Chapter 19
Infrastructure Development and Environmental Change: A Case Study of Forced (Im)mobility in the Mhamid Oasis (Southern Morocco)

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19.1 Introduction

Migration from areas on the Southern Shore of the Mediterranean usually are perceived as a result of historical connections enforced by economics and politics (De Haas, 2007; Lahlou, 2021). The reasons for this phenomenon, however, are much more complex and interlinked not only with those issues but also with the implications of climate change and the less obvious consequences of development investments visible through environmental and social changes (de Haas, 2001; Sobczak, 2008, 2012). Projects such as highways, mines, and urban infrastructure are significant drivers of displacement and forced migration (Randell, 2016). In fragile, semi-arid and arid areas, attention should be given to the impact of hydropower infrastructure investments.

Various groups perceive the significance of large investments differently. The positive impact of these projects is appreciated mostly by actors outside the area, such as industries, mega-cities and even countries. Those living in the affected territory face, however, most of the negative consequences (McCully, 2001; Sneddon & Fox, 2008; WCD, 2000). Urban or national access to electricity typically is a higher priority than the needs of fishers, farmers, and peasant subsistence agriculture. Such inequality of values makes the results of negotiations over potential compensation and *benefit-sharing* asymmetrical (Duarte-Abadía et al., 2015; Martinez-Alier, 2014).

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The literature describing the influence of hydro-power investments usually focuses on societies living in close proximity to the affected area and indicate consequences such as a decline in fish stocks, episodes of fish kills, loss of habitat due to the influx of workers during construction, loss of inter-generational transmission of traditional farming knowledge (Hanna et al., 2016), or the development-induced forced migration of inhabitants (Hitchcock, 2015; Randell, 2016). Some publications describe how dam-induced alterations of river flows affect the livelihoods of those living downstream (e.g. Richter et al., 2010) and those who are pushed or forced to move due to further changes taking place in the natural and social environments, not always in the direct vicinity of the investment (Beirne, 2014). People who are displaced due to construction of the dam and filling of the reservoir often receive *compensation* meant to help them settle in a new region (Randell, 2016; Vaughan, 2020). However, Cernea (2008) indicated that *compensation* for those resettled and displaced from affected areas is insufficient and called for investments *additional to compensation,* financed from benefits generated by the projects that require resettlement. Also, more and more research calls for long-term *benefit-sharing* (Cernea, 2008), though, again, the focus here is mostly on populations living in close proximity to the investment (Schulz & Skinner, 2022), leaving those affected in distant places without adequate support. Therefore, the chapter proposes a new approach in *benefit-sharing* called *extended benefit-sharing,* where the perception of locality is extended to the environment and communities that, despite being further from the investment areas, share the project's negative consequences (cf. Vanclay, 2002).

Growing hydropower production causes changes in both the social and natural environments and pushes populations to migrate (Kirchherr & Charles, 2016). Responding to the need for better attuning the environmental change-migration nexus 'to the actual practice and needs of those affected' (Wiegel et al., 2019, p. 2), I intentionally use the term 'mobility' instead of 'migration'. To fully capture the reality of such cases, however, the theme of immobility is also discussed. Contrary to mobility, immobility has more of a binary perspective, 'either someone chooses to stay or is forced to stay, which is too simplistic to capture the complexity of the real world' (Zickgraf, 2021, pp. 125–126, see also Mallick & Schanze, 2020). An approach in which a 'mobilities perspective centres on the practices, motives, and experiences of mobility[1] and immobility in the context of environmental change' allows for a deeper understanding of (non)movement itself (Wiegel et al., 2021, p. 11).

This chapter discusses ideas around development-caused changes in the social and natural environments and their complex relationship influencing (im)mobility with the example of changes and behaviours triggered in Mhamid Oasis in Southern Morocco by the construction of the Mansour Eddahbi Dam. A deeper understanding

[1] I use the term 'mobility' for all types of movement: forced and voluntary, internal and international. Only in the case of more relevant situations, terms such as 'relocation', 'displacement', or 'migration' are used.

of past and current mobility trends caused by the dam can make it possible to predict patterns of future population mobility in the Mediterranean and implement adequate policies to manage challenges caused by such investments.

The chapter is structured as follows. The first section below shows the broader context of large dam and hydropower investments that trigger environmental, economic, social, and cultural transformations. It also proposes a conceptual framework for analysing the role of such developments and their environmental, social, and economic changes in an extended understanding of locality. The subsequent part describes research methods, followed by a description of the environmental and socio-economic transformations caused by the Mansour Eddahbi Dam in Mhamid. This is followed by a results section, which is dedicated to research conducted in the investigated area. Discussion and conclusions close the chapter.

