended relocating part of the on-site construction camp and storage facilities to a designated area outside of the project site. This could save construction space on-site and avoid any unnecessary dismantling and rebuilding of the construction facilities for the future phases of the $Noor_o$ complex. Established outside of the project site, the infrastructure and facilities could then be used as either a permanent focal point for construction of the consecutive project phases, the maintenance of $Noor_o$, or even handed over to the adjacent communities for other uses.

9.2.5.2 Household prosperity and standard of living

Livelihood impact	**19**	*Improved socio-economic situation and standard of living*	Observed
Social change process		• *Change in employment, disposable income and financial spending* • *Change in access to healthcare*	
Project stage		**Project activity / output**	
Planning		Agreement on local content	
Construction		Direct, indirect and induced employment opportunities;	
Operation		Direct, indirect and induced employment opportunities	

Morocco has high unemployment, especially among youth, and only one family among four earns an annual income above the poverty threshold (HCP, 2012). Considering this, interviewees across all communities had high hopes for new income and employment opportunities from Noor$_o$ I to alleviate poverty and bring socio-economic development to the Ouarzazate region. Despite the shortcomings in job opportunities discussed above (see also impact 7), interviewees reported that employment payments stemming from Noor$_o$ I had already increased and diversified many community members' incomes and thereby improved their standard of living, e.g., by opening up the possibilities to: replace firewood with butane gas for cooking to prevent respiratory diseases, improve nutrition, and spend more money on healthcare. Community members from Ouarzazate and the rural Commune of Ghassate benefited from new income that enabled them to cope better with short-term economic shocks associated with seasonal agriculture, pastoralism, or social events (e.g., marriage, school enrollment, health payments).

Three main types of employment opportunities stemming from Noor$_o$ I were identified:

Direct employment opportunities (people employed by the project itself):

Under the local content encouragement set by MASEN, the project developers have steadily increased the number of local workers and SMEs hired for civil works during construction (see Figure 9-9). Noor$_o$ I has become the single largest employer in the region.

Situation in early September 2014	Number	%	Situation in the previous month	Evolution
Total employees	**1,851**	100%	1,726	+ 7.2%
Total Moroccan employees	**1,571**	85%	1,509	+ 4%
Total expatriates	**280**	25%	217	+ 30%
Local Employees				
Employees from Ouarzazate	**556**	30%	583	- 4%
Employees from Ghassate	**146**	8%	166	- 12%
Employees from the main Moroccan cities				
Employees from Tinghir	**118**	6.3%	113	+ 4.4%
Employees from Casablanca	**91**	5%	68	+ 34%
Employees from Zagora	**62**	3.5%	49	+ 26.5%
Employees from Mohammedia	**53**	2.8%	33	+ 60%
Employees from Kenitra	**31**	1.6%	27	+ 15%
Employees from El Jadida	**24**	1.3%	8	+ 200%
Employees from Errachidia	**21**	1.1%	16	+ 32%
Employees from Agadir	**20**	1%	20	+ 0%

Figure 9-9: Employment situation in September 2014
Source: ACWA Power Ouarzazate, Personal Interview, 2014.

In September 2014, 1,851 workers were employed in construction jobs, out of which 85% were Moroccan and almost 40% were local, reflecting the recruitment priorities given to local communities (ACWA Power Ouarzazate, Personal Interview, 2014) (seeFigure 9-10).

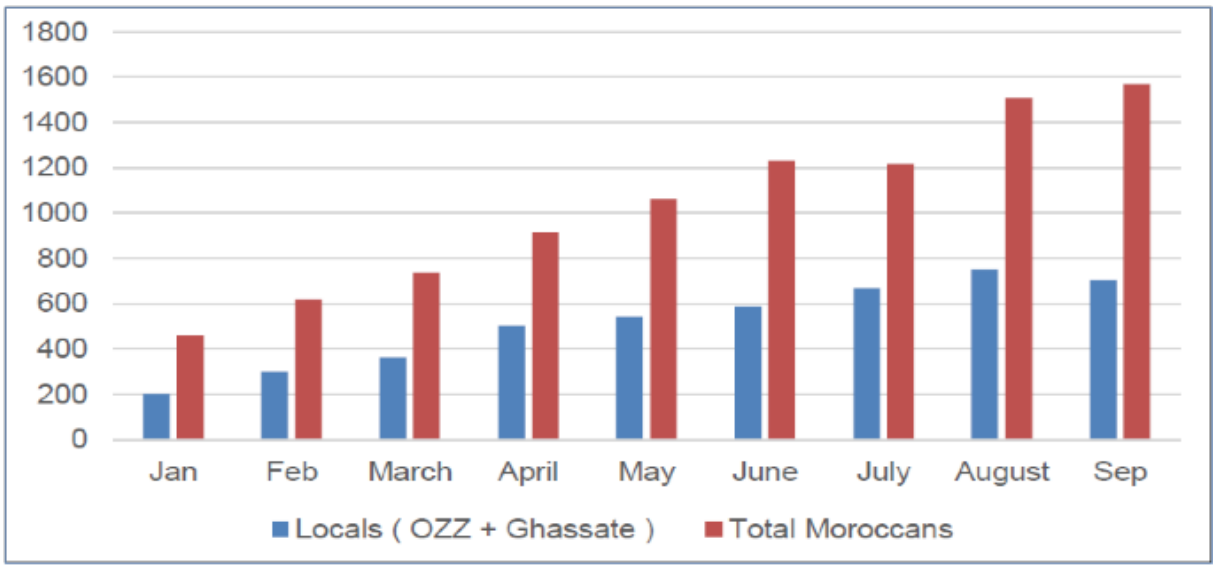


Figure 9-10: Local and total employment in September 2014
Source: ACWA Power Ouarzazate, Personal Interview, 2014.

During the first year, direct construction jobs were provided in three categories:

- *Groundwork*: Prior to construction, extensive groundwork was performed, including land leveling, back-filling and grading, building the access road, and constructing drainage pipes. These activities required heavy-duty construction vehicles and machinery, such as excavators, trucks, bulldozers, graders, and compactors. Additional security staff

members were required to guard the construction equipment, infrastructure, and solar facilities. According to an interview with *Equipment de Ouarzazate,* local firms increased their number of employees by 45% and provided almost 100% of all civic work supplies needed during the first construction year (Equipment de Ouarzazate, Personal Interview, 2014).

- *Installation and assembly*: Low-skilled construction workers, mechanical engineers, and technical advisors assembled all components of the CSP solar field and its associated infrastructure. The work included collector assembly and installation, as well as the construction of on-site buildings and other facilities. As most of this was basic construction work and not specific to CSP, local construction companies were qualified to do it. However, where the necessary skills were lacking, additional non-local workers were recruited from other parts of the country and Europe.
- *Implementation of SDP projects*: Additional construction jobs were created to implement SDP projects in the rural Commune of Ghassate (see also impact 10).

In contrast to the construction phase, the number of jobs created directly during operation will be relatively small, especially in comparison to the expected amount of revenue that will be generated. In this phase, the project developers will employ around 60 semi-to high-skilled engineers and workers to operate and maintain the plant(ACWA Power, 2013; 5 Capitals, 2012a:178).

Indirect employment opportunities (people contracted to supply materials, equipment, and services for the project):

While interviewees expected to gain direct employment opportunities, they also valued the indirect employment effects from local suppliers and distributors resulting from MASEN's local procurement policy.

During the first year of construction, local SMEs profited from Noor$_o$ I in two areas:

- *Raw material and basic equipment supply*: Local content provisions required the project developers to source raw materials and equipment for the solar field and its associated facilities locally where possible. This created further downstream production and employment through local inter-industry linkages. Local small and medium-sized companies delivered services like maintenance, security, industrial cleaning, and the required machinery for construction. However, according to an interview with *Equipment de Ouarzazate*, local firms could only provide basic construction materials such as stones, sand, or concrete. Steel and other high-value materials had to be imported from other parts of Morocco and overseas.
- *Manufacturing of components*: The project developers imported the high-tech components for the power block and the solar field from Europe and the United States. These components included the steam turbine, receivers, heat transfer fluid, steam generators, heat exchangers, and pumps (ACWA Power Ouarzazate, Personal Interview, 2014). According to participants of the SME focus group, Ouarzazate-based companies were also unable to manufacture some low-tech components, such as mirrors, steel frames, and pipes. Consequently, these were also imported from other parts of the country or from

abroad. All components were transported by heavy-load transport vehicles to the construction site, either from the ports of Casablanca or Nador through the Atlas Mountains or through Errachidia.

For the operational phase, local SMEs expected to benefit from the demand for ongoing maintenance, services, and materials. They hoped to profit from technology transfer and know-how from international companies to expand and diversify their local industry base, as well as to increase their future contributions in the field of medium- to high-tech supplies and services (see also impact 26).

*Induced employment opportunities (*people engaged in providing goods and services to meet the workers' needs*):*

Considering only direct and indirect employment might underestimate the true economic effects of $Noor_o$ I at the local level. Induced impacts resulting from employees' spending need to be taken into account. During the first year of construction, there was a slight increase in the demand for services like accommodations, transportation, and catering. While hoteliers and people providing transportation noticed minor increases in business, commercial traders, women from adjacent communities, and people working in the tourism sector - especially in Agdz – missed out. They were hoping to benefit from induced "multiplier effects" from project related services (e.g., accommodation, catering, cleaning, housing, transportation) for construction workers and increased spending on local commodities.

In the operational phase, induced jobs will potentially create more income and contribute more to poverty alleviation than direct and indirect employment. Interviewees in Ouarzazate hoped that students enrolled in the IFMEREE and the university programs would increase demand for housing and other goods. Community members from Ghassate and Agdz also hoped to profit from increased tourism.

Livelihood impact	**20**	*Deterioration of socio-economic situation and standard of living in adjacent communities*	Observed
Social change process		• *Change in land availability and accessibility* • *Change in availability of and accessibility to ecosystem resources and services* • *Change in employment, disposable income, and financial spending*	
Project stage		**Project activity / output**	
Planning		Agreement on LAP; Land transfer	
Construction		Restricted land access	
Operation		Throughout all project activities	

Despite these positive effects, people living nearby the power plant reported the loss of certain economic activities important to their livelihoods. They were directly impacted by losing access to land and therefore income, from the sale of firewood, fodder, building materials, and the grazing of goats, resulting in negative repercussions for womens' ability to meet household obligations. They were indirectly impacted because these resources met domestic needs. Land users stated that they now have to find additional sources of income to cover increased household spending for these commodities or have to travel to more distant areas to pursue their original livelihood activities. Decreased income, more spending, and less

time, coupled with higher prices for local commodities, left some rural households more vulnerable to economic shocks. Women especially reported disadvantages as their incomes highly depend on pastoralist activities. Furthermore, villagers from the douars of Izerki also complained that the frequently used footpath to Ouarzazate is now blocked by the physical barrier surrounding the project site, forcing them either to walk longer to reach Ouarzazate or to spend more money paying for private transportation. Additionally, interviewees from all communities reported cases in which people who had moved to urban areas for employment returned to their families hoping to find a better job during construction (see also impact 1). When they did not find a job, families had to cope without monthly remittances that provided roughly 50-60% of household income (Heidecke, 2009:24). Several interviewees who were hired during construction worried about the loss of income once construction was complete and their traditional subsistence activities had been lost due to the loss of the land.

9.2.5.3 Regional prosperity

Livelihood impact	**21**	*Increased regional prosperity and value added*	Observed
Social change process		• *Change in employment, disposable income, and financial spending* • *Change in economic profile and revenue characteristics of the region*	
Project stage		**Project activity / output**	
Planning		Project announcement	
Construction		Direct, indirect and induced employment opportunities	
Operation		Direct, indirect and induced employment opportunities, University programs and IFMEREE	

Despite the challenges discussed above, the majority of interviewees perceived Noor$_o$ as an important catalyst for development and increased regional prosperity. The preferential recruitment and procurement of local workers, suppliers, and distributors has already provided new employment and contractor opportunities and generated substantial employment and household income (see also impact 19). According to a number of interviews, this income was largely re-injected into the local economy, generating economic multiplier effects in four ways:

- Purchasing goods and services from local SMEs during the construction of Noor$_o$ I;
- Household spending by local workers (wages from direct, indirect, and induced jobs) on regional goods and services, which led to consumption-induced growth effects for local businesses (e.g., services, tourism, transportation etc.);
- Government investments in community infrastructure and rural services to foster rural development within regional development plans and the SDP;
- Direct capital investments from outside or foreign companies, e.g., the opening of district offices of national companies to localize part of their business activities.

In addition, interviewees expected indirect value-added contributions to the regional economy to come from income taxes to increase the budget of the Ouarzazate province. This expectation, however, will not be met as the main project developers – ACWA Power Ouarzazate, Acciona, TSK Electrónica y Electricidad or NOMAC - are commercially registered in

Rabat under a different jurisdiction and thus are not required to pay value-added taxes (V.A.T.) and royalty payments (e.g., a 30% V.A.T.) to the local communities (Interview with ACWA Power Ouarzazate).[48] While most of these multiplier-effects were associated with the construction phase, interviewees hoped positive effects would continue into the maintenance and operational phases due to the capacity building efforts related to the IFMEREE and the university programs (see also impact 24). With the region's increased visibility and attractiveness for investment, local SMEs were confident that the linkages between the regional economy and foreign project developers would grow further (see also impact 26). However, for this development to be achieved, local SMEs recommended even higher local content requirements and taking further steps in capacity building and skill development, technology transfer, and micro-lending in order to promote sustainable regional growth and develop mature industries in the field of CSP (see also impact 25).

9.2.5.4 Prices

Livelihood impact	**22**	*Erosion of local purchasing power and decreased standard of living among low-income groups*	Anticipated
Social change process		• *Influx of outsiders and foreigners* • *Change in employment, disposable income, and financial spending* • *Change in land availability and accessibility* • *Change in availability of and accessibility to ecosystem resources and services* • *Change in level of prices (goods and services)*	
Project stage		**Project activity / output**	
Planning			
Construction		Direct, indirect and induced employment opportunities; Restricted land access	
Operation		Throughout all project activities	

The downside of regional economic growth is that increased demand for products from migrant and local workers, students, and tourists could inflate prices for local consumers, including those not benefitting from the project. People with few employment skills and income opportunities, such as the unemployed, people working in agriculture, women, and the elderly, worried that the market prices for commercial and residential property (rented and owned) and important livelihood commodities could increase (see also impact 2). While higher local prices would benefit traders, property owners, and real estate agents, people from lower-income and other vulnerable groups were concerned about the erosion of their purchasing power and further economic marginalization. Increased prices for livelihood commodities and services with low price elasticity, such as staple food, healthcare, or other social services, could reduce the standard of living of poor community groups during both construction and operational phases. Additionally, participants in the focus group of farmers reported that prices of land adjacent to the project site had increased as people looked for new land for grazing and firewood collection. This made it more difficult for Izerki and Tidgheste citizens to pursue their former pastoral activities nearby. They stated that decreased supply of firewood and fodder would further strain the economic situation of the villagers (see also impact 20).

[48] However, it would be up to the National Treasury to decide on the further spending of the tax incomes.

9.2.6 Human capital

9.2.6.1 Public awareness

Livelihood impact	**23**	*Increased public interest in renewable energy systems and civil society engagement*	Observed
Social change process		• *Change in public awareness*	
Project stage		**Project activity / output**	
Planning		Project announcement	
Construction		Throughout all project activities	
Operation		Throughout all project activities	

Interviewees reported that public awareness of renewable energy and environmental problems, including climate change, had increased in the region since the king inaugurated the project. It also increased because of MASEN's numerous public consultation and outreach efforts, such as the youth camp in Ghassate Center for local students and teachers and regional conferences for the scientific community about renewable energy (see. 10)

Participants from the farmers' focus group emphasized their preference for renewable energy over traditional sources and reported increased interest in installing either small-scale solar heaters on their rooftops or solar PV irrigation systems. Participants from the youth focus group reported an increased interest in careers in renewable energy as a result of the project and the existing and planned opportunities for skill development and capacity building at the University of Ouarzazate and the IFMEREE. As a result of this increased interest, local associations already included elements of awareness raising about renewable energies in their organizational profile and expected to further increase their activities not only in renewable energy but also in human development and civil society empowerment[49].

9.2.6.2 Skill development

Livelihood impact	**24**	*Benefits from skill development and knowledge transfer particularly among youth*	Anticipated
Social change process		• *Change in local absorptive capacities* • *Change in local knowledge and competencies*	
Project stage		**Project activity / output**	
Planning		Project announcement	
Construction		Direct, indirect and induced employment opportunities	
Operation		Direct, indirect and induced employment opportunities, University programs and IFMEREE	

While much has been said about the voluntary local content target set for Noor$_o$ I as an important pathway to regional prosperity (see also impact 21), sustaining long-term socio-economic benefits significantly depends on the absorptive capacities of Ouarzazate's econ-

[49] The Human Touch, a new development NGO focusing on solidarity, communication and cooperation for the benefit of women, youth and human development, was formed by Ouarzazati researchers after being involved in this project ("SocialCSP").

omy. As the region lacks a strong industrial base, MASEN has made substantial efforts to address the limited local absorptive capacities (see also impact 18) by coupling its local procurement and recruitment policies for the entire $Noor_o$ project with additional measures.

Interviewees perceived MASEN's efforts in the field of local capacity building, skill development, and R&D as a means of increasing the competitiveness and productivity of the local industry. This would occur through technology transfer and sustainable employment opportunities for local suppliers and workers throughout the project's value chain. They especially supported two initiatives to mitigate the risk of "crowding out" local stakeholders:

- The planned vocational training center (IFMEREE) to boost the training and education of workers in the field of CSP and
- The University of Ouarzazate's plan to introduce new courses on renewable energy (up to the Master's level) and develop local research capacities;

Additionally, interviewees hoped to benefit from knowledge exchange and skill transfer through the establishment of long-term relationships among local SMEs, international/outside companies, the local university, and the planned IFMEREE. Together the cluster of these actors was associated with great opportunities to improve local capabilities and equip local people to meet the labor requirements for implementing and operating CSP technologies. Interviewees perceived foreign firms as vehicles for contributing to industrial development by transferring skills, technology, and operational experience required for local SMEs' long-term involvement in renewable energy technologies. People expected that the procurement contracts between international/outside and local companies would be twinned with commitments to support apprenticeships and other on-site training opportunities to increase the upward mobility of local suppliers, workers, and university students.

While it is too early to assess the outcomes of MASEN's efforts to increase the local absorptive capacity, partnerships between local and international construction companies (see also impact 26) and workshops offered by MASEN to teach youth about entrepreneurship improved local peoples' confidence in their economic participation in the field of low-to-medium-end technology components and services throughout the next stages of $Noor_o$. ACWA Power Ouarzazate already signed a partnership agreement with the University of Ouarzazate to offer internships, award best university graduates, and provide field visits to students (ACWA Power Ouarzazate, Personal Interview, 2014). In fall 2014, ACWA Power Ouarzazate offered training to 24 Ghassate villagers in welding in partnership with OFPPT and the rural Commune of Ghassate (ACWA Power Ouarzazate, Personal Interview, 2014) (see also impact 10).

Although not directly related to $Noor_o$ I, there is a joint R&D program focusing on CSP among ACWA Power, the Saudi King Abdullah University of Science & Technology (KAUST), and the *Université Internationale de Rabat* (UIR). ACWA Power is also funding Moroccan high school graduates to attend the solar program at the Higher Institute for Water and Power Technologies (HIWPT) in Rabigh, Saudi Arabia.

Livelihood impact	**25**	*Mismatch between educational qualifications and labor market requirements*	Observed
Social change process		• *Change in local absorptive capacities* • *Change in local knowledge, skills, and competencies*	
Project stage		**Project activity / output**	
Planning		Agreement on local content	
Construction		Direct, indirect and induced employment opportunities	
Operation		Direct, indirect and induced employment opportunities, University programs and IFMEREE	

Despite MASEN's efforts to promote capacity building and skill development, many young people noted a mismatch between the training currently offered by local educational institutions and the requirements to work at Noor$_o$ I. The University of Ouarzazate's bachelor degree in renewable energy has gained popularity since the launch of Noor$_o$ I in 2013, and it received 600 applications for 100 places. However, none of the graduates found a job that matched his/her qualifications during Noor$_o$ I's construction phase. Young people were disappointed and frustrated to learn that they were not qualified for medium to high-skilled employment at Noor$_o$ I. Participants in the youth focus group criticized the bachelor program for being too general, too theoretical, and insufficiently focused on CSP. University officials echoed this criticism, noting that insufficient feedback loops among industry, government, and academia left professors unaware of how to match the curriculum to the solar labor market requirements. If inadequately addressed in particular by the Ministry of Education, these concerns could weaken the support for the project among young people. Interviewees worried that dissatisfaction could increase because of the expectations of the early graduates coming from IFMEREE and the university programs for jobs.

9.2.6.3 Technology and knowledge transfer

Livelihood impact	**26**	*Strengthened technological capacity of local firms*	Anticipated
Social change process		• *Change in local absorptive capacities* • *Diffusion and adoption of new technology*	
Project stage		**Project activity / output**	
Planning			
Construction		Direct, indirect and induced employment opportunities	
Operation		Direct, indirect and induced employment opportunities	

In addition to improving local absorptive capacity for CSP technology effectively through measures of capacity building and skill development (see impact 24), representatives of local SMEs identified the transfer of new technologies as a prerequisite for Noor$_o$ I to deliver long-term employment opportunities and promote lasting socio-economic benefits in the region (see also impact 21). Many SME representatives doubted that technology transfer would be distributed equally among local firms and that new technologies would generate significant spillover effects due to the limited absorptive capacities of small SMEs (see also impact 18). However, the majority of local SMEs also had high hopes that foreign companies would

share their knowledge and technology with the local industry. As a result and despite the fact that real evidence of technology cooperation in regards to $Noor_o$ I is yet to be seen, some local construction companies have already developed partnerships with foreign companies to increase their knowledge of and access to the technologies used in $Noor_o$ I. They aim to build a competitive local supply chain industry at the size and quality necessary to satisfy construction and operation demands for the $Noor_o$ complex.

9.2.6.4 Working conditions

Livelihood impact	**27**	*Unequal and poor labour conditions*	Observed
Social change process		• *Change in employment, disposable income, and financial spending* • *Change in working conditions*	
Project stage		**Project activity / output**	
Planning			
Construction		Set-up of power plant facilities and site preparation	
Operation			

SME representative:

"At the beginning all construction workers wanted to work there. However, half of them returned because the working conditions for building houses in the city of Ouarzazate were much better."

Although this study did not directly collect data on the on-site working conditions, several interviewees mentioned shortcomings at the project site. The issues raised by the interviewed workers can be summarized as follows:

- *Unequal pay for work of equal value*: Most local workers reported that the wages (70-150 MAD for approximately 9 hours) were adequate to cover their living costs, yet many expressed discontent with the wages paid by different contractors for similar work. Local firms paid their workers less than the local average and significantly less than what foreign companies paid for the same kind of work.
- *Inconsistent contract periods*: Local workers also expressed dissatisfaction with their short-term, temporary contracts (3 months), because they believed that other workers with the same qualifications were hired for a longer time period (2 years).
- *Unequal employment benefits*: Local workers were also dissatisfied that foreign companies provided health insurance and retirement benefits while local firms did not.
- *Long and hard working hours*: A few local workers raised concerns about long working hours, while others reported working eight-hour days. Some people also complained about high dust emissions and risk of heat stroke.
- *Insufficient commuting infrastructure*: While the project developers arranged buses for workers coming from Ouarzazate, people from the rural Commune of Ghassate had to arrange and pay for their own transportation, resulting in additional expenses, people walking for up to three hours each way to work, and illegal means of transport.

9.2.6.5 Health

Livelihood impact	**28**	*Influence of noise, dust, and vibration on psychological well-being*	Observed
Social change process		• *Change in air quality, noise levels, and production of waste* • *Change in water availability and accessibility*	
Project stage		**Project activity / output**	
Planning			
Construction		Set-up of power plant facilities and site preparation; Treatment and disposal of solid and hazardous waste	
Operation		Treatment and disposal of solid and hazardous waste; Waste water discharge, Water withdrawal from the Mansour Eddahbi reservoir; Process heat and air emissions	

People from the douars of Izerki and Tidgheste reported psychological distress stemming from increased dust, noise, and vibrations due to earth removal and exhaust from construction vehicles or mechanical equipment, yet physical effects on the health of adjacent communities were not observed.

Livelihood impact	**29**	*Environmental pollution*	Anticipated
Social change process		• *Change in air quality, noise levels and production of waste* • *Change in water availability and accessibility*	
Project stage		**Project activity / output**	
Planning			
Construction		Set-up of power plant facilities and site preparation; Treatment and disposal of solid and hazardous waste	
Operation		Treatment and disposal of solid and hazardous waste; Waste water discharge, Water withdrawal from the Mansour Eddahbi reservoir; Process heat and air emissions	

Local villagers expressed concerns about possible health impacts resulting from pollution or contamination of local air, water, and land resources, and increased mirror reflections during the construction and operation of the power plant. People in the rural Commune of Ghassate were concerned about the health effects of discharges of cooling and cleaning water, as well as hazardous spills potentially contaminating water in local streams, wadis, storm water drainage canals or wells. People from downstream oases worried that reduced water levels in the Mansour Edahbbi reservoir from Noor$_o$ could affect water quality in the reservoir and its downstream river (see also impact 15). This could lead to water-borne illnesses caused by bacteria, algae blooms, or eutrophication. Furthermore, villagers from adjacent communities were concerned that plumes of steam and air emissions (e.g., SO_x, NO_x, CO, CO_2, O_3, and PM10) from the cooling towers could become problematic under certain temperature and humidity conditions during operation (5 Capitals, 2012a:23). Lastly, citizens from Ouarzazate city and the rural Commune of Ghassate perceived the in-migration of foreigners and outsiders as a health risk and raised concerns about an increase in sexually transmitted diseases.

9.2.6.6 Safety

Livelihood impact	**30**	*Increased crime and fatal road accidents*	Anticipated
Social change process		• *Influx of outsiders and foreigners* • *Change in community safety*	
Project stage		**Project activity / output**	
Planning			
Construction		Direct, indirect and induced employment opportunities; Transportation and traffic	
Operation		Direct, indirect and induced employment opportunities; Transportation and traffic; IFMEREE and university programs	

The interviewees were concerned about increased crime rates and traffic. In Ouarzazate and Agdz, people worried about higher crime rates from drug and alcohol abuse among outside and/or foreign workers and students (see also impact 2 and 4). Similarly, people complained that the new road in Tasselmant – which the SESIA study identified as a generally positive impact (5 Capitals, 2012a:186) – allowed unwanted visitors ("drunk and homeless") to enter the village. Therefore, villagers worried about issues with drugs and alcohol related to the in-migration of non-locals.

Another safety issue interviewees raised was that increased traffic to the project site could put communities situated along the main roads at risk. Without a bypass road around Ouarzazate and Idelsane to the project site, people were concerned about an increase in fatal road accidents, especially involving children and people walking along rural roads with insufficient street lighting at night. They viewed this risk as exacerbated by upgraded roads, such as the planned highway between Ouarzazate and Skoura or an improved road infrastructure in the rural Commune of Ghassate to accommodate heavy construction vehicles.

10 Field research II: impact significance

"*The evaluation of significance is subjective, contingent upon values, and dependent upon the environmental and community context. Often scientists evaluate significance differently. The intrusion of wider public concerns and social values is inescapable and contentions will remain even with well-defined criteria and a structured approach*" (Sadler,1996: 121).

This quote highlights the need to include a variety of perspectives when determining impact significance. Although this need has been widely recognized within the EIA and SIA literature, to date very few efforts have been made to allow the affected stakeholders to communicate their concerns, views, and values to determine the significance of impacts. This study aims to address this shortcoming by integrating multiple perspectives by a) determining significance in a participatory process with different local stakeholder groups (participatory approach) that is presented in section 10.1 and b) asking experts from different fields to evaluate the impacts from their perspectives (technical approach) that are presented in section 10.2. Both sections present the empirical results from the second field research in Ouarzazate (from October 27 to November 21, 2014)

10.1 Results of the participatory approach: local stakeholder focus groups

The findings from the focus group workshops on the impact significance are presented below. Significance is defined as the product of 1) the degree to which an impact affects the community (level of affectedness) and 2) the importance of associated social, cultural, economic, or natural values that the community evaluates (level of importance). Local stakeholders assessed both factors by using preference ranking and rating methods which are described in more detail below. Importance in this study is understood as a value judgment, dependent upon the value society places on a particular value. Here, to determine the importance, affected values were ranked. The stakeholders assess their affectedness by using a rating, which is a subjective perception of how much they anticipate and will be affected, not a quantitative prediction. Table 10–1 overviews the evaluated livelihood impacts and associated values. Below, the overall results are presented, followed by a detailed analysis of the results from each stakeholder group. The data is further analyzed to evaluate the differences in importance and affectedness among the four communities – Ouarzazate, Ghassate, Agdz, and Idelsane / Skoura.

	Values	Livelihood impacts
1	Family and social support	Strengthened family ties and social support
2	Preservation of social standing and political influence	Loss of social standing and political influence
3	Local and regional reputation	Intensified local pride and gains for regional reputation
4	Preservation of community atmosphere and cultural identity	Accelerated change in community atmosphere and cultural identity
5	Inclusion of marginalized communities and social groups	Preferential treatment of local communities and socio-economic inclusion of women
6	Social peace and community cohesion	Social conflict, rivalry, and feelings of envy
7	Provision of transparent and comprehensive information	Uncertainty, unrealistic expectations, and frustration
8	Community engagement and participation in decision-making processes	Social exclusion and powerlessness in decision-making
9	Trust in project developers and addressing community concerns	Suspicion towards the project, its developers and community protest
10	Improvement of living conditions in adjacent communities	Improved living conditions in adjacent communities
11	Regional socio-economic and infrastructure development	Spurred regional socio-economic and infrastructure development
12	Availability and affordability of regional infrastructure and services	Strain on regional infrastructure and services
13	Preservation of land as a culturally important resource	Decreased psychological well-being and loss of cultural attachment in adjacent communities
14	Maintain sufficient water supply in Tasselmant	Decreased water security in the community of Tasselmant
15	Water security in the Draa Valley	Deprivation of farming livelihoods in Ouarzazate and cascading effects in the downstream oases of the Draa Valley
16	Preservation of biodiversity in adjacent communities	Deprivation of subsistence activities in adjacent communities
17	Economic participation of SMEs	Economic participation and benefits for local SMEs
18	Economic participation of micro-scale SMEs	Economic exclusion of micro-scale SMEs
19	Poverty alleviation, income generation, health care and improved standard of living	Improved socio-economic situation and standard of living
20	Preservation of subsistence farming activities in adjacent villages	Deteriorated socio-economic situation and standard of living in adjacent communities
21	Regional prosperity and value added	Increased regional prosperity and value added
22	Price stability of local commodities	Erosion of local purchasing power and decreased standard of living among low-income groups
23	Public interest in renewable energy	Increased public interest in renewable energy systems and civil society engagement
24	Skill development and knowledge transfer (particularly among youth)	Benefits from skill development and knowledge transfer particularly among youth
25	Educational qualifications	Mismatch between educational qualifications and labor market requirements
26	Technology transfer to local firms	Strengthened technological capacity of local firms
27	Fair and equal labor conditions	Poor and unequal labor conditions
28	Tranquil environment and quiet surroundings	Influence of noise, dust and vibration on psychological well-being
29	Clean and unpolluted environment (land, water resources)	Environmental pollution
30	Road and public safety	Increased crime and fatal road accidents

Table 10–1: Overview of livelihood impacts and associated values

10.1.1 Overview of results for all participants

In this study, 106 local stakeholders participated in 20 focus groups to evaluate the importance of a list of environmental, societal, and socio-economic values that the development stages of $Noor_o$ I could impact and the level of affectedness by the respective livelihood impacts. During the focus groups, each participant initially ranked the values and rated the impacts and then the results were discussed with the group. For analyzing rankings of values, the ranking results were afterward transformed into rating scores. The value ranked as most important on rank "1st" was assigned a score of "10", the item ranked second was assigned a score of "9" and so on (1=10th; 2=9th; 3=8th; 4=7th; 5=6th; 6=5th; 7=4th; 8=3rd; 9=2nd and 10=1st). It is important to account for the non-responses, as in nearly all groups the list included more values than distributable ranks; therefore, items omitted in the ranking were scored with a zero. The number of ranks was limited to 10 in order to keep the ranking exercise simple. After the transformation, the mean importance scores were calculated for each of the 20 stakeholder groups, across stakeholder groups for the four communities and for the overall sample. For the overall assessment the mean scores were grouped into low (scores < 4), medium (scores ranging between 4 – 5.9) and high (scores ≥ 6) importance, and are presented in tables below for evaluating the importance. This explains why the analysis of importance is expressed in rating scores even though participants of stakeholder groups ranked the importance of values. The data from the livelihood impact rating was analyzed with a similar approach. The average ratings were used to compare the affectedness of the different groups by the different livelihood impacts and to determine the level of effect on the stakeholders. The average ratings provide important summaries, indicating the most serious impacts from the viewpoint of the local stakeholders. Since it was assumed that not all impacts were applicable to all groups, each stakeholder group was assigned a limited number of impacts by which they were/are/would be affected or which they were best qualified to evaluate. The research team selected the impacts for each group, based both on logical considerations and the results from the first research trip. By comparing across focus groups, the researchers could see how many people found the collected data to be significant (frequency) and the variability in rating scores across group members. An overview of frequencies and average ratings across the focus groups is provided in Table 10–2 and Table 10–3.

Table 10–2 illustrates the absolute and relative frequencies of the importance rankings of livelihood assets in terms of low, medium, and high importance and the average rating across the population (n). Table 10–3 summarizes the absolute and relative frequencies of the level of affectedness (not affected (0), low (<1.5), medium (1.5-2.4) and high (≤ 2.5)) for the different livelihood impacts and the average (i.e., mean) affectedness scores across all focus groups (see chapter 5). In addition, the first columns of both tables provide information about how many participants were asked to evaluate each value / impact, as an absolute number and as a percentage of the population.

		Importance Ranking Frequency Distribution (n=106)								
		Evaluation by		Low		Medium		High		Average Rating
		n=	% of sample	Absolute frequency	Relative frequency	Absolute frequency	Relative frequency	Absolute frequency	Relative frequency	10 (high) to 0 (low)
	Values									
1	Family and social support	23	22%	5	22%	2	9%	16	70%	7.3
2	Preservation of social standing and political influence	38	36%	28	74%	4	11%	6	16%	2.2
3	Local and regional reputation	100	94%	57	57%	13	13%	30	30%	3.7
4	Preservation of community atmosphere and cultural identity	85	80%	34	40%	18	21%	33	39%	4.8
5	Inclusion of marginalized communities and social groups	71	67%	17	24%	29	41%	25	35%	5.4
6	Social peace and community cohesion	102	96%	29	28%	20	20%	53	52%	5.7
7	Provision of transparent and comprehensive information	106	100%	58	55%	34	32%	14	13%	3.2
8	Community engagement and participation in decision-making processes	100	94%	37	37%	30	30%	33	33%	4.7
9	Trust in project developers and adressing community concerns	99	93%	63	64%	23	23%	13	13%	2.7
10	Improvement of living conditions in adjacent communities	28	26%	9	32%	5	18%	14	50%	5.6
11	Regional socio-economic and infrastructure development	15	14%	7	47%	4	27%	4	27%	4.3
12	Availability and affordability of regional infrastructure and services	32	30%	26	81%	1	3%	5	16%	1.8
13	Preservation of land as a culturally important resource	23	22%	7	30%	7	30%	9	39%	5.1
14	Maintain sufficient water supply in Tasselmant	17	16%	10	59%	3	18%	4	24%	3.5
15	Water security in the Draa Valley	25	24%	4	16%	3	12%	18	72%	7.7
16	Preservation of biodiversity in adjacent communities	17	16%	17	100%	0	0%	0	0%	0.1
17	Economic participation of SMEs	4	4%	3	75%	0	0%	1	25%	3.8
18	Economic participation of micro-scale SMEs	4	4%	2	50%	0	0%	2	50%	5.0
19	Poverty alleviation, income generation, health care and improved standard of living	95	90%	18	19%	17	18%	60	63%	6.6
20	Preservation of subsistence farming activities in adjacent villages	22	21%	15	68%	3	14%	4	18%	2.8
21	Regional prosperity and value added	49	46%	27	55%	12	24%	10	20%	3.2

22	Price stability of local commodities	73	69%	42	58%	19	26%	12	16%	3.0
23	Public interest in renewable energy	100	94%	65	65%	19	19%	16	16%	2.8
24	Skill development and knowledge transfer (particularly among youth)	33	31%	10	30%	11	33%	12	36%	5.1
25	Educational qualifications	38	36%	13	34%	12	32%	13	34%	5.1
26	Technology transfer to local firms	4	4%	3	75%	0	0%	1	25%	2.5
27	Fair and equal labor conditions	16	15%	6	38%	7	44%	3	19%	4.1
28	Tranquil environment and quiet surroundings	17	16%	17	100%	0	0%	0	0%	0.0
29	Clean and unpolluted environment (land, water resources)	36	34%	19	53%	7	19%	10	28%	3.5
30	Road and public safety	54	51%	42	78%	9	17%	3	6%	1.9

Level of importance

High
Medium
Low

Table 10–2: Overview of stakeholder value assessment frequency and average

		Affectedness Rating Frequency Distribution (n=106)										
		Evaluation by		Not affected		Low (1)		Medium (2)		High (3)		Average Rating
		n=	% of sample	Absolute frequency	Relative frequency	Absolute frequency	Relative frequency	Absolute frequency	Relative frequency	Absolute frequency	Relative frequency	1 (low) to 3 (high)
	Livelihood impacts											
1	Strengthened family ties and social support	23	22%	10	43%	6	26%	5	22%	2	9%	**1.0**
3	Intensified local pride and gains for regional reputation	100	94%	5	5%	12	12%	24	24%	59	59%	**2.4**
5	Preferential treatment of local communities and socio-economic inclusion of women	71	67%	14	20%	19	27%	22	31%	9	13%	**1.4**
10	Improved living conditions in adjacent communities	28	26%	5	18%	9	32%	9	32%	5	18%	**1.5**
11	Regional socio-economic and infrastructure development	15	14%	7	47%	1	7%	5	33%	2	13%	**1.1**
17	Economic participation and benefits for local SMEs	4	4%	3	75%	1	25%	0	0%	0	0%	**0.3**
19	Improved socio-economic situation and standard of living	95	90%	21	22%	21	22%	43	45%	10	11%	**1.4**
21	Increased regional prosperity and value added	49	46%	3	6%	15	31%	19	39%	12	24%	**1.8**
23	Increased public interest in renewable energy systems and civil society engagement	100	94%	12	12%	29	29%	35	35%	24	24%	**1.7**
24	Benefits from skill development and knowledge transfer particularly among youth	33	31%	9	27%	7	21%	13	39%	4	12%	**1.4**
26	Strengthened technological capacity of local firms	4	4%	3	75%	0	0%	1	25%	0	0%	**0.5**

Rating by high percentage of the sample desirable (Positive)

- over 50%
- over 33%
- over 25%

Rating by high percentage of the sample not desirable (Negative)

- over 50%
- over 33%
- over 25%

	Livelihood impacts											
2	Loss of social standing and political influence	38	36%	25	66%	2	5%	3	8%	8	21%	**0.8**
4	Accelerated change in community atmosphere and cultural identity	85	80%	39	46%	19	22%	19	22%	8	9%	**1.0**
6	Social conflict, rivalry and feelings of envy	102	96%	35	34%	18	18%	25	25%	24	24%	**1.4**

7	Uncertainty, unrealistic expectations and frustration	106	100%	27	25%	19	18%	22	21%	38	36%	**1.7**
8	Social exclusion and powerlessness in decision-making	100	94%	27	27%	20	20%	19	19%	34	34%	**1.6**
9	Suspicion towards the project, its developers and community protest	100	94%	55	55%	18	18%	15	15%	12	12%	**0.8**
12	Strain on regional infrastructure and services	32	30%	9	28%	6	19%	9	28%	8	25%	**1.5**
13	Decreased psychological well-being and loss of cultural attachment in adjacent communities	23	22%	7	30%	9	39%	6	26%	1	4%	**1.0**
14	Decreased water security in the community of Tasselmant	17	16%	11	65%	1	6%	3	18%	2	12%	**0.8**
15	Deprivation of farming livelihoods in Ouarzazate and cascading effects in the downstream oases of the Draa Valley	25	24%	6	24%	5	20%	3	12%	11	44%	**1.8**
16	Deprivation of subsistence activities in adjacent communities	17	16%	6	35%	2	12%	5	29%	4	24%	**1.4**
18	Economic exclusion of micro-scale SMEs	4	4%	0	0%	0	0%	3	75%	1	25%	**2.3**
20	Deteriorated socio-economic situation and standard of living in adjacent communities	22	21%	12	55%	6	27%	3	14%	1	5%	**0.7**
22	Erosion of local purchasing power and decreased standard of living among low-income groups	73	69%	39	53%	17	23%	12	16%	5	7%	**0.8**
25	Mismatch between educational qualifications and labor market requirements	38	36%	10	26%	5	13%	14	37%	9	24%	**1.6**
27	Poor and unequal labor conditions	16	15%	6	38%	0	0%	3	19%	7	44%	**1.7**
28	Influence of noise, dust and vibration on psychological well-being	17	16%	6	35%	2	12%	2	12%	7	41%	**1.6**
29	Environmental pollution	36	34%	21	58%	4	11%	7	19%	4	11%	**0.8**
30	Increased crime and fatal road accidents	54	51%	32	59%	9	17%	6	11%	7	13%	**0.8**

Rating by high percentage of the sample desirable (Positive)

over 50%

over 33 %

over 25%

Rating by high percentage of the sample not desirable (Negative)

over 50%

over 33 %

over 25%

Table 10–3: Overview affectedness rating frequency distribution and average

In this study the final significance of impacts was determined as a product of the level of affectedness by an impact and the level of importance of the values of the affected communities. To combine the results of these two assessments to determine the overall significance level, the data were grouped and analyzed in a matrix. This is a common approach to operationalize a theoretical concept like significance (see section 5.4.2). Usually more than one solution exists to combine and classify different indicators. Table 10–4 explains the rationale behind the assignment of significance values. For each combination of "Importance" and "Affectedness," a significance level was specified. Impacts with high importance and a high level of affectedness were classified as being of very high significance, while impacts with a high significance were either assessed to have high importance and a medium impact level or to have medium importance but a high impact level. Impacts with moderate significance were either assessed as having a medium level of affectedness and a medium level of importance or as having a high level of affectedness but a lower level of importance. Impacts with low importance and medium effects or with low effects and medium importance were assessed to be of low significance. Furthermore, impacts with low effects that were associated with values of high importance were also assessed to have low significance, because if an impact has zero to low effects it cannot be classified as significant. Finally, impacts were assessed to have only very low significance if they were of low importance and had only low effects according to the local stakeholders.

		Level of importance		
		low (< 4)	**medium** (4-5.9)	**high** (≥ 6)
Level of affectedness	**low** (< 1.5)	very low	low	low
	medium (1.5-2.4)	low	moderate	high
	high (> 2.4)	moderate	high	very high

Table 10–4: Matrix approach to determine impact significance

The data summarized in Table 10–2 clearly indicates that the values 1 "Family and social support," 15 "Water security in the Draa Valley," and 19 "Poverty alleviation, income generation, health care, and improved standard of living" on average were ranked as most important, which is visible according to the average rating scores to which the participant's raking has finally been transformed. While values 1 and 15 were ranked by about a quarter of the stakeholders, value 19 was ranked by 90% of the focus group participants, highlighting its overall importance to the entire group of local stakeholders. Also evaluated by a large percentage of the group of local stakeholders and ranked by over 60% as being of medium or high importance are the values 4 "Preservation of community atmosphere and cultural identity" (60%), 5 "Inclusion of marginalized communities and social groups" (76%) and 6 "Social peace and community cohesion" (72%). Besides 15 "Water security in the Draa Valley" being an environmental value, all the other highly ranked values are societal values. While the financial values represented by 19 "poverty alleviation, income generation, and health care" usually can be quantified, other values like family support, social inclusion,

social peace, community atmosphere, and cultural identity are more difficult to quantify and are therefore often neglected in impact assessments. The high importance ranking of these values by stakeholders from the affected communities illustrates the need to consider such aspects when evaluating the social sustainability of large-scale infrastructure developments.

Values that local stakeholders ranked as having very low importance included 12 “Availability and affordability of regional infrastructure and services”, 16 “Preservation of biodiversity in adjacent communities”, 28 “Tranquil environment and quiet surroundings,” and 30 “Road and public safety”. Especially clear was the result for value 16 “Preservation of biodiversity in adjacent communities” and 28 “Tranquil environment and quiet surroundings” for which 100% of the stakeholders that were asked to rank these values ranked them as being of low importance. In contrast, the results for the values 17 “Economic participation of SMEs”, 18 “Economic participation of micro-scale SMEs,” and 26 “Technology transfer to local firms” were inconsistent. This is because only 4% of the stakeholders evaluated these impacts, namely the SME focus group, which demonstrated a high variability of opinions among participants.

Following the ranking of the importance of values, the second step in the evaluation process was to determine the level of affectedness by the different impacts. In Table 10–3, it is important to distinguish between positive and negative impacts, because high affectedness by a positive impact is desirable while the opposite holds true for negative impacts.

The impact rated as having the highest affect by far, affecting 95% of stakeholders who evaluated it, is 3 “Intensified local pride and gains for regional reputation”. Fifty-nine percent of these stakeholders rated the level of affectedness by this impact as high. Some positive impacts had only a low impact or did not affect the relevant stakeholders including 1 “Strengthened family ties and social support”, 11 “Spurred regional socio-economic and infrastructure development”, 17 “Economic participation and benefits for local SMEs” and 26 “Strengthened technological capacity of local firms”. Most stakeholders expected that they would not be affected by most positive livelihood impacts.

Similarly, most stakeholders expected they would not be strongly affected by most negative impacts. The five impacts stakeholders rated as having medium to high affectedness (i.e., over 50% of the stakeholders) included 7 “Uncertainty, unrealistic expectations and frustration”, 8 ”Social exclusion and powerlessness in decision-making”, 15 “Deprivation of farming livelihoods in Ouarzazate and cascading effects in the downstream oases of the Draa Valley”, 25 ”Mismatch between educational qualifications and labor market requirements”, 27 ”Poor and unequal labor conditions” and 28 “Influence of noise, dust, and vibration on psychological well-being”. The negative impact stakeholders rated as having the highest affect was 18 “Economic exclusion of micro-scale SMEs”, but only the SME focus group rated this impact, so it is not representative of the entire sample. By comparison, 57% of stakeholders rated impact 7 “Uncertainty, unrealistic expectations and frustration” as being of medium to high affectedness and 53% rated impact 8 ”Social exclusion and powerlessness in decision-making” of medium-high affectedness. All stakeholders evaluated impact 7, and 94% of the stakeholders evaluated impact 8 indicating affectedness experienced across stakeholder groups. Impact 9 “Suspicion towards the project, its developers and community protest” was also evaluated by 94% of the participants but was perceived to be of no effect (55%) or only

of low effect (18%), while only a small group (12%) expected to be highly affected by this impact.

To determine the overall significance of the identified impacts, the correlation between the value importance scores – based on participant's rankings - and the livelihood impact affectedness rating needs to be assessed, because impacts will only be perceived as significant if stakeholders assign importance to affected values (see chapter 5). Accordingly, the impact significance is shown in Figure 10-1 as the correlation of the importance rating scores (level of importance) – based on participant's importance rankings - and the ratings of affectedness (level of affectedness). The results indicate that for the entire population n, the most significant impacts are 8 "Social exclusion and powerlessness in decision-making" and impact 15 "Deprivation of farming livelihoods in Ouarzazate and cascading effects in the downstream oases of the Draa Valley". On average, based on the former importance and affectedness assessment, impact 15 was found to be of high importance with medium impact and Impact 8 was found to be of medium importance with high impact. The high significance level of impact 8 confirms the findings from the impact identification analysis (chapter 9) that stakeholders perceived the information management and the ability to participate in the consultation process for Noor$_o$ I as insufficient. While this is a significant impact it is also one that could be mitigated in future projects by improving the dialogue, and providing better opportunities for local stakeholders to participate in meaningful ways.

Other impacts that were found to be of high significance include 10 "Improved living conditions in adjacent communities", 19 "Improved socio-economic situation and standard of living", 25 "Mismatch between educational qualifications and labor market requirements" and 27 "Poor and unequal labor conditions". Impact 18 "Economic exclusion of micro-scale SMEs," which was found on average to be of medium importance according to the associated value but with high effects, was only evaluated by the SMEs stakeholder group and is therefore very significant for this group but cannot be categorized as being significant across stakeholder groups and communities. The results show that impacts connected to the economic development and the improvement of the current living conditions, including improved educational levels and employment opportunities, are of high significance. In contrast, impacts that have the opposite effect of exclusion from economic development and decision-making processes and unequal working conditions also have a high significance.

Impacts with low significance are those with values rated of low importance and the affectedness rated as also low. These include: 2 "Loss of social standing and political influence", 9 "Suspicion towards the project, its developers and community protest", 20 "Deteriorated Socio-economic situation and standard of living in adjacent communities", 22 "Erosion of local purchasing power and decreased standard of living among low-income groups", 26 "Strengthened technological capacity of local firms" and 30 "Increased crime and fatal road accidents" (see Figure 10-1).

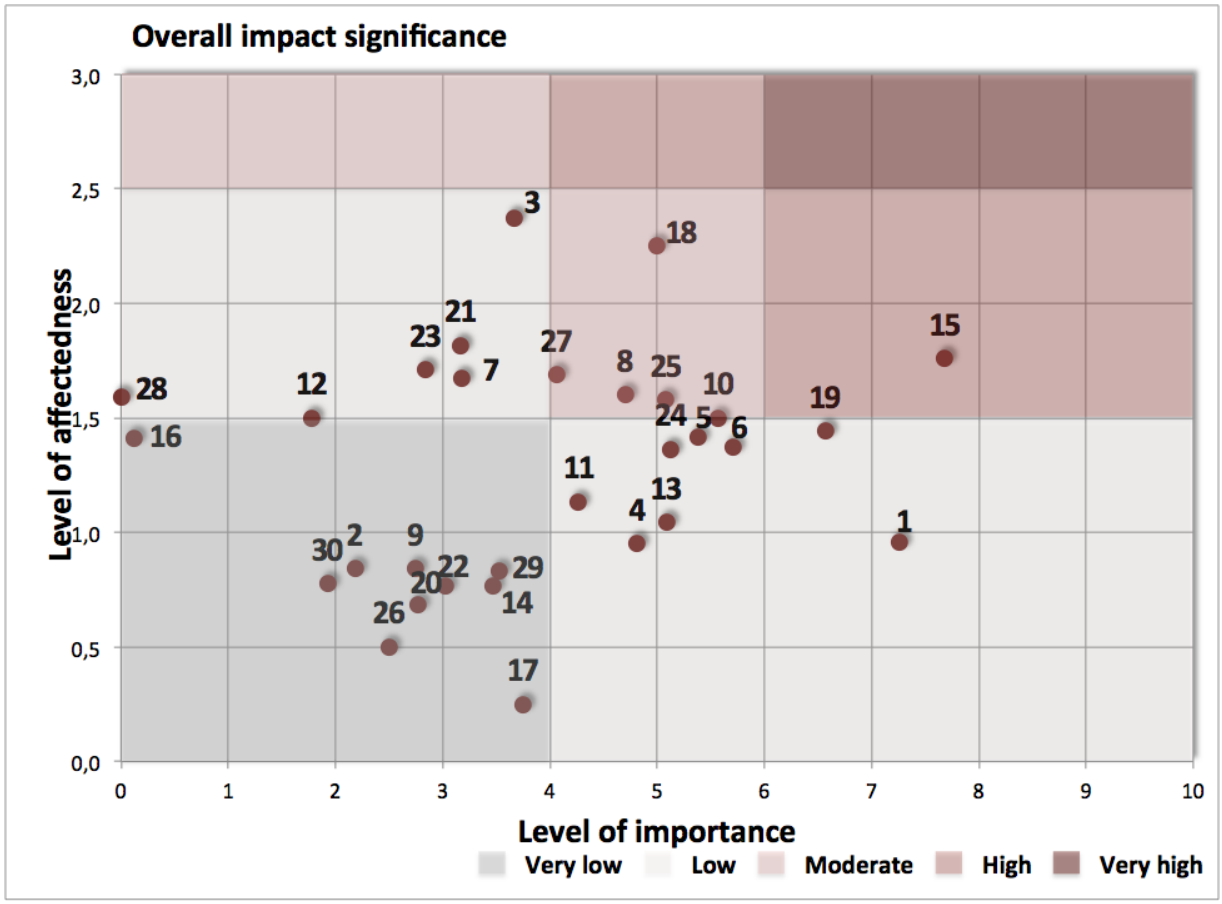


Figure 10-1: Overall significance of impacts

10.1.2 Results of the stakeholder group: women

Women are often disadvantaged and vulnerable within Morocco, especially in rural areas. It is therefore important to give them the opportunity to participate and to express their opinions. Accordingly, women formed a separate stakeholder focus group. Four women's focus groups were conducted, one for each of the affected communities.

The women's assessments of the values presented in Table 10–45 show that on average participants ranked as being highly important: 1 "Family and social support", 5 "Inclusion of marginalized communities and social groups," and 19 "Poverty alleviation, income generation, health care and improved standard of living". Furthermore, value 15 "Water security in the Draa Valley," which was only relevant to the community of Agdz, was ranked to be of high importance. Women from Ouarzazate ranked families as an important value of local communities but stated that reducing poverty and vulnerability are even more important to overall social stability. Women from all focus groups further stressed the importance of including marginalized groups including women, as well as unemployed and disabled people.

		Women (n= 23)									
		Importance mean scores						Affectedness mean scores			
		Ouarzazate	Ghassate	Agdz	Idelsane/ Skoura	Average rating		Ouarzazate	Ghassate	Agdz	Idelsane/ Skoura	Average rating
	Values	**Livelihood impacts**										
1	Family and social support	8.6	6.5			**7.5**	Strengthened family ties and social support	0.2	0.2			**0.2**
3	Local and regional reputation	4.6	4.0	4.5	9.2	**5.6**	Intensified local pride and gains for regional reputation	2.4	2.2	1.2	3.0	**2.2**
5	Inclusion of marginalized communities and social groups	5.6	6.0	5.7	7.2	**6.1**	Preferential treatment of local communities and socio-economic inclusion of women	0.6	1.3	1.2	2.7	**1.5**
10	Improvement of living conditions in adjacent communities		5.2			**5.2**	Improved living conditions in adjacent communities		1.3			**1.3**
19	Poverty alleviation, income generation, health care and improved standard of living	8.8	7.0	5.5	7.0	**7.0**	Improved socio-economic situation and standard of living	0.6	1.2	1.2	2.7	**1.4**
23	Public interest in renewable energy	5.2		2.0	2.0	**2.9**	Increased public interest in renewable energy systems and civil society engagement	2.2		1.5	2.2	**1.9**
	Values	**Livelihood impacts**										
2	Preservation of social standing and political influence	3.8	0.5			**2.0**	Loss of social standing and political influence	0.2	1.0			**0.6**
4	Preservation of community atmosphere and cultural identity	3.0	1.3	5.5	5.3	**3.8**	Accelerated change in community atmosphere and cultural identity	0.4	0.3	1.2	0.0	**0.5**
6	Social peace and community cohesion	2.2	2.8	6.8	6.3	**4.7**	Social conflict, rivalry and feelings of envy	1	2.0	1.0	0.0	**1.0**
7	Provision of transparent and comprehensive information	1.2	2.2	4.7	3.7	**3.0**	Uncertainty, unrealistic expectations and frustration	0.8	2.7	2.0	1.8	**1.9**
8	Community engagement and participation in decision-making processes	3.6	5.0	7.2	5.2	**5.3**	Social exclusion and powerlessness in decision-making	1.2	2.3	2.5	2.5	**2.2**

9	Trust in project developers and addressing the community concerns	3.2	0.0	4.7	2.3	**2.5**	Suspicion towards the project, its developers and community protest	0.2	1.8	1.8	0.3	**1.1**
13	Preservation of land as a culturally important resource		3.8			**3.8**	Decreased psychological well-being and loss of cultural attachment in adjacent communities		0.8			**0.8**
14	Maintain sufficient water supply in Tasselmant		4.7			**4.7**	Decreased water security in the community of Tasselmant		0.7			**0.7**
15	Water security in the Draa Valley			8.5		**8.5**	Deprivation of farming livelihoods in Ouarzazate and cascading effects in the downstream oases of the Draa Valley			2.3		**2.3**
16	Preservation of biodiversity in adjacent communities		0.0			**0.0**	Deprivation of subsistence activities in adjacent communities		2.3			**2.3**
20	Preservation of subsistence farming activities in adjacent villages		2.3			**2.3**	Deteriorated socio-economic situation and standard of living in adjacent communities		1.3			**1.3**
22	Price stability of local commodities	2.6	4.3		3.8	**3.1**	Erosion of local purchasing power and decreased standard of living among low-income groups	0.6	0.8		0.0	**0.5**
28	Tranquil environment and quiet surroundings		0.0			**0.0**	Influence of noise, dust and vibration on psychological well-being		1.5			**1.5**
29	Clean and unpolluted environment (land, water resources)		0.8			**0.8**	Environmental pollution		1.3			**1.3**
30	Road and public safety	2.6	0.0		3.0	**1.8**	Increased crime and fatal road accidents	0.0	1.2		0.0	**0.4**

Assessment of importance and affectedness

Level of importance: High, Medium, Low, Not rated

Level of affectedness rating (positive): High, Medium, Low, Not rated

Level of affectedness rating (negative): High, Medium, Low, Not rated

Table 10–5: Average rating based on ranks and ratings given by groups of women

In addition to the importance ranking of values, women rated impacts according to the level of affectedness. A summary of the impact ratings is also presented in Table 10–10. The average scores across the four communities show that the impacts that were rated to have a moderate to high negative effect are impact 8 “Social exclusion and powerlessness in decision-making”, impact 15 “Deprivation of farming livelihoods in Ouarzazate and cascading effects in the downstream oases of the Draa Valley” and 16 “Deprivation of subsistence activities in adjacent communities”. While impact 8 affects all four communities, impacts 15 and 16 only apply to Agdz. Another negative impact, which was on average only of medium strength but had high effects on women from Ghassate and moderate effects on women in Agdz and Idelsane / Skoura, is impact 7 “Uncertainty, unrealistic expectations and frustration”.

The only positive impact communities rated as having medium effect was impact 3 “Intensified local pride and gains for regional reputation”. In Idelsane / Skoura women rated two additional impacts as having a high effect. These were impact 19 “Improved socio-economic situation and standard of living” and impact 5 “Preferential treatment of local communities and socio-economic inclusion of women”. Women from Ouarzazate had hoped that the project would create more job opportunities, especially for women. Women in Idelsane / Skoura and Ouarzazate rated impact 23 “Increased public interest in renewable energy systems and civil society engagement” as having a positive, medium impact level. Women from Agdz mentioned that the project had also led people to think about renewable energy for domestic energy use and for agricultural activities. Therefore, while impacts 3 and 23 are more general impacts, impacts 5 and 19 describe direct positive impacts on the living conditions.

Generally, women were especially concerned about impacts affecting social resources and political capital. The high to moderate level of affectedness with which women rated negative impact 7 and 8 suggests that women are especially concerned with aspects such as participation, inclusion, and information policies. This was also reflected in the focus group discussions in which women said they felt excluded from the decision processes.

The evaluation of the impact significance shown as a correlation between the importance rankings and the ratings of affectedness in Figure 10-2 indicates that women in the communities of Agdz and Idelsane / Skoura rated a number of impacts with high significance. For women from Agdz, the negative impacts 8 “Social exclusion and powerlessness in decision-making” and 15 “Deprivation of farming livelihoods in Ouarzazate and cascading effects in the downstream oases of the Draa Valley” had the highest significance. Women in the communities of Idelsane and Skoura identified as most significant the positive impacts 3 “Intensified local pride and gains for regional reputation”, 5 “Preferential treatment of local communities and socio-economic inclusion of women,” and 23 “Increased public interest in renewable energy systems and civil society engagement”. Women from Ouarzazate also rated impact 3 and 5 to be significant, but less so than women from Idelsane / Skoura. Figure 10-2 also shows that women from Ouarzazate perceived themselves to be overall less affected by the impacts of Noor$_o$ I compared to women from the other communities. Women from Ghassate viewed themselves as moderately affected by most impacts, but rated the values as less important, resulting in lower significance levels.

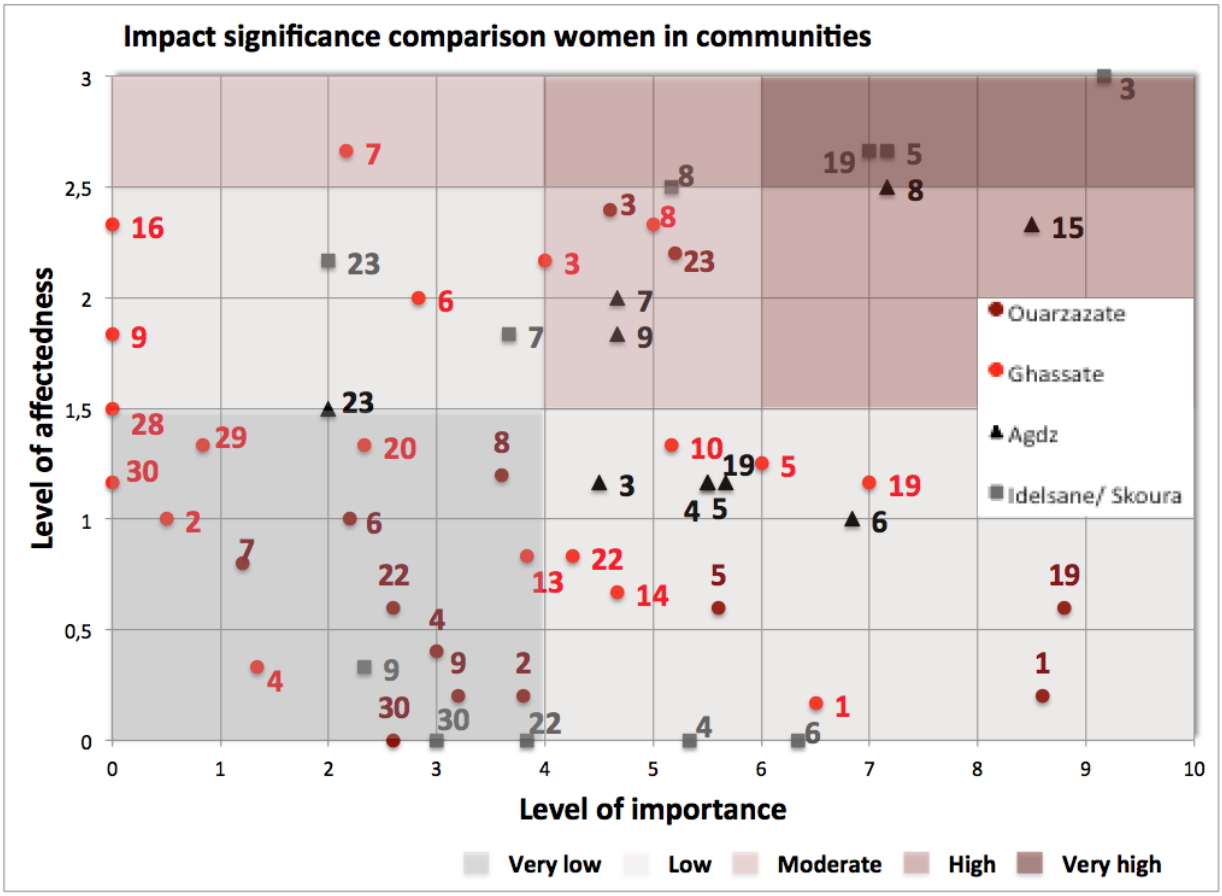


Figure 10-2: Impact significance based on evaluation of focus groups comprising women in four communities

The average significance of impacts for women across communities is shown in Figure 10-3. The most significant impact was impact 3 “Intensified local pride and gains for regional reputation” and impact 8 “Social exclusion and powerlessness in decision-making”. Again, impact 15 “Deprivation of farming livelihoods in Ouarzazate and cascading effects in the downstream oases of the Draa Valley” also has a high significance but only concerns the community of Agdz. The same applies to impact 10 “Improved living conditions in adjacent communities,” which is significant but only for the women from Ghassate. Across communities, impacts 19 “Improved socio-economic situation and standard of living” and 5 “Preferential treatment of local communities and socio-economic inclusion of women” were found to be of moderate significance. Overall the results show that women rated the significance of positive impacts higher than the significance of negative impacts.

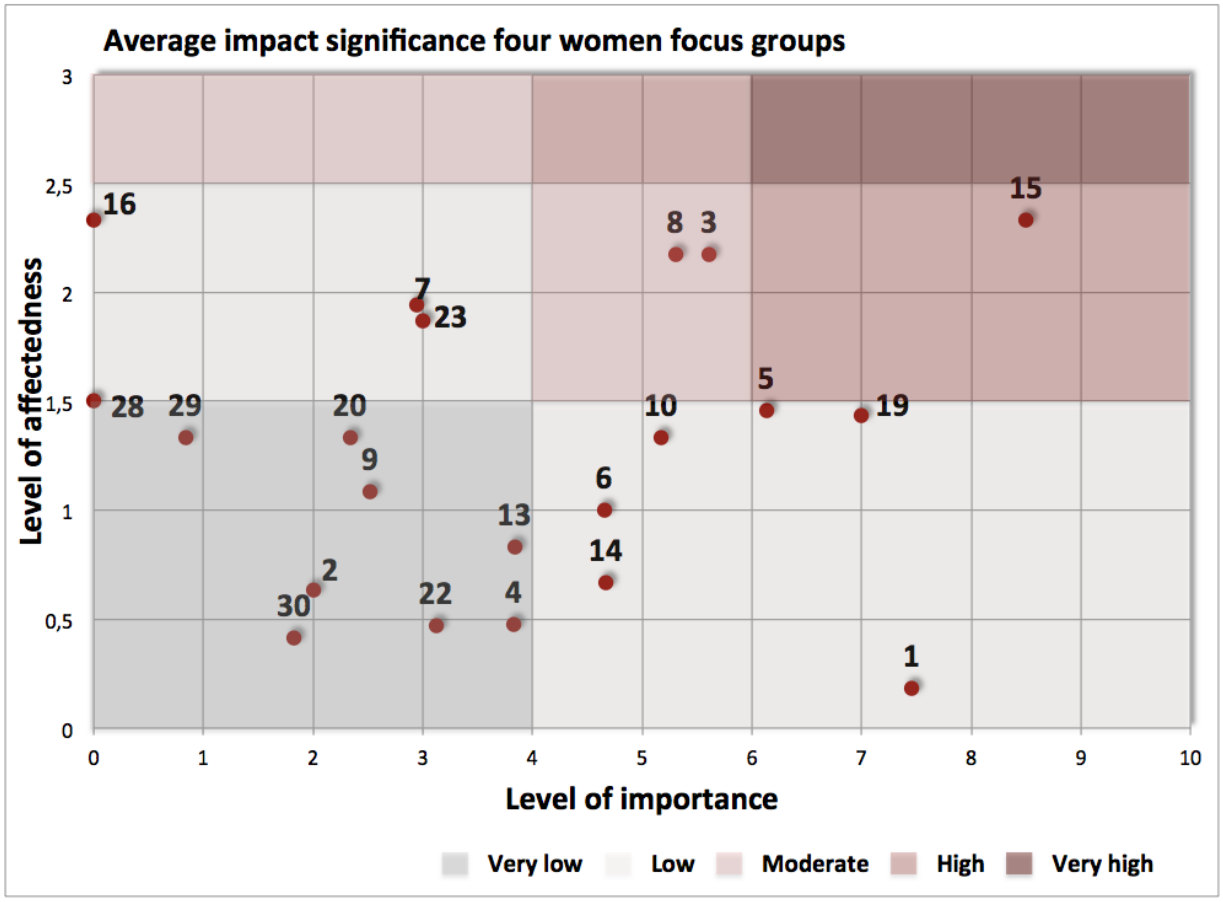


Figure 10-3: Average impact significance based on evaluation of four women's focus groups

10.1.3 Results of the stakeholder group: youth

Adolescents are important stakeholders that could benefit from investments in large infrastructural projects, such as Noor$_0$ I, through employment opportunities or increased access to education. At the same time youth are often not included in decision-making processes. Hence, it was important to include adolescents as a stakeholder group, giving them the opportunity to express their views and taking their perceptions into account.

Table 10–6 displays the average rating scores from the youth focus groups from each affected community. The participants across communities agreed on the high importance of value 19 "Poverty alleviation, income generation, health care and improved standard of living". The youth groups from the communities of Ouarzazate and Ghassate also found 1 "Family and social support" to be highly important. While 6 "Social peace and community cohesion" was of moderate importance to the youth group from Ouarzazate, Ghassate and Idelsane, it was of high importance to the youth in Agdz. The importance of this value was discussed in all youth focus groups, and participants emphasized that without social peace, protest and conflict would impede progress and development.

		Youth (n= 23)									
		Importance mean scores						Affectedness mean scores				
		Ouarzazate	Ghassate	Agdz	Idelsane/ Skoura	Average rating		Ouarzazate	Ghassate	Agdz	Idelsane/ Skoura	Average rating
	Values						**Livelihood impacts**					
1	Family and social support	8.0	6.2			**7.1**	Strengthened family ties and social support	1.3	2.0			**1.7**
3	Local and regional reputation	1.7	2.2	5.5	1.0	**2.7**	Intensified local pride and gains for regional reputation	2.8	2.8	2.0	3.0	**2.7**
5	Inclusion of marginalized communities and social groups	3.0	5.5	5.5	5.8	**4.9**	Preferential treatment of local communities and socio-economic inclusion of women	1.5	2.0	1.2	1.6	**1.6**
10	Improvement of living conditions in adjacent communities		6.0			**6.0**	Improved living conditions in adjacent communities		2.2			**2.2**
19	Poverty alleviation, income generation, health care and improved standard of living	7.2	7.3	8.2	8.8	**7.8**	Improved socio-economic situation and standard of living	1.5	1.8	1.2	1.6	**1.5**
23	Public interest in renewable energy	2.0	1.2	6.0	1.0	**2.6**	Increased public interest in renewable energy systems and civil society engagement	2.0	2.3	1.7	2.0	**2.0**
24	Skill development and knowledge transfer (particularly among youth)	6.8	3.3		5.2	**5.1**	Benefits from skill development and knowledge transfer particularly among youth	1.8	2.0		1.0	**1.6**
	Values						**Livelihood impacts**					
2	Preservation of social standing and political influence	0.0	1.5			**0.8**	Loss of social standing and political influence	0.2	1.2			**0.7**
4	Preservation of community atmosphere and cultural identity	4.2	3.3	5.7	5.4	**4.6**	Accelerated change in community atmosphere and cultural identity	1.7	1.2	1.7	0.6	**1.3**
6	Social peace and community cohesion	5.5	5.0	7.5	5.6	**5.9**	Social conflict, rivalry and feelings of envy	1.0	2.2	1.2	1.6	**1.5**
7	Provision of transparent and comprehensive information	4.3	0.8	5.0	1.4	**3.0**	Uncertainty, unrealistic expectations and frustration	1.2	1.7	1.0	2.0	**1.4**

8	Community engagement and participation in decision-making processes	2.3	2.3	5.0	5.2	**3.7**	Social exclusion and powerlessness in decision-making	1.0	1.2	2.0	1.4	**1.4**
9	Trust in project developers and addressing community concerns	1.8	0.5	5.7	2.2	**2.6**	Suspicion towards the project, its developers and community protest	1.0	1.0	0.8	1.4	**1.0**
12	Availability and affordability of regional infrastructure and services	2.2				**2.2**	Strain on regional infrastructure and services	2.5				**2.5**
13	Preservation of land as a culturally important resource		4.3			**4.3**	Decreased psychological well-being and loss of cultural attachment in adjacent communities		1.0			**1.0**
22	Price stability of local commodities	1.8			5.0	**3.3**	Erosion of local purchasing power and decreased standard of living among low-income groups	1.8			1.4	**1.6**
25	Educational qualifications	2.5	5.3		5.0	**4.2**	Mismatch between educational qualifications and labor market requirements	1.2	1.3		2.0	**1.5**
30	Road and public safety	1.7	0.2		3.4	**1.6**	Increased crime and fatal road accidents	0.5	1.2		0.2	**0.6**

Assessment of importance and affectedness

Level of importance: High; Medium; Low; Not rated

Level of affectedness rating (positive): High; Medium; Low; Not rated

Level of affectedness rating (negative): High; Medium; Low; Not rated

Table 10–6: Average rating based on ranks and scores given by youth focus groups

The three impacts that had on average medium to high effects were all positive, including 3 “Intensified local pride and gains for regional reputation”, 10 “Improved living conditions in adjacent communities,” and 23 “Increased public interest in renewable energy systems and civil society engagement”. Only youth from Ouarzazate rated 12 “Strain on regional infrastructure and services”, which was the only negative impact rated as having a high effect. Regarding impact 3, the youth group from Agdz thought that an improved reputation for the region resulting from the project could attract further investment and improve healthcare and education. This group also emphasized that the CSP plant increased public awareness of renewable energy but that renewables should be even more widely advertised as these technologies could contribute to development.

With regards to the significance of the identified impacts, Figure 10-4 shows that on average none of the impacts are of high significance for youth in each community. The impacts that the youth rated as having a high effect were related to values that were identified as having low importance. However, some impacts were found to be of at least of moderate significance to the youth of Ghassate. These included the positive impacts 1 “Strengthened family ties and social support”, 5 “Preferential treatment of local communities and socio-economic inclusion of women”, and 10 “Improved living conditions in adjacent communities”, as well as the negative impact 6 “Social conflict, rivalry and feelings of envy”. These results suggest that the community closest to the CSP plant benefited from Noor$_0$ I, but that this also led to feelings of social rivalry and envy, as all residents may not benefit equally.

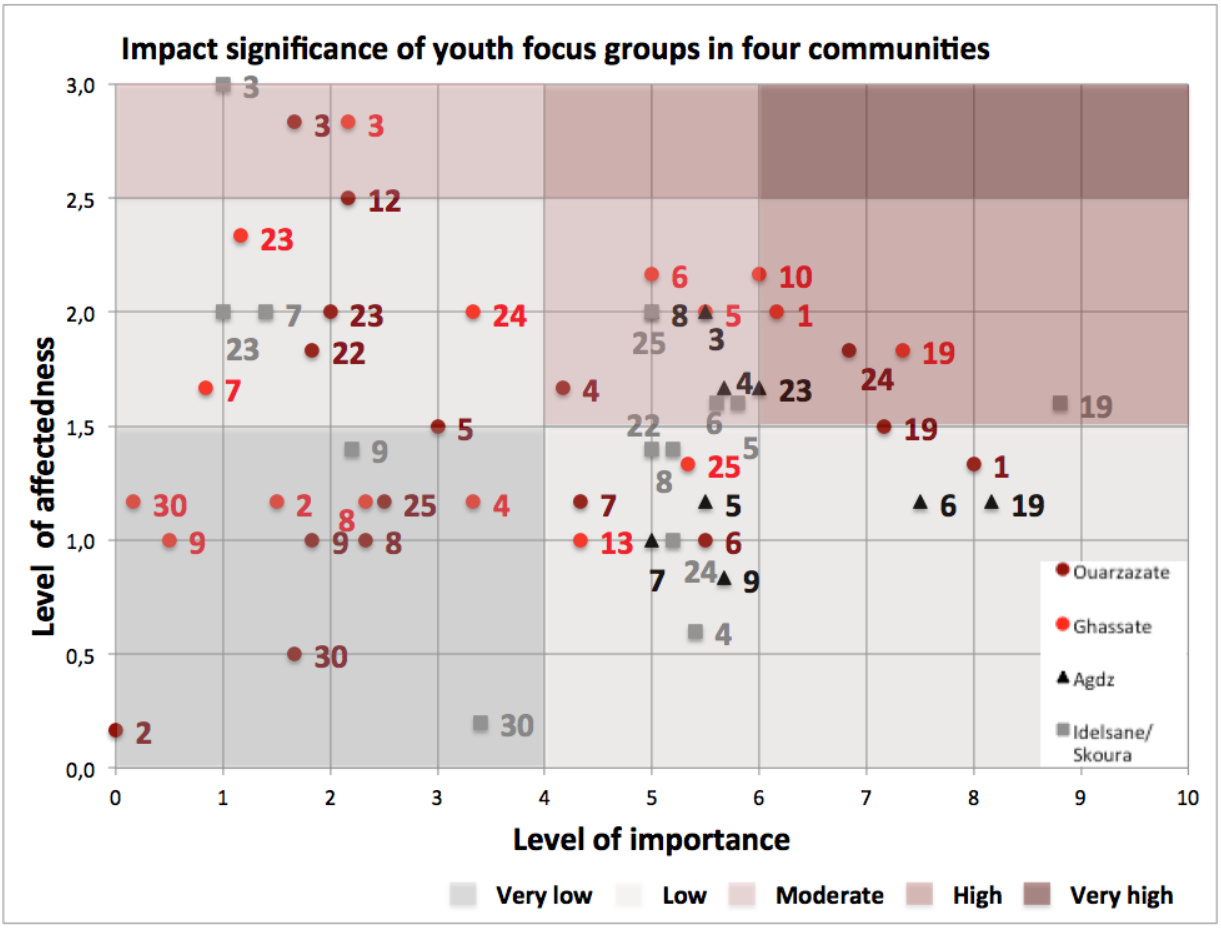


Figure 10-4: Impact significance based on evaluation of youth focus groups in four communities

No average impact was found to be of high significance to youth, as is illustrated by the cluster of impacts in the middle of the diagram (see Figure 10-5). This is because impacts that youth rated as having high effects were not found to be of high importance, and values that they found to be of high importance were at most rated to be of moderate effect. Overall the youth groups rated many impacts as being of moderate significance. The youth only rated three negative impacts to be of low significance including 2 “Loss of social standing and political influence”, 9 “Suspicion towards the project, its developers and community protest,” and 30 ”Increased crime and fatal road accidents”.

