044468

EACH-FOR
Environmental Change and Forced Migration Scenarios

Specific Targeted Project
Scientific support to policies – SSP

Deliverable reference number and title : D 2.5.2.3

Morocco

Case Study Report

Due date of deliverable: 31.12.2008
Actual submission date: 28.3.2009

Start date of project: 01.01.2007
Duration: 2 years

Organisation name of lead contractor for this deliverable: EUR

Project co-funded by the European Commission within the Sixth Framework Programme (2002-2006)		
Dissemination Level		
PU	**Public**	PU
PP	**Restricted to other programme participants (including the Commission Services)**	
RE	**Restricted to a group specified by the consortium (including the Commission Services)**	
CO	**Confidential, only for members of the consortium (including the Commission Services)**	

EACH-FOR is a project funded by the European Commission, by SERI (Austria) and by ATLAS Innoglobe (Hungary)
Project website: www.each-for.eu

Morocco

Case Study Report

"Migration and environmental change in Morocco : The case of rural oasis villages in the Middle Drâa Valley"

Responsible Institution: Erasmus University Rotterdam (EUR)
Authors: Mohamed Ait Hamza, Brahim El Faskaoui and Alfons Fermin [1]

1. INTRODUCTION

In March 2008.empirical investigations were conducted in two palm groves of the Middle Drâa Valley (M'hamid and Ktaoua) on the fringes of the Sahara desert in Morocco to test the EACH-FOR hypotheses with regard to the relation between environmental degradation and migration. This report presents and analyses the fieldwork findings (Chapter 3). The case study methods and the selection of the case study site are discussed in Chapter 2. To understand and analyse the results of the fieldwork, background knowledge on the socio-historical, socio-economic and environmental contexts is indispensable. This background information is presented in this chapter. The first subsection sketches the physical and human contexts of the case study area, while the subsequent one presents some information on the Moroccan migration context. The third section of this chapter describes some salient environmental problems and changes in the case study area.

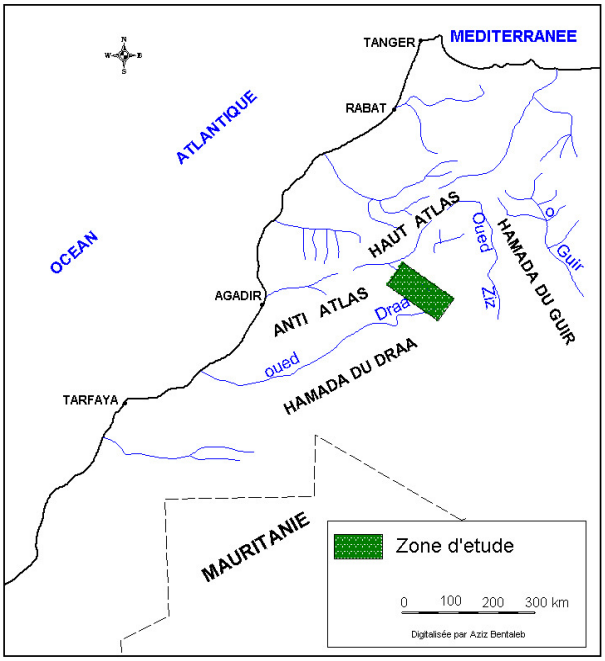
1.1. Synthesis of context

1.1.1. Physical context

Morocco is situated at the northwest of the African continent (See Figure 1; and Figure 4 in the Annex). In terms of topography, mountains occupy a large part of the country.

[1] The case study research has been subcontracted by the EUR to M. Ait Hamza (Director of Historical & Environmental studies Centre of the Royal Institute for Amazigh Culture in Rabat, Morocco). Mr. Ait Hamza has undertaken the research together with B. El Faskaoui (Professor of Human Geography, Moulay Ismail University; Meknes, Morocco) and they have written a Case study report in French. This case study research has been supervised by Prof.Dr. Han Entzinger and Dr. Alfons Fermin of the Erasmus University Rotterdam. Alfons Fermin is responsible for this English, shortened and edited version of the Case Study Report (including some additions).