19.2 Hydropower Infrastructure and Benefit-Sharing

The consequences of environmental change are often perceived as a major reason for migration in many regions of the world (Black et al., 2011; Entzinger & Scholten, 2022; Ionesco et al., 2017). Less attention is paid to development projects, although 'approximately 300 million people have been involuntarily displaced from their homes' by such investments, with over a quarter of them displaced by large dam constructions worldwide (Yue-fang et al., 2021, pp. 3511–3512). A variety of papers describe the results of the construction of large-scale water infrastructure (e.g. Hanna et al., 2016, Li et al., 2013; Wu & Liu, 2017), as well as the effects of expected changes in the environment and life conditions of the affected population (Sayektiningsih & Hayati, 2021). Apart from directly causing the resettlement of inhabitants of the area flooded for the reservoir, large-scale infrastructure also has a huge social and environmental impact (Duarte-Abadía et al., 2015; Molle & Floch, 2008). Its most significant aspects are the change of hydrological regimes, which irreversibly influences the life of local communities. Its significant impact on livelihoods is seen not only in the loss of residence and resettlements of inhabitants but also through the loss of access to areas of arable land as well as the various resources needed for grazing, agriculture, or fuel (Hitchcock, 2015; Ryser, 2019).

The World Commission on Dams (active between 1998 and 2000) evaluated that approximately 50,000 large dams have displaced 40–80 million people globally (Randell, 2016; Scudder, 2005). Most of those investments were described as having a balanced (50%) or negative (44–46%) social impact (Kirchherr & Charles, 2016). The limited positive impact was usually related to infrastructure, such as improved flood control and increased electricity production (Kirchherr et al., 2016; Schulz & Adams, 2019). Nowadays, dams, particularly those generating electricity, have again become an investment hotspot (Kirchherr & Charles, 2016) and are perceived as a climate change adaptation strategy and an important part of the new 'green economy' (Sneddon & Fox, 2008; Swyngedouw, 2014).

The construction of dams usually impacts communities living both up and downstream (Beirne, 2014). Those inhabiting deliberately flooded areas usually face displacement. Those living in areas below the dam may benefit from irrigation water and flood protection, however, the impact is not clearly positive. It often correlates with the destruction and/or enclosure of resources, which are *local common goods* (Blaser & de la Cadena, 2017), and results in an underestimated impact on local populations (Hitchcock, 2015). It was estimated that by 2009, 472 million people living downstream of dams were affected by their construction (Richter et al., 2010) or suffered from insufficient water for irrigation, changes in soil fertility, or an increase in erosion (Beirne, 2014). This is justified by the greater national good, i.e., electricity or extensive exploitation of natural resources, which are a *national common good* (Blaser & de la Cadena, 2017; Ryser, 2019). Control over nature is presented as progress and civilisational (Duarte-Abadía et al., 2015), yet the threat that people living downstream will be excluded from this development is a violation of human rights (World Commission on Dams, 2000). Therefore, their participation in 'benefit-sharing is a logical consequence of such normative considerations' (Schulz & Skinner, 2022, p. 7).

To mitigate the negative consequences of such investments, affected populations receive compensation. However, this approach is often criticised because 'compensation alone cannot mitigate the impoverishment risks and resettlement should be treated as a development opportunity for affected population' (Yue-fang et al., 2021, p. 3512). Compensation should outlast the project implantation and enable the affected population to take part in decision-making regarding the division of profits from the investment even a few years after the investment. Therefore, more attention should be paid to the 'time value' of the consequences and benefits of hydropower projects, which most often go to stakeholders instead of toward new settlements established after the relocation or displacement of residents (Schulz & Skinner, 2022; World Commission on Dams, 2000). Such an approach demands, however, policy that incorporates the different needs of people affected by the investment to support either their adaptation strategies or the decision to move (Thornton et al., 2021).

In Morocco, the pressure to obtain the energy received from renewable sources is high as well. New solar energy plants are established alongside previously built big dams, such as those on the Dades-Draa or Todra-Ziz rivers. More recently, they have been followed by big solar power plants, such as Noor I, II, and III, established near the Mansour Eddahbi Reservoir on the Dades-Draa river. This case, like the others previously discussed, has consequences for areas located even 300 km farther downstream. In this context, it is important to discuss dam-induced changes occurring in area of the oasis located below the dam in a way conceived as outcomes of socio-environmental interaction processes through descriptions of residents' everyday life experiences and to show the need for *distant benefit-sharing*.