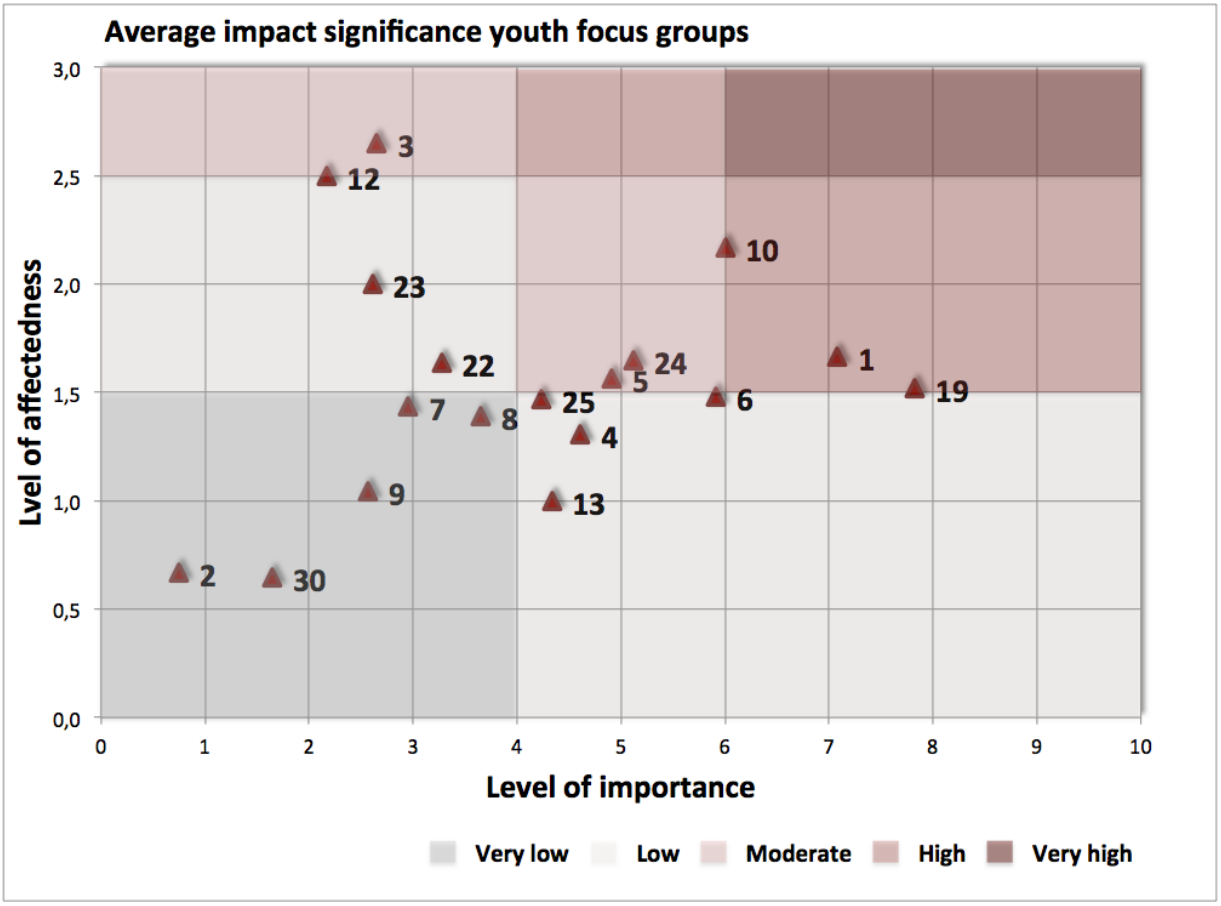


Figure 10-5: Average impact significance based on evaluation of youth focus groups

10.1.4 Results of the stakeholder group: farmers

Four focus groups with local farmers were conducted. Farmers were chosen as a stakeholder group as farming is of high relevance in the region and the availability of natural resources like water and land which are affected by the project are indispensable to the livelihood of farmers Table 10–7 compares the rating for the importance of the values – based on participant’s ranking - and the ratings for the level of affectedness of the impacts for these groups and reports the average ratings. The importance rating shows that farmers ranked factors like 6 “Social peace and community cohesion” and 19 “Poverty alleviation, income generation, health care and improved standard of living” as most important. In this respect, some farmers from Ghassate and Agdz stated that communication, solidarity, social ties and peace within the communities are key to fighting poverty and to supporting economic development. Additionally, 13 “Preservation of land as a culturally important resource” and 15 “Water

security in the Draa Valley" – both values that have a natural resource dimension – were also very important for farmers from Ghassate and Agdz. While only farmers from Ghassate assigned importance to 13, farmers from Agdz especially emphasized the importance of water security for their community during the focus group discussion, which also farmers from Ouarzazate found as moderately important. Farmers from Ouarzazate further assigned high importance to 2 "Preservation of social standing and political influence", while farmers from Ghassate attached only low importance to this value. Instead they regarded 29 "Clean and unpolluted environment (land, water resources)" as very important. Farmers from Idelsane and Skoura attributed high importance to 3" Local and regional reputation", 4 "Preservation of community atmosphere and cultural identity," and 5 "Inclusion of marginalized communities and social groups".

In terms of the effects of the positive impacts, farmers across communities rated 3 "Intensified local pride and gains for regional reputation" as having the highest effect. The farmers from Ouarzazate, Ghassate, and Agdz also expected to be moderately affected by impact 21 "Increased regional prosperity and value added". Farmers from Ghassate affirmed that people who are working at $Noor_o$ I could improve their living conditions and they believed that through the project the region gained a good reputation, resulting in hopes of further investment in the area.

Farmers from Ghassate also expected to be moderately to highly affected by a number of negative impacts, mainly on their social and political capital such as 7 "Uncertainty, unrealistic expectations and frustration" and 6 "Social conflict, rivalry and feelings of envy", as well as impacts that affect human capital like 28 "Influence of noise, dust and vibration on psychological well-being" and impact 29 "Environmental pollution". Farmers rated impact 7 especially high, showing that the information provided to farmers living closest to the CSP plant was not sufficient to avoid mistaken expectations.

		Farmers (n= 20)									
		Importance mean scores						Affectedness mean scores			
		Ouarzazate	Ghassate	Agdz	Idelsane/ Skoura	Average rating		Ouarzazate	Ghassate	Agdz	Idelsane/ Skoura	Average rating
	Values						**Livelihood impacts**					
3	Local and regional reputation	5.0	1.2	1.2	6.6	**3.5**	Intensified local pride and gains for regional reputation	3.0	2.2	2.2	2.0	**2.4**
5	Inclusion of marginalized communities and social groups	2.4	4.0	4.4	6.2	**4.3**	Preferential treatment of local communities and socio-economic inclusion of women	1.6	1.0	0.8	1.4	**1.2**
10	Improvement of living conditions in adjacent communities		4.0			**4.0**	Improved living conditions in adjacent communities		0.6			**0.6**
19	Poverty alleviation, income generation, health care and improved standard of living	7.8	3.8	6.2	6.8	**6.2**	Improved socio-economic situation and standard of living	1.6	1.8	0.8	1.4	**1.4**
21	Regional prosperity and value added	2.4	0.0	3.6	3.4	**2.4**	Increased regional prosperity and value added	1.8	2.4	2.0	1.2	**1.9**
23	Public interest in renewable energy	2.8	0.8	4.0	1.4	**2.3**	Increased public interest in renewable energy systems and civil society engagement	1.4	0.8	1.4	1.0	**1.2**
	Values						**Livelihood impacts**					
2	Preservation of social standing and political influence	6.2	2.2			**4.2**	Loss of social standing and political influence	0.0	2.2			**1.1**
4	Preservation of community atmosphere and cultural identity	2.0	4.4	5.6	6.6	**4.7**	Accelerated change in community atmosphere and cultural identity	1.0	2.0	0.6	0.2	**1.0**
6	Social peace and community cohesion	4.0	5.0	8.0	8.8	**6.5**	Social conflict, rivalry and feelings of envy	0.6	2.4	0.8	0.4	**1.1**
7	Provision of transparent and comprehensive information	3.8	3.0	3.0	3.2	**3.3**	Uncertainty, unrealistic expectations and frustration	1.4	3.0	1.0	0.0	**1.4**
8	Community engagement and participation in decision-making processes	2.0	5.8	4.8	3.6	**4.1**	Social exclusion and powerlessness in decision-making	0.0	2.2	0.8	0.4	**0.9**

9	Trust in project developers and addressing community concerns	4.2	1.8	0.6	1.2	**1.9**	Suspicion towards the project, its developers and community protest	0.0	2.0	0.4	0.0	**0.6**
12	Availability and affordability of regional infrastructure and services	2.2	0.0			**1.1**	Strain on regional infrastructure and services	1.0	1.2			**1.1**
13	Preservation of land as a culturally important resource		8.6			**8.6**	Decreased psychological well-being and loss of cultural attach-ment in adjacent communities		1.4			**1.4**
14	Maintain sufficient water supply in Tasselmant		3.0			**3.0**	Decreased water security in the community of Tasselmant		1.8			**1.8**
15	Water security in the Draa Valley	4.6		7.4		**6.0**	Deprivation of farming livelihoods in Ouarzazate and cascading effects in the downstream oases of the Draa Valley	0.8		1.2		**1.0**
16	Preservation of biodiversity in adjacent communities		0.0			**0.0**	Deprivation of subsistence activities in adjacent communities		1.8			**1.8**
20	Preservation of subsistence farming activities in adjacent villages		3.0			**3.0**	Deteriorated socio-economic situation and standard of living in adjacent communities		0.6			**0.6**
22	Price stability of local commodities	2.0	2.0		4.4	**2.8**	Erosion of local purchasing power and decreased standard of living among low-income groups	0.0	1.4		0.0	**0.5**
28	Tranquil environment and quiet surroundings		0.0			**0.0**	Influence of noise, dust and vibration on psychological well-being		2.4			**2.4**
29	Clean and unpolluted environment (land, water resources)	3.6	2.8	6.2		**4.2**	Environmental pollution	0.0	2.0	0.0		**0.7**
30	Road and public safety				2.8	**2.8**	Increased crime and fatal road accidents				1.4	**1.4**

Assessment of importance and affectedness

Level of im-portance: High, Medium, Low, Not rated

Level of affectedness rating (positive): High, Medium, Low, Not rated

Level of affected-ness rating (negative): High, Medium, Low, Not rated

Table 10–7: Average values (rating) based on ranks and scores given by farmers in focus groups

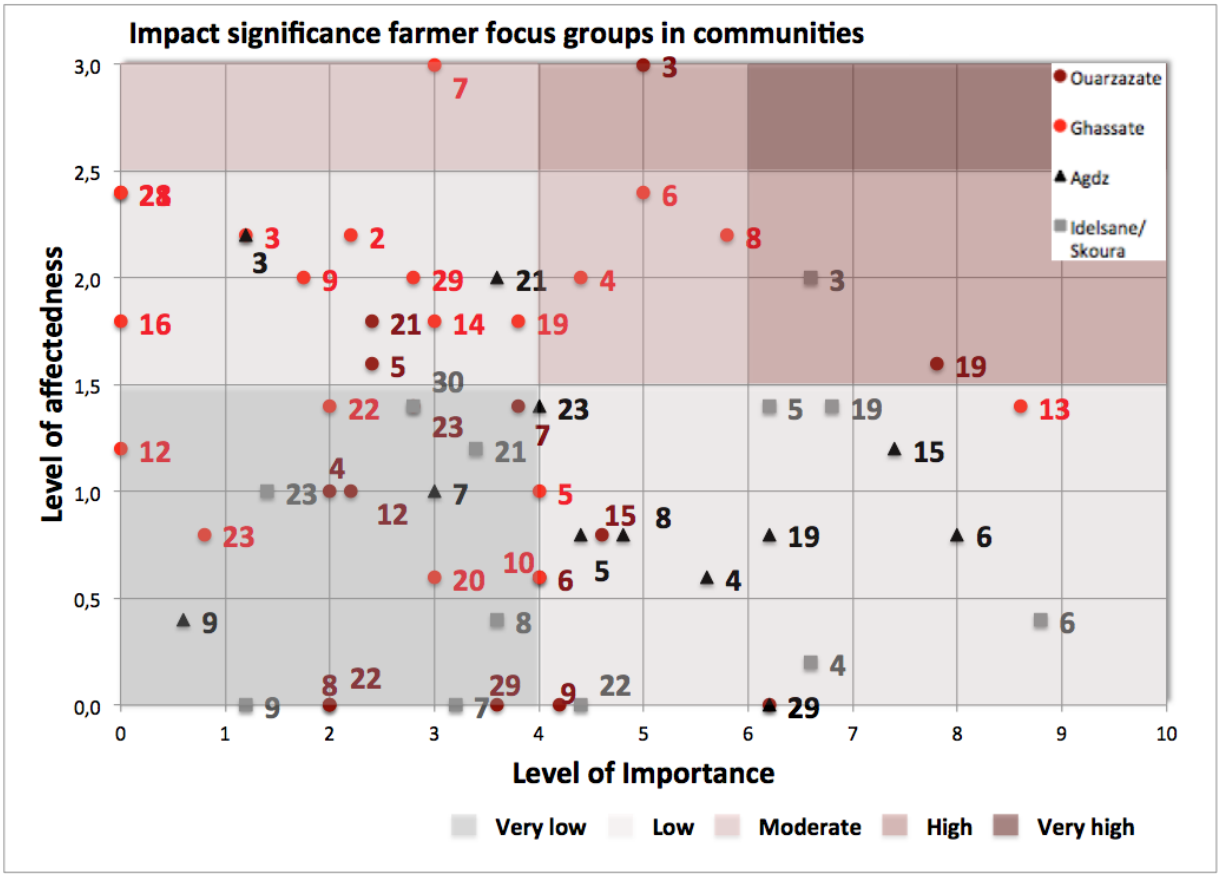


Figure 10-6: Impact significance based on evaluation of farmer focus groups in four communities

Defining the significance of the impacts based on the two assessments conducted by the farmer groups (see Figure 10-6) illustrates that the results vary considerably among communities. While on average no impact was highly significant, the results show that farmers from the community of Ghassate expected to be more affected than farmers from Ouarzazate, Agdz, and Idelsane / Skoura. The most significant negative impacts farmers from Ghassate identified include 4 “Accelerated change of community atmosphere and cultural identity”, 6 “Social conflict, rivalry and feelings of envy,” and 8 “Social exclusion and powerlessness in decision-making”. Farmers from Agdz and Idelsane / Skoura also assigned high importance to the values associated with these impacts, but they were not highly affected by these impacts themselves.

Assessing the significance of impacts for farmers illustrates that none of the impacts has a high level of significance. Instead many impacts are of moderate significance. Moreover, impacts that have greater effects on farmers are assigned less importance than other values that are only affected to a limited extent by CSP development (see Figure 10-7).

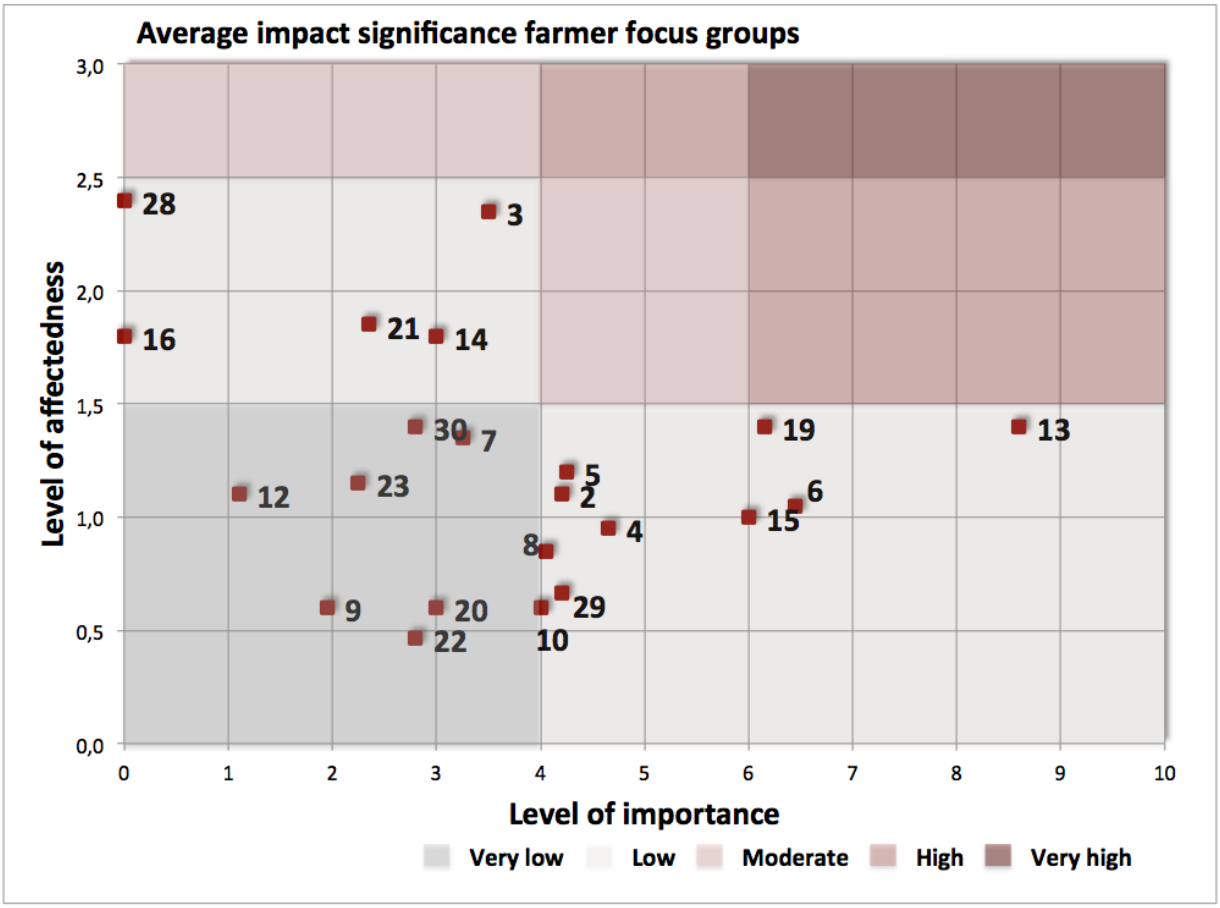


Figure 10-7: Average impact significance based on evaluation of focus groups with farmers

10.1.5 Results of the stakeholder group: community representatives

Stakeholder consultations also included four focus groups with community representatives from Ouarzazate, Ghassate, Agdz, and Idelsane / Skoura. Community representatives were chosen as a stakeholder group because they can provide insights on community priorities and into the significance of selected values, beliefs, and attitudes in the affected communities.

In ranking the importance of the different values of the living environment, representatives from all four affected communities considered 4 “Preservation of community atmosphere and cultural identity” as a key value which is visible according to the rating of each community in Table 10–8. Community representatives from Idelsane and Agdz explained that this was an important value because it contributes to social cohesion and to the overall stability and peace in the area. Community representatives from Ouarzazate pointed out that compared to the movie industry and tourists, the CSP plant had only limited influence on the social and the cultural environment. An even more important value for the community representatives from Ouarzazate and Agdz was 15 “Water security in the Draa Valley”. Besides these two aspects, the community representatives assigned at least medium importance to the following values: 6 “Social peace and community cohesion”, 8 “Community engagement and participation in decision-making processes”, 11 “Regional socio-economic and infrastructure development” and 19 “Poverty alleviation, income generation, health care and improved standard of living”. Representatives from Idelsane especially thought that 11 and 19 were

key values as the available infrastructure, such as hospitals and schools, is insufficient and the majority of residents in this community are poor and vulnerable. Another aspect ranked as being of high importance in Agdz and moderate importance in Ouarzazate, but of very low importance in Ghassate was 29 “Clean and unpolluted environment (land, water resources)”. Representatives form Ouarzazate explained the importance of this value, staing that for them the environment is part of the cultural heritage.

		Community Representatives (n= 19)									
		Importance mean scores						Affectedness mean scores			
		Ouarzazate	Ghassate	Agdz	Idelsane/ Skoura	Average Rating		Ouarzazate	Ghassate	Agdz	Idelsane/ Skoura	Average Rating
	Values						**Livelihood impacts**					
3	Local and regional reputation	0.2	5.5	0.3	1.5	**2.2**	Intensified local pride and gains for regional reputation	2.8	2.5	2.5	2.8	**2.6**
10	Improvement of living conditions in adjacent communities		5.5			**5.5**	Improved living conditions in adjacent communities		2.0			**2.0**
11	Regional socio-economic and infrastructure development	5.2	1.5		7.3	**4.3**	Spurred regional socio-economic and infrastructure development	1.4	0.3		2.0	**1.1**
19	Poverty alleviation, income generation, health care and improved standard of living	1.8	5.2	7.3	5.0	**4.7**	Improved socio-economic situation and standard of living	1.8	1.5	1.3	2.0	**1.6**
21	Regional prosperity and value added	3.2	2.7	4.5	5.0	**3.7**	Increased regional prosperity and value added	2.2	2.5	2.0	1.5	**2.1**
23	Public interest in renewable energy	1.6	2.7	2.8	6.5	**3.2**	Increased public interest in renewable energy systems and civil society engagement	2.4	1.7	2.0	2.0	**2.0**
	Values						**Livelihood impacts**					
4	Preservation of community atmosphere and cultural identity	6.4	7.3	6.3	5.3	**6.4**	Accelerated change in community atmosphere and cultural identity	1.0	1.7	1.3	0.3	**1.1**
6	Social peace and community cohesion	6.6	3.8	5.5	3.0	**4.7**	Social conflict, rivalry and feelings of envy	2.0	2.2	1.5	2.5	**2.1**
7	Provision of transparent and comprehensive information	3.4	0.0	3.0	1.3	**1.8**	Uncertainty, unrealistic expectations and frustration	1.8	1.5	1.3	1.3	**1.5**
8	Community engagement and participation in decision-making processes	5.4	3.3	6.3	8.0	**5.5**	Social exclusion and powerlessness in decision-making	1.4	2.0	1.8	1.3	**1.6**
9	Trust in project developers and addressing community concerns	2.4	2.5	2.8	5.3	**3.1**	Suspicion towards the project, its developers and community protest	0.8	0.8	0.5	0.5	**0.7**
12	Availability and affordability of regional infrastructure and services	2.6	1.2			**1.8**	Strain on regional infrastructure and services	1.4	1.3			**1.4**

13	Preservation of land as a culturally important resource		4.2			**4.2**	Decreased psychological well-being and loss of cultural attachment in adjacent communities		1.0			**1.0**
14	Maintain sufficient water supply in Tasselmant		2.7			**2.7**	Decreased water security in the community of Tasselmant		0.0			**0.0**
15	Water security in the Draa Valley	8.2		0.0		**9.0**	Deprivation of farming livelihoods in Ouarzazate and cascading effects in the downstream oases of the Draa Valley	2.2		2.3		**2.2**
16	Preservation of biodiversity in adjacent communities		0.3			**0.3**	Deprivation of subsistence activities in adjacent communities		0.2			**0.2**
20	Preservation of subsistence farming activities in adjacent villages		2.5			**2.5**	Deteriorated socio-economic situation and standard of living in adjacent communities		0.5			**0.5**
22	Price stability of local commodities	1.0	2.7		2.0	**1.9**	Erosion of local purchasing power and decreased standard of living among low-income groups	0.8	1.0		1.0	**0.9**
28	Tranquil environment and quiet surroundings		0.0			**0.0**	Influence of noise, dust and vibration on psychological well-being		1.0			**1.0**
29	Clean and unpolluted environment (land, water resources)	5.8	0.7	6.5		**3.9**	Environmental pollution	1.0	0.8	0.5		**0.8**
30	Road and public safety	1.2	0.8		5.0	**2.1**	Increased crime and fatal road accidents	1.2	0.0		2.8	**1.1**

Assessment of importance and affectedness

Level of importance: High, Medium, Low, Not rated

Level of affectedness rating (positive): High, Medium, Low, Not rated

Level of affectedness rating (negative): High, Medium, Low, Not rated

Table 10–8: Average ratings based on ranks and scores given by community representatives in the focus groups

Similar to the other stakeholder groups, the impact rating from the community representatives illustrate that they expect to be highly affected by the positive impact 3 “Intensified local pride and gains for regional reputation”. Additionally, participants expected a medium, positive effect related to 10 “Improved living conditions in adjacent communities”, 21 “Increased regional prosperity and value added” and 23 “Increased public interest in renewable energy systems and civil society engagement”. On the other hand, negative impacts that participants assigned at least a medium level of affectedness included 6 “Social conflict, rivalry and feelings of envy” and 15 “Deprivation of farming livelihoods in Ouarzazate and cascading effects in the downstream oases of the Draa Valley”. With regard to impact 6 (envy), the community representatives from Ghassate stated that the feelings of people towards the CSP plant have changed due to the conflicts around the land. Community representatives from Agdz believed that feelings of envy only occurred among the population of Ghassate next to the CSP site and not in the region in general. In relationship to impact 15 (farming livelihoods), community representatives expected that their community would be negatively affected, because they believed the CSP project strained water resources. Another negative impact that had on average only low effects but was rated to have high effects in Idelsane / Skoura was 30 “Increased crime and fatal road accidents”, while representatives from Ouarzazate thought that this impact was not related to the development of the CSP plant.

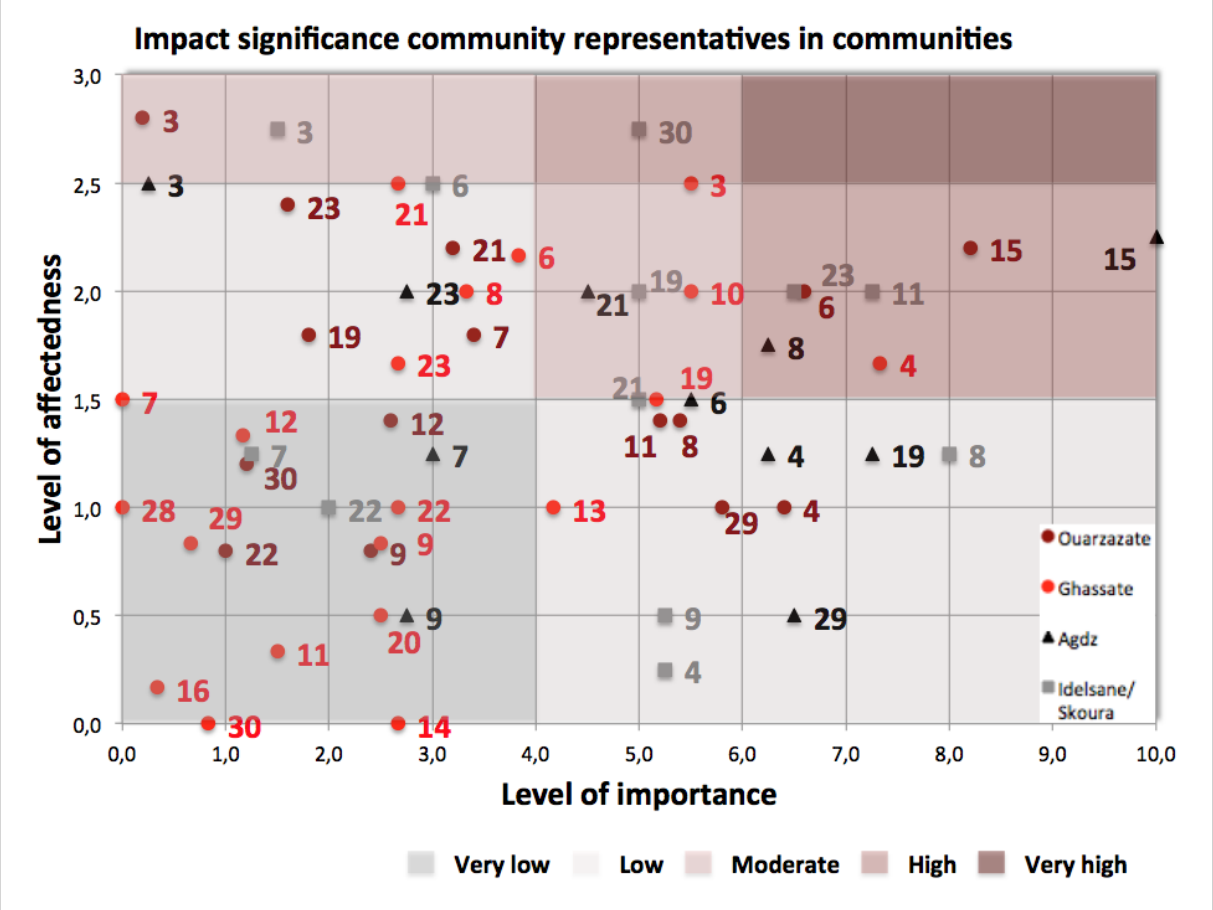


Figure 10-8: Impact significance based on evaluation by focus groups with community representatives in four communities

The impact significance across the communities for the stakeholder group of community representatives (see Figure 10-8) show that impact 15 “Deprivation of farming livelihoods in

Ouarzazate and cascading effects in the downstream oases of the Draa Valley" has the highest significance due to the high ratings from Ouarzazate and Agdz. Of medium significance is impact 6 "Social conflict, rivalry and feelings of envy" and 10 "Improved living conditions in adjacent communities," followed by impact 8 "Social exclusion and powerlessness in decision-making", 19 "Improved Socio-economic situation and standard of living", 21 "Increased regional prosperity and value added," and 23 "Increased public interest in renewable energy systems and civil society engagement". This shows that both positive and negative impacts are of significance to the community representatives. Additionally, impact 3 "Intensified local pride and gains for regional reputation" was rated across communities as having high effects but only having low importance for the associated value, while impact 4 "Accelerated change in community atmosphere and cultural identity" has a higher importance for the associated value but affected the communities only at a low level. On average, the community representatives attributed the lowest significance to the impacts 9 "Suspicion towards the project, its developers and community protest", 14 "Decreased water security in the community of Tasselmant", 16 "Deprivation of subsistence activities in adjacent communities", 20 "Deteriorated socio-economic situation and standard of living in adjacent communities" and 22 "Erosion of local purchasing power and decreased standard of living among low-income groups" (see Figure 10-9).

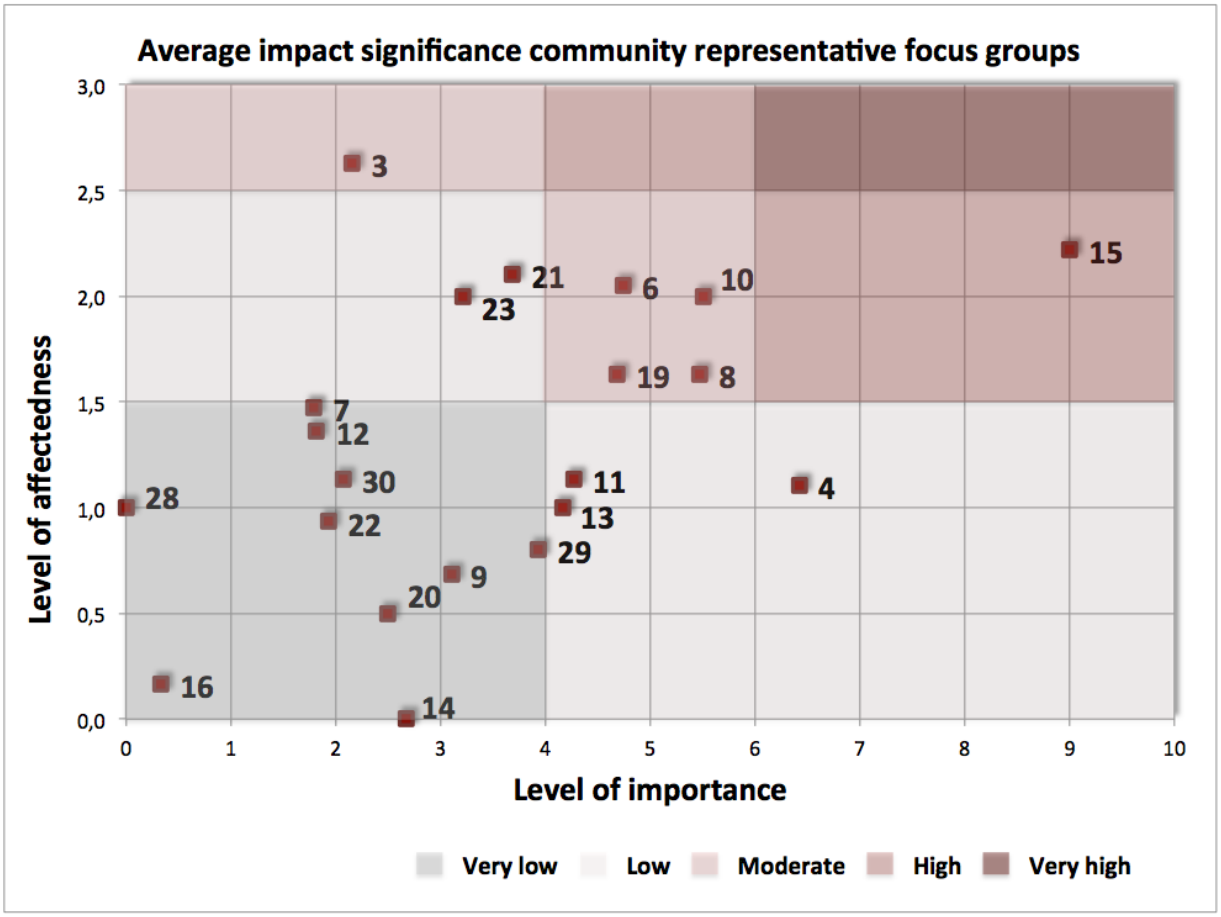


Figure 10-9: Average impact significance based on evaluation by focus groups with community representatives

10.1.6 Results of stakeholder groups across communities: workers, unemployed, SMEs and students who moved to the region

In addition to the four focus groups described above, four additional stakeholder groups were conducted across communities. Participants for these focus groups were sampled according to their employment situation or business sector or for the student group according to their status as new residents. As some of the identified impacts were particularly concerning to these groups it was important to get feedback on the significance of these impacts from the affected groups. Although these groups were not community specific, most participants came from Ouarzazate because most businesses and the university are located here. Table 10–9 shows the average ratings – based on participants rankings - of all four groups for the importance assigned to values and the rating of affectedness by the identified impacts. The significance of the different impacts based on the correlation of these ratings is presented in Figure 10-10 for each of the four groups. Below, the results for each group will be described separately.

			Mean Importance and impact affectedness level rating stakeholder groups across communities							
			Workers CSP plant (n=6)		Unemployed (n=5)		SMEs (n=4)		Students who moved to the region (n=6)	
			Importance	Affectedness	Importance	Affectedness	Importance	Affectedness	Importance	Affectedness
	Values	**Livelihood impacts**								
3	Local and regional reputation	Intensified local pride and gains for regional reputation	6.0	1.8	1.0	2.0	6.3	2.0		
5	Inclusion of marginalized communities and social groups	Preferential treatment of local communities and socio-economic inclusion of women			8.6	1.2				
10	Improvement of living conditions in adjacent communities	Improved living conditions in adjacent communities			7.2	1.2				
17	Economic participation of SMEs	Economic participation and benefits for local SMEs					3.8	0.3		
19	Poverty alleviation, income generation, health care and improved standard of living	Improved socio-economic situation and standard of living	7.8	1.2			6.0	0.8		
21	Regional prosperity and value added	Increased regional prosperity and value added	4.2	1.2			3.3	1.3		
23	Public interest in renewable energy	Increased public interest in renewable energy systems and civil society engagement	1.0	1.0	2.6	1.6	0.3	2.0	8.0	1.5
24	Skill development and knowledge transfer (particularly among youth)	Benefits from skill development and knowledge transfer particularly among youth	2.8	2.0			4.5	0.3	7.8	0.7
26	Technology transfer to local firms	Strengthened technological capacity of local firms					2.5	0.5		
	Values	**Livelihood impacts**								
2	Preservation of social standing and political influence	Loss of social standing and political influence			2.0	1.2				
6	Social peace and community cohesion	Social conflict, rivalry and feelings of envy	6.2	2.0	6.0	0.4			8.8	1.5
7	Provision of transparent and comprehensive information	Uncertainty, unrealistic expectations and frustration	1.8	2.3	4.8	2.0	5.8	2.0	7.2	2.3
8	Community engagement and	Social exclusion and powerlessness	5.5	2.3	7.2	2.0	2.5	1.5		

	participation in decision-making processes	in decision-making								
9	Trust in project developers and addressing community concerns	Suspicion towards the project, its developers and community protest	5.5	0.8	2.4	0.6	3.5	0.5		
12	Availability and affordability of regional infrastructure and services	Strain on regional infrastructure and services			2.6	1.4				
18	Economic participation of micro-scale SMEs	Economic exclusion of micro-scale SMEs					5.0	2.3		
20	Preservation of subsistence farming activities in adjacent villages	Deteriorated socio-economic situation and standard of living in adjacent communities			3.4	0.2				
21	Regional prosperity and value added	Increased regional prosperity and value added	4.2	1.2			3.3	1.3		
22	Price stability of local com-modities	Erosion of local purchasing power and decreased standard of living among low-income groups	5.7	0.7	2.4	0.6	3.8	0.5		
25	Educational qualifications	Mismatch between educational qualifications and labor market requirements	5.7	1.7	4.8	2.4	5.3	2.0	7.0	0.8
27	Fair and equal labor conditions	Poor and unequal labor conditions	2.8	2.5			2.8	1.5	6.2	1.0

Assessment of importance and affectedness

Level of importance: High; Medium; Low; Not rated

Level of affectedness rating (positive): High; Medium; Low; Not rated

Level of affectedness rating (negative): High; Medium; Low; Not rated

Table 10–9: Average ratings based on ranks and scores given by focus groups: Workers CSP plant; unemployed; SMEs and students who moved to Ouarzazate

Workers from the CSP plant

The results from the focus group of workers that are employed at Noor$_o$ I show that they ranked the values of 3 “Local and regional reputation”, 6 “Social peace and community cohesion” and 19 “Poverty alleviation, income generation, health care and improved standard of living” of high importance. Of medium importance to the workers were the values 8 “Community engagement and participation in decision-making processes” and 9 “Trust in project developers and addressing community concerns”. Regarding 9, the focus group mentioned that the information provided was not appropriate for the intended audience, fostering mistrust within communities with regard to elected representatives and local authorities. Furthermore, the workers believed that problems occurring during the construction could have been avoided if local knowledge and experiences had been incorporated into the process. In addition to these aspects, medium importance was also attributed to 22” Price stability of local commodities” and 25 “Educational qualifications”.

Workers expected to be highly affected by impact 27 “Poor and unequal labor conditions”. The workers expected to be further negatively impacted on a medium level by 6 “Social conflict, rivalry and feelings of envy”, 7 “Uncertainty, unrealistic expectations and frustration”, and 8 “Social exclusion and powerlessness in decision-making” while they expected to benefit from 24 “Benefits from skill development and knowledge transfer particularly among youth”.

The most significant impacts to the workers based on importance and impact affectedness include 3 “Intensified local pride and gains for regional reputation, 6 “Social conflict, rivalry and feelings of envy”, 8 “Social exclusion and powerlessness in decision-making” and 25 “Mismatch between educational qualifications and labor market requirements” (see Figure 10-10). While impacts like 7, 24 or 27 had high effects, participants did not rank them as being of high importance. This suggests that the participants thought it was better to have a regular employment at the CSP plant than to be unemployed, even though the working conditions were not satisfying.

Unemployed

The findings from the focus group with unemployed persons show that they especially ranked of high importance the values 5 ”Inclusion of marginalized communities and social groups”, 8 “Community engagement and participation in decision-making processes,” and 10 “Improvement of living conditions in adjacent communities”. They stated that they think that marginalized groups like themselves should also get opportunities to participate, so that the inequalities between social classes could be evened out. There are numerous factors independent from infrastructure projects, such as the lack of education, that contribute to marginalization and accordingly the participants expected to be highly affected by impact 25 “Mismatch between educational qualifications and labor market requirements”. Not surprisingly, they also perceived a medium affectedness by the negative impact 7 “Uncertainty, unrealistic expectations and frustration” and 8 “Social exclusion and powerlessness in decision-making”. At the same time they felt a medium affect related to the positive impact 3 “Intensified local pride and gains for regional reputation”.

Based on the average importance and impact rating scores in Table 10–9 the most significant impacts for the focus group of unemployed people included 25 “Mismatch between educational qualifications and labor market requirements”, 7 “Uncertainty, unrealistic expectations and frustration,” and 8 “Social exclusion and powerlessness in decision-making”. The impacts 9 “Suspicion towards the project, its developers and community protest”, 20 “Deteriorated Socio-economic situation and standard of living in adjacent communities” and 22 ”Erosion of local purchasing power and decreased standard of living among low-income groups” only had low significance. With regard to impact 22, participants stated that there was no deterioration in purchasing power due to the CSP plant, but that the purchasing power was already weak before the project began due to the vulnerability of the local economy. Overall, the high significance of a mismatch between educational qualifications and labor market requirements illustrates that unemployed persons do not have the right qualifications to benefit from the CSP development which must be overcome.

SMEs

The participants from the SMEs focus group assigned the highest importance to value 3 “Local and regional reputation” and 19 “Poverty alleviation, income generation, health care and improved standard of living” and medium importance to 7 ”Provision of transparent and comprehensive information”, 18 “Economic participation of micro-scale SMEs” and 25 “Educational qualifications”. With regards to value 25, the participants stated that educational qualifications are very important for them as well as for students who are future employees.

The highest level of affectedness was assigned to impact 18 “Economic exclusion of micro-scale SMEs”, followed by impact 3 “Intensified local pride and gains for regional reputation”, 7 “Uncertainty, unrealistic expectations and frustration”, 23 “Increased public interest in renewable energy systems and civil society engagement”, and 25 “Mismatch between educational qualifications and labor market requirements“. Accordingly, the significance evaluation shows a high significance for the impacts 3, 7, 25 and 18, while impact 23 has high effects but was only of low importance to the SME stakeholders. These results amongst others suggest that micro-scale SMEs need support to overcome the exclusion they have experienced.

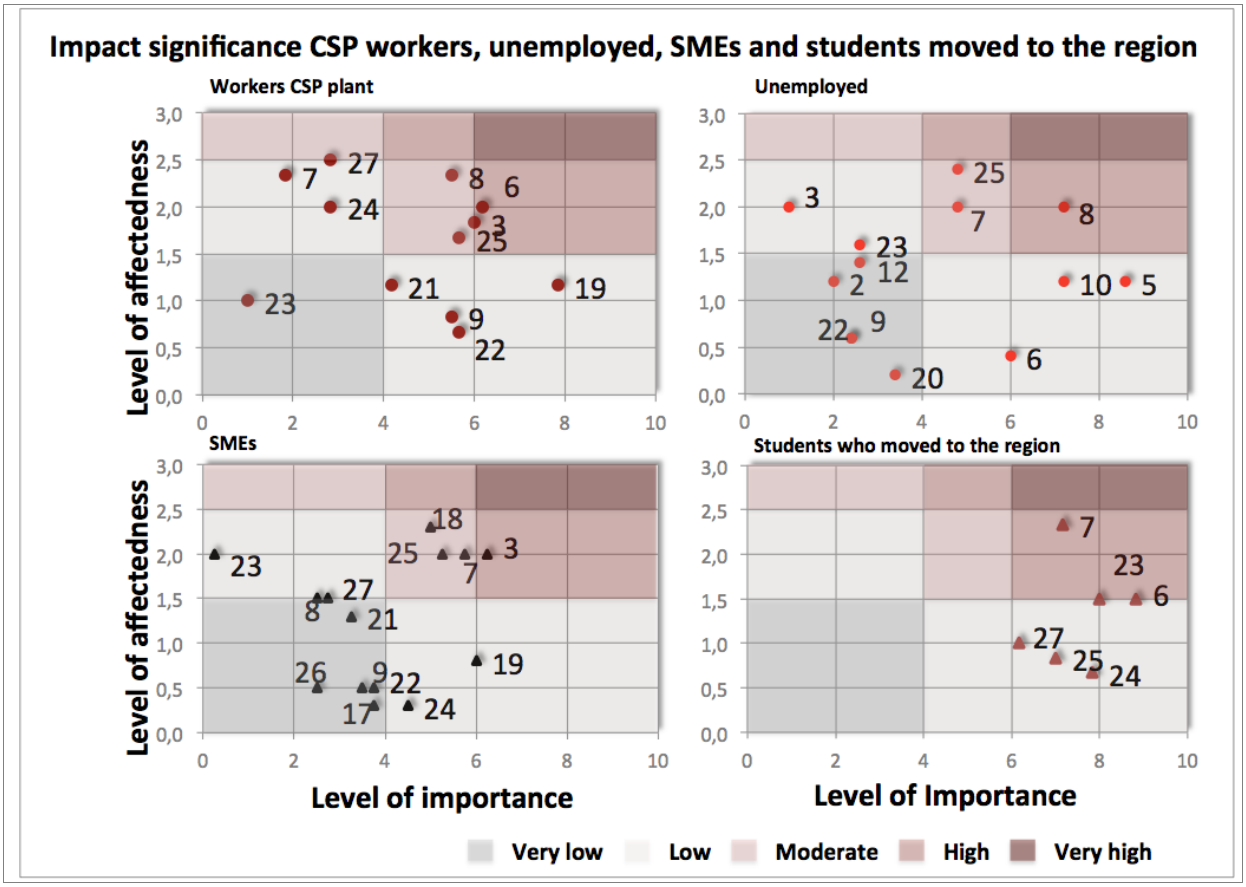


Figure 10-10: Significance from focus groups with CSP workers, unemployed, SMEs, and students who moved to the region

Students who moved to the region

In social impact assessment methodology, it is important to understand the opinions of people who have moved to the area due to factors associated with the project development. In this case, students have moved to Ouarzazate to study in the new educational program focusing on renewable energy. Foreign workers (mostly European) would have been another stakeholder group in this category, but because this is not a vulnerable group, they are not a focus of the sustainable livelihood analysis.

As the recently immigrated students had no baseline for comparing the region's past with its present, they could only evaluate a limited number of impacts. The smaller number of impacts resulted in a higher importance ranking, but the ranking order still allows for comparison to the other stakeholder groups.

The students assigned the highest importance to the values 6 "Social peace and community cohesion" and 23 "Public interest in renewable energy", while they were most affected by impact 7 "Uncertainty, unrealistic expectations and frustration". The participants found value 23 to be important because they hoped public awareness of renewable energy would help them to start businesses in the sector. They hoped that renewable energy would boost the nation's economy and rationalize the generation of energy. At the same time the students were overwhelmed by the pressure of answering the public's questions regarding renewables in general and Noor$_o$ I in particular. Additionally, the students stated that they perceived

that studying renewable energies in Ouarzazate did not enable them, as some of them had hoped, to find employment at $Noor_o$ I later on.

10.1.7 Comparison of results for the different communities

It is also of interest if differences in the significance evaluation of impacts exist between the communities. Table 10–10 overviews the average ratings of importance and affectedness for the different communities. The findings from the transformation of participant's ranking into rating scores are inconsistent among communities. Taking a closer look at the importance rankings of values, it becomes apparent that, across communities, high importance was only attached to 19 "Poverty alleviation, income generation, health care and improved standard of living" and to 1 "Family and social support" by the communities of Ouarzazate and Ghassate and 15 "Water security in the Draa Valley" by the communities of Ouarzazate and Agdz. Of moderate importance across communities were values 5 "Inclusion of marginalized communities and social groups", 6 "Social peace and community cohesion", 10 "Improvement of living conditions in adjacent communities," and 11 "Regional socio-economic and infrastructure development". Low importance was attached across communities to 9 "Trust in project developers and addressing community concerns", 23 "Public interest in renewable energy" and 30 "Road and public safety," and to 12 "Availability and affordability of regional infrastructure and services" in Ouarzazate and Ghassate. A larger difference among communities in the value importance ranking exits for 11 "Regional socio-economic and infrastructure development", 18 "Economic participation of micro-scale SMEs" and 24 "Skill development and knowledge transfer (particularly among youth)", which ranged from low to high importance. Value 11 was ranked to be of high importance by participants from Idelsane / Skoura and of medium importance in Ouarzazate but only of low importance in Ghassate. Similarly, 24 was ranked high in Ouarzazate and Idelsane / Skoura but low in Gassate and Agdz. Value 18 concerning SMEs was ranked as high in Ouarzazte and low in Agdz, which can be explained by the fact that SME participants and businesses in general are mainly based in Ouarzazate.

			Mean level of importance and affectedness in the four communities							
			Ouarzazate (n=36)		Ghassate (n=25)		Agdz (n=23)		Idelsane / Skoura (n=21)	
			Importance	Affectedness	Importance	Affectedness	Importance	Affectedness	Importance	Affectedness
	Values	**Livelihood impacts**								
1	Family and social support	Strengthened family ties and social support	8.3	0.8	6.0	1.2				
3	Local and regional reputation	Intensified local pride and gains for regional reputation	2.7	2.6	3.5	2.5	3.5	1.9	5.0	2.6
5	Inclusion of marginalized communities and social groups	Preferential treatment of local communities and socio-economic inclusion of women	4.8	1.2	5.3	1.5	5.2	1.1	6.4	1.9
10	Improvement of living conditions in adjacent communities	Improved living conditions in adjacent communities	7.2	1.2	5.1	1.5				
11	Regional socio-economic and infrastructure development	Spurred regional socio-economic and infrastructure development	5.2	1.4	1.5	0.3			7.3	2.0
17	Economic participation of SMEs	Economic participation and benefits for local SMEs	4.0	0.3			3.0	0.0		
19	Poverty alleviation, income generation, health care and improved standard of living	Improved socio-economic situation and standard of living	6.4	1.4	6.0	1.5	6.8	1.1	7.1	1.9
21	Regional prosperity and value added	Increased regional prosperity and value added	2.4	1.6	2.1	2.2	4.0	2.1	4.5	1.3
23	Public interest in renewable energy	Increased public interest in renewable energy systems and civil society engagement	3.4	1.8	1.6	1.6	3.5	1.6	2.4	1.8
24	Skill development and knowledge transfer (particularly among youth)	Benefits from skill development and knowledge transfer particularly among youth	7.0	1.1	2.8	2.1	1.5	1.5	5.0	1.0
26	Technology transfer to local firms	Strengthened technological capacity of local firms	3.3	0.7			0.0	0.0		
	Values	**Livelihood impacts**								
2	Preservation of social standing and political influence	Loss of social standing and political influence	2.9	0.4	1.4	1.5				
4	Preservation of community	Accelerated change in community	3.9	1.0	4.3	1.3	5.7	1.2	5.7	0.3

	atmosphere and cultural identity	atmosphere and cultural identity									
6	Social peace and community cohesion	Social conflict, rivalry and feelings of envy	5.5	1.1	4.3	2.3	7.1	1.1	6.0	1.0
7	Provision of transparent and comprehensive information	Uncertainty, unrealistic expecta-tions and frustration	4.4	1.7	1.4	2.3	4.2	1.4	2.4	1.3
8	Community engagement and participation in decision-making processes	Social exclusion and powerlessness in decision-making	3.9	1.2	4.3	2.0	5.9	1.8	5.2	1.5
9	Trust in project developers and addressing community concerns	Suspicion towards the project, its developers and community protest	2.7	0.5	1.5	1.4	4.0	1.0	2.6	0.5
12	Availability and affordability of regional infrastructure and services	Strain on regional infrastructure and services	2.4	1.6	0.6	1.3				
13	Preservation of land as a culturally important resource	Decreased psychological well-being and loss of cultural attachment in adjacent communities			5.2	1.1				
14	Maintain sufficient water supply in Tasselmant	Decreased water security in the community of Tasselmant			3.3	0.8				
15	Water security in the Draa Valley	Deprivation of farming livelihoods in Ouarzazate and cascading effects in the downstream oases of the Draa Valley	6.4	1.5			8.5	1.9		
16	Preservation of biodiversity in adjacent communities	Deprivation of subsistence activi-ties in adjacent communities			0.1	1.3				
18	Economic participation of micro-scale SMEs	Economic exclusion of micro-scale SMEs	6.7	2.3			0.0	2.0		
20	Preservation of subsistence farming activities in adjacent villages	Deteriorated socio-economic situation and standard of living in adjacent communities	3.4	0.2	2.6	0.8				
22	Price stability of local com-modities	Erosion of local purchasing power and decreased standard of living among low-income groups	2.4	0.8	2.9	1.0	3.0	0.5	4.1	0.6
25	Educational qualifications	Mismatch between educational qualifications and labor market requirements	4.8	1.5	5.3	1.5	6.0	2.5	5.3	2.0
27	Fair and equal labor conditions	Poor and unequal labor conditions	5.5	1.5	3.5	2.5	0.5	1.5	1.0	2.0

28	Tranquil environment and quiet surroundings	Influence of noise, dust and vibration on psychological well-being			0.0	1.6				
29	Clean and unpolluted environment (land, water resources)	Environmental pollution	4.7	0.5	1.4	1.4	6.3	0.2		
30	Road and public safety	Increased crime and fatal road accidents	1.8	0.6	0.4	0.7			3.5	1.0

Assessment of importance and affectedness

Level of importance: High, Medium, Low, Not rated

Level of affectedness rating (positive): High, Medium, Low, Not rated

Level of affectedness rating (negative): High, Medium, Low, Not rated

Table 10–10: Average ratings based on ranks and scores given by participants grouped by communities

Assessing the affectedness of communities shows that overall the only impact that affected Ouarzazate, Ghasasate and Idelsane / Skoura highly - and Agdz close to moderately - was impact 3 ”Intensified local pride and gains for regional reputation”. Another impact that affected three of the four communities at least moderately was 25 “Mismatch between educational qualifications and labor market requirements”. Furthermore, in the communities of Ouarzazate and Agdz, impact 18 “Economic exclusion of micro-scale SMEs” was also rated as being of medium effect. Additional commonalities among the communities relate only to impacts with low effects. These include 4 “Accelerated change of community atmosphere and cultural identity”, 9 “Suspicion towards the project, its developers and community protest”, 17 “Economic participation and benefits for local SMEs”, 20 ”Deteriorated Socio-economic situation and standard of living in adjacent communities”, 22 “Erosion of local purchasing power and decreased standard of living among low-income groups”, 26 “Strengthened technological capacity of local firms”, 29 “Environmental pollution”, and 30 “Increased crime and fatal road accidents.” Differences in affectedness levels exist for the impacts 6 “Social conflict, rivalry and feelings of envy”, 7 “Uncertainty, unrealistic expectations and frustration”, 8 “Social exclusion and powerlessness in decision-making” and 11 “Spurred regional socio-economic and infrastructure development”. Impacts 6, 7, and 8 have been rated as having high effects in Ghassate but in other communities 6 was rated to have only a low impact, and 7 and 8 to have only a low to moderate impact.

The same patterns are reflected in the significance evaluation of the impacts. Figure 10-11 shows that the correlation between level of importance and level of affectedness is stronger for the impacts with low significance. Likewise, Figure 10-11 shows that Ouarzazate was least affected by the CSP development, while the commune of Ghassate experienced the most impacts. This result is not surprising as Ghassate is the commune located next to the CSP development while Ouarzazate and the communities of Agdz and Idelsane / Skoura are located some distance from the power plant. The results also show that the participants from Ghassate did assign lower importance to the values associated with the impacts that would affect them most resulting only in low to medium significance for most impacts. In the community of Idelsane / Skoura, a clear correlation between impact level and importance level resulted in higher significance levels. Accordingly, a medium to high significance level can be assigned in these communities to the impacts 3 “Intensified local pride and gains for regional reputation”, 5 “Inclusion of marginalized communities and social groups”, 11 “Spurred regional socio-economic and infrastructure development”, 19 ”Improved Socio-economic situation and standard of living”, and 25 “Mismatch between educational qualifications and labor market requirements“. Impacts 11 and 19 especially illustrate that despite the feelings of social rivalry and envy that were confirmed earlier, communities that are not located closest to the plant but in the near area will benefit from significant impacts with regards to the CSP development. However, this does not mean that they benefit equally. Impact 25 is also of high significance for Agdz next to impact 15 “Deprivation of farming livelihoods in Ouarzazate and cascading effects in the downstream oases of the Draa Valley”. Here, impact 25 suggests that the population of Agdz in particular needs support to improve skills for addressing needs that are sought after in the labor market.

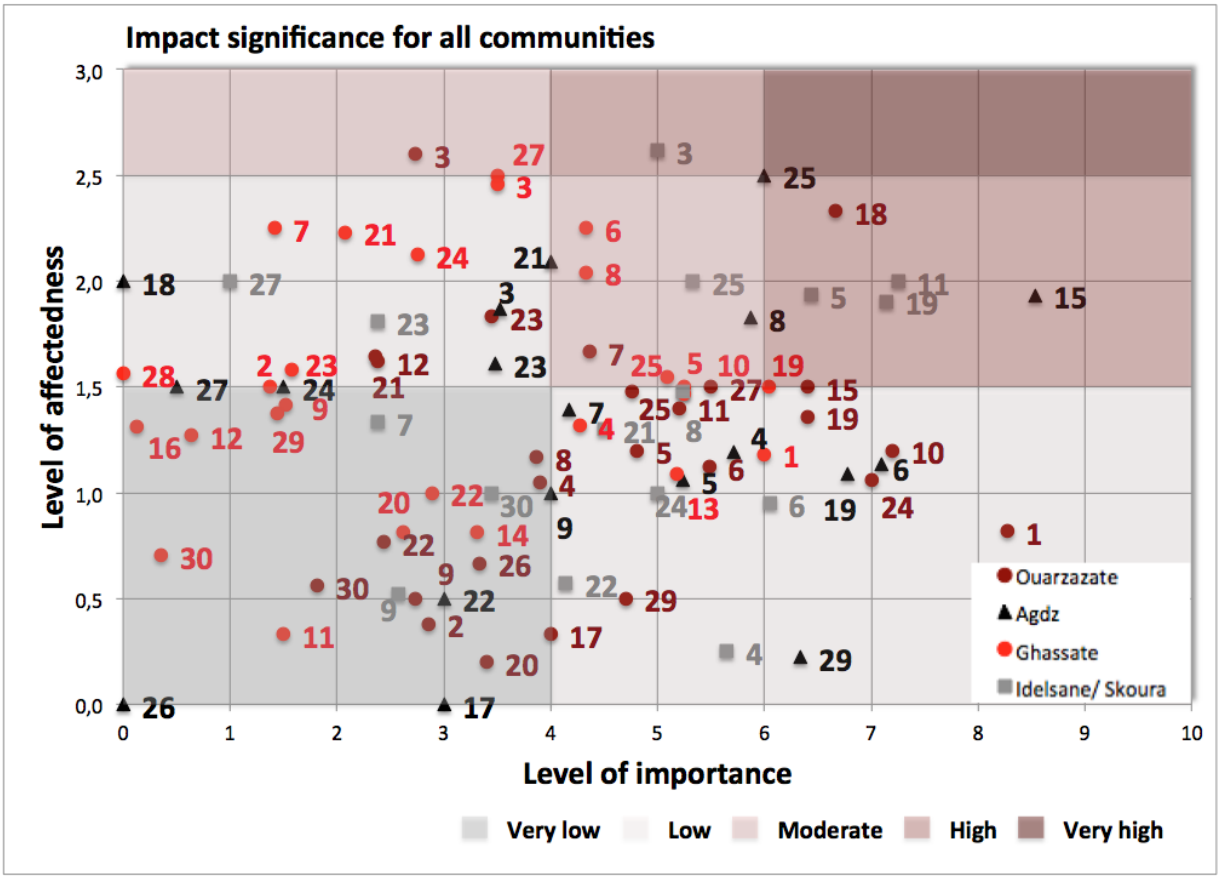


Figure 10-11: Impact significance findings for all communities

10.1.8 Summary of results for the participatory assessment of impact significance

This section summarizes the findings from the focus groups to provide an overview of which impacts are of significance to the different local stakeholder groups.

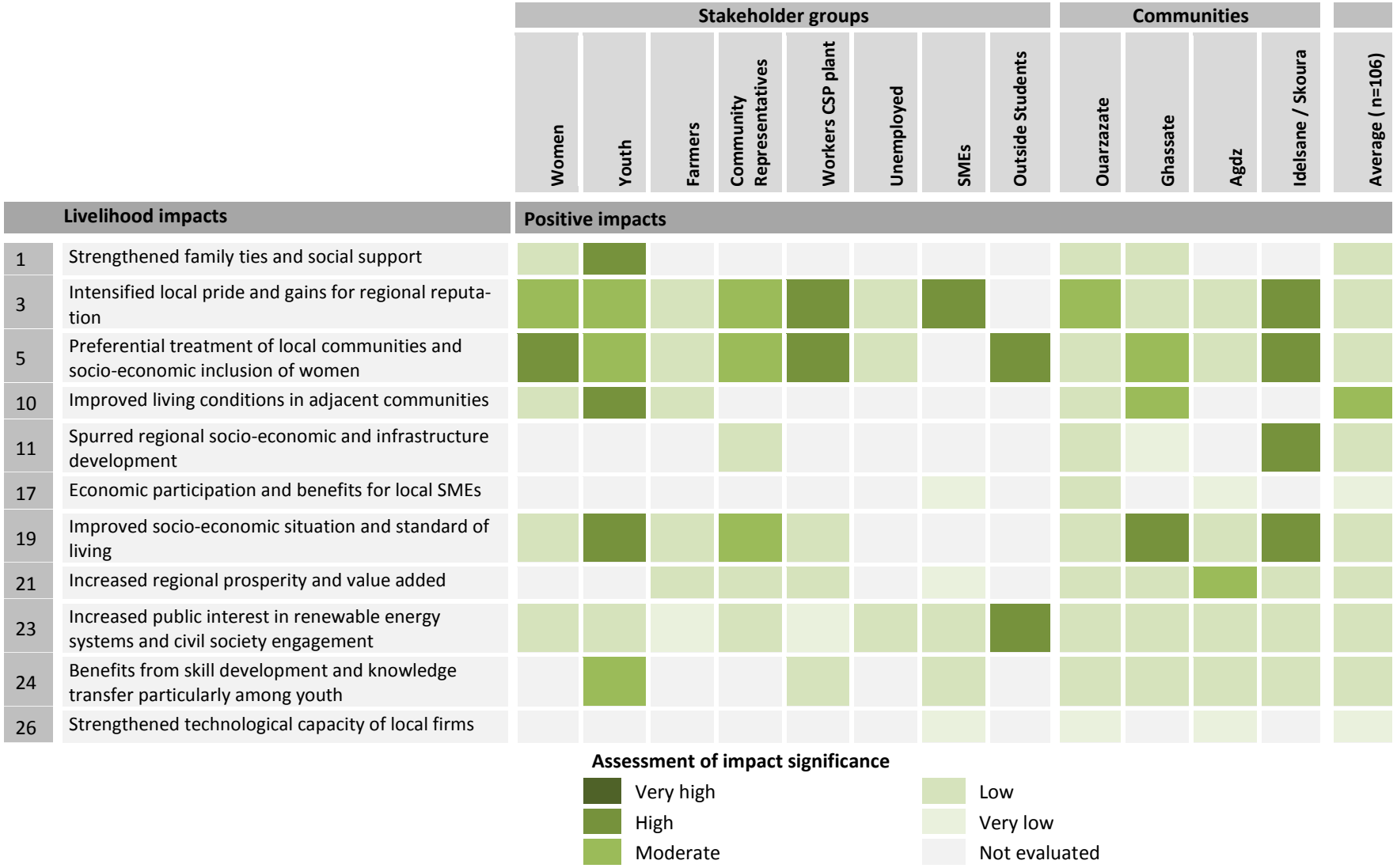
The results of applying impact significance classification to the level of importance of values and level of affectedness of impacts above are presented in Table 10–11. It becomes apparent that a) only a small number of impacts have a very high or high significance and b) that more positive impacts were assessed as having a higher significance than negative impacts. Many of the impacts were assigned a lower significance level than previously expected. However, that does not mean that individuals were / are / will not be highly affected by impacts in positive or negative ways. Those impacts that were in relative terms the most significant positive impacts were 3 “Intensified local pride and gains for regional reputation”, 5 “Inclusion of marginalized communities and social groups”, 10 “Improved living conditions in adjacent communities”, and 19 “Improved socio-economic situation and standard of living” while the most significant negative impacts were 6 “Social conflict, rivalry and feelings of envy”, 7 “Uncertainty, unrealistic expectations and frustration”, 8 “Social exclusion and powerlessness in decision-making”, 15 “Deprivation of farming livelihoods in Ouarzazate and cascading effects in the downstream oases of the Draa Valley”, 25 “Mismatch between educational qualifications and labor market requirements”, and 27 ”Poor and unequal labor conditions”. All of these impacts have already been observed, with the exception of impact 15 addressing the water situation in Ouarzazate and the Draa Valley. The high significance

attached to this potential future impact can be explained by water being one of the scarcest resources in the region and at the same time being of high importance for local livelihoods.

In some categories, the average figure results in "low" although several stakeholder groups had assessed that category between "moderate" and "very high". This is reasonable since an average of "low" means, that both in case of level of affectedness and level of importance the groups "low", "medium", and "high" could have been affected (Table 10–4). For example, if the level of affectedness has been assessed as "low", the average value was <1.5. If the total range has been between 0 and 2 (average = 1), other significance values would have been elaborated as if the total range has been between 0 and 2.8 (average = 1.4). This means that the higher the range of stakeholder evaluations is, the broader the range of the final assessment appears.

The distribution of significance among stakeholder groups illustrates that the youth and the students who moved to Ouarzazate to study rated more impacts as significant compared to the farmer groups that attached lower significance to all impacts. This is because young people had higher expectations for the development of $Noor_o$ I in terms of employment, income, and educational opportunities. No substantial difference was observed in the impact significance across different communities. Although it was previously shown that stakeholders from the community of Ghassate perceived higher levels of affectedness due to the proximity to the project site, the impact significance does not differ considerably from the other communities.

Assessing the distribution of significant impacts with regards to the distribution between the sustainable livelihood capitals, it can be noted that impacts affecting the social (3, 4, 5), political (7, 8) and human capital (25, 27) were among the most significant. Most impacts associated with the physical, financial and natural capital were assigned lower significance. This emphasizes the importance of measuring not only material and environmental values in impact assessments but also paying closer attention to social factors such as cultural identity and social cohesion.


Stakeholder groups
Communities
Women
Youth
Farmers
Community Representatives
Workers CSP plant
Unemployed
SMEs
Outside Students
Ouarzazate
Ghassate
Agdz
Idelsane / Skoura
Average (n=106)
Livelihood impacts
Positive impacts
1 Strengthened family ties and social support
3 Intensified local pride and gains for regional reputation
5 Preferential treatment of local communities and socio-economic inclusion of women
10 Improved living conditions in adjacent communities
11 Spurred regional socio-economic and infrastructure development
17 Economic participation and benefits for local SMEs
19 Improved socio-economic situation and standard of living
21 Increased regional prosperity and value added
23 Increased public interest in renewable energy systems and civil society engagement
24 Benefits from skill development and knowledge transfer particularly among youth
26 Strengthened technological capacity of local firms
Assessment of impact significance
Very high
High
Moderate
Low
Very low
Not evaluated

	Livelihood impacts	Negative impacts
2	Loss of social standing and political influence	
4	Accelerated change in community atmosphere and cultural identity	
6	Social conflict, rivalry and feelings of envy	
7	Uncertainty, unrealistic expectations and frustration	
8	Social exclusion and powerlessness in decision-making	
9	Suspicion towards the project, its developers and community protest	
12	Strain on regional infrastructure and services	
13	Decreased psychological well-being and loss of cultural attachment in adjacent communities	
14	Decreased water security in the community of Tasselmant	
15	Deprivation of farming livelihoods in Ouarzazate and cascading effects in the downstream oases of the Draa Valley	
16	Deprivation of subsistence activities in adjacent communities	
18	Economic exclusion of micro-scale SMEs	
20	Deteriorated socio-economic situation and standard of living in adjacent communities	
22	Erosion of local purchasing power and decreased standard of living among low-income groups	
25	Mismatch between educational qualifications and labor market requirements	
27	Poor and unequal labor conditions	
28	Influence of noise, dust and vibration on psychological well-being	
29	Environmental pollution	

30	Increased crime and fatal road accidents															

Assessment of impact significance

	Very high		Low
	High		Very low
	Moderate		Not evaluated

Table 10–11: Illustration of results from the participatory assessment of impact significance

10.2 Results of the technical approach: expert survey

This section describes the results of the evaluation by 25 local and international experts of the anticipated and observed livelihood impacts that local stakeholders identified as described above. This technical approach complements the participatory approach to reduce the risks of participatory approaches such as biased judgments or overlooking significant impacts. The impacts were assessed based upon four criteria: intensity, geographic range, duration, and likelihood. Furthermore, the confidence level of the experts in making the judgments was assessed and integrated into the evaluation. Each criterion was rated on a significance scale as described in Table 10–12. The impact assessment methodology is described in detail in section 5.3.2.

Intensity		Geographic range		Duration		Likelihood	
None	0	Community-scale	1	Momentary	1	None	0
Low	2	Commune	2	Short term	2	Unlikely	2
Medium	3	Urban	3	Medium term	3	Likely	3
High	4	Provincial	4	Long term	4	Most likely	4
Very High	5	Regional	5	Irreversible	5	Definite	5

Table 10–12: Overview of significance criteria and scale

Table 10–12 overviews the five-point scales used to assess the impacts. Experts were only asked to evaluate those impacts germane to their specialty. Impacts that were evaluated by the local experts that fell outside of their expertise were excluded from the evaluation. An overview of the impacts is presented again in Table 10–13. The results of this evaluation are described below.

	Livelihood impacts
1	Strengthened family ties and social support
2	Loss of social standing and political influence
3	Intensified local pride and gains for regional reputation
4	Accelerated change in community atmosphere and cultural identity
5	Preferential treatment of local communities and socio-economic inclusion of women
6	Social conflict, rivalry and feelings of envy
7	Uncertainty, unrealistic expectations and frustration
8	Social exclusion and powerlessness in decision-making
9	Suspicion towards the project, its developers and community protest
10	Improved living conditions in adjacent communities
11	Spurred regional socio-economic and infrastructure development
12	Strain on regional infrastructure and services
13	Decreased psychological well-being and loss of cultural attachment in adjacent communities
14	Decreased water security in the community of Tasselmant
15	Deprivation of farming livelihoods in Ouarzazate and cascading effects in the downstream oases of the Draa Valley
16	Deprivation of subsistence activities in adjacent communities
17	Economic participation and benefits for local SMEs
18	Economic exclusion of micro-scale SMEs
19	Improved socio-economic situation and standard of living
20	Deteriorated socio-economic situation and standard of living in adjacent communities
21	Increased regional prosperity and value added
22	Erosion of local purchasing power and decreased standard of living among low-income groups
23	Increased public interest in renewable energy systems and civil society engagement
24	Benefits from skill development and knowledge transfer particularly among youth
25	Mismatch between educational qualifications and labor market requirements
26	Strengthened technological capacity of local firms
27	Poor and unequal labor conditions
28	Influence of noise, dust and vibration on psychological well-being
29	Environmental pollution
30	Increased crime and fatal road accidents

Table 10–13: Overview of livelihood impacts

The intensity of an impact describes the level to which the livelihood of the local communities is affected by this impact. As Figure 10-12 shows, experts rated nearly all impacts to be only of low to medium intensity. Experts rated Impact 30 “Increased crime and fatal road accidents“ as having almost no effect on the local communities. Of the seven impacts rated as having the highest intensity with ratings of medium intensity (3) or higher, five are positive impacts and two are negative impacts. The positive impacts include 3 “Intensified local pride and gains for regional reputation”, 11 “Spurred regional socio-economic and infrastructure development”, 19 “Improved Socio-economic situation and standard of living”, 21 “Increased regional prosperity and value added,” and 24 “Benefits from skill development and knowledge transfer particularly among youth”. The two negative impacts that were rated to

be above medium intensity were 18 ”Economic exclusion of micro-scale SMEs” and 25 “Mismatch between educational qualifications and labor market requirements”. Both impacts are associated with the fact that the implementation of a complex, new technology like CSP requires specific skills and that the human capital available within the local economy can only partly meet these requirements. Although the project provided investments in supplementing the technical skills of the local workforce, as shown by the rating of impact 24, it is necessary to continue to strengthen the overall education and skill base of the population and the private sector. However, this task cannot be appropriately addressed by the stakeholders involved in implementing a renewable energy project alone but requires efforts and commitment well beyond $Noor_o$ I.

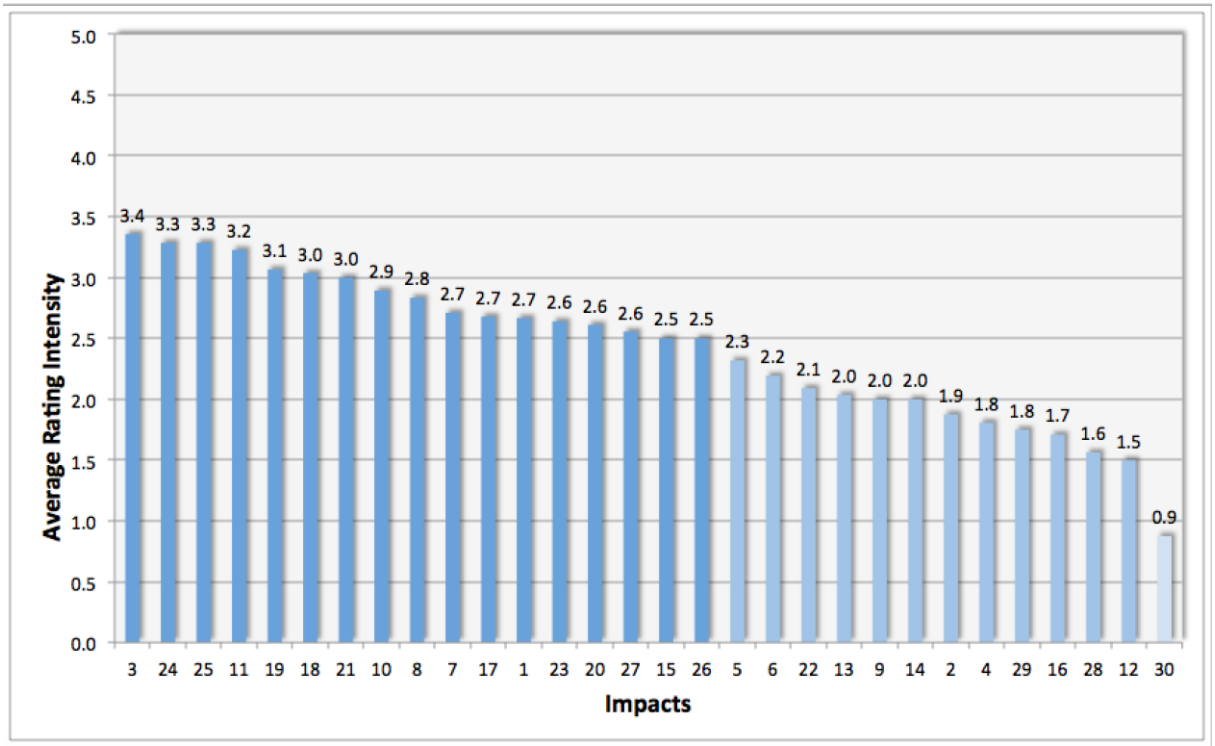


Figure 10-12: Intensity rating

The second significance criterion against which the experts evaluated the impacts was the geographic range of impacts. The geographic range refers to whether impacts are limited to a small area or affect a wider radius. As this study focused only on local impacts, the scale was limited to the regional context within Morocco and it ranges from community-scale (only affecting individual communities) to effects on the regional level (see Table 10–12).