Figure 1 Map of Morocco and case study area (= *zone d'etude*)[2]



The country has a differentiated Mediterranean climate, with oceanic influences prevailing in the northwest, while in the south and southeast of the High Atlas and Anti Atlas Mountain ranges the continental, Saharan influences dominate. This results in a huge bioclimatic diversity. Given these geophysical conditions, almost all biological life is concentrated in the northern part and in the oases along the rivers (*Oueds* in Arabic) and water ponds in the southern part of the country. The oases of Tafilalet (, along the river Ziz; see Figure 1) and of the Drâa (also spelled Dra or Draa), constitute Morocco's most important palm groves.

In the Drâa Valley a river of the same name (*Oued* Drâa) flows from the Atlas Mountains southwards to Ktaoua and from there westwards to the Atlantic Ocean. The Upper Drâa is part of the province of Ouarzazate. The middle part of the water catchment is part of the province of Zagora and consists of 6 palm groves (Mezguita, Tinzouline, Ternate, Fezouate, Ktaoua and M'hamid; See figure 2). The Lower Drâa, after M'hamid, is predominantly a dry river bed. The river is lost in the desert sand and has not reached the Atlantic Ocean near Tan-Tan for decades. The former lake Iriqui (or Lac Irigui / Iriki) is now a desiccated salt pan. Ktaoua[3] and M'hamid[4] constitute the southernmost palm groves of the middle Drâa Valley. They are located on the edge of the Sahara with an arid climate, and constantly threatened by drought, salinity, sand advancement and locust invasions.