19.3 Methodology

This chapter relies on research carried out in the Mhamid Oasis in Southern Morocco (Fig. 19.1). The author undertook this research in 2004. Since then, both the environment and inhabitants of the oasis have been investigated with the use of different methods grounded in physical and social geography. Most important for this chapter is the research carried out between 2015 and 2019. The analysis was started with extensive desk research on relevant social and environmental contexts to understand the natural conditions as well as historical and social backgrounds of the investigated area and society. The literature review was followed by quantitative and qualitative research.

19.3.1 Quantitative Research

The quantitative part of the research was divided into two stages. The first was a micro-questionnaire conducted in 120 households of the oasis. This allowed to select 48 households for an extended questionnaire interview with the heads of households. Although the number of households investigated in the second stage was influenced by the low response rate, the team made every attempt to ensure that chosen

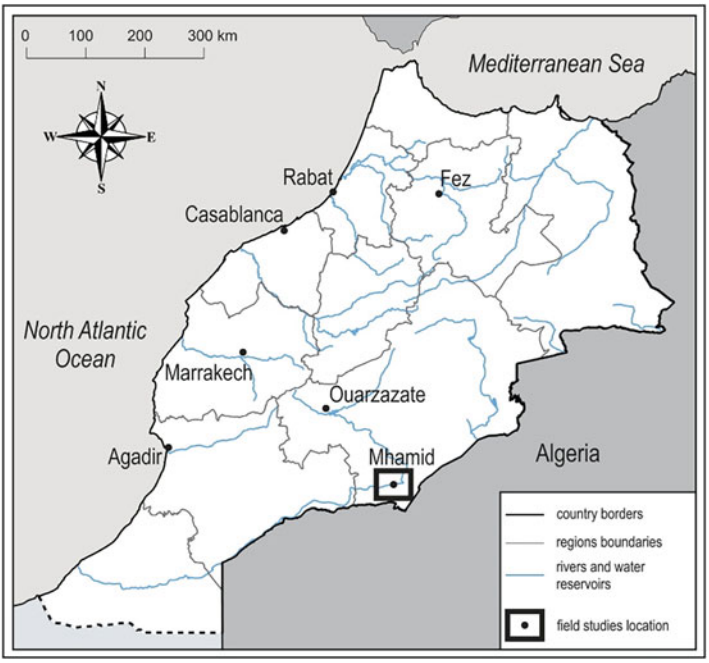

Fig. 19.1 Location of field research. (Prepared by. P. Jaczewski)

households differed in the number of inhabitants, size of owned and cultivated land, type of environmental hazards affecting agriculture, share of income from agriculture in total household earnings, as well as the presence of internal and international migrants among household members. Trained local interviewers helped implement PAPIs (paper and pen personal interviews).

19.3.2 Qualitative Research

The aim of the qualitative study was to understand the relationships between the environment, regional development and migration. Preliminary analysis of the results of the questionnaire allowed us to pinpoint the households with the highest value regarding environmental factors causing limitations in income from agriculture. In-depth interviews were carried out with 12 household heads of families and/or adult children, then the level of saturation was reached. Farms were selected based on their location in various *ksars,*[2] differentiated in terms of area of arable land, income obtained from agriculture, and number of farm members. As part of the interview, questions were asked about changes in the natural environment and their impact on agriculture and income obtained from it, alternative sources of revenue for households, migration of farm members, and whether and how it was related to limitations caused by the natural environment.

The team conducting the research comprised a social and physical geographer and a local gatekeeper, who also acted as interpreter. The interviews were conducted in *Darija* and/or in French with an interpreter. Due to the very traditional cultural approach of Mhamid inhabitants, interviews were not recorded, but meticulous notes were taken and subsequently analysed using AtlasTi.

The team also worked within the target area performing non-participatory observation, compiling photo documentation, etc. Changes to the surface land cover were additionally analysed based on Landsat TM/ETM + data.

The use of a variety of methods and data approached resulted in a multidimensional analysis that allowed for an understanding of the correlation between different factors and complemented the existing data with a bottom-up perspective.

[2] In North Africa, a *ksar* is a fortified village, usually with adjacent buildings, a mosque, and a granary. In Mhamid oasis, there were six ksars, after which parts of the oasis were named.