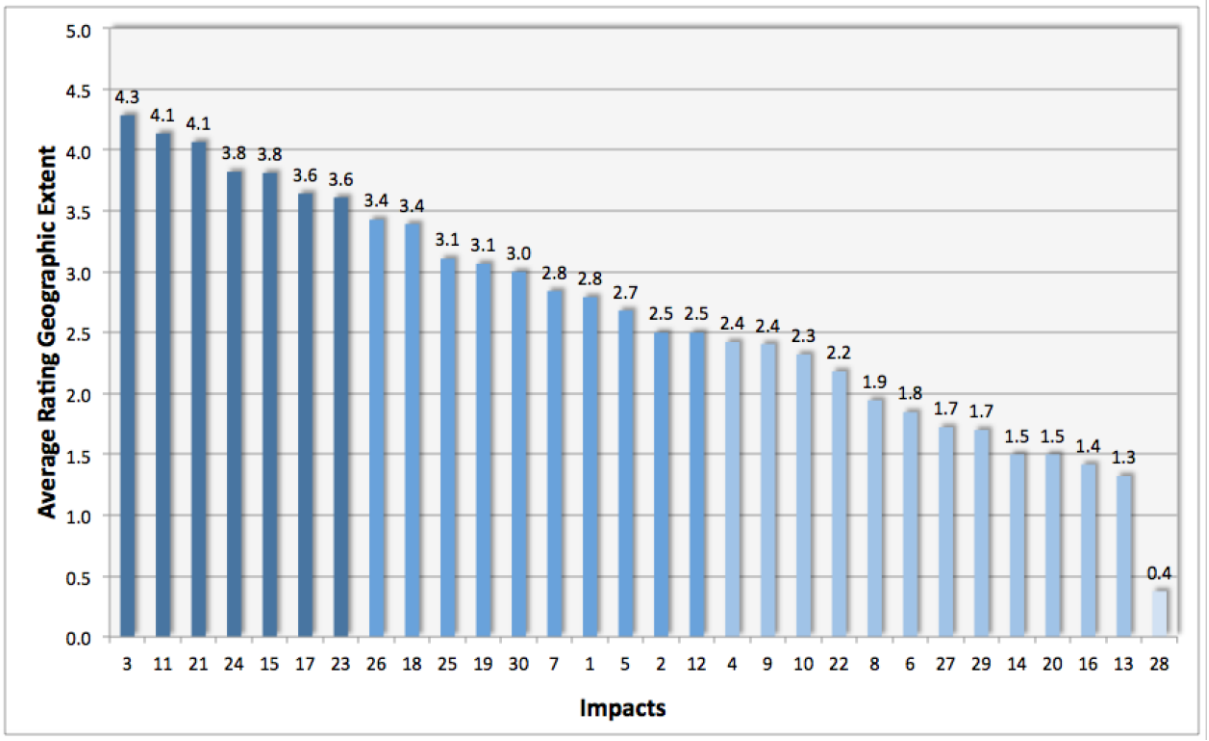


Figure 10-13: Geographic range rating

The experts rated a number of impacts to have effects up to the provincial level as Figure 10-13 shows. These include mainly positive impacts like 3 “Intensified local pride and gains for regional reputation”, 11 “Spurred regional socio-economic and infrastructure development”, 17 “Economic participation and benefits for local SMEs”, 21 “Increased regional prosperity and value added”, 23 “Increased public interest in renewable energy systems and civil society engagement” and 24 “Benefits from skill development and knowledge transfer particularly among youth”. The only negative impact that experts rated to have effects up to provincial level was 15 “Deprivation of farming livelihoods in Ouarzazate and cascading effects in the downstream”. This is an anticipated impact, but if it were to occur it would be significant in terms of geographic range. In comparison, an impact with a very limited geographic range was 28 “Influence of noise, dust and vibration on psychological well-being” which obviously only affects the area adjacent to the project site. Other impacts that experts thought would have a limited range were impact 13 “Decreased psychological well-being and loss of cultural attachment in adjacent communities”, 14 “Decreased water security in the community of Tasselmant”, 16 “Deprivation of subsistence activities in adjacent communities” and 20 “Deteriorated socio-economic situation and standard of living in adjacent communities”. These impacts are by definition limited to the communities adjacent to the power plant. The expert ratings confirm the results from the impact identification process, that the assessed impacts only affect a limited area and a smaller group of people.

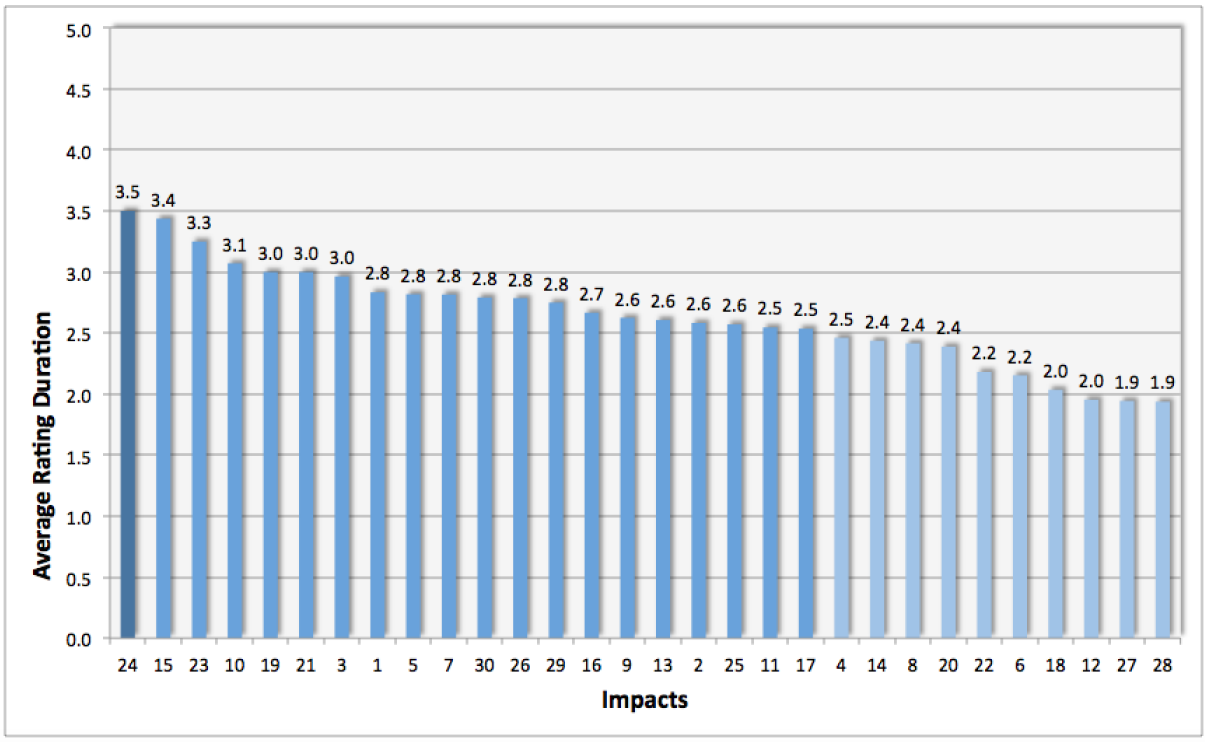


Figure 10-14: Duration rating

The third criterion used to assess the impact significance was the duration of the anticipated and observed impacts. Duration refers to the length of time an impact affects the local communities from momentary, short-term, medium-term, long-term to irreversible. Figure 10-14 shows that the experts did not classify any of the impacts as being irreversible and they only rated one impact to be of medium to long-term effect. This was the positive impact 24 “Benefits from skill development and knowledge transfer particularly among youth”. The expected longer-term benefit of this impact can be attributed to the fact that training and skill development can expand the human capital available within the local economy in the long-term. Trained personnel engaged in the construction phase may have better chances of gaining employment at the regional or national level after construction is complete.

Other impacts that are expected to persist for a longer period of time include the negative impact 15 “Deprivation of farming livelihoods in Ouarzazate and cascading effects in the downstream oases of the Draa Valley” and the positive impacts 3 “Intensified local pride and gains for regional reputation”, 10 “Improved living conditions in adjacent communities”, 19 “Improved Socio-economic situation and standard of living”, 21 “Increased regional prosperity and value added” and 23 “Increased public interest in renewable energy systems and civil society engagement”. Overall, however, the impacts are rated to be only of short-term to medium-term effect, meaning that most impacts are expected to be shorter than the project lifespan. This underscores the need to accompany energy infrastructure projects like $Noor_o$ I with additional measures to share the benefits with the local communities, if the project aims to support sustainable development within the region.

The research also evaluated the likelihood of the impacts occurring. The likelihood describes the probability that an impact will occur. The average expert ratings of the likelihood of the impacts occurring are presented in Figure 10-15. It illustrates that most impacts are rated to be likely to occur, describing a probability of up to 50%. A higher probability was only as-

signed to the positive impacts 3 “Intensified local pride and gains for regional reputation” and 11 “Spurred regional socio-economic and infrastructure development”. Impacts rated as unlikely to occur were the negative impacts 4 “Accelerated change of community atmosphere and cultural identity”, 12 “Strain on regional infrastructure and services”, 14 “Decreased water security in the community of Tasselmant”, 22 “Erosion of local purchasing power and decreased standard of living among low-income groups”, 27 “Poor and unequal labor conditions” and 29 “Environmental pollution”. The probability of impact 30 “Increased crime and fatal road accidents” occurring was rated to be close to zero. These results show that experts rated many of the impacts on the human capital dimensions of livelihoods as having a low likelihood, while several impacts on the social and political capital were rated as having a higher likelihood. But experts assigned a higher probability to the impacts 23 “Increased public interest in renewable energy systems and civil society engagement” and 24 “Benefits from skill development and knowledge transfer particularly among youth” – which both have a human capital dimension – that opens up opportunities for changing processes.

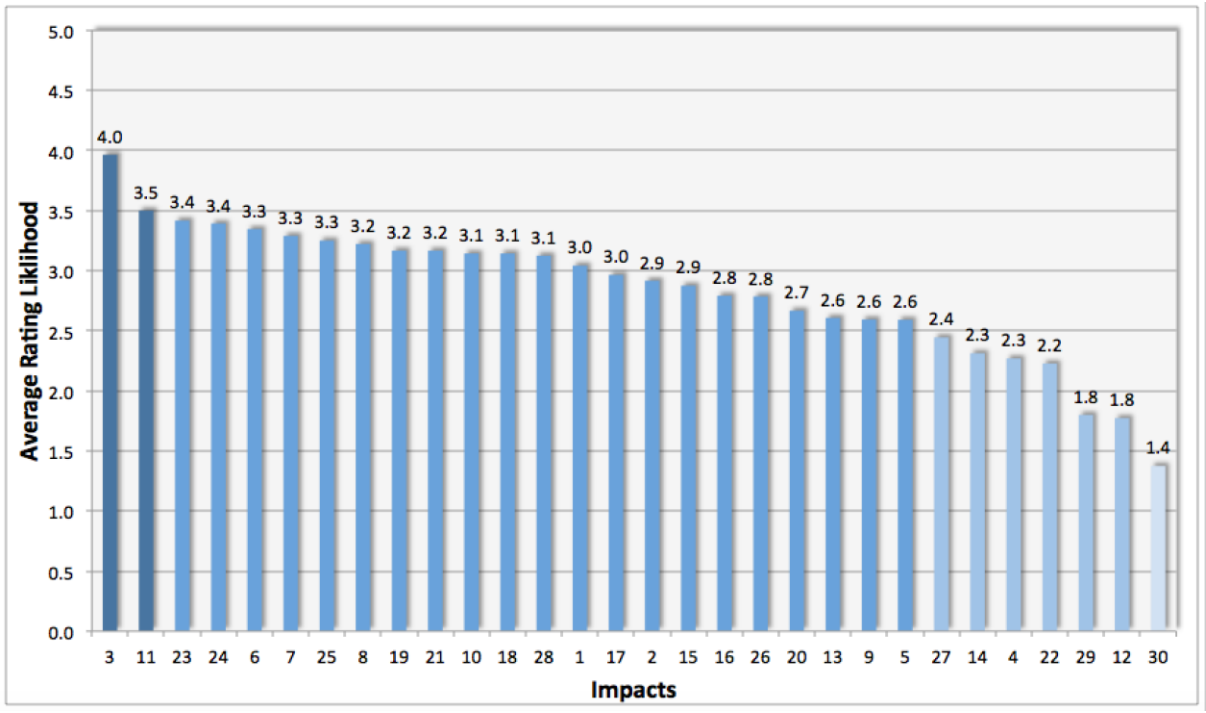


Figure 10-15: Likelihood rating

Based on the criteria intensity, geographic range, duration and likelihood the impact significance was finally determined. Therefore, the values for the criteria intensity, geographic range, and duration were summed and then multiplied with the value assigned to the likelihood, by aggregating the numerical values assigned to each impact for each criterion into a final score. The significance scores derived from the results of the expert impact evaluation were categorized into five significance levels, which were presented in Table 10–14.

		Impacts	Technical Approach (Expert survey)					Participatory Approach
		Status	Intensity (0-5)	Geographic range (0-5)	Duration (0-5)	Likelihood (0-5)	Average Significance Score Expert Survey (0-75)	Average Significance Local Stake-holder focus groups
	Livelihood impacts	**Positive impacts**						
1	Strengthened family ties and social support	observed / anticipated	2.7	2.8	2.8	3.0	26.8	
3	Intensified local pride and gains for regional reputation	observed	3.4	4.3	3.0	4.0	43.1	
5	Preferential treatment of local communities and socio-economic inclusion of women	observed	2.3	2.7	2.8	2.6	22.6	
10	Improved living conditions in adjacent communities	observed	2.9	2.3	3.1	3.1	28.1	
11	Spurred regional socio-economic and infrastructure development	anticipated	3.2	4.1	2.5	3.5	35.3	
17	Economic participation and benefits for local SMEs	observed	2.7	3.6	2.5	3.0	29.7	
19	Improved socio-economic situation and standard of living	observed	3.1	3.1	3.0	3.2	32.2	
21	Increased regional prosperity and value added	observed	3.0	4.1	3.0	3.2	36.4	
23	Increased public interest in renewable energy systems and civil society engagement	observed	2.6	3.6	3.3	3.4	36.4	
24	Benefits from skill development and knowledge transfer particularly among youth	anticipated	3.3	3.8	3.5	3.4	38.3	
26	Strengthened technological capacity of local firms	anticipated	2.5	3.4	2.8	2.8	27.8	

Assessment of positive impact significance*

- Very high (61-75)
- High (46- 60)
- Moderate (31- 45)
- Low (16 -30)
- Very low (0-15)

* Values in brackets refer to significance score from the expert evaluation

	Livelihood impacts	**Negative impacts**						
2	Loss of social standing and political influence	anticipated	1.9	2.5	2.6	2.9	22.2	
4	Accelerated change in community atmosphere and cultural identity	anticipated	1.8	2.4	2.5	2.3	15.3	
6	Social conflict, rivalry and feelings of envy	observed	2.2	1.8	2.2	3.3	21.8	

7	Uncertainty, unrealistic expectations and frustration	observed	2.7	2.8	2.8	3.3	31.6	
8	Social exclusion and powerlessness in decision-making	observed	2.8	1.9	2.4	3.2	25.0	
9	Suspicion towards the project, its developers and community protest	observed	2.0	2.4	2.6	2.6	18.4	
12	Strain on regional infrastructure and services	anticipated	1.5	2.5	2.0	1.8	11.8	
13	Decreased psychological well-being and loss of cultural attachment in adjacent communities	observed	2.0	1.3	2.6	2.6	16.0	
14	Decreased water security in the community of Tasselmant	observed	2.0	1.5	2.4	2.3	16.9	
15	Deprivation of farming livelihoods in Ouarzazate and cascading effects in the downstream oases of the Draa Valley	anticipated	2.5	3.8	3.4	2.9	29.3	
16	Deprivation of subsistence activities in adjacent communities	anticipated	1.7	1.4	2.7	2.8	17.5	
18	Economic exclusion of micro-scale SMEs	observed	3.0	3.4	2.0	3.1	30.0	
20	Deteriorated socio-economic situation and standard of living in adjacent communities	observed	2.6	1.5	2.4	2.7	18.2	
22	Erosion of local purchasing power and decreased standard of living among low-income groups	anticipated	2.1	2.2	2.2	2.2	19.5	
25	Mismatch between educational qualifications and labor market require-ments	observed	3.3	3.1	2.6	3.3	31.2	
27	Poor and unequal labor conditions	observed	2.6	1.7	1.9	2.4	19.5	
28	Influence of noise, dust and vibration on psychological well-being	observed	1.6	0.4	1.9	3.1	12.2	
29	Environmental pollution	anticipated	1.8	1.7	2.8	1.8	12.2	
30	Increased crime and fatal road accidents	anticipated	0.9	3.0	2.8	1.4	6.7	

Assessment of negative impact significance*

- Very high (61-75)
- High (46- 60)
- Moderate (31- 45)
- Low (16 -30)
- Very low (0-15)

* Values in brackets refer to significance score from the expert evaluation

Table 10–14: Overview of results significance evaluation based on technical approach and participatory approach

The results of the expert survey show that none of the livelihood impacts were rated to be of high or very high significance. Eight impacts were rated as being of moderate significance while the remaining impacts were rated to be of only low to very low significance. From the eight impacts that where rated to be of moderate significance the highest significance score was for the positive impact 3 “Intensified local pride and gains for regional reputation”. Overall, the group of moderate impacts contained six positive impacts and two negative impacts. The negative impacts are of particular interest as these might require mitigation measures to protect the livelihoods of local stakeholders. These are impact 7 “Uncertainty, unrealistic expectations and frustration” and 25 “Mismatch between educational qualifications and labor market requirements”. The scores for both impacts were barely scored as being of moderate significance. Nevertheless, impact 7, which describes the unrealistic expectations of the local communities, should be considered for mitigation measures as it already led to disappointment and skepticism towards $Noor_o$ I. This livelihood impact is especially interesting as it results in something that people feel, which cannot be easily quantified. At the same time, these feelings can lead to tangible effects like protests, which could result in schedule slippage and cost overruns for project developers and financiers. That the experts rated this impact to be among the most significant shows that the material and physical aspects are not the only important aspects of large scale infrastructure projects like $Noor_o$ I. Non-material aspects of well-being are at least equally important for successful and sustainable project implementation. It is therefore important to closely monitor and try to mitigate this impact and to improve the process for the upcoming phases of $Noor_o$ by improving communication and dialogue with the local population.

Besides the eight impacts of moderate significance, most other impacts were rated to be of low significance and five impacts were even rated to have only a very low significance, including 4 “Accelerated change of community atmosphere and cultural identity”, 12 “Strain on regional infrastructure and services”, 28 “Influence of noise, dust and vibration on psychological well-being”, 29 “Environmental pollution”, and 30 “Increased crime and fatal road accidents” (see Table 10–14).

These results provide important insights, but to capture the reality of the project's impacts and their significance on the livelihoods of local communities, the results from the expert evaluation have to be coupled with the results of the participatory approach of the local stakeholders groups. This allows for the technical prediction of impacts to be placed within the context of community values (see Table 10–14).

10.3 Summary of results from the technical and participatory significance assessments

In this study different approaches were utilized to determine impact significance with local stakeholders and experts with regards to the impacts identified during the first research study (a detailed description of the methodology can be found in chapter 5.4.2). In the end, however, the significance was rated on a five-point scale ranging from very low to very high. Impacts classified as high or very high are considered to be significant. For significant, negative impacts, mitigation measures should be taken. Impacts of moderate significance should be mitigated if feasible and necessary, while impacts with “low” or “very low” significance often do not require mitigation measures.

The average ratings of impact significance from the impact assessments are presented in the last two columns of Table 10–14. The results show that the local stakeholders and experts rated all but one impact as having on average only very low to moderate effects. Furthermore, it is shown that the ratings from the participatory assessment and the expert survey differ only by one significance level (with one exception). This shows that although different perceptions exist, the overall evaluation of the social impact significance does not deviate substantially. There were few problems stemming from the risks of the initial participatory approach, such as providing biased judgments or overlooking significance.

The one exception was a negative impact that was assessed to be of high significance by local stakeholders and only of low significance by experts – impact 15 “Deprivation of farming livelihoods in Ouarzazate and cascading effects in the downstream oases of the Draa Valley”. This impact is anticipated for the future, and the high rating by local stakeholders can be explained by the fact that water is a very scarce resource in the region, which has already been suffering recently from severe droughts. Accordingly, local stakeholders fear that the water use of the power plant will put further pressure on the water resources in the region. However, MASEN emphasizes that the estimated water consumption for Noor$_o$ I would only be 0.7% of the regular annual water volume of the Mansour Eddahbi Dam. From their perspective, the water use from the reservoir will not have any impact on the other dam users, including water used for agricultural needs. Nevertheless, the concerns of the local stakeholders should be addressed. The other impact with regards to water security, impact 14 “Decreased water security in the community of Tasselmant” was rated to be of very low significance by local stakeholders and low significance by experts. Also several stakeholders from the community of Tasselmant stated during the process of assessment that this impact had already occurred, which might have been a misconception and the reason for the low rating. Furthermore, MASEN clarified that the Noor$_o$ I complex has not and will not use groundwater but only water from the Mansour Eddahbi Dam. The examples of these two impacts show that livelihood impacts are not always based on measurable changes but are also based upon perspectives and/or misconceptions. However, this does not mean that these impacts do not have to be addressed, but the mitigation measures would be different than for impacts that result in material consequences affecting the local livelihoods.

Although the ratings differ only marginally, experts rated most positive impacts as having higher significance than local stakeholders did. Local stakeholders rated several negative impacts as having higher significance than experts did. The reason could be based on an information deficit on the side of the local stakeholders, but it could also be because local stakeholders experience impacts differently or value certain livelihood aspects more than experts believe that they do. This could mean that from an objective point of view the impact might be negligible, but for the local stakeholders it would be significant. Local stakeholders also rated one positive and three negative impacts to be of moderate significance while experts rated them as being of low significance. These included impact 8 “Social exclusion and powerlessness in decision-making”, 10 “Improved living conditions in adjacent communities”, 18 “Economic exclusion of micro-scale SMEs”, and 27 “Poor and unequal labor conditions”. While positive impacts rated as more significant by local stakeholders, like impact 10, are welcome and do not require increased consideration, the negative impacts 8, 18, and 27 should be addressed.

Impact 8 resulted from insufficient information exchange between developers and the communities and shortfalls in the public engagement process, especially regarding the land acquisition process and the Social Development Plan. That these concerns exist was also stressed by one of the experts who highlighted that the power plant has impacts on collectively owned land in the region. Although it might be unrealistic to involve the communities in essential project decisions and the decisions related to the Social Development Plan that mainly are not made by the project implementing organizations but governed by the DAR, it will be important for the future phases of $Noor_o$ to develop better participatory community engagement processes. Representatives in public engagement processes do not typically systematically represent the affected communities. According to Stolp et al. (2002:12) “those individuals involved in public participation processes are often higher educated, better informed, have relatively more time, and a higher level of interest in the project than the average citizen”. Finally, it is important to mention and to consider that the methods of public involvement can alter the nature, magnitude, and importance ratings of social impacts (Lawrence, 2007c:781).

Impact 18 reflects the fact that complex and new technologies like CSP require specific skills that small-scale local SMEs are often unable to provide. As discussed in the previous section, the project already invested in supplementing the technical skills of the local workforce. However, a renewable energy project can only contribute to a limited extent to address underlying causes of unemployment such as the lack of education and limited skill base of the local population and the private sector. With regards to impact 27, it is important to acknowledge that workers perceived the labor conditions to some extent as poor and unequal, although the working conditions might be average within the regional context. However, the workers also stated that even though they are not fully content with the working conditions, they value regular employment. By examining the overall list of impacts it can be observed that experts rated in general the significance of impacts higher than local stakeholders. Different explanations are possible for this. Either local stakeholders are not yet aware of a particular impact because it has not yet occurred or they cannot yet evaluate the extent of effects on their livelihoods, even though from an objective point of view the impact is / will be significant. In this case, the expert evaluation helps to avoid the risk that important impacts could be neglected. Another explanation could be that experts a) place different weight on impacts than local stakeholders or b) have a more objective view because they are not personally affected. The fact that most experts rated the positive impacts as being of higher significance could either be because the positive impacts have not yet fully materialized but the experts expect that they will, or it could be because the experts are too optimistic about the positive impacts and vulnerable groups have a limited opportunity to benefit from them. Furthermore, positive impacts stemming from infrastructure projects are often overestimated for strategic reasons, to portray these developments in a more positive light.

It is important to understand that the concept of significance and the interpretation of the different significance levels are always to some extent subjective. Furthermore, the significance of social impacts can vary over time and among groups (Lawrence, 2007c:781). It is therefore unrealistic to expect complete consensus on impact significance among local stakeholder groups and between local stakeholders and experts. This also highlights the importance of conducting impact assessments separately for different stakeholder groups to ensure that the effects on vulnerable populations are considered. The results of such a

significance evaluation should be seen as opportunity to better understand the livelihood impacts and the possible reactions of affected communities in order to implement suitable mitigation measures to make large-scale renewable energy projects socially sustainable.

11 Discussion of empirical results and concluding remarks

To mitigate climate change, socio-economic development can no longer follow traditional pathways that depend heavily on fossil fuel energy sources. Instead, the adoption of renewable energy and phase-out of fossil fuels will need to be increased significantly. However, climate change mitigation itself does not ensure that energy development is sustainable. Sustainable energy must meet social, economic, and environmental goals. This study evaluated the livelihood dimension of CSP in Morocco to better understand how the social pillar of sustainability at the local level could be met in low-carbon energy projects.

Recognizing that the majority of renewable energy technologies are now cost-effective, the Global South is increasingly developing and deploying them. In fact, by adopting ambitious renewable energy rollout targets, numerous developing countries have accelerated their renewable energy strategies, transforming them into new global leaders towards a sustainable energy trajectory, while progress on renewable energy investments has stalled in many industrialized countries (IEA, 2013).

Among the forerunners in renewable energy policy-making, the kingdom of Morocco clearly has emerged as a standout, whose leadership shines beyond the MENA region. With ambitious targets, strong governmental policies and the patronage of King Mohammed VI, the country's national Solar Plan represents a potential game changing paradigm shift towards a low-carbon future. Morocco has already been ranked among the top ten countries globally based on its climate and energy policies and now ranks first among African and developing nations in this category (Germanwatch, 2014). More importantly, the Kingdom is implementing its National Energy Strategy in accordance with established deadlines (IEA, 2014:11) and has supported its commitment with concrete actions and an increasing quantity and scale of solar and wind projects. Today, Morocco generates the largest share of electricity from renewables and has the greatest number of renewable energy projects under construction of all Arab countries (RCREEE, 2014). However, the country has not simply prioritized its solar ambitions out of concern for the climate, but rather as means of securing climate-compatible and more inclusive development. Embedded within national development plans, the production of green electrons is envisioned to yield long-lasting dividends in terms of energy security, self-reliance and balance of payments as well as to grow local economies through *integrated solar development projects* along the renewables value chain. Among these projects, the planned 500 MW $Noor_o$ solar complex under construction in Ouarzazate is one of the most important developments. As an early mover, pioneering the feasibility of CSP in Africa, the success of $Noor_o$'s first phase, the 160 MW parabolic trough ($Noor_o$ I), will affect the regional and even global perceptions of the feasibility of CSP technology as an accessible low-carbon alternative needed to offset planned conventional electricity infrastructures.

> *"Convinced of the vital importance of protecting and preserving the environment, and having realized at an early stage — thanks to its geographical location — the potential impact of climate change, my country resolutely opted for sustainable development which, needless to say, goes hand in hand with human development."*
>
> King Mohammed VI at the conference "Energy Challenges in the Euro-Mediterranean Region" (2012).

Besides technical and economic aspects, there is also a locally specific component to the proof-of-concept of CSP. Acceptance of CSP by local communities where utility-scale CSP plants are sited is equally important if CSP technology is to become a socially accepted, and

widely utilized alternative in the future electricity system – not only in Morocco but throughout and beyond the MENA region. Guided by the main research question

"What are the positive and negative livelihood consequences stemming or anticipated from CSP development at the local level and how can livelihood co-benefits be maximized to achieve sustainable development in adjacent communities?"

this study aimed to scientifically contribute to the understanding of the livelihood dimension of CSP. The findings are based on the in-depth empirical analysis and assessment of Noor$_o$ I's livelihood dimension at the community level that included in total 346 local participants of numerous interview rounds, focus groups, an expert survey and validation workshops during three months of field research in Morocco. In this chapter the main findings are summarized and concluding remarks presented.

11.1 The livelihood dimension of Noor$_o$ I

While many renewable energy projects in Europe are faced with a *Not-In-My-Backyard (NIMBY)* attitude, the introduction of Noor$_o$ I was received very positively in the region of Ouarzazate (see Table 11-1). High levels of support were also found in regards to the eventual possibility to export the electricity generated by CSP to Europe, provided that the local population would see benefits. These findings sharply contrast with the skepticism and critique in the popular media and academia that usually arises from the typical "conflict-oriented" portrayal of deploying large-scale renewable energy projects in North Africa and the perception that exporting electricity from North Africa to Europe, or even from local communities to other parts of Morocco, would necessarily end in exploitative, neo-colonial relationships.

As approval and support of community stakeholders cannot be taken for granted but is highly dependent upon the project developer's *social license to operate* at the local level, much of Noor$_o$ I's high degree of community acceptance can be attributed to MASEN's approach that addressed the livelihood dimension of the project. Where public resistance was met, it can largely be traced to shortfalls in the project planning and implementation procedures (e.g., community engagement) and less to unsustainable project outputs. Based on the analysis and assessment of the positive and negative impacts of Noor$_o$ I, three interrelated factors were found to have shaped the livelihood dimension and thereby the community acceptance of Noor$_o$ I: project embededdness, implications for community livelihood sustainability, and community perceptions/awareness (see figure 11-1).

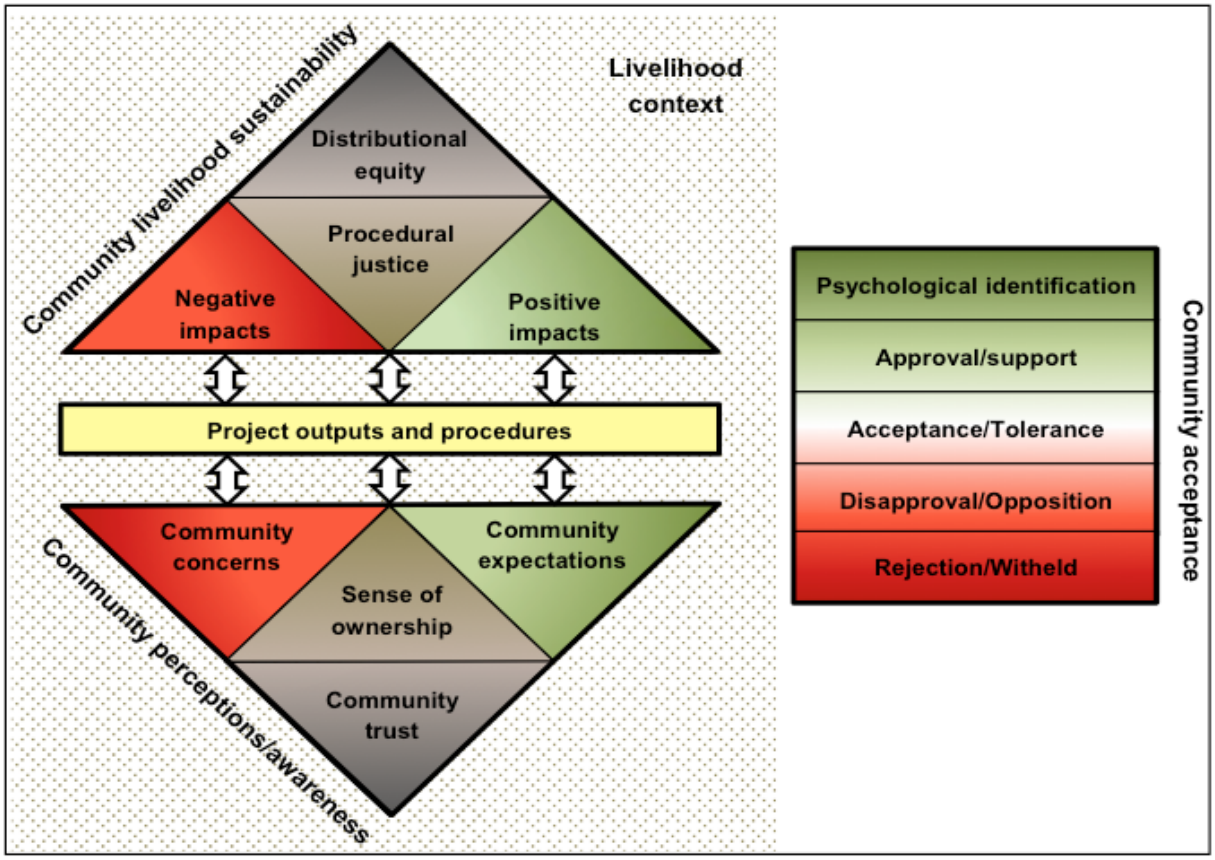


Figure 11-1: Factors influencing the livelihood dimension and community acceptance in regard to $Noor_o$ I

11.1.1 Project embeddedness in the local livelihood context

The development of the $Noor_o$ I project along the foot of the Atlas Mountains of southern Morocco is not occurring in isolation but is situated in a complex livelihood context with a long history, characterized by a combination of precarious sustainability challenges and limited coping capacities, such as:

- Environmental deterioration due to climate change, land degradation, diminishing water resources, and recurring periods of droughts;
- Social pressure due to a demographically young population, social inequalities, lack of social infrastructures, challenges relating to education and services, as well as rural exodus – especially among the youth;
- Economic marginalization due to high levels of unemployment and rural poverty, a lack of industrial competitiveness, a depleted tourism sector, and declining agricultural yields.

CSP plants are often sited based upon technical specifications and geographic features, such as solar insolation and the flatness of the land. The Moroccan government also considered the need for local socioeconomic development when siting the power plant. Although the project site was found to be well suited for a utility-scale CSP project due to its geographic features (including topography, geology, hydrology and solar radiation), this study illustrates that local livelihood context (exposure and coping capacities) should also be accounted for when choosing power plant sites, as it affects the significance of the economic, social, and environmental changes at the local level.

11.1.2 Implications for community livelihood sustainability

Although Noor$_o$ I has yet to be commissioned, the planning and construction phases have already had positive and negative effects on people's livelihoods, varying within and between communities across the different project phases. While direct, indirect, and cumulative impacts could already be observed for the completed project phases, the assessment also included anticipated impacts for the operational phase based on local stakeholder input and expert judgments. Among the factors that have had or will have implications for livelihood sustainability at the community level, issues related to procedural and distributional equity were found to be most important.

Enhancement and provision of positive livelihood impacts

The electricity generated at Noor$_o$ I will be routed to the country's southern and eastern cities in order to meet Morocco's growing electricity demand, rather than remaining in the local community. Therefore, MASEN has put great efforts into aligning CSP deployment to the region's vulnerability context to meet broader human development objectives and integrating the project within the productive structure of the local economy. Yet, CSP technology, despite being clean, is not a panacea to alleviate regional poverty and to deliver broader socio-economic development prospects. Consequently, stakeholders evaluated most of the benefits stemming from Noor$_o$ I as having low-moderate significance. Apart from indirect positive effects, such as strengthened family ties and social support from reversed migratory flows (low beneficial impact), an increased public interest in renewable energy (low to moderate beneficial impact), the creation of local employment opportunities, strengthened capacity, and improvements to social infrastructure in adjacent communities were found to be the most significant ways of demonstrating shared value and providing direct development prospects (see Table 11-1).

Employment and income opportunities and multiplier effects resulting from MASEN's efforts to encourage the project developer to achieve the highest possible local content during the construction phase, as well as the economic participation of local SMEs (very low to low beneficial impact), have already improved the socio-economic situation in the region and the standard of living in certain households (low to moderate beneficial impact). This income, if re-injected into the local economy, can generate economic multiplier effects that will increase prosperity and value added throughout the Ouarzazate region (low to moderate beneficial impact). While only a handful of the 700 direct construction jobs for local workers from the Ouarzazate area (out of more than 1,800 at the end of 2014) and business opportunities for local suppliers and contractors will remain during operation and maintenance, potential induced income effects in the service and tourism sector (e.g., Noor$_o$ attracting foreigners to visit the largest CSP plant in the world) could spur new and longer-term economic opportunities that have not previously existed in the region.

Despite MASEN's voluntary local content encouragements set for Noor I being an important vehicle to potentially promote industrial growth, sustaining local economic participation and delivering long-term benefits significantly depends on the absorptive capacities of the local economy. As the Ouarzazate region lacks a strong industrial base, MASEN emphasized addressing the limited local capacities by coupling its local procurement and recruitment policies with additional measures. The planned initiatives in the fields of local capacity building, skill development, and R&D raised hope within the local communities (low to moderate

beneficial impact) that the competitiveness and productivity of the local population would be increased throughout the entire value chain of the project. Although contributions of technology transfer to local firms were viewed with skepticism (very low to low beneficial impact), all of these measures are generally important to avoiding a new form of import dependency that would substitute fossil fuel dependency with reliance on imports of CSP-related technologies.

SLA issues	Positive livelihood impacts	Status	Average significance evaluation	
			by community (stakeholder)	by experts
Population size and social structure	*Strengthened family ties and social support*	*Observed/ Anticipated*	Low	Low
Community culture and sense of place	*Intensified local pride and gains for regional reputation*	*Observed*	Low	Moderate
Equity and gender equality	*Preferential treatment of local communities and socio-economic inclusion of women*	*Observed*	Low	Low
Community infrastructure and services	*Improved living conditions in adjacent communities*	*Observed*	Moderate	Low
Regional infrastructure	*Spurred regional socio-economic and infrastructure development*	*Anticipated*	Low	Moderate
Local content	*Economic participation and benefits for local SMEs*	*Observed*	Very low	Low
Household prosperity and standard of living	*Improved socio-economic situation and standard of living*	*Observed*	Low	Moderate
Regional prosperity	*Increased regional prosperity and value added*	*Observed*	Low	Moderate
Public awareness	*Increased public interest in renewable energy systems and civil society engagement*	*Observed*	Low	Moderate
Skill development	*Benefits from skill development and knowledge transfer particularly among youth*	*Anticipated*	Low	Moderate
Technology and knowledge transfer	*Strengthened technological capacity of local firms*	*Anticipated*	Very low	Low

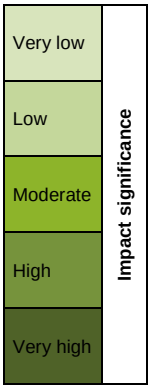


Table 11–1: Overview of positive livelihood impacts stemming from $Noor_o$ I

As the region has some of the country's poorest infrastructure and services, investments made under the Social Development Plan (SDP) – generated from the proceeds of the landtransfer for $Noor_o$ – and the voluntary measures taken by MASEN and ACWA Power that targeted improved access and availability of important social services were another crucial element in distributing net benefits at the local level (low to moderate beneficial impact). The SDP has already contributed to improved living conditions in adjacent communities and is expected to become a catalyst for further regional development by spurring future regional development plans and promoting continued improvements to infrastructure (low to moderate beneficial impact).

Generation and mitigation of negative livelihood impacts

In light of the region's precarious vulnerability context, most of the negative livelihood effects stemming from Noor$_o$ I are only partially attributable to project activities. The majority of the identified change processes and adverse impacts are not new but are intertwined with the existing sustainability challenges in the region. Additionally, the bulk of the negative consequences are neither specifically attributable to CSP technology nor to the local context. Rather, these drawbacks are inevitably experienced with most utility-scale infrastructure projects in remote areas around the globe. Yet, unlike the potential harm associated with mining activities and fossil fuel power plants at the local level, the negative impacts stemming from Noor$_o$ I were found to be generally low and significantly lower in areas including harm to public health and air and water pollution.

Among the negative impacts, the potential effect of the project's operational water withdrawal on the region's water scarcity stands out as the highest concern for local stakeholders (low-high adverse impact). The loss of 3,041 ha of collective land and restricted access to rather unfertile ecosystem goods and services were not perceived as critical enough to substantially deprive adjacent communities of subsistence activities or to desecrate the cultural attachment of local communities to their ancestral land (low adverse impact), it is the downstream oases of the Draa Valley where Noor$_o$ I could potentially have the most severe impacts (low to high adverse impact). Although the yearly water withdrawal during operation of 1.75 million m³ is estimated to be only 0.7% of the Mansour Eddahbi reservoir's 12-year average annual volume (2001-2013), the already observed decline it the reservoir's water capacity is reason for concern. In the period 1972-1998, the reservoir has lost more than 25% of its original capacity and MASEN currently even estimates the loss to be more than 50% with a present yearly average of 250 million m³ compared to the original 560 million m³ in the 1970s. Even worse: different future scenarios developed within the GLOWA-IMPETUS project simulate a signifcant reduction of the reservoir's water capacity for the next decades, with the worst-case scenario calculating that the Mansour Eddahbi reservoir could become inoperable between 2030 and 2042 plummeting to 0-200 million m³ due to climate change, societal and agricultural demands, and reservoir silting (Diekkrüger et al., 2010:11). Notwithstanding the inherent uncertainties of these scenarios, it must be stated that against the current observations and projections of a uncertain future, fulfilling the project's operational wet-cooling requirements could risk affecting people's livelihoods in the settlements of the Draa River – including food insecurity and social conflict. A fact that has been addressed by MASEN's decision to apply dry cooling technology for the next phases of Noor$_o$ (Noor$_o$ II and III) but could tip the scales of Noor$_o$ I.

The second highest negative impact of the project (of moderate significance), was theperceived mismatch between the training currently offered by local educational institutions and the requirements to work at Noor$_o$ I, despite MASEN's efforts to promote capacity building and skill development. Young people - and university graduates in particular - were frustrated to learn that their curricula did not match the requirements of the renewable energy labor market and that they were not qualified for medium to high-skilled employment at Noor$_o$ I. Similar frustrations were found among micro-scale SMEs that felt excluded from MASEN's procurement arrangements because they lacked capacities and skills (low to moderate adverse impact). Although MASEN was falsely associated with this mismatch, its causes are

more related to the education system in general and specifically to the low industrial base in the region.

SLA issues	Negative livelihood impacts	Status	Average significance evaluation	
			by community (stakeholder)	by experts
Population size and social structure	*Loss of social standing and political influence*	*Anticipated*	Very low	Low
Community culture and sense of place	*Accelerated change of community atmosphere and cultural identity*	*Anticipated*	Low	Very low
Community cohesion and conflict	*Social conflict, rivalry and feelings of envy*	*Observed*	Low	Low
Information and transparency	*Uncertainty, unrealistic expectations, and frustration*	*Observed*	Low	Moderate
Participation	*Social exclusion and powerlessness in decision-making*	*Observed*	Moderate	Low
Accountability and grievance resolution	*Suspicion towards the project, its developers as well as community protest*	*Observed*	Very low	Low
Regional infrastructure	*Strain on regional infrastructure and services*	*Anticipated*	Low	Very low
Land rights and access	*Decreased psychological well-being and loss of cultural attachment in adjacent communities*	*Observed*	Low	Low
Local water security	*Decreased water security in the community of Tasselmant*	*Observed*	Very low	Low
Regional water security	*Deprivation of farming livelihoods in Ouarzazate and cascading effects in the downstream oases of the Draa Valley*	*Anticipated*	High	Low
Biodiversity	*Deprivation of subsistence activities in adjacent communities*	*Anticipated*	Very low	Low
Local content	*Economic exclusion of micro-scale SMEs*	*Observed*	Moderate	Low
Household prosperity and standard of living	*Deteriorated socio-economic situation and standard of living in adjacent communities*	*Observed*	Very low	Low
Prices	*Erosion of local purchasing power and decreased standard of living among low-income groups*	*Anticipated*	Very low	Low
Skill development	*Mismatch between educational qualifications and labor market requirements*	*Observed*	Moderate	Moderate
Working conditions	*Poor and unequal labor conditions*	*Observed*	Moderate	Low
Health	*Influence of noise, dust and vibration on psychological well-being*	*Observed*	Low	Very low
	Environmental pollution	*Anticipated*	Very low	Very low
Safety	*Increased crime and fatal road accidents*	*Anticipated*	Very low	Very low

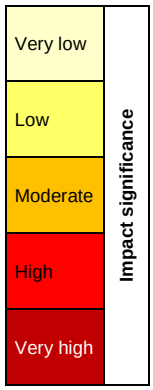


Table 11–2: Overview of negative livelihood impacts stemming from Noor$_o$ I

Furthermore, relative changes in employment and infrastructure in some communities and social groups resulted in competition over employment opportunities and the distribution of

SDP projects, thus decreasing social cohesion and spurring rivalry and conflict within and among communities (low adverse impact). In particular, disadvantaged community groups (e.g., women, farmers) with limited or inapplicable skills and competencies to the relevant technologies and employment opportunities felt excluded and economically discriminated against during the construction stage. However, these tensions had little to do with the CSP technology itself and instead were related to procedural shortcomings and differing expectations (see below).

Another community concern was the anticipated change in demographics associated with the influx of outsiders, foreign workers, and students. However, the results show that in reality the impacts of people with differing social practices and weak social ties moving to the region had only limited effects on local cultural identity and local traditions (very low to low adverse impact). The same is true for the concerns that new people moving into the area could further strain the already limited local social services and infrastructures, contribute to a rise in local prices, and increase risks for safety and security (very low to low adverse impacts).

Lastly, increased dust, noise, and vibrations due to earth removal and exhaust from construction vehicles or mechanical equipment were reported to have caused psychological distress in adjacent communities (very low to low adverse impact) and raised concerns of possible health impacts resulting from pollution or contamination of local air, water, and land resources, and increased light emissions (i.e., mirror reflections) during the operation of the power plant (very low adverse impact). Local workers employed at the project site reflected this concern as well as poor and unequal on-site working conditions (low to moderate adverse impact).

Distributional equity and the dispersion of livelihood outcomes among affected stakeholders

Considering the scale of Noor$_o$ I and its required land acquisition, MASEN addressed the distributional equity dimension of the project by developing a local benefit-sharing regime for neighboring communities. A benefit sharing plan was used to a) to compensate a wide cross-section of local villagers for any inconvenience and/or social, economic, and environmental hardship stemming from Noor$_o$ I, b) to enhance community development and resilience, and c) to develop and foster local value chains. Despite the preferential recruitment and procurement procedures under MASEN's voluntary 30% local content target, local stakeholders perceived these efforts as having only a low beneficial impact. It is difficult to explain why local stakeholders saw local context requirements, along with SDP projects, that exceeded legal obligations as having low significance. One explanation could be that expectations raised prior the construction phase were not grounded in reality. Another explanation could be that this finding was an artifact of the research design, since the research focused on vulnerable groups that would benefit less from the project. For example, women in rural Morocco are often underrepresented, if not excluded, from many infrastructural developments due to cultural norms, lack of skills, and high levels of illiteracy. Yet MASEN and ACWA Power made an effort to support women as a distinct group of stakeholders by including them in project services and providing socio-economic opportunities through gender-specific SDP and CSR measures.

Clearly, the degree to which people viewed the negative impacts versus the benefits of the project as an acceptable trade-off calculus contributed to the acceptance of $Noor_o$ I. The research findings also emphasize that beneficial outcomes - providing jobs, income, skill development, SDP projects, and equitable benefit sharing arrangements - represented only one side of sustainability and community acceptance. The other side is characterized by the procedural equity dimension of community engagement and equality in decision-making and explains the disappointed community expectations.

Procedural justice and measures of fair and meaningful community engagement

Generally, the assessment confirmed that the efforts to inform, consult, and engage with local stakeholders during the project's siting and development phase were in compliance with Moroccan law and international standard procedures. As community engagement in large-scale infrastructure projects is relatively new in Moroccan politics, and obtaining consent from all different stakeholder groups with a diverse array of interests and claims is almost impossible (especially in the case of collectively owned land), MASEN's commitment to formally give local communities a stake in the project was commendable. However, despite mechanisms that were in place to enable selected community representatives to play an active role in the decision-making process, the project siting and development process raised issues of procedural equity with regards to information disclosure, transparency, participation, and the effective management of grievances.

One of the most salient findings was that the affected public perceived that they were not recognized as legitimate participants in the project's development and that decisions addressing the local aspects of $Noor_o$ I were made in a rather technocratic, top-down manner. While it was found to be important that affected communities share the benefits of the project, community members also demanded to be considered as active participants in a shared decision-making process, instead of being seen as passive recipients of information. In particular, local communities perceived the distribution of information as insufficient for understanding relevant project details and participating meaningfully in the decision-making processes (low to moderate adverse impact). Furthermore due to lack of information, some local stakeholders thought the community engagement process was tokenistic and granted participation only to a select group of local elites instead of being open to a wider cross-section of affected communities and marginalized social groups (e.g., women) (low to moderate adverse impact). As a result of these perceptions, local villagers thought that they had limited opportunities to develop an informed community opinion and negotiate decisions that directly affected their livelihoods in their favor. In particular, some villagers thought that the agreements on the project siting, the land acquisition process, and the SDP were decided up front without the opportunity for local communities to consult with their representatives so that they could obtain prior and informed community consent. In absence of effectively working community grievance mechanisms and avenues for dispute resolution, frustration among villagers living adjacent to the site, mostly over unfulfilled expectations, intransparent SDP spending priorities and job requirements, unequal employment conditions, and lack of engagement opportunities, consequently culminated in community protest campaigns towards the project and the local authorities – eventually disrupting construction activities.

As MASEN plays a limited role in this area, responsibility can be attributed partly to local governmental institutions and their lack of experience in coordinating a genuine trilateral

dialogue among the responsible authorities, project developers, and a wide spectrum of local stakeholders. This was needed for a project of this magnitude. However, in response to the protests, MASEN institutionalized open communication channels with local communities in 2014, which are expected to enable an ongoing, proactive dialogue, prevent grievances, and improve the relationship with affected communities.

11.1.3 Community perceptions/awareness of and attitudes towards Noor$_o$ I

While MASEN's substantial efforts to take the project's livelihood context into account, as well as to achieve a favorable balance among positive and negative livelihood impacts, share benefits equally, and engage the community meaningfully, have all contributed to the high community acceptance of Noor$_o$ I, perceptions and awareness of different stakeholder groups provide additional insight into the project's success in addressing the local livelihood dimension. As various community groups with varying interests and claims are influenced by different project activities, their perceptions and attitudes towards the project reflect Noor$_o$ I's due diligence performance at the community-level and indicate potential areas for improvements in order to increase community acceptance.

What constitutes community acceptance?

According to Hall et al. (2013:207) community acceptance can be defined as *"the acceptance secured for a development from affected stakeholders within the community in which the development is located"*
In line with this definition, community acceptance is based on the acceptance of the project by the stakeholders affected by the project, not by a representative sample of the population.

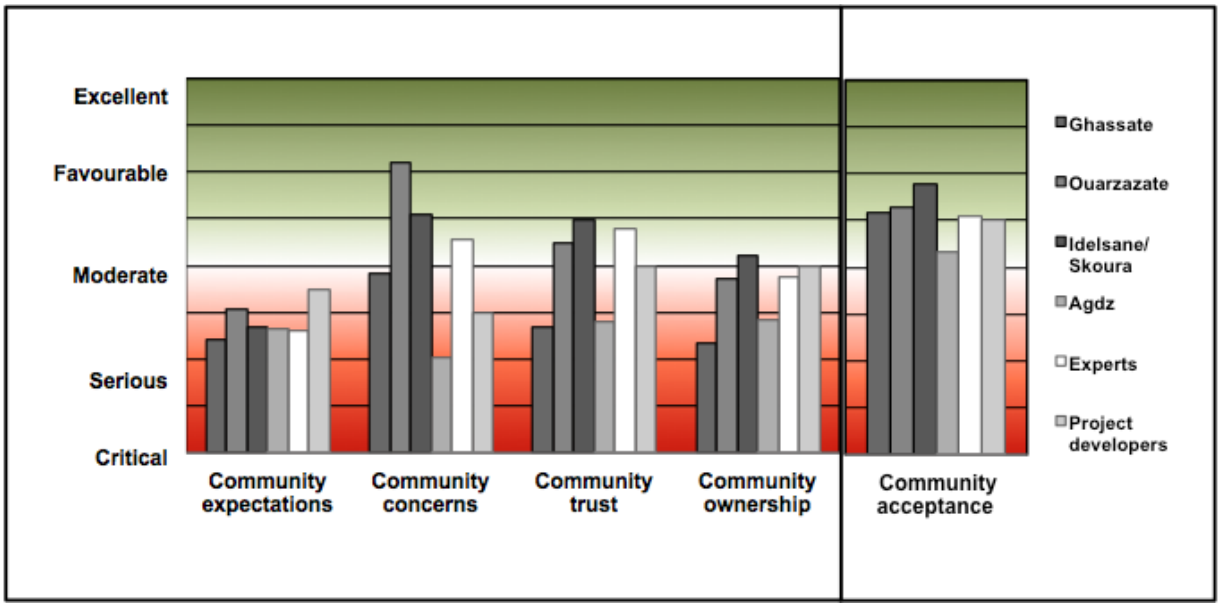


Figure 11-2: Community perceptions/awarenessand acceptance of Noor$_o$ I

Four determinants of the project's perceived due diligence performance were identified during the second field research through a community-level survey with a sample of 106 people from 20 selected community stakeholder groups, 20 community experts, and the project developers MASEN, ACWA Power Ouarzazate and KfW (one of the main lenders). These include: fulfillment of expectations, level of concern, community trust, and sense of community ownership.

Community expectations about positive livelihood impacts

As a consequence of villagers' perceptions of local authorities and the shortcomings in how community representatives and MASEN had communicated with local citizens, the project development process was left behind a veil of secrecy for the majority of the communities. In combination with the socio-economic and environmental vulnerability context, the lack of transparent information, inappropriate communication channels and resulting uncertainties and misperceptions associated with the outcomes of $Noor_o$ I fueled rumors and led to a range of unreasonable expectations as to possible benefit sharing arrangements throughout the entire region. As CSP technology is not a panacea to address and solve all the development challenges that prevail in the rural areas of the Ouarzazate region, most of these expectations went unfulfilled – due in particular to the limited number of employment opportunities. The frustration across all researched communities, which culminated in social conflict and community protest campaigns during the construction phase, is a clear indication of the need to improve information disclosure, communication efforts, and expectation management.

Community concerns about negative livelihood impacts

With the exception of Agdz, where serious concerns were raised about the potential impacts of the project's operational water consumption, and Ghassate, where moderately significant concerns were raised about restricted land access, the general level of concern over $Noor_o$ I was found to be rather low in the Ouarzazate region. Although the lack of understanding among community representatives and villagers left room for various uncertainties, they mostly trust CSP technology to generate clean electricity with few adverse impacts to the environment and society.

Community trust in the project's decision-making processes and outcomes

Similar to the level of concern, rather favorable degrees of trust towards local authorities, community representatives, and MASEN were found in Ouarzazate and Idelsane/Skoura. However, villagers in Agdz and the rural Commune of Ghassate reported relatively low trust levels and that the top-down decision-making intensified existing mistrust towards local decision-makers. Scattered accusations of nepotism regarding the distribution of jobs and SDP projects in adjacent villages and unfair treatment of remote oases communities in relation to water security are an indication that trust-building activities and appropriate communication measures will need to be developed and broadened in these communities in order to mitigate risks of further opposition and protest.

Community sense of ownership in the project

The low to moderate sense of community ownership over the project's processes and outcomes leaves room for improvement. It resulted from the lack of direct engagement and decision-making power for villagers in the processes of siting the project, acquiring the land and compensating the community for it, investing the money in SDP projects, and implementing the recruitment/procurement policies. This is especially true for villagers in the rural Commune of Ghassate and Agdz, where negative opinions correlate with the observed or anticipated negative impacts and villagers reported feelings of exclusion and powerlessness. These are deficits that need to be addressed to increase community ownership of the project and to change perceptions that the project has been imposed on the region.

11.2 Concluding remarks

The numerous social change processes and impacts derived from the impact assessment of Noor$_o$ I clearly illustrate that achieving a sustainable energy system, to address the macro-level challenges of climate change mitigation and energy security, could face critical challenges at the local scale if the livelihood dimension of utility-scale CSP is not addressed in sustainable ways. The findings of the assessment further indicate that simply because CSP plants could substitute fossil fuels with renewable energy does not *per se* imply that they will result in sustainable and equitable development outcomes in neighboring communities, particularly for the most vulnerable groups in society. This is because CSP plants, like any other comparable large-scale infrastructure development, are interwoven in a complex fashion with social, economic, political, and environmental dimensions at the local level and thus have the potential to transform communities in the vicinity of the project site. While these changes could have the potential to strengthen many people's resilience to coping with existing and future stressors, it could also increase the exposure of already stressed local communities to a variety of livelihood risks.

The high level of support in the Province of Ouarzazate, even among local communities who are negatively affected or who are living in proximity to the project, underlines MASEN's substantial efforts to counteract the local conflict potential of CSP by converting renewable energy assets into assets of improved socio-economic development, capacity, and infrastructure. While community outcomes of large-scale investments are rarely the focus of governments or investors, and generally the investment only marginally benefits the local population, MASEN's foresight and planning in regards to the country's first standalone CSP plant were commendable.

However, the perceived procedural deficits to give affected communities a stake in Noor$_o$ I and to obtain prior and informed community consent has especially blurred community perceptions and led to an unrealistic understanding of the project procedures and outputs. As a consequence, unfulfilled expectations about positive livelihood opportunities and their intransparent distribution, in combination with unequal labour conditions and serious concerns about the project's water demands have all stirred feelings of powerlessness and suspicion, particularly towards local authorities and, thus, constrained an ideal degree of community buy-in to the project.

The different community groups' varying affectedness, particularly the community protests during the construction phase and local opposition in communities directly neighboring the power plant can be explained by the divergence of expected and received benefits, low levels of trust, and a sense that the project has been imposed on local communities that lack considerable decision-making power. Although these perceptions had little to do with the CSP technology itself and despite being in full compliance with national laws and international procedures, we conclude, that if the procedural deficits remain unsolved and the project's operational water demands would compete with future domestic uses, this could result in a scenario in which utility-scale CSP projects in general, and the Noor$_o$ solar complex in particular could generate risks from spurred social conflict, decreasing community acceptance, and increasing opposition in affected communities.

E Recommendations and outlook

12 Recommendations to the project developer

Based on the findings of the field research two main recommendations were formulated. One relates to the initiatives required to improve the local livelihood sustainability for the next stages of the Noor$_o$ solar complex (Noor$_o$ II-IV) and other utility-scale solar projects planned under the MoSP. The other concerns the future rollout of CSP technology in the MENA-region and beyond.

Existing community engagement needs to be adjusted to allow for broadened stakeholder dialogue, collaboration, and shared decision-making

Although the community-oriented approach taken by MASEN for developing, siting, and implementing utility-scale CSP provides elements upon which a further roll-out of CSP in the MENA region could be built to allow for a sustainable and socially robust path, there a certain aspects that could be improved. These initiatives should focus on improving procedural equity, rather than on adding socio-economic benefits. Despite complying with domestic and international laws, the research identified a clear need to develop a more structured approach to enable inclusive, collaborative, and meaningful community participation. By recognizing the informed involvement of community stakeholders as an ongoing process, improved measures of community engagement could help to establish a trilateral dialogue and relationships based on understanding and trust among affected communities, local authorities and project developers. Through consensus building and shared decision-making procedures, the project's embeddedness in the local context could be optimized and more positive attitudes and feelings of community ownership over the next project stages of the Noor$_o$ solar complex could be established.

A robust sustainability framework for utility-scale CSP is required to allow for both techno-economic and sustainable community outcomes

With numerous CSP plants, currently in the planning stage throughout the MENA region, the sole reliance on the environmental and social safeguards provided by Multilateral Development Banks (MDBs) or the self-regulatory finance benchmark of the *Equator Principles* is problematic. Although these requirements are crucial for ensuring that attention is given to the environmental and socio-economic outcomes of CSP projects, the assessment of Noor$_o$ I clearly indicated their inability to cover the community dimension adequately. The procedural deficits of the decision-making processes of Noor$_o$ I, as well as the limited coverage of social impacts in the project's ESIA process, the lack of participatory, social and pro-active elements in existing MDB performance standards and ESIA procedures, prevent positive steps towards greater community sustainability and shared decision-making, thereby increasing the risk of community opposition. Since CSP plants have a lifespan over 20 years, and energy infrastructure often becomes locked-in or path dependent, this insufficient consideration of the community dimension in existing safeguards must therefore be considered a critical bottleneck for scaling-up CSP and other large-scale renewable energy technologies.

With the CSP technology being a promising technological option in the MENA region, there is a need to significantly amend existing safeguards by complementing them with a comprehensive and robust set of due-diligence policies. By placing the social dimension upfront, these policies should move beyond compliance and impact mitigation towards a community-centered philosophy that accounts for long-term improvements of livelihood conditions and a clear commitment to participatory and shared-decision making. With sectors, such as the mining sector or the Gold Standard for CDM having addressed similar objectives through the application of sustainability frameworks, a new sustainability framework tailored to CSP could form an effective best practice guide to unlock the CSP technology's full potential to deliver techno-economic benefits and become a catalyst for sustainable community development. These preconditions are needed to achieve favorable levels of community support for utility-scale CSP plants in MENA countries and to avoid the continued construction of fossil-fired capacity or a lock-in of nuclear technologies.

Why is public awareness important for the CSP roll-out?

Despite the Fukushima nuclear disaster in 2011, which illustrated the multiple hazards inherent in nuclear technology, many MENA countries still favor the promotion of nuclear energy and have expressed a strong interest in its civilian use The reasons for this are manifold and range from energy and water security concerns to socio-economic development needs to acquiring prestige for internal and external political agendas. Renewable energies on the other hand are still perceived troughout the region as relatively incompatible with a modern way of living and are quite often not regarded as a viable alternative to oil, gas or nuclear considering the region's race to technologically catch-up with the developed countries. In this regard, low levels of awareness and lack of knowledge about the potentially beneficial interplay among the pursuit of sustainable livelihoods, poverty alleviation, industrial development, and renewable energy technologies, such as CSP are, are still major barriers to their dissemination.

Recommendations

Most of the impacts of Noor$_o$ I are related to the procedural dimensions of the siting and implementation process. Therefore, these recommendations focus largely on shifting from a formal model of compliance-based community consultation fixed in permit and legal compliance obligations towards the sphere of informal community engagement procedures with improved collaboration and shared decision-making among local authorities, project developers, and affected communities. Additional recommendations are provided that address distributional equity and the mitigation of negative impacts and the enhancement of positive ones. Given that Noor$_o$ II-IV in the Ouarzazate region and other utility-scale solar projects in Morocco are currently in the planning phase (e.g., in Midelt and Tata), there is an opportunity now for MASEN to address some of these issues in the planning and implementation schemes for the next phases of the Noor$_o$ solar complex and to use them as a guidance for other CSP projects under the MoSP. The recommendations are action-orientated, mostly low-cost and based on the authors' conclusions as well as the suggestions provided by interviewees including local villagers, community representatives, and local key informants.

Recommendations on procedural aspects

1. *Establish a structured approach for an in-depth stakeholder analysis with the participation of a wide range of local stakeholders.*

   The claims, rights, and needs of affected and interested community groups should be recognized and identified through an iterative "Participatory Stakeholder Analysis" prior

to the development of any future utility-scale CSP plants under the MoSP. Ideally, this process would include a wide cross-section of the local population and representative bodies, not just elected representatives or a select group of spokesmen. The stakeholder mapping process should inform any public communication related to the project (see recommendation 4).

2. *Move the ESIA process beyond compliance with international standard procedures towards a participatory and community-oriented approach.*

   The limited coverage of social impacts and the lack of participatory elements in the project's ESIA process illustrate that applying a mainly top-down checklist approach in compliance with MDBs safeguard policies was insufficient at covering the unique community dimension of $Noor_o$ I and at fostering community trust and understanding. Instead of perceiving local communities as passive recipients of information, local citizens should be recognized as true participants in the ESIA process and in developing locally appropriate mitigation and needs-oriented compensation measures. Rather than covering the social dimension within an integrated ESIA study, a separate, contextual state-of-the-art "Social Impact Assessment" should be conducted by an interdisciplinary team of social scientists and should be based on a qualitative approach (such as the SLA) to research local needs, capacities, concerns, and aspirations. Embedded into such a detailed social analysis, a "Social Development Needs Analysis" should examine opportunities and constraints arising out of the community context of CSP and identify compensation and enhancement measures that are culturally appropriate and that support forward-looking development objectives in affected communities.

3. *Broaden the stakeholder engagement with rural communities towards an inclusive, meaningful, ongoing and participatory process.*

   With a focus on timely and shared decision-making processes, the identified community and stakeholder groups should be involved in:

   - siting the project and monitoring project activities that have positive and negative impacts on the local community;
   - developing compensation measures, especially through the SDP, which are equitable and culturally appropriate;
   - ensuring access to grievance mechanisms and feedback channels, through which local communities can address concerns and solve disputes.

   These measures should be added to the legal participation requirements of formal consultation in order to ensure the inclusion of those community groups that do not have the resources to voice their opinion, or are often marginalized - specifically, women, youth, farmers and local NGOs. "Multi-Stakeholder Forums" supervised by an independent body and coordinated by a "Locally-trusted Steering Committee" consisting out of the local authorities, project developers, formal and informal community representatives (e.g., NGOs) and dedicated villagers may provide an effective means of facilitating this process and fostering trusting trilateral relationships.

4. *Adopt an ongoing communication and expectations management strategy.*

   A transparent position regarding project information should be adopted and all relevant aspects of the project publicly disclosed prior to any decision-making in culturally appropriate formats throughout the entire project cycle - without exaggerating any of the project's outcomes. This would ensure understanding and meaningful modes of participation and keep the expectations and demands of local stakeholders realistic and community perceptions positive. Since information provision does not necessarily lead to understanding, a "Community Outreach Task Force" trained in the fields of mediation and communication may be established as a trilateral dialogue link between local authorities, project developers and community villagers. This task force could interact with local communities, respond to uncertainties and pro-actively manage expectations through target-group oriented communication measures, e.g., community assemblies, workshops, interview rounds, and information dissemination activities. Additionally, an online and on-site "Transparency Platform" (at the Visitor's Center) could be created to provide more detailed and regularly updated information. In this regard "Information Modules and Manuals" may be developed, especially concerning the following issues:

   - The main project features, with a focus on potential negative impacts, the number of jobs available to the local community, and land compensation procedures;
   - The legal framework that regulates the relationship between the project and the local affected population;
   - The scope of the community engagement in the ESIA consultation process and the level of flexibility of the design choices within the negotiations on the project siting, land acquisition, recruitment process, and the SDP.

5. *Empower local civil society associations and organizations as agents of change and public outreach.*

   Important opinion leaders and representatives of local civil society associations and organisations (NGOs) should be empowered to engage in and facilitate the communication and community engagement processes. In this regard, "Regular Workshops and 1:1 Feedback Meetings" with local NGOs could be arranged to inform citizens about the project and discuss outcomes and decision-making. Also "Joint Advocacy Campaigns" between MASEN and local NGOs could be another way to foster trusting relationships between local communities and the project developers as well as to promote structures for empowerment. However, any partnership with local NGOs should always be based on a two-way listening and learning process between the project developers and NGOs. In this regard, a "Visitor's Centre" on-site or next to the project could be established and jointly operated by a dedicated team including MASEN and local NGOs. With a thematic focus on renewable energy and the environment, the centre may serve as an education facility to explain the Noor$_o$ solar complex, its applied technologies and the local context, as well as to inform the public about the project's contributions to energy security and climate change mitigation. As an open meeting point for exchange and public outreach the centre would strengthen the relationships between the project and its neighboring communities, increase awareness and potentially even become a tourist destination.

Recommendation on distributional aspects

6. *Promote gender equality and women's empowerment in the distribution of benefits and decision-making processes.*

   As seen with $Noor_o$ I, employment and income benefits during the construction of CSP plants are mostly captured by men, yet women bear an unequal share of the burdens (e.g., in particular due to loss of land access) and often have a limited voice in decision-making processes. In order to balance this gender bias in the distribution of negative and positive impacts as well as in decision-making, women should be targeted, supported, and included as a distinct stakeholder group in the project development. "Gender Quotas" in the recruitment process to promote women's employment, "Gender-specific Affirmative Training Actions" to improve skills and competencies, and "Gender Audits" to ensure a gender balance in decision-making may be promising measures to give women a more equal share and stake in the project.

Recommendation on the mitigation of negative impacts

7. *Adopt a precautionary approach that allows for technological flexibility to respond* to changes in the Mansour Eddahbi reservoir's water capacity.

   The high uncertainties concerning the potential impacts of $Noor_o$ I's operational water withdrawal on the downstream oases in the Draa Valley make it obligatory to better understand and closely monitor the effects of climate change and societal water demands on the future water capacity of the Mansour Eddahbi reservoir. In-depth "Water Studies based on State-of-the-Art Regional Climate Models" are recommended. If water security in the downstream oases is compromised, compensatory measures in the fields of "Integrated Water Resources Management (IWRM)" should be provided to affected communities to prevent livelihood deterioration of downstream oases. As a last option, altering the cooling-technology (from wet to dry cooling) should be considered (this has already been addressed by applying dry-cooling systems to the next project phases).

Recommendations on the enhancement of positive impacts

8. *Increase the absorptive capacities and the integration of the local industry and university graduates.*

   The development of competencies and skills of local SMEs and students which are required to increase the absorptive capacities in the Ouarzazate region should be further promoted by building up a knowledge base, domestic industries and sustainable employment opportunities in order to avoid technological import dependency for Morocco. In this regard the main responsiblitiy lies with the Ministry of Education: Through governmental efforts the IFMEREE and the bachelor (or possibly a master's) program of the university of Ouarzazate (optimally also Agadir) should be closely aligned with the activities of the project developers, and the R&D platform should be jointly developed with the participation of the local education sector. "Cross-Sector Partnership Agreements" and "Education and Training Clusters" developed among foreign project developers, the local industry, and local educational facilities could help match local curriculums to CSP market requirements and also to promote technology and knowledge transfer. Such partnerships may include: internships for university graduates, field visits to the project site, joint lectures by project developers and MASEN at the IFMEREE and the university, trainings

for local SMEs, and scientific research opportunities at the R&D platform for local students. Additionally, an ambitious, yet realistic, increase in the "Local Content Requirements" within future CSP projects should be fostered.

9. *Earmark economic revenues stemming from royalties and taxes to local communities.*

   Instead of going to the central government, a significant "Share of Revenues from Taxes (e.g., V.A.T.) and Royalties" could be decentralized and provided to local communities affected by the project. While the responsibility for doing so lies with the GoM and not with MASEN, MASEN could follow also the South African model by requesting that project developers "Allocate a Certain Percentage of the Project Revenues" directly to a local community fund. The additional budget may then be invested into "Community Development Plans" to promote human and socio-economic development objectives as determined in partnership with local communities, not only to compensate for potential negative impacts but also to spur regional development.

10. *Accompany the MoSP with additional measures to foster sustainable development and enable future socio-economic prospects in rural areas.*

    Because CSP projects alone are neither a panacea to lift rural areas in Southern Morocco out of poverty nor to combat local environmental degradation, the MoSP should be accompanied by additional measures to foster sustainable development. Since the responsibility for doing so lies with the GoM, international donors and international development institutions should be encouraged to jointly develop and implement "Affirmative Projects" that could be aligned with the MoSP - either directly or indirectly - in order to enhance the socio-economic development of rural areas and increase their resilience towards environmental pressures. In this regard, priority should be given to projects that address the socioeconomic competitiveness of existing actors and structures in terms of new employment and income opportunities and contribute to conservation of cultural heritage within a sustainable development based on the "Water-Energy-Food Nexus". Rather than being tokenistic, such projects should have a long-term focus and may include:

    - improving agricultural techniques and irrigation schemes through solar water pumping and drip irrigation;
    - providing vocational training for microenterprises, small and medium-sized businesses, and youth employment in the fields of energy efficiency, rooftop solar water heater, photovoltaics and entrepreneurship;
    - Fostering market competitiveness, integration, and access for traditional local handicraft industries and arts, particularly selling such goods online and/or through social media;
    - Considering and testing co-generation applications at the CSP plant for industrial or agricultural purposes, such as greenhouses, solar drying, heat excess use or desalination etc. (see also www.saharaforestproject.com);
    - Promoting community-based ecotourism as an incentive for the rehabilitation of historic buildings (e.g., kasbahs, ksours) and the preservation of cultural heritage by applying new marketing strategies.

13 Sustainability safeguards for utility-scale CSP projects

The main aim of CSP projects should always be the provision of green electricity, contributing to climate mitigation and energy security. However, the development of utility-scale CSP plants could also contribute to improvements of existing livelihood baseline conditions in adjacent communities. In this regard, the study argues that project developers, governments, and international lenders involved in the scale-up of CSP should move beyond legal and/or donor compliance and mitigation measures towards an enhancement philosophy with a strong commitment to participatory and shared decision-making, local development and social inclusion. In order to design and implement a project that fits in the community context and contributes to the protection and enhancement of the livelihoods of affected communities, the consideration of affected communities should go beyond a checklist approach towards a community-centered and participatory analysis in which the interest, rights, and needs of affected communities form the basis of the project's design and implementation.

What is meant by mitigation and enhancement?

The distinction between mitigation and enhancement is difficult because SIA practitioners mostly aim to achieve both in tandem.

Mitigation, according to the US Council on Environmental Quality (2011: 4–5), entails measures to avoid, minimize, rectify, reduce or compensate for negative impacts.

Enhancement, according to Rowan and Streather (2011), can be defined as actions and processes that create, increase and distribute new project benefits.

Mitigation measures generally must be taken to meet the safeguards and performance standards of international lenders. Enhancement measures are mostly optional and generally depend on the priorities or goodwill of project developers, for example in form of CSR policies (Rowan and Streather, 2011: 219).

For this, a new sustainability framework particularly tailored towards CSP could form an effective best practice guide to unlock the CSP technology's full potential to deliver techno-economic profits and become a catalyst for sustainable community development[50] through three principles:

- *"Good process":* Promote effective means of community understanding and engagement by ensuring an inclusive, timely and transparent decision-making process;
- *"Do no harm":* Respect the livelihood security of affected communities by avoiding and mitigating adverse impacts and ensuring fair compensation of disadvantages;
- "*Do good":* Provide livelihood opportunities and ensure that co-benefits are shared equitably and fairly among the widest possible cross-section of the local population.

The 18 sustainability safeguards proposed in this chapter aim to guide the development of utility-scale CSP in ways that do not harm the environment and affected peoples' livelihoods so that affected stakeholders receive appropriate socio-economic benefits and are able to engage meaningfully in the development process. Yet, the safeguards should neither be understood as ready-to-use nor as fully comprehensive, but rather as an inspirational platform for debates about new sustainability requirements for the rollout of CSP technology.

[50] The presented ideas substantially draw on the academic literature on state-of-the-art SIA (Vanclay, 2002, 2003), benefit-sharing approaches (Egre et al, 2002, 2008), community investment (Esteves, 2008; Esteves and Vanclay, 2009) as well as on enhancement measures (Rowan and Streather, 2011). Additionally, they are reflected by the Equator Principles (2006), the International Finance Corporation (IFC) Policy and Performance Standards on Social and Environmental Sustainability (2006), the revised Operational Policies of the World Bank, the United Nation's Global Compact, the Global Reporting Initiative (GRI) or the OECD Guidelines for Multinational Enterprises.

Structure of the safeguards

The 18 safeguards are based on the findings of the impact assessment of Noor$_o$ I, the previously developed "pool of criteria" (see chapter 3), and an additional round[51] of screening existing sustainability frameworks and grouped under five themes (see Figure 13-1):

- *Overarching safeguards (P0-2):* The acknowledgement of Human Rights as fundamental and the need to address vulnerable groups and to assess impacts as overarching across categories;
- *Procedural safeguards (P3-5):* Process oriented issues for meaningful community engagement, accountability, and a transparent project governance structure;
- *Distributional safeguards (P6-7):* Distributional issues for a fair and equal benefit sharing and compensation among affected stakeholders;
- *Mitigation safeguards (P8-14):* The avoidance and minimization of potential negative impacts stemming from the project outcomes;
- *Enhancement safeguards (P15-17):* The promotion and provision of positive impacts and non-monetary, voluntary actions built upon communal resources and needs.