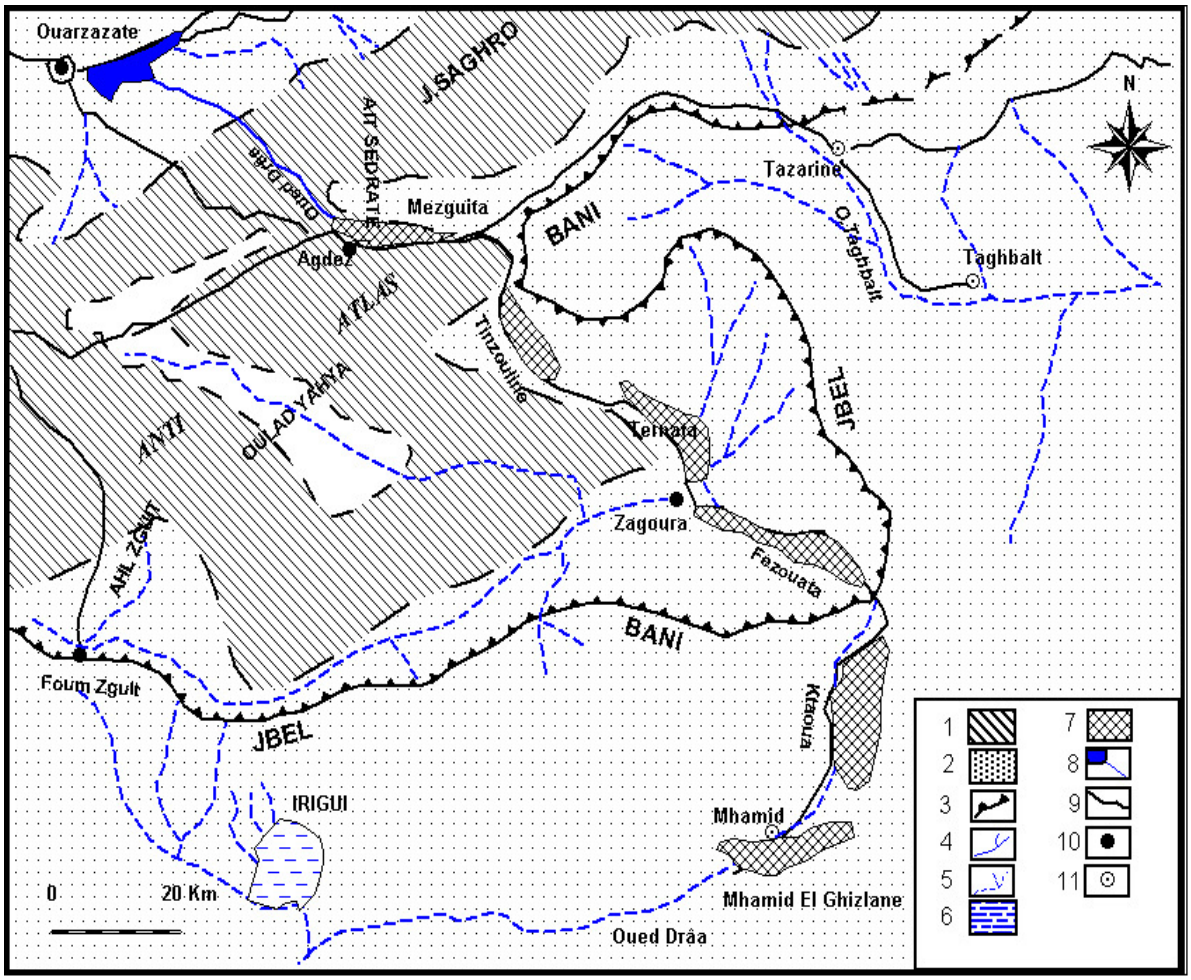
---

[2] NB: Hamada is type of barren, rocky desert landscape; Oued = river.

[3] The palm grove Ktaoua (or Ktawa) is also referred to by the name of the *Commune* (= municipality) Tagounite. The two names are used in this report to refer to the same palm grove. The rural centre Tagounite, that hosts the seat of the *Commune* was founded in the last administrative division of 1992

[4] M'hamid (or Mhamid) is also known as M'hamid El Ghizlane (El Ghizlane = of the antelopes)..

Figure 2 Map of the Case study area



Sources : Topographical map of Zagora province, with added personnel measurements (2005) by the authors ; B. El Faskaoui 2007.
1. Mountain massif, 2. Plateaus and plains, 3. Summits of the Jbel Bani Mountains (*Jbel* = mountain), 4. Permanent river (*Oued* = river), 5. Temporary river, 6. Salt pan (*Sabkha*), 7. Palm grove, 8. Barrier (Mansour Eddahbi reservoir), 9. Paved road, 10. Provincial capital, 11. Urban-rural centre.

1.1.2. Socio-historical and political context

Because of its strategic position on a Saharan caravan route between the Sahara and the north of Morocco, and due to the importance of its resources, the Drâa Valley has been highly attractive to people of various origins throughout its history. This resulted in a considerable ethnic mixing. The *Draoua*[5] (the black population), supposed to be the natives, constitute the core of the local population. Since the 13th century, in order to protect against incursions by the Arab Bedouin tribes of *Maâqil*, the indigenous peoples

[5] *Draoua* (plural of Draoui): derived from the word *Dra*. The word means the populations living in the Valley of the Drâa. By extension, the concept refers to all black populations of Saharan or sub-Saharan origin (also called *Haratin*), who are generally known for being attached to agricultural land without possessing it.

called on the help of the *Ait Atta*[6] as well as the *Ait Sedrate*[7] for protection. The first came from the Sahara and Saghro regions, the latter likely came from the north. The protection given by these tribes to the local population was often exchanged for a part of the territory, goods and sovereignty.

In the same context, a number of brotherhoods (*zaouias* or *zawiyas*) moved into the valley. The *Chorfa* (plural of *Cherif;* descendants of the Prophet) are *marabouts* affiliated with these *zaouias* and they played the role of mediators, social administrators and religious preachers. Due to their status as social and spiritual leaders, the *Chorfa* were often able to avoid manual labour.and lived off of the offerings and the goods left by the faithful pilgrims.

The Jewish merchants and craftsmen also have marked the history of the valley. According Ch. De Foucauld (1888: 295), the palm grove of *Ktaoua* had two *mellahs*[8] while the palm grove of M'hamid had one *mellah*. In 1936, approximately 1169 Jews lived in the two palm groves.

Furthermore, in the 1960s the Sahrawi nomad Arabic tribe of Aaribs, that habitually crossed the Sahara with their camels and goats, were forced to settle in the oases due to the 1963 border conflict between Morocco and Algeria.

Situated in this ethnically mixed valley, the palm groves of Ktaoua and M'hamid therefore inherited a very diverse socio-ethnic and hierarchical structure. The *Chorfa marabouts* are at the top of the pyramid, followed by the *Imazigh* (white) nomadic tribes and at the base are the *Haratin* (*Draoui* or *Issoukiyn,* the black oasis dwellers) and the Jews. The linguistic map follows the same contours and complex situation: Arabic, Berber[9], and Hebrew.