19.4 Area Description

19.4.1 The Environment and Its Changes

Situated next to continuous desert and Algeria, Mhamid Oasis is the last of six oases in the Draa Valley. In the desert climate where temperatures can exceed 50 °C and fall below −5 °C, and where average yearly precipitation is below 50 mm (Ait Lamqadem et al., 2017; Bentaleb, 2018; Johannsen et al., 2016), oasis agriculture is strictly dependant on irrigation. Before 1972 when the Mansour Eddahbi Dam was constructed, the main source of water for irrigation of fields in the oasis was the Draa River. As its sources are located in the High Atlas, its flows were strictly dependent on the timing of snow melting and autumn rainfalls (Klose, 2013; Pletsch, 1971). The river flows were also essential for recharging the alluvial waters, which were the source of additional irrigation water for the local population. After the construction of the Mansour Eddahbi Dam, both melting snow and autumn rains were first used to recharge the dam reservoir. Due to climate change and resulting variability, the time of rainfall and amount of precipitation significantly decreased along the entire river basin and drought years became more frequent (Schulz et al., 2008). The quantity and quality of water accumulated in reservoirs is additionally influenced by evaporation, which may reach even 3000 mm/year (*La Region De Draa – Tafilalet Monographie Generale*, 2015). In the case of the Mansour Eddahbi Reservoir, this means a loss of approximately 24% of the water volume of the dam reservoir (1980–1999 average) (Benmohammadi, 2001). Further, high evaporation promotes the accumulation of salt in the reservoir itself, and subsequently in the soil, leading to secondary salinity, which in turn results in deterioration in the quality and size of crops (Dłużewski & Krzemień, 2003). Evapotranspiration is also influenced by two dominant winds: the North-Eastern dry and hot Chergui, and South-Western fresh Sahili (Ait Lamqadem et al., 2017; Bentaleb, 2018).

All these factors have meant that since 1972, both the quality and quantity of water reaching Mhamid has decreased. Five times a year, the oasis received water supplies from the dam for irrigation. This was significantly less than assumed at the time of the dam's construction, and much less than before its construction when the Draa River had a periodic character (Karmaoui, 2015; Sobczak, 2008, 2012). According to preliminary estimations, with a water discharge of 300 NM/year, approximately 250 NM/year should be used to irrigate the fields below the dam (IMPETUS, n.d.). During years when the reservoir is not sufficiently replenished, water deliveries are limited both in terms of the time of the first flow and the amount of water reaching the oasis. Timeliness of rainfall and irrigation are vital for the quality of crops. If they start too early, the grain will be defective, if too late, it may dry out (Dłużewski & Krzemień, 2003).

Due to limited delivery of both surface and alluvial water, the first water level decreased and became saline. As far back as 1967, the depth of the groundwater table varied from 2 to 8 meters (Pletsch, 1971), in 2005 it was 3 to 12 meters, and in 2015 it ranged from 6.5 to 17 meters (field observations). Deeper wells necessitate

mechanical pumping, and the number of such wells increased from 10 in 1977 to 60 in 2005 (Heidecke, 2009; Heidecke et al., 2008). This solution is expensive, so only slightly over 10% of the fields are irrigated with these water resources (Dłużewski et al., 2017). Further climate scenarios show that available underground water will decrease significantly by 2029 and will not meet the growing demand for irrigation, especially during years of drought (Johannsen et al., 2016).

Due to limited access to underground water, the vegetation cover of Mhamid Oasis decreased by 23% between 1984 and 2017 (Lamqadem et al., 2019), which facilitated deflation of the material. As a consequence, Mhamid struggles with the advancement of aeolian forms, which encroach on fields and houses and hamper local activity (Ait Hamza et al., 2009; Sobczak, 2008).

As for the quality of the soil, it is sandy and fertile. However, irrigation of fields with mineralised waters increased soil salinity and its further degradation, which significantly affects crop quality. Another challenge is the spread of a fungal disease of date palm trees called *bayout* (Benzohra et al., 2015), which limits income from the traditional cultivation of date palms. All this significantly limit agriculture's ability both to provide a source of income and to meet the needs of the decreasing number of oasis inhabitants.