Each safeguard encompasses a guiding principle, criteria, and sub-criteria to specify the principle and guidelines to operationalize the criteria.

[51] While the "pool of criteria" was developed to inspire the empirical field research, the screening also focused on learning about formulations and structures of existing frameworks. The following studies, technical reports and guidelines were included in this process: the Guidelines for the use of REDD+ Social & Environmental Standards at country level and the REDD+ Social & Environmental Standards (REDD Standards, 2010), Principles and Criteria for the Production of Sustainable Palm Oil (RSPO, 2013), the G4 Sustainability Reporting Guidelines (GRI, 2013), the UN's Guiding Principles on Business and Human Rights (UN, 2011a) and the UN's Guide for Business: How to Develop a Human Rights Policy (UN, 2011b), Guidance On Consolidated Principles & Criteria for Sustainable Biofuel Production (RSB, 2011), the OECD Guidelines for Multinational Enterprises (OECD, 2011), Recommendations on Transparency and Public Participation in the Context of Electricity Transmission Lines (Rottmann, 2013), the Human Rights Compliance Assessment (DIFHR, 2006), the IFC Performance Standards on Environmental and Social Sustainability (IFC, 2012) and the Standard for Responsible Mining (IRMA, 2014).

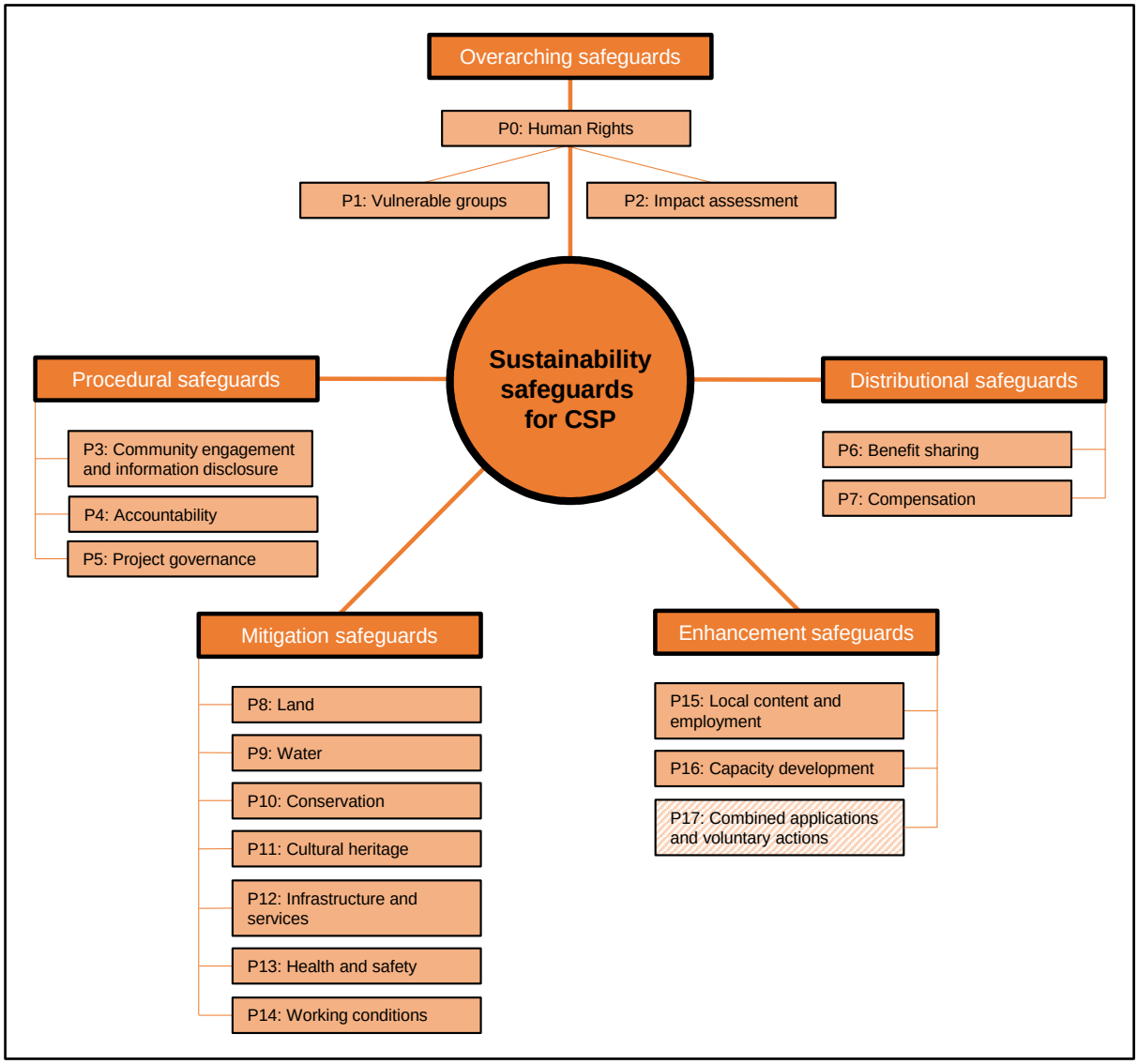


Figure 13-1: The sustainability safeguards for CSP
Note: The striped box refers to a voluntary corporate social responsibility principle.

I.) Overarching safeguards

Principle 0: Human Rights ***Human Rights should form the basis upon which the project is designed and developed.***		
Criteria	**Sub-Criteria**	**Guidelines**
0.1 **Human Rights acknowledgement** ***The key objective is to adopt Human Rights as an overarching principle underpinning the project's design and development.***	0.1.1 The involved duty bearers should commit themselves to protect (governmental authorities) and respect (business companies) Human Rights. 0.1.2 The involved parties should avoid infringing upon Human Rights and should mitigate adverse impacts on Human Rights. 0.1.3 The involved parties should allow those entitled to Human Rights (i.e., affected local communities) to claim them.	- Involved parties should adopt a mutually agreed upon Human Rights statement. - Prior to the project's implementation, the involved parties should conduct a Human Rights Risk Assessment as part of the ESIA or SIA to identify any potential Human Right's violations caused by the project. The following Human Rights should be prioritized: • Right to water and sanitation; Right to land, particularly for indigenous people; Right to development and scientific progress; Right to an adequate standard of living; Right to work; Right to non-discrimination. - The Human Rights Risk Assessment should be revised before any major decision or change throughout the project cycle. - If there is any indication of a potential Human Rights violation, measures should be taken to prevent or mitigate it.

Principle 1: Vulnerable groups ***Vulnerable and marginalized groups should receive special attention and protection in the public engagement process and with respect to benefits and adverse impacts.***		
Criteria	**Sub-Criteria**	**Guidelines**
1.1 **Protection of vulnerable groups** ***The key objective is to protect vulnerable and marginalized groups and to consider their interests, rights, and needs.***	1.1.1 Actions should be taken to ensure that the interests, rights, and needs of vulnerable and marginalized groups are respected and that any inequality in impacts is avoided. 1.1.2 Vulnerable and marginalized groups should be pro-actively engaged to make their voice heard within the decision-making process.	- Vulnerable, disadvantaged, marginalized, and underrepresented stakeholders within different cultural, ethnic, racial, religious, sexual, or demographic groups should be identified and their interests, rights and needs assessed through engagement with local stakeholders. - All vulnerable groups should be invited to participate through specific and culturally appropriate measures that comply with the United Nations Declaration on the Rights of Indigenous Peoples. Measures may include meetings that make their voices heard and take their opinions seriously throughout the project cycle. Adverse impacts should be avoided when possible; otherwise they should be minimized or mitigated (see C:7.1[52]). - Any shortfalls in the ability of vulnerable groups to participate in the decision-making process should be identified, and reasonable measures should be taken to improve their capacity (e.g., training or education) to participate meaningfully. - If adverse impacts disproportionately affect stakeholder livelihoods, a Livelihood Restoration Plan should be implemented (see C:7.1).

[52] Cross-references to other criteria within the safeguards are identified via a short form, where, for example, „C:7.1“ refers to the criteria 7.1.

Principle 2: Impact assessment ***All social, environmental, and economic impacts stemming from the project should be assessed and measures should be formulated to avoid or mitigate adverse impacts and enhance project benefits.***		
Criteria	**Sub-Criteria**	**Guidelines**
2.1 **Comprehensive impact assessment** ***The key objective is to gain a clear understanding of all of the community level impacts stemming from the project and formulate mitigation and enhancement measures.***	2.1.1 Impacts should be assessed on the basis of scientifically accurate impact assessment procedures with special attention given to local-scale social impacts. 2.1.2 Participatory methods involving relevant community stakeholder groups should be used for the assessment of social and other impacts and for the development of mitigation and enhancement measures.	- Comprehensive state-of-the-art impact assessment methods should be used to assess all impacts prior to the project's development. The assessment of impacts should inform the mitigation, enhancement, or compensation measures taken during the project cycle. - Impacts can be assessed with Environmental Impact Assessment (EIA) and Social Impact Assessment (SIA) or with a combined Environmental Social Impact Assessment (ESIA). If a combined assessment is taken, care should be given to addressing sufficiently the social impacts. Specialized impact assessments for some issues might also be necessary. - All impact assessments should: • Be carried out by accredited, independent experts that have the knowledge, skills, and experience necessary to conduct the assessments; • Include participatory methods for engaging relevant community stakeholder groups (see C:3.1) to identify the social impacts to ensure that local customs, languages, practices, and indigenous knowledge are respected and utilized. Stakeholders should also be involved in the development of mitigation and enhancement measures; • Avoid using checklists and instead use a holistic approach based upon principles, e.g., the Sustainable Livelihood Approach (SLA), to structure the impact assessment; • Where possible, group impacts into positive and adverse impacts and identify which community stakeholder groups may be affected by these impacts and to what extent. - The impact assessment(s) should include, but not necessarily be limited to the following issues: • Human Rights risks (see C:0.1); • Land resources including issues like land-use and an evaluation of land availability and access (see C:8.1); • Water bodies including an evaluation of water availability and access (see

		C:9.1); • Highly Protected Areas and High Conservation Values (see C:10.1); • Local traditions, practices, values, and sense of place characteristics as well as sites with special cultural, ecological, economic, archaeological, religious or spiritual value (see C:11.1); • Existing infrastructure and services and their vulnerability to increased use (see C:12.1); • The health situation and the safety of local residents (see C:13.1); • The community's employment situation, as well the employment creation impact and the local content potential (see C:14.1).

II.) Procedural safeguards

Principle 3: Community engagement and information disclosure ***Decisions should have the Free, Prior &, Informed Consent (FPIC) of the relevant community stakeholder groups (especially decisions related to livelihood resources like land, water or cultural heritage).***		
Criteria	**Sub-Criteria**	**Guidelines**
3.1 **Comprehensive community stakeholder engagement** ***The key objective of community engagement is to empower stakeholders to participate in the decision-making process to gain the community's consent for the project.***	3.1.1 All relevant community stakeholder groups should be identified through a transparent process. 3.1.2 Stakeholder groups should be allowed to choose their own representatives. 3.1.3 Meaningful, effective, culturally appropriate, and socially inclusive participation[53] should be ensured to incorporate stakeholders' views and gain the community's consent for all project stages. 3.1.4 Partnerships[54] with local civil society organizations (NGOs) should be enhanced.	- Prior to the project's development, a stakeholder analysis should be conducted to identify stakeholder groups and their interests, rights, and needs, and livelihood strategies. The local community should be engaged in this process (for vulnerable and marginalized groups see C:1.1). The stakeholder analysis should be iterative because the interests of stakeholder groups could change over time as new information becomes available. The stakeholder analysis should comprehensively map the stakeholder groups and identify the communities anticipated to be positively and negatively affected by the project. - In consultation with local experts and associations, barriers to meaningful participation should be identified and addressed. These could include: • Local representatives failing to represent the voices, concerns, and aspirations of the communities; • Local representatives are unable to communicate effectively and relay information to their communities; • Local communities do not understand the stakeholder engagement process (see also C:3.2). - A comprehensive, socially inclusive, and culturally appropriate community stakeholder engagement process should be developed. The goal of the community stakeholder engagement process is to allow relevant community stakeholder groups (i.e., local SMEs, local authorities, local community members) to express their views and interests in meaningful ways at the earliest stage possible (preferrably in the planing phase as part of the ESIA consultation). Stakeholder should be incorporated into decision-making during all project stages from planning to implementation. The stakeholder engagement strategy should not be seen as a one-time task, but as an ongoing process. It should include the following elements: • Stakeholder analysis (see above);

info-box „participation" for more information.

See info-box „partnerships" for more information.

		• Dissemination of information (see C:3.2); • Consultation and participation of relevant community stakeholder groups including several in-person meetings; • Grievance mechanisms (see C:4.2); • Monitoring and reporting. - Decision-makers should consider establishing a "steering group" to facilitate the stakeholder engagement process. This "steering group" should represent all relevant stakeholder groups and provide guidance on the stakeholder engagement strategy (including appropriate local decision-making structures, e.g., council of elders, tribal leaders, language preferences, appropriate meeting venues). - As part of the stakeholder analysis, an analysis and assessment of local civil society organizations should be conducted and partnerships with NGOs should be established to encourage a community-led engagement strategy to allow a) local NGOs to represent community views and interests, and b) to ensure that local development programs accompanying the project are well designed and effectively delivered according to communities' needs.
3.2 **Transparency and information disclosure** ***The key objective is to inform all relevant community stakeholder groups in a timely, clear, and transparent method about all aspects of the project.***	3.2.1 Clear and timely information about the project's expected outcomes and processes should be provided through a culturally appropriate method to community stakeholder groups to allow for ongoing participation. 3.2.2 Relevant documents about the project should be made publicly available.	- Appropriate channels of communication (both formal and informal) and dissemination of information should be identified that reach a wide cross-section of relevant community stakeholder groups and include vulnerable and marginalized social groups. - Information should be provided to the stakeholders in advance to give them sufficient time to understand the project and its anticipated outcomes. - Technical information should be explained and discussed with all relevant community stakeholder groups, especially on the following issues: • Overview of the project development, planning, and implementation, as well as the aspects of the design that can be changed (including project duration, geographic location, and anticipated social, economic, and environmental impacts); • A roadmap of the community stakeholder engagement process (including the goals, procedures, tools, and timeline of the process that answers the following questions: "What kind of participation is expected?", "What impact will participation have on the project?", "Why should one participate?"). The roadmap should include a list of the included stakeholder groups and the method used to select them; • Procedural aspects of the project, such as land acquisition, recruitment policy, consultation and siting process(es), and social development plans; • The procurement and recruitment procedures, such as the tender procedures for local SMEs, application procedures for jobs, job eligibility

		requirements (e.g., skills and experience), job selection criteria, conservative estimates of the number of jobs, the kind of jobs (permanent and temporary), and the working conditions.
3.3 **Expectations management** ***The key objective is to ensure that community expectations align with the project's outcomes and processes.***	3.3.1 Information should be provided so that community expectations are reasonable, and the project should then be amended to meet these expectations. Decision-makers and project developers should also have reasonable expectations for the community's engagement and the project drawbacks they are willing to accept.	- Community expectations for the project and its outcomes should be analyzed and assessed. - Measures should be taken to communicate information about the project to the public so that their expectations are feasible, and project developers should also work to maintain reasonable expectations for community engagement and the community's willingness to accept drawbacks. Such measures could include: • Community workshops, presentations, or community wide awareness-raising campaigns (see C:3.4).
3.4 **Awareness raising** ***The key objective is to raise awareness about renewable energy, climate change mitigation in general and about the project in particular among relevant community stakeholder groups.***	3.4.1 The project should contribute to learning and awareness-raising by providing educational activities, especially related to climate change mitigation and energy security.	- Educational activities should be identified in conjunction with the project's development to educate people about the project's sustainability aspects, such as: • Environmental training and awareness-raising, e.g., water management, renewable energy resources and climate change, through educational and apprenticeship programs and tours of the power plant.

Principle 4: Accountability ***The project should comply with all relevant laws and regulations and implement effective mechanisms to resolve grievances.***		
Criteria	**Sub-Criteria**	**Guidelines**
4.1 **Legal compliance** ***The key objective is to ensure that the project operates in compliance with relevant laws and that those with rights related to the project should have the resources to secure them.***	4.1.1 The project should be developed in compliance with customary, national, and international laws, rules, regulations, permit requirements, and ratified conventions. 4.1.2 Relevant community stakeholder groups should have access to legal advice.	- Applicable and relevant customary, national, and international laws, rules, regulations and permit requirements should be identified with the participation of local community leaders and local experts in order to integrate local knowledge especially concerning customary laws and practice. - In particular, customary, national, and international laws should be followed in these circumstances: • Conflict, extreme political instability, failure of the rule of law; • Poverty, drought, epidemics, food insecurity, or natural disasters; • Activities that might affect natural resources, such as, water, forests, the atmosphere, or disrupt communities; • Involvement of indigenous communities.
4.2 **Grievance resolution** ***The key objective is to address grievances and disputes that arise during the project cycle in a transparent and accountable way in order to identify, prevent, or mitigate conflicts.***	4.2.1 Effective grievance mechanisms should be developed for all project stages.	- A conflict management system including grievance and dispute resolution mechanisms should be developed early on for resolving grievances about, for example, project siting, compensation measures, and land acquisition procedures. Such measures could include: • Local hearings, • Comment boxes; • Mediation processes facilitated by professional mediators and / or local community leaders. - The conflict management system should meet international criteria specified in Principle 31 of the “United Nations Guiding Principles on Business and Human Rights” (i.e., legitimacy, accessibility, predictability, equitability, transparency, rights-compatibility, and a source of continuous learning). - The conflict management system should be mutually agreed upon and accepted by all relevant community stakeholder groups and be established through open and consensual agreements that allow for anonymity of complaints and feedback. - The conflict management system may be facilitated through a mutually agreed upon

		external expert or body. - Grievances and disputes should be documented and reviewed systematically and objectively and feedback should be provided on issues raised by relevant community stakeholder groups.

Principle 5: Project governance ***The project should have a comprehensive and transparent governance structure in place.***		
Criteria	**Sub-Criteria**	**Guidelines**
5.1 **Governance structure** ***The key objective is to create a comprehensive and transparent governance structure for the project.***	5.1.1 The governance structure of the project should be clearly defined, transparent, and accountable. 5.1.2 All structures should allow for dialogue that includes local authorities, project developers, and relevant community stakeholder groups.	- The project developer and responsible local authorities should: • Create the structures necessary to comply with the principles and guidelines outlined in this document; • Specify the personnel, including management representative(s), who have the responsibility and authority for implementing the principles and guidelines outlined in this document. - Long-term structures (i.e., throughout the entire project cycle) and mechanisms (e.g., for mechanisms developed under C:4.2 and C:7.1) should be established that allow for constant tri-sector dialogue and feedback among local authorities, project developers, and relevant community stakeholder groups. Such measures could include: • Training and qualification for a community member in mediation, hiring a professional mediator, and providing sufficient financial resources and organizational capacities.
5.2 **Anti-Corruption measures** ***The key objective is to prevent corruption associated with the project's outcomes and processes.***	5.2.1 Bribery, nepotism, elite capturing, and any other form of corruption by project developers, employees, or responsible local authorities should be prohibited.	- A written policy with measures that prohibit corruption should be agreed upon, and implemented.

*III.) Distributional safeguards

Principle 6: Benefit sharing ***The affected community stakeholder groups should have a reasonable share in the socio-economic benefits/financial returns stemming from the project to achieve rural uplift and economic diversification and to improve the long-term livelihood security.***		
Criteria	**Sub-Criteria**	**Guidelines**
6.1 **Distributional equity** ***The key objective is that affected local stakeholder groups should receive a reasonable share of the benefits appropriate to the nature and scale of the project.***	6.1.1 The project should contribute to decreased poverty and increased income generation among most affected community stakeholder groups. 6.1.2 The project's benefits should be fairly distributed among the most affected community stakeholder groups. 6.1.3 Most affected community stakeholder groups should not suffer disproportionately from adverse impacts. 6.1.4 A fair share of taxes and royalties or revenues stemming from the project should be allocated to the most affected communities in fair and transparent ways.	- It should be clearly outlined how affected community stakeholder groups, especially in communities adjacent to the project, should share in the socio-economic benefits stemming from the project. • Priority should be given to benefits stemming from project outcomes (see P:15 and P:16), but benefits could also stem from additional activities surrounding the project (e.g., voluntary actions, see C:17.2 or for outcomes of a Social Development Plan see C:7.1); • Benefit distribution should be tailored towards the livelihood strategies of affected stakeholders. - If the project negatively affects the livelihoods of community stakeholder groups, the mechanisms specified under C:7.1 should be used. - Decision-makers should consider allocating a percentage of the value-added tax (VAT) or of project revenues to a local community fund to finance community development projects in affected communities.

6.2 **Contributions towards gender equality and non-discrimination** ***The key objective is to ensure that women and men gain equal benefits from the project.***	6.2.1 Opportunities should be optimized for both women and men (a) to participate fully and equally; (b) to receive comparable social and economic benefits; and (c) to avoid gender inequalities. 6.2.2 The employment selection process should promote gender equality and the employment of women wherever possible.	- Measures should be taken to avoid giving unequal access to the livelihood resources, services, and benefits stemming from the project based on race, color, gender, religion, sexual orientation, political opinion, social origin, or physical or mental disability. - Hiring decisions should be made based upon experience, qualifications, skills and other objective criteria. - As women are often excluded from decision-making processes and are marginalized in hiring processes, authorities should consider establishing a gender quota within the recruitment process to promote women's employment.

Principle 7: Compensation ***Fair compensation measures should be taken if livelihoods are lost for any stakeholder groups (e.g., loss of land, resources, infrastructure, or services).***		
Criteria	**Sub-Criteria**	**Guidelines**
7.1 **Fair compensation** ***The key objective is to guarantee fair compensation for community stakeholder groups who will be adversely affected by the project.***	7.1.1 Compensation measures should be established through participatory and transparent methods. 7.1.2 If consensus is not reached on compensation measures, stakeholder groups can use the grievance mechanisms	- Community stakeholder groups are eligible for compensation if their livelihoods should be harmed due to the project and / or its activities. Steps to ensure compensation could include: • Community stakeholder groups entitled compensation should be identified through a transparent, participatory system; • The system for determining and distributing fair compensation (monetary or otherwise) is transparent and agreed upon by all community stakeholder groups. This especially concerns stakeholder groups that have lost access and rights to land; • Fair compensation may be determined by an independent third-party mediator; • If disproportionate adverse impacts on the livelihoods of vulnerable and marginalized groups are expected, e.g., due to a complete loss of livelihoods or physical displacement, a Livelihood Restoration Plan should be imple-

	developed under C:4.2. 7.1.3 Any communitywide compensation measures should be additional (meaning they would not have been taken without the resources stemming from the project).	mented. The Livelihood Restoration Plan should explain how the loss of livelihoods for affected stakeholders should be redressed. Affected stakeholders should not only be compensated monetarily, they should be given other resources to rebuild their livelihoods (e.g., such as education and training programs); • Monetary compensation should be provided in a timely manner. - Compensation measures can be taken on an individual-level or community-level basis, or a combination of each. For example: • In cases in which communities have lost access to a collective resource, or the community's decision-making processes are collectivist, community-level compensatory measures should be taken; • Concrete community-scale compensation measures (i.e., Social Development Plans) should be developed through a participatory Social Development Needs Analysis[55] in close cooperation with affected communities and as part of the ESIA or SIA; • Compensation measures should be based on performance indicators, targets, or acceptance criteria that can be tracked over defined time periods.

[55] See info-box „Social Development Needs Analysis" for more information.

IV.) Mitigation safeguards[56]

Principle 8: Land ***The acquisition of land for the project should not harm any livelihood resources of the affected community stakeholder groups (e.g., due to a loss of land or loss of access to land).***		
Criteria	**Sub-Criteria**	**Guidelines**
8.1 **Land use and access to land** ***The key objective is to avoid any loss of livelihood due to a loss of land or loss of access to land by affected community stakeholder groups.***	8.1.1 It should be ensured that traditional rights to land, territories, and resources are recognized and respected. 8.1.2 It should be ensured that involuntary resettlement is avoided. 8.1.3 It should be ensured that the degradation or loss of productive agricultural land is avoided in order to guarantee the food security of the affected communities.	- An analysis of the ecological state and projected future (including climate change) of land resources should be conducted under the ESIA or EIA. Furthermore, a land-use assessment, including the evaluation of land availability and access and the customary and statutory land rights of affected community stakeholder groups, should also be conducted. - The land-use assessment should include at minimum the following steps: • A review of publicly available data and maps; • An assessment of land tenure and land rights in consultation with national / regional experts and institutions; • A detailed on-site assessment though consultation with affected community stakeholder groups, especially vulnerable and marginalized groups. - As part of the land-use assessment: • Measures should be specified to verify existing claims and titles to land with the participation of local NGOs and community representatives; • In cases in which land claims or titles are unclear, the mechanisms specified under C:4.2 should be used to resolve this. - On the basis of the land-use assessment: • The project site should be chosen to ensure the lowest possible impact on the livelihoods of affected communities; • Local NGOs or community representatives should approve the land acquisition process; • No coercive measures should be taken to obtain or transfer land;

[56] The following mitigation hierarchy should be acknowledged throughout all project stages:

- Adverse impacts should be avoided if possible (e.g., different project design choices);
- If adverse impacts cannot be avoided, it should be clearly demonstrated and documented why adverse impacts cannot be avoided;
- Measures should be formulated and implemented to minimize / mitigate and compensate for unavoidable adverse impacts.

		• Affected community stakeholder groups that lose their land or lose access to land should be compensated following the measures specified under C:7.1. - Measures should be taken to avoid involuntary or forced resettlement and its adverse social and economic impacts through engagement with local stakeholders. - If resettlement cannot be avoided: • Measures should be taken to ensure a full restoration of the community's livelihoods (e.g., a Livelihood Restoration Plan) including appropriate compensation and rehabilitation measures and assistance given to displaced persons to at least partially restore their incomes and standards of living (see C:7.1); • Measures should be taken to ensure the participation of affected community stakeholder groups in resettlement planning and implementation and to ensure that protected categories, such as gender, age, and race do not disadvantage affected stakeholders (see C:3.1); • Alternative project designs should be considered in order to avoid resettlement through engagement with affected community stakeholder groups. - Measures should be taken to mitigate damages to productive agricultural land, such as soil sealing, degradation, fragmentation of landscapes, salinization in order to guarantee food security of affected communities.

Principle 9: Water ***The project's water usage should not threaten the availability and access to* water in adjacent communities.**		
Criteria	**Sub-Criteria**	**Guidelines**
9.1 **Water security (water availability and access)** ***The key objective is to avoid any negative impacts on***	9.1.1 Long-term water security should be maintained or enhanced by minimizing water use of the project.	- An analysis and assessment of the ecological state and projected future (including climate change) of water bodies and an evaluation of water availability and access should be conducted as part of the ESIA or EIA. - Legitimate local water users should be identified, regardless of whether their water rights are recognized by a government. - The potential effects of the project on local water availability and access should be

livelihoods due to decreased availability and/or access to water.		assessed. • If the water assessment finds that the project should significantly affect local water resources, measures should be taken to reduce the impacts on affected populations; • If the water usage of the project cannot be significantly reduced, other measures should be taken to improve the water security. Measures could, for example, include domestic water efficiency measures, desalination, water distribution systems, wastewater treatment, irrigation systems; • If measures to improve water security are insufficient and it affects community livelihoods, the, affected community stakeholder groups should be compensated through the measures specified under C:7.1.

Principle 10: Conservation ***The project should not harm or endanger areas with high conservation values or biodiversity.***		
Criteria	**Sub-Criteria**	**Guidelines**
10.1 **Protection of high conservation values and biodiversity** ***The key objective is to protect* high conservation value areas *and biodiversity to avoid any loss of livelihood for affected community stakeholder groups that rely on these resources.***	10.1.1 Any project activities in Highly Protected Areas should be forbidden. 10.1.2 High conservation value areas and biodiversity should be maintained.	- Highly Protected Areas should be identified as part of a broader ESIA or EIA. Infrastructure should not be established in these places. Highly Protected Areas include but are not limited to: • World Heritage Sites, • Nominated World Heritage Sites, • IUCN category I-IV protected areas, • Category I-V marine protected areas, • Core areas of UNESCO biosphere reserves. - An analysis and assessment of high conservation value areas on the project site should be conducted as part of a broader ESIA or EIA. Additionally, ecosystem services should be identified. - Measures should be taken to protect high conservation value areas, including those that are (a) legally protected, (b) officially proposed for protection, (c) identified (by authoritative sources) for their high conservation value or (d) recognized as protected or of high value by indigenous communities. • If high conservation value areas are harmed and this affects stakeholder livelihoods, affected community stakeholder groups should be compensated following the measures specified under C:7.1.

Principle 11: Cultural heritage *The project should respect the cultural identity and heritage of the affected communities.*		
Criteria	**Sub-Criteria**	**Guidelines**
11.1 **Protection of cultural heritage** ***The key objective is to respect the traditions, values, and cultural identity of communities and not to disturb or disrupt the social cohesion within affected communities.***	11.1.1 Unwanted alterations of intangible cultural resources and local lifestyles should be avoided. 11.1.2 Tangible cultural resources with unique social value should not be damaged or removed.	- An analysis and assessment of local traditions, practices, values, and sense of place (people's values for local landscapes, such as quietness) should be conducted as part of a broader ESIA or SIA. Local associations or local development NGOs should be enlisted to assist with this assessment. If the project would result in undue impacts on local traditions or practices, measures should be taken to mitigate these impacts in consultation with relevant community stakeholder groups. • If high conservation value areas are depleted nevertheless and, community stakeholder groups experience a negative impact on their livelihoods as a result, affected community stakeholder groups should be compensated following the measures specified under C:7.1. - An analysis and assessment of sites with cultural, ecological, economic, archaeological, religious or spiritual value should be conducted through engagement with relevant community stakeholder groups as part of a broader ESIA or SIA. The analysis should cover natural areas with cultural and/or spiritual value, such as, sacred groves, sacred bodies of water and waterways, sacred trees, and sacred rocks. Based on the outcome of the analysis, a cultural heritage consent agreement should be negotiated by the project developers and local associations to protect tangible forms of cultural resources.

Principle 12: Infrastructure and services *The project should not harm the availability of and access to infrastructure and services.*		
Criteria	**Sub-Criteria**	**Guidelines**
12.1 **Availability of and access to infrastructure and services** ***The key objective is to ensure***	12.1.1 Sufficient local infrastructure and services for incoming foreigners / immigrants should be ensured.	- An analysis and assessment of existing infrastructure and services and its vulnerability to additional demand should be conducted as part of a broader ESIA or SIA. • Based on this assessment, measures should be implemented in order to improve local infrastructure (e.g., roads) and services (e.g., healthcare), as necessary; • If measures to improve availability of and access to infrastructure and services are not sufficient and, therefore, community stakeholder groups expe-

that the project and its associated processes, such as an influx of workers, should not constrain the availability of and access to local infrastructure and services.		rience a negative impact on their livelihoods as a result, affected community stakeholder groups should be compensated following the measures specified under C:7.1.

Principle 13: Health and safety ***The project and its activities should not cause any negative impacts on communal health and safety.***		
Criteria	**Sub-Criteria**	**Guidelines**
13.1 **Safeguarding of communal health and safety** ***The key objective is to ensure the health and safety of local residents.***	13.1.1 The project should not harm the physical or psychological well-being of local residents. 13.1.2 The release of or exposure to hazardous pollutants and/or materials should be avoided. 13.1.3 The project should not endanger the safety of local residents. 13.1.4 Waste should be reduced, recycled, and disposed of in an environmentally	- An analysis and assessment of the health situation of affected community stakeholder groups in the project area should be conducted as part of the ESIA or SIA. The assessment should identify project activities that may harm the physical health (e.g., due to the release of hazardous pollutants that pollute the groundwater, air, or soil) or psychological health (e.g., due to noise and vibrations emitted during construction work) of local residents. • Measures should be taken to avoid any harm to the health of local residents resulting from the project; • If hazardous pollutants are released, the intensity and mass flow of these pollutants should be reduced and frequently monitored, and it should be demonstrated that these pollutants do not endanger human health. - Activities and impacts of the project that could endanger the safety of local residents should be identified as part of the ESIA or SIA. For example: • The safety of local residents could be endangered due to project activities, such as increased traffic during construction; • The safety of local residents could also be endangered due to social change processes and project impacts, such as higher crime rates related to a high influx of outsiders; • Measures should be taken to account for the safety of local residents. For example, if traffic accidents increase, new street lighting or signage could be developed. - A waste management plan should be developed to ensure that waste is handled in an environmental friendly manner. The waste management plan should include issues

	responsible manner to minimize material resource usage.	such as: • Identification and monitoring of the sources of the waste; • Improving the efficiency of resource utilization.

Principle 14: Working conditions ***Project employees should benefit from safe working conditions and well-being.***		
Criteria	**Sub-Criteria**	**Guidelines**
14.1 **Decent work conditions** ***The key objective is to guarantee safe working conditions free from discrimination that respect international labor rights and standards.***	14.1.1 The project should respect international labor rights described in the ILO (International Labor Organization) core principles and relevant conventions.	- It should be ensured that the project is implemented in compliance with (at least) the following ILO conventions: • Freedom of Association and Protection of the Right to Organize Convention (No. 87), • Right to Organize and Collective Bargaining Convention (No. 98), • Forced Labor Convention (No. 29), • Abolition of Forced Labor Convention (No. 105), • Minimum Age Convention (No. 138), • Worst Forms of Child Labor Convention (No. 182), • Equal Remuneration Convention (No. 100), • Discrimination (Employment and Occupation) Convention (No. 111), • Minimum Wage Fixing Convention (No. 131).
	14.1.2 The project should conform to international child labor standards.	
	14.1.3 The project should not have forced or compulsory labor.	- Employee contracts should reflect ILO conventions for fair pay and safe working conditions including: • Fair, transparent contracts that employees can understand and • Payments that should be made on a regular basis, in a timely manner.
	14.1.4 All employees should receive payment commensurate with the hours worked, as	- Measures should be taken to ensure that employees enjoy freedom of association, the right to organize, and the right to bargain collectively. These measures should not be undermined by any project activity. Also, employees should have the right to participate in the verification process of decent working conditions without the fear of employer retribution.

	well as benefits and safe working conditions. Workers should be paid the same regardless of gender. 14.1.5 All employees should receive a minimum wage. 14.1.6 Employees should enjoy freedom of association, the right to organize, and the right to collectively bargain.	- Employees should have access to grievance mechanisms. These grievance mechanisms should be separated from the mechanisms discussed under C:4.2 and should be used for disputes and grievances concerning working conditions and workplace concerns (including, but not limited to harassment and threats, workplace violence, disputes over contracts etc.). - Measures should be taken to ensure that work sites are safe for minority employees and women, including freedom from sexual harassment and other discrimination and abuse (physical or verbal).
14.2 **Occupational health** ***The key objective is to guarantee a safe working environment for all employees.***	14.2.1 The project should guarantee a safe working environment for all employees.	- Qualified personnel should conduct a Health Risk Assessment to identify health risks to employees. If any health risks are identified, e.g., exposure to harmful substances or heat, countermeasures should be taken to mitigate the risks. - An occupational health and safety officer should be hired who will be responsible for the monitoring, verification, and documentation of occupational health and safety measures including the documentation of accidents and implementation of appropriate counter measures. Additionally, regular occupational health and safety trainings should be provided for all employees.

V.) Enhancement safeguards

Principle 15: Local content and employment *The project should maximize the economic participation of local industries (SMEs) as well as employment opportunities for local workers.*		
Criteria	**Sub-Criteria**	**Guidelines**
15.1 **Economic participation of local industries** ***The key objective is to guarantee that a reasonable share of the project's components and services come from local sources (i.e., a "local content requirement").***	15.1.1 The inclusion and use of available local industries (SMEs) to supply the components of the project and to deliver the required goods and services should be ensured. 15.1.2 It should be ensured that any technology applied allows a significant share of equipment to be sourced from local suppliers as well as to provide local industry stakeholders with opportunities to maintain and manage the technology in the long-term.	- To determine a reasonable local content share, an analysis and assessment of the local supply chain and local capacity to contribute to the implementation, operation, and maintenance of the project should be conducted as part of a broader ESIA or SIA, or as a specialized stand-alone Local Content Potential Assessment. Based on this analysis, a clear target for a local content share should be specified. - Measures should be specified to ensure the inclusion and use of available local industries, businesses, relevant organizations and traditional knowledge to meet the demands of the project and deliver required goods and services. - Efforts should be made to strengthen the capacity of local suppliers to contribute to supply chains, giving special attention to disadvantaged groups. - A community-based cluster of entrepreneurs should be developed to join forces, subcontract to each other, invest in shared tools etc..

15.2 **Locally sourced workers** ***The key objective is to maximize the employment opportunities stemming from the project with priority given during recruitment to the most affected communities.***	15.2.1 High and low skilled employment opportunities should be created both for men and women, predominately for the most affected communities.	- An analysis and assessment of the employment situation at the community level and of the project's employment creation impact should be conducted as part of the ESIA or SIA or as a specialized stand-alone Local Content Potential Assessment. - Whenever possible, the technology's typical employment rate should be considered in order to maximize employment opportunities. - Measures should be taken to ensure that local workers are given hiring priority over migrant workers for low and high skilled jobs. Job opportunities could be prioritized for individuals who have been historically or culturally disadvantaged (e.g., women). • This agreement should include explicit goals (e.g., a total number or percentage of locally sourced workers) and should include a justification for such goals. - Whenever possible, employers should favor long-term contracts (permanent jobs) over short-term contracts (temporary jobs). - A local recruitment office should be created that is supervised by the Ministry of Labor and supported by community representatives. - Job opportunities should be advertised publically and made available to community organizations (see C:3.2). • Job descriptions should be clearly defined and updated frequently.

Principle 16: Capacity building

Activities should be implemented that promote and contribute to capacity building for individuals, local industries and communities in the context of the project.

Criteria	Sub-Criteria	Guidelines
16.1 **Skill development**	16.1.1 The capacities of the community to build up a local skill base relevant to the project and to improve local absorptive capacities should	- Existing educational programs could be enhanced to foster the know-how, competencies, skills, and careers needed in local communities to increase local content opportunities and the future self-reliance of the project. These could include apprenticeship programs, programs focused on disadvantaged groups, lifelong learning programs, and skills recognition.

The key objective is to enhance the local skill base and absorptive capacities.	be increased.	- Measures should also include education and on-site vocational training for project employees (especially for low to medium qualified jobs).
16.2 **Technology transfer** ***The key objective is to enhance technology transfer between local / regional and international companies.***	16.2.1 Technology transfer and cooperation between local / regional and international companies should be promoted to increase local capacities for technological innovation and the provision of local content.	- An analysis and assessment of the local / regional industries to absorb, manage, and maintain new technologies should be conducted as part of the ESIA or SIA or as a specialized stand-alone Local Content Potential assessment through engagement with local industry stakeholders. - Measures should be taken to increase the know-how of local industry related to the transferred technologies so they can manage the technology on their own in the medium-term.
16.3 **Knowledge transfer** ***The key objective is to enhance knowledge exchange between local / regional and international institutions.***	16.3.1 Knowledge transfer and cooperation between local / regional and international institutions should be facilitated.	- Decision-makers should consider developing partnerships with organizations, such as universities or research laboratories, to enhance scientific and technological development. Measures could, for example, include the establishment of a technology center / cluster.

VI) Voluntary actions

Principle 17: Combined applications and voluntary actions ***The project developer should identify and implement additional measures that go beyond legal compliance and frameworks to enhance local benefits.***		
Criteria	**Sub-Criteria**	**Guidelines**
17.1 **Combined applications** ***The key objective is to pro-actively identify and implement combined applications for CSP projects.***	17.1.1 A review of the project's potential for combined applications should be facilitated.	- As CSP projects bear a high potential for combined applications, it should be considered to apply combined applications, such as, greenhouses, solar drying, heat excess use, desalination etc. to the project design.
17.2 **Identification and implementation of voluntary actions** ***The key objective is to identify and implement voluntary actions that fit within the communities' sustainability context.***	17.2.1 The procedures for identifying voluntary actions should be conducted in close cooperation with local stakeholders. 17.2.2 Voluntary actions should fit within the communities' sustainability context and should result in long-term benefits for local communities.	- While voluntary actions can be very different in nature, it should be ensured that these actions fit within the local sustainability context in order to maximize and achieve long-term benefits. Therefore, the identification of voluntary actions should be based on: • A review of official local and regional development plans and • Approaching local associations, NGOs, or community representatives in order to gain input from them. - During and after the implementation of voluntary actions relevant community stakeholder groups should be consulted in order to gain feedback about the impact achieved due to voluntary actions.

Info-Box: Partnerships

Partnerships are "[…] a collaboration between municipalities, businesses and appropriate others from civil society, academia, the media etc. who commit to work together on a project or programme to pursue sustainable development goals in which the partners bring complementary [sic] resources, contribute to the design of the programme, and share risks and benefits" (GTZ, 2008:4). There are several forms of partnerships: Private Public Partnerships (PPPs) and Cross-Sector Partnerships (CSPs). PPPs are a collaborative venture between a government and a private entity in which the private entity provides the upfront investment in a technology, infrastructure or service, and then gains in return long-term concessions, leases, or fees[57] (GTZ, 2008:6). In CSPs, "[…] government, businesses and civil society work together in areas of mutual interest to achieve common – or at least complementary – goals" (GTZ, 2008:6). NSI (2014:4) further defines cross-sector development partnerships (CSDPs) "[…] as engagements between and among government, non-profit organizations, and businesses (any combination) that have an explicit pro-poor orientation and in which the private sector is a proactive partner". CSDPs may reflect best the spirit of the partnerships envisioned within this report and the accompanied principles and criteria catalogue as it promotes a proactive engagement and a pro-poor development orientation.

It is important to note that the collaborating parties do not necessarily have to share the same objectives or motivations for engaging in a partnership. In fact, it is sufficient if the parties have complementary assets that can be used to create win-win situations. The value of partnerships can be found within the mutual short- and long-term benefits generated from the complementary nature and direction of the different assets (resources, capabilities, skills) of the involved parties (NSI, 2014:4 f). While tri-sector partnerships among companies, government, and civil society are considered as one "new model" to convert wealth created by private entities into sustainable development outcomes (Rogerson, 2011:5409), they are not without risks and challenges. Risks for the involved partners are the loss of autonomy over decision-making, conflicts of interest between partners, lack of accountability and a negative reputation due to a partner's action. It is time-intensive to build these long-term partnerships, which require non-traditional approaches to challenges.

Info-Box: Social Development Needs Analysis

Social Development Needs Analysis (SDNA) is an add-on tool for Social Impact Assessments (SIAs). SDNA can be defined "[…] as process that seeks to identify the significant social issues that need to be addressed in order for a company to contribute to the sustainable development of the local community over time, while creating value for the business" (Esteves and Vanclay, 2009:141). It builds on an SIA process that is "[…] participatory, proactive and oriented towards social development […]" (Esteves and Vanclay, 2009:141) in which impacts are assessed from the perspective of those most affected by a project and where the views of the most vulnerable populations are incorporated into the assessment process (Esteves and Vanclay, 2009:141). In this context, Social Development is framed as "[…] the processes of fulfilling the basic needs of people, achieving a fair distribution of wealth gained as a result of economic growth, building human and social capital, expanding the scope of opportunities of individuals and communities, promoting social justice and equal opportunities, and eradicating poverty and illiteracy" (Esteves and Vanclay, 2009:141 citing Esteves, 2008:43). As a methodological enhancement, SDNA builds on the standard SIA phases: 1.) Understanding the issues and opportunities; 2.) Predicting the likely impacts and contributions; 3.) Developing mitigation/development strategies; and 4.) Monitoring and adaptive management.

However, SDNA expands SIA especially due to an active inclusion of stakeholders and their needs within the process. Based on a capital approach, such as the SLA, stakeholders will be identified and consulted with the goal of, on the one hand, identifying impacts, but also, on the other hand, identifying social development needs and opportunities and strategies. The proactive engagement of stakeholders within SDNA is also helpful as a major emphasis is placed on the alignment of the social investment decision of companies with the social development goals of communities within this process. Therefore, potential social investment decision of companies can be oriented towards the communities' social sustainability context. Within SDNA, the involved and affected stakeholders also monitor the successful implementation of these initiatives.

[57] PPPs can also include other forms of cooperation, e.g., sponsoring, competitive grants, public finance aimed at encouraging private (co)-investment in developing countries

and financial and advisory services for private investors (NSI 2014, p4).

While SDNA is not yet a mainstream tool within traditional SIAs, SDNA points towards new and innovative ways how corporate-community partnerships can be implemented.

Info-Box: Participation

Participation is widely regarded as a precondition for sustainability (Newig et al., 2011:27). Since the UN Conference on Environment and Development in Rio (1992), participation was elevated on the political agenda. Principle 10 of the Rio Declaration, which states that "Environmental issues are best handled with the participation of all concerned citizens […]", reflects the belief that environmental and sustainability related challenges cannot be handled anymore in a technocratic top-down manner, but need the input of affected people. This new spirit can also be understood as a way to address modern environmental and sustainability related challenges that come with a high degree of uncertainty and complexity. Additionally, the normative concept of sustainability in strongly context dependent meaning that the input and knowledge of affected stakeholders is needed to achieve societal consensus and to operationalize sustainability effectively (Newig, 2011:485 f).

More broadly, Renn et al. (1995:2) define participation as "[…] forums for exchange that are organized for the purpose of facilitating communication between citizens, stakeholders and interest groups, and businesses regarding a specific decision or problem". As there exist many different forms of participation, it can also be characterized due to five central elements (following Newig, 2011:487):

1.) *Cooperation / communication* (In contrast to top-down decisions, participation is characterized by the will of involved groups to find a collective solution to a problem which requires communication between these groups as a central element);

2.) *Public space* (Participation is characterized by a decision-making process that occurs in the "public space", meaning that these decisions affect a wider group of people, which potentially also involves conflicts);

3.) *Codetermination* (Participation involves people who routinely do not make decisions about the problem at hand; this does not mean that governmental institutions cannot be part of decision-making processes, but that such institutions cannot be the only involved party);

4.) *Power* (Involved parties must have the power to influence the decision at stake);

5.) *Representation* (Involved parties must represent the group of people who are affected by the decision).

However, as empirical findings suggest, it cannot be stated that participation will improve sustainability outcomes *per se* (Newig et al., 2011:41). The outcomes depend upon the implementation of a "good" process and other factors. Hence, participation includes opportunities like more efficient, creative and feasible solutions - solutions that are better accepted by the broader public and solutions that respect citizen rights - but also poses challenges like lack of trust and transparency within the process or lack of preparation, which can lead to mistrust and frustration among the participants as well as a lack of resources, skills and time (Rottman, 2013:9 ff). Despite the fact that a one-fits-all solution for a participatory process is infeasible, as every situation and context is unique, Rottmann (2013:13 ff) identified factors for success that should be followed to safeguard a participatory process. In her view, transparency is a precondition for participation. The timely dissemination of information about the project at hand as well as about the process itself is necessary for a good participative process. Furthermore, it must be clearly communicated which decision(s) can be influenced in what ways. Hence, the "room to maneuver" must be specified. Additionally, fairness and inclusiveness within the process are needed in combination with a consistent dialogue and feedback mechanisms to build trust among all participants. Finally, it is important to include professional staff members who have sufficient resources and skills to facilitate the process.

The success of participation and its sustainability outcomes will also depend on the willingness of decision-makers to allow for more bottom-up influenced decisions within the decision-making process.

Glossary of important terms:

Affected, interested and relevant stakeholders: While there are many definitions of the term "stakeholder", i.e., "[…] people/communities who may - directly or indirectly, positively or negatively – affect or be affected by the outcomes of projects or programs" (AfDB, 2001: 2), it is more difficult to distinguish between different kinds of stakeholders. Building upon various proposed definitions (e.g., IFC, 2012: 5; IRMA, 2014: 164) and the $Noor_o$ I case study, the authors want to distinguish between affected and interested stakeholders. In the view of the authors, affected stakeholders are those individuals or groups that are directly and locally affected by the project within the project's area of influence (e.g., farmers, residents, women, and water associations). On the other hand, interested stakeholders are individuals or groups that may not be directly affected, but have an interest in the decisions to be made as they represent stakeholder groups or specific interests (e.g., local or national environmental NGOs or associations) or think that they can contribute to the decisions to be made. In that sense, these definitions come close to the definition proposed by Wilburn and Wilburn (2011: 9) who distinguish between vested and non-vested stakeholders. Vested stakeholders are those, "[…] who have a right to the possession of something tangible in the community in which the social license to operate is being requested. This tangibility could be owning physical property or inhabiting property with a need for resources such as water, arable land, and clean air" while non-vested stakeholders "[…] would be those who have an interest in the activity that is being pursued in the license to operate". Furthermore, while in this document stakeholders are referred to as *groups*, it should be acknowledged that stakeholders do not necessarily have to be organized in groups.

Community engagement: According to Franks (2012: 10) "Community engagement and participation can assist in developing open, meaningful dialogue, and can influence decision making, build trust, legitimacy, capacities, address community concerns, manage expectations, tap local knowledge and negotiate mutually beneficial futures that are more sustainable and locally relevant."

Enhancement: Enhancement is defined as the "deliberate attempts taken in the design and subsequent phases of projects, policies, plans and programmes to ensure the success of a wider range of direct and indirect benefits that could possibly flow from the project or policy" (Arcre-Gomez et al., 2015:92 citing João et al., 2011: 171).

Fair compensation: Compensation can be defined as a measure "[…] to compensate affected people for loss of physical assets, revenue, and income resulting from economic displacement or physical relocation whether these losses are temporary or permanent" (IFC, 2002: 28). However, it is difficult to measure fairness. Fair compensation "[…] is a matter to be decided by the circumstances of each case" (Rwegasira, 2012: 312). Nevertheless, Rwegasira (2012: 312 f) concludes that fair compensation is never to be decided unilaterally by "a strong hand", but instead requires transparency and the acceptance of the community members on which the decisions would be imposed.

Free, Prior & Informed Consent (FPIC): While the principle of FPIC was firstly mentioned in article 10 of the United Nations Declaration on the Rights of Indigenous Peoples (2007) and, therefore, is intended to recognize predominantly the rights of indigenous people, the authors think that this principle should not only apply to indigenous people, but should form the basis

for any stakeholder involvement regardless of whether or not a specific stakeholder group would be classified as indigenous. However, according to different organizations (e.g., the UN Department of Economic and Social Affairs, 2005; IRMA, 2014) the principle of FPIC should include: an implementation based on the Human Rights; clear institutional agreements; engagement that is free from external manipulation, coercion and intimidation; notification, sufficiently in advance of commencement of any activities, that consent will be sought; full disclosure of information regarding all aspects of a proposed project or activity in a manner that is accessible and understandable to the people whose consent is being sought; acknowledgment that the people whose consent is being sought can approve or reject a project or activity, and that the entities seeking consent will abide by the decision.

High Conservation Values: The High Conservation Value Resource Network (HCVNetwork, 2014) distinguishes among six High Conservation Values (HCVs): (1) Concentrations of biological diversity including endemic species, and rare, threatened or endangered species that are significant at global, regional or national levels, (2) Large landscape-level ecosystems and ecosystem mosaics that are significant at global, regional or national levels, (3) Rare, threatened, or endangered ecosystems, habitats or refuges, (4) Basic ecosystem services in critical situations, (5) Sites and resources fundamental for satisfying the basic necessities of local communities or indigenous peoples and (6) Sites, resources, habitats and landscapes of global or national cultural, archaeological or historical significance, and/or of critical cultural, ecological, economic or religious/sacred importance for the traditional cultures of local communities or indigenous peoples.

Impacts: According to IFC (2012: 5) "[…] environmental and social impacts refer to any change, potential or actual, to (i) the physical, natural, or cultural environment, and (ii) impacts on surrounding community and workers, resulting from the business activity to be supported".

Livelihood: According to the World Bank (2014:1) the term livelihood "[…] refers to the full range of means that individuals, families and communities utilize to make a living, such as wage-based income, agriculture, fishing, foraging, other natural resource-based livelihoods, petty trade and bartering".

Meaningful participation: According to the United Nations report "Realizing the Right on Development" (UN, 2013:106 f) meaningful participation is "[…] reflected by the people's ability to voice their opinions in institutions that enable the exercise of power, recognizing the citizenry as the origin of and the justification for public authority", while meaningful stands for "[…] an effective expression of popular sovereignty in the adoption of development programmes and policies". To be meaningful, some preconditions for participation must be realized. This includes, for example, the transparency of the process, adequate information dissemination, involvement of all relevant stakeholders and an equal and respectful relationship between the stakeholders and the project developers.

Mitigation: According to Arcre-Gomez et al. (2015:91) mitigation "[…] involves minimising or reducing any negative impacts, and where this is not possible, to provide compensation to affected parties". Furthermore, mitigation should involve a sequenced strategy, meaning that the first option should be the avoidance of adverse impacts and second, if this option is not feasible, adverse impacts should be minimized or mitigated and/or compensated for.

Project and the project's "area of influence": According to IFC (2012:6) "[…] the term "project" refers to a defined set of business activities, including those where specific physical elements, aspects, and facilities likely to generate risks and impacts, have yet to be identified. Where applicable, this could include aspects from the early developmental stages through the entire lifecycle (design, construction, commissioning, operation, decommissioning, closure or, where applicable, post-closure) of a physical asset". The project's area of influence is defined by the area that is likely to be affected by the project's activities and accompanied impacts (especially direct and local impacts caused by the project and its associated facilities, but also unplanned, but predictable impacts; indirect impacts on local biodiversity and livelihoods; and cumulative impacts).

Realistic expectations: Realistic expectations are those that are in line with the project's nature and scale. While it is out of the reach of the project developers to control the expectations of the stakeholders, measures can be implemented in order to ensure that stakeholders' expectations are congruent to the project's outcomes. Measures may include adequate information dissemination about the project's nature and scale as well as an assessment of impacts based on scientific methods. Moreover, project outcomes (e.g., numbers of jobs generated) should be communicated in a conservative manner.

Vulnerable and marginalized groups: A detailed definition of vulnerable and marginalized groups would encompass the determination of the multidimensional, complex and interwoven issues of vulnerability and marginalization, which is clearly beyond the scope of this study. Therefore, the authors decided to a) combine the different groups of vulnerable and marginalized groups as they both need special attention and b) use a workable definition of these terms. According to the Buck and Curran (2009:2) vulnerable and marginalized groups are defined as "[…] people with limited income, employment opportunities and education, minimal power, living in poverty or communities that are deprived, under-resourced, and/or lack sufficient infrastructure. It also includes persons who suffer some form of disadvantage due to their state of mental health, disability, racial or cultural background, age, or a combination of all these". Furthermore, marginalized groups "[…] are those that normally have little or no influence over decision-making processes. Marginalization may be related to gender, ethnicity, socioeconomic status and/or religion" (REDD, 2010:16) (for an in-depth discussion about vulnerable and marginalized groups see: Larkin, 2009).

14 Research limitations, recommendations and outlook

14.1 Research limitations

The research to assess the social impacts of $Noor_o$ I was designed to provide valid answers to the research questions through long-term fieldwork, stakeholder focus groups, and a large number of interviews. Nevertheless, there are always limitations to research design, as summarized below (see also section 5.5).

- **Representativeness**: The stakeholder interviewee sample might not be entirely representative of the full range and diversity of the perspectives of the local population, which could skew the results. Furthermore, this study sampled within a certain geographic radius from the power plant site and may have excluded perspectives from and impacts on communities living further from the power plant.
- **Reductionism**: Inaccuracies may have resulted from shortening the data into brief impact descriptions for categorization, although collating data is a necessary step in analyzing and interpreting data. The process of determining the significance of these impacts was somewhat subjective. Reducing complex qualitative data into variables could have eliminated information important to measuring the impact significance. Additionally, translating qualitative data into a numerical scale can be reductionist and suffer from inaccuracies.
- **Bias**: This study aimed to measure stakeholder opinions, which are by nature based on subjective opinions, worldviews, and lenses. Care must be taken in extrapolating facts from these opinions (e.g., someone's fear that an influx of construction workers will increase crime in the area does not mean that it will). Despite efforts to remain objective, expert assessments are also inevitably influenced by the lenses through which experts see the world, by incomplete information and knowledge deficits, and by an innate inability to predict the future.

However, despite these drawbacks, the collected empirical information, as well as the literature review, draw a consistent picture and have been verified in the study as being useful to achieving comprehensive findings from affected society groups.

14.2 Future research recommendations

Future research should analyze whether the anticipated impacts are actually observed during later phases of the project. It would also be important to understand the degree to which communities are actually affected in the future, as well as the changing perception of the impact significance in the communities. Further studies could determine the extent to which promised socio-economic benefits are fulfilled. A comparison could be draw between these longer-term impacts and those of conventional power plants such as coal and nuclear. $Noor_o$ II and III provide opportunities to study these future impacts across different types of large-scale technologies (CSP trough, CSP tower, PV).

Another opportunity for future research is to study the energy-water nexus more thoroughly, including the future impacts of CSP on water scarcity in the MENA region. CSP could also reduce water scarcity in the MENA region through seawater desalination. Interdisciplinary collaboration should also be fostered to provide integrated assessment of renewable power

plants in that region. This research should include a comparison to conventional power plants.

Another future research direction is to improve the social impact assessment (SIA) methodology and prioritize it equally to environmental assessment. SIA is typically a quantitative project planning tool, but it ought to be transformed into a participatory, qualitative planning process. The importance of participation is emphasized in literatures ranging from sustainability science to governance but rarely effectively implemented. Therefore, research is also needed on how to better integrate local stakeholders into the project planning and implementation processes without making the process too complicated especially if no donor or international agency is involved. In addition, the research-policy interface must be addressed to overcome insufficient effects of engagement processes on policymaking. In terms of defining the significance of social impacts, more structured approaches would be desirable, especially to enable comparison across case studies.

14.3 Applying the research beyond Morocco

Even though CSP currently costs more than PV, CSP offers socio-economic and other advantages that could be beneficial for the MENA region and its challenges. The results of this study are relevant to future CSP power plants, as well as other large-scale renewable energy facilities. Most of identified impacts are likely not specific to CSP. The data are somewhat site-specific and not entirely generalizable, but many insights from the study can be applied to the MENA region. Furthermore, the methodological design could be applied to other case studies, even outside of the region. Participatory processes are new in the MENA region, but the experience gained in this study can be applied to improve future participation. Since such extensive research is not always possible, other energy development projects should use the sustainability safeguards during project development. The sustainability framework could also be used by the UNFCCC, the UN "Sustainable Energy for All" initiative, and the "Sustainable Development Goals" within the Post-2015 development agenda to improve outcomes across climate protection, energy security, and sustainable development.

15 References

5 Capitals Environmental & Management Consulting (2012a): Quarzazate Solar Power Complex, Phase 1 Morocco. Specific Environmental and Social Impact Assessment Volume 1, Rabat.

5 Capitals Environmental & Management Consulting (2012b): Quarzazate Solar Power Complex, Phase 1 Morocco. Specific Environmental and Social Impact Assessment Volume 2, Rabat.

5 Capitals Environmental & Management Consulting (2012c): Quarzazate Solar Power Complex, Phase 1 Morocco. Environmental and Social Impact Assessment -Environmental social Management Plant Volume 3, Rabat.

Abeyasekera, S. (2001): Analysis Approaches in Participatory Work involving Ranks or Scores. Statistical Services Centre, University of Reading: Reading. www.ssc. reading.ac.uk.

AfDB African Development Bank (2001): Handbook on Stakeholder Consultation and Participation in ADB Operations.

AfDB (African Development Bank Group) (2011): Summary of the environmental and social impact assessment, Tunis.

AfDB (African Development Bank Group) (2012a): Project Appraisal Report. Ouarzazate Solar Power Station – Phase 1, Tunis.

AfDB (African Development Bank Group) (2012b): African Development Bank's Integrated Safeguard System, Summary Report of the Regional Consultations.

AGIC (Australian Green Infrastructure Council) (n. y.): AGIC fact sheet no 6.

AGIC (Australian Green Infrastructure Council) (2012b): IS Rating Tool.

Ait Hamza, M. (2002): Mobilité socio-spatiale et développement local au Sud de l'Atlas marocain (Dadès-Todgha), Maghreb-Studien 13.

Akiouh, L. (1994): Ouarzazate une ville oasis, Processus et formes d'expansion urbains - DES en Géographie, Université de Rabat, Rabat, Morocco [in arabischer Sprache].

Al-Karaghouli, A., Renne, D. and L. L. Kazmerski (2009): Solar and wind opportunities for water desalination in the Arab regions, Renewable and Sustainable Energy Reviews 13, 2397-2407.

Alexeew, J., Bergset, L., Meyer, K., Petersen, J., Schneider, L. and C. Unger (2010): An analysis of the relationship between the additionality of CDM projects and their contribution to sustainable development, International Environmental Agreements 10, 33-248.

Almaouja.com (2013): La santé à Ouarzazate: priorité à la modernisation, available from http://www.almaouja.com/sur-la-vague/eclairages/ouarzazate-2013/453-la-sante-a-ouarzazate-priorite-a-la-modernisation (accessed 14th Septermber 2013).

Almaouja.com (2013): Ouarzazate et ses environs, available from http://www.almaouja.com/guide/provinces/ouarzazate (accessed 21st June 2013).

Alvarez, S. and B..Douthwaite et al (2010) : Participatory impact pathways analysis: a practical method for project planning and evaluation. In: Development in Practice 20, Number 8, 946-958.

Ammor, F. M. (2012): Moroccan Higher Education System, available from https://eu.daad.de/medien/eu/veranstaltungen/drittkooperationen/2012-11-09_workshop_southern_neighbourhood_nto_morocco.pdf (accessed 16th September 2013).

Anzid, K., Baali, A., Vimard, P., Levy-Desroches, S., Cherkaoui, M. and P. M. López (2013, in press): Inadequacy of vitamins and minerals among high-school pupils in Ouarzazate, Morocco, In: Public Health Nutrition,1-10.

Anzid, K., Elhamdani, F. Z., Baali, A., Boetsch, G., Levy-Desroches, S., Lôpez, P. M. and M. Cherkaoui (2009): The effect of socio-economic status and area of residence on household food variety in Morocco, In: Annals of Human Biology 36 (6), 727-749.

Arce-Gomez, A., Donovan, J.D. and Bedggood, R.E. (2015): Social impact assessments: Developing a consolidated conceptual framework. Environmental Impact Assessment Review 50 (2015) 85–94.

Arrami, S. (Pub.)(2012): Imider, spoliation des resources naturelles et résistence populaire. Mouvement sur la Voie de 96, available from http://www.kabyle.com/articles/imider-spoliation-des-ressources-naturelles-resistance-populaire-21282-30122012 (accessed 09th February 2014).

A. T. Kearney Inc. (2010): Solar Thermal Electricity 2025, Clean electricity on demand: attractive STE cost stabilize energy production, Düsseldorf.

Badraoui, M., Agbani, M. and B. Soudi (2000): Evolution de la qualité des sols sous mise en valeur intensive au Maroc, Séminaire 'Intensification agricole et qualité des sols et des eaux, Rabat.

Bakkoury, (2013) : Communication. Plan Solaire Marocain: Un projet intégré et structurant, available from http://www.ires.ma/sites/default/files/pj-analyses/pdf_masen_presentation_ires_a_publier.pdf (accessed 05.09.2013).

Becker, D. R., Harris, C. C., McLaughlin, W., Nielsen E. A. (2003): A participatory approach to social impact assessment: the interactive community forum. Environmental Impact Assessment Review 23 (2003) 367–382.

Becker, D. R., Harris, C. C., Nielsen E. A., McLaughlin, W. (2004): A comparison of a technical and a participatory application of social impact assessment. Impact Assessment and Project Appraisal, volume 22, number 3, September 2004, pages177–189.

Bellon M.R. (2001): Participatory Research Methods for Technology Evaluation: A Manual for Scientists Working with Farmers. Mexico.

Benedek, F. (2011): Environmental impact assessment for a proposed 75MW CSP plant and associated infrastructure in the Siyanda district, Northern Cape, Final Environmental Impact Report (Revision 01), Johannesburg.

Benjelloun, S. (2002): Nutritional transitions in Morocco. Public Health Nutrition 5 (1A), 135-140.

Bennis, A. (2013): Corruption in Morocco: Condemned in Theory, Condoned in Practice, available from http://www.moroccoworldnews.com/2013/01/74752/corruption-in-morocco-condemned-in-theory-condoned-in-practice/ (accessed 16th September 2013).

Benoit, C. and G. Vickery-Niederman (2010): Social Sustainability Assessment Literature Review, The Sustainability Consortium, Arizona State University and University of Arkansas.

Bernard, H. R. (2006), Research Methods in Anthropology, Qualitative and Quantitative Approaches, 4th Edition, Oxford, UK

Block, M. R, (1999): Identifying Environmental Aspects and Impacts. Quality Press: Milwaukee.

Borbonus, S., T. Fink, B. Brand, S. Wane, P. Viebahn, K. Fritzsche, K. Blattmann, S. Zaoui, J. Hamachal, A. Jahar, N. Amri (2012): Analyse de al chaîne de valeur des technologies relative a l'énergie solaire en Tunisie, GIZ: Bonn und Eschborn.

Bosshard, P. (2004): NGO Concerns on the Use of National Safeguard Systems in World Bank Projects, A Critique of the World Bank Paper, Issues in Using Country Systems in Bank Operations, International Rivers Network, Berkeley.

Brand, B., Boudghene, S., Zejli, D. (2012): The value of dispatchability of CSP plants in the electricity systems of Morocco and Algeria, Energy Policy 47 (2012), 321-331.

Brent, A. C., Heuberger, R. and D. Manzini (2005): Evaluating projects that are potentially eligible for Clean Development Mechanism (CDM) funding in the South African context: a case study to establish weighting values for sustainable development criteria, Environment and Development Economics 10, 631-649.

Brent, A. C. and C. Labuschagne (2006): Social Indicators for Sustainable Project and Technology Life Cycle Management in the Process Industry, International Journal of Life Cycle Assessment 11 (1), 3-15.

Briggs, S., Hudson, M. D. (2013): Determination of significance in Ecological Impact Assessment: Past change, current practice. Environmental Impact Assessment Review 38 (2013) 16–25 Contents.

Buck, A. and Curran, L. (2009): DELIVERY OF ADVICE TO MARGINALISED AND VULNERABLE GROUPS: THE NEED FOR INNOVATIVE APPROACHES. Public Space: The Journal of Law and Social Justice (2009) Vol 3, Art 7, pp 1-29.

Burck, J., Marten, F. and C. Bals (2014): The Climate Change Perfomance Index 2015. Bonn. Available from: https://germanwatch.org/en/9472 (Accessed on 19.12.2014).

Burdge, R. et al. (2003): Principles and guidelines for social impact assessment in the USA The Interorganizational Committee on Principles and Guidelines for Social Impact Assessment. Impact Assessment and Project Appraisal, volume 21, number 3, September 2003, pages 231–250.

Burgeap (2011): Etude d'impact complexe solaire d'Ouarzazate Maroc, Roubai.

Burian, M. (2006): The Clean Development Mechanism, Sustainable Development and its Assessment, HWWA-Report 264, Hamburgisches Welt-Wirtschafts-Archiv (HWWA), Hamburg Institute of International Economics.

Busche, H. G. K. (2013): Modeling hydrological processes in a semi-arid mountainous catchment at the regional scale, Dissertation, Bonn.

Byker, N. and R. de Villiers (2011): Draft Socio-Economic Impact Assessment Report for the proposed establishment of Concentrated Solar Power (CSP) and Photovoltaic (PV) plants on three sites in the Northern Cape: Kaalspruit Site (Loeriesfontein). Revision 1, Johannesburg.

Caldwell, R. (2002): Project Design Handbook. CARE International, Atlanta.

Catley, A. (1999). Monitoring and Impact Assessment of Community-based Animal Health Projects in Southern Sudan: Towards participatory approaches and methods. A report for Vétérinaires sans frontiers. Musselburgh.

CGEM Souss Massa Drâa (Confédération Générale des Entreprises du Maroc Souss Massa Drâa) (2010): Monographie de la region du souss massa Drâa.

Chafik H., Demante, M. J., Gillet T., Zainabi A. T. (2003): Dispositif d'appui au renforcement des capacités des acteurs du développement local de la Vallée du Dra- Etude préalable. ADEDRA / IRAM. Paris. Available from http://f3e.asso.fr///IMG/pdf/Rapport_def_vallee_du_DRa.pdf (accessed 13th March 2014).

Chambers, R. and G. Conway (1992): Sustainable rural livelihoods: practical concepts for the 21century, IDS Discussion Paper 296, University of Sussex, Institute of Development Studies, Brighton.

Chambers, R. (1994): The origins and practice of participatory rural appraisal, World Development, 22(7), July, pages 953– 969.

Cherkaoui H.D ., Moussadek R., Sahbi H. (2007): Apport des techniques géo-spatiales pour la caractérisation de la qualité des eaux souterraines des oasis de la vallée du Drâa : cas de la nappe de Fezouata. In : Lamaddalena N. (ed.), Bogliotti C. (ed.), Todorovic M. (ed.), Scardign o A. (ed.).Water saving in Mediterranean agriculture and future research needs [Vol. 2]. Bari : CIHEAM, 2007 . p.293-304 (Option s Méditerranéennes : Série B. Etudes et Recherches; n. 56 Vol.II) Available from http://om.ciheam.org/om/pdf/b56_2/00800198.pdf (accessed 13th March 2014)

Cherni, J. A. (2003): Renewable Energy for Sustainable Rural Livelihoods, DFID.

CHHA (Canadian Hard of Hearing Association) (2011): Review and Update of the World Bank's Environmental and Social Safeguards Policies, available from http://www.multibriefs.com/briefs/chha/chha_safeguards.pdf (accessed 12th April 2013).

Choukr-Allah, R. (2011): Comparative study between Moroccan water strategies and WFD. In S. Junier, M. El-Moujabber, G. Trisorio-Liuzzi, S. Tigrek, M. Serneguet, R. Choukr-Allah, M. Shatanawi and R. Rodríguez (Eds.): Dialogues on Mediterranean water challenges: Rational water use, water price versus value and lessons learned from the European Water Framework Directive, Options Méditerranéennes: Série A. Séminaires Méditerranéens 98, 181 - 188.

CIA (Central Intelligence Agency) (2010): The World Factbook, Africa, Morocco, available from https://www.cia.gov/library/publications/the-world-factbook/geos/mo.html (accessed 16th September 2013).

CIA (Central Intellience Agency). (2014): The Word Factbook: Morocco. Available from https://www.cia.gov/library/publications/the-world-factbook/geos/mo.html (accessed 17th February 2014).

CIF (Climate Investment Funds) (2013): Revised CTF investment plan for MENA CSP, Washington, D. C., USA.

CIFOR (Center for International Forestry Research) (1999): Guidelines for Developing, Testing and Selecting Criteria and Indicators for Sustainable Forest Management, available from http://ciifad.cornell.edu/downloads/ME_CIFORtoolbox.pdf (accessed 16th August 2013).

Cloquell-Ballester, V. A., Monterde-Dıaz, R., Santamarina-Siurana, M. C. (2007): Indicators validation for the improvement of environmental and social impact quantitative assessment. Environmental Impact Assessment Review 26 (2006) 79–105.

Colantonio, A. (2009): Social Sustainability: Linking Research to Policy and Practice, Oxford Institute for Sustainable Development (OISD), Oxford Brookes University, Headington.

Coulibaly, M. (2012): Comments on the Integrated Safeguard System (ISS) of the African Development Bank: Operational Safeguards On Environmental and Social Assessment (ESA) OS1, The CSO Coalition on the African Development Bank.

CMA (Congress Mondial Amazigh) & APMM Maroc (Association des Populations des Montagnes du Monde)Pub. (2012): Imider (Province de Tinghir)spoliation des ressources naturelles et résistance populaire. Available from http://solidmar.blogspot.com/2012/12/cause-dimider-rapport-du-congres.html (accessed 17th February 2014)

CPI (Climate Policy Initiative) (2012): San Giorgio Group Case Study: Ouarzazate I CSP, CPI Report, San Francisco.

Cramb, R. A. and Purcell, T. D. (2001): How to Monitor and Evaluate Impacts of Participatory Research Projects: A Case Study of the Forages for Smallholders Project. Ausgabe 185 von CIAT working document.

CSP today (2012): Mikro CSP still looking good in Sogopy's wake, by Heba Hashem, http://social.csptoday.com/markets/micro-csp-still-looking-good-sopogy's-wake (accessed 15th June 2013)

CSP World (2013a): CSP Facts and Figures 2013, available from: http://www.csp-world.com/resources/csp-facts-figures (accessed 02nd May 2013)

CSP World (2013b): Spanish CSP companies appeal against new regulatory framework. available from: http://www.csp-world.com/news/20130425/00833/spanish-csp-companies-appeal-against-new-regulatory-framework.

CSO (Civil Society Organizations) (2012): Initial Comments by Civil Society Organizations on the World Bank's Safeguard Policies Review and Update, available from http://siteresources.worldbank.org/EXTSAFEPOL/Resources/584434-1306431390058/InitialCommentsbyCivilSocietyOrganizationsontheWorldBankSafeguardsReviewNovember142012rev1.pdf (accessed 11th March 2013).

CTF (Clean Technology Fund) (2013): Revised CTF investment plan for MENA CSP. Climate Investment Fund, Worldbank. May 2013, Washington.

Dani, A., Freeman, A. D. and V. Thomas (2011): Evaluative Directions for the World Bank Group's Safeguards and Sustainability Policies, Evaluation Brief 15, Washington, D. C.

De Jong, C., Makroum, K. and G. Leavesley (2006): Developing an oasis-based irrigation management tool for a large semi-arid mountainous catchment in Morocco, In: Hydrology and Earth System Sciences 8 (6), 1015-1089.

Del Rio, P. and M. Burguillo (2008): Assessing the impact of renewable energy deployment on local sustainability: Towards a theoretical framework. In: Renewable and Sustainable Energy Reviews 12(5), pp. 1325-1344.

Del Rio, P. and M. Burguillo (2009): An empirical analysis of the impact of renewable energy deployment on local sustainability. In: Renewable and Sustainable Energy Reviews 13(6-7), pp.1314-1325.

Departement de l'eau (2013): Le Bassin Hydraulique du Draâ, Ministère de l'énergie, des mines, de l'eau et de l'environnement, available from http://www.water.gov.ma/userfiles/file/15_Dr%C3%A2a-d%C3%A9f.pdf (accessed 16th September 2013).

DF (Desertec Foundation) (2009): Clean Power from Deserts, The DESERTEC Concept for Energy, Water and Climate security, WhiteBook 4th Edition, Bonn.

DF (Desertec Foundation) (2013a): Principles, Criteria and Indicators for the Evaluation of Renewable Energy Power Plants, Version 1.0, Heidelberg.

DF (Desertec Foundation) (2013b): Press Release: Desertec Foundation presents its criteria for the implementation of large solar projects, available from http://www.desertec.org/press/press-releases/130411-desertec-foundations-presents-desertec-critieria/ (accessed 16th August 2013).

DFID (Department for International Development) (1999): Sustainable Livelihoods Guidance Sheets, London.

Diekkrüger, B., Busche, H., Klase, A., Klase, S., Rademacher, C. and O. Schulz (2010): Impact of global change on hydrology and soil degradation – scenario analysis for the semi-arid Drâa catchment (South Morocco). In: The Global Water Systems Project. (2010): The global dimension of change in river basins. Threat, linkages and adaptation, 5-13.

Diekkrüger, B., Busche, H., Klose, A., Klose, S., Rademacher, C. and O. Schulz (2012): Impact of Global Change on hydrology and soil degradation - scenario analysis for the semi-arid Drâa catchment (South Morocco), In: J. J. Bogardi, J. Leentvaar and H.-P. Nachtnebel (Eds.) (2012): River Basins and Change, GWSP and UNESCO-IHE, Bonn, 21-26.

DIFHR Danish Institute for Human Rights (2006): Human Rights Compliance Assessment (HRCA) Quick Check. Copenhagen, Denmark.

Dii (2012): 2050 Desert Power, Executive Summary, The Case for Desert Power, available from http://www.dii-eumena.com/fileadmin/flippingbooks/dp2050_exec_sum_engl_web.pdf (accessed 16th August 2013).

Dii (2013). Desert Power Getting Started. Munich.

DLR (Deutsches Zentrum für Luft- und Raumfahrt) (2005): MED-CSP, Concentrating Solar Power for the Mediterranean Region, Final Report, Stuttgart.

DLR (Deutsches Zentrum für Luft- und Raumfahrt) (2007): AQUA-CSP, Concentrating Solar Power for Seawater Desalination, Final Report, Stuttgart, Germany.