19.4.2 Social Background

Inhabited mostly by the Aarib tribe, Mhamid is an old, traditional oasis on a former trade route to Timbuktu, dating as far back as 3000 BC. Already then, circulation of people was a constant element of the life of the inhabitants, although migration to Europe from Mhamid developed later than in other Maghreb regions. Operating in the 1970s, Morgha, who recruited tens or even hundreds of people in other areas of Morocco, chose only a few persons from Mhamid. Therefore, the migration of the 1970s and 1980s was mostly internal (information from interviews).

In the 1970s, Mhamid faced an increase of inhabitants due to both a demographic boom and the settlement of breeders who established the main habitats for their families in the oasis (Amsidder et al., 2021). In 1971, the oasis reached a population of 9090 (Ait Hamza et al., 2009). Such a change in the number of inhabitants increased the pressure on meeting their growing needs. However, already in the 1980s, due to a high emigration rate, the population started to decrease, falling to 5857 in 2014 (RGPH, 2019a).

Year	Number of inhabitants	Number of households
1960	7406	1376
1971	9090	1463
1994	8508	1129
2004	7764	1088
2014	5857	906

Source: CMV-ORMAVO (2004), RGPH (2019b), and Ait Hamza et al. (2009)

Today, youth below 15 years of age comprise 30% of the total population of Mhamid where people of working age make up 63% of its inhabitants. Such an age division places great economic responsibility on the latter group. Yet, limited work opportunities mean unemployment is high, reaching 74% among women and 59% among men. High unemployment translates into a demand for mobility. People migrate to increasingly urbanised communes along the Draa and the Dades rivers. These regions offer income alternatives, particularly in the tourism sector, to subsistence agriculture (Rössler et al., 2010). As migration is undertaking mostly by males in Mhamid, the number of women (3156) exceeds the number of men (2701). The high migration rate is the main reason for the negative population growth in Mhamid (RGPH, 2019b).

Also significant is the differing education level of women and men. Most women are not at all or poorly educated (48% with no education and 22% with primary education). Among men, the situation is slightly better as 23% receive no or primary education, and 52.1% finish at least secondary education (RGPH, 2019b). Such an education structure influences possibilities for employment both outside agriculture and in the broader Mhamid Oasis.

19.5 Transformation of the Oasis Through Environmental Changes—Bottom Up Perspective

In everyday life in Mhamid, the deep intertwining of water and community comes to the fore. Since the dam was built, water to Mhamid has been delivered five times a year. If there was a great deal of rain and the dam was full, in October—the first month of the agricultural year—water flowed to the oasis. However, due to insufficient rainfall and rising water demand above and around the dam, water supplies have become increasingly limited in terms of both intensity of flow and frequency of discharges, as an interviewee explained:

> *In the past, there was always water. Now [2016], from the dam you can only have water 3 or 4 times a year. (HC152)*

The influence of the change of flows on the ecosystem, particularly on access to alluvial waters, is visible and obvious for oasis inhabitants, who remember times when there was water in the riverbed. One of them reflected:

> *Before the dam, the wells were shallow, maximum 1 m deep. Each rain caused water to flow in the riverbed. Additionally, in the summer there were small springs in the riverbed. They caused the formation of lakes, which also provided water to the oasis. There were a lot of birds. There was Iriki Lake. (HB141)*

Over the past 50 years, the groundwater level has dropped significantly from 1 m in the 1970s up to 15–16 m now (2016). Those who can afford it try to dig deeper, looking for water of better quality, but this further influences the levels of the shallower wells. As the quality of water decreased as well, the irrigation with saline

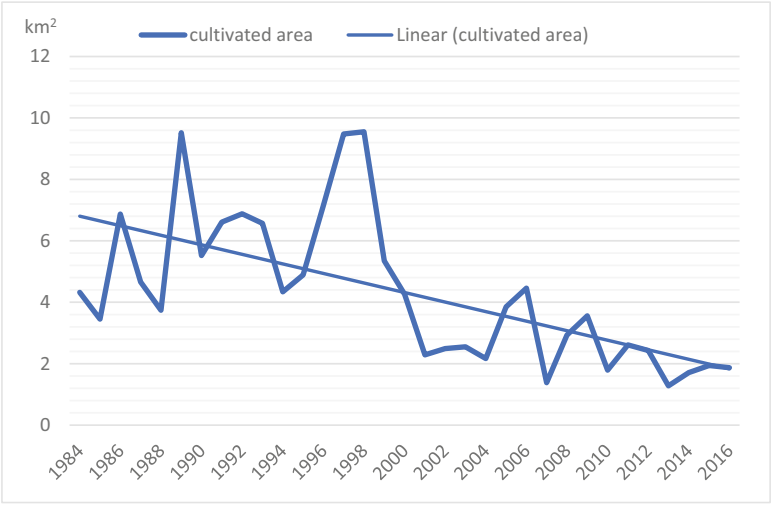

Fig. 19.2 The change in cultivated area in Mhamid Oasis between 1984 and 2016. (Calculated by K. Skocki)

waters influence soil quality. Economic reasons (high costs of pump operation) are mentioned much more often as the reason for the abandonment of irrigation than environmental ones (poor water quality). Lack of water contributes to a reduction of both the cultivated area (Fig. 19.2) and the diversity of crops. In the oasis, vegetables are not cultivated any more, even those grown for the inhabitants' own needs.

In time, the challenges for agriculture increased. The most recent one stems from the construction of the Ouarzazate Solar Power Station (OSPS), also called the Noor Power Station, near the Mansour Eddahbi Dam. This further limited water delivery and worsened the situation, as one of our interviewees explained:

> *Last year [2015], there was water from the dam. The first was in December, the last in July. Usually, the first water came in October. But for three years they have not released water in October because they have built a farm of solar panels near Ouarzazate and that consumes a lot of water. (. . .) The solar farm uses so much water that there is not enough for agriculture. (Mhamid HC1)*

Currently, none of the farms cultivate the entire agricultural area belonging to them. The most common reasons for this are the insufficient water in the discharges and the distance of the fields from the irrigation canal and the house. Usually, the *kaid*[3] receives information on the amount of water and, on this basis, farmers decide on the size of the fields that should be prepared for sowing. If a small amount of water is to be let from the dam, the selection of fields to be cultivated is determined by their proximity to the irrigation canal and the farm. In the interviews, farmers explained:

[3]The head of the commune.

> *I don't farm there* [3 km east of Talha, one of Mhamid's ksars] *because there is no water, and it's far away and I'm tired, I don't want to go there. It's hard to go that far. (HH44)*
>
> *There was no water in September, October, and November [2016]. This means that the year will be worse, so we have only prepared fields near* [home]. (HC1)

Finally, there are not enough people willing to work in the fields. Those who had been taking care of the farm have grown old and the youth have left or have other jobs. People who found employment outside agriculture are not able to support their family in carrying out even seasonal work in the field:

> *All current members of the farm who could work* [in the field] *have left. [...] There is no one to work, there are no conditions. (HH20)*

These statements by Mhamid residents illustrate that with the construction of the dam they had to face a profound transformation of the local ecosystem on which their livelihood depends (cf. Duarte-Abadía et al., 2015). The changes they mention, such as the disruption of water flows, or water use systems, should be understood as a re-patterning of the existing hydro social network and thus conceptualised inseparably from concomitant social changes such as leaving in search of work. Therefore, to understand the complexity of the impact of the dam on the oasis, it is necessary to trace the attempts to adapt to new environmental conditions, including emerging patterns of (im)mobility that emerged with the effects of the dam and began the process of reformulating local social structures.

19.6 Transformation of Local Society Through (Im)mobility

In the analysis of the changes taking place in Mhamid Oasis, a local lens on the concept of community is applied, which, as the collected data indicate, is co-created by forced (im)mobility. In Mhamid, we can observe the complexity of the (im)-mobility decision framework, including attachment to places and societies in which the inhabitants live.

Income in Mhamid has been strongly influenced by the changes in the environment, which have pushed inhabitants towards the so-called *patchwork economy*, more and more typical for households that rely on agriculture in fragile arid and semi-arid areas (see e.g., Sobczak-Szelc & Fekih, 2020). Looking for sources of revenue outside of agriculture, inhabitants of Mhamid primarily found them in the army and in tourism. Changes in the global economy, first due to the 2008 economic crisis and then the Arab Spring in 2011, influenced tourism and resulted in a further worsening of the economic situation in the region and lack of possibilities for in situ diversification of income. In 2016, over 90% of the households investigated in the survey reported at least one source of income other than agriculture, and over 54% indicated two or more additional sources of income. These sources of additional revenue were also more diversified than in the past. Still, employment in the army (68%) was the most reported, with other services also being significant (23%). The

importance of tourism decreased and was equal to the role of the construction sector (17%). The main sources of additional income became migration and remittances from those who left for the big cities of Morocco (65%).