DNV (Det Norske Veritas) (2012): Validation Report "Ouarzazte I Concentrated Solar Power Project" in Morocco, Hovik: DNV, avilable from http://cdm.unfccc.int/filestorage/_/u/UPJY61802QALB3GR5OHEVNSWFIZ4C9.pdf/8946-FVR.pdf?t=aGx8bXNwaWxifDD01sFGzLY5tFGQc9B9wtfM (accessed 28th August 2013).

Douthwaite, B., Alvarez, S., Thiele, G., Mackay, R., Cordoba, D. & Tehelen, K. (2008): Participatory Impact Pathways Analysis: a practical method for project planning and evaluation. Paper prepared for: 'Rethinking Impact: Understanding the Complexity of Poverty and Change' Workshop.

Duinker, P. N., Beanlands G. E (1986): The Significance of Environmental Impacts: an Exploration of the Concept. Environmental Management 1986;10(1): 1–10.

Dyner, I. Henao, F., Cherni, Judith, A. (2004): A multicriteria approach to sustainable enrgy supply fort he rural poor, in energy policy, 218:3, 801-809.

Ecofys, TÜV-Süd and FIELD (2009): Gold Standard Annexes to Toolkit Version 2.1, Köln.

EFE (2007): Cien personas cortan dos carriles de la autovía A-92 durante media hora, available from http://www.ideal.es/jaen/20071208/local/granada/cien-personas-cortan-durante-200712081757.html (accessed 16th July 2013).

Egelec, 2012. Egyptian Electricity Holding Company. Annual report 2012.

Égré, D., Roquet, V. and C. Durocher (2002): Benefit Sharing from Dam Projects Phase 1: Desk Study Final Report, Prepared for the World Bank.

Égré, D., Roquet, V. and C. Durocher (2008): Benefits sharing to supplement compensation in resource extractive activities: the case of dams. In: Can Compensation Prevent Impoverishment? Reforming Resettlement through Investments and Benefit-Sharing, Cernea, M.M. and H. M. Mathur (eds.) (2008), pp. 317–356. New Delhi.

EIB (European Investment Bank) (2009): The EIB Statement of Environmental and Social Principles and Standards, Luxembourg.

Eisgruber, L. (2013): The resource curse: Analysis of the applicability to the large-scale export of electricity from renewable resources, Energy Policy 57, 429–440.

Energy and Environment Consultant (2006): Environmental Impact Assessment for the 150MW Kuraymat integrated solar combined cycle power plant, Cairo.

Erdle, S. (2010): The Desertec Initiative, Powering the development perspectives of the Southern Mediterranean countries? German Development Institute, Discussion Paper 12/2010, Bonn.

ESTELA (European Solar Thermal Electricity Association) (2009): Solar Power from the Sun Belt, The Solar Thermal Electricity Industry's proposal for the Mediterranean Solar Plan, Brussels.

Esteves, A.M. (2008): Evaluating community investments in the mining sector using multi-criteria decision analysis to integrate SIA with business planning. In: Environmental Impact Assessment Review, Vol. 28(4–5), pp 338–348.

Esteves, A. M. and F. Vanclay (2009): Social development needs analysis as a tool for SIA to guide corporate–community investment: applications in the minerals industry. In: Environmental Impact Assessment Review, Vol. 29(2), pp. 137–145.

Esteves, A. M., Franks, D., Vanclay, F. (2012): Social impact assessment: the state of the art. Impact Assessment and Project Appraisal Vol. 30, No. 1, March 2012, 34–42.

Euroheat and Power (2006): Ecoheatcool Work Package 1, The European Heat Market, Final Report, Brussels, Belgium.

FAME (Forum Alternatife Mondial de l'Eau) 2013: La lutte d' Imider au sud-est du Maroc. Available from http://www.fame2012.org/fr/2013/04/28/la-lutte-imider/ (accessed 10.02.2014).
Forum Marocain du Tourisme – FMDT- (2013): Rapport d'evaluation du tourisme marocain, Rabat.

FAO (1999) Conducting a PRA Training and Modifying PRA Tools to Your Needs. An Example from a Participatory Household Food Security and Nutrition Project in Ethiopia. Rome.

Favretto, N.; Stringer, L.C.; Dougill, A.J. (2012): Policy and institutional frameworks fort he promotion of sustainable biofuels in Mali, Sustainability Research Institute, Paper No. 35.

Fouguig, B. (2013): La Société Metallurgique d'Imider (SMI) au Maroc: Accumulation des Richess & Défis de development durable du territoire. Faculté de Sciences Juridiques économiques et Sociales. Fés. Marocco. Available from http://rojoynegro.info/sites/default/files/ECADIM_Imider_Maroc.pdf (accessed 09th February 2014).

Flah, L. (2012): Corruption Continues to Plague Morocco - Transparency International, available from http://www.moroccoworldnews.com/2012/10/61325/ (accessed 16th September 2013).

Franks, D. (2012): Social impact assessment of resource projects. Australia.

Fraunhofer ISI and Ernst and Young (2011): Middle East and North Africa Region – Assessment of the Local manufacturing potential for Concentrated Solar Power (CSP) projects, World Bank/ESMAP: Washington.

Freeman, R. E. (1984): Strategic Management: a Stakeholder Approach. Basic Books, New York.

Freier, K. P. (2012): Modelling alternative land use regimes in semi-arid Morocco, Assessment of perspectives in a changing environment, PhD Thesis prepared within the International Max Planck Research School on Earth System Modelling, Hamburg.

Friedman, L. (2011): Can North Africa Light Up Europe With Concentrated Solar Power? New York Times (20.06.2011), available from http://www.nytimes.com/cwire/2011/06/20/20climatewire-can-north-africa-light-up-europe-with-concen-79708.html?pagewanted=all (access 16th July 2013).

FSC (Forest Stewardship Council) (2012): FSC Principles and Criteria for Forest Stewardship, Supplemented by Explanatory Notes and Rationales, Final Draft for Vote by Members of FSC A.C.

Ftaita, T. (1999): De l'eau d'irrigation à l'eau de la ville. Sous la direction de Regrain, R. et Auphan, E., Editions CTHS.

Furrer, A. J. (2009): Strong Objection to the Nuweiba Power Plant Project in South Sinai planned by the Egyptian Electricity Holding Company and to be financed by the European Investment Bank and the African Development Bank, available from http://www.spotredsea.com/newsletter/issue331/img/powerplant-nuweiba.pdf (accessed 16th July 2013).

GEF (Global Environment Facility) (2009): The ROtI Handbook: Towards Enhancing the Impacts of Environmental Projects, Methodological Paper # 2, Washington, D. C., USA.

Gibson, R. B. (2006): Sustainability assessment: basic components of a practical approach, Impact Assessment and Project Appraisal 24 (3), 170-182.

Gibson, R. B. (2011): Environmental Governance for Sustainability and Resilience: Innovations in Canadian Biosphere Reserve and Model Forests - Case Study Guide. Waterloo, Ontario.

GIZ (2008): IMPETUS – Marokko. Rundgespräch. Köln, available from http://www.giz.de/Themen/de/dokumente/en-water-climate-change-impetus-morocco.pdf (accessed 16th September 2013).

Gomez, A. A., Donovan J. D., Bedggood, E. (2012): Developing a 'best practice' SIA process: Exploring the integration of technical and participatory approaches.

Graf K., (2010) Drinking Water Supply in the Middel Drâa valley, South Morocco – Options for Action in the Context of Water Scarcity and Institutional Constrains. Kölner Ethnologische Beiträge. Casimir J. (Hrsg). Available from http://kups.ub.uni-koeln.de/4171/ (accessed 19th March 2014)

Greentechsolar, (2013): The sunset of Solel-Siemens CSP and Solar Trough technology. available from: http://www.greentechmedia.com/articles/read/The-Sunset-of-Solel-Siemens-CSP-and-Solar-Trough-Technology (accessed 02nd May 2014)

GRI Global Reporting Initiative (2013): G4 Sustainability Reporting Guidelines. Reporting Principles and Standard Disclosures.

GS (Gold Standard) (2011): Introduction to the Gold Standard. Recognizing excellence in carbon markets.

GTZ Gesellschaft für technische Zusammenarbeit (2008): Partnerships: An Introduction to Partnerships for Sustainable Development in South Africa.

Hall, N., Ashworth, P. and P. Devine-Wright (2013): Societal acceptance of wind farms: analysis of four common themes across Australian case studies. In: Energy Policy. Vol. 58. pp. 200-208.

Hassan Taiqi (2013): an opinion given to a journalist; project of law related to the rights to information. Available in Arabic at http://hespress.com/societe/86608.html (accessed 21st April 2015).

HCP (Haut Commisariat de Plan) Pub. (2004): Recensement général de la population et de l'habitat 2004. Available from http://www.hcp.ma/Recensement-general-de-la-population-et-de-l-habitat-2004_a633.html (accessed 10th February 2014).

HCP (Haut Commissariat au Plan du Maroc) (2007): Indicateurs communaux de la pauvreté, de la vulnérabilité et de l'inégalité, available from http://www.hcp.ma/Indicateurs-communaux-de-la-pauvrete-de-la-vulnerabilite-et-de-l-inegalite_a649.html (accessed 28th August 2013).

HCP (Haut Commissariat au Plan) (2011): Donnée de la délégation provinciale de HCP à Ouarzazate, Ouarzazate.
HCP (Haut Commissariat au Plan) (2012): Donnée de la délégation provinciale de HCP à Ouarzazate, Ouarzazate.

HCVNetwork High Conservation Value Resource Network (2014): Available from https://www.hcvnetwork.org/about-hcvf/the-six-high-conservation-values (accessed 10th February 2014).

Heidecke, C. (2009): Economic analysis of water use and management in the Middle Drâa Valley in Morocco, Dissertation, Bonn, Germany.

Herberston, K., Ballesteros, A. R., Goodland, R. and I. Munilla (2010): Breaking Ground: Engaging Communities in Extractive and In-frastructure Projects. World Resources Institute, available at: http://www.wri.org/publication/breaking-ground-engaging-communities (accessed 12th April 2014)

Herbertson, K. (2011): World Bank vs. World Bank: Protecting Safeguards in a "Modern" International Institution, available from: http://insights.wri.org/news/2011/04/world-bank-vs-world-bank-protecting-safeguards-modern-international-institution - fn:1 (accessed 12th April 2013).

Hering, Garrett (2011): Rays of hope. Photon International, December 2011, p. 156-165.

Hernández-Moro, J. and J.M. Martínez-Duart (2012): CSP electricity cost evolution and grid parities based on the IEA roadmaps, Energy Policy 41, 184-192.

Heuberger, R. (2003): CDM Projects under the Kyoto Protocol of the UNFCCC: A Methodology for Sustainable Development Assessment and an Application in South Africa. Diploma Thesis of Renat Heuberger In cooperation with Christoph Sutter, Zurich.

Houdret, A. (2012): The water connection: Irrigation and politics in southern Morocco. In: Water Alternatives 5(2), 284-303.

Howe, M. (2005): Morocco: The Islamist awakening and other challenges. Oxford University Press.

HRW (Human Rights Watch) (2013): Abuse-free Development, How the World Bank Should Safe-guard Against Human Rights Violations.

Hugé, J., Le Trinh, H., Hai, H. P., Kuilman, J. and L. Hens (2009): Sustainability indicators for clean development mechanism projects in Vietnam, Environment, Development and Sustainability 12, 561-571.

Hutchins, M. J. and J. W. Sutherland (2008): An exploration of measures of social sustainability and their application to supply chain decisions, Journal of Cleaner Production 16 (15), 1688-1698.

IAIA (International Association for Impact Assessment) (2003): International Principles for Social Impact Assessment. In: Impact Assessment and Project Appraisal 21, Number 1, 5-11.

ICARDA (International Center for Agricultural Research in the Dry Areas) (Ed.) (2012): A Review of Available Knowledge on Land Degradation in Morocco, OASIS - Combating Dryland Degradation, OASIS Country Report 2, Aleppo, Syria.

ICCR (Interfaith Center on Corporate Responsibility) (2011): ICCR's Social Sustainability Resource Guide, Building Sustainable Communities through Multi-Party Collaboration.

ICPC (2013): Maroc a ratifié la convention des nations unies contre la corruption. Available from http://www.icpc.ma/wps/wcm/connect/8c6a8d004eda484590f6f4a773c8f0d1/projet+loi+mars+2013.pdf?MOD=AJPERES&CACHEID=8c6a8d004eda484590f6f4a773c8f0d1 (accessed 21st April 2015).

IEA (International Energy Agency) (2010): IEA Technology Roadmap. Concentrating Solar Power, OECD/IEA, Paris

EA (International Energy Agency) (2011): Co-generation and Renewables, Solutions for a low-carbon energy future, Paris.

IEA (International Energy Agency) (2013): Tracking clean energy progress 2013 - IEA input to the clean energy ministerial. Paris. Available from: http://fsinsight.org/docs/download/iea-report-tracking-clean-energy-progress.pdf (accessed 13th November 2014).

IEA (International Energy Agency) (2014): Morocco 2014 – Energy Policies Beyond IEA Countries. Paris.
Available from: http://www.iea.org/Textbase/npsum/morocco2014sum.pdf (accessed 13th November 2014).

IEG (Independent Evaluation Group) (2010): Safeguards and Sustainability Policies in a Changing World, An Independent Evaluation of World Bank Group Experience, IEG Study Series, The World Bank, Washington, D.C.

IFC (International Finance Corporation) (2002): Handbook for Preparing a Resettlement Action Plan. Washington.

IFC (International Finance Corporation) (2012): IFC Performance Standards on Environmental and Social Sustainability. Washington.

ILO (International Labour Organization) (2011): Global Employment Trends 2011, The Challenge of a jobs recovery, Executive Summary, available from http://www.ilo.org/wcmsp5/groups/public/@dgreports/@dcomm/@publ/documents/publication/wcms_150443.pdf (accessed 16th July 2013).

IPCC (Intergovernmental Panel on Climate Change) (2011): Renewable Energy Sources and Climate Change Mitigation, Geneva, Switzerland.

IPCC (Intergovernmental Panel on Climate Change) (2007a): Summary for Policy makers, In: M. L. Parry, O. F. Canziani, J. P. Palutikof, P. J. van der Linden and C. E. Hanson (eds.): Climate Change 2007: Impacts, Adaptation and Vulnerability, Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change, Cambridge.

IPCC (Intergovernmental Panel on Climate Change) (2007b): Working Group II: Impacts, Adaptation and Vulnerability, Chapter 10 – Africa, Geneva.

IRENA (International Renewable Energy Agency): 2012: Renewable Energy Technologies: Cost analysis series. Concentrating Solar Power. IRENA Working Paper Volume 1: Power sector, Issue 2/5. Abu Dhabi, June 2012.

IRMA Initiative for Responsible Mining Assurance (2014): Standard for Responsible Mining. Draft v1.0.

ISE, 2012: Studie Stromgestehungskosten Erneuerbare Energien. Fraunhofer Institut für Solare Energiesysteme (ISE), Freiburg May 2012.

ITS Global (2011): Forest Certification – Sustainability, Governance and Risk, Melbourne, Australia.

Junginger, M., van Sark, W., Faaij, 2010. A. Technology Learning in the Energy Sector. Edward Elgar Publishing, Cheltenham, ISBN: 978-1-84844-8346.

Kasimbazi, E. (2009): Compliance with Safeguard Policies of the World Bank and African Development Bank, available from http://www.iaia.org/iaia09ghana/documents/cs/CS6-4_Kasimbazi_Compliance_with_Safeguard_Policiesi.pdf (accessed 21st March 2013).

Khalifa, M. A. and S. Connelly (2009): Monitoring and guiding development in rural Egypt: local sustainable development indicators and local Human Development Indices, Environment, Development and Sustainability 11, 1175–1196.

Khupe, B. and K. Jodas (2011): Environmental Impact assessment for a proposed Ilanga Lethemba PV solar energy facility near De Aar, Northern Cape Province, Sunninghill, South Africa, available from http://www.sahra.org.za/sites/default/files/additionaldocs/Appendix%20K%20EMP.pdf (accessed 02nd May 2014).

Kjellerup, U. (1999): SIGNIFICANCE DETERMINATION: A RATIONAL RECONSTRUCTION OF DECISIONS. ENVIRON IMPACT ASSESS REV 1999;19:3–19.

Klawitter, J. (2010): Towards a Sustainability Framework for the Desertec Concept, Master thesis at the University of Applied Sciences in Eberswalde, Eberswalde.

Klose, A. (2009): Soil characteristics and soil erosion by water in a semi-arid catchment (Wadi Drâa, South Morocco) under the pressure of global change, Dissertation, Bonn.

Kost, C., Thomsen, J., Schlegl, T., Fluri, T., Philipps, S., Lude, S., Hädrich, I., Weber, D., Platzer, W. and H. Wirth (2012): Support for Moroccan Solar Plan, Solar Technologies in Morocco - Industry and Value Chain Assessment, Freiburg: Fraunhofer Institute for Solar Energy Systems.

Krewitt, W., Teske, S., Simon, S., Pregger, Th., Graus, W., Blomen, E., Schmid, Schafer, O. (2009): Energy [R]evolution 2008 a sustainable world energy perspective. Energy Policy 12, 5764–5775. doi:10.1016/j.enpol.2009.08.042.

Krueger, R. A. (1994): Focus groups. A practical guide for applied research. Thousand Oaks; London; New Delhi.

Kruger, T. and J. Thomas (2011): Environmental Impact Assessment Process for the proposed De Aar solar energy facility on a site east of De Aar, Northern Cape, Cape Town, South Africa, available from http://www.savannahsa.com/documents/2573/ACED%20De%20Aar%20FEIR.pdf (accessed 16th July 2013).

Kurkeakoski (2009): Impact on micro hydropower based electrification on rural livelihoods, case study Nam Mong in Luang Prabang, Province Lao PDR, Master Thesis at Jyväskylä available at: https://jyx.jyu.fi/dspace/bitstream/handle/123456789/22636/URN_NBN_fi_jyu-200912144518.pdf?sequence=1.

L'economiste (2011): Tiznit Polémique autour d'un projet de centrale thermique, available from http://www.leconomiste.com/article/888349-tiznitbrpolemique-autour-d-un-projet-de-centrale-thermique (accessed 21st June 2013).

Lahmeyer International (2010): Project Information Memorandum 50, MWp CSP Plant with 12 hours Storage, Ouarzazate, Morocco, Bad Vilbel.

Lammerts van Bueren, E. and E. Blom (1996): Hierarchical Framework for the Formulation of Sustainable Forest Management Standards, Wageningen.

Larkin, M. (2009): Vulnerable Groups in Health and Social Care. SAGE Publications Ltd.

Lawrence, D. P. (2007a): Impact significance determination – Designing an approach. Environmental Impact Assessment Review 27 (2007) 730–754.
Lawrence, D. P (2007b): Impact significance determination – Back to basics. Environmental Impact Assessment Review 27 (2007) 755–769.

Lawrence, D. P., (2007c): Impact significance determination – Pushing the boundaries. Environmental Impact Assessment Review 27 (2007) 770–788.
Lehr , U., Mönnig, A. and R. Missoui (2012): Renewable energy and energy efficiency in Tunisia – employment, qualification and economic effects, GIZ: Bonn und Eschborn.

Lewandowski, I. and A. P. C. Faaij (2006): Steps towards the development of a certification system for sustainable bio-energy trade, Biomass and Bioenergy 30, 83-104.

Link, M, Piontek, F, Scheffran, J. and J. Schilling (2010): Integrated Assessment of Climate Security Hot Spots in the Mediterranean Region: Potential Water Conflicts in the Nile River Basin, Paper presented at the 250th Anniversary Conference on “Climate Change and Security" in Trondheim, Norway, June 21-24.

Linstädter A., Baumann, G., Born, K., Diekkrüger, B., Fritzsche, P., Kirscht, H. and A. Klose (2010): Land use and land cover in Southern Morocco: Managing unpredictable resources and extreme events, In: P. Speth, M. Christoph and B. Diekkrüger (2010): Impacts of Global Change on the Hydrological Cycle in West and Northwest Africa, Heidelberg, 612-633.

López, P. M., Anzid, K., Cherkaoui, M., Baali, A. and S. R. Lopez (2012): Nutritional status of adolescents in the context of the Moroccan nutritional transition: the role of parental education, In: Journal of Biosocial Science 44 (4), 481-494.

Mackay, R. and D. Horton (2003): Expanding the use of impact assessment and evaluation in agricultural research and development. In: Agricultural Systems 78, 143–165.

Mahmoudi , H., Renn, O., Vanclay F., Hoffmann, V., Karami, E. (2013): A framework for combining social impact assessment and risk assessment. Environmental Impact Assessment Review 43 (2013) 1–8.

Maghress.com (2010): Finances News, Le Maroc renforce ses capacités de production de manganèse, available from http://www.maghress.com/fr/financesnews/7255 (accessed 10th September 2013).

Magis, K. and C. Shinn (2009): Emergent themes of social sustainability, in: Dillard, J., Dujon V. and M.C. King (Eds.): Understanding the Social Aspect of Sustainability, New York.

MANAGEM Group Industriel (2011): Mine d’Imider, Fiche Identite. Available from http://www.managemgroup.com/Activites/Operations/Mine-d-Imiter (accessed 09th February 2014).

Maredia, M. K. (2009): Improving the Proof. Evolution of and Emerging Trends in Impact Assessment Methods and Approaches in Agricultural Development. Available from: http://www.ifpri.org/sites/default/files/publications/ifpridp00929.pdf (accessed 13th May 2015).

MASEN (Moroccan Agency for Solar Energy) (2010): International invitation for expression of interest of companies and consortia for the design, construction, operation, maintenance and financing of a 500 MW Solar Power Installation Program in Ouarzazate, Morocco, Rabat, Morocco.

MASEN (Moroccan Agency for Solar Energy) (2012a): Moroccan Solar Energy Agency – Etude d’impact environnemental du plan de developpement du site du complexe energetique solaire de Ouarzazate, Rabat. Available from: www.masen.org.ma/upload/environnement/doc3.pdf (accessed 16th September 2013).

Mayer, H. O. (2009): Interview und schriftliche Befragung: Entwicklung, Durchführung und Auswertung. München.

Mc Kenzie, S. (2004): Social sustainability: towards some definitions. Working Paper Series. No. 27. Magill.

MEMEE (Ministry of Energy, Mines, Environment and Water Resources (2010a): La loi 13/09 relatives aux energies renouvelables. Available from http://www.mem.gov.ma/Documentation/pdf/loi%20Energies%20renouvelables/loi%20Energies%20renouvelables.pdf (accessed 21st April 2015).

MEMEE (Ministry of Energy, Mines, Environment and Water Resources (2010b): La loi 16/09 relative ä la creation de l'agence nationale pour le development des energies renouvelables et de l'efficacite energetique. Available from http://www.mem.gov.ma/Documentation/pdf/Loi%20ADEREE/Loi%20ADEREE.pdf (accessed 21st April 2015).

Ministère de l'Intérieur (1993): Vers une stratégie marocaine en matière d'environnement-Conférence Ministérielle sur l'environnement dans la région méditerranéenne, Casablanca, Maroc, 24-25 mai 1993-Rabat.

Ministry of Health (2013): Province d'Ouarzazate. Ouarzazate.

Momtaz, S.; Kabir, S. M. Z. (2013): Evaluating Environmental and Social Impact Assessment in Developing Countries, 1st Edition.

Mrosek, T., Balsillie, D. and P. Schleifenbaum (2006): Field testing of a criteria and indicators system for sustainable forest management at the local level. Case study results concerning the sustainability of the private forest Haliburton Forest and Wild Life Reserve in Ontario, Canada, Forest Policy and Economics 8 (6), 593-609.

Mulugetta, Y., Doig. A., Dunnet. S., Jackson. T., Khennas. S. and Rai. K. 2005: Energy for Rural Livelihoods: A framework for sustainable decision making. Bourton-on-Dunsmore: ITDG Publishing.

Ndobe, S. N. and H. N. Durrell (2012): Why a stand-alone indigenous peoples policy within the African Development Bank's integrated safeguards system. An Assessment by the CSO Coalition on the AfDB, available from http://www.forestpeoples.org/sites/fpp/files/publication/2012/11/why-standalone-ip-policy-afdb-s-iss.pdf (accessed 19th August 2013).

Newig, J., Kuhn, K. and Heinrichs, H. (2011): Nachhaltige Entwicklung durch gesellschaftliche Partizipation und Kooperation? – eine kritische Revision zentraler Theorien und Konzepte Nachhaltige Entwicklung durch gesellschaftliche Partizipation. In: Heinrichs, H., Kuhn, K. and Newig, J. (Hrsg): Nachhaltige Gesellschaft: Welche Rolle für Partizipation und Kooperation? VS Verlag für Sozialwissenschaften, Springer Fachmedien Wiesbaden.

Noh, J. and Lee, K. M. (2003): Application of Multiattribute Decision-Making Methods for the Determination of Relative Significance Factor of Impact Categories. Environmental Management Vol. 31, No. 5, pp. 633–641.

Nortonrosefulbright (2013): Renewable energy in Morocco. Available from http://www.nortonrosefulbright.com/knowledge/publications/66419/renewable-energy-in-morocco (accessed 21st April 2015).

Novatec (2012): Technology description, available at: http://novatec-solar.de/20-1-Nova-1.html (accessed 20 th March 2012).

NREA (New & Renewable Energy Authority) (2011): Terms of Reference, Environmental and Social Impact Assessment (ESIA) For 100 MWe Kom Ombo Concentrated Solar Power (CSP) Project, available from http://www.climateinvestmentfunds.org/cif/sites/climateinvestmentfunds.org/files/Kom%20Ombo%20CSP%20-%20ESIA%20TOR%20.pdf (accessed 16th May 2015).

NREL (National Renewable Energy Laboratory) (2011): Concentrating Solar Power Projects, available from http://www.nrel.gov/csp/solarpaces/project_detail.cfm/projectID=4 (accessed 16th July 2013).
NSI The North-South Institute (2014): The Value of Cross-Sector Development Partnerships.

OECD (2011): OECD Guidelines for Multinational Enterprises 2011 Edition.

Olsen, K. H. and J. Fenhann (2008): Sustainable development benefits of clean development mechanism projects: A new methodology for sustainability assessment based on text analysis of the project design documents submitted for validation, Energy policy 36 (8), 2819-2830.

ONEE (Office National de l'Electricité et de l'Eau Potable) (2013): Electricité Chiffres clés 2013. Casablance.

ONEP (Office National de l'eau potable) (2010): L'ONEP réalise un important projet de renforcement de l'alimentation en eau potable de la ville de Ouarzazate, des centres et douars avoisinants à partir du barrage Tiouine pour un montant global de 300 millions DH, available from http://www.onep.ma/news/2010/Ouarzazate_Visite Royale_28_10_10/accueil.html (accessed 12th September 2013).

ORMVAO (Office régionale de Mise en Valeur Agricole de Ouarzazate) (1993): Projet pilote de mise en valeur des terrains de parcours de la région de Ouarzazate, Ouarzazate, Royaume du Maroc, Ministère de l'Agriculture et de la Réforme Agraire.

ORMVAO (Office régionale de Mise en Valeur Agricole de Ouarzazate) (2000): Aperçu général sur l'hydrogéologie dans la vallée du Drâa moyen par Ben Taleb, A. Ouarzazate.

ORMVAO (Office régionale de Mise en Valeur Agricole de Ouarzazate) (2000): Regional office for Agriculture – Rapport annuel de office régional de mise en valeur agricole de ouarzazate.

ORMVAO (Office régionale de Mise en Valeur Agricole de Ouarzazate) (2013): Monographie Agricole de la province d'Ouarzazate, available from http://www.ormva-ouarzazate.ma/fileadmin/medias/rapports/monographie/Monographie_Agricole_de_la_province_de_Ouarzazate.pdf (accessed 18th June 2013).

Oudada, M. (2000): Le fonctionnement d'un espace oasien: le cas de la palmeraie de Ktaoua. Mémoire de DEA, Aix Marseille I Université de Provence.

Oudada, M. (2008): Le pays du Bani: désenclavement et développement dans le sud du Maroc, Publications de l'Université de Province.

Oudada, M. (2011): L'eau dans le Bani (Sud marocain), Disparités et gestion participatives, in: A. Bensaâd (Ed.): L'eau et ses enjeux au Sahara, Iremam Karthala, 147-159.

Ouhajou, L. (1996): Espace Hydraulique et Société au Maroc: Cas des systèmes d'irrigation dans la vallée du Dra, Publication de la Faculté de Lettres de l'Université Ibn Zohr d'Agadir.

Overdevest, C. (2010): Comparing forest certification schemes: the case of ratcheting standards in the forest sector, Socio-Economic Review 8 (1), 47–76.

Paeth, H., Fink, A., Born, K., Schulz, O. Klose, S., Klose, A. and C. Piecha (2008): IMPETUS – Marokko, Rundgespräch GTZ 2008, Köln, available from http://www.giz.de/Themen/de/dokumente/en-water-climate-change-impetus-morocco.pdf (accessed 16th September 2013).

Paris, T. R., Manzanilla, D., Tatlonghari, G., Labios, R., Cueno, A, Villanueva, D. (2011): articipatory Guide to varietal submergence- selection for tolerant rice. Los Baños (Philippines): International Rice Research Institute. 111 p.

Patridge, E. (2005): 'Social sustainability': a useful theoretical framework? Paper presented at the Australasian Political Science Association Annual Conference, Dunedin, New Zealand, 28-30 September 2005.

Penitsch, R. (n. y.): Population dynamic in the Drâa catchment, Poster of the IMPETUS project, Cologne, Germany.

Pérennès, J.-J. (1992): Le maroc à portée du million d'hectares irrigués, In: Monde arabe: Maghreb - Machrek 137, Paris, 25-42.

Pérez, J. J. (2007): Los agricultores de Aldeire cortan la A-92 para llamar la atención sobre su causa, available from http://www.ideal.es/granada/20071209/provincia/agricultores-aldeire-cortan-para-20071209.html (accessed 16th July 2013).

Popp, H. (1983): Moderne Bewässerungslandwirtschaft in Marokko: Staatliche und individuelle Entscheidungen in sozialgeographischer Sicht, Erlanger Geographische Arbeiten, Sonderband 15, Erlangen, Germany.

Power Engineering International (2013): What are the future prospects for utility-scale CSP? Available from http://www.powerengineeringint.com/articles/print/volume-21/issue-5/features/what-are-the-future-prospects-for-utility-scale-csp.html (accessed 21st April 2015).

Province of Ouarzazate (2009): Monographie de la province de Ouarzazate. Ouarzazate.

Province of Ouarzazate (2013): Province of Ouarzazate Website, available from http://www.province-ouarzazate.com (accessed 15th September 2013).

PV Magazine (2012): Polysilicon prices continue to drop for solar. http://www.pv-magazine.com/news/details/beitrag/polysilicon-prices-continue-to-drop-forsolar_100005736/#ixzz1qbj5zj24 (accessed 30th March 2012).

PWC (PricewaterhouseCoopers LLP) (2010): 100% renewable electricity, A roadmap to 2050 for Europe and North Africa, London, UK, available from http://www.pwc.co.uk/assets/pdf/100-percent-renewable-electricity.pdf (accessed 19th August 2013).

Rademacher, C. (2008): Investments in Land and Water Rights in Ouled Yaoub, In: Schulz, O. and Judex, M. (Eds.): IMPETUS Atlas Morocco, Research Results of the IMPETUS Project 2000-2007, Bonn, 77-78.

Räisänen, J., Hansson, U., Ullerstig, A., Döscher, R., Graham, L. P., Jones, C., Meier, H. E. M., Samuelsson, P. and U. Willén (2004): European climate in the late twenty-first century: regional simulations with two driving global models and two forcing scenarios, In: Climate Dynamics - CLIM DYNAM, 22 (1), 13-31.

Rametsteiner and E. Simula, M. (2003): Forest certification – an instrument to promote sustainable forest management?, Journal of Environmental Management 67 (1), 87-98.

REDD Standards (2010): REDD+ Social & Environmental Standards. REDD+ SES Version 2.

Reed, M. S. et al (2009): Who's in and why? A typology of stakeholder analysis methods for natural resource management. Journal of Environmental Management 90 (2009) 1933–1949.

Reinhards, J., Weber, A., Nižetič, B., Kupka, K. and F. Maxwell-Lyons (1968): Studies on the epidemiology and control of seasonal conjunctivitis and trachoma in southern Morocco, In: Bulletin of the World Health Organization 39 (4), 497-545.

Renewable Energy Focus (2011): CSP. Developments in heat transfer and storage development, by Dr. Andy Skumanich, http://www.renewableenergyfocus.com/view/17095/csp-developments-in-heat-transfer-and-storage-materials/ (accesses 13th April 2013)

REN21, 2013a.MENA Renewable Status Report. 2013.http://www.ren21.net/Portals/0/documents/activities/Regional%20Reports/MENA_2013_lowres.pdf (accesses 14th April 2013).

REN21, 2013b. Renewables 2013. Global Status Report 013. http://www.ren21.net/REN21Activities/GlobalStatusReport.aspx (accessed 14th April 2013)

Renewable Energy World (2013): How Solar PV is winning over CSP, by Romeu Gaspar, http://www.renewableenergyworld.com/rea/blog/post/2013/03/how-solar-pv-is-winning-over-csp (accessed 13th April 2013)

Renn, O., Webler, T. and Wiedemann, P. (1995): A Need for Discourse on Citizen Participation: Objectives and Structure of the Book. In: Renn, O., Webler, T. and Wiedemann, P. (Hrsg.): FAIRNESS ANO COMPETENCE IN CITIZEN PARTICIPATION Evaluating Models for Environmental Discourse. Springer-Science+Business Media, B.V.

Reyes, O. (2012):. Power to the people, Moroccan solar power and the EU energy grab, World Development Movement, London, UK, available from http://www.wdm.org.uk/sites/default/files/Power%20to%20the%20people%20II.pdf (accessed 05th September 2013).

R.I. (2008): Agricultores de Aldeire retoman sus protestas contra Andasol, available from http://www.ideal.es/granada/20080116/provincia/agricultores-aldeire-retoman-protestas-20080116.html (accessed 16th July 2013).

Rignall, K. (2012): Theorizing Sovereignty in Empty Land: the Land Tenure Implications of Concentrated Solar Power in pre-Saharan Morocco, Draft, Ithaca, USA.

Rindefjäll, T., Lund, E. and J. Stripple (2010): Wine, fruit and emission reductions: CDM as development strategy in Chile. Working Paper 004. The Governance of Clean Development Working Paper Series. School of International Development, University of East Anglia.

Riser, J. (1973): Le barrage Mansour Eddahbi et les aménagements agricoles de la vallée du Drâa moyen, In: Revue de Géographie du Maroc 23-24, 167-177.

Roche, P. (1965): L'irrigation et le statut juridique des eaux au Maroc (géographie humaine, droit et coutumes), Revue Juridique et Politique (Indépendante et Coopération), 55-120, 255-284.

Rogerson, C.M. (2011): Mining enterprise and partnerships for socio-economic development. African Journal of Business Management Vol. 5(14), pp. 5405-5417.

Rogner, H.-H., F. Barthel, M. Cabrera, A. Faaij, M. Giroux, D. Hall, V. Kagramanian, S. Kononov, T. Lefevre, R. Moreira, R. Nötstaller, P. Odell, and M. Taylor (2000). Energy resources. In: World Energy Assessment. Energy and the Challenge of Sustainability. United Nations Development Programme, United Nations Department of Economic and Social Affairs, World Energy Council, New York, USA.

Ross, M. (2001): Does Oil Hinder Democracy? World Politics, 53(3), 325–361.

Rössler, M., Kirscht, H., Rademacher, C., Platt, S., Kemmerling, B. and A. Linstädter (2010): Migration and resource management in the Drâa Valley, Southern Morocco, In: P. Speth, M. Christoph and B. Diekkrüger (Eds.): Impacts of Global Change on the Hydrological Cycle in West and Northwest Africa, Springer Verlag, Berlin and Heidelberg, Germany, 584-596.

Rottmann, K. (2013): Recommendations on Transparency and Public Participation in the Context of Electricity Transmission Lines. Bonn and Berlin.

Rossouw, N. (2003): A REVIEW OF METHODS AND GENERIC CRITERIA FOR DETERMINING IMPACT SIGNIFICANCE. AJEAM-RAGEE Volume 6 June 2003 p44-61.

Rowan, M. (2009): Refining the attribution of significance in social impact assessment. In: Impact Assessment and Project Appraisal, 27(3),185-191.

Rowan, M. and T. Streather (2011): Converting project risks to development opportunities through SIA enhancement measures: a practitioner perspective. In: Impact Assessment and Project Appraisal, Vol. 29:3, pp 217-230.

RSPO Roundtable on Sustainable Palm Oil (2013): Principles and Criteria for the Production of Sustainable Palm Oil 2013.

Ruggie, J. (2009): Business and human rights: Towards operationalizing the "protect, respect and remedy" framework, Report to the Human Rights Council, 22 April 2009, A/HRC/11/13,Text No. 13, Zurich, Switzerland, available from http://www.ivr.uzh.ch/institutsmitglieder/kaufmann/archives/HS09/vorlesungen/Text-13.pdf (accessed 02nd May 2014)

Rwegasira, A. (2012): Land as a Human Right: A History of Land Law and Practice in Tanzania. Tanzania.

RWI (Revenue Watch Institute) (n. y.): Sustainable Development Framework: 10 Principles, Revenue Watch Resource Center, available from http://archive-2011.resources.revenuewatch.org/en/official-document/sustainable-development-framework-10-principles (accessed 19th August 2013).

Sadler, B. (1996): ENVIRONMENTAL ASSESSMENT IN A CHANGING WORLD: Evaluating Practice to Improve Performance. Minister of Supply and Services Canada 1996.

Scheffran, J. and A. Battaglini (2011): Climate and conflicts: the security risks of global warming, in: Regional Environmental Change 11 (1), 27-39.

Schilling, J., Freier, K. P., Hertig, E. and J. Scheffran (2012): Climate change, vulnerability and adaptation in North Africa with focus on Morocco, University of Hamburg, Research Group Climate Change and Security, Working Paper CLISEC-13, Hamburg.

Schilling, J., Scheffran, J. and P.M. Link (2010): Climate Change and Land Use Conflicts in Northern Africa, in: Endlicher, W. and F.-W. Gerstengarbe (Eds.): Continents under Climate Change, Nova Acta Leopoldina, Halle, Germany, 173-182.

Schinke, B. (2013): Energy Transition in a Changing Arab World? –Discussing Human Development Requirements for Future Large-Scale Renewables Energy Projects in the MENA Region. World Social Forum. Tunis March 2013. Bonn.

Schinke, B. and J. Klawitter (2011): Desertec and Human Development at the Local Level in the MENA-Region, A human rights-based and sustainable livelihoods analysis, Stuttgart.

Schinke, B. and J. Klawitter (2013): It's Springtime I the desert. Safeguarding the Sustainable Implementation of the Desertec Concept, Germanwatch, Bonn.

Schinke, B., Klawitter, J. and C. Koegler (2012): DESERTEC, Zwischen Heilsanspruch und neokolonialen Befürchtungen, Wissenschaft & Frieden 2012-3, 39-42.

Schlütter, D. (2006): Stadtentwicklung, Wassermanagement und Ressourcenkonflikte in Ouarzazate, Eine sozialgeographische Analyse im südlichen Marokko, Bayreuth.

Schulz, O., Busche, H. and A. Benbouziane (2008): Decadal Precipitation Variances and Reservoir Inflow in the Semi-Arid Upper Drâa basin (South-Eastern Morocco), In: F. Zereini and H. Hoetzl (Eds.) (2008): Climatic Changes and Water Resources in the Middle East and in North Africa, Vienna, , 165–178.

Sekmaski, A. (2013): Women situation; example of Ouarzazate.

SGG /Secretariat General du Gouvernement) (2011): La constitution – edition 2011. Available from http://www.sgg.gov.ma/constitution_2011_Fr.pdf (accessed 21st April 2015).

SGG (Secretariat General du Gouvernement) (2012): Projet de loi cadre portant charte d'environnement et du développement durable. Available from http://www.sgg.gov.ma/portals/0/AvantProjet/5/Projet_loi_99-12_Fr.pdf (accessed 21st April 2015).

SGG (Secretariat General du Gouvernement) (2013) : Projet de loi n° 16-08 modifiant et complétant le dahir n°1-63-226 du 14 rabii I 1383 (5 août 1963) portant création de l'Office National de l'Electricité. Available at http://www.sgg.gov.ma/Projet_loi_16.08_Fr.pdf (accessed 21st April 2015).

Smith, S., Byker, N. and R. De Villiers (2011): Socio-Economic Impact Assessment for the proposed establishment of a CSP and PV plants on three sites in the Northern Cape: Droogfontein Site (Kimberley), Revision 6, Johannesburg.

Soares, S. R., Toffoletto, L., Deschenes, L. (2006): Development of weighting factors in the context of LCIA. Journal of Cleaner Production 14 (2006) 649-660.

Soentoro, T., Ramadhania, O. and D. Puspa (2012):Response of Indonesian Civil Society to World Bank Safeguard Policy Review, available from http://siteresources.worldbank.org/EXTSAFEPOL/Resources/584434-1306431390058/ResponseofIndonesianCivilSocietytoWBSafeguardReviewOct2012_5.pdf (accessed 19th August 2013).

Soitec, (2013): SOITEC and Schneider Electric sign memorandum of understanding with MASEN on integrated partnership on CPV technology in Morocco, available from http://www.soitec.com/en/news/press-releases/article-680/ (accessed 05th September 2013).

Solarserver (2013): Concentrating Solar Power. Reliance Power commissions 100 MW Linear Fresnel Reflector technology plant in Rajassthan, available from http://www.solarserver.com/solar-magazine/solar-news/archive-2014/2014/kw46/concentrating-solar-power-reliance-power-commissions-100-mw-linear-fresnel-reflector-technology-plant-in-rajasthan.html (accessed 15th May 2015).

SSN (SouthSouthNorth) (n. y.): The SouthSouthNorth Sustainable Development Appraisal & Ranking Matrix Tool, Cape Town.

Stolp, A., Groen W., van Vliet J.; Vanclay F. (2002): Citizen values assessment: incorporating citizens' value judgements in environmental impact assessment. Impact Assessment and Project Appraisal, volume 20, number 1, March 2002, pages 11–23.

Storm, H. (2009): Willingness to Pay for Irrigation Water in the Drâa Valley in Morocco – An Application of the Contingent Valuation Method and the MIVAD Model, Diploma Thesis, University of Bonn.

Sutheerawatthana, P. and T. Minato (2010): Incorporating social groups' responses in a descriptive model for second- and higher-order impact identification, Environmental Impact Assessment Review 30 (2), 120-126.

Sutter, C. (2003): Sustainability Check-Up for CDM Projects, How to assess the sustainability of international projects under the Kyoto Protocol, Wissenschaftlicher Verlag Berlin, Berlin.

Swearingen, W. D. (1988): Moroccan Mirages: Agrarian Dreams and Deceptions, 1912-1986. I.B.Tauris.

Tamufor, L., Klemm, J. and L. Schalatek (2011): Ready to be Africa's Climate Bank? A Mapping of Climate-related Policies, Programs and Practice at the African Development Bank, available from http://www.boell.org/downloads/AfDB_Mapping_Study_Boell_BIC_Final.pdf (accessed 11th March 2013).

Thiam, Bachier (2013). Centrale Solaire Ouarzazate. Les Espagnols Construiront la Première Phase. Article Le Economiste, online: http://www.leconomiste.com/article/906247-centrale-solaire-ouarzazateles-espagnols-construiront-la-premi-re-phase (accessed 24th February 2015).

TEP and CEPS (2010): Study on Social Impact Assessment as a tool for mainstreaming social inclusion and social protection concerns in public policy in EU Member States. The Evaluation Partnership (TEP) Centre for European Policy Studies (CEPS).

Thompson, M. (1990):Determining impact significance in EIA: a review of 24 methodologies. J Environmental Management 1990;30:235–50.

Transparency Maroc (2012): Publication annuelle, Lutte contre la corruption 2012: Déclarations d'intentions, absence de mesures concrètes, available from http://www.transparencymaroc.ma/TM/sites/default/files/La%20publication%20annuelle%202012_0.pdf (accessed 15th September 2013).

Trieb, F., Schillings, C.,O'Sullivan, M., Pregger, T., Hoyer-Klick, C. (2009): Global Potential of Concentrating Solar Power. Presentation at the Solar Paces Conference. September 2009, Berlin.

Trieb, F.; Viebahn, P.; Kabariti, M.; Bennouna, A.; El Nokraschi, H.; Hassan, S.; Hasni, T.; El Bassam, N.; Satoguina, H. (2005): Concentrating Solar Power for the Mediterranean Region, Stuttgart: Deutsches Zentrum für Luft- und Raumfahrt.

UN (United Nations) (2005): WORKSHOP ON FREE, PRIOR AND INFORMED CONSENT. An Overview of the Principle of Free, Prior and Informed Consent and Indigenous Peoples in International and Domestic Law and Practices. New York.

UN (United Nations) (2011a): Guiding Principles on Business and Human Rights. Implementing the United Nations "Protect, Respect and Remedy" Framework. New York and Geneva.

UN (United Nations) (2011b): A Guide for Business: How to Develop a Human Rights Policy. New York and Geneva.

UN United Nations (2013): Realizing the Right to Development. New York and Geneva.

UN (United Nations) (2013): A New Global Partnership: Eradicate Poverty And Transform Economies Through Sustainable Development, The Report of the High-Level Panel of Eminent Persons on the Post-2015 Development Agenda, United Nations Publications, New York.

UNDP (United Nations Development Programme) (2011): Arab Development Challenges Report 2011, Towards the Developmental State in the Arab Region, Cairo.

UNDP (United Nations Development Programme) (2013): Human Development Report 2013, The Rise of the South: Human Progress in a Diverse World, New York.

UNEP (2002): Social Impact Assessment tools and methods. EIA Training Resource Manual. United Nations Environment Programme. Nairobi.

UNEP (2007): DAMS AND DEVELOPMENT PROJECT COMPENDIUM ON RELEVANT PRACTICES Social Impact Assessment of Affected People. United Nations Environment Programme. Nairobi.

UNFCCC (United Nations Framework Convention on Climate Change) (1992): United Nations Framework Convention on Climate Change, Bonn.

UNFCCC/CCNUCC (2012): Project design document form for CDM project activities. Version 04.1. Geneva.

UNICEF. (n.d.) At a glance: Morocco. Available from http://www.unicef.org/infobycountry/morocco_statistics.html (accessed 02nd May 2014)

UNODC (United Nations Office on Drugs and Crime) (2003): Country Profile Drugs and Crime, Morocco, 2003, available from http://www.unodc.org/pdf/egypt/country_profile_morocco.pdf (accessed 10th September 2013).

US Council on Environmental Quality (2011): Memorandum of Appropriate Use of Mitigation and Monitoring and Clarifying the Appropriate Use of Mitigated Findings of No Significant Impact. Washington.

Vallance, S., Perkins, H. C. and J. E. Dixon (2011): What is social sustainability? A clarification of concepts, Geoforum 42, 342-348.

Van Cauwenbergh, N., Biala, K., Bielders, C., Brouckaert, V., Franchois, L., Garcia Cidad, V., Hermy, M., Mathijs, E., Muys, B., Reijnders, J., Sauvenier, X., Valckx, J., Vanclooster, M., Van der Veken, B., Wauters, E. and A. Peeters (2007): SAFE - A hierarchical framework for assessing the sustainability of agricultural systems, Agriculture, Ecosystems and Environment 120, 229-242.

Vanclay, F. (1999): Social impact assessment. In: Petts, J. (Ed.) (1999): Handbook of Environmental Impact Assessment 1, 301-326. Oxford.

Vanclay, F. (2000): Social Impact Assessment Contributing Paper Prepared for the World Commission on Dams (for the Thematic Review V.2: Environment and Social Assessment for Large Dams).

Vanclay, F. (2002): Conceptualising social impacts. Environmental Impact Assessment Review 22, 183-211.

Vanclay, F. (2003): International Principles For Social Impact Assessment, Impact Assessment and Project Appraisal 21 (1), 5-11.

Vanclay, F. (2005): Engaging Communities with Social Impact Assessments: SIA as a Social Assurance Process, available from http://www.engagingcommunities2005.org/abstracts/Vanclay-Frank-final.pdf (accessed 16.07.13).

Vanclay, F. (2006): Principles for social impact assessment: A critical comparison between the international and US documents, Environmental Impact Assessment Review 26 (1), 3-14.

Vanclay, F. and A. M. Esteves (Eds.) (2011): New Directions in Social Impact Assessment, Conceptual and Methodological Advances, Cheltenham, UK.

Viebahn, P., Lechon, Y., Trieb, F. (2010): The potential role of concentrated solar power (CSP) in Africa and Europe – A dynamic assessment of technology development, cost development and life cycle inventories until 2050, Energy Policy 39 (2011), 4420 – 4430.

Voss, R., May, W. and E. Roeckner (2002): Enhanced resolution modelling study on anthropogenic climate change: changes in extremes of the hydrological cycle, In: International Journal of Climatology, 22 (7), 755-777.

WCED (World Commission on Environment and Development) (1987): Our Common Future, United Nations, Oxford, UK.

Wilburn, K.M. and Wilburn, R. (2011): ACHIEVING SOCIAL LICENSE TO OPERATE USING STAKEHOLDER THEORY. Journal of International Business Ethics Vol.4 No.2.

WILKINSON, R. (2002): The impact of energy infrastructure projects on poverty. A sustainable livelihood analysis. Discussion paper for the DFID.

http://www.practicalaction.org/docs/consulting/energy%20and%20livelihoods%20final%20version%20rew%20mar02.pdf (accessed 13th May 2015).

Wood, C. (2003): Environmental Impact Assessment: A Comparative Review, 2nd Edition, Pearson Education Limited, Essex.

Wood, G. (2008): Thresholds and criteria for evaluating and communicating impact significance in environmental statements: 'See no evil, hear no evil, speak no evil'? Environmental Impact Assessment Review 28 (2008) 22–38.

World Bank. (n.d.): Morocco. Available at http://data.worldbank.org/country/morocco (accessed 02.05.1014)

World Bank (2001): The World Development Report 2000/2001: Attacking Poverty, Washington.

World Bank (2003): User's Guide to Poverty and Social Impact Analysis (PSIA), Washington.

World Bank (2009): Morocco study on the impact of climate change on the agricultural sector, Washington D. C.

World Bank (2010): World Bank Indicators - Morocco - Land use – country indicators. Washington. Available at data.worldbank.org (accessed 02nd May 2014).

World Bank (2011a): Middle East and North Africa Region Assessment of the Local Manufacturing Potential for Concentrated Solar Power (CSP) Projects, Washington, D. C.

World Bank (2011b): Participatory Rural Appraisal (PRA) Techniques. http://go.worldbank.org/EU99NNIVS0 (assessed 21st December 2014).

World Bank (2011c): *Appraisal Document on a proposed loan in the amount of US $200* million and a proposed Clean Technology Fund loan in the amount of US $97 million to MASEN for the OZZ1 CSP Project, Washington, D. C.

World Bank (2012a): The world bank's safeguard policies proposed review and updated Approach Paper, available from http://siteresources.worldbank.org/EXTSAFEPOL/Resources/5844341306431390058/SafeguardsReviewApproachPaper.pdf (accessed, 11th March 2013).

Word Bank (2012b). The challenge of youth inclusion in morocco. Available at http://www.worldbank.org/en/news/feature/2012/05/14/challenge-of-youth-inclusion-in-morocco (accessed 02nd May 2014).

World Bank (2013): Impact - Assessment of the Local Manufacturing Potential for CSP Projects. Issue 02. Washington.

World Bank (2014): Environmental and Social Standard 5 Land Acquisition, Restrictions on Land Use and Involuntary Resettlement.

Worley Parsons RSA (Pty) Ltd (2012): DRAFT Environmental Impact Assessment Report for the proposed Arriesfontein Concentrated Solar Power Plant on the farm 267, near Danielskuil in the Northern Cape, Ashlea Gardens.

WWAP (World Water Assessment Programme) (2012): The United Nations World Water Development Report 4: Managing Water under Uncertainty and Risk, UNESCO, Paris, France.

Zahler, C. (2007): Advantages of Linear Fresnel Collectors for Solar Cooling Applications, Presentation at the SolarPACES – Fraunhofer ISE Workshop „Chances and Potentials for Medium Scale Solarthermal Power Using Combined Heating, Cooling and Power", Freiburg, Germany, available from

http://www.mss-csp.info/documents/solarpaces/c.-zahler-mirroxx-gmbh-the-advantages-of-linear-fresnel-collectors-for-solar-cooling-applications (accessed 16th July 2013).

Zanabi A. (2001): La Valle du Dra: Development Alternatif et Action Communautaire. World Development Report 2003. Worldbank. Available from http://siteresources.worldbank.org/DEC/Resources/16678_Zainabi.pdf (accessed 18th March 2014).

Zhou, S. (2010): Reassessing the Prospects of a Human Rights Safeguard Policy at the World Bank, Journal of International Economic Law 15 (3), 823-841.

Zohny, H. (2010): A quite revolt stops power plant in Nuweiba, available from http://www.egyptindependent.com/node/16270 (accessed 16th July 2013).

16 Annex

The Annex includes additional information that was gathered for several chapters of this report.

16.1 Screening of existing sustainability frameworks (input for chapter 3.1)

Due to the large number of existing sustainability frameworks from many different fields (local to international level) and the veritable mountain of literature available on the topic, it was not in the scope of this screening to present a complete review of all existing frameworks and their approaches. Rather, examples were selected based on their relevance to CSP technology[58].

16.1.1 Sectorial sustainability frameworks

The Clean Development Mechanism (CDM)

CDM criteria catalogues

The CDM's aim is to achieve sustainable development in developing countries while reducing GHG-emissions in developed countries in the most cost-effective way (Olsen and Fenhann, 2008:2819). Renewable energy projects are among a wide range of available strategies for accomplishing this twofold goal. The CDM can therefore be compared to the implementation of CSP projects because CSP projects could also help to achieve overall sustainable development – namely, a low-carbon energy future for the EUMENA region, water and food security, and prosperity and development for the MENA region by improving energy infrastructure (DF, 2009:6).

Since the CDM has made a negligible contribution to local sustainable development, various authors and organizations have developed criteria catalogues for planning, monitoring, and evaluating CDM projects to rectify this problem. Based on an approach by Sutter (2003) and Heuberger (2003), most authors used sustainability's triple bottom line to group criteria. They derived their criteria by examining relevant publications, conducting expert interviews, and asking for input through mailing lists. Additionally, they held an e-conference where more than 100 experts discussed the criteria. The criteria were then modified and supplemented during a local stakeholder consultation process in Uruguay, making them more applicable to local conditions (Sutter, 2003).

Most authors (e.g., Brent et al., 2005; Heuberger, 2006) evaluating CDM projects' contribution to sustainable development used the proposed set of criteria by Sutter (2003) and Heuberger (2003) as a reference, with slight changes. Olsen and Fenhann (2008) developed their taxonomy and criteria in a more bottom-up manner, basing criteria on potential impacts reported in the project design documents while incorporating existing methodologies. Hugé et al. (2009) believe an expert process is most useful for selecting indicators for CDM projects in Vietnam. They compiled a list of existing CDM indicators plus Vietnamese sustaina-

[58] Not all sustainability frameworks are divided into the common three-pillar model of sustainability (e.g., the FSC criteria). If a framework is divided into social, economic, and environmental dimensions (e.g., all CDM frameworks), all criteria from the social dimension were included and, if necessary, useful criteria from the other two dimensions were included. If a framework distinguishes its criteria in another way, the authors selected useful criteria.

bility indicators and then ranked them with the help of experts. Finally, Alexeew et al. (2010) developed their own criteria by drawing on existing CDM sustainability criteria and the relevant scientific literature. Additionally, they evaluated the usability of the criteria based on information given in the CDM project design documents. Livelihood sustainability criteria developed by these studies are presented in the tables below.[59]

Criteria	Description
Social	
Stakeholder Participation	Stakeholders can participate in the project development.
Improved Service Availability	The project contributes to improved availability of essential services.
Equal Distribution of Project Return	The share of the turnover, which benefits disadvantaged people, increases.
Capacity Development	The project generates opportunities for additional capacity development.
Economic	
Regional Economy	The project contributes to generation of wealth in a disadvantaged region.
Employment Generation	The project creates jobs.
Technology Transfer	The project applies innovative, locally manageable technologies.
Environment	
Land resources	The project decreases pressure on regional land resources.
Water resources	The project decreases pressure on regional water quality.

Table 16–1: Selected criteria from Sutter (2003)

Criteria	Description
Social	
Improved social services availability	- Assessment of available policies and plans for national, provincial, and local development priorities, e.g., access to sanitation, energy, and water supply.
Capacity development	- Training and skills development for project participants and beneficiaries.
Stakeholder participation	- Project developed by and benefiting local communities through meaningful participation. - Participation of neighboring countries.
Economic	
Technology transfer and development (TT)	- New technologies to be used in the project, from international or local sources. - Technological skills to be transferred and future self-reliance of the project. - Previous successful application of the technology. - Appropriateness of the technology for South Africa. - Project provides demonstration and replication potential.
Social equity and poverty alleviation (SE)	- Number of employment opportunities created/ destroyed. - Distribution of employment. - Types of employment. - Categories of people to be employed in terms of gender and racial equity.
Environment	
Land resources	- Transformation of land or land use; loss of topsoil. - Loss of terrestrial biodiversity.
Water resources	- Water availability and use. - Loss of aquatic biodiversity.

Table 16–2: Selected criteria from Brent et al. (2005)

[59] Catalogues are only included if the author gave a description of the criteria included.

Criteria	Description
Social benefits	
Health	Reduction of health risks, such as diseases and accidents or improvement of health conditions through activities such as constructing a hospital, running a health care center, preserving food, and reducing health-damaging air pollutants and indoor smoke.
Learning	Facilitation of education, dissemination of information, research and increased awareness related to e.g. water management, renewable energy resources, and climate change through constructing a school, running educational programs, visiting sites, and giving tours.
Welfare	Improvement of local living and working conditions including safety, community or rural uplift, reduced traffic congestion, poverty alleviation, and income redistribution through e.g., increased municipal tax revenues.
Economic benefits	
Employment	Creation of new jobs and employment opportunities including income generation.
Energy	Improved access, availability, and quality of electricity and heating services through greater coverage and reliability.
Other benefits	
Corporate social responsibility	Support of ongoing corporate social responsibility activities that are the indirect or derived benefits of the CDM project activities.
Environment	
Conservation	Protection and management of resources and landscapes.
Land	Avoid soil pollution.
Water	Improved water quality through, e.g., water savings, wise and reliable water distribution, cleaning of water.

Table 16–3: Selected criteria from Olsen and Fenhann (2008)

Criteria	Description
Social development	
Stakeholder participation	This criterion assesses the possibilities relevant stakeholders have to express their views and how these comments are used.
Social benefits for poorer parts of society	This criterion aims to reflect on to what extent the project has beneficial social effects especially for poorer people. Important aspects for the local population: - professional training of unskilled workers; - the supplementation of other educational opportunities (e.g., schools, kindergarten); - the creation of infrastructure (e.g., roads, bridges) and - improved service availability (e.g., health centers).
Supporting the development of poorer regions	This criterion aims to measure whether the project benefits a poor region.
Impact on quality of life	This criterion estimates whether the project has a beneficial impact on the life quality of the local population - here defined as the degree of physical well-being experienced by people. A project could improve the level of noise or the working conditions, including the security of work places and the risk of accidents.
Economic development	
Sustainable and innovative technology	This criterion evaluates whether technology has been transferred from an Annex B country partner to the CDM project host country or whether an in-house innovative technology has been developed through the CDM project activity. Local workers should be able to maintain the transferred technology in the long-term by themselves, without being dependent on imported skills.
Employment generation	This criterion estimates whether and to what extent the project activity creates employment opportunities. It estimates whether these jobs were created only during the construction phase, or in both the construction and the operating phases.
Environment	
Impact on soil	Improvement of following features: Soil fertility, excavation of soil, erosion, and various impacts on biodiversity.
Impact on water	Improvement of following characteristics: Water quality of freshwater / waste water, availability of fresh water and/or water for irrigation use, impact on biodiversity.

Table 16–4: Selected criteria from Alexeew et al. (2010)

The SouthSouthNorth Sustainable Development Matrix Tool and the Gold Standard

Sustainability frameworks for the CDM have also been developed by non-governmental organizations (NGOs). The most prominent premium label for CDM activities is the CDM Gold Standard (GS). In 2003, a group of organizations developed the GS as a voluntary tool for the CDM. The World Wide Fund for Nature (WWF), SouthSouthNorth, and Helio Interna-

tional, led this effort, which built on existing criteria and indicators from Helio International. With the goal to support "[...] sustainable development through carbon offset markets that are characterized by transparency and equality of access for all market participants" (GS, 2012:3), the GS only evaluates projects that address renewable energy supply or end-use energy efficiency.

The GS is essentially a set of tools that guide project proponents through the project development process to achieve high-quality greenhouse gas reduction projects that make measurable, positive impacts on sustainable development. The elements of the GS relevant to this study are:

a) The "Sustainable Development Matrix";
b) The "Do No Harm Assessment";
c) The stakeholder consultation.

SSN, an NGO that focuses on implementing CDM projects well, developed the "Sustainable Development Matrix" (SSN, n. y.). They developed the tool in three steps: surveying good operating indicators for CDM projects, redefining these indicators, and publishing a finalized version of the matrix tool (Burian, 2006:67). Their matrix is included in the GS toolbox as an instrument that allows for a simple assessment of the project's contribution to sustainable development within the GS (Table **16**–**5**).

Criteria	Description
Social development	
Quality of employment	Quality of employment refers to changes compared to the baseline in: - **Labor conditions**, such as job related health and safety; - **Quality value of employment**, such as whether the jobs resulting from the project activity require highly or poorly qualified labor, temporary or permanent.
Livelihood of the poor	Livelihood of the poor refers to changes compared to the baseline in: - **Poverty alleviation**, e.g., changes in living standards, number of people living under the poverty line; - **Access to health care services** (hospitals, doctors, medication, etc.); affordability of services; reliability and quality of services; land; diseases prevention and treatment, including HIV/AIDS, measles, TB, malaria, cholera, and others. - **Access to sanitation** including access to toilets/washrooms. Waste management facilities that offer the possibility of deposing waste in a sanitary way; - **Access to an appropriate quantity, quality, and variety of food** that is a prerequisite for health. Changes in vulnerability to natural disasters that may be climate change related (e.g. droughts, flooding, storms, etc.); - **Long-term changes** other than natural disasters, which occur steadily and increasingly rather than suddenly (e.g., community's dependency on water from a river with diminishing volumes of water).
Access to affordable and clean energy services	Access to energy services refers to changes compared to the baseline in: - **Access, affordability, and reliability of services;** - **Reducing dependency of fuel/ energy imports** that may lead to more sustainable and affordable energy services in a country. Also, decrease in risk of political conflicts caused by energy imports may be included.
Human and institutional capacity	Human and institutional capacity refers to changes compared to the baseline in: - **Education & skills**: Access to primary, secondary, and tertiary schooling, as well as affordability and quality of education. Educational activities that are not part of the usual schooling system, such as environmental training, awareness raising for health or other issues, literacy classes for adults, and other knowledge dissemination; - **Gender equality**: Livelihood and education for women that may include special schooling opportunities as well as other woman-specific training, awareness-raising, etc.; - **Empowerment**: Changes in the social structure caused by, for example, a change in the distribution of income and assets. This may result in shifts in decision-making power at the project level (e.g. participation in project executive board, ownership of Certified Emission Reductions (CERs) etc.), community level (e.g. community council), or at a higher level. Especially in communities with diversified ethnic or religious structures, changes in income and asset distribution may have an impact. Especially ownership of CERs or other direct involvement in the project may support participation in project decision-making.
Economic and technological development	
Quantitative employment and income generation	Quantitative employment and income generation refers to changes compared to the baseline in: - **Number of jobs;** - **Income from employment in the formal and informal sector**. Other income, such as from ownership of CERs, may be included.

Table 16–5: Selected criteria from the Gold Standard / SSN "Sustainable Development Matrix"

The "Do No Harm Assessment", developed by Ecofys, TÜV-SÜD, and FIELD in 2009, is important to this study because it assesses the risk that any CDM project could result in harmful environmental, social, and/or economic impacts (Ecofys et al., 2009). It is comprised of eleven safeguarding principles and guiding questions that are: derived from the UN MDGs;

relate to international conventions and agreements, such as the Universal Declaration of Human Rights; and are considered to be applicable for any project location. The seven principles that are relevant to this study are described below (Table 16–6).

Safeguarding Principles	Guiding Questions for "Do No Harm" Assessment
Human rights	
The project respects internationally proclaimed human rights including dignity, cultural property and uniqueness of indigenous people. The project is not complicit in Human Rights abuses.	- Are human right abuses common in the country and/or region? - Does the project respect life, liberty, and security? - Does the project respect personal and political freedom? - Does the project respect economic, social and cultural freedoms? - Does the project respect cultural property? - Does the project respect the uniqueness of indigenous people? - Is one of the project participants an arms producer or distributor? - Is one of the project participants a land mines producer or distributor? - Has the host government ratified the relevant conventions on human rights? - Does the host country have its own legislation in place prohibiting the violation of the principle? - Does the host country actively enforce the compliance with this principle?
The project does not involve and is not complicit in involuntary resettlement.	- Does the project result in any person's relocation? - If yes, has the project sufficiently demonstrated that these people can stay or move voluntarily after project implementation? - Is the project area limited in access to people who previously had access? - Will the project have an economic or other impact on people living nearby? - Has the project sufficiently demonstrated that any limitations caused by the project will not force people to relocate? - Has the host government ratified the ILO convention 169? - Does the host country have its own credible legislation in place prohibiting involuntary resettlement? - Does the host country actively enforce compliance with the principle preventing involuntary resettlement? - Is involuntary resettlement common in the country and/or region?
The project does not involve and is not complicit in the alteration, damage, or removal of any critical cultural heritage.	- Does the project alter, damage, or remove tangible property and sites having archaeological, paleontological, historical, cultural, artistic or religious value? - Does the project alter, damage, or remove tangible property and sites with unique natural environmental features that embody cultural values? - Does the project alter damage, or remove intangible forms of culture, such as cultural knowledge, innovations, and practices of communities embodying traditional lifestyles? - Has the project sufficiently demonstrated that the cultural property will not be impacted negatively? - Has the host government ratified the relevant UNESCO convention? - Does the host country have its own credible legislation in place prohibiting damage to cultural property? - Does the host country actively enforce the compliance with this principle against damage to cultural property? - Is alteration, damage or removal of cultural heritage common in the country and/or region?
Labor	
The project does not employ and is not complicit in any form of child labor.	- Does the project employ or intend to employ children below the age of 15 in regular work or hazardous work? - Does the project employ or intend to employ children below the age of 18 in hazardous work? - Has the host government ratified convention 138 (minimum age) and convention 182 (worst form of child labor) under the ILO Declaration on Fundamental Principles and Rights at Work? - Does the host country have its own credible legislation in place prohibited child labor? - Does the host country actively enforce the principles of child labor? - Is child labor common in the country and/or the region?
The project does not involve and is not complicit in any form of discrimination based on gender, race, religion, sexual orientation, or any other basis.	- Does the project's employment policy district, exclude or give preference to people based on race, color, gender, religion, sexual orientation, political opinion, national extraction, social origin, or physical or mental disability? - Has the host government ratified convention 100 (equal remuneration) and convention 111 (discrimination in employment/occupation) under the ILO Declaration on Fundamental Principles and Rights at Work? - Does the host country have its own credible legislation in place prohibiting discrimination? - Does the host country actively enforce the principle of discrimination? - Is discrimination at work common in the country/region?
The project provides workers with a safe and healthy work environment and is not complicit in exposing workers to unsafe or unhealthy work environments.	- Has there been a credible and sufficient investigation to identify potential hazards for workers? - Are workers exposed to hazardous chemicals or other materials? - Are workers involved in processes that are potentially dangerous? - Have other hazardous materials been identified? - Has the risk of sexual harassment and abuse of women been considered sufficiently? - Is there an emergency action plan in the case of accidents for every site? - Is there an insurance or pension system for workers in place in case of health impacts? - Has the government ratified relevant ILO convention? - Does the host country have its own credible legislation in place enforcing the principle? - Does the host country actively enforce the principle of work environment? - Does the host country actively enforce the principle? - Are unsafe work environments common in the country and/or region?
Environmental protection	
The project takes a precautionary approach with regard to environmental challenges and is not complicit in practices contrary to the precautionary principle.	- Does the project include any planting, agricultural, or similar activities? - Does the project involve invasive species likely to cause harm? - Does the project produce chemicals that are excessively dangerous to the environment? - Does the project deliberately use genetically modified organisms? - Does the project involve large mono-culture plantations? - Does the project produce hazardous waste? - Has the host country ratified all conventions relevant to this project? - Does the host country have its own credible legislation in place enforcing the principle? - Does the host country actively enforce the precautionary principle? - Are violations of the precautionary principle common in the country/region?
The project does not involve and is not complicit in significant conversion or degradation of critical natural habitats, including those that are (a) legally protected, (b) officially proposed for protection, (c) identified by authoritative sources for their high conservation value or (d) recognized as protected by traditional local communities.	- Is this a greenfield project or does additional lands need to be used for project purpose? - Are there critical natural habitats located at or close to the project site? - Could project activities create increased stress on this site through activity displacement or invasive species introduction? - Did the project consult protected area sponsors and managers, local communities, and other local relevant stakeholders for the protection of critical habitats? - Has the host countries ratified all conventions relevant to this project? - Doe the host country have its own credible legislation in place enforcing this principle? - Does the host country actively enforce the principles of critical natural habitats? - Are violations of the critical natural habitats common in the country/region?

Table 16–6: Guiding questions for "Do No Harm Assessment" under the CDM Gold Standard

According to the GS, stakeholder involvement is mandatory, with two rounds of consultation.

The local stakeholder consultation: providing information face-to-face about the project's purpose and its duration and assessing the potential environmental and social impacts of the project on relevant (local) stakeholders including NGOs, policymakers, and local residents.

The stakeholder feedback round: discussing the project design and its potential environmental and social impacts with relevant (local) stakeholders and actively collecting feedback, comments, and concerns to ensure that local sustainability benefits are tangible and the risks of opposition and delays during project implementation are reduced (Nussbaumer, 2009:93).

The forestry sector

The REDD+SES Initiative

Reducing Emissions from Deforestation and Forest Degradation (REDD) is an international approach that emphasizes the roles of forests in mitigating global climate change. The independent and voluntary REDD+SES Initiative was founded in 2009 to recognize the growing awareness at both international and national levels for effective social and environmental safeguards to contribute to the conservation; sustainable management and enhancement of forests; and risk avoidance, particularly for indigenous people and local communities. Much of the work on addressing the social dimensions of REDD+ has focused on safeguards and standards. Through a series of multi-stakeholder workshops and public comment periods engaging governments, NGOs, indigenous people, international policy and research institutions, and the private sector, the REDD+SES Initiative established a comprehensive framework for high social and environmental performance in REDD+ programs.

Overseen by an International Standards Committee, these REDD+ social and environmental safeguards (SES), consisting of PC&I, can be used by governments, NGOs, financing agencies, and other stakeholders to improve the social and environmental performance of REDD+ programs to enhance benefits and avoid harmful effects. Relevant PC&I from the Draft 2012 REDD+ SES Version 2 are described in Table **16–7**.

Criteria		Description
Principle 1: Rights to land, territory and resources are recognized and respected.		
1.1	The REDD+ program effectively identifies the different rights holders and their rights to lands, territories and resources relevant to the program.	- An effective process is established to inventory and map rights to lands, territories and resources relevant to the REDD+ program;
1.2	The REDD+ program recognizes and respects rights to lands, territories and resources which indigenous people or local communities have traditionally owned, occupied or otherwise used or acquired.	- Policies of the REDD+ program include recognition of and respect for customary rights; - Land-use plans used by the REDD+ program recognize and respect rights of indigenous people and local communities; - The REDD+ program promotes securing statutory rights to lands, territories and resources;
1.3	The REDD+ program requires the free prior and informed consent of indigenous people and local communities for any activity affecting their rights to lands, territories and resources.	- Collective rights holders define a process of obtaining their free, prior and informed consent; - Free, prior and informed consent is obtained from indigenous people and local communities; - Where any relocation or displacement occurs, there is prior agreement on the provision of alternative lands and/or fair compensation;
Principle 2: The benefits of the REDD+ program are shared equitably among all relevant rights holders and stakeholders.		
2.1	There is transparent and participatory assessment of predicted and actual benefits, costs, and risks of the REDD+ program for relevant rights holder and stakeholder groups at all levels, with special attention to women and marginalized and/or vulnerable people.	- Benefits, costs and risks of the REDD+ program are assessed during program design and implementation;

2.2	Transparent, participatory, effective and efficient mechanisms are established for equitable sharing of benefits of the REDD+ program among and within relevant rights holder and stakeholder groups taking into account socially differentiated benefits, costs and risks.	- Relevant rights holders and stakeholders participate in defining the decision-making process and distribution mechanism for equitable benefit-sharing; - Relevant rights holders and stakeholders determine the form that the benefits will take and how they are delivered; - Clear policies and guidelines for equitable benefit-sharing are established; - Administrative procedures for benefit sharing are timely, transparent, effective and efficient;
Principle 3: The REDD+ program improves long-term livelihood security and well-being for indigenous people and local communities with special attention to the most vulnerable people.		
3.1	The REDD+ program generates additional, positive impacts on the long-term livelihood security and well-being of indigenous people and local communities, with special attention to women and the most marginalized and/or vulnerable people.	- The objectives and policies of the REDD+ program include improving long-term livelihood security and well-being of indigenous people and local communities; - The REDD+ program generates additional, positive impacts on the long-term livelihood security and well-being of indigenous people and local communities; - The REDD+ program generates additional resources to improve long-term livelihood security and well-being of indigenous people and local communities;
3.2	The REDD+ program is adapted based on assessment of predicted and actual impacts in order to mitigate negative, and enhance positive, impacts on indigenous people and local communities with special attention to women and the most marginalized and/or vulnerable people.	- The REDD+ program is adapted in order to mitigate negative, and enhance and sustain positive, impacts on indigenous people and local communities;
Principle 4: The REDD+ program contributes to good governance, to broader sustainable development and to social justice.		
4.1	The governance structures of the REDD+ program are clearly defined, transparent, effective and accountable.	- Information on the roles, responsibilities and decision- making processes, of REDD+ program governance structures is publicly accessible;
4.2	The REDD+ program is coherent with relevant policies, strategies and plans at all relevant levels and there is effective coordination between agencies/organizations responsible for the design, implementation and evaluation of the REDD+ program and other relevant agencies/organizations.	- The REDD+ program is integrated into the broader policy framework of the forest sector and other relevant sectors.; - Inconsistencies between the REDD+ program and other relevant policies, strategies and plans are identified and resolved; - There is effective and efficient coordination between the REDD+ program and all relevant agencies/organizations;
4.3	Adequate information about the REDD+ program is publicly available.	- Adequate information about the REDD+ program is publicly available;
4.4	The REDD+ program leads to improvements in governance of the forest sector and other relevant sectors.	- The REDD+ program establishes and monitors performance targets for the governance issues that it can address in the forest sector and other relevant sectors; - The activities of the REDD+ program include institutional capacity strengthening and other measures to improve governance;
4.5	The REDD+ program contributes to achieving the objectives of sustainable development policies, strategies and plans established at national and other relevant levels.	- The REDD+ program elaborates how its policies and measures will contribute to the implementation of any existing sustainable development policies, strategies and plans; - National poverty monitoring shows improvements in areas where the REDD+ program is implemented;
4.6	The REDD+ program contributes to respect, protection and fulfilment of human rights.	- The REDD+ program identifies human rights issues that it can address and elaborates how its policies and measures will contribute to the improved respect, protection and fulfilment of human rights; - The REDD+ program monitoring and evaluation plan includes key human rights indicators;
Principle 5: The REDD+ program maintains and enhances biodiversity and ecosystem services.		
5.1	Biodiversity and ecosystem services potentially affected by the REDD+ program are identified, prioritized and mapped.	- Biodiversity and ecosystem services potentially affected by the REDD+ program are identified, prioritized and mapped;
5.2	The REDD+ program maintains and enhances the identified biodiversity and ecosystem service priorities.	- The objectives and policies of the REDD+ program include making a significant contribution to maintaining and enhancing biodiversity and ecosystem services; - The REDD+ program maintains and enhances the identified biodiversity and ecosystem service priorities; - The REDD+ program generates additional resources to maintain and enhance biodiversity and ecosystem service priorities;
5.3	The REDD+ program does not lead to the conversion or degradation of natural forests or other ecological areas.	- Monitoring of the impacts of the REDD+ program on natural forests and other important areas demonstrates there is no conversion or degradation;
5.4	There is transparent assessment of predicted and actual, and positive and negative environmental	- The predicted and actual environmental impacts of the REDD+ program are assessed;

	impacts of the REDD+ program on biodiversity and ecosystem service priorities and any other negative environmental impacts.	
5.5	The REDD+ program is adapted based on assessment of predicted and actual impacts, in order to mitigate negative, and enhance positive environmental impacts.	- The REDD+ program is adapted in order to mitigate negative, and to enhance and sustain positive, environmental impacts;
Principle 6: All relevant rights holders and stakeholders participate fully and effectively in the REDD+ program.		
6.1	The REDD+ program identifies all rights holder and stakeholder groups and characterizes their rights and interests and their relevance to the REDD+ program.	- Rights holder and stakeholder groups are identified and their rights and interests and relevance to the REDD+ program are characterized; - There is a procedure to enable any interested party to apply to be considered a relevant rights holder or stakeholder;
6.2	All relevant rights holder and stakeholder groups that want to be involved in REDD+ program design, implementation, monitoring and evaluation are fully involved through culturally appropriate, gender sensitive and effective participation.	- A process and institutional structure for full and effective participation are established and functional; - Consultations use socially and culturally appropriate approaches; - The REDD+ program design and implementation is adapted in response to rights holder and stakeholder participation; - Rights holder and stakeholder groups select their own representatives;
6.3	The REDD+ program builds on, respects, supports and protects rights holders' and stakeholders' traditional and other knowledge, skills, institutions and management systems including those of indigenous people and local communities.	- The REDD+ program builds on, respects, supports and protects the decision-making structures and processes of indigenous people and local communities; - The REDD+ program identifies, builds on, respects and supports relevant traditional and other knowledge, skills and management systems; - Free, prior and informed consent is obtained for any use of traditional knowledge, innovations and practices of indigenous people and local communities;
6.4	The REDD+ program identifies and uses processes for effective resolution of grievances and disputes relating to the design, implementation and evaluation of the REDD+ program, including disputes over rights to lands, territories and resources relating to the program.	- Processes are identified and used to resolve grievances and disputes related to the REDD+ program; - No activity is undertaken by the REDD+ program that could prejudice the outcome of an unresolved dispute related to the program;
6.5	The REDD+ program ensures that rights holders and stakeholders have the information that they need about the REDD+ program, provided in a culturally appropriate, gender sensitive and timely way, and the capacity to participate fully and effectively in program design, implementation and evaluation.	- Rights holders and stakeholders have access to relevant information about the REDD+ program; - The most effective means of dissemination of information about the REDD+ program are identified and used for each rights-holder and stakeholder group; - Constraints to effective participation are addressed through capacity building; - Rights holders and stakeholders can access relevant legal advice;
6.6	Rights holder and stakeholder representatives collect and disseminate all relevant information about the REDD+ program from and to the people they represent in an appropriate and timely way, respecting the time needed for inclusive decision making.	- Rights holder and stakeholder representatives collect and disseminate all relevant information from and to the people they represent;
Principle 7: REDD+ program complies with applicable local and national laws and international treaties, conventions and other instruments.		
7.1	The REDD+ program complies with applicable local law, national law and international treaties, conventions and other instruments ratified or adopted by the country.	- Local and national laws and international treaties, conventions and other instruments ratified or adopted by the country relevant to the REDD+ program are identified; - The REDD+ program recognizes and respects the human rights of indigenous people and local communities; - Appropriate measures are taken to ensure compliance of the REDD+ program with relevant legal instruments;
7.2	Where local or national law is not consistent with the REDD+ SES or relevant international treaties, conventions or other instruments, a process is undertaken to reconcile the inconsistencies.	- Gaps and inconsistencies between local or national law and the REDD+ SES or relevant international treaties, conventions or other instruments are identified; - A process is established to address any gaps and inconsistencies between the local or national law and the REDD+ SES or relevant international treaties, conventions or other instruments;

Table 16–7: Selected criteria from REDD+SES

Center for International Forestry Research (CIFOR)

From 1994 to 1998, CIFOR, in collaboration with 30 research organizations, crafted a framework and guidelines for developing site-specific criteria and indicators for sustainable local forest management (Mrosek et al., 2006:595). The result was a step-by-step guide for the development of PC&I for the forestry sector and a generic template for forestry PC&I.