Mobility as part of the *patchwork economy*, which allowed earning additional resources, was visible already in the 1970s when the effects of the dam's construction in conjunction with a drought caused the departure of a brother of one head of household, who revealed:

> *Before the dam was built, we cultivated all the fields, and there were a lot. After the dam was built, there were years with rain and dry years. (...) There was a drought for 5 years. In 1977, I left. There was no river, no water, no rain, you had to go away to live. (HB141)*

Another interviewee mentioned in his testimony:

> *The reason for (my) departure was the drought. There was a drought, everything was dry, there were no dates. The drought appeared when the dam was built. Then the Oued Draa dried up and there was no water for 6–8 years. (HH142)*

With time, agriculture became rather a traditional and sentimental endeavour than the main source of income. Young people do not want to work hard on the farm and wait for water and uncertain wages. Instead, they look for other solutions to meet their needs and aspirations, as explained by a father of two sons:

> *You can't work anymore in agriculture due to climate change. One year is good and then you have 5–10 years of drought. That's why my sons won't stay here. (. . .) In Mhamid, a large amount of water is occasional. It is unprofitable to quit your job for one moment that there is water. The sons decided that they would not stay here, because if it is good for two years, it is good, but then the drought will come and there is no job. (HH44)*

Few have the chance and opportunity to go abroad. However, it happens mainly thanks to marriages with citizens of European countries, such as tourists or daughters of former emigrants.

Some similarities are visible between the migration of the 1970s and 1980s, and that of today. Migration is also the domain of young men aged around 21 who move to the large cities of Morocco, such as Casablanca, Tangier, Marrakesh, and Rabat. Nearby towns are destinations for migration due to family and neighbourly contacts. Sons, like their fathers, return home during holidays and maintain permanent economic ties with family farms. However, unlike in the past, today's migrants more often make their own decisions, not always in accordance with their parents' will:

> *Father wanted* [the brothers] *to stay and help in the field, but they did not want to. The brothers went to Casa because they wanted to work and have money, they didn't want to work hard on the land and wait for water. (...)* [Before leaving] *they did nothing, they were unemployed, so they went. They earn money to live. (. . .) If there were any other work than agriculture here* [in Mhamid]*, they would stay, or they would come back. (HC141)*

Cultural conditions and the structure of the farm affect the duration and termination of mobility. Families where women are left without a male guardian are very rare; if the only man in the family leaves, the likelihood of his long-term mobility is low. Starting a family outside of Mhamid or the departure of all its members severs

economic ties with those who remain in the oasis. In fact, it means that migration becomes constant. An extreme example is the ksar Oualad Mhaya where the number of families decreased from 140 in the 1980s to 34 today. Current residents say that these families left due to both lack of water and the encroaching sand, which began to cover the fields.

At the same time, cultural conditions and traditions prevent the inhabitants of Mhamid from selling their fields. It is perceived as better to find someone who will cultivate them rather than sell the children's heritage, as one interviewee indicated:

> *We are looking for someone who will lease a field and share the crops, but no one comes forward. (. . .) If we don't find them, we just leave the field. (...) We will not sell the land because it is the result of the father's division. Because we have children, and this is their inheritance. (HH126)*

Some of the youth have a long-term plan to invest in improving their qualifications through vocational training and studies. This group also comprises women, although they are decidedly a minority. Some of them will have the opportunity to return to Mhamid, although most are likely to leave for good and live in different parts of Morocco.

In the case of Mhamid, mobility used to be part of an adaptation strategy that was to make it possible to obtain income and gain additional sources for investments that would allow the development of further adaptation strategies (see also Stoler et al., 2021). Now, mobility has become the last resort (environmentally forced migration) (Ionesco et al., 2016; Renaud et al., 2011) because for many people, it is not possible to continue living in Mhamid. Those who leave, root themselves in new areas and, as soon as they start a family there, their main interest is no longer centred in Mhamid. The remittances have become limited as well, which decreases the mitigation and adaptation possibilities of those who remain. Thus, Mhamid is an example of people becoming both stuck and pushed out by the changes taking place in a community that is located far from an investment meant to be developmental.

19.7 Discussion Projections

In the concluding discussion, we reflect on the community transformation and importance of its categorisation in the context of forced (im)mobility under environmental change induced by a faraway development investment. This leads us to revisit the issue of benefit-sharing, particularly in the region of the Mediterranean where a growing number of investments are funded by European or international organisations.

Those who are resettled due to development are categorised using various terms—internally displaced person (IDPs), development-induced people (DIP), development-induced displaced (DID), or development-caused forced displacement and resettlement (DFDR). The definition of those terms partly overlap, as most of those displaced due to development lose their homes and assets and are forced to

move (Polzer & Hammond, 2008). Discussion over their rights to compensation and benefit-sharing is pending. However, those who are at a distance from the investment remain on the margins of this discussion. In their book, Jesper Bjarnesen and Simon Turner (2020) discuss the issue of 'blind spots' in policy regarding (forced) migrants. They focus mostly on those who do not fit into the category of 'directly displaced' or 'displaced for development', but who are displaced indirectly. The authors indicate that 'displacement by development takes place when people are excluded from use of territory on which they relied' (2020). This includes exclusion of the territory that constituted the basis for their survival and income, even if they do not lose their homes directly. In other words, mobility is not the only condition for being included in one of those groups, and there is a call for inclusion of this group in the IDP category. Contrary to those who have lost their homes, forced mobility of those who face the loss of their assets can be prevented by increasing their ability to mitigate changes taking place in the environment, and to adapt to the new situation. Therefore, there is a clear need to develop policies at different scales that support in situ adaptation for those who choose to remain. With such an approach, even the potential future risk of deterioration of living conditions should be enough to include people affected by development in the *benefit-sharing* system.

Also, Mhamid does not fit the most-often-used categories of areas affected by such investments, although results of the research show socioecological impacts of the dam's construction and further investments on this community situated 300 km away. Mhamid is just one of many examples where such infrastructure is presented as progress and the *national common good* receives higher priority than the *local common good*, and where users rarely receive a benefit-sharing guarantee, if they are included in the compensation system at all (Duarte-Abadía et al., 2015). This is a double structural exclusion, both during the planning regarding potential consequences of the investment and in the later benefit-sharing when changes occur.

This chapter shows the necessity to include those who are forced into (im)mobility due to development investments in the discourse, policy, and practice. This change is particularly important as the frequency and number of forced displaced are increasing, and most countries of the Global South lack 'protective, robust, and binding legal frameworks' (Cernea & Maldonado, 2018, pp. 4–5). Changes in the environment, life quality, and culture should justify the inclusion of populations living in distant, nonetheless affected areas, and their rights to *distant benefit-sharing* should be recognised. This should be grounded in recognition and protection of human rights. Such extended *benefit-sharing* should mitigate the negative consequences of an investment in all aspects: economic, cultural, and environmental. The proposed approach is even wider than the "resettlement with development" defined by Cernea and Maldonado (2018) as it completely reframes the idea of *benefit-sharing* or *hydropower-benefit-sharing* (Schulz & Skinner, 2022), extending it according to the scope of its influence, which may change over time. This perspective gives an additional argument in the discussion undertaken by Bjarnesen and Turner (2020) regarding the visionary limitations of those who design large investments associated with the displacement of thousands of people. Such investments are repeatedly implemented with insufficient or even erroneous

estimations of the long-term effects, whether spatial or temporal. If significant steps are not taken to change the social differences between various types of beneficiaries of development, the effects will multiply (Price et al., 2020, p. 456).

19.8 Conclusion

The research conducted in Mhamid shows the strong impact of one dam's construction on the deterioration of living conditions of the oasis inhabitants as changes in the environment and limitations regarding agriculture push people to seek for different sources of income through mobility. Unpredictability discourages inhabitants from continuing to work in agriculture. While limitations regarding the natural environment (low quality and quantity of water, and accumulation of aeolian forms in the fields) affect the decision to leave, the nature of migration (temporary or permanent) is influenced by age, gender, and family situation. In the past, migration made it possible to create patterns of behaviour that, given the current limitations of the natural environment, facilitate the decision to leave. The risk related to farming reduces the likelihood that those who have left will ever return. The condition for returning or staying is the possibility of finding a job other than in agriculture on the spot. Those who stay or wait their turn to leave, remain either due to social norms (women and those caring for children or the elderly) or because they have other sources of income (military, retirement or other services). Without adequate *distant benefit-sharing* local development is impossible and inhabitants are forced to move to other regions of Morocco or, if possible, abroad.

The Mediterranean is particularly attractive for different power investments, both hydro and solar. They will continue to influence the living conditions of both local and more distant societies. Depending on the approach implemented when it comes to compensation and benefit-sharing, there may be different regional development and migration scenarios. The cultural context is also significant here, as without its proper consideration, even well-intentioned mitigation measures can foster unintended impacts (Hanna et al., 2016; Vanclay, 2002, 2012).

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