The CIFOR framework combines top-down and bottom-up approaches. It defines principles, based on common sense, before developing C&I using existing frameworks. CIFOR uses bottom-up field studies to test the initial PC&I sets and integrate the field data into the PC&I sets (see Figure 16-1) by applying multi-criteria analysis. CIFOR's generic framework includes four overarching themes accompanied by six principles. The social theme (with its three principles) is summarized in Table **16**–**8**.

Criteria		Description
Principle 3: Forest management maintains or enhances fair intergenerational access to resources and economic benefits		
3.1	Local management is effective in controlling maintenance of, and access to, the resource	Ownership and use rights to resources (inter and intra-generational) are clear and respect pre-existing claims.
		Rules and norms of resource use are monitored and successfully enforced.
		Means of conflict resolution avoid violence.
		Access to forest resources is perceived locally to be fair.
		Local people feel secure about access to resource.
3.2	Forest actors have a reasonable share in the economic benefits derived from forest use	Mechanisms for sharing benefits are seen as fair by local communities.
		Opportunities exist for local and forest-dependent people to receive employment and training from forest companies.
		Wages and other benefits conform to national and/or International Labour Organization (ILO) standards.
		Damages are compensated in a fair manner.
		The various forest products are used in an optimal and equitable way.
3.3	People link their and their children's future with management of forest resources	People invest in their surroundings (i.e., time, effort, and money).
		Out-migration levels are low.
		People recognize the need to balance the number of people with natural resource use.
		Children are educated (formally and informally) about natural resource management.
		Destruction of natural resources by local communities is rare.
		People maintain spiritual or emotional links to the land.
Principle 4: Concerned stakeholders have acknowledged rights and means to manage forests cooperatively and equitably		
4.1	Effective mechanisms exist for two-way communication related to forest management among stakeholders	> 50% of timber company personnel and forestry officials speak one or more local language, or > 50% local women speak the language used by the timber company in local interactions.
		Local stakeholders meet with satisfactory frequency, sufficient representation of local diversity, and high quality of interaction.
		Contributions made by all stakeholders are mutually respected and valued at a generally satisfactory level.
4.2	Local stakeholders have detailed, reciprocal knowledge pertaining to forest resource use (including user groups and gender roles), as well as forest management plans prior to implementa-tion	Plans/maps showing integration of uses by different stakeholders exist.
		Updated plans, baseline studies and maps are widely available, outlining logging details such as cutting areas and road construction, and include temporal aspects.
		Baseline studies of local human systems are available and consulted.
		Management staff recognizes the legitimate interests and rights of other stakeholders.
		Management of NTFP reflects the interests and rights of local stakeholders.
4.3	Agreement exists on rights and responsibili-ties of relevant stakeholders	Level of conflict is acceptable to stakeholders.
Principle 5: The health of forest actors, cultures and the forest is acceptable to all stakeholders		
5.1	There is a recogniza-ble balance between human activities and environmental conditions	Environmental conditions affected by human uses are stable or improving.
		In-migration and/or natural population increases are in harmony with maintaining the forest.
5.2	The relationship between forest management and human health is recognized	Forest managers cooperate with public health authorities regarding illnesses related to forest management.
		Nutritional status is adequate among local populations.
		Forest employers follow ILO work and safety regulations and take responsibility for the forest-related health risks of workers.
5.3	The relationship between forest maintenance and human culture is acknowledged as important	Forest managers can explain links between relevant human cultures and the local forest.
		Forest management plans reflect care in handling human cultural issues.
		There is no significant increase in signs of cultural disintegration.

Table 16–8: Selected criteria from CIFOR

The Forest Stewardship Council (FSC)

FSC members collaboratively developed the Forest Stewardship Council PC&I. In principle, any person or non-governmental organization with a commitment to sustainable forestry can become a member of the FSC and provide input on the PC&I (Overdevest, 2010:54). Unlike other forestry sustainability frameworks, the FSC is not based on existing PC&I sets (Rametsteiner and Simula, 2003:91) and has been criticized for only representing the deliberation of its General Assembly rather than an intergovernmental or scientific process (ITS Global, 2011:15).

Although the FSC is a global framework, it encourages the development of national chapters that adopt the global PC&I to national or local conditions, which must be approved by the FSC board (Overdevest, 2010:54). Recently, FSC revised its PC&I to emphasize social issues. A selection of PC&I most applicable to this study is shown in Table 16–9.

Criteria		Description
Principle 1: Compliance with laws		
1.5	Compliance with laws	The organization shall comply with the applicable national laws, local laws, ratified international conventions and obligatory codes of practice, relating to the transportation and trade of forest products within and from the Management Unit, and/or up to the point of first sale.
1.6	Acknowledgement of customary laws and engagement with affected stakeholders	The organization shall identify, prevent and resolve disputes over issues of statutory or customary law, which can be settled out of court in a timely manner, through engagement with affected stakeholders.
1.7	Compliance with anti-corruption legislation	The organization shall publicize a commitment not to offer or receive bribes in money or any other form of corruption, and shall comply with anti-corruption legislation where this exists. In the absence of anti-corruption legislation, the organization shall implement other anti-corruption measures proportionate to the scale and intensity of management activities and the risk of corruption.
Principle 2: Workers' rights and employment conditions		
2.1	Acknowledgement of ILO Declaration on Fundamental Principles and Rights at Work	The organization shall uphold the principles and rights at work as defined in the ILO Declaration on Fundamental Principles and Rights at Work (1998) based on the eight ILO core labor conventions.
2.2	Promotion of gender equality	The organization shall promote gender equality in employment practices, training opportunities, awarding of contracts, processes of engagement and management activities.
2.3	Health and safety practices for workers	The organization shall implement health and safety practices to protect workers from occupational safety and health hazards. These practices shall, proportionate to scale, intensity and risk of management activities, meet or exceed the recommendations of the ILO Code of Practice on Safety and Health in Forestry Work.
2.4	Payment of living wages	The organization shall pay wages that meet or exceed minimum forest industry standards or other recognized forest industry wage agreements or living wages, where these are higher than the legal minimum wages. When none of these exist, the organization shall through engagement with workers develop mechanisms for determining living wages.
2.5	Job-specific training	The organization shall demonstrate that workers have job-specific training and supervision to safely and effectively implement the management plan and all management activities.
Principle 3: Indigenous peoples' rights		
3.1	Identification of affected indigenous people and their rights of tenure, rights of access, customary rights, legal rights and obligations	The organization shall identify the indigenous peoples that exist within the Management Unit or are affected by management activities. The organization shall then, through engagement with these indigenous peoples, identify their rights of tenure, their rights of access to and use of forest resources and ecosystem services, their customary rights and legal rights and obligations, which apply within the Management Unit. The organization shall also identify areas where these rights are contested.
3.4	Acknowledgement of rights, customs and culture of indigenous peoples	The organization shall recognize and uphold the rights, customs and culture of indigenous peoples as defined in the United Nations Declaration on the Rights of Indigenous Peoples (2007) and ILO convention 169 (1989).
3.5	Identification and protection of sites with special cultural, ecological, economic, religious or spiritual significance through engagement with indigenous people	The organization, through engagement with indigenous peoples, shall identify sites which are of special cultural, ecological, economic, religious or spiritual significance and for which these indigenous peoples hold legal or customary rights. These sites shall be recognized by the organization and their management, and/or protection shall be agreed through engagement with these indigenous peoples.
Principle 4: Community relations		
4.1	Identification of affected	The organization shall identify the local communities that exist within the Management Unit and those that are affected by

	local communities and their rights of tenure, rights of access, customary rights, legal rights and obligations	management activities. The organization shall then, through engagement with these local communities, identify their rights of tenure, their rights of access to and use of forest resources and ecosystem services, their customary rights and legal rights and obligations that apply within the Management Unit.
4.3	Provision of opportunities for employment, training and other services to local communities	The organization shall provide reasonable opportunities for employment, training and other services to local communities, contractors and suppliers proportionate to scale and intensity of its management activities.
4.5	Avoidance and Mitigation of negative impacts	The organization, through engagement with local communities, shall take action to identify, avoid and mitigate significant negative social, environmental and economic impacts of its management activities on affected communities. The action taken shall be proportionate to the scale, intensity and risk of those activities and negative impacts.
4.6	Resolving grievances and provision of fair compensation	The organization, through engagement with local communities, shall have mechanisms for resolving grievances and providing fair compensation to local communities and individuals with regard to the impacts of management activities of the organization.
4.7	Identification and protection of sites with special cultural, ecological, economic, religious or spiritual significance through engagement with local communities	The organization, through engagement with local communities, shall identify sites which are of special cultural, ecological, economic, religious or spiritual significance, and for which these local communities hold legal or customary rights. These sites shall be recognized by the organization, and their management and/or protection shall be agreed through engagement with these local communities.
Principle 5: Benefits from the forest		
5.4	Use of local processing, services and value adding	The organization shall use local processing, local services, and local value adding to meet the requirements of the organization where these are available, proportionate to scale, intensity and risk. If these are not locally available, the organization shall make reasonable attempts to help establish these services.
Principle 7: Management planning		
7.5	Public availability of management plan	The organization shall make publicly available a summary of the management plan free of charge. Excluding confidential information, other relevant components of the management plan shall be made available to affected stakeholders on request, and at cost of reproduction and handling.
Principle 8: Monitoring and assessment		
8.2	Monitoring and evaluation of impacts and activities	The organization shall monitor and evaluate the environmental and social impacts of the activities carried out in the Management Unit, and changes in its environmental condition.
8.4	Public availability of monitoring and evaluation results	The organization shall analyze the results of monitoring and evaluation and feed the outcomes of this analysis back into the planning process.

Table 16–9: Selected criteria from the FSC

The mining sector

The International Council on Mining and Metals (ICMM) was established in 2011 as an industry group of international mining companies "committed to contributing to the sustainable development of the countries and communities in which they operate" (RWI, n. y., n. pag.). They also act as a catalyst to improve mining industry performance. To recognize mining's social and environmental challenges and respond to public criticism, the ICMM established a "Sustainable Development Framework" in 2003 to improve the sustainability of mining companies under the ICMM. The framework was developed during a three-year multi-stakeholder review process (Global Mining Initiative) based on mining projects' existing societal and environmental problems. Additional input was derived by using leading global sustainability standards as benchmarks.[60] The ICMM framework intends to create voluntary guidelines that individual mining companies could adopt. It consists of 10 core principles and accompanying criteria aiming to demonstrate the mining companies' commitment to meeting societal needs and expectations. The principles and criteria relevant to this study are summarized in Table 16–10.

[60] such as the 1992 Rio Declaration, the Global Reporting Initiative, the OECD Guidelines for Multinational Enterprises, the World Bank Operational Policies, the OECD Convention on Combating Bribery, ILO Conventions 98, 169, 176, and the Voluntary Principles on Human Rights and Security (ICMM, 2013, n. pag.).

Key themes	Principles	Criteria
Corporate Governance	*Implement and maintain ethical business practices and sound systems of corporate governance.*	Develop and implement company statements of ethical business principles and practices that management is committed to enforcing;
		Implement policies and practices that seek to prevent bribery and corruption;
		Comply with or exceed the requirements of host-country laws and regulations;
		Work with governments, industry and other stakeholders to achieve appropriate and effective public policy, laws, regulations and procedures that facilitate the mining, minerals and metals sector's contribution to sustainable development within national sustainable development strategies;
Corporate Decision-Making	*Integrate sustainable development considera-tions within the corporate decision-making process.*	Integrate sustainable development principles into company policies and practices;
		Plan, design, operate and close operations in a manner that enhances sustainable development;
		Implement good practice and innovate to improve social, environmental and economic performance while enhancing shareholder value;
		Encourage customers, business partners and suppliers of goods and services to adopt principles and practices that are comparable to our own;
		Provide sustainable development training to ensure adequate competency at all levels among our own employees and those of contractors;
		Support public policies and practices that foster open and competitive markets;
Human Rights	*Uphold fundamental human rights and respect cultures, customs and values in dealings with employees and others who are affected by our activities.*	Ensure fair remuneration and work conditions for all employees and do not use forced, compulsory or child labor;
		Provide for the constructive engagement of employees on matters of mutual concern;
		Implement policies and practices designed to eliminate harassment and unfair discrimination in all aspects of our activities;
		Ensure that all relevant staff, including security personnel, are provided with appropriate cultural and human rights training and guidance;
		Minimize involuntary resettlement, and compensate fairly for adverse effects on the community where they cannot be avoided;
		Respect the culture and heritage of local communities, including Indigenous Peoples;
Risk Management	*Implement risk management strategies based on valid data and sound science.*	Consult with interested and affected parties in the identification, assessment and management of all significant social, health, safety, environmental and economic impacts associated with our activities operations and of the measures that will be taken to manage the potential risks effectively;
		Ensure regular review and updating of risk management systems;
		Inform potentially affected parties of significant risks from mining, minerals and metals;
		Develop, maintain and test effective emergency response procedures in collaboration with potentially affected parties;
Health and Safety	*Seek continual improvement of our health and safety performance.*	Implement a management system focused on continual improvement of all aspects of operations that could have a significant impact on the health and safety of our own employees, those of contractors and the communities where we operate;
		Take all practical and reasonable measures to eliminate workplace fatalities, injuries and diseases among our own employees and those of contractors;
		Provide all employees with health and safety training, and require employees of contractors to have undergone such training;
		Implement regular health surveillance and risk-based monitoring of employees;
		Rehabilitate and reintegrate employees into operations following illness or injury, where feasible;
Environment	*Seek continual improvement of our environmental performance.*	Assess the positive and negative, the direct and indirect, and the cumulative environmental impacts of new projects from exploration through closure;
		Implement an environmental management system focused on continual improvement to review, prevent, mitigate or ameliorate adverse environmental impacts;
		Rehabilitate land disturbed or occupied by operations in accordance with appropriate postmining land uses;
		Provide for safe storage and disposal of residual wastes and process residues;
		Design and plan all operations so that adequate resources are available to meet the closure requirements of all operations;
Biodiversity	*Contribute to conservation of biodiversity and integrated approaches to land use planning.*	Respect legally designated protected areas;
		Disseminate scientific data on and promote practices and experiences in biodiversity assessment and manage-ment;
		Support the development and implementation of scientifically sound, inclusive and transparent procedures for integrated approaches to land use planning, biodiversity, conservation and mining;
Material Stewardship	*Facilitate and encourage responsible product design, use, reuse, recycling and disposal of our products.*	Advance understanding of the properties of metals and minerals and their life-cycle effects on human health and the environment;
		Conduct or support research and innovation that promotes the use of products and technologies that are safe and efficient in their use of energy, natural resources and other materials;
		Develop and promote the concept of integrated materials management throughout the metals and minerals value chain;
		Provide regulators and other stakeholders with scientifically sound data and analysis regarding our products and operations as a basis for regulatory decisions;
		Support the development of scientifically sound policies, regulations, product standards and material choice decisions that encourage the safe use of mineral and metal products;
Community Development	*Contribute to the social, economic and institutional development of the communities in which we operate.*	Engage at the earliest practical stage with likely affected parties to discuss and respond to issues and conflicts concerning the management of social impacts;
		Ensure that appropriate systems are in place for ongoing interaction with affected parties, making sure that minorities and other marginalized groups have equitable and culturally appropriate means of engagement;
		Contribute to community development from project development through closure in collaboration with host communities and their representatives;
		Encourage partnerships with governments and non-governmental organizations to ensure that programs (such as community health, education, local business development) are well designed and effectively delivered;
		Enhance social and economic development by seeking opportunities to address poverty;
Independent Verification	*Implement effective and transparent engagement, communication and independently verified reporting arrangements with our stakeholders.*	Report on our economic, social and environmental performance and contribution to sustainable development;
		Provide information that is timely, accurate and relevant;
		Engage with and respond to stakeholders through open consultation processes;

Table 16–10: 10 sustainable development principles and accompanying criteria of the ICMM

The process industry

Brent and Labuschagne (2006:4) analyzed 29 frameworks from a variety of fields, such as Social Impact Assessment Guidelines and the corporate social responsibility literature, to develop a social sustainability criteria framework for the South African process industry. Their criteria catalogue presents a detailed account of which social sustainability criteria should be

addressed from a business management perspective. The authors verified the criteria through case studies. They found that, that "[…] the framework is complete enough to be used as an initial base to develop a social assessment methodology, which can incorporate social sustainability into project and technology management practices" (Brent and Labuschagne, 2006:7). Next, they validated the framework using a Delphi survey of 23 project management experts. They concluded, „[...] that all the criteria are not relevant to project and technology management, but should rather manifest as part of corporate policy" (Brent and Labuschagne, 2006:7).

Brent and Labuschagne's suggested criteria are summarized in the following Table 16–11.

Criteria	Description
Internal human resources	***Internal human resources focus on the social responsibility of the company toward its workforce and include all aspects of employment.***
Employment stability	This criterion addresses a business initiative's impact on employment within the company, their stability, and the evaluation of the fairness of compensation.
Employment practices	Disciplinary and secrecy practices, as well as employee contracts, are addressed under this criterion. These are evaluated to ensure that they comply with the laws of the country, international human rights declarations and other human rights and fair employment practice standards.
Health & safety	This criterion focuses on the health and safety of the workforce and evaluates preventive measures as well as the occurrence and handling of health and/or safety incidents.
Capacity development	This criterion addresses two different aspects -- research and development and career development.
External population	***External population focuses on the external impacts of the company's operational initiatives on society, e.g. impacts on the availability of services, community cohesion, economic welfare, etc.***
Human capital	Human capital refers to an individual's ability to work in order to generate income, and it encompasses aspects such as health, psychological wellbeing, education, training and skill levels. This criterion addresses health and education separately.
Productive capital	Productive capital entails the assets and infrastructure an individual needs in order to maintain a productive life. The criterion measures the strain placed on the availability of assets and infrastructure.
Community capital	This criterion takes into account the effect of an operational initiative on the social and institutional relationships and networks of trust, reciprocity and support, as well as the typical characteristics of the community.
Macro social performance	***Macro social performance focuses on the contribution of an organization to the environmental and financial performance of a region or nation, e.g. contribution to exports.***
Socio-economic performance	This criterion addresses the external economic impact of the company's business initiatives. Economic welfare (contribution to GDP, taxes, etc.) and trading opportunities (contribution to foreign currency savings, etc.) are addressed separately.
Socio-environmental performance	This criterion considers the contributions of an operational initiative to the improvement of the environment on a community, regional and national level. The extension of the environmental monitoring abilities of society, as well as the enhancement of legislation and its enforcement, are included in this criterion.
Stakeholder participation	***Stakeholder participation focuses on the relationships between the company and ALL its stakeholders (internally and externally) by assessing the standard of information sharing and the degree of stakeholder influence on decision-making.***
Information provisioning	The quantity and quality of information shared with stakeholders are measured. Information can either be shared openly with all stakeholders (Collective Audience) or shared with targeted, specific groups of stakeholders (Selected Audience).
Stakeholder influence	The degree to which the company actually listens to the stakeholders' opinion should also be evaluated. Two separate sub-criteria are included: Decision Influence Potential and Stakeholder Empowerment.

Table 16–11: Social sustainability criteria as presented by Brent and Labuschagne (2006)

Biomass trade

Lewandowski and FaaijIt (2006) developed a PC&I framework for sustainable biomass trade by analyzing roughly 50 existing certification systems and management guidelines in areas including forestry, agriculture, plantations, transport, chain-of custody control, and trade. From this, they extracted more than 100 social, economic, ecological, and general criteria. They based the selection on the criterion's relevance to the biomass trade chain, namely "biomass for energy", "agriculture"," forestry" and "air trade". Most of the proposed criteria were extracted from high quality standards (CEN, Eco-label, EMAS, ISO5) or sustainability standards (CREM5) for a range of products. Lewandowski and FaaijIt (2006) view their list

only as a launching point for establishing a sound sustainability framework for sustainable biomass trade. They recommended that criteria sets be adapted to local conditions and tested for feasibility by conducting case studies on stakeholder opinions, analyzing local conditions (e.g., local production potentials and limits, preferences of local people). The criteria relevant in the context of this study are summarized in Table 16–12.

Areas of concern	Criteria
Social	
Labor conditions	- Prohibition of forced labor; - Prohibition of discrimination and equal pay for work;
Protection of human safety	- Protection and promotion of human health; - Provision of a safe and healthy working environment;
Rights of children, women, indigenous people and discrimination	- Elimination of child labor; - Children have access to schools, work does not jeopardize schooling; - Indigenous peoples' rights have to be respected; - Strengthening the role and rights of indigenous people; - Women should not be discriminated and their rights be respected;
Access to resources ensuring adequate quality of life	- Access to potable water, sanitary facilities, adequate housing, education, training, transportation and health services; - Promotion of education, training and public awareness;
Capacity building	- Local organizations, institutions or companies should be involved in the process; - Marginalized groups should play an equitable role; - Jobs should be generated; - Building and use of local labor and skills;
Combating poverty	- The activity should contribute to combating poverty;
Democratic participation	- Stakeholder involvement in the decisions that concern them;
Land ownership	- Avoidance of land tenure conflicts;
Community well-being	- A basis is created for strengthening the mutual confidence between business and society
Acceptance	- The activity does not lead to disadvantages for the local population like losses of jobs - The activity carries advantages for the local population
Strengthen the role of NGOs	- The role of NGOs should be strengthened
Improvement of local conditions	- Generation of jobs; - Generation of education opportunities; - Capacity building; - Support infrastructure development; - Enhancement of democratic development; - Increase of income; - Improvement of environmental management at the local level;
Economic	
Strength and diversification of local economy	- The activity should contribute to strengthening and diversifying the local economy.
No blocking of other desirable developments	- The activity should not block other desirable developments.
Environment	
Preservation of sensitive ecosystems	- Avoidance of pollution of ecological sensitive systems;
Conservation of biodiversity	- Preservation of habitats;
Conservation of land resources	- No impoverishment of land resource;
Conservation of water resources	- No depletion of ground and surface water resources; - Protection of the quality and supply of fresh water resources; - No pollution of ground water resources;
Waste management	- Minimization of waste; - Recycling of waste;

Table 16–12: Selected criteria for sustainable biomass production and trading

Australian Green Infrastructure Council (AGIC)

The AGIC was founded in 2008 as "[...] a not-for-profit national industry association formed to establish a rating framework to enhance sustainability in Australian infrastructure" (AGIC, n. y.). AGIC was "[…] formed by a group of industry professionals from engineering, environmental, planning, legal, financial and construction backgrounds working in both private

and public organizations related to infrastructure" (AGIC, website, 2012). In February 2012, AGIC released the first version of their rating framework.[61]

Their framework is divided into six different themes (Management and Governance; Using Resources; Emissions, Pollution and Waste; Ecology; People and Place; Innovation), which are further subdivided into categories that can be seen as criteria. Information on how AGIC developed their rating framework could not be located. The categories and sub-categories identified as most relevant to this study are summarized in Table 16–13.

[61] AGIC changed its name to the Infrastructure Sustainability Council of Australia (ISCA) on April 4, 2013.

Category		Aim
Theme: Management and governance		
Management System		This category rewards the consideration of sustainability in a holistic and integrated way from policy level down to detailed processes.
Sub-Category	Risk and opportunity management	To reward the assessment of sustainability risks and opportunities to inform project management.
	Reporting and review	To reward regular, comprehensive and transparent sustainability reporting and review.
	Knowledge sharing	To reward sustainability knowledge-sharing initiatives.
Theme: Using resources		
Water		This category focuses on reduction in water consumption, water re-use, and recycling.
Sub-Category	Water use monitoring and reduction	To reward monitoring and minimizing water use as much as possible across the infrastructure lifecycle.
	Water saving opportunities	To reward identification and implementation of opportunities to reduce water use.
Theme: Emission, pollution and waste		
Discharge to air, land and water		This category assesses the level and effectiveness of management practices for preventing and mitigating discharges to air, water and land over the life cycle of a given piece of infrastructure. It also seeks to encourage initiatives to enhance natural capital.
Sub-Category	Receiving water quality	To reward the management of impacts on local receiving water quality.
	Noise	To reward the management of noise impacts.
Theme: People and place		
Community, Health, Wellbeing and Safety		This category encourages moving beyond compliance in minimizing impacts to sustaining health, wellbeing and safety and delivering enhanced outcomes.
Sub-Category	Community, health and wellbeing	To reward making a positive contribution to community, health and wellbeing.
	Community and user safety	To reward design and practice that enhances community and user safety.
Heritage		The intent of this category is for infrastructure projects or assets to contribute to conserving, promoting and enhancing heritage in a way that satisfies asset delivery in the communities for which heritage is significant.
Sub-Category	Heritage assessment and management	To reward the development of baseline assessment of heritage and predictions against which improvements can be measured.
	Monitoring of heritage	To reward monitoring of impacts on heritage.
Stakeholder participation		One of the key purposes of stakeholder participation is to capture local knowledge to inform better project outcomes and involve the community in the planning and delivery of the infrastructure. Appropriate participatory processes should be provided from inception to operation; the capacity of the community to participate should be advanced through the project and the community's views and issues should be respected, considered and addressed.
Sub-Category	Stakeholder engagement strategy	To development and implementation of a comprehensive stakeholder engagement strategy.
	Level of engagement	To reward an appropriately high level of engagement, particularly on negotiable issues.
	Effective information	To reward clear, timely and relevant communication with the community.
	Addressing community concerns	To reward proper consideration and addressing of community concerns.
Urban and landscape design		This category focuses specifically on the analysis, planning and design of the infrastructure asset within its community and environment. Given the subjective nature of urban and landscape design, there is an emphasis on review of plans by third parties.
Sub-Category	Site and context analysis	To reward comprehensive site and site context analysis.
Theme: Innovation		
Innovation		This category rewards innovative strategies and technologies that are a 'first' in that state or the nation, contribute to broader market transformation towards sustainable development, or address a sustainability issue outside of the current scope of the IS rating tool.
Sub-Category	Innovative strategies and technologies	To reward pioneering initiatives in sustainable design, process or advocacy.

Table 16–13: Selected criteria from the AGIC sustainability rating framework

The Desertec Foundation's criteria catalogue for evaluating renewable energy power plants

In 2013, after several years of research and development, the Desertec Foundation released a set of sustainability requirements that aim to "ensure the social and environmental responsibility of large solar projects in desert regions" (DF, 2013b:n. pag.). The requirements include issues such as economic viability, security of supply, local content, employment, education, and social and environmental impacts.

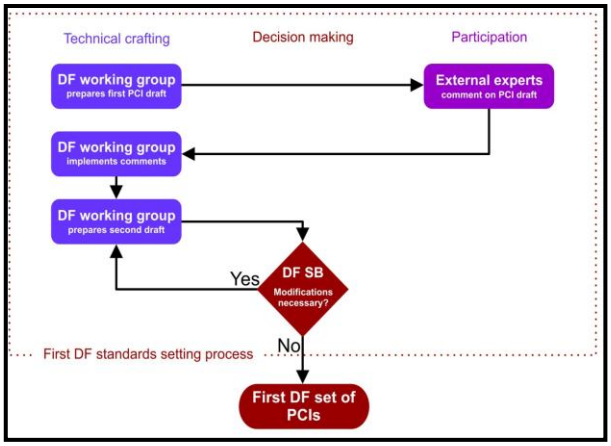


Figure 16-1: Workflow of the PC&I development

Using FCS's methodology, the Desertec Foundation developed its PC&I from the suggestions of an internal working group, a small round of expert consultations, and comments from its supervisory board. This first version is only intended as a starting point for an extended stakeholder dialogue to hone the requirements. The Desertec Foundation's PC&I (DF, 2013a) were drawn from the "Principles and Criteria for Sustainable Palm Oil Production" developed by the Roundtable on Sustainable Palm Oil Production, which is summarized in Table 16–14.

Criteria		Description
Principle 1: Electricity from renewable resources: In the case of solar-thermal power plants, a solar share of at least 95% of their electricity output has to be achieved at their final construction phase.		
1.1	The use of renewable energy in standard operation mode is maximised from at least 50% initially to 95% at their final construction phase.	Schedule of measures to increase the contribution of solar energy. Guidance: This criterion only applies to solar-thermal power plants. The power plant may initially generate up to 50% (annual average) of its electrical power from fossil fuels. After two years, the part of power produced with fossil fuels must be reduced to 10%. After a further two years, the part of power produced with fossil fuels must be reduced to 5%. After a further two years, the part of power produced with fossil fuels must be reduced to 0% in standard operation mode.
1.2	Technological appropriateness.	- Description of the local renewable energy resources (e.g. DNI, WPD); - Description of current electricity production and demand for electricity in the host country; - Description of the local load profile; - Description of the local / national grid; - Outline of the intended local and export shares; - Preliminary power plant and power line / grid layout; - Anticipated power output profile; - Estimated capacity factor; - Expected annual electrical power production; Guidance: In the case that the power plant is intended to provide electricity mainly or exclusively for the local or national consumption, there should be a very good match between the respective load profile and the power output profile. In the case that most or all electricity is produced for exports to Europe, the selected system should provide dispatchable electricity.
Principle 2: Reliability of electricity supply: The planning and design of the power plant takes into account potential risks and grid instabilities and mitigates their consequences.		
2.1	The downtime is minimized and its consequences mitigated.	-Identification of major technical factors that could cause any downtime of the power plant; -Identification of major non-technical risks of downtime; -Proposals of protective measures to avoid major risks and if applicable to mitigate their consequences on electricity production; Guidance: Risks for the undisturbed operation may arise from (a) the freezing of molten salt within storage systems or damage due to sand storms, (b) shortages in component supplies, (c) maintenance issues, (d) vulnerable infrastructure or (e) political instabilities. The planned plant layout should withstand an extended standstill period without severe damage.
2.2	Interconnectivity and grid stability.	- Description of the existing electricity infrastructure; - Outline of the envisaged electrical power distribution; - Identification of quality indicators for grid stability; - Identification of quality indicators for measures to maintain stability; - Emergency plan for grid instabilities; - Evidence for the proper communication of possible negative impacts on grid stability to local and national stakeholders; - Evidence for the proper communication of the envisaged electrical power distribution to local and national stakeholders; Guidance: If applicable, the power plant design should offer or at least not rule out the option to provide electricity for international and intercontinental power lines.
Principle 3: Water use: Particularly in arid regions suffering from water scarcity, power plants are designed for lowest possible and feasible water consumption.		
3.1	The use of water is minimized and the water balance should be positive or at minimum neutral.	- Description of local water sources and water use; - Preliminary framework to minimize water consumption and to recycle the used water; Guidance:

		Efforts should be made towards water neutrality. For water-cooled systems with a high fresh water consumption for example, at least double of the fresh water amount which is irreplaceably consumed through evaporation, leakage or consumption during operation has to be replenished by seawater desalination with process heat or by provision of electricity for desalination plants. The option to provide fresh water for the local population should be assessed.
3.2	The power plant project contributes to the mitigation of water scarcity.	- Description of the local and national demand for fresh water; - Outline of the planned contribution of the project to the mitigation of water scarcity;
Principle 4: Socio-economic impact / Local benefits: The power plant project contributes to the improvement of livelihoods and to economic stability.		
4.1	The power plant provides the local and / or national population and industry with electricity.	- Description of current electricity production and demand for electricity in the host country; - Description of the current legislation concerning feed-in from private companies; - Quantification of the required area for the plant and of the total area with suitable solar conditions available in the host country; - Estimation of the development of electricity demand, costs and pricing; - Contribution of the project to the provision of electricity to the local and national population; Guidance Electricity should be made available to the local or national population and industry under conditions common to the host country if the current national or local legislation allows the off-take and if the current national or local demand for electricity or the expected future demand for electricity justifies the additional supply. If, for legal reasons or those of the current electricity demand, it is not possible or appropriate to supply the local population with electricity, it has to be assured that enough space with comparably good solar conditions remains available for the future in the case that more solar power plants will be needed to satisfy the local demand.
4.2	The power plant project provides education and training for the local and / or national population.	- Description of the current education and qualification level of the local workforce; - Description of the required qualifications and numbers of workers for plant construction and maintenance; - Outline of planned educational trainings;
4.3	The power plant project creates jobs for the local and / or national population.	- Description of production facilities relevant to component production for the power plant; - Estimation of the number of jobs created on a short term for component production, distribution, construction and maintenance of the plant; - Estimation of the number of jobs created on a long term for component production, distribution, construction and maintenance of the plant;
4.4	The power plant project contributes to an improved educational and training infrastructure for the local and / or national population.	- Outline of planned new schools or educational or training facilities;
4.5	All socio-economic impacts are communicated to and evaluated by the national and local public.	- Evidence for round table events and workshops addressing local and national stakeholders; - Evidence for a close collaboration with local stakeholders in order to optimize local value creation depending on the local capacities; - List of impacts and their evaluation by the national and local public; - Transparent documentation of events and materials for stakeholder information in order to prevent blackmailing and bribery; - Documentation of financial investments and returns; - Evidence for the implementation of a conflict management system if negative impacts have been identified;
Principle 5: Environmental responsibility and conservation of natural resources and biodiversity: The design of the power plant project aims at the avoidance of negative environmental impacts. Unavoidable negative impacts are mitigated.		
5.1	Aspects of power plant project that have environmental impacts are identified, and plans to mitigate the negative impacts and promote the positive sustainable ones are made.	- Environmental impact assessment; - List of impacts and their evaluation by the national and local public; Guidance: Environmental impact assessment should cover the following activities, where they are undertaken: (a) Plant construction, building new roads, power lines or other infrastructure, (b) Disposal of effluents. Environmental impacts may be identified on soil and water resources, air quality, biodiversity and ecosystems, and people's amenity, both on and off-site.

		Environmental impacts have to be communicated, evaluated and moderated by the national and local public. Where the identification of impacts requires changes in current practices, in order to mitigate negative effects, a timetable for change should be developed.
5.2	The status of rare, threatened or endangered species and high conservation value habitats, if any, that exist on the site or that could be affected by the power plant management, shall be identified and their conservation taken into account in management plans and operations.	- Information should be collated that includes both the power plant area itself and relevant wider landscape level considerations (such as wildlife corridors). This information should cover: (a) Presence of protected areas that could be significantly affected by the power plant; (b) Conservation status (e.g. IUCN status), legal protection, population status and habitat requirements of rare, threatened, or endangered species that could be significantly affected by the power plant and power grid; (c) Identification of high conservation value habitats, such as rare and threatened ecosystems, that could be significantly affected by the power plant. - If rare, threatened or endangered species, or high conservation value habitats, are present, appropriate measures for management planning and operations will include: (a) Ensuring that any legal requirements relating to the protection of the species or habitat are met. In the case that stricter regulations are in place within the European Union, these requirements should be met; (b) Avoiding damage to and deterioration of applicable habitats; (c) Developing responsible measures to resolve human-wildlife conflicts. Guidance: This information gathering should include checking available biological records and consultation with relevant government departments, research institutes and interested NGOs if appropriate. Depending on the biodiversity values that are present, and the level of available information, some additional field survey work may be required.
5.3	Waste is reduced, recycled, reused and disposed of in an environmentally and socially responsible manner.	- Identification of all waste products and sources of pollution; - Identification of the current waste management in the region and breakdown of the expected challenges. The main kind of these facts must be communicated, matched and adjusted; - Outline of a waste management and disposal plan to avoid or reduce pollution; Guidance: The waste management and disposal plan should include measures for (a) Identifying sources of waste and pollution; (b) Improving the efficiency of resource utilisation and recycling potential wastes; (c) Appropriate disposal of hazardous chemicals and their containers.
5.4	The power plant will be responsibly decommissioned and materials will be recycled after the operational period.	Outline of decommissioning plan including recyclable material amounts and management of non-recyclable materials.

Table 16–14: PC&I developed by the Desertec Foundation

Social sustainability principles for CSP projects developed by Germanwatch

To analyze how large-scale CSP projects in the MENA region could impact people's livelihoods and affect human rights, Schinke and Klawitter (2011:6) of Germanwatch, a German NGO, drew upon a human rights-based approach incorporated into a Sustainable Livelihood framework. Their study provides a comprehensive account of the distribution of the potential livelihood opportunities and challenges from CSP across the geographical and social space in the MENA region. Through a combined livelihood and human rights analysis, the authors developed a set of social sustainability principles and recommendations for CSP projects to improve decision-making processes and achieve more sustainable outcomes at the local level. However, the authors emphasize that their principles are far from comprehensive, because an "effective set of principles cannot be developed without empirically gained knowledge (…) [and the] adequate representation of views and claims from affected people" (Schinke and Klawitter, 2011:39).

The principles are based on three strategic elements - social inclusion, empowerment, and human security - and guided by the established principles of the "World Commission for Dams". Table 16–15 describes Schinke and Klawitter's social sustainability principles.

Key themes	Principles	Description
Social Inclusion	*All affected communities should be fully informed about any CSP project in an early stage of the project.*	Information should be disseminated in a complete and easily understandable way.
	No CSP project should exacerbate existing social inequalities in absolute terms (relative changes might be unavoidable) but it should address them.	Special attention should be paid to the needs of vulnerable and/or disadvantaged groups (such as women and illiterate and elderly populations).
	Benefits of any CSP project should be maximized, while negative impacts should be minimized.	If negative impacts are unavoidable, those who are affected should be compensated in an adequate (just & fair) manner. Those, who are greatly affected should be the first beneficiaries (e.g. access to electricity and water or other goods and services generated by the project, such as jobs).
Empowerment	*Active participation of relevant stakeholders during relevant stages of a project to benefit affected people in a complete, transparent, and culturally appropriate form should be a fundamental of all CSP projects.*	An emphasis should be laid on a fair dialogue between duty bearers & rights holders, especially those who are most affected by the project (such as local communities, women, and indigenous people).
	Strengthening capabilities should be an outcome of any CSP project.	Capabilities should be strengthened by transfer of know-how and skills from north to south and from south to south.
	Access to the judicial system should be guaranteed for any affected stakeholder at the community level.	
Human Security	*International agreed standards, especially the human rights, as well as customary law. Local understandings of and control over resources should be acknowledged.*	No violence or force should be used through any project stage.
	Social and environmental issues should be valued with the same importance as technical and economic issues.	
	Any risk that could threaten the food, health, water, environmental or personal security of the duty bearers' livelihood assets should be mitigated.	

Table 16–15: Social sustainability principles to foster sustainable human development outcomes for large-scale CSP projects in the MENA region

16.1.2 Integrated and overarching sustainability frameworks

ISO 26000 - Guidance on social responsibility

Transnational organizations and their stakeholders are becoming increasingly aware of the need for and the benefits of socially and environmentally responsible behavior. Therefore, the International Organization for Standardization (ISO) prepared the standard "ISO 26000 - Guidance on social responsibility" to help private actors contribute to sustainable development. The ISO 26000 provides guidance to its users to voluntarily integrate, implement, and promote social responsibility in private sector practices and policies. By taking into consideration societal, environmental, legal, cultural, political, and organizational and economic diversity, this standard encourages socially responsible behavior beyond legal compliance while recognizing existing laws and agreements.

ISO 26000 was developed through a multi-stakeholder approach involving experts from more than 90 countries and 40 international or regional organizations involved in different aspects of social responsibility. These experts were from diverse stakeholder groups. ISO also balanced between developing and developed countries and gender. As the result of this multi-stakeholder expert dialogue, the ISO 26000 represents a global consensus on the state-of-the-art voluntary social responsibility guidelines. Two of the seven core subjects were selected. The rest were excluded due to duplication with the previous frameworks.

Core subjects	Issues	Description
Human rights	Due diligence	Identify, prevent and address actual or potential human rights impacts resulting from activities or the activities of other involved project partners;
	Human rights risk situations	Take particular care when dealing with circumstances and environments in which human rights are endangered by applying, for example, an independent human rights impact assessment. Such situations could include: - Conflict, extreme political instability, failure of the democratic or judicial system; - Poverty, drought, extreme health challenges or natural disasters; - Involvement in activities that might affect natural resources such as water, forests, the atmosphere, or disrupt communities; - Proximity of operations to communities of indigenous peoples;

		- Activities that can affect or involve children; - A culture of corruption;
	Avoidance of complicity	Exercise due diligence to ensure that the organization is not participating in, facilitating or benefiting from human rights violations committed by any of its partners providing work, goods or services;
	Resolving grievances	Establish or otherwise ensure the availability of legitimate, accessible, predictable, clear, transparent and equitable remedy mechanisms for the organization's own use and that of its stakeholders;
	Discrimination and vulnerable groups	- Take care to ensure that the organization does not discriminate against employees, partners, customers, stakeholders, members and anyone else with whom it has any contact or on whom it can have an impact; - Contribute to redressing discrimination or the legacy of past discrimination, wherever practical by striving to employ or do business with organizations operated by people from groups historically discriminated against; - Support efforts to increase access to education, infrastructure or social services for groups denied full access;
	Civil and political rights	Respect all individual civil and political rights, such as life of individuals, freedom of opinion and expression, to own property, access to a fair hearing;
	Economic, social and cultural rights	- Exercise due diligence to ensure that the organization does not engage in activities that infringe, obstruct or impede the enjoyment of economic, social and cultural rights; - Do not directly or indirectly limit or deny access to an essential product or resource, such as the supply of scarce drinking water resources; - Consider adopting or maintaining specific policies to ensure the efficient distribution of essential goods and services where this distribution is endangered;
	Fundamental principles and rights at work	Compliance with ILO declaration
Community involvement & development	Community involvement	- Consult representative community groups in determining priorities for social investment and community development activities. Special attention should be given to vulnerable, discriminated, marginalized, unrepresented and under-represented groups, to involve them in a way that helps to expand their options and respect their rights; - Consult and accommodate communities, including indigenous people, on the terms and conditions of development that affect them. Consultation should occur prior to development and should be based on complete, accurate and accessible information; - Participate in local associations as possible and appropriate, with the objective of contributing to the public good and the development goals of communities; - Maintain transparent relationships with local government officials and political representatives, free from bribery or improper influence;
	Education and culture	- Promote and support education at all levels, and engage in actions that improve the quality of and access to education, promote local knowledge and help eradicate illiteracy; - Promote learning opportunities for vulnerable or discriminated groups; - Promote cultural activities where appropriate, recognize and value the local cultures and cultural traditions, consistent with the principle of respect for human rights; - Help conserve and protect cultural heritage, especially where the organization's activities have an impact on it; - Promote the use of traditional knowledge and technologies of indigenous communities;
	Employment creation and skills development	- Analyze the impact of its investment decisions on employment creation and, where economically viable, make direct investments that alleviate poverty through employment creation; - Consider the impact of technology choice on employment and, where economically viable in the longer term, select technologies that maximize employment opportunities; - Consider the benefit of creating direct employment rather than using temporary work arrangements; - Consider participating in local and national skills development programmes, including apprenticeship programmes, programmes focused on particular disadvantaged groups, lifelong learning programmes and skills recognition; - Consider helping to develop or improve skills development programmes in the community where these are inadequate, possibly in partnership with others in the community; - Give special attention to vulnerable groups with regard to employment and capacity building;
	Technology development and access	- Consider contributing to the development of innovative technologies that can help solve social and environmental issues in local communities; - Consider contributing to the development of low-cost technologies that are easily replicable and have a high positive impact on poverty and hunger eradication; - Consider developing potential local and traditional knowledge and technologies while protecting the community's right to that knowledge and technology; - Consider engaging in partnerships with organizations, such as universities or research laboratories, to enhance scientific and technological development with partners from the community, and employ local people in this work; - Adopt practices that allow technology transfer and diffusion; - Set reasonable terms and conditions for licenses or technology transfer so as to contribute to local development; - The capacity of the community to manage the technology should be considered and enhanced;
	Wealth and income creation	- Consider the economic and social impact of entering or leaving a community, including impacts on basic resources needed for the sustainable development of the community; - Consider supporting appropriate initiatives to stimulate diversification of existing economic activity in the community; - Consider giving preference to local suppliers of products and services and contributing to local supplier development; - Consider undertaking initiatives to strengthen the ability of and opportunities for locally based suppliers to contribute to value chains, giving special attention to disadvantaged groups within the community; - Consider contributing to durable programmes and partnerships that assist community members, especially women and other socially disadvantaged and vulnerable groups to establish businesses and co-operatives, in improving productivity and promoting entrepreneurship. - Consider appropriate ways to make procurement opportunities more easily accessible to community organizations, including, for example, through capacity-building on meeting technical specifications, and making information about procurement opportunities available; - Consider supporting organizations and persons that bring needed products and services to the community, which can also generate local employment as well as linkages with local, regional and urban markets where this is beneficial for the welfare of the community; - Consider appropriate ways to help in the development of community-based associations of entrepreneurs;
	Health	- Seek to eliminate negative health impacts of any production process, product or service provided by the organization; - Consider raising awareness about health threats and major diseases and their prevention, such as HIV/AIDS, cancer, heart disease, malaria, tuberculosis and obesity; - Consider supporting long lasting and universal access to essential health care services and to clean water and appropriate sanitation as a means of preventing illness.
	Social investment	- Take into account the promotion of community development in planning social investment projects. All actions should broaden opportunities for citizens by increasing local procurement and any outsourcing so as to support local development; - Consider partnering with other organizations, including government, business or NGOs to maximize synergies and make use of complementary resources, knowledge and skills; - Consider contributing to programmes that provide access to food and other essential products for vulnerable or discriminated groups and persons with low income, taking into account the importance of contributing to their increased capabilities, resources and opportunities;

Table 16–16: Selected core subjects and issues of the ISO 26000

Safeguard policies of Multilateral Development Banks (MDBs)

To ensure that bank-supported operations do not result in negative impacts for people and the environment, MDBs established Safeguard Policies,[62] or key policies that define the requirements with which bank financed projects must comply in order to identify, minimize, and mitigate potentially adverse environmental and social consequences.

In contrast to the sectorial frameworks, these Safeguard Policies are integrated and over-arching sustainability frameworks that have already been applied to large-scale infrastructure projects in the MENA region. The Safeguard Policies provide sustainability requirements that could be relevant for the study and an opportunity to assess strengths and weaknesses of an integrated framework approach. Equally important, the authors reviewed whether the MDB's internal operational guidelines and procedures are adequate to address the framework conditions for CSP deployment in the light of the Arab Spring.

The authors considered the World Bank (WB), the African Development Bank Group (AfDB), and the European Investment Bank (EIB) to be the most important MBDs in the MENA region because of the size of the projects in which they have invested, the amount they have invested, and their focus on renewable energy.

First, the Safeguard Policies of the selected banks were screened. Second, their strengths and weaknesses were evaluated, and third, their adequacy for CSP projects in the MENA region was assessed.

Current structures of Safeguard Policies

The Safeguard Policies of the WB, AfDB, and EIB share a similar structure. Regardless of their thematic focus, all policies fall under an umbrella safeguard, which requires an appropriate environmental and social impact assessment of the MBDs' projects using a project categorization system. These are attached to a set of complementary safeguards, providing guidelines, mechanisms, and standards for the bank and borrowers to address particular environmental and social risks in the different development phases of the programs and projects. Those safeguards also contain a framework for public consultations and disclosure of information for the projects. Unlike the WB and the AfDB, which include a clearly defined set of Safeguard Policies, the EIB only loosely describes environmental and social requirements and standards. The Safeguard Policies of the three MDBs are summarized in Table 16–17.

[62] The MDBs use different terms for their Safeguard Policies. While the WB and the EIB utilize the term "Operational Policies", the AfDB uses the term "Operational Safeguards". For clarity, this study will subsequently use the general term "Safeguard Policies" and thereby include all types of internal bank Safeguards.

Safeguard Policies		Description
World Bank[63]		
OP 4.01	Environmental assessment	- Used to identify, avoid, and mitigate potential negative environmental impacts associated with bank lending operations; - Improves decision making to ensure that project options are sound and sustainable, and that potentially affected people have been properly consulted.
OP 4.04	Natural habitats	- Ensures that World Bank supported infrastructure and other development projects take into account the conservation of biodiversity, as well as the numerous environmental services and products that natural habitats provide to human society; - Strictly limits the circumstances under which any bank supported project can damage natural habitats; - Prohibits bank support for projects that would lead to the significant loss or degradation of any Critical Natural Habitats (those natural habitats that are either legally protected, officially proposed for protection, or unprotected but of known high conservation value).
OP 4.36	Forests	- Aims to reduce deforestation, enhance the environmental contribution of forested areas, promote afforestation, reduce poverty, and encourage economic development; - Provides three pillars to guide future bank involvement with forests: o Harnessing the potential of forests to reduce poverty; o Integrating forests in sustainable economic development; o Protecting vital local and global environmental services and forest values.
OP 4.09	Pest management	- Aims to avoid using harmful pesticides in rural development and health sector projects by using Integrated Pest Management (IPM) techniques and Pest Management Plans (PMP).
OP 4.11	Physical cultural resources	- Aims to avoid, or mitigate, adverse impacts on cultural resources from development projects that the World Bank finances.
OP 4.37	Safety of dams	- Requires experienced and competent professionals to design and supervise construction of dams; - Requires the borrower to adopt and implement dam safety measures through the project cycle, e.g. dam safety assessments; - Recommends, where appropriate, that bank staff discuss with the borrowers any measures necessary to strengthen the institutional, legislative, and regulatory frameworks for dam safety programs in those countries.
OP 4.12	Involuntary resettlement	- Aims to avoid involuntary resettlement to a feasible extent, or to minimize and mitigate its adverse social and economic impacts; - Promotes participation of displaced people in resettlement planning and implementation; - Assists displaced persons in their efforts to improve or at least restore their incomes and standards of living after displacement; - Prescribes compensation and other resettlement measures and requires that borrowers prepare adequate resettlement planning instruments prior to bank appraisal of proposed projects.
OP 4.10	Indigenous people	- Requires borrowers and bank staff to identify indigenous peoples, consult with them, ensure that they participate in and benefit from bank funded operations in a culturally appropriate way and that adverse impacts on them are avoided, or where not feasible, minimized or mitigated.
OP 7.50	International waterways	- The bank attaches great importance to riparian zones, making appropriate agreements or arrangements for the entire waterway, or parts thereof, and stands ready to assist in this regard.
OP 7.60	Disputed areas	- Requires that the bank will only finance projects in disputed areas when either there is no objection from the other claimant to the disputed area or when the special circumstances of the case support bank financing, despite the objection.
African Development Bank		
OS 1	Environmental and social assessment	- Governs the process of determining a project's environmental and social category and the resulting Environmental and Social Assessment requirements; - The requirements cover the scope of application, categorization, use of Strategic Environmental and Social Assessment (SESA) and Environmental and Social Impact Assessment (ESIA) where appropriate; Environmental and Social Management Plans; climate-change vulnerability; public consultation; community impacts; treatment of vulnerable groups, including indigenous peoples; and grievance procedures.
OS2	Involuntary resettlement, land acquisition, population displacement and compensation	- Embraces comprehensive and forward-looking notions of livelihood and assets to account for their social and cultural dimensions, as well as their economic ones; - Adopts a progressive understanding of community and common property that emphasizes the crucial need to maintain social cohesion, community structures, and the social inter-linkages that common property provides; - Defines the need to provide compensation at full replacement cost; the importance of achieving resettlement that improves standards of living, income-earning capacity, and overall means of livelihood; and the need to ensure that potential aspects of social considerations, such as gender and age, do not disadvantage particular project-affected people.
OS 3	Biodiversity and ecosystem services	- Provides operational requirements on integrated water resources management; - Reflects the objectives of the Convention on Biological Diversity to preserve biological diversity and promote the sustainable use of natural resources.
OS 4	Pollution prevention and control, greenhouse gases, hazardous materials and resource efficiency	- Covers the range of key pollution, waste and hazardous materials impacts for which there are agreed international conventions as well as comprehensive industry-specific standards that are followed by other MDBs and financial institutions that have adopted the Equator Principles; - Introduces a GHG emission threshold for projects to trigger a detailed analysis of feasible reduction or offset measures and reporting on emission levels; - Provides requirements for borrowers or clients to consider measures to improve resource efficiency.
OS 5	Labor conditions, health and safety	- Aligns the bank's requirements for its borrowers or clients with the range of ILO conventions concerning workers' conditions, rights and protection from abuse or exploitation; - Covers working conditions, workers' organizations, avoidance of child or forced labour and occupational health and safety.
European Investment Bank		
	Environmental assessment (EA)	- Assesses the requirements for an Environmental Impact Assessment (EIA) according to the EU EIA Directive and the Strategic Environmental Assessment (SEA) Directive.
	Impacts on sites of nature conservation	- Requires a screening of bank financed projects on potential impacts on sites of nature conservation. Where the impacts are expected to be significant, a special biodiversity assessment is carried out, according to the principles and practices of the EU Habitats Directive.
	Other environmental impacts	- Requires an assessment of bank projects regarding greenhouse gas emissions, the scope for improvements in energy efficiency as well as the need for measures to adapt to climate change.
	Principles and standards applied in the sectors	- Requires the EU Water Framework Directive and the EU Waste Framework Directive be applied in respective projects.

[63] The WB is using two frameworks to address environmental and social issues arising in projects: a safeguard framework for the public sector and a performance standards framework (IFC, MIGA) for the private sector. The safeguards in the table refer to the public sector framework.

	of water and waste	
	Standards in EU law	- Requires projects to comply with the relevant standards laid down in EU law, for instance those of the Large Combustion Plant Directive in the power generation sector and the Integrated Pollution Prevention and Control Directive in the industry sector.
	Recognized good international practices	- Recognizes good international practices as laid out by the World Commission on Dams (WCD) and the Extractive Industries Review (EIR). The bank applies stringent requirements with regard to dam projects' justification and design, the EIA process, the social and environmental safeguards, the preparation of mitigating measures, and the management capacities of the project promoter.
	Fulfillment of relevant multilateral environmental agreements (MEA)	- Requires all bank financed projects to comply with the requirements of relevant MEAs to which the host country and/or the EU is a party, including the Montreal Protocol, the UN Convention on Climate Change and the Kyoto Protocol and the Aarhus Convention.
	Social issues	- Determines that social issues are assessed in their own right, where necessary, as part of an integrated assessment. For projects mainly located outside Europe, internal guidelines are based on internationally accepted good practices, and in developing countries related to the Millennium Development Goals. They focus on labour standards, occupational and community health and safety (including major communicable diseases), population movement (including involuntary resettlement issues), minority rights (including indigenous people, women and vulnerable groups), public consultation and participation, and cultural heritage.

Table 16–17: Safeguard Policies of WB, AfDB and EIB
Source: AfDB, 2012b; EIB, 2009; World Bank, 2012.

Reviewing the weaknesses of Safeguard Policies

Scholars and stakeholders generally conclude that if safeguards are well designed and reliably implemented they have "helped [to] avoid or mitigate large-scale social and environmental risks in the projects [they finance]" (Dani et al., 2011:1, see also CSO, 2012; Kasimbazi, 2009). However, a literature review[64] revealed significant weaknesses in the MDBs Safeguard Policies and their application. We divided these weaknesses into three categories:

A. Weaknesses related to the *contents* of the Safeguard Policies: These weaknesses result from the safeguards' neglect of important types of livelihood capitals (Coulibaly, 2012; CSO, 2012; Dani et al., 2011; Zhou, 2010). Further, existing safeguards are weakened by a lack of clarity about specific target groups and core concepts (CSO, 2012; Ndobe and Durell, 2012).

B. Weaknesses related to the *concepts* of the Safeguard Policies: The conceptual weaknesses relate to the top-down methods used to develop and apply the Safeguard Policies, in which the environmental and social Impact Assessments sometimes become technocratic, expert-driven processes (Vanclay, 2005; Coulibaly, 2012; Herbertson, 2011; Soentoro et al., 2012).

C. Weaknesses related to the *organization and application* of the Safeguard Policies: These are due to the deficits in the implementation of and compliance with safeguards, as well as by their insufficient monitoring and evaluation (Dani et al., 2011; IEG, 2010; Kasimbazi, 2009; Tamufor et al., 2011).

Assessing the appropriateness of Safeguard Policies

Based on the literature review, we assessed whether the framework's safeguards were appropriate and adequate for CSP projects in the MENA region given the weaknesses discussed above. Especially following the Arab Spring, the following framework requirements for Safeguard Policies should be added:

1. Safeguard Policies need to ***foster participation*** in CSP projects to address the Arab Spring's demand for equitable public participation. Fulfilling this demand is also a precursor for social acceptance of the projects and thereby for the successful development of renewable energy projects in a region with relatively low awareness of renewable energy technology.

[64] See table 16-18: Categorization of weaknesses in Safeguard Policies.

2. Safeguard Policies need to ***address, identify, and manage the whole range of livelihood issues relevant to CSP projects*** to sufficiently capture the livelihood impacts at the local level, especially on vulnerable groups. They also need to facilitate renewable energy projects' contribution to achieving livelihood sustainability.
3. Safeguard Policies need to ***assure that CSP projects consider addressing social framework conditions*** to contribute to a socio-political transition toward more democratic decision-making.

Our comparison of safeguard weaknesses and safeguard framework requirements[65] revealed that two types of weaknesses could prevent the adequate fulfillment of the framework requirements for CSP.

First, the top-down approach used to develop safeguards and apply them is contradictory to the requirement to foster equitable participation in CSP projects in the MENA region. Scholars and stakeholders found that while the safeguards require community involvement, communities are not always integrated into project planning. Safeguards are particularly insufficient at addressing community concerns (CHHA, 2011; Soentoro et al., 2012). Additional barriers to public participation include unclear specifications on the timely release of information about the project and the use of technical and inaccessible language (Kasimbazi, 2012).

Second, the limited coverage of livelihood issues in the social safeguards suggests that core social risks are insufficiently addressed or overlooked (IEG, 2010; Dani et al., 2011). It is striking that Safeguard Policies neither require borrowers to assess gender issues, labor standards, and trade union rights nor the risk of negative impacts on a community's health, safety, social cohesion, children's rights, and land rights (Dani et al. 2011; IEG, 2010). Although some issues are indirectly covered by mainstreaming them within the assessment process or by simply integrating them into the requirements of other safeguards, this practice risks "marginalizing or oversimplifying" the social dimension (Tamufor et al., 2011:46).

Additionally, the WB's preference for national, rather than global standards is a weakness (Bosshard, 2004; IEG, 2010) as this could encourage a race to the bottom. There are also implementation and compliance problems with the safeguards (IEG, 2010; Tamufor et al., 2011) and a lack of adequate supervising and monitoring (Dani et al., 2011; Coulibaly, 2012; Kasimbazi, 2009). The importance of extensive and far-reaching social safeguards is best illustrated by a new study by Human Rights Watch (HRW) (see Info box below).

[65] See table 16-19: Assessment of weaknesses of Safeguard Policies with regard to framework requirements

Info box: New Human Rights Watch (HRW) study concerning the World Bank's safeguard policy

In their new study "Abuse-Free Development - How the World Bank should safeguard against Human Rights violations" Human Rights Watch shows theoretically, and empirically on the basis of three case studies, how the World Bank repeatedly violated human rights and did not prevent human rights violations in their supported projects. The case studies draw attention to human rights violations in two projects in Ethiopia and one in Vietnam. From HRW's point of view, these violations could have been avoided if social safeguards, particularly human rights safeguards, had been contractually fixed and their implementation monitored beforehand. The study provides recommendations to improve the development outcomes of future WB projects including:

- Commit not to support any activities that will contribute to or exacerbate human rights violations and to respect international human rights throughout all their activities;
- Undertake human rights impact assessments to identify potential human rights violations or to maximize possible positive human rights impacts;
- Enhance existing safeguards according to international human rights standards, emphasizing indigenous people's rights, involuntary resettlement policies, and discrimination;
- Take measures to ensure the effectiveness of the (new) safeguards, like consistently offering opportunities for participation, offering transparent information about the project or generally supporting countries in implementing effective safeguards on their own (HRW 2013:7).

These findings indicate that the existing Safeguard Policies of the MDBs do not ensure the sustainable and equitable deployment of CSP projects in the MENA region. The safeguards' weaknesses, however, provide a learning opportunity for the development of an integrated, overarching sustainability framework.[66]

[66] The WB and the AfDB are currently reviewing their Safeguard Policies. It remains to be seen if the review processes will improve these weaknesses.

Weaknesses of Safeguard Policies	Description	Literature
A. Contents related weaknesses		
A1. Gaps in social Safeguards	○ Restriction to only one (AfDB) or two (WB) policies ○ Limited thematic coverage of Safeguards ○ Missing out most common social risks (labor standards and rights, trade union rights, working conditions, health and safety, welfare and social security, protection of women's rights, rights of persons with disabilities, tenure of land, housing and natural resources)	Civil Society Organizations 2012, Coulibaly 2012, Dani et al. 2011, IEG 2010,Tamufor et al. 2011,Zhou 2012
A2. Lack of clarity and specificity within existing social Safeguards	○ Lack of clarity and specificity in how to define target groups (e.g. indigenous people) or impacts to trigger ○ Lack of definitions for central concepts (e.g. cultural heritage)	Civil Society Organizations 2012, Ndobe/Durell 2012
A3. Focus on bank's risks	○ focus on risks to the bank and not on the economic, financial, environmental and other risks to affected people	IEG 2010
B. Conceptual weaknesses		
B1. Development of Safeguards in top down manner	○ SIA as technocratic expert-driven process ○ Lack of participation and meaningful consultation of affected communities ○ No timely access to information, no use of local languages in official documents ○ No realization of principles of transparent, inclusive and responsive consultation	CHHA 2011, Coulibaly 2012, Herbertson 2009, Herbertson 2010, Vanclay 2005
B2. Lack of consistency in categorization of risks	○ No objective criteria for categorization of environmental and social risks ○ Categorization of projects based on environmental and social risks differs within the banks ○ Lack of clear guidance and objective criteria to screen projects	Dani et al. 2011, Herbertson 2010, IEG 2010
C. Organizational weaknesses		
C1. Fail in comprehensive implementation of and compliance with Safeguards	○ Failure to comprehensively implement policies and comply with Safeguards	IEG 2010, Kazimbazi 2009, Tamufor et al. 2011
C2. Lack of adequate supervision and monitoring	○ Satisfactory supervision in only 2/3s of the Bank's portfolio, 1/3 had unrealistic Safeguards ratings (WB) ○ The quality of supervision of Safeguards across regions is very uneven	Civil Society Organizations 2012, Coulibaly 2012, Dani et al. 2011, IEG 2010, Kazimbazi 2009, Tamufor et al. 2011
C3. Weaknesses related to the use of country systems (WB)	○ Since the late 1990s, the World Bank has endeavored to replace its mandatory social and environmental policies with flexible principles or national standards through processes such as the Safeguard policy conversion ○ Through these processes, the World Bank is undermining the upward harmonization of environmental and social standards globally ○ The implementation of the Country Systems approach will also undermine the ability of the Inspection Panel to assess World Bank compliance with its policies	Bosshard 2004, Kazimbazi 2009,
C4. Lack of country ownership and borrower responsibility	○ Lack of country capacity to implement Safeguards ○ No regular reporting by borrowers	CHHA 2011, IEG 2010
C5. Problems concerning new types of lending (WB)	○ Traditionally: investment loans, Safeguards designed to manage risks associated with these specific projects. ○ Now: development policy loans, programs for results where the borrower's actual use of WB funds is often unknown. Environmental and social impacts of these new investments are extremely difficult to monitor.	IEG 2010
C6. Weaknesses related to review processes	○ NGOs are frustrated with way of consultations on Safeguards in recent years and are wary of this new process. ○ Some NGO claim that the actual "Safeguards review" as labeled by the bank could apply to as little as 16% of the Bank's total portfolio	Civil Society Organizations 2012, Herbertson 2009,, Herbertson 2010, Ndobe/Durell 2012,

Table 16–18: Categorization of weaknesses in Safeguard Policies

Framework conditions for Safeguard Policies	Framework Requirements for Safeguard Policies	Problems regarding Safeguard Policies
	Summary of requirements: (1) Foster participation in CSP projects (2) Secure that the whole range of social issues tackled by CSP projects is identified and managed (3) Secure that CSP projects consider changing social framework conditions	Organizational weaknesses (C) apply to all conditions
1. Participation In the course of the Arab Spring, people are demanding empowerment over their future through informative and participative bottom up approaches as well as a right to equitably participate in decisions that shape the future of MENA societies. New energy structures need to address those demands.	→ OPs need to **foster participation (1)** in CSP projects in order to address the demand for participation and ensure that new energy structures are not implemented in a top-down manner. Moreover, participation is needed to secure the integration of local knowledge and of views of the impacted people into the project development in ways that are more sustainable and locally relevant.	B1. Development of Safeguards in top-down manner
2. Socio-political transition The Arab Spring launched a socio-political transition away from the ruling autocratic regimes. CSP projects have to ensure that the design of renewable energy pathways is not used to repackage the old socio-economic models but to contribute to socio-political transition in region.	→ OPs need to secure that CSP projects **consider changing social framework conditions (3)** in the region.	A 1 Gaps in social Safeguards B1. Development of Safeguards in top-down manner
3. Social acceptance Awareness levels of renewable energy technologies in MENA-countries are still low. Renewable energies are still perceived throughout the region as relatively incompatible with a modern way of living and not regarded as a viable alternative to oil, gas or nuclear considering the region's race to technologically catch-up with the West. To guarantee successful realization and implementation, CSP projects need to ensure social acceptance of renewable energies.	→ OPs need to **foster participation (1)** in CSP projects being essential to establish and assure social acceptance. → OPs need to secure that the **whole range of social issues tackled by CSP projects is identified and managed (2)** being essential to establish and assure social acceptance. → OPs need to secure the **consideration of changing social framework conditions (3)** in the region.	A 1 Gaps in social Safeguards A2.Lack of clarity and specificity within existing social Safeguards B1. Development of Safeguards in top-down manner
4. Potential negative social impacts arising from CSP Plants A purposive renewable energy transition and its accompanying large-scale power plants may have a range of negative social impacts on local level and the most vulnerable groups of society in particular. CSP projects need to sufficiently capture potential adverse social impacts.	→ OPs need to secure that CSP projects take the **whole range of social issues tackled by CSP projects into account (2)** and provide mitigation measures to avoid negative impacts.	A 1 Gaps in social Safeguards A2.Lack of clarity and specificity within existing social Safeguards B2. Lack of consistency in categorization of risks
5. Social possibilities/contribution to social sustainability arising from CSP Plants The renewable energy transition may contribute to the enforcement of social sustainability. Therefore, the design of future CSP plants in the MENA-region should be extended beyond the obvious supply-based triangle of climate, energy and employment security and include also issues related to the demand-based provision of basic human needs and services, the empowerment and capacity-building in local communities through adequate information, participation and accountability options, a focus on vulnerable groups and the equitable distribution of benefits and adverse impacts.	→ OPs need to secure that CSP projects take the **whole range of social issues tackled into account (2)** to make the enforcement of social sustainability possible	A 1 Gaps in social Safeguards

Table 16–19: Assessment of weaknesses of Safeguard Policies regarding framework requirements

16.2 Ouarzazate baseline (input for chapter 8)

In order to develop case and context specific hypotheses about potential livelihood consequences arising from Noor$_o$ I, it is important to understand thoroughly the livelihood situation in the affected communities. This chapter establishes a preliminary baseline as a set of reference points for the impact assessment as well as the development of sustainability requirements. While data from field research were later added to complement this chapter, the preliminary baseline only relies on quantitative, statistical data sources from official reports, national statistics, and scientific publications to shed light on relevant socio-economic, environmental, and institutional aspects that shape the livelihood conditions of the Ouarzazate region.

16.2.1 Geographic and administrative location

Location of Ouarzazate

This chapter focuses on the Province of Ouarzazate (often simply called the Province below) and the administrative district of Agdz in the bordering Province of Zagora. The Province of Ouarzazate is located in the Southeast of Morocco in the eastern part of the administrative region of Souss-Massa-Drâa in the lower catchment of the Wadi Drâa at the edge of the arid Sahara Desert (see Figure 16-2). Covering a total area of 1,112,460 ha (ORMVAO, 2013:6), the Province is home to 292,750 inhabitants, of which an estimated population of 69,364 are living in the city of Ouarzazate. Ouarzazate means the city of serenity in Tamazight. It is the Province's administrative capital (HCP, 2004). Ouarzazate city is located at the border of the middle and upper Drâa River, approximately 3 km to the west of the meeting point of the rivers Oued Dades and Oued Imini and right next to the Mansour Eddahbi reservoir. More than 63% of the population in the Province lives in rural areas generally concentrated along the rivers, where water is available both for drinking and irrigation (Département de l'eau, 2013:327). Most of the population belongs to the ethnic group of the Berbers and thus speaks Tachelhit. Only in the local community of Skoura is Moroccan Arabic commonly used to communicate (Almaouja, 2013a).

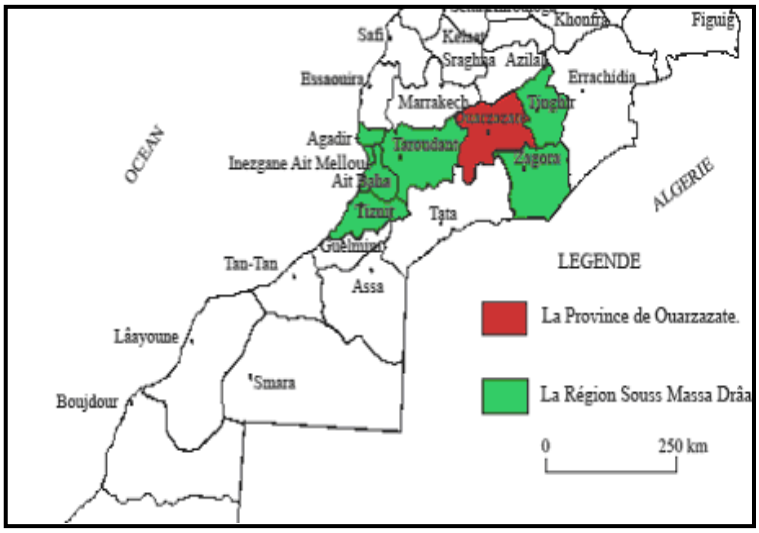


Figure 16-2: Location of the province of Ouarzazate and the region of Souss-Massa-Drâa
Source: Oudada, 2008.

The city of Ouarzazate was founded out of a former military camp, which the French colonists established in 1928 to control the Southeast of Morocco. However, the history of the region dates back to more than 3,000 years to the glories of the Berber era. In fact, many historic monuments, such as the famous Kasbahs, or fortified castles, bear testimony to the times when the historic region of Ouarzazate was home to powerful dynasties reigning over Morocco. In contrast, since Morocco's independence in 1956, the Province of Ouarzazate has suffered from political neglect and economic isolation. This marginalization relates to its geographic situation – semi-desert with a windy road to the nearest major city of Marrakech – the scarcity of its natural resources, and its severe weather. Public administration services, rural agriculture, and small handicraft industries are the main sources of employment and income in the region. In 1980s the international movie industry flourished in the Province, but it is now in decline. Today, the region suffers from some of the nation's poorest infrastructures, concentrated rural poverty, especially among ethnic minorities, rural exodus; a young population; social inequalities; and the virtual absence of financial services for small farmers and rural poor. Additionally, the region has a high level of vulnerability to environmental stressors from climate change, such as soil erosion, diminishing water resources, recurring periods of drought, and land degradation. Accounting for the combined effects of vulnerability to climate change and socio-economic trends, concerns have been raised about social conflict stemming from declining livelihood opportunities and increasing livelihood insecurity, such as a loss of income due to decreasing agricultural productivity for example.

Location of the administrative district of Agdz

The administrative district of Agdz is located in the northern part of the Drâa Valley and to the south of the Province of Ouarzazate (Chafik et al., 2003:15). The district borders the following administrative districts and communities (see Figure 16-3):

- The rural districts of Skoura and Tarmigte (Province of Ouarzazate) in the north.
- The rural community of Timzouline in the south.
- The rural district of Tazarine in the east.
- And the rural district of Taznakht and Foum- Zguid in the west.

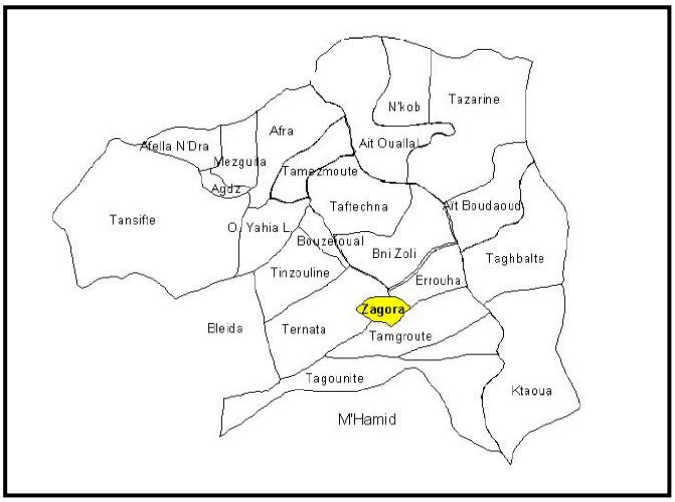


Figure 16-3: Agdz
Source: Chafik et al., 2003.

The administrative district of Agdz has a total population of 58,936 inhabitants. It encompasses the important palm oasis of Mezguita and parts of the oasis of Tinzouline to the south. The communities of the district include Tansift, Afla N'Drâa, Afra, Mezguita, Tamezmoute, and Ouled Yahia. Combined, they have a population of 53,066 inhabitants (Chafik et al. 2003). Besides these rural communities, the district contains the municipality of Agdz with 5,870 inhabitants. The region of Agdz is dominated by palm oasis agriculture typical for the middle Drâa Valley, and agriculture remains the primary economic activity and basis for livelihoods. Similar to the region of Ouarzazate, Agdz has high ethnic diversity, rich history, cultural sites, and monuments, and is a marginalized region within the Kingdom of Morocco.

16.2.2 Environment

Topography

The Province is characterized by the dominance of mountainous topography, which is formed mainly by the High Atlas in the North (up to 3,000 m), and the Anti-Atlas in the South (up to 2,000 m). In between the two mountain ranges lies the relatively flat Basin of Ouarzazate at an altitude of 1,000-1,500 m. Figure 16-4 and Figure 16-5 show the geographic location and topography of the Ouarzazate region.

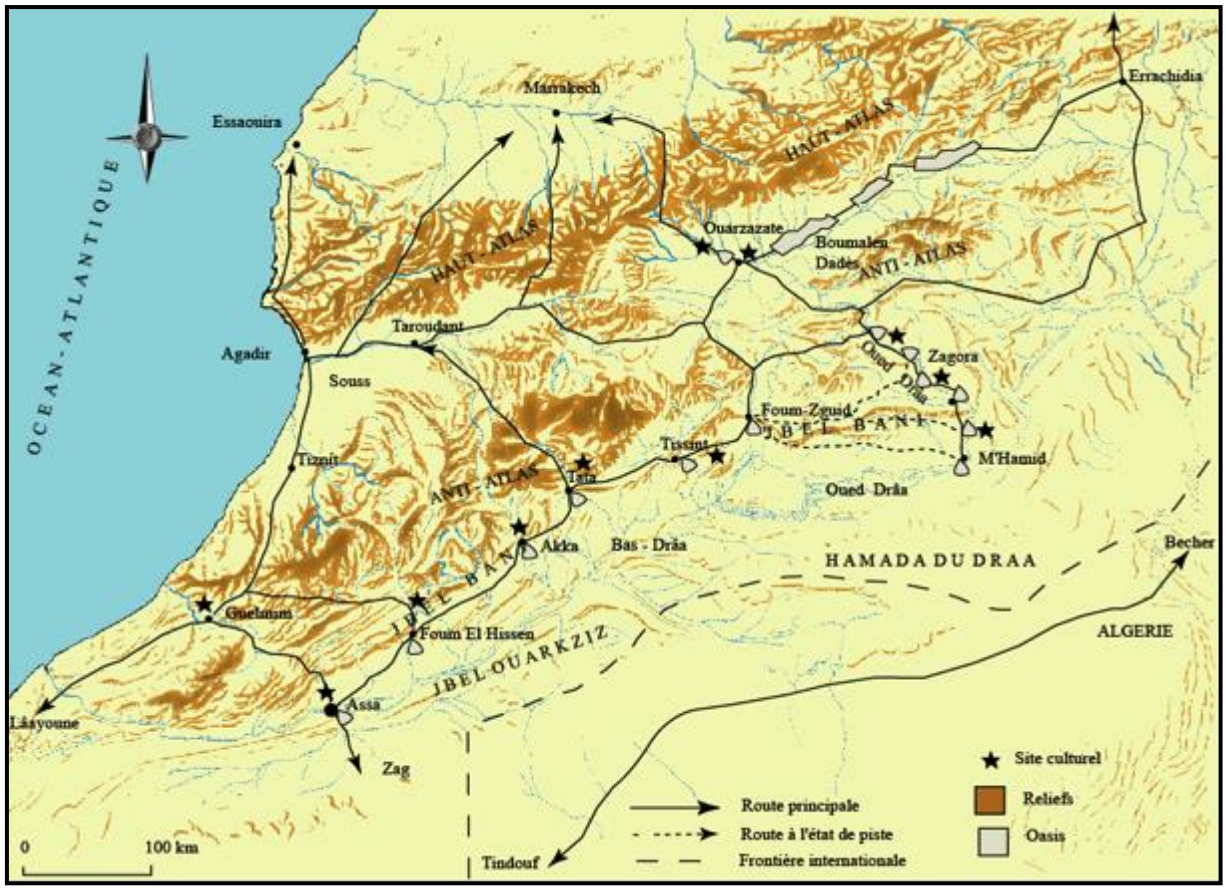


Figure 16-4: Geographic location of Ouarzazate
Source: Oudada, 2004.

The region of Agdz is within the Drâa Valley. It can be divided in three main zones characterized by different forms of irrigation and land use patterns (Zanabi, 2001:9):

- High plateaus, which are used for pastoralism (sedentary and nomadic), where irrigation is only possible by motor-powered pumping
- Valley plains and low plateaus, which are used for pastoralism, where irrigation is possible by *khetara* (rainwater collection) or motor-powered pumping,
- River valley of Oued Drâa, where the river provides irrigation.

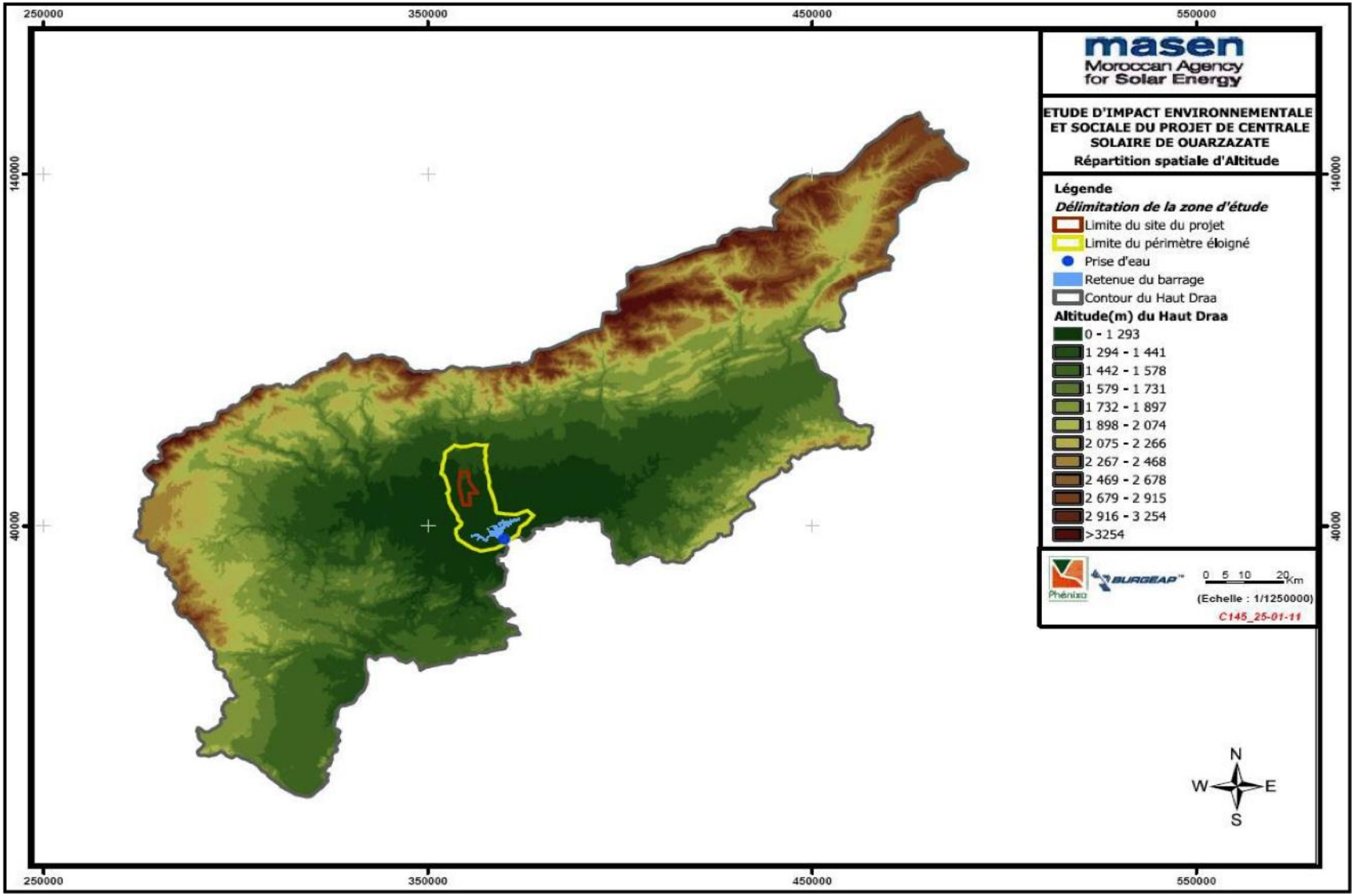


Figure 16-5: Topography of the Province of Ouarzazate
Source: Burgean-Phenixa, 2011:64.

The Drâa Valley is downstream from the Mansour Eddahbi dam in the north and extends south to the area of Tagounite (see Figure 16-6). The valley is more than 200 km long with a surface area of 23,000 km² (Chafik et al. 2003:16).

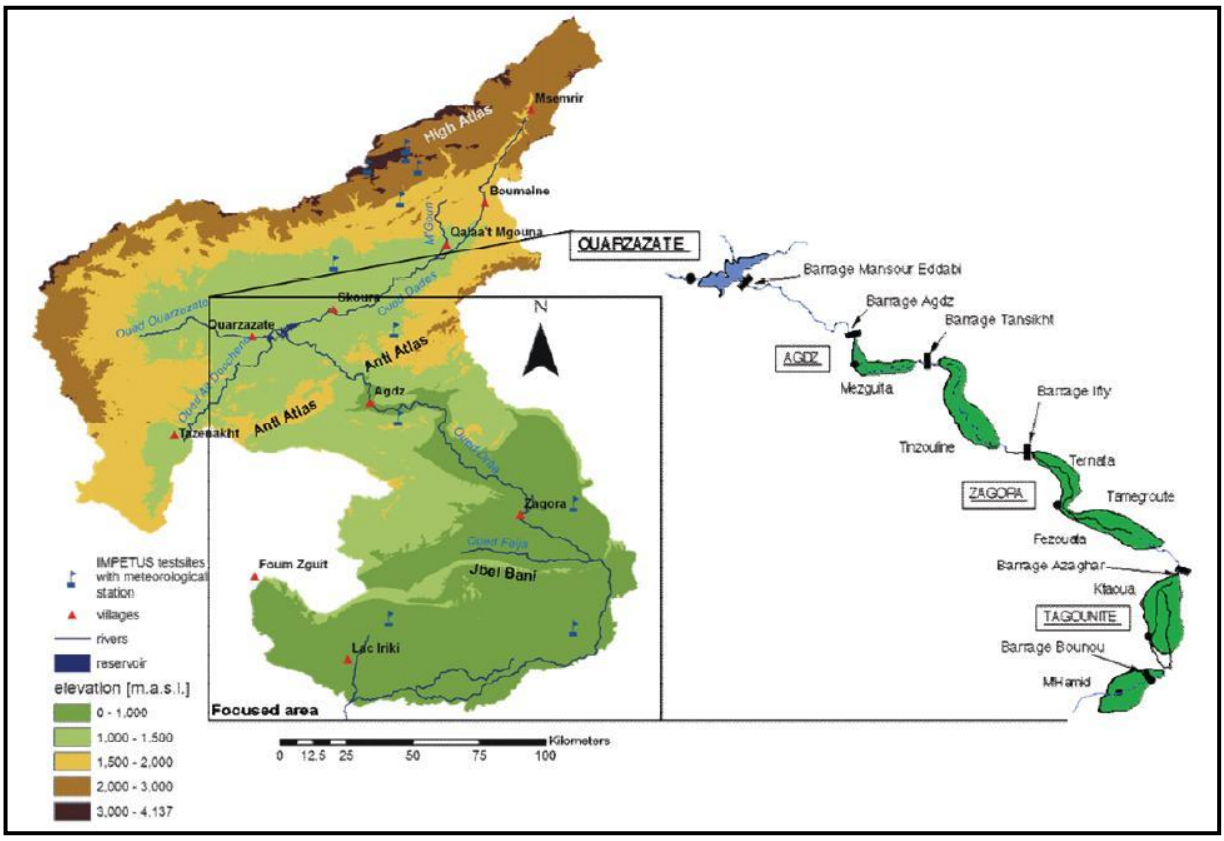


Figure 16-6: The Drâa catchment and the middle Drâa Valley
Source: Graf, 2010:16.

Soil

The soils in the Province of Ouarzazate are a mixture of silty clay: 75% are iso-humus, 20% are unsophisticated alluvial deposits, and 5% are skeletal (ORMVA, 2013:3). Such soil is not fertile. According to a study conducted by the Regional Office of Agricultural Development of Ouarzazate (ORMAVO), only soils in the oases and valleys, which cover 15 to 20% of the studied area, are fertile. The soils of non-irrigated pastures, which comprise 70 to 75% of the area, are infertile and require maintenance and minerals and organic materials to be arable. Furthermore, soils in the Province suffer from wind erosion (Ministère de l'Intérieur, 1993:31). The soils in Agdz are generally poor and often at high risk of soil degradation by water and wind erosion. Furthermore, soils in exposed oases suffer from continuous sand influx due to wind-induced mass movements (Chafik et al., 2003:16).

Climate

In the Province of Ouarzazate, the mountains of the High Atlas form an orographic barrier against the humid Atlantic currents coming from the north and west, providing it with semi-arid to arid climate conditions. Additionally, the climate of the Province of Ouarzazate is classified as Saharan, with cool winter and hot summer temperatures.

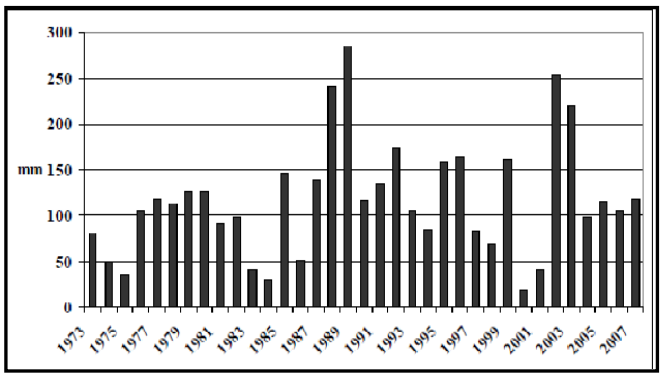


Figure 16-7: Annual precipitation in Ouarzazate from 1973 to 2007
Source: Heidecke, 2009:14.

A characteristic feature of the region's climate is the wide variations in temperatures, from over 40°C during summer to -5°C during winter. There is more rain in the summer than winter, as well as a high variability in annual rainfall (see Figure 16-7), with only 84.7 mm of annual rainfall in 2010 and over 250 in 2003 (HCP, 2012). Precipitation levels are relatively low with 150 mm annually in the city and up to 250 mm in the nearby mountains (in comparison: Cologne in Germany has around 800 mm annually) (Heidecke, 2009:13). This is significantly less than the national average of 346 mm per year (Worldbank, 2009). Additionally, the region is characterized by extreme evaporation, which ranges from 2,000 to 3,000 mm per year (Département de l'eau, 2013:327). As a result of the highly variable precipitation and large evaporation rates, the Drâa Valley is among the ten most arid catchments in the world and has suffered regularly from long lasting droughts historically causing major water availability problems (De Jong et al., 2006:1).

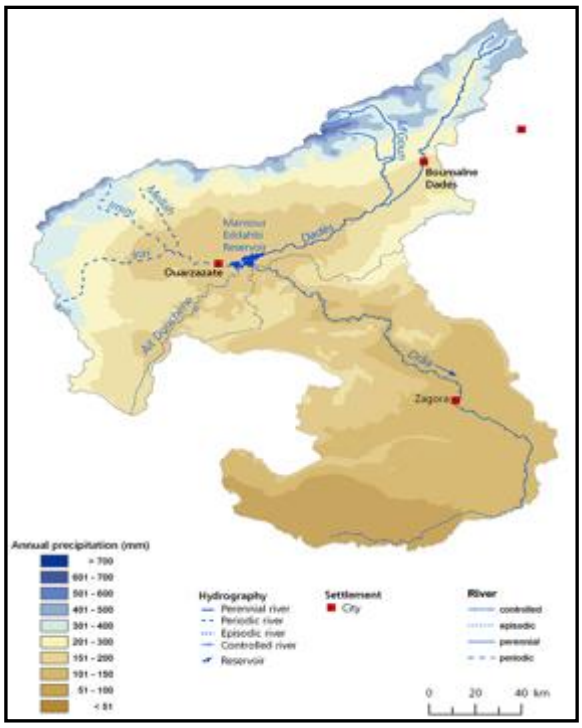


Figure 16-8: Total annual precipitation in the Upper and Middle Drâa basin
Source: Heidecke, 2009:13.

Agdz is characterized by its aridity with an average of 80 mm of rainfall per year (Chafik et al., 2003:16). Snowfall mainly occurs in the highest parts of the High Atlas Mountains from November to April and is a major source of freshwater renewal. It secures water availability in the small rivers and the groundwater reserves in the arid lowlands of the Ouarzazate Province. Droughts have been common since 1970.

Biodiversity (flora and fauna)

Due to the limited water availability in the region, the Ouarzazate Province is characterized as semi-desert and rock steppe. Vegetation density is generally low in the region, due to climatic conditions, the extensive extraction of firewood, and severe overgrazing (Diekkrüger et al., 2012:23). Halfa grasslands are found in remote places, but have widely been replaced by sagebrush steppes dominating the elevations of 1,400-2,200 m, which are in varying degrees of degradation (Busche, 2012:38). The forests that form the transition zone towards the steppes are only 93,153 ha (ORMVAO, 2013:6) due to overexploitation and degradation. In addition to perennial species, some seasonal grasses flourish with short cycles in the forest or alongside rivers, especially during the rainy season, but with high spatial and temporal variability. However, the occurrence of natural fauna in the vicinity of the *wadis* has been widely replaced by orchards and croplands including apple, walnut, almond, olive, date palm, and various field crops (Busche, 2012:38). Climate change, grazing, and the high demand on wood for fuel are threatening the flora in the area. The Province is also a diverse wildlife habitat, containing many wild animals, such as woodpigeon, partridge, raptors, vipers, jackal, wildcat, and gazelles (Province of Ouarzazate, 2013:26).

Water resources (availability and quality)

Water availability (groundwater, surface water): Currently, Morocco has a water availability per capita of about 700 m^3/y, which is below the critical threshold of 1,000 m^3/y (WWAP, 2012:799) for water scarcity. The scarcest resource in the Ouarzazate area is water. Water availability per capita in the region is significantly lower than the national average at 360 m^3/y in the region of Souss-Massa-Drâa (Choukr-Allah, 2011:182). Water resources in the Ouarzazate area are mainly fed by precipitation and snowfall at the highest points in the surrounding mountains. People usually obtain water from the surface of lakes and streams, groundwater pumping, and traditional groundwater harvesting systems called *khettaras* (Busche, 2012:20). The main water resource in the area is Morocco's longest river, the episodic Drâa and its main sources: River Ouarzazate, River Dades, River M'Goune, and River N'Ait Dochen.

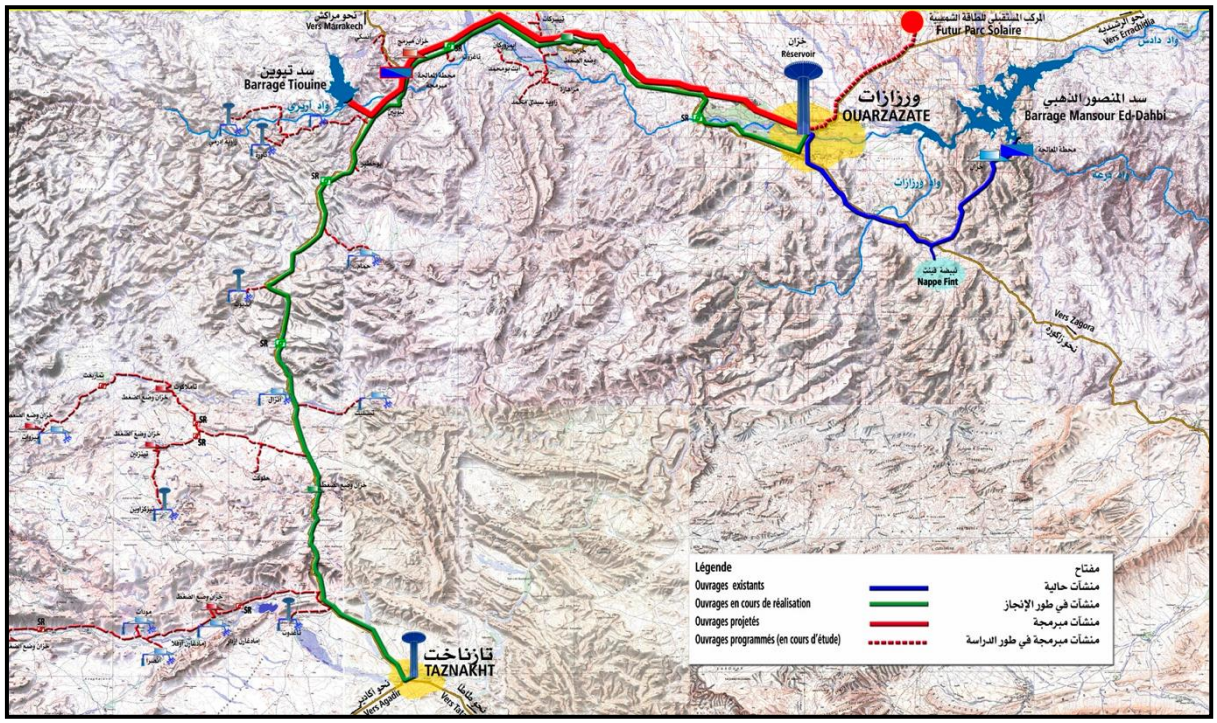


Figure 16-9: Location of the Mansour Eddahbi and Tiouine reservoirs
Source: ONEP, 2010.

Almost no natural water flow systems exist in the Ouarzazate area, with the exception of seasonal *wadis* and their corresponding alluvial aquifers from the High Atlas, and the riverbed of the Drâa is dry for most of the year. Therefore, the water availability of the Ouarzazate area is almost completely dependent upon the releases from the Mansour Eddahbi reservoir, which is one of the five biggest reservoirs in Morocco. Other small reservoirs in the region include Taghdoute, which holds 2.8 million m^3 of water, and Argue Ait Ouagharda. There are also three diversion dams[67] located in Tifoultout, Tikert, and Tadoula (ORMVAO, 2013:3).

The Mansour Eddahbi reservoir supplies the six date palm oases in the Middle Drâa Valley (beginning with the district of Agdz at the provincial border) with controlled water portions (lachers) for irrigation (Schulz, et al., 2008:168). These outlets represent the major water input in the region as they cover the irrigation requirements of agriculture (Heidecke, 2009:12). The Middle Drâa Valley is described as a discontinuous hydraulic surface highly dependent on the Drâa River for agriculture. While the annual releases from the reservoir initially provided sufficient water to the Ouarzazate area, the fast growing population, plus the changing precipitation patterns and continuous drought have resulted in insufficient releases from the reservoir (Diekkrüger et al., 2012:64). The original intended output of 250 million m^3 has only been reached in 43% of the years since the reservoir's construction, leading to water scarcity in the region (Diekkrüger et al., 2012:64). This has put high pressure on the amount and availability of drinking water and the water used for agricultural and industrial production. People living in rural areas outside of Ouarzazate are most heavily affected by this water stress, as their livelihoods and agricultural activities depend upon the water pro-

[67] A diversion dam refers to a dam that diverts all or a portion of the flow of a river from its natural course. Usually, diversion dams do not store water in a reservoir but they divert it into an artificial watercourse or canal. The diverted water may be used for irrigation or returned to the river after passing through hydroelectric generators

vided by the High Atlas Mountains. In recent years, farmers have increasingly substituted water from the dam and from rivers with more expensive and reliable groundwater irrigation. This has already caused an unsustainable depletion of groundwater reservoirs and falling groundwater tables (Diekkrüger et al., 2012:330). The number of motor pumps has increased since the construction of the Mansour Eddahbi reservoir in 1972. It is estimated that the number of motor pumps in the six oases doubled from 2,000 motor pumps in 1977 to around 4,000 by 1985. Today there are almost 7,000 pumps in the whole Drâa Valley (Heidecke, 2009:18). Faouzi (1986) argues there are more pumps because not only is the water release from the reservoir insufficient, the time between reservoir releases is too long for water-intensive crops e.g., vegetables, alfalfa, and henna (Heidecke, 2009:19). Due to the decrease in groundwater tables and the competition in water extraction, not all motor pumps extract water 24 hours per day (Heidecke, 2009:18).

Water quality: Groundwater quality is an increasingly important issue in the Drâa Valley. Salinity concentrations of groundwater are naturally high due to the geological characteristics of the region (ORMVAO, 2000) and significantly affect the water quality, especially during the summer. Both high evaporation rates and increasing use of groundwater for irrigation contribute to water salinity (Ouhajou, 1996). Groundwater salinity increases from north to south and constrains agricultural production. By comparison, the River Dades has an average salt concentration ranging between 0.4 to 0.6 grams per liter, the River M'Goun averages between 0.8 and 0.9 grams per liter, and the River Ouarzazate averages around 1.5 grams per liter (ORMVAO, 2000).

Land resources and availability

The total area of the Province of Ouarzazate is estimated to be 1,112,460 ha. The arable land in the Province of Ouarzazate is estimated to be 23,037 ha, of which 5,427 ha are not irrigated (*Bour)* and 17,520 ha are irrigated. In addition, 93,153 ha are forest, and 996,270 ha are uncultivated pastures (ORMVAO, 2013:6). The actual cultivated land represents only 2.063% of the total area of the Province. According to the agricultural services, officials and civil society in the Province, the most limiting factor in extending the agricultural area is the lack of irrigation. If alternative solutions were adopted for irrigation, the arable land could be extended, leading to an increase of food production, employment, and income. The legal status of agricultural land in the Province is dominated by private land (*Melk* land) at more than 91.07% of the area, followed by 6.44% collective land (land of *Jmaa*), 2.27% endowed land (land of Habouss) and 0.22% state land (ORMVAO, 2013:7). In general, the sizes of the land parcels in the Province are very small. The average farm size is 0.95 ha, and each farm has an average of 7.64 parcels. Of the farms, 91.07% are exploited directly by the owners and the rest are exploited either through rent or lease (ORMVAO, 2013:6).

Environmental vulnerability

The Province of Ouarzazate is characterized by high vulnerability to environmental pressures. This vulnerability is caused by the harsh environmental conditions in the region and is amplified by the effects of climate change. The most pressing environmental challenges include: precipitation and temperature changes, soil degradation, salinization, diminishing water resources, and persistent droughts.

Precipitation and temperature changes

In the Province of Ouarzazate, the decadal “natural” oscillations that result in varying annual temperatures and precipitation levels are superimposed on trends of increasing temperature and decreasing rainfall in Northwest Africa attributed to climate change. Already, a general tendency towards warmer and drier conditions has been observed in the last decades for the region (Schilling et al., 2012:4). Although the climate projections for this region differ greatly and are uncertain, the observed trend is likely to continue, resulting in even warmer and drier conditions in the near future. According to the IPCC, North Africa's temperatures during March and November are likely to rise between 2°C and 3°C while precipitation is likely to decrease between 10% and 20% by the year 2050 (IPCC, 2007b:494). Additionally, the temperature could rise by more than 5°C by 2080 in the eastern part and the mountainous zones of Morocco with a reduction in rainfall by 40% compared to the period of 1961-1990 in the most pessimistic scenario (World Bank, 2009:4). The increase in temperature would also involve an increase in evapotranspiration (the sum of soil water evaporation and plant water transpiration) of about 20% from now until 2050 and 40% by 2080 (A2 scenario) (World Bank, 2009:4). This would decrease the snow in the High Atlas Mountains, resulting in a loss of water storage for runoff.

These trends are also reflected in a regional model (SRES A1B) developed by the IMPETUS project for the Ouarzazate Province. This model predicts a “likely” (IPCC terminology) increase in temperature up to 1.4°C (±0.7°C) and a decrease of rainfall up to 30% (±11%) and snowfall by up to 31%, as well as an increased rainfall variability with heavier rainfalls and prolonged periods of drought by 2050 (Diekkrüger et al., 2012:10).

Soil degradation

Some of the worst land and soil degradation is occurring in the southern, pre-Saharan regions of Morocco. Ninety-three percent of Morocco’s dry weather (arid to sub-humid) areas are vulnerable to desertification due to overexploitation of natural resources and soils including the Province of Ouarzazate (ICARDA, 2012:10). Adverse climate conditions, such as heavy rainfall and drought, as well as shallow soils and sparse vegetation, have already placed high pressure on the soils in the region (Linstädter et al., 2010:565) and led to increased salinity and decreased soil fertility (Klose, 2009:III). Furthermore, unsustainable land use, such as overgrazing (ORMVAO, 1993:1), has amplified the negative impacts on soils. The resulting high levels of soil erosion are already causing the siltation of valuable water reservoirs, such as the Mansour Eddahbi reservoir.

With a projected increase in rainfall extremes in Southern Morocco, as well as reduced vegetation coverage due to higher temperature and less precipitation and socio-economic pressures, erosion rates of fertile land will likely increase in the future (Linstädter et al., 2010:567, Figure 16-10).

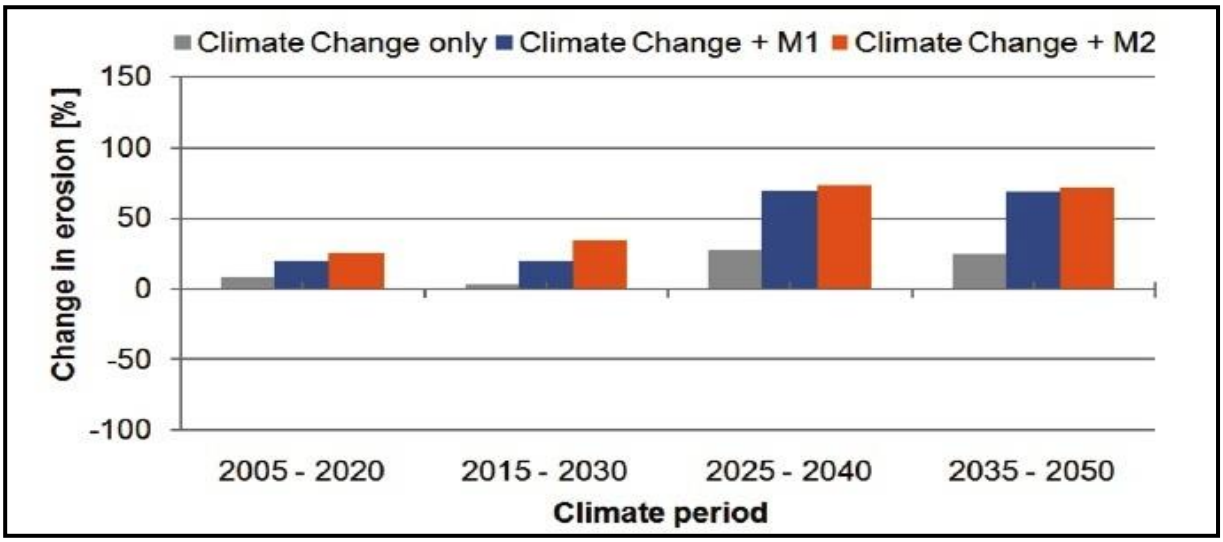


Figure 16-10: Climate change and socio-economic scenario comparison for the basin of Ouarzazate
Source: Linstädter et al., 2010:570.

Note: The results of the combined climate change and socio-economic scenarios compared to the reference climate period and the climate change only scenario for the basin of Ouazazate

For instance, a soil erosion model using a combination of climate change and land-use trajectories estimates an increase in the rate of soil erosion in the basin of Ouarzazate of between 5-60% by 2050 (Linstädter et al., 2010:570). Serious impacts are expected both on the amount of available grazing land and on fodder in the rangeland that altogether could have highly adverse consequences on the agrarian economy in the region[68]. While human influence – less intense livestock grazing and less firewood collection – could decrease soil erosion considerably, worsened conditions seem to be more likely due to more intense livestock grazing and increased firewood collection as a result of increasing population pressure (Klose, 2009:IV). High evaporation rates with more pronounced droughts and floods are also expected to occur in the region (IPCC, 2007b:443) further increasing the risk of desertification and soil degradation.

Salinization

Irrigated soils in Morocco are expected to lose more than 50% of their productivity within 20 years (Badraoui et al., 2000:227-234). This trend could worsen due to the impacts of climate change, specifically decreasing precipitation levels and higher temperatures.

Diminishing water resources (water scarcity)

Under the assumptions of current climate change scenarios, water in the Ouarzazate area will be the resource most directly and strongly affected. Higher temperatures and less reliable precipitation will likely decrease the overall availability of water in the region and result in significantly adverse impacts on the water situation due to the insufficient recharge capacities of the water reservoirs and groundwater tables. Already, a limiting factor for agricultural activities in the Province of Ouarzazate is low levels of precipitation. The change in rainfall, as well as other environmental and socio-economic pressures, has already affected water

[68] While the drivers of climate change cannot be influenced by the local population, socio-economic measures, such as increasing the vegetation coverage by afforestation and reducing overgrazing by a sustainable management of range land, can have a direct influence and by that extend the lifetime of the reservoir (Diekkrüger et al., 2010:12).

levels in the Mansour Eddahbi reservoir. The dam divides the Drâa Valley into two equally sized parts and thereby acts as a sediment trap. Since its construction in 1972 until 1998, the reservoir's capacity has been reduced by more than 25% - from 583 million m³ to 433 million m³-- according to the last bathymetry in 1998 (Diekkrüger et al., 2010:7) due to reduced rainfall, high evaporation losses, poor farming practices, increasing water demands, and soil erosion that results in reservoir silting[69]. Latest numbers based on the yearly average (2001-2013) suggest that the reservoir's current annual average is 250 million m³, which represents a further reduction of more than 50% of its original capacity (MASEN, Personal Interview, 2014). The mean erosion rate of 5.6 t/ha/year has already resulted in a dire shortage of water in the Ouarzazate area (Diekkrüger et al., 2010:7) and less storage capacity of water for irrigation of the downstream oases. This situation has made the dam's capacity to meet the required amounts of water for drinking (15 million m³/y) and agricultural usage (245 million m³/y) frequently insufficient (Diekkrüger et al., 2012:23). In the last several years, the reservoir levels have fluctuated greatly ranging from 12% to 40% to over 90% of the original capacity (5 Capitals, 2013a:77).

In addition to these challenges, eutrophication and algae blooms (Busche, 2012:39) expose households in the area to waterborne diseases. The drinking water tastes bad, but local authorities claim that it is safe.

With decreasing water availability from the reservoir, the aquifers have already been depleted, leading to reduced groundwater tables and high levels of salinity in the soil and groundwater reservoirs. This adversely affects the water quality in the Drâa Valley around Ouarzazate, especially during the summer (Heidecke, 2009:1). Anthropological investigations in the Drâa Valley show that the water table not only for irrigation wells is declining but also in domestic wells in proximity to settlements that provide the water needed for drinking, cooking, and washing as well as for animals (Rössler, 2010:585). As a result of the declining groundwater level, wells have to be deepened once or twice every two years, particularly during periods of drought. Additionally, groundwater balance models estimate that groundwater tables are likely to decrease by another two meters by 2020 (Heidecke, 2009:17).

Further silting of the Mansour Eddahbi reservoir can be expected in the future due to higher interannual variability of rainfall, higher temperatures, and less overall rain and snowfall leading to increasing erosion rates. As a result of the diminishing capacity of the reservoir and decreasing surface water availability, the region can expect a further increase in the use of groundwater for irrigation and domestic usage, accompanied by declining groundwater tables.

[69] Siltation of the Mansour Eddahbi reservoirs could be reduced by about 30% if areas of high erosion risk (>30 t/ha) are afforested (Paeth et al., 2008).

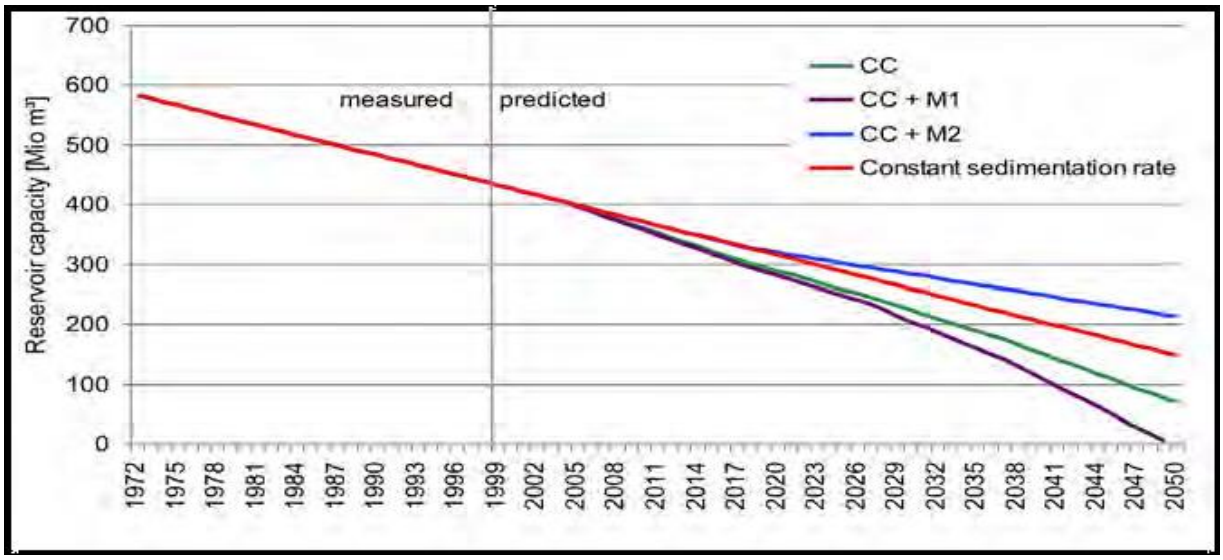


Figure 16-11: Simulated development of the capacity of the Mansour Eddahbi reservoir
Source: Diekkrüger et al., 2010:12.

Note: Simulated development of the capacity of the Mansour Eddahbi reservoir under socioeconomic scenario M1 "marginalization" and M2 "rural development" and climate change scenario. 250 million m^3 is required for satisfying water demand of the middle Drâa Valley

Even worse: different future scenarios developed within the GLOWA-IMPETUS project that included assumptions about climate change, anticipated socio-economic developmement, and environmental degradation simulate a signifcant reduction of the reservoir's water capacity for the next decades, with the worst-case scenario calculating that the Mansour Eddahbi reservoir could become inoperable between 2030 and 2042 and thus would no longer be able to supply enough water for drinking and agricultural demands in the Ouarzazate area (Diekkrüger et al., 2012:10), In their conclusions, the authors of this study state that in any case of their scenarios "the remaining reservoir is between nearly 0 and 200 million m^3 in 2050 which will severely threaten water management for the middle Drâa Valley" (Diekkrüger et al., 2010:11) (see Figure 16-11). Although the assumptions which frame the outcomes of these scenarios are somewhat speculative and thus connected to uncertainties, the already observed decline in the reservoir's capacity to a current annual average of 250 million m^3 (MASEN, Personal Interview, 2014), is reason for concern as this value is already signifcantly lower than what had been previously estimated by the IMPETUS-GLOWA project for 2015 based on their base year of 1998.

This scenario might have a negative impact on irrigation but likely not on the CSP project, which will be given priority due to its significantly smaller needs. Once it is commissioned, the reservoir of Tiouine will provide drinking water. The reduced capacity of the Mansour Eddahbi reservoir will likely increase the region's vulnerability to future climate change.

The Tiouine dam

To reinforce the additional water consumption in the region, a new dam is currently being constructed in the Province of Ouarzazate (Hallaouy, 2011). It is expected to be operable by 2015. The capacity of this dam, which is called Tiouine, will be 270 million m^3. This dam will regulate a water volume of 30 million m^3 per year, of which two thirds will be used to supply drinking water to cities and centers in the Provinces of Ouarzazate and Zagora. The remaining 10 million m^3 will be used to supply the agricultural needs in the area between the dam Tiouine and the dam Mansour Eddahbi (which is a total area of 1,600 hectares)

While irrigation availability in the surface water dependent oases would remain high enough to sustain agriculture at its current levels, a drastic decline in surface discharge and water reservoir recharge would severely weaken the water security in the Province of Ouarzazate by 2050 and beyond (Busche, 2012:III).

Droughts

As mentioned, droughts are common in Morocco. From 1456 to 2002, 16 single drought years have occurred per century, with the 20th century being slightly above this average (19). From 1912 to 1992, an average interval between droughts of only three years was reported (Schilling et al., 2012:24). The Province of Ouarzazate was particularity affected by droughts during the early 1970s, the early 1980s, and the late 1990s to the beginning of the 21st century (Klose, 2009:56). According to climate projections, the trend of increasing temperatures and decreasing precipitation levels will substantially raise both the risk and duration of droughts in the future. Räisänen et al. (2004) even conclude that in the future there will be fewer precipitation days rather than reduced precipitation intensity, making lengthy droughts more likely. Similarly, Voss et al. (2002) project a significant prolongation of very long dry spells for North Africa (10-year return values of annual maximum dry spells) for the period from 2060-2089 compared to 1970–1999 (Schilling et al., 2012:7).

16.2.3 Society

Demography

Population size: According to the census of 2004, the Province of Ouarzazate has a population of 292,750 inhabitants (see Table 16–20), of which more than 63% lives in rural areas. The annual population growth rate is estimated to be 0.95%, which is lower than the national average. Paradoxically, the fertility rate is one of the highest in the country (HCP, 2004). The actual growth rates for the rural and urban population are, respectively, 0.6% and 4.1% (Busche, 2012:19).

	Communes	2004	2006	2008	2010	2012	2013	2014
16.2.3.1.1.1.1 Urban centres	Ouarzazate (M)	56,340	59,498	61,930	64,791	68,097	69,364	70,638
	Tzanakht (M)	6,143	6,640	7,073	7,574	8,148	8,396	8,650
	Skoura AC	2,806	2,820	2,793	2,780	2,781	2,763	2,745
	Tabounte AC	21,073	22,150	22,947	23,895	24,996	25,401	25,806
	Total Urban area	86,362	91,108	94,743	99,040	104,022	105,924	107,839

16.2.3.1.1.1.2 Rural area	Ait Zineb	9,230	9,208	9,234	9,229	9,169	9,163	9,106
	Amerzgane	7,610	7,365	7,165	6,947	6,696	6,591	6,451
	Azanguen	12,015	12,237	12,528	12,783	12,966	13,092	13,146
	Ighrem N'Ougdal	14,008	13,993	14,05	14,061	13,989	13,989	13,911
	Khouzama	8,182	8,232	8,325	8,391	8,408	8,437	8,421
	Ouisselsate	15,356	15,315	15,354	15,341	15,237	15,225	15,128
	Siroua	9,626	9,641	9,705	9,737	9,711	9,723	9,681
	Telouet	14,210	14,133	14,129	14,078	13,944	13,913	13,806
	Tidili	14,642	14,760	14,957	15,105	15,165	15,233	15,218
	Ghassate	8,832	8,583	8,384	8,162	7,899	7,791	7,642
	Idelsane	8,146	8,021	7,938	7,829	7,677	7,621	7,524
	Imi N'oulaoune	19,970	19,824	19,78	19,671	19,447	19,385	19,217
	Skoura rural	20,031	20,382	20,844	21,247	21,529	21,727	21,806
	Tarmigt rural	9,646	10,266	10,982	11,709	12,410	12,809	13,147
	Toundoute	11,866	11,915	12,026	12,097	12,096	12,127	12,091
	Total Rural Area	183,37	183,875	185,401	186,387	186,343	186,826	186,295
Province of Ouarzazate		269,732	274,983	280,144	285,427	290,365	292,750	294,134

Table 16–20: Population dynamics in the Province of Ouarzazate
Note: Data were obtained from HCP services Ouarzazate, 2013.

Spatial distribution of population: The Province of Ouarzazate consists of a total of 17 Communes of which two are considered urban and 15 rural (Province de Ouarzazate, 2009:4). Only the largest rural Communes are listed in Table 16–20. However, in the vicinity of the

Noor$_o$ CSP plant, there are numerous small communities with fewer than 1,000 inhabitants. Roughly 30 of these communities are situated within a 30 km radius (see Figure 16-13). Of the urban communities, Tabounte is the closest to Ouarzazate (2 km), followed by Skoura (40 km) and Taznakht (90 km) (see Figure 16-12 and Figure 16-13).

The land on which the Noor$_o$ complex is being constructed belongs to the ethnic community Ait Ougrour, which is part of the rural Commune of Ghassate in the Province of Ouarzazate. The Commune of Ghassate is bounded by:

- North: Province of Azilal;
- Northeast : Rural Commune of Toundout;
- Northwest: Rural Commune Telouet;
- South: Rural Commune of Tarmigt;
- Southeast: Rural Commune of Idelsane and rural Commune of Skoura Ahl Oust;
- Southwest: Rural Commune of Ait Zineb.

The *douars* (villages) that constitute the Ait Ougrour community include: Tasselmant, Oum Romane, Essour, Agouddim Izerki, Iznaguene, Tiflite, Igherm Amellal, Tidgheste, and Taferghoust. The land on which the complex is constructed belonged to the people living in these douars. The douars of Izerki (i.e. Tasselmant, Oum Romane, Essour, Agouddim Izerki and Iznaguene) are located to the north of the complex and the other douars (i.e., Tiflite, Igherm Amellal, Zaouiat Tidgheste and Taferghouste) are located to the east of the complex.

Table 16–21 provides the demographics of the douars of the rural Commune of Ghassate (MASEN, 2012a:83 and 85).

Douar	Population		Households		Children between 6 and 11 years old		Women of childbearing age
	2004	2008	2004	2008	Girls	Boys	
Tasselmant	280	324	40	40	10	12	25
Oum Romane	40	42	6	8	5	4	4
Essour	131	190	19	20	24	20	15
Agouddim Izerki	179	263*	18	25*	10	14	18
Iznaguene	112	112	14	13	9	7	10
Tiflite	400	362	65	57	26	30	40
Igherm Amellal	150	143	20	20	20	15	20
Zaouiat Tidgheste	248	146	42	23	70	40	35
Taferghouste	134	156	30	23	12	13	28

* including the population and household of the douars Imi'n Tgouflet and Ifred.

Table 16–21: Population of the douars of the Ait Ougrour community between 2004 and 2008

Igherm Amellal, Zaouiat Tidgheste, and Taferghouste are called the douars of Tidgheste, while Tasselmant, Oum Romane, Essour, Agouddim Izerki, and Iznaguene are called the douars of Izerki.

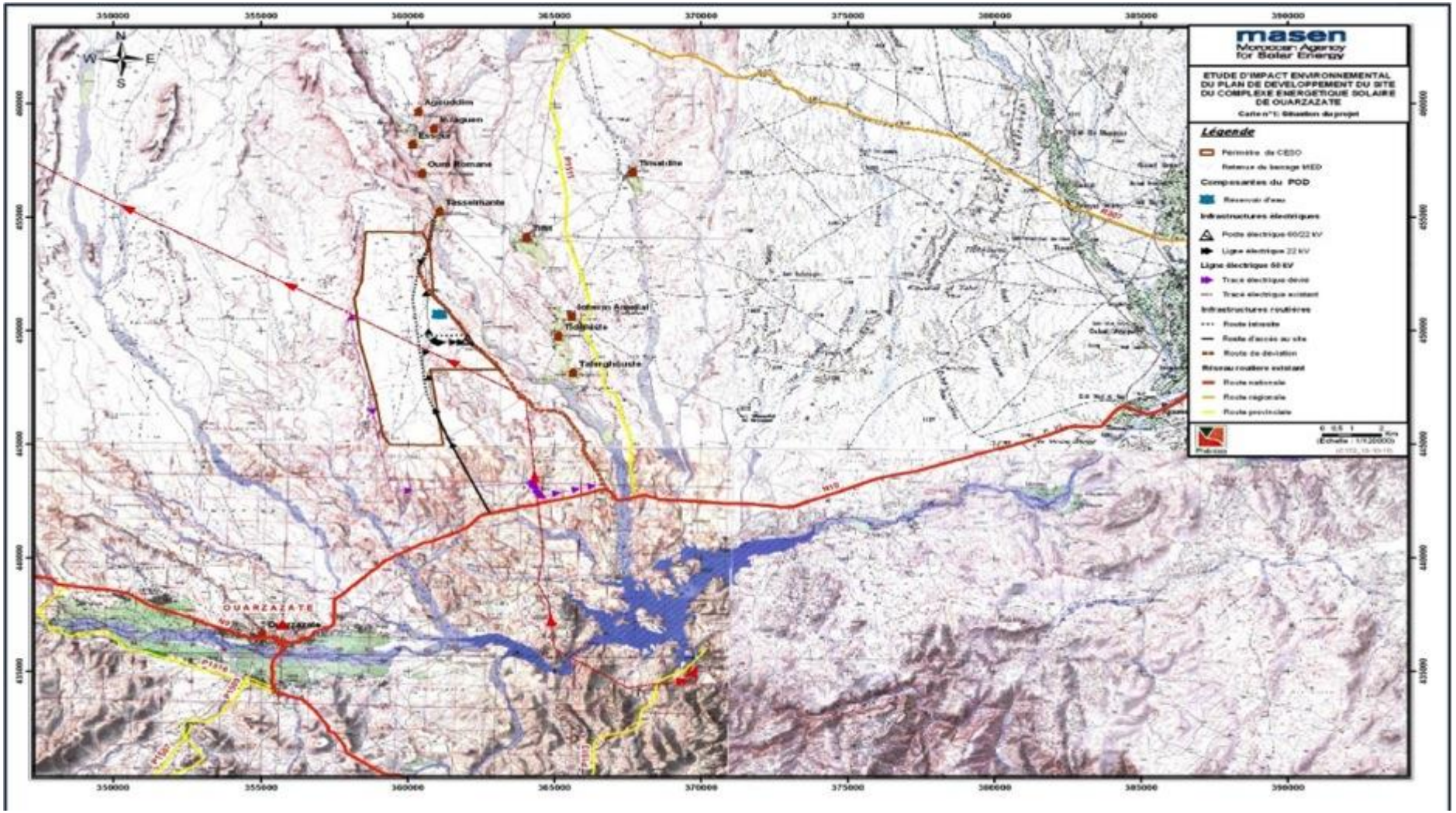


Figure 16-12: Spatial distribution of settlements in the vicinity of the Noor$_0$ solar complex

Source: MASEN, 2012a:2.

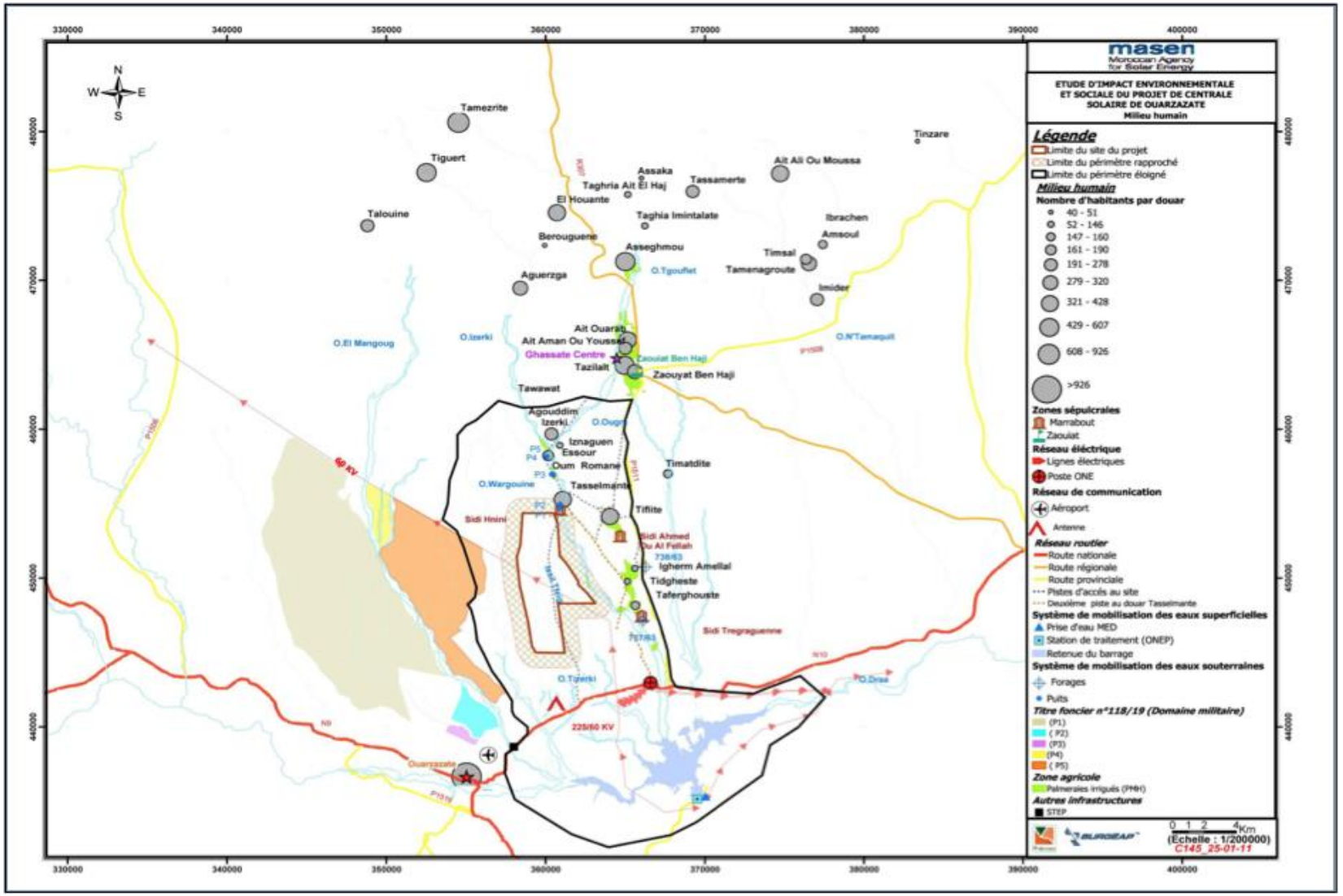


Figure 16-13: Spatial distribution of settlements in the vicinity of the Noor$_0$ solar complex

Source: Burgeap, 2011:26.

The total population of the administrative district of Agdz was 58,936 people living in 6,676 households, with an average household size of 8,828 members as of 1994 (Table 16–22 and Table 16–23). Only 11% of the total population lives in the urban area of the municipality of Agdz. The district's population is skyrocketing, with a 9.09% mean annual growth and a population density of 13.2 inhabitants per km² (Chafik et al., 2003:18).

Municipality	Community	Population (1994)	No. of households	Average household size
Agdz	Agdz	5870	838	7,005
	Afla N'Dra	6906	821	7,582
	Tansifte	11645	1393	836
Caida	Mezguita	7603	818	9,295
	Tamzmoute	9099	931	9,773
Tamzmoute	Afra	8290	977	8,485
	Oulad Yahia	9523	898	10,6
Total		58936	6676	8,828

Table 16–22: Total population, number of households, and household size in the administrative district of Agdz in 1994
Source: Table adjusted according to Chafik et al., 2013:16.

Municipality	Community	Population (1994)	Annual growing rate (%)	Density (inhabitants/km²)
Agdz	Agdz	5870	3.69	76.2
	Afla N'Dra	6906	8.412	25.7
	Tansifte	11645	8.36	6.52
Caida	Mezguita	7603	9.295	24.1
	Tamzmoute	9099	9.773	19
Tamzmoute	Afra	8290	8.485	12.2
	Oulad Yahia	9523	10.6	19.2
Total		58936	9.09	13.2

Table 16–23: Total population, growth rates and population density in the administrative district of Agdz in 1994
Source: Table adjusted according to Chafik et al., 2003:18.

Although many people - especially youth - migrate from the Drâa region to Moroccan cities in search for employment, Graf (2010) describes the region of the middle Drâa Valley as over-populated, with more than eight inhabitants per irrigated hectare in 2009. In comparison, the whole Drâa Valley more than doubled in size from 122,291 people in 1971 to 283,368 in 2004.

Population composition: The population in Morocco is very young; the median age is estimated to be 26.5 years, with higher rates of young people livin in the rural areas (CIA, 2010). Similarly, the population in the Province of Ouarzazate is very young, with more than 43% under 18 and 57.6% under 25. The 25-35 age bracket is the largest (see Table 16–24 and Table 16–25). However, the infantile mortality rate is 20.9/1000 (HCP, 2004).

< 5 years	5-9	10-14	15-19	20-24	25-34	35-44	45-54	55-64	65-74	75-84	> 85
10.8	12.2	13.2	11.7	9.7	14	10.5	7.9	4.7	3.2	1.5	0.7

Table 16–24: Age structure in the Province of Ouarzazate
Source: HCP, 2004.

	Community	Population	<5 years	>85 years	< 18 years	>18 years	>60 years
Urban areas	Skoura AC	2,808	9.1%	0.5%	41.2%	58.8%	6.4%
	Ouarzazate	53,489	10.5%	0.4%	37.6%	62.4%	5.3%
	Taznakht	6,185	10.1%	0.6%	39%	61%	6.9%
Rural areas	Aiz Zineb	9,233	9.4%	0.6%	39.7%	60.3%	9.5%
	Ouisslate	15,339	9.3%	0.7%	40.9%	59.1%	8.3%
	Tidili	14,630	11.9%	0.8%	46.5%	53.5%	8.6%
	Siroua	9,633	11.2%	0.7%	44%	56%	8.8%
	Idelsane	8,140	9.6%	0.5%	36.5%	63.5%	8.8%
	Telouet	14,203	9.9%	0.7%	42.8%	57.2%	9.2%
	Toundoute	11,872	11.6%	1%	46.4%	53.6%	9.1%
	Tarmigt rural	9,703	8.8%	0.6%	36.5%	63.5%	8.5%
	Skoura rural	20,072	10.6%	0.7%	41.6%	58.4%	8.7%
	Imi n'oulaune	19,968	13.2%	0.7%	49.8%	50.2%	7.5%
	Tabount	21,157	11.1%	0.4%	41.2%	58.8%	5.2%
	Khouzama	8,191	11%	0.5%	47.4%	52.6%	8.7%

	Ighrem n'ougdal	14,000	11.1%	0.7%	44.1%	55.9%	8.9%
	Aznaguen	12,040	11.4%	0.7%	44.7%	55.3%	9%
	Amerzgane	7,593	9%	0.9%	40.1%	59.9%	9.4%
	Ghassate	8,815	10.1%	1%	43.4%	56.6%	9.6%

Table 16–25: Population age in the Province of Ouarzazate
Source: HCP, 2004.

The gender distribution of the population in the Province consists of 48% males and 52% females (HCP, 2012, see Table 16–26).

	Community	Population	Male	Female
Urban areas	Skoura AC	2,808	47.2%	52.8%
	Ourzazate	53,489	49.9%	50.1%
	Taznakht	6,185	49.1%	50.9%
Rural areas	Aiz Zineb	9,233	45%	55%
	Ouisslate	15,339	48.4%	51.6%
	Tidili	14,630	45.9%	54.1%
	Siroua	9,633	46.3%	53.7%
	Idelsane	8,140	46.4%	53.6%
	Telouet	14,203	47.6%	52.4%
	Toundoute	11,872	45.6%	54.4%
	Tarmigt rural	9,703	46.8%	53.2%

	Skoura rural	20,072	48%	52%
	Imi n'oulaune	19,968	47.1%	52.9%
	Tabount	21,157	49.9%	50.1%
	Khouzama	8,191	44.9%	55.1%
	Ighrem n'ougdal	14,000	46.9%	53.1%
	Aznaguen	12,040	44.8%	55.2%
	Amerzgane	7,593	47.2%	52.8%
	Ghassate	8,815	45.8%	54.2%

Table 16–26: Gender distribution in the Province of Ouarzazate
Source: HCP, 2012.

The bulk of the population in the Province of Ouarzazate is of Berber ethnicity, with some minorities and migrants from other Provinces and parts of the country (Schlütter, 2006:43).

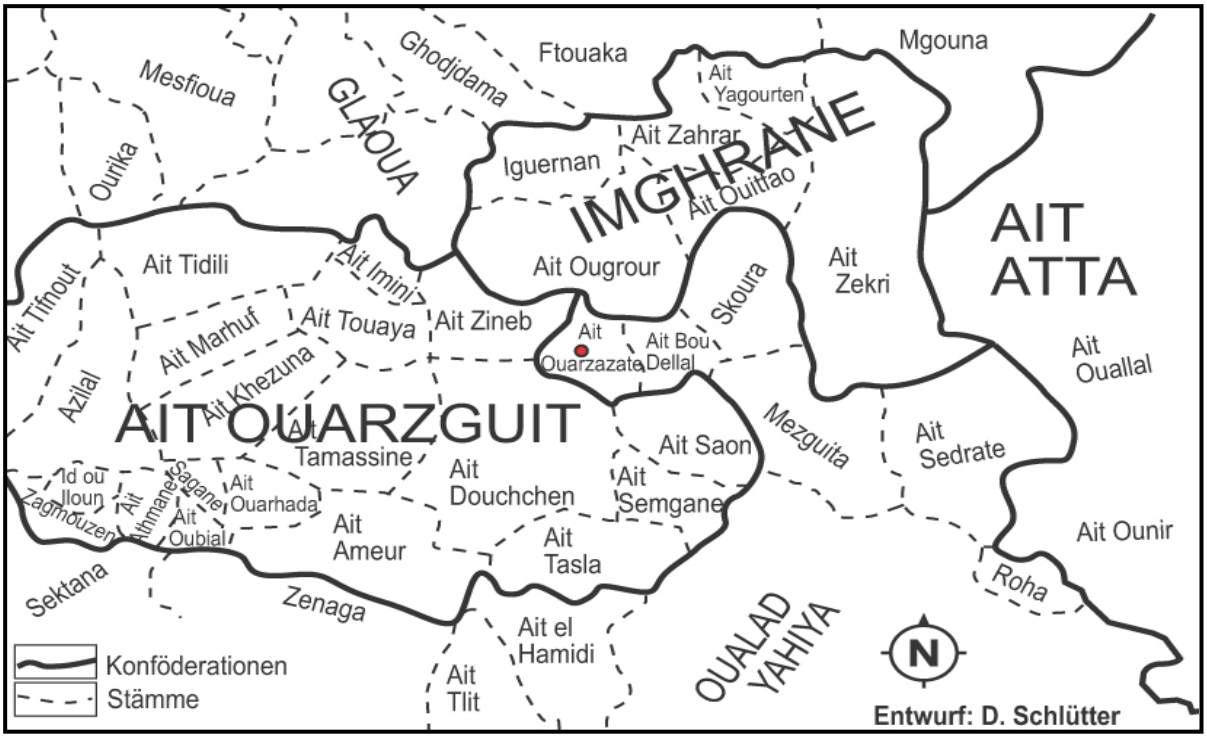


Figure 16-14: Berber tribes in the region of Ouarzazate
Source: Schlütter, 2006:44.

The configuration of the Berber tribes living in the Province of Ouarzazate is illustrated in Figure 16-14. Members of the Ait Ouarzazate Berber tribe are concentrated around the city of Ouarzazate. Near the eastern borders is the territory of the small Ait Bou Dellal Berber tribe, to the west is the land of the Ait Zineb, which is part of the confederation of the Ait Ouarzguit, and in the north the Ait Ougrour are found, which are part of the large Imghrane federation (Schluetter, 2006:44).

Further South in the Drâa Valley, the population is very diverse with three main ethnic groups (Chafik et al. 2003:19):

- *The Draoua.* They are the majority in the Drâa Valley and in most douars. They belong to the Haratines, descendants of slaves from Senegal and Sudan. They were among the first sedentary farmers of the region.
- *Arab groups.* At least seven Arab groups coexist in the Drâa Valley. They arrived as nomads between the 13th and 16th centuries. Today, the majority have become sedentary farmers.
- *Imazighen or Berber groups.* The Ait Atta tribe has been present in the valley for more than 1,000 years, but the second tribe Ait Sederat settled in the region as recently as the 18th century. The Imazighen who arrived as nomads mostly switched to sedentary farming.

The differences among these groups have been a source of conflict in the past and even today. According to Chafik et al. (2003:19) these conflicts mainly concern natural resources and internal power structures.

There are fewer than 200 foreigners living in the Province of Ouarzazate (HCP, 2004, see Table 16–27).

Origin	Number	Percentage
Total	154	100
France	79	51.4
Algeria	5	3.3
Spain	9	5.8
Syria	9	5.8
Tunisia	9	5.8
Other	43	27.9

Table 16–27: Foreign residents in the Province of Ouarzazate
Source: HCP, 2012.

Language: The languages in the Province of Ouarzazate include “tamazight” and “tashelhit,” Berber dialects (Table 16–28).

	Community	Moroccan dialects	Tashlhit	Tamazight	Tarifit	Hsaynia
Urban area	Ouarzazate	90.3%	64.1%	7.1%	0.2%	0.3%
	Skoura AC	99%	21.9%	6.8%	0%	0%
	Taznakht	71.7%	90.1%	3.4%	0.1%	0.1%
Rural area	Ghassate	36.2%	99.5%	0.2%	0%	0%
	Aiz Zineb	54.7%	98.7%	0.2%	0%	0.2%
	Ouisslate	10.1%	99.4%	0%	0%	0%
	Tidili	29.5%	99.6%	0.1%	0%	0.1%
	Siroua	18.5%	99.8%	0%	0%	0%
	Idelsane	92.2%	28.9%	0%	0%	0%
	Telouet	37.2%	99.3%	0.1%	0%	0%
	Toundoute	29.7%	98.5%	0.8%	0%	0%
	Tarmight rural	35.2%	96.7%	1.4%	0%	0%
	Skoura rural	77%	44.6%	0.2%	0%	0%
	Imi n’oulaoune	13.2%	99.7%	0%	0%	0%
	Tabount	81.1%	75.7%	6.8%	0.1%	0.3%
	Khouzama	6.9%	99.6%	0.1%	0%	0%
	Ighrem n’ougdal	39.4%	99.1%	0.1%	0%	0%
	Aznaguen	25.1%	99.5%	0.1%	0%	0%
	Amerzgane	61.5%	98.5%	0%	0%	0.1%

Table 16–28: Spoken languages (5 years and older)
Source: HCP, 2004.

Table 16–29 shows the distribution of the population of the Province of Ouarzazate according to their language skills. From these data, it appears that the illiteracy - defined here as people who only speak Berber or Arabic dialects - is very high. It ranges between 23.9% and 35.9% in the urban Communes while in the rural Communes it reaches up to 72.9%. Furthermore, only a small proportion of the literate population speaks languages other than Arabic and French.

	Community	Only dialects	Only Arabic	Arabic and French	Arabic, French and other	Arabic and other except French	Other	Illiteracy rate for young (15-24)
Urban area	Ouarzazate	23.9%	14.7%	42.7%	18.5%	0.1%	0.2%	9%
	Skoura AC	26.9%	10.5%	42.9%	19.6%	0%	0.1%	9%
	Taznakht	35.9%	18.5%	35.9%	9.5%	0.1%	0.1%	16%
Rural area	Ghassate	57.3%	23.5%	17.4%	1.8%	0%	0%	43%
	Aiz Zineb	43.4%	19.8%	32.3%	4.5%	0%	0.1%	21%
	Ouisslate	50.6%	22.1%	24.4%	2.9%	0%	0%	31%
	Tidili	58.3%	25.3%	15.4%	1%	0%	0%	-
	Siroua	63%	20.8%	14.8%	1.5%	0%	0%	49%
	Idelsane	43.4%	17.1%	34.2%	5.2%	0%	0%	20%
	Telouet	60.6%	21.8%	15.9%	1.7%	0%	0%	47%
	Toundoute	57%	20.9%	20%	2%	0%	0%	45%
	Tarmight rural	44.3%	15.9%	34%	5.7%	0.1%	0.1%	23%
	Skoura rural	49.2%	16.8%	28.9%	5%	0%	0%	31%
	Imi n'oulaoune	71.8%	15.1%	12.1%	1%	0%	0%	65%
	Tabount	33.8%	19.2%	36.9%	9.9%	0.1%	0.1%	14%
	Khouzama	72.9%	21%	5.8%	0.4%	0%	0%	71%
	Ighrem n'ougdal	54.2%	21.7%	22.1%	2%	0%	0.1%	35%
	Aznaguen	64.3%	22%	13%	0.7%	0%	0%	51%
	Amerzgane	42.4%	19.6%	33.1%	4.9%	0%	0%	19%

Table 16–29: Spoken and written languages in the region of Ouarzazate (10 and older)
Source: HCP, 2004.

Human Development

Morocco is a nation of medium human development. The country's Human Development Index (HDI) for 2012 was 0.591, positioning Morocco 130th out of 187 countries (UNDP, 2013:146). The HDI of Arab states is an average of 0.652, situating Morocco below the regional average (UNDP, 2013:147). In the rural areas in particular, the HDI is often well below the Moroccan average. In the urban areas of the Ouarzazate Province, the HDI is above the national average (Diekkrüger et al., 2012:22 and Table 16–30). As 63% of the population in the Province of Ouarzazate lives in rural areas, the area can be characterized as a marginalized zone in terms of human development.

	Community	Inequality index	HDI	Social development index
Urban area	Ouarzazate (M)	38.1	0.76	-
	Taznakht (M)	41.1	0.67	-
	Skoura (AC)	40	0.69	-
Rural area	Khouzama	27.8	0.31	0.45
	Telouet	29.2	0.49	0.61
	Imi N'Oulaoune	28.3	0.42	0.28
	Iznaguen	29.6	0.49	0.53
	Ghassate	30	0.49	0.53
	Toundoute	27.4	0.52	0.68
	Ighrem N'Ougdal	30.8	0.49	0.76
	Siroua	30.3	0.39	0.65
	Tidli	30.8	0.48	0.47
	Ouisselsate	29.2	0.57	0.7
	Skoura Ahl El Oust	35.3	0.58	0.44
	Tabount (AC)	40.1	0.69	-
	Amerzgane	30.4	0.62	0.83
	Idelsane	33.8	0.62	0.83
	Ait Zineb	33.4	0.61	0.72
	Tarmigt	39.3	0.61	0.68

Table 16–30: Human development index
Source: HCP, 2004.

There is a strong national commitment to reduce rural poverty and to overall improve human development in rural areas. The “National Initiative for Human Development (INDH)” is in its initial phase and has improved many socio-economic factors in rural Morocco. Additionally the “Plan Maroc Vert” of 2008, aims to modernize the agricultural sector and to increase farmers’ incomes. Other plans contribute to improving the access to electricity and drinking water in rural areas including the “Plan for drinking water supply (AEP)”, the “Supply program of drinking water for rural populations (PAGER)”, the “National program for rural electrification (PNER),” and the “Global rural electrification program (PERG)”.

Most of the projects targeted the agricultural sector, health services, small business, and artisanal industries in rural and marginalized areas. It implemented irrigation projects in oases in the region of Ouarzazate.

Community infrastructure and services

Community services: The Province of Ouarzazate hosts four women’s centers, two youth houses, one poly-sport centre, one cultural and sports complex, a municipal swimming pool,

a zoo park, an Anatim park, a cultural and congress palace, seven sport centers, and nine libraries (CGEM Souss Massa Drâa, 2010:14).

Housing: Generally, the rural houses in the Provinces are big houses with more than three rooms and a kitchen, with adjacent buildings for agricultural activities, such as a cowshed (see Table 16–31). There seems to be neither an overcapacity of houses nor a lack of housing in the Province.

	Urban		Rural	
Housing type	**Number**	**Percentage in %**	**Number**	**Percentage %**
Villa	458	2.83	69	0.24
Apartment	688	4.26	7	0.02
Traditional Moroccan House	1,980	12.25	463	1.61
Modern Moroccan House	10,386	64.26	2,033	7.08
Township house	193	1.19	498	1.73
Rural house	1,812	11.21	25,080	87.31
Others	646	4.00	576	2.01
Total	16,163	100	28,726	100

Table 16–31: Living and housing situation in the Province of Ouarzazate
Source: HCP, 2004.

Sanitation: Most of the urban centers in the Province of Ouarzazate have access to sanitation services (Province of Ouarzazate, 2009:15). In the rural areas, residents manage their sanitation services by themselves.

Roads: The Province of Ouarzazate has a total of 1,620 km of roads, of which 26.4% are national roads, 19.3% are regional roads, and 54.3% are provincial (Province de Ouarzazate, 2009: 10).

Transport: The Province of Ouarzazate has a small international airport with a total capacity of 260,000 passengers per year. There are currently 11 international companies serving this airport, most with charter flights.

The city of Ouarzazate has a bus station. Bus lines serve the major cities in Morocco, mainly Marrakech, Casablanca, Rabat, and Agadir. Local bus companies provide transportation within the urban perimeter of Ouarzazate.

Water demand, access and rights

Water demand: In the Province of Ouarzazate villages tourists, and the agricultural sector demand the most water. The city of Ouarzazate and its Province requires 15 million m³/y for drinking water and 245 million m³/y for agricultural usage (Diekkrüger et al., 2012:23, Figure 16-15).

Villages consume around 10% of the water used in the Drâa Valley. According to ONEP (2003), the consumption of the Province of Ouarzazate was 2.5 million m^3 of water in 2003. It was expected that the consumption would rise to 14.8 million m^3 by 2020; however this figure

has already been exceeded. This includes drinking water for households and also smaller industries and services.

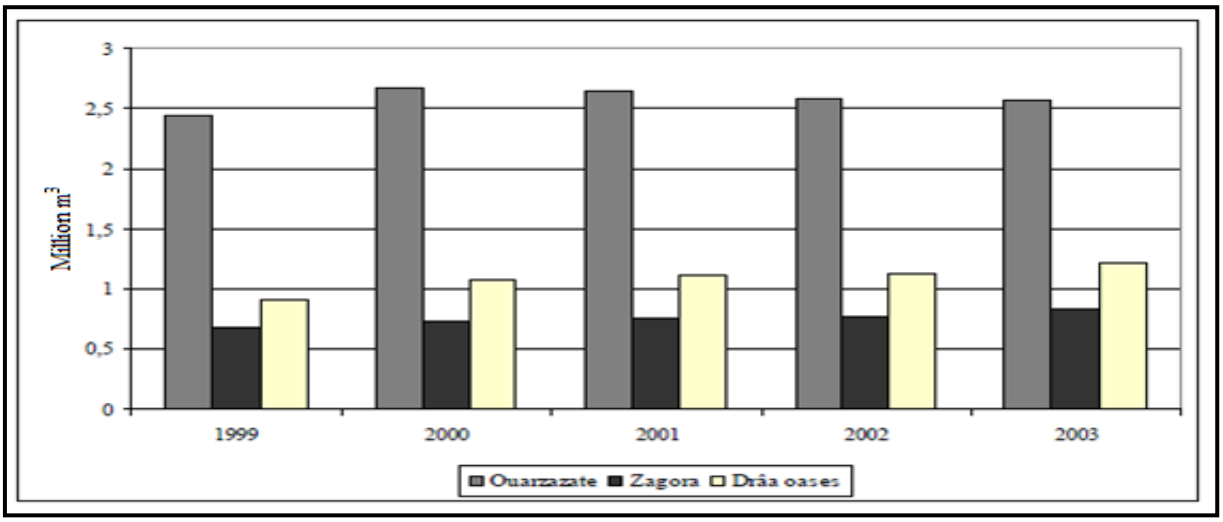


Figure 16-15: Average water provided to the municipalities of Ouarzazate and Zagora
Source: Heidecke, 2009:22.

The total amount of water used by the tourism sector hardly exceeds 0.1 million m^3/year. No robust data could be found for the amount of water used by industry, but the industry sector is a minor consumer (Heidecke, 2009:25). The agricultural sector is by far the largest consumer of water due to irrigation needs. Approximately 245 million m³ of water is needed annually for agriculture so that the ideal seven releases (35 million m³ each) can be provided to the oases of the Middle Drâa Valley (Busche, 2008:47).[70]

Water access: Today access to water in the city of Ouarzazate is socially and geographically unevenly distributed (Schlütter, 2006:172) and varies significantly in quality. Individual grid connection is provided only in the modern parts of the city and is chiefly concentrated along the main roads. The lower socioeconomic neighborhoods often have no direct access to the water and sanitation systems in Ouarzazate (Schlütter, 2006:147). Many of the households in the city's periphery also lack direct access. The groundwater resources are limited to the groundwater tables of Tikert and Ouarzazate, which were estimated to be 12.6 million m^3/year and 4 million m^3/year, respectively (ORMVAO, 2013:9).

The total volume of water used in the Drâa region, which includes also the Province of Zagora, is estimated to be more than 620 million m^3 divided into:

- 510 million m^3 of surface water (used entirely for irrigation)
- 110 million m^3 of groundwater (86.5% for irrigation and 13.5% for drinking and industrial water).

The volume provided for drinking and industrial activities is 15 million m^3, which covers the actual needs.

Water rights: Water rights are entirely independent of the land in the sense that the amount of water allocated to each parcel is in no way proportional to its surface. Water rights can be

[70] The water from the reservoir is not released continuously but in larger quantities called lâchers, although the period of water release and the quantity released varies.

bought or sold, often with the land that the water irrigates, but sometimes independently.

Land rights

Generally, land use relates to one of the following categories: land of Jmaa, land of Habouss, Melk land, or Domain land:

- Land of *Jmaa* is land that belongs to an ethnic community (collective land). In general, it is uncultivable land. Lands with this status are disappearing as communities sell them to equip their villages or to pay taxes. The collective land of Ait Ougrour is an example of such land.
- Land of *Habouss* is land with religious foundations (Zaouia, Mosque, or Marabout families). The census, carried out by the administration of Habous in 1975, estimated that Zaouia Naciria (which is the most powerful, influential, and richest foundation in the region) owned more than 1,200 ha of irrigated land in the Drâa Valley (Oudada, 2000:35). The heritage of this Zaouia extends beyond the Drâa Valley to the mountains of the High and Middle Atlas, to the Souss region and the Atlantic plains.
- *Melk* land is private property linked to the early sedentary agriculture in the Commune of Ghassate region, with a traditional irrigation system.
- Domain land, also called domain of state, is the land that belongs to the state.

Land parcels in the region are fragmented and dispersed. Each parcel has a name and precise limits. These parcels are demarcated by walls built of soil or by fences made of branches (called *Zerb*). These limits indicate land ownership and restrict land access.

The land use in the region is regulated by one of two modes:

- Direct use: In this case, the family members help the father with agricultural work, except the eldest who works at home and brings in the crops. The farmer employs agricultural workers. Farmers also help one another with agricultural work.
- Indirect use: In this case, farmers operate their parcels and other parcels that belong to families who have left the village. The farmer gives a certain proportion of the harvest to the landowner as compensation.
- *Khamassat* (sharecropping): Here the owner provides the land, water, seed, and fertilizer, while the Khamass provides the workforce. The Khamass must perform all agricultural work (fertilization of soil and trees, irrigation, rehabilitation of irrigation system, etc.) and sometimes domestic services. Traditionally, he receives one fifth of the harvest as compensation. Currently, Khamass demand one quarter, one third, or even one half of the harvest because this mode of operation has much declined in recent years, as young people prefer to emigrate or seek other employment.

In summary, entitlements and endowments for land and water are unevenly distributed between rural and urban people, between landowners and landless, and within communities in the Province of Ouarzazate. These inequalities lead to social tensions (Schlütter, 2006).

Electricity

The Province of Ouarzazate is connected to the national power transmission grid via two high voltage lines: the first connecting the Province to the hydropower station at the dam My Youssef in the region of Marrakech, and the second connecting the Province of Ouarzazate to the Province of Errachidia (Province of Ouarzazate, 2009:30). In addition, electricity is generated in the Province of Ouarzazate at the hydropower station at the Mansour Eddahbi dam, with a capacity of 10 MW. Private mining and tourism companies use fuel-powered generators (Province of Ouarzazate, 2009:30-31).

	Number of clients (March 2013)				Electricity sold in 2012	
Service agency	Middle Voltage	Low Voltage Classic	Low Voltage NOUR	Total clients Low Voltage	Quantity (in MWh)	Price (in MAD 1,000)
Ouarzazate	154	32,748	6,934	39,682	87,278	80,999
Skoura	29	6,817	4,062	10,879	13,157	12,070
Taznakht	40	3,157	7,662	10,819	40,675	33,123
Total	223	42,722	18,658	61,380	141,110	126,192

Table 16–32: Number of clients and energy sold in the Province of Ouarzazate
Source: ONEE – Electricity Branch, 2013.

The electricity sector in the Province of Ouarzazate is managed by the Provincial Directorate of ONEE – Electricity Branch. Almost all (96%) of the households in the Province have access to electricity via the electricity grid or via solar home systems (3,521 households) (Province of Ouarzazate, 2009:16-17). The GoM planned to reach 100% by 2015 according to its Millennium Development Goal commitments. Table 16-32 shows the quantity and the price of the electricity sold in the Province of Ouarzazate.

Prices of electricity are proportional to the volume of consumption. The prices for domestic use and private lightning in the urban areas are:

- MAD 0.9010 per kWh if the monthly consumption is less or equal 100 kWh;
- MAD 0.9689 per kWh if the monthly consumption is between 101 and 200 kWh;
- MAD 1.0541 per kWh if the monthly consumption is between 201 and 500 kWh;
- MAD 1.4407 per kWh if the monthly consumption is more than 500 kWh.

The “Nour” system is based on a prepayment meter system in which the customer purchases electricity through recharge cards. The prices for domestic use in the rural areas are:

- MAD 1.0700 per kWh if the power is less or equal 1 kW;
- MAD 1.1021 per kWh if the power is between 1 and 2kW;
- MAD 1.1449 per kWh if the power is between 2 and 3kW;
- MAD 1.3910 per kWh if the power is more than 3 kW.

Prices are slightly higher for public illumination and also for industrial, agricultural, and administrative use.

Health (mortality, diseases, health facilities)

The following health infrastructures exist in the Province of Ouarzazate (Ministère de la Santé, 2007; Province of Ouarzazate, 2009:86):

- There is one doctor for every 5,750 persons;
- The Province of Ouarzazate has three urban health facilities equipped with beds, five urban health facilities without beds, nine rural health facilities with modules, 22 rural health facilities, and 26 rural pharmacies;
- In addition, Ouarzazate has two generic hospitals equipped with 366 beds, and one specialized hospital equipped with 82 beds;
- The Province has also 22 private generalist medicine offices, and nine dentist offices, two private specialist medicine offices, 18 pharmacies, and one laboratory for medical analysis.

These public facilities are inadequate in quality and quantity; moreover, they suffer from neglect and mismanagement. Private health care is lacking, especially specialists. Health facilities are insufficient to satisfy the needs of the population in the Province and neighboring Provinces, which have even worse medical facilities. For the diseases requiring specialized care, patients who have the financial resources travel to Marrakech. Morocco recently introduced state health insurance for the lowest income bracket (RAMEED). This policy is considered to be a major improvement in the Moroccan health care system and was praised by international organizations.

Table 16–33 shows the average values of the number of births, the birth rate (which is the total number of births per 1,000 people annually) and the child mortality rate (the death of infants and children under the age of five per 1,000 people annually).

	Community	Number of children per woman	Birth rate	Child mortality per 1000
Urban area	Ouarzazate	2.6	23.2	20.9
	Taznakht	2.7	22.8	49.6
	Skoura AC	1.7	14.6	24.4
Rural area	Aiz Zineb	2.6	23.1	42.3
	Ouisslate	2.7	20.1	45.3
	Tidili	3.8	28	83.1
	Siroua	3.8	27.9	152.4
	Idelsane	2.4	21.6	34.1
	Telouet	3.2	22.4	84.9
	Toundoute	3.3	24.6	58.2
	Tarmigt rural	2.2	20	51.5
	Skoura rural	3	23.7	23.2
	Imi n'pilaoune	4.1	28.6	57.8
	Tabount	2.7	23.2	16.3
	Khouzama	3.6	25.6	171.4
	Ighrem n'ougdal	3.3	25.6	97.8
	Aznaguen	3.1	24.7	64
	Amerzgane	2.6	20.8	31.6
	Ghassate	2.9	20.6	71.4

Table 16–33: Number of children per woman, birth rate and child mortality in the Province of Ouarzazate
Source: HCP, 2004.

Education

Education is the largest public expenditure in Morocco. It is free of charge at all levels, including university. The first nine years of primary education are compulsory. The Moroccan educational system has undergone many changes, which reduced the quality of education and led to the development of a private educational system serving mostly elites and the middle class who are able to pay for it.

The educational system in the Province of Ouarzazate was neglected during the 1970s and 1980s. It was only in the 1990s that the Moroccan government made significant efforts to build rural schools and assign teachers to work there. Today, the city of Ouarzazate has one satellite university, which belongs to Ibn Zohr University of Agadir. The campus employs 71 permanent staff and has 2,300 students enrolled in the following disciplines (HCP, 2012):

- Technical use of renewable energies;
- Informatics and enterprise management;
- Informatics systems and software;
- Mathematics and informatics sciences;
- English studies, communication and pedagogy;
- Applied foreign languages;
- Tourism, management and communication;
- Cinematographic and audiovisual techniques;

Furthermore, the city of Ouarzazate has a school for medical assistance, a vocational training centre for construction (TVET), an institute for tourism technology and hotels, a school for informatics, a school for informatics science and management, and a school for handicrafts (HCP, 2012).

During the 2011-2012 academic year, 39,741 students were enrolled in primary school in the Province of Ouarzazate,12,623 in middle school, and 8,067 in high school (HCP, 2011:28).

The country's illiteracy rate points to disparities in education, both in terms of gender and geography. Recent public statements estimated illiteracy rates at under 30%. Morocco aimed to eradicate illiteracy by 2015. The illiteracy rate in the province of Ouarzazate is higher compared to the national level, at 67.77% overall and 84.65% among women (Semkaski, 2013). Almost 70% of the population in the middle Drâa Valley is illiterate: 47% of men and almost 89% of women. In rural areas 91.7% of women are illiterate while only 68.9% of women in urban areas are illiterate (Chafik et al., 2003, Table 16–34).

Age groups	Male	Female	Total
10- 14 yrs.	22.5	72.6	46.6
15- 24 yrs.	32.4	83.5	59.3
25- 34 yrs.	50.7	94.5	76.6
35- 49 yrs.	66.6	98	84
50 yrs +	83.6	99.4	91.9

Table 16–34: Illiteracy rate in the Drâa Valley
Source: Chafik et al., 2003.

In the Province of Zagora, only 25.7% of girls are enrolled in school, compared to 72.5% of boys. This is due to the long distances of schools from villages and the lack of financial resources to send girls to school, as girls are needed for labor at home (e.g., walking to gather water and wood, housework, child care, agricultural labor, food production) (Chafik et al., 2003:22).

Dietary diversity

Research on nutrition in Ouarzazate is sparse but consistent. The general trend points to the area of residence (urban vs. rural) and socioeconomic status (high vs. low income) as major determinants of dietary diversity, with urban and high-income households reporting greater

dietary diversity than rural and low income ones. However, the correlation between income and dietary diversity may apply only in urban areas; no significant differences in dietary diversity have been found between low- and high-income households in rural areas. Research using longitudinal data corroborated these findings (Benjelloun, 2002). Urbanization and social mobility have been associated with systematic changes in dietary diversity, as well nutrition-related pathology.

In their large sample study on food diversity and Ouarzazate high school students, Anzid et al. (2009) found that from a pool of 183 food items from 10 categories, 108 items were consumed by the students in Ouarzazate, compared to 124 by students in Marrakech and 92 by students in Skoura. The most frequently consumed food items were from the vegetables category, followed by items from the fresh and dried fruits category. Fish was the least frequently consumed food category in Ouarzazate.

Nutritional transition and nutrition-related pathology

Ouarzazate is thought to be urbanizing and many of its households experiencing social mobility. These social and economic changes are recent but the dietary characteristics of the area have already started to change as a consequence. However, to our knowledge, no studies that systematically address the dynamics of the nutritional transition in Ouarzazate have been published. While reports on nutritional transition at the national level exist (Benjelloun, 2002), they should not be generalized to Ouarzazate. Benjelloun (2002) found significant change in dietary habits in Morocco between 1970 and 1999. She reported that the major change consisted of an increase in the consumption of animal products, especially poultry. The author reported an increase from an average of 2,410 kcal consumed in 1968/70 to 3,031 kcal in 1997/99.

These transitions vary with geography and socioeconomic status and are not always positive. While the caloric and macronutritional profiles (proteins, fats, carbohydrates, and fiber) of young Ouarzazis are in accordance with the World Health Organization (WHO) standards (López et al. 2012), the micronutritional profiles are inadequate. A study on Ouarzazti adolescents (Anzid et al., 2013:in press), found that the most inadequate nutrients were pantothenic acid, biotin, thiamine, iodine, and calcium. Sodium was in excess. Generally boys consumed more empty calories than girls, who had healthier diets. Height and weight in young Ouarzazis were below WHO recommendations. Boys had a higher incidence than girls of being severely underweight (7.5% vs. 2.9%) or overweight (9.4% vs. 3.5%). Girls had a slightly higher rate of obesity (1.2% vs. 0.9%).

Hunger and Food Security

Given its scarce water resources, poor soil quality, and very limited material means of production, Ouarzazate is far from being food secure. Ouarzazate gets most of its food supply from Zagora (164 km to the SE), Marrakech (204 km to the NW), Agadir (380 km to the E), and to a lesser extent Beni Mellal (400 km to the N). On a weekly basis, they supply Ouarzazate with 50 to 60 six-wheeler trucks and pickup trucks of food. In the winter, transport between Marrakech and Ouarzazate is occasionally disrupted because of the snow in the Tichka region, on the road between Marrakech and Ouarzazate.

The Sunday market in Ouarzazate is the largest in the Province, and many villagers make the trip to the market weekly. This raises the cost of food in terms of transportation and time.

Whether the inhabitants of the area can afford to feed themselves and their families adequately is a difficult question. There are clear discrepancies in measuring purchasing power and the studies conducted so far suffer from sampling bias, relying mainly on data from secondary school students. Such a sampling strategy may exclude participants from the poorest and most remote villages not enrolled in secondary school thereby excluding the groups most vulnerable to food insecurity. In summary, food security may be an issue for a significant segment of the Province's population due to the distance travelled for food, its micronutrient inadequacies, and its cost.

Social vulnerability

The Province of Ouarzazate is characterized by high social vulnerability. This vulnerability is mainly caused by the marginalization of rural areas, social disparities, gender inequalities, and high levels of out-migration.

Marginalization of rural areas

Public investments in infrastructure have traditionally supported the urban and touristic development of Ouarzazate. Rural areas have been excluded and, in some cases, people have been forced to resettle as land is purchased for urban growth (Schlütter, 2006).

In a scenario model addressing the environmental and socio-economic aspects of the Drâa Valley, Diekkrüger et al. (2012) conclude that the marginalization in the area could increase up to 27% by 2050 and endanger the livelihoods of nomads. Here marginalization is defined by low income levels, high energy costs, and high soil erosion rates (Diekkrüger et al., 2012:22). Since poorer segments of the population have less ability to adapt and cope, steps taken now to improve social inequalities could build their future resilience.

Migration

One of the reasons for the relatively low population growth is migration, which is a common phenomenon in the southern Provinces of Morocco. Already, the region of Ouarzazate suffers from high emigration rates to large cities such as Casablanca, Marrakech, and Rabat, and emigration to foreign countries, especially France. Population growth is expected to decline further due to longer childbirth intervals, a higher marriage age as well as increasing environmental pressure and lack of economic opportunities (Penitsch, n. y.).

While emigration has had a negative impact on population growth in the Province, it has also contributed substantially to its socio-economic development through remittances from family members who have emigrated, which have been spent on community facilities and services. The remittances are estimated to be around 60% of the monetary income of households (Rademacher, 2008). Storm (2009) conducted a survey finding that 67% of the farmers in the oasis Ternata receive additional income, half of which is from remittances provided by sons who emigrated (Heidecke, 2009:24).

Illnesses/diseases

In the 1950s, most common epidemics, including typhus, smallpox, and the plague were either totally or nearly eradicated (Reinhards et al., 1968). According to the director of the health delegation of Ouarzazate (Almaouja, 2013), the fight is ongoing against six epidemics: polio, typhus, diphtheria, cholera, tetanus, and tuberculosis. In a report by the Ministry of Health (2012), Ouarzazate, and some neighboring areas like Zagora and Tinghir, showed

comparatively high levels of diarrhea-related illnesses. In 2011 alone, 4,594 cases of dehydration “A” were registered for children under the age of five in Ouarzazate, of which as many as 4,027 (87.66%) were registered in rural areas. In the same year, 31 cases of dehydration “B”, 13 cases of dysentery, and 5 cases of persistent diarrhea were registered, all of them in rural areas. There were 153 cases of tuberculosis, which has been targeted by a national immunization program. Additionally, Ouarzazate has seen 295 cases of Leishmaniasis, a parasitic infection from the sand fly bite. This is the fifth largest outbreak of the disease, preceded by Zagora, Tinghir, Errachidia, and Azilal. The Ouarzazate-Zagora-Tata triangle also has seen cases of trachoma, an infectious eye disease that may lead to blindness if left untreated (Ministry of Health, 2013)

Elites

The Moroccan society is characterized by high ethnic and social heterogeneity. Powerful elites are traditionally the core decision-makers in the country. Most politicians own large farms or companies that work with public administration, and they sometimes have a monopoly over public projects. This affects many aspects of the livelihood of the Moroccan people. As a result, Schlütter (2006) argues that the distribution of water and land entitlements in the Province of Ouarzazate is mainly based on the interests of influential elites.

Gender inequity

As discussed above, Moroccan society is characterized by social and economic inequality between men and women, particularly in rural areas. Women are frequently unable to exercise human rights, such as the right to education, employment, property ownership, and a life free of violence and coercion. Until recently, women were largely excluded from political decision-making processes (Schlütter, 2006). Moroccan women’s rights legislation is among the most progressive in Africa and the Middle East; however, these laws are not always enforced nor are they always followed due to cultural norms.

Social divide

Morocco has high inequalities in income and social status. Many of the Francophone elite enjoy a high quality of life. In contrast, the poorest people struggle to survive and thrive, and many young people attempt to emigrate.

Vulnerable groups

Vulnerability to climate change can be correlated with social inequalities in the Province of Ouarzazate. Vulnerable groups include the economically and socially marginalized who do not have adequate capacities to cope with and adapt to changing climate conditions, especially since their livelihoods depend on pastoralism and agriculture. The effects of climate change could exacerbate social divides in the Province of Ouarzazate, increasing the vulnerability of marginalized groups.

Civil conflicts

Increasing competition over water-land endowments and entitlements, plus discontent over the compensation for resettlement has led to numerous demonstrations and conflicts between the local administration and citizens (Schlütter, 2006). Concern has been raised regarding the implications of a lack of food and water scarcity on social unrest in North Africa (Scheffran and Battaglini, 2011:27-39). In the past few decades, numerous insurrections

have been reported due to food insecurity and droughts that exacerbate existing social and economic problems. In early 2008, food riots occurred in Morocco after a year of reduced food production that resulted from prolonged drought. Therefore, the potential for social tensions and conflicts might increase due to diminishing water resources and fertile land between the Upper Drâa and the Middle Drâa and competing water usages (water for electricity generation, irrigation, and domestic consumption) (Busche, 2012:58).

Crime and safety

Anecdotally, many Moroccans view Ouarzazate as safe. People say it is the only city in Morocco where people leave their doors unlocked during the day. If a car is stolen, it is likely to make the news and be discussed in cafés for quite some time. Actual crime statistics are lacking. The data that are available are highly aggregated and difficult to analyze and interpret. A UN report on drugs and crime in Morocco (UNODC, 2003) claims that in 1999 alone, an average of 2,978 individuals (for every 100,000 inhabitants) had an encounter with the police - 91 for theft, 92 for drug crimes, and 289 for assault. There are no statistics specifically for Ouarzazate. According to the Ministry of Justice, the tribunal in Ouarzazate processed 12,683 cases in 2011, of which 8,233 were civil and 4,450 were misdemeanors.

Socio-economic impacts of the Mansour Eddahbi reservoir development

Under King Hassan II's "Grande Hydraulique" policy, three major dam projects were constructed in Morocco between 1970 and 1973. One was the Mansour Eddahbi dam in Ouarzazate, which was constructed to improve regional development (Popp, 1983:38). The construction of Mansour Eddahbi divided the catchment area of the Drâa River to provide water to new beneficiaries. Despite having some positive effects, it did not result in integrated sustainable development for the region (Ait Hamza, 2002:139). While regional urban centers like Ouarzazate received public investment in infrastructure for urban and touristic development (Pérennès, 1992:34), Schlütter (2006:85) asserts that the dam had negative social consequences for the residents living in adjacent communities. About 1,340 families that lived next to the rivers Oued Dadès and Oued Ouarzazate in 1971 (Riser, 1973:176) were displaced from their homes. Government resettlement and compensation measures were poorly received and many of the displaced emigrated outside of the Ouarzazate region. According to Riser (1973) the displaced viewed the governmental compensation as unjust, the compensation areas were not profitable for agriculture, and public housing was rejected. An informal property market grew around certain villages. Hence, only the wealthy and landowners benefited from the dam's construction. Social tensions increased, as well as the inequalities between landowners and landless (Akiouh, 1994:45).

16.2.4 Culture

Traditional customs and habits

The customs and institutions based on tribal and ethnic origins in the Drâa Valley are reflected in the region's social structure. Most popular decisions, such as choosing elected representatives, are made on this basis. During droughts and other times of stress, these social institutions result in discrimination against marginalized groups (Schlütter, 2006:240).

Cultural and archaeological heritage

The Province of Ouarzazate has a very rich cultural heritage, including Kasbahs and old palaces dating back to the 17th and 18th centuries. The Kasbah of Taourirte in Ouarzazate, for example, is a UNESCO world heritage site (Almaouja, 2013). Tourists cannot access all of these sites because some are remote.

16.2.5 Economy

The major economic activities in the Province of Ouarzazate include agriculture; tourism; small handicrafts; and other small industrial activities, such as dairy production and the processing of date palm fruits. The region is also known for its mining industry (Heidecke, 2009:19). Table 16–35 shows the employment distribution by sector in each of the Communes of the Province of Ouarzazate, as well as unemployment rates.

Community	Active population	Employment by sector (in % of the active population)										
		Agriculture	Mine	Industry	Water/ Energy	B.T.P	Commerce	Transport and NTIC	Service	Admin-istration	Expatriated	Unem-ployment
Ghassate	2219	48.7	0.1	8	0.3	27	4.2	3.4	3.2	4.8	0.3	10.41
Ouarzazate	17908	4.1	0.3	8.2	0.9	11.7	12	5.4	16.4	39.1	1.8	16.85
Taznakht	2371	5.9	9.7	40.3	0.2	7.8	13.8	4.2	6	11.8	0.3	12.86
Aiz Zineb	3059	33.4	0.5	13.8	0.4	25.2	7.6	4.8	6.3	7.1	0.9	13.96
Ouisslate	6270	24.5	5.2	41.3	0.1	14.9	5.9	1.9	2.3	3.1	0.9	6.00
Tidili	4634	57.6	0.7	5	1.3	20.6	5.1	2.5	3	4	0.3	4.25
Siroua	4364	26.7	0.3	52.6	0	11.2	3.2	1.2	1.7	2.7	0.3	3.80
Idelsane	3440	60.9	0.2	3.8	0	21.1	5.4	1.6	2.1	4.6	0.4	9.42
Telouet	5822	64.5	0.3	5.7	0.2	16	3	3.2	2.8	3.9	0.3	5.19
Toundoute	3867	61.8	0.3	4.4	0	18.3	3.7	2.1	4.6	4.3	0.4	3.57
Tarmigt Rural	3044	34	0.4	6.8	0.6	32	5.3	3.2	6.5	9.9	1.3	7.23
Skoura Rural	5088	43	0.2	5.9	0.1	32.1	6.7	1.8	4	5.8	0.3	12.32
Imi N'oulaoune	5072	58.7	0	1.5	0.1	32.2	1.9	1.6	0.4	3.4	0.3	2.43
Tabount	5697	3.8	0.7	10.6	1	25.7	14.8	6.1	8.6	27.5	1.1	17.73
Khouzama	3939	28.1	0	56.9	0	8.1	1.9	0.5	1.4	2.9	0.3	1.60
Ighrem N'ougdal	4486	43	0.9	10.3	7	16.8	6.3	1.2	2.2	6.3	5.8	14.16
Aznaguen	4644	32.6	0.8	37.2	0	16.2	3.2	1.5	3.5	3.2	1.7	8.85
Amerzgane	2277	24.3	9.5	19.9	0.1	20.5	7.5	3.9	4.9	8.9	0.6	17.61
Skoura AC	681	7.1	0	8.2	0.9	10.9	19.9	3.2	9.1	40.7	0	17.47

Table 16–35: Employment by sectors
Source: HCP, 2004.

Agriculture

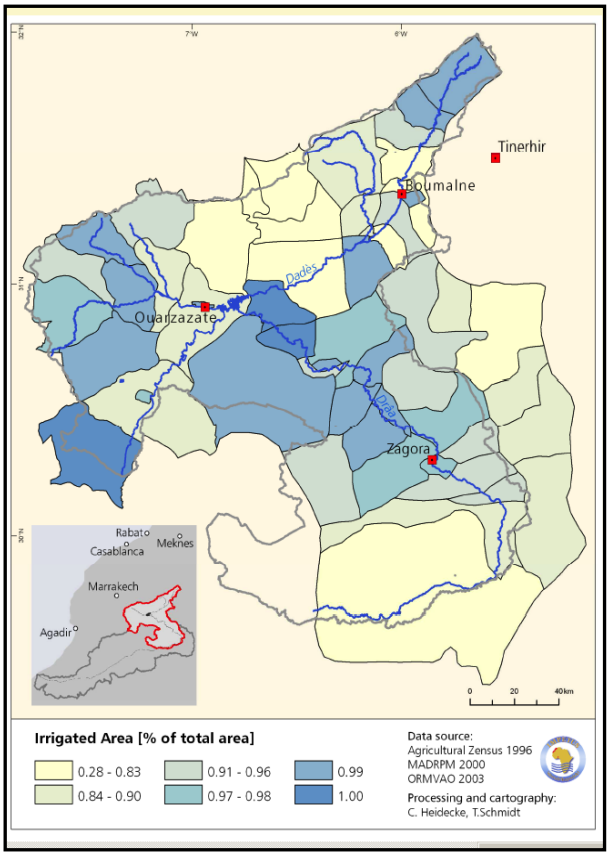


Figure 16-16: Irrigated area in the Province of Ouarzazate
Source: Schulz and Kirsch, n.d.

Agriculture in Morocco comprises 16.7% of GDP (Ammor, 2012:2). Sixteen percent of the arable land is irrigated (World Bank, 2010). Since 61% of the population lives in rural areas, agriculture - mainly farming and pastoral livestock husbandry - is the dominant sector in the Province, making important contributions to household income and food security. Table 16-35 illustrates that 31.68% of the active population in the Province of Ouarzazate is employed in agriculture, which is the main source of household income.

In order to cope with variable and low precipitation levels, a mixed system of agro-pastoralism[71], combining irrigation agriculture in river oases with transhumant livestock grazing (based on seasonal movement) on natural rangelands is used. Outside the oases, pastoralism is the only agricultural activity. Additionally, animal husbandry offers lifesaving capital for families (Freier, 2012:18). Even so, the arid climate and need for irrigation makes agriculture difficult (see Figure 16-16).

Most farming is for family subsistence purposes. The most common crops include: wheat, barley, alfalfa, and corn as well as various fruit and vegetables grown in the oases and along the rivers (see Table 16–36). The area dedicated to cash crops is very limited. On a small scale, some farmers cultivate saffron for a total area of 85 ha. The number of fruit trees planted in the Province is estimated to be 1,748,608 trees, of which 34.48% are olive trees,

[71] Agro-pastoralism is defined as the diversification of agricultural activities. By relying on husbandry and crop production, with diversification of animals and crops, losses obtained in one field of activity can be balanced out or mitigated by another field of activity (hedging). Transhumant husbandry can mitigate drought impacts by:

- carrying extra animals that can be sold during a drought, either for food or cash;
- maintaining reciprocal grazing arrangements with more distant communities in drought years, e. g., by truck transports of livestock;
- maintaining fodder reserves or purchasing supplementary fodder.

The crop producing sector mitigates drought impacts by (Heidecke, 2009;):

- stockpiling grain and fodder from good years;
- reducing cultivated land;
- increasing groundwater irrigation;
- using fertilizers.

26.57% are almond, 15.63% are apple tree, 12.89% are palm, 1.38% are apricot, and 9.05% are other (ORMVAO, 2013:6).

Crops	Cultivated area in ha	Annual production in T
Durum	550	1,337
Wheat	7,000	16,129
Barley	4,550	8,870
Corn	1,675	6,180
Alfalfa	2,760	199,525
Vegetables	1,417	2,560

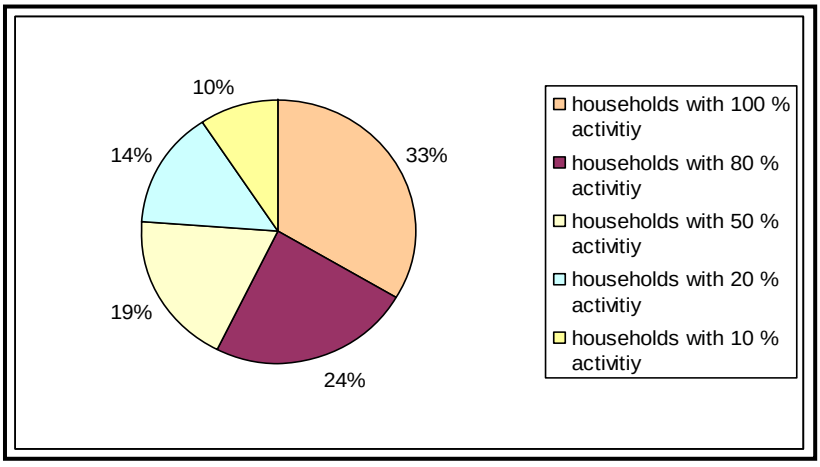
Table 16–36: Main crops, production, and cultivated area
Source: ORMVA, 2013:6.

The most common livestock are sheep, goats, and cattle for meat production (see Tabel 16-37). While transhumant husbandry is the most common, sedentary flocks are increasing (Freier, 2012:18).

	Number of Heads
Cattle	**20,860**
Sheep	**263,200 (43000 D'man)**
Goats	**180,000**
Camels	**60**
Horses	**9,230**
Honey production	**5,820 honey-units**

Table 16–37: Livestock data
Source: ORMVA, 2013:7.

Agricultural trends are similar in the Drâa Valley. According to Chafik et al. (2003:20) agriculture remains the principal economic sector in the district of Agdz. But in many cases agriculture is just one of multiple income sources and not the most important one.



The main cash crop of the Drâa Valley is dates from the date palm oases, which are co-cultivated with grain for self-sufficiency, fruit trees, and vegetables (Chafik et al., 2003:20). Water scarcity threatens date palms, which are then vulnerable to fungal diseases. Therefore, date production is very irregular and inefficient. Additionally, livestock breeding of cattle, sheep (D'Man), goats, and camels can be found both on a sedentary and nomadic basis (Chafik et al., 2003:20).

Figure 16-17: Economic Activities of households in Agriculture
Source: Province de Zagora, 2004.

Industry (growth, employment, income, revenues, market, practices)

Due to regional isolation, the industrial sector of the Province of Ouarzazate is very small and does not contribute significant added value to the economy. The industrial sector consists of small and medium-sized businesses with local-scale production. Investment is oriented toward other industries including building, public works, and tourism (Province of Ouarzazate, 2009:71).Table 16-38 presents data related to industry turnover, investment, and jobs created by this sector.

	Number of enterprises	Turnover	Initial Investment	Added value	Permanent staff
Food processing	8	14.49	0.28	1.05	1,145
Chemical industry	14	0.88	42.45	0.31	682
Mechanical and metallurgical industry	12	0.66	21.18	0.16	482
Total	34	16.03	63.92	1.53	2,309

Table 16–38: Main aspects of the industry sector in the Province of Ouarzazate in million of Euro
Source: Province of Ouarzazate, 2009:72.

The main food processing activities in the Province are olive oil and milk production. However, the facilities that exist are very small. The food industry has one mill for crushing wheat, one mill for processing olive oil, two cooperatives for milk pasteurization, and four industrial bakeries. The are also six units for rosewater distillation, two printing houses, some units for manufacturing and building materials, and some units for wood and aluminum joinery. The mechanical and metallurgical industries have some units for manufacturing and repairing trucks and other units for renovating the engines of vehicles and machines (Province of Ouarzazate, 2009:72).

Besides heavy industry, the Province has more than 25,000 handicraft units relating to jewelry, pottery, weaving, and building construction. This sector is an important employer, providing jobs for approximately 25,000 artisans (Province-Ouarzazate, 2013).

Cinematography

The cinematography sector in Ouarzazate is promising and attracts much investment. The estimated turnover generated by this sector is around US $100 million. Many films and TV reality shows have been filmed in the Province. However, the sector is facing enormous challenges due to increasing international competition. The Province of Ouarzazate aims to double the turnover of this sector by 2016, to create 8,000 local jobs, and to produce 28 films, including 15 international films. However, it is unclear whether this target is achievable without direction from a competent agency and an advertising campaign (CGEM Souss Massa Drâa, 2010:36).

Mining

There are two mines in the Province that play a key economic role (see also Figure 16-18):

- Mine of Imini: This chemical manganese mine is 45 km northwest of Ouarzazate. Mining started in 1929 and reached an annual production of 17,489 tons in 2006 (Almaouja.com, 2013). Following a period of crisis between 2001 and 2005, the mine's operator, "Sharif Anonymous Company of Mining Studies (SACEM)", has experienced an ongoing

boom. Sales volume, exclusively dedicated to export, increased from MAD 17 million in 2006 to MAD 95 million in 2009 (Maghress.com, 2010).

- Mine of Bou-Azzer: This site is located 120 km south of Ouarzazate and opened in 1930. It employs 1,600 people mostly from the district of Agdz and is the only cobalt mine in Morocco. In 2013, it reached an annual production of 2,000 t (MANAGEM, 2013).

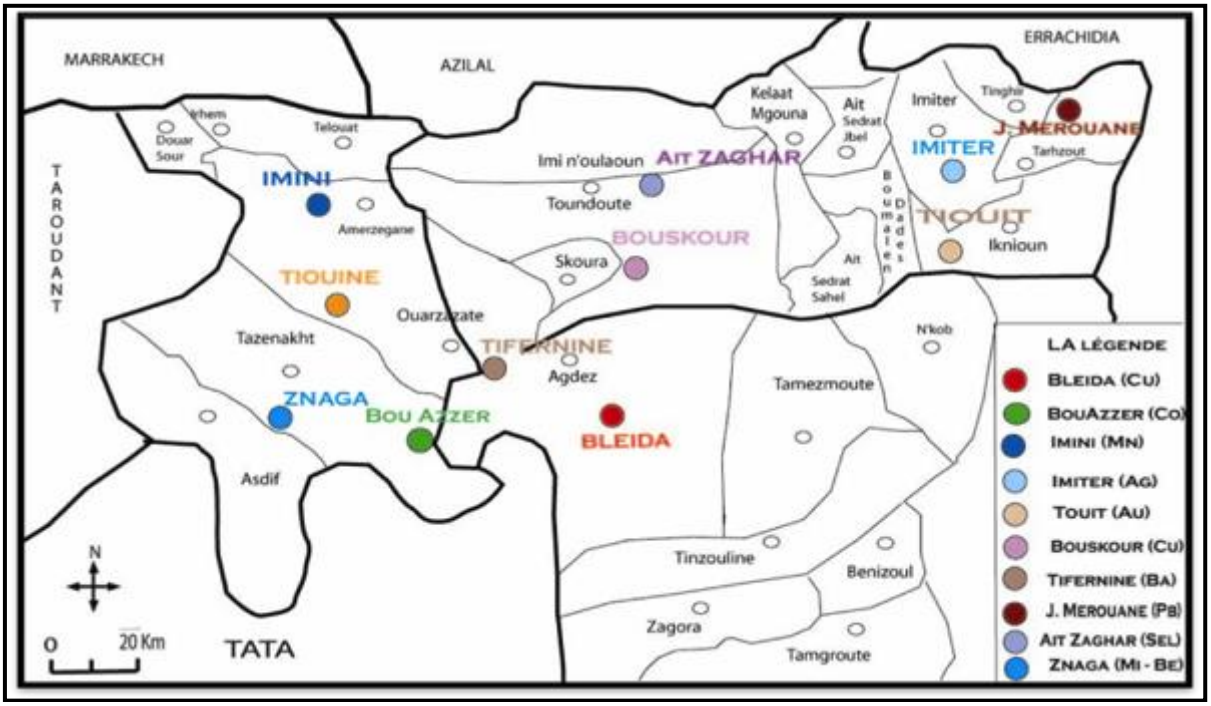


Figure 16-18: Mines in the Provinces of Ouarzazate, Tinghir and Zagora
Source: Direction Provinciale de l'Énergie et des Mines d'Ouarzazate.

There are other mines in the region including:

- Mine d'Imiter[72]: The silver mine of Imiter is 150 km east of Ouarzazate and 30 km from Tinghir in the Anti-Atlas Mountains at an altitude of 1,500 m. Mining originally began in the 8th century, with modern mining starting in the 1970s. Today, the mine employs 1,000 workers and produces 7.7 million ounces[73] of silver per year (Groupe Managem, 2013). It is one of the largest silver deposits in the world, with reserves of 8,000 t.
- Bleida copper mine. Mining has long been one of the main economic activities in the region of Agdz. However, the district's copper mine Bleid was shuttered in 1997 and the remaining resources are very limited. Small-scale mining activities by entrepreneurs and individuals still exist in the region (Chafik et al. 2003:21).

[72] Note that the mine of Imiter does not belong to the Province of Ouarzazate anymore, but to the Province of Tinghir (it was located in the Province of Ouarzazate before the creation of the Province of Tinghir).
[73] An ounce is equal to one sixteenth of a pound or approximately 28 grams. It is the unit used to express the mass of precious metals such as gold, platinum, palladium, rhodium, or silver.

Service sector

Commerce

The commercial trade sector is very important for the economy of the Province. There are 172 retail units, 138 of which are in urban areas and 34 in rural areas (Province of Ouarzazate, 2009:68). The number of small retailers is more important, totaling 4,160. Generally, each small retailer employs one person while large retailers employ three to five people. In addition, there are seven supermarkets in the Province, mostly in Ouarzazate. The 14 weekly markets in the Province of Ouarzazate play an important role in commerce. Further, the Province has five municipal markets (Province of Ouarzazate, 2009:68).

Tourism

Due to its famous landscape, its proximity to desert dunes, its handicrafts, its film studios, and its world heritage Kasbahs, Ouarzazate is a popular destination for tourists. The Province has 27 rated hotels with more than 4,500 beds, 1,500 beds in unrated hotels, 8 campgrounds, and 30 guesthouses. Table 16-39 illustrates the number of nights spent by tourists in classified hotels in the Province, which shows that the numbers are declining.

Year	2003	2004	2005	2006	2007	2008	2009
Number	407,530	468,134	531,973	550,200	533,380	508,427	446,289
Growth	-	14.87	13.64	3.43	-3.06	-4.68	-12.22

Table 16–39: Number of tourists in the Province of Ouarzazate
Source: Ministère de tourisme & FMDT, 2013:8.

Further south, the tourism potential of the district of Agdz and the broader Province of Zagora, is high due to its rich historical, cultural, and architectural sites and its high topographic and natural diversity. More than 100,000 tourists travel through the Zagora Province each year. Still the economic benefits of this tourism are limited mostly to the urban centers of Zagora and Agdz and to a limited number of entrepreneurs. In addition, the majority of profits go to entrepreneurs and tourist agencies outside of the Drâa Valley (Chafik et al., 2003:21).

Household spending

According to the Moroccan High Planning Commission, the annual household expenditure in the Province of Ouarzazate is MAD 36,461 (MAD 50,034 in urban areas and MAD 31,996 in rural areas). About half of this covers food and clothes, 27.2% household equipment and services, and 22.5% other goods and services.

Credit

The dearth of financing mechanisms is one of the main reasons why investments are lacking in the Province. Since the global financial crisis, many women have taken out microcredit loans with short repayment times. Because it is the women who manage the household, victims of predatory lending schemes are often illiterate women who cannot read the terms of the loans. Unable to meet the short repayment times, many people took out new microcredits to repay earlier ones escalating a cycle of debt. Protests resulted and 4,600 people refused to repay loans from microcredit organizations in Ouarzazate.

Economic vulnerability

The Province of Ouarzazate is characterized by high economic vulnerability including poverty, unemployment, and declining agricultural yields due to environmental challenges.

Poverty

Poverty is high in the rural areas of Morocco with 15% of the Moroccan population living below the poverty line. In the Province of Ouarzazate, three out of four families live below the poverty line (HCP, 2007). Table 16–40 shows the poverty[74] and vulnerability[75] rates in the Province of Ouarzazate. Rates are low in the urban Commune of Ouarzazate (3.2) and also in the rural Communes of Tarmigt, Ait Zineb, and Idelsane (respectively 6.9, 7.1 and 7.9), reaching 36.6 in the rural Commune of Imi N'Oulaoune. The vulnerability rate ranges from 13 to 39.4 in the Communes in the Province of Ouarzazate.

	Local Commune	Poverty rate	Vulnerability rate
Urban area	Ouarzazate (M)	3.2	13
	Taznakht (M)	15.3	39.4
	Skoura (AC)	16	38.9
Rural area	Khouzama	22	29.4
	Telouet	25.5	28.2
	Imi N'Oulaoune	36.6	28.6
	Iznaguen	25.1	27.8
	Ghassate	21.4	27.1
	Toundoute	20.6	28.9
	Ighrem N'Ougdal	19	26.6
	Siroua	18.3	26.2
	Tidli	18.3	27.5
	Ouisselsate	18.3	27.9
	Skoura Ahl El Oust	16.9	22.2
	Tabount (AC)	14.1	36.1
	Amerzgane	10.4	22.2
	Idelsane	7.9	15.5
	Ait Zineb	7.1	19.7
	Tarmigt	6.9	14

Table 16–40: Poverty and vulnerability patterns in the Province of Ouarzazate
Source: HCP, 2007.

[74] The poverty rate is the percentage of the people living below the poverty line for a given population. The poverty line is an income level below which a household is considered poor.
[75] Vulnerability rate for a given population refers to the percentage of the people who are unable to withstand adverse impacts from multiple stressors to which they are exposed.

Overgrazing, overexploitation of water resources, and other soil degrading activities can be considered a result of poverty. Table 16–41 illustrates that poverty and vulnerability are more severe in the Commune of Ghassate than in the nation and Province.

	Province of Ouarzazate		Rural Commune of Ghassate	National level	
	Urban area	Rural area	Rural area	Urban area	Rural area
Poverty rate	7.6	23.9	30.5	22	10
Vulnerability rate	21.5	51	64.06		

Table 16–41: Poverty and vulnerability rates for the rural Commune of Ghassate and those for the provincial and national levels
Source: MASEN, 2012:85.

Loss of yields

The effects of climate change are likely to cause a decrease in the primary agricultural production in some African countries of up to 50% by 2020 (IPCC, 2007b:13).

State	Percentage of water withdrawals used for agricultural purposes (2000)	Rain fed land as a percent of total agricultural area (2003)	Percent impact of climate change on agricultural productivity by 2080 (compared to 2003), without carbon fertilization	Percent impact of climate change on agricultural productivity by 2080 (compared to 2003), with carbon fertilization
Algeria	65	98.6	-36	-26.4
Egypt	86	0.1	11.3	28
Libya	83	97	NA	NA
Morocco	87	95.2	-39	-29.9
Tunisia	82	96	NA	NA

Table 16–42: Agriculture and climate change impact in North Africa
Source: Schilling et al., 2012:11 according to Cline, 2007.

Considering that many African countries rely significantly on agriculture as the most importance source of national income and employment, this decrease in production could have severe effects on economic growth and poverty alleviation. Morocco could be among the countries with a projected 39% reduction in average agricultural productivity from 2003 to 2080 (Schilling et al., 2012:11, see Table 16–42). This is because the agricultural sector in Morocco is highly dependent on climatic conditions, as precipitation levels and soil fertility are highly correlated with agricultural yields. Whereas fruit and some vegetables could benefit from changing climatic conditions, wheat, barley, and olives – as the major agricultural commodities - would be among the most negatively affected by less favorable growing conditions, with projected yields expected to decline on average by 7-26% (wheat), 6-17% (barley) and 8-20% (olives) by 2050. Durum wheat yields could even decline by 28-54% by 2080 according to the World Bank (World Bank, 2009:5, see Figure 16-19).

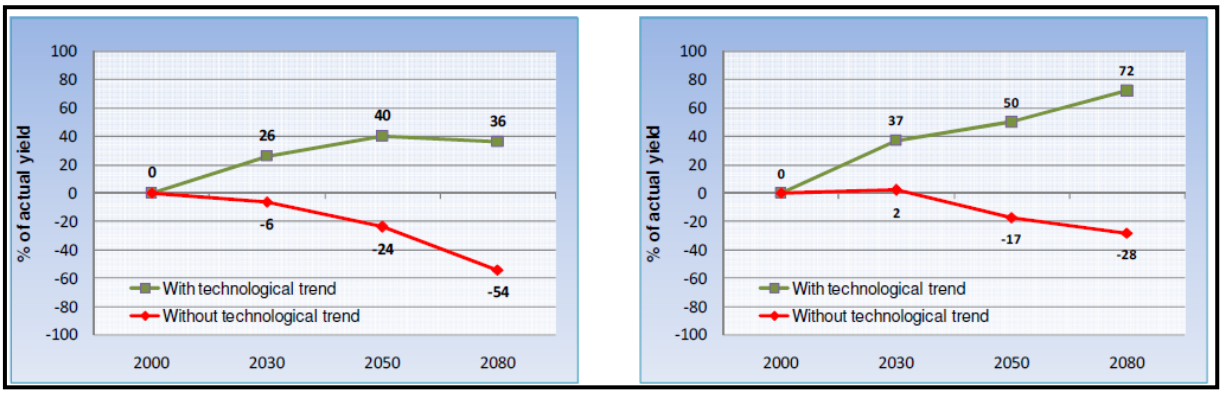


Figure 16-19: Impact of different climate change scenarios (A2 left and B2 right) on rain-fed durum wheat yield in Morocco
Source: World Bank, 2009:5.

Loss of agricultural income

Decreasing yields would result in declining incomes. Freier (2012) estimates that a 20% reduction in average precipitation would decrease total income from pastoralism by 15-37% in Morocco. In this scenario, sedentary pastoralism would be affected by 23-39%, while mobile pastoralism would only be affected by 8-31% (Freier, 2012:2). The same scenario, however, also shows that increasing the share of pasture area and fodder used for mobile pastoralism would reduce the potential impacts of droughts on total income by 11% (Freier, 2012:2). Additionally, Freier (2012) states that education on sustainable land use practices could reduce pressures "upon natural resources such as arable land, rangeland, and water, and would enable modes of production with a lower variability in income generation and a reduced magnitude of income shocks during droughts" (Freier, 2012:133). Furthermore, "replacing rural energy supply for cooking and heating by electricity" would enable rural people to compensate for the impacts of climate change on sedentary pastoralism in the area and additionally "contribute to alternative sources of income which are not coupled to climate change impacts such as droughts (Freier, 2012:133).

Unemployment

The unemployment rate in Morocco is high, especially among youth (CIA, 2010). According to the HCP (2012:68), the unemployment rate in the Province of Ouarzazate is about 3.9% (10.4% in urban areas, and 1.7% in rural areas) and 54.3% of the workforce is active on average (42.8% in urban areas and 60% in rural areas). This figure masks many realities, such as unpaid work done by family members in rural areas and temporary jobs in cities.

Corruption

On September 2, 2013 the Attorney General of the Court of Appeal in Ouarzazate was found guilty of neglect and failure to prevent bribery. Discussions on social media hailed the act of bringing to justice someone of this caliber. Given that the ruling was made by the High Council of Judges, a national body in the capital headed by the King, people were conflicted about whether it represented a genuine and decisive stance against corruption. The skeptics outnumbered the optimists. This skepticism is not hard to explain. First, there have been other instances in which a high-ranking individual was prosecuted while corruption remained rampant, resulting in disillusionment. Second, some think that corruption is written into the

fabric of the state. As a young Moroccan put it, corruption is “condemned in theory but condoned in practice” (Bennis, 2013).

Nepotism is another form of corruption. Nepotism is a form of favoritism in which a person in power preferentially distributes benefits to family members and friends rather than to the most qualified or deserving person. This practice threatens social cohesion. Many businesses in the area are small and crippled family businesses, where non-family members are the last to be hired and the first to be fired, where management is almost never entrusted to outsiders no matter how competent.

Moroccans in both rural and urban areas are concerned about the effects of corruption. The present Parliament ran on a platform to combat corruption on many levels. Now this very government is criticized for failing to keep fighting corruption on its list of priorities. According to global corruption rankings by Transparency International (Flah, 2012), Morocco slid from 80th of 176 to 88th. (Note that this is a perception index, not an absolute measure of corruption.) The sectors most affected by corruption including local governments, the real estate sector, justice, police, and customs (Transparency Maroc, 2012:2).

16.2.6 Institutions

Institutional organization and governance structure

The Province of Ouarzazate belongs to the administrative region Souss-Massa-Drâa (one of the 16 administrative regions in Morocco). The administration of the region is elected, whereas the Province is under the jurisdiction of the Ministry of the Interior. The Ministry of the Interior nominates the governor of the Province, who plays a very powerful role. Technicians, engineers, and administrative officials are responsible for the administrative functions of the Province.

The Province is divided into administrative circles, cayadas, and Communes. The main duties of circles and cayadas are the administration and security of the territory, as well as the control of the work of elected representatives. Elected representatives are responsible for the administration of the Communes. In each Province there are one or more circles, in each circle there are one or more cayadas and in each cayada there is one or more Commune. The local administration structure is divided as follows, in decreasing order of authority:

The Province of Ouarzazate is divided into:

- 2 circles: Ouarzazate and Amerzgane;
- 7 cayadas: Amerzgane, Telouet, Ighremn’ougdal, Ouisselsate, Ouarzazate, Skoura, Moghrane;
- 19 Communes:
    - Urban: Ouarzazate; Taznakht;
    - Rural: Ait Zineb; Amerzgane; Aznaguen; Ighremn'ougdal; Khouzama; Ouisselsate; Siroua; Telouet; Tidili; Commune of Ghassate; Idelsane; Imin'oulaoune; Skoura rural; Tarmigt rural; Toundout (Province of Ouarzazate 2013).

Community participation in decision-making

Communal elections for representatives in the rural or urban Communes are held every five years. These representatives form the rural or urban Communal Council, which is responsible for managing local development and governing the Commune. The elected communal representatives choose the Provincial Council members and the Regional Council members.

According to an official from the local urban Commune of Ouarzazate, the local Communes of the Province of Ouarzazate consist of 315 elected members, which are distributed as shown in Table 16–43. The Provincial Council of Ouarzazate consists of 15 members, while the Regional Council of Souss-Massa-Drâa consists of 110 members.

Commune	Number of members	Local Commune	Number of members
Ouarzazate	35	Siroua	13
Taznakht	13	Tidli	15
Khouzama	13	Ouisselsate	25
Telouet	17	Skoura Ahl El Oust	25
Imi N'Oulaoune	25	Amerzgane	15
Iznaguen	15	Idelsane	15
Ghassate	15	Ait Zineb	15
Toundoute	15	Tarmigt	27
Ighrem N'Ougdal	17		

Table 16–43: Number of representatives in various local Communes of the Province of Ouarzazate
Source: Official of Commune of Ouarzazate, 2013:Personal Interview.

The population also elects its three parliamentary representatives. The local representatives engage in dialogue with their communities. It is through these representatives that local communities could propose or reject projects.

Legal aspects of water usage

There are attempts to challenge customary water ownership rules through legal mechanisms. Policymakers sometimes end up taxing the dispossessed beneficiaries and forcing them to pay for water that was rightfully theirs. As opposed to the Sharia, customary law varies greatly from one community to another for geographical, historical, and political reasons.

Several centuries ago, the Islamic religious scholars (Tolba) and Marabouts changed some aspects of Berber customary law without banning it completely. These customary rules, which structure all levels of community life, reveal the legal basis of the social contract and the anchoring of practices in the distant past. Roché (1965:66-67) shows that the implementation of Islamic law could not claim to solve all problems, including the ownership and management of water. It adapted to allow for customary law if it did not conflict with the guidelines of Sharia.

Land ownership is separate from the water rights. This distinction does not violate the Islamic precepts relating to the right of Chafaa and or Chirb. According to Sonnier (1933), the first allows anyone, even a stranger to the community, to take a quantity of water to drink, while

the second, reserved only for residents, recognizes water ownership rights to those who cultivated the source. Hence, the Maliki rite, whose precepts govern religious and social life in North Africa, recognized private water ownership. Roché (1965:68) stated that if the Chafaa right is for everyone, the Chirb right is reserved for residents and therefore justifies the ownership of the land. However, the Chirb right is attached to the riparian land. If the owner sells his riparian land, then the water rights are transferred along with the land. If the landowner wants to sell his land without water rights, he can only do so by linking the water rights to another parcel of riparian land that he owns. The oases inhabitants were able to save their traditional water rights system under the Water Code established by the colonial power. Between 1914 and 1925, the water resources of the country were subject to the rules of public domain: inalienability and use was controlled and regulated by the state. Nobody could make economic use of water (more than two hundred cubic meters / day) without the government's permission and fees.

Diversion of water rights: Attempts to divert water for domestic or speculative purposes have made a medium and long-term impact on the already precarious water security, of the populations and could likely lead to rural exodus. The examples below attest to the seriousness of the situation (Oudada, 2011:147-159):

- Some oases lost their right to water, such as the oasis Saguia of Tiznit for which the water is currently managed by the state drinking water utility to supply the growing population of Tiznit (Ftaita, 1999:197-206). As an alternative, the ex-beneficiaries of the Saguia, i.e., the farmers of the Douterga oasis, use the wastewater of the city of Tiznit for irrigation. A wastewater facility was built to improve the quality of this water for irrigation; unfortunately it is has been inoperable for many years. The result is disastrous both economically and ecologically. The farmers must use their land parcels meant to provide livestock with fodder crops.
- A second example is that of the two sources of Eghboula (located in the rural Commune of Reggada) where the excavation of a deep well for which the trajectory has finally met the conduit through which both sources of Eghboula are powered. The two water points have then been drained. The only alternative for those holding the water rights of Eghbouli sources is to install a pump.
- After hydro-agricultural developments by the state in the Drâa oasis, farmers were forced to pay for water to which they originally had the rights.

These three examples show the water challenges that oases communities will face. The urbanization process the leaders of rural communities desire, and better pumps, will affect future water rights in the oases (Oudada, 2008:52).

Local policies and development plans

Local Communes are responsible for the local development plans for the Commune. The provincial and regional institutions support these development plans technologically and financially. On the other hand, many development projects at communal, provincial, and regional levels are launched by the GoM and managed by central agencies or institutions. In this case, local Communes sometimes contribute to financing these projects and often coordinate them.

Civil society organizations

The total number of associations and NGOs in the Province of Ouarzazate is estimated to be more than 1,857. In the rural Commune of Ghassate, 50 associations have been created of which only 25% are active. The scope of these associations is fairly narrow (management of water supply, energy, installation of equipment or services, etc.).

Educated young people have recently created associations in areas including the promotion of education, health, socio-educational activities, and income generating activities. For example:

- The “Near East Foundation” to prevent students from dropping out of school;
- The Tichka Association for salt mining;
- The Rosa and Nour Association to promote women's activities.

These associations have a relatively narrow social base and a lack of resources and are poorly equipped to secure financial aid. It is important to note that traditional institutions like Jmaâ are still operational, although they are declining due to the emergence of new associations. Their primary role in the Commune is currently limited to:

- Operation and development of the local community patrimony;
- Granting the right-holders lots for housing construction;
- Arbitration of intra- and inter-community conflicts;
- Mobilization of public land for construction of social and community facilities.

16.3 Legislative conditions for stakeholder involvement in Morocco (input for chapter 7.6)

Legislative conditions that are related to public engagement in planning, designing, developing, and operating large-scale renewable energy projects in Morocco can be divided into two main categories:

1. General legislative conditions with regards to rights to information, participation, accountability, integrity, and transparency;

2. Specific legislative conditions that are related to the development of renewable energy projects.

16.3.1 General legislative conditions

Information

The Moroccan constitution protects access to information stating in article 27:

"Citizens have rights to access information detained by public agencies, elected bodies and organizations providing public services. Access to information can only be limited by force of the law in order to protect national defense, internal and external security, and private life;

prevent violation of civil rights and liberties; and safeguard sources and data defined plainly by the constitution" (SGG, 2011).

The law 99-12, “Charte nationale de l’environnement”, protects and frames the rights to adequate information related to environment and sustainable development.

Additionally, as of June 2014, the parliament was discussing law “31-13” to : a) establish a clear mechanism for accessing information by individuals and organizations and b) provide grievance procedures in case information is not provided adequately (Taiqi, 2013).

Participation

Article 12 of the Moroccan constitution guarantees to citizens and civic organizations participation in public affairs as their constitutional right and ensures rights to “contribute according to participatory democracy to design, monitor and evaluate projects and policies proposed and implemented by public authorities” (SGG, 2011). Additionally, the law 99-12 entitles civil society associations and individual citizens to proactively participate in planning and implementing public policies, strategies, and programs that are related to the environment and sustainable development.

In order to promote civil society engagement and participation in public affairs, the current government has a ministry in charge of civil society coordination. The ministry organizes workshops, conferences, and debates; launches periodic consultations; and keeps permanent dialogues and contacts, in order to discuss any relevant policies, laws, and rules with civil society organizations and interested stakeholders.

Transparency, integrity, and accountability

Morocco established several mechanisms governing transparency, integrity, and accountability. The government ratified the United Nations Convention against Corruption on May 2007 (ICPC, 2013) and few months later founded an “agency with competencies to prevent corruption”. Additionally, article 36 of the constitution imposes the establishment of a national commission for integrity and prevention of corruption that will replace the former agency and will have broader competencies and operative authority. Currently, a framework law establishing the agency is being studied by the government and will be ratified soon (as of June 2014). Meanwhile, the government promulgated the decree 1-06-15 of 2006 that obligates all public agencies and institutions to adopt competitive and transparent procurement in awarding projects financed by the public budget (Nortonrosefulbright, 2013). This decree shaped the prospects of monitoring the tendering process and gaining access to information related to renewable energy projects by civil society and involved stakeholders. Hence, it contributes to achieving full transparency and openness within the renewable energy sector.

Moreover, the first clause of the Moroccan constitution refers to accountability as an integral part of the decision-making process; it states that the Kingdom of Morocco is founded on collaboration and separation of authorities/powers, on citizen and participatory democracy, and on accountability principles (SGG, 2011). Meanwhile, the framework law 99-12 states that any person or institution is accountable for any actions that may damage the environment and natural resources. The first clause of this law states that civil society organizations and individual citizens have the responsibility to contribute to protecting the environment and achieving sustainable development.

16.3.2 Renewable energy legal and administrative frameworks

Morocco has established specific frameworks in order to develop utility scale renewable energy projects. The government adopted several protocols to create a favorable investment and business environment for the renewable energy sector and achieve sustainable development. However, these frameworks focus on technical and commercial aspects rather than rights-based policies. Meanwhile, large-scale renewable energy projects are being managed by competent agencies; inputs and contribution from civil society, academics, and professional associations are gathered and considered on a per project basis, although not adhering to a clear systemic approach.

Specific legislative conditions related to renewable energy projects include mainly:

Energy pro law 16-08

The energy pro law “16-08” was adopted in 2006; it increased the authorized production of independent power generators from 10 MW to 50 MW and enabled private firms and consortia to invest in renewable energy projects (SGG, 2013). This law constitutes an integral reference for the renewable energy law 13/09 (see paragraph b). Public engagement in these projects is allowed during the mandatory environmental and socio-economic impact studies, and during application procedures for relevant authorizations or submission of declarations and notifications.

Renewable energy Law 13/09

Law 13/09 provides a framework for renewable energy development and seeks to incentivize power generation from renewable resources by public or private entities (MEM, 2010a). It constitutes the cornerstone of the Moroccan strategy to achieve sustainable development, enhance the use of local resources, and protect natural resources and climate. The mandatory environmental and socio-economic impacts studies for renewable energy projects, the administrative procedures outlined for projects between 2 and 50 MW, and the notifications for projects with capacities equal to or less than 2 MW, aid in civil society and public engagement in projects’ design, implementation, and monitoring.

Law MASEN 57/09

Law 57/09 establishes the Moroccan Agency for Solar Energy (MASEN) as a national body to implement and develop large solar energy projects, and eventually create an interlocutor for civil society and other stakeholders to contribute to large scale solar energy projects (see chapter 7.6). The law does not require MASEN to engage civil society and stakeholders in the projects’ design, planning, implementation, and monitoring, but the agency is following best corporate social and citizen responsibilities and engaging local stakeholders in addressing the social, economic, and environmental dimensions of its solar energy projects during the planning and implementation processes.

Law ADERREE 16-09

Law 16-09 established the National Agency for Renewable Energy and Energy Efficiency (ADEREE). Professional associations and civil society are soliciting ADEREE to collaborate on renewable energy and energy efficiency plans and projects (MEM, 2010b). Furthermore, ADEREE has the competency to design and implement development programs that are

related to renewable energies and energy efficiency, with the option to engage and consult civil society, academics, and professional associations. ADEREE represents the interface between the national government with its affiliated departments, and civil society and the public on renewable energy and energy efficiency affairs.

16.3.3 Conclusion

Morocco amended its legislative conditions for ensuring stakeholder and public engagement in planning, designing, implementing, and monitoring large scale renewable energy projects, with the main objective of guaranteeing full transparency, openness, and active participation. The public authorities are aware that renewable energy and low carbon development creates opportunities for the country to reinforce its socio-economic development and best governance practices. In order to ensure the effectiveness of governmental policies and the efficiency of public investment, the government strives to improve and adapt such legislative conditions and to implement them. Challenges and difficulties are encountered when implementing new legislative rules.

Meanwhile, the Noor$_o$ I project represents an interesting case study for the government in terms of lessons learned, and it could improve the legislative and administrative frameworks to adjust them to the on-the-ground realities.

16.4 Stakeholder perceptions and community acceptance

The rural Commune of Ghassate: Since the municipality of Ghassate encompasses the communities located in proximity to Noor$_o$ I, the community affectedness by the project is reflected in the community perceptions. Although the general acceptance of the project was moderate to favorable, feelings of being left out of the decision-making processes for Noor$_o$ I were reflected across all community stakeholder groups. One exception is youth who were rather positive in their level of concern, which can be attributed to cultural change and their decreasing attachment to land and related agricultural activities.

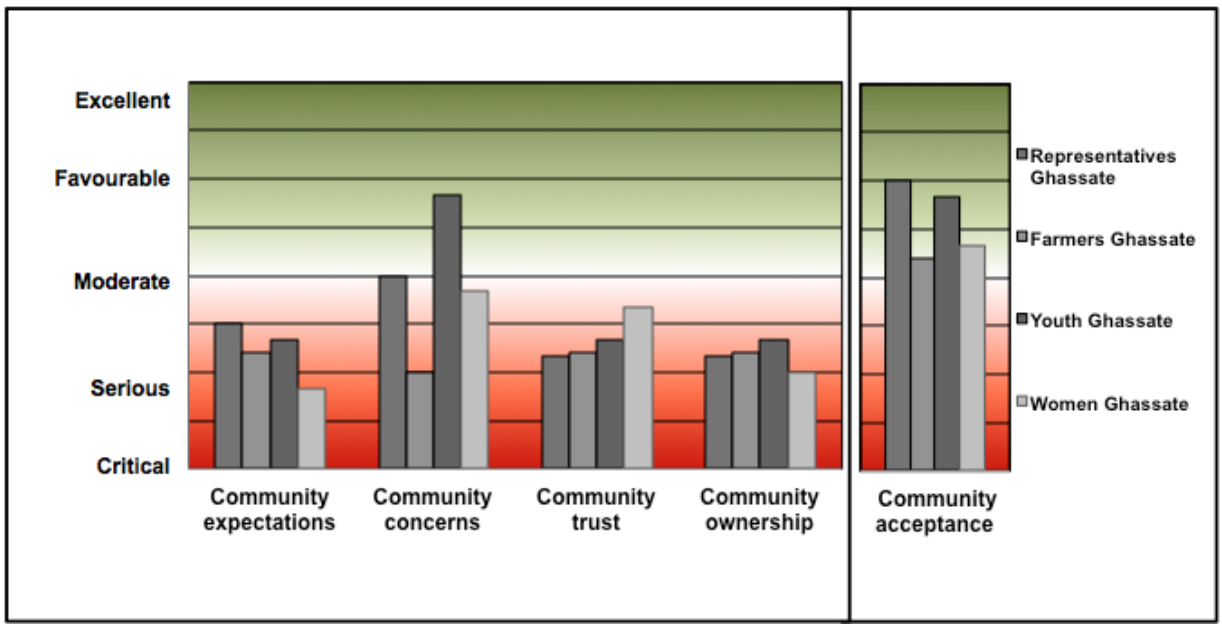


Figure 16-20: Community perceptions and acceptance of Noor$_o$ I in the rural Commune of Ghassate

The city of Ouarzazate: The most evident finding in the city of Ouarzazate was a generally moderate to favorable degree of community perceptions towards Noor$_o$ I. However, as with the other communities, the fulfillment of expectations was reported to be rather low - especially among youth. Interestingly, the sense of community ownership among community representatives was the lowest of all community stakeholder groups.

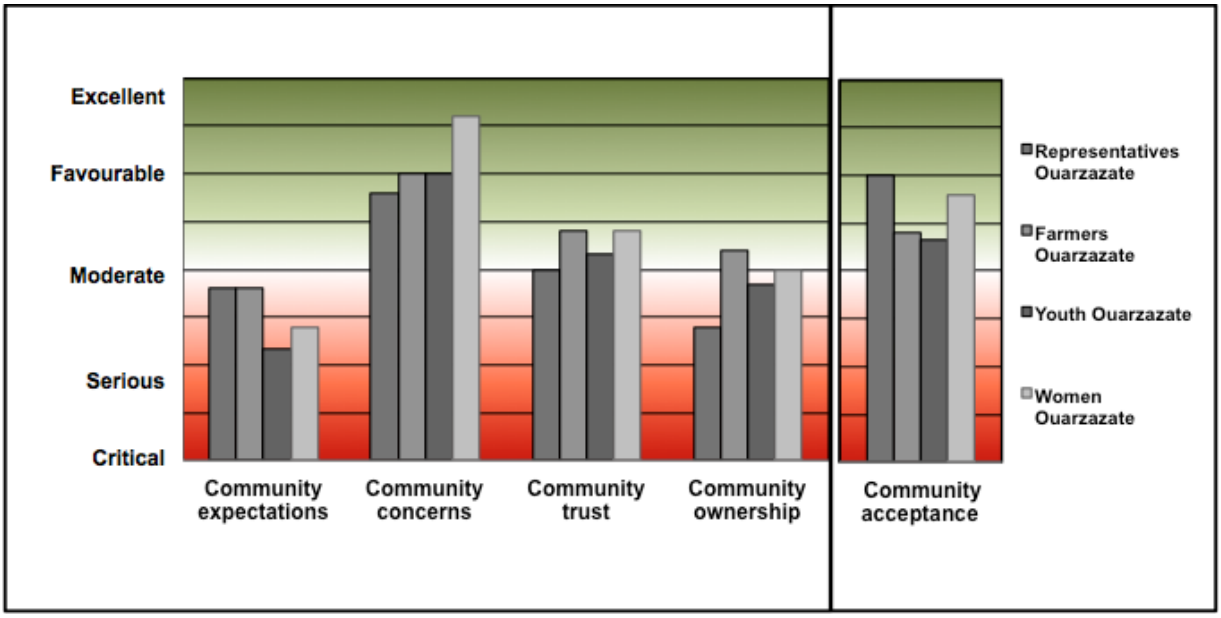


Figure 16-21: Community perceptions and acceptance of Nooro I in the city of Ouarzazate

The community of Agdz: Due to its possible high affectedness by the project's operational water demands, community stakeholders in Agdz showed the most critical community perceptions towards Noor$_o$ I. Women especially perceived the project critically which reflects their high vulnerability with regards to water as they are highly dependent on local natural resources for their livelihood, because of their responsibility to secure water and food for their families.

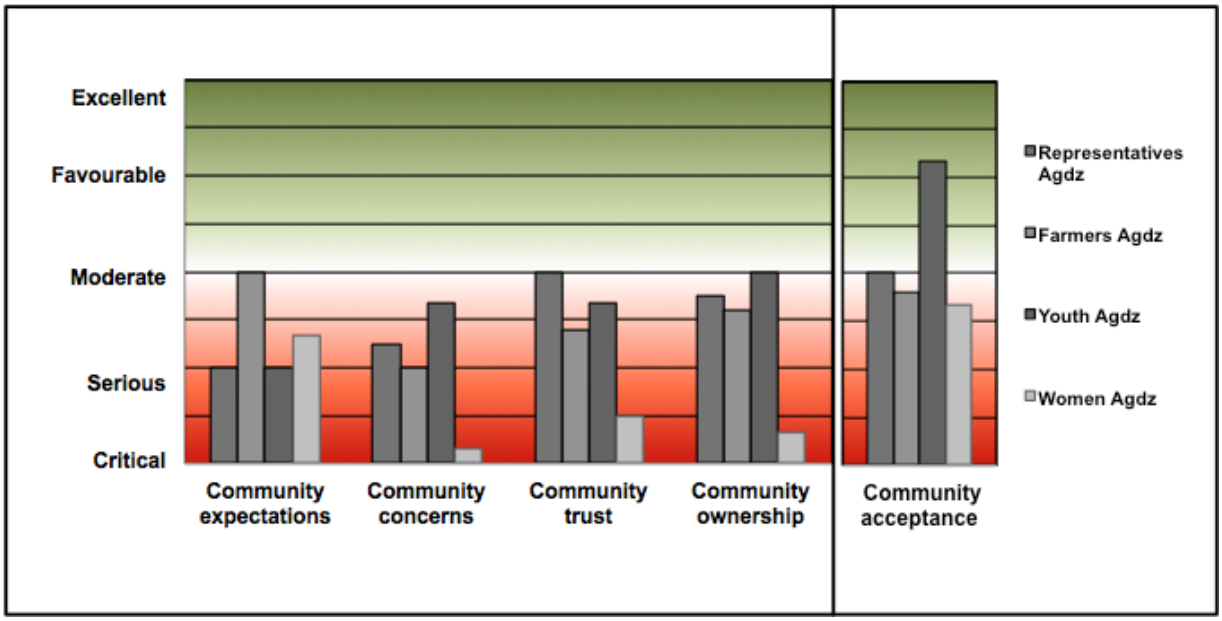


Figure 16-22: Community perceptions and acceptance of Nooro I in the community of Agdz

The communities of Idelsane and Skoura: These two communities showed similar perceptions towards Noor$_o$ I as the city of Ouarzazate, with a generally low fulfillment of expectations - especially among youth.

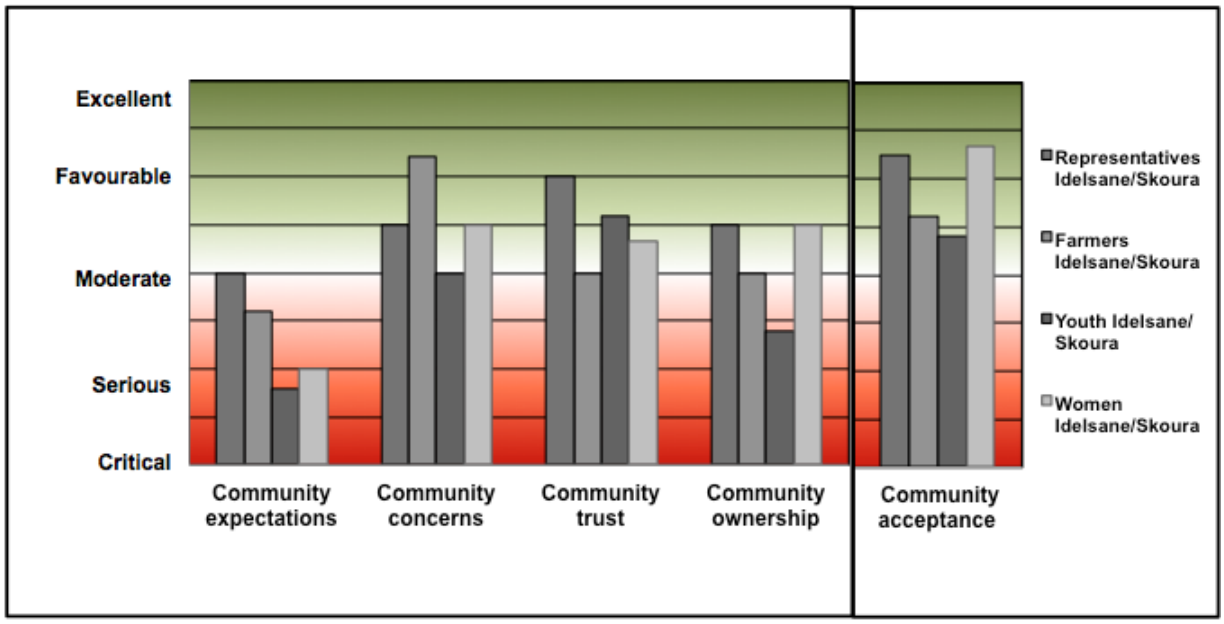


Figure 16-23: Community perceptions and acceptance of Nooro I in the community of Idelsane / Skoura

Community stakeholder groups, local experts and project developers: The survey found high levels of acceptance across all groups. However, the degree to which expectations were perceived as being fulfilled varied substantially, with high levels among SMEs and project developers (MASEN, ONEE, ACWA Power Ouarzazate), but rather low levels in the other stakeholder groups. With regard to community concerns, the project developers assumed there would be great concern within local communities, but this was not reflected in the answers given by community stakeholders. While the degree of community trust was distributed rather homogeneously, significant variations were found in the sense of community ownership, with the project developers assuming substantially higher levels. Across all categories the expert judgments were close to the average of all perceptions.

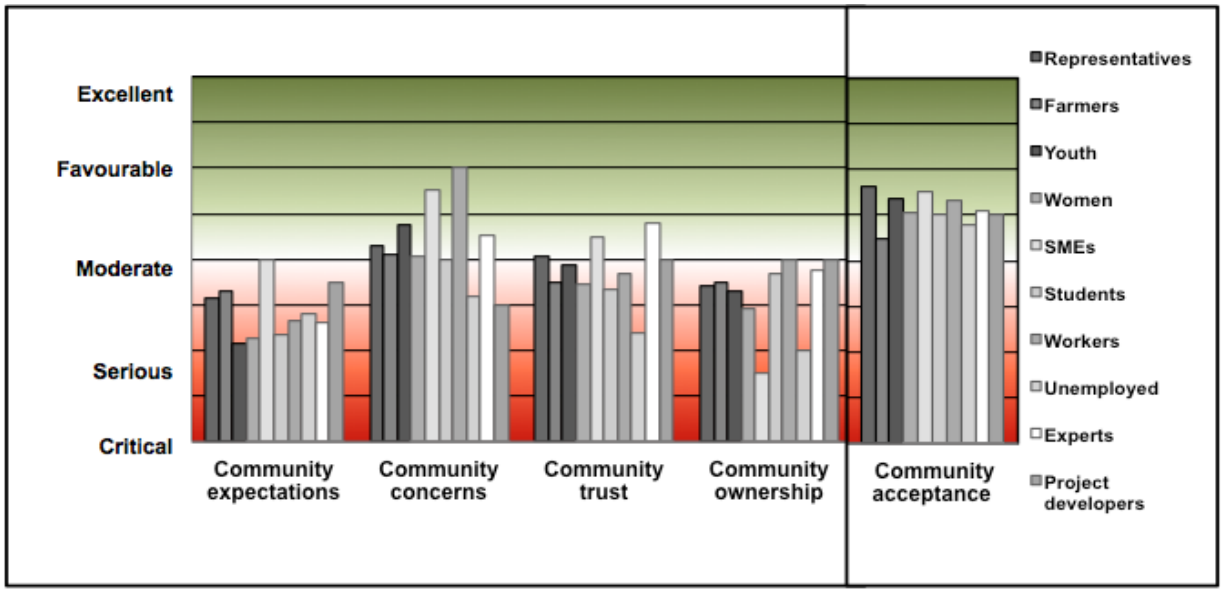


Figure 16-24: Community perceptions and acceptance of Nooro I across different stakeholder groups