Social promotion stimulated by schooling, internal and international migration, and the presence and growth of urban centres (of Tagounite and M'hamid) contributed to the alleviation of this hierarchy based on social status. Nevertheless, we can still notice the features of this hierarchy consciously and subconsciously in the community. For example, each social class has its own neighbourhood mosque within the villages (*ksars*[10]). Its traces are also

---

6 The *Ait Atta* constituted a tribe or a confederation of mainly nomadic tribes that arrived from the Sahara in this region. They are organized in confederations on a territory that spreads up from the Tafilalet, to the High Atlas and to the plains of Tadla and El Haouz in the north of the Atlas. NB: *Ait* means "people of", thus in this combination: people who trace their ancestry to a man named Atta.

7 The *Ait Sedrat* tribe is a *makhzen* tribe (*makhzen* is a term used for the governing elite in Morocco), which migrated to the south to protect the Draoua. In the Drâa valley they live nowadays in the palm grove of Mezguita.

8 *Mellah* indicates a separate Jewish quarter or neighbourhood. The two *mellahs* of the palm grove are located in the *ksars* (fortified villages) of Beni haioun and Bni Sbih.

9 Instead of Berber, we use Amazigh language. Amazigh (plural: Imazigh) when referring to people may signify 'white' or pale skinned people in opposition to the black population of *Haratin*. The Ait Atta and Ait Sedrate are both of Amazigh origin.

10 Ksars (or ksur/qsur, plural of qsar): villages in the Atlas and southern of the Atlas; traditionally fortified villages of attached houses and collective granaries constructed from adobe, but the term is also used for modern villages in this region.

noticeable in the geopolitical space (administrative divisions)[11]. These divisions come to the surface in daily life in concerns such as management of water, land tenure and community housing and especially during events such as elections, weddings and cultural events.

1.1.3. Demographic overview

There are several specific factors of relevance to the demographic development of the two palm groves area. The two palm groves are near the Moroccan-Algerian border and in the early sixties, they, especially M'hamid,were the battleground between Morocco and Algeria (the Sands War of 1963)[12]. This resulted in the departure of many families, but also the arrival and installation of several military contingents. Furthermore, the departure of the Jewish community took place at the same time.[13] Moreover, it is difficult to count the nomadic population. They are not always included in the census. Notably, the severe drought in the early 1980s had a very negative impact on the livestock husbandry, resulting in an accelerated settling process of nomads (Table 1).

Table 1 Nomadic population of M'hamid and Tagounit / Ktaoua (1960-1994)

Year	1960		1982		1994	
	Households	Pop.	Households	Pop.	Households	Pop.
Number	269	1508	370	2795	141	1143

Source: Recensement Général de la Population et de l'Habitat (RGPH), 1960 - 1982 – 1994

However, while the drought had negative impacts on the vegetation and wildlife, they have stimulated desert tourism. The M'hamid palm grove became an important tourist destination for lovers of adventure tourism, camel riding, hunting etc. and it offers nowadays a range of hotels and Bedouin camps for these purposes. The nomad festival of 20 to 23 March each year for example, is an event organized to attract tourists. However, despite the increase in tourism, the population of both palm groves continues to decrease (Table 2).

[11] During the communal division of 1992, the Ktaoua palm grove was divided into two municipalities or *communes*: the *commune* of Tagounit whose population is in majority composed of Draoua and the *commune* of Ktaoua with the dominance of Ait Atta.

[12] The border disputes between Morocco and Algeria are still unsolved, and part of the border near the case study sites is still disputed. The borders between both countries have been closed several times (after the Sands War, after Morocco's Green March to the Western Sahara 1976-1988, and since 1994). Fighting terrorism, but also the dispute over the Western Sahara are main motives for the tensions between both countries. See: 'Chronology: Border disputes highlight Morocco-Algeria rivalry", Reuters.UK, Dec. 3, 2007. http://uk.reuters.com/

[13] In 1960, 877 Jews were living in the *Cercle* of Zagora (Province of Zagora since 1997). The two palm groves of Ktaoua and M'hamid counted 345 Moroccan Jews emigrated massively to Israel and other countries (incl. France) after the foundation of the state of Israel in 1948 and the Six Day War of 1967.

Table 2 Population of the two palm groves

Year of census	M'hamid		Ktaoua[14]	
	Household	Population	Household	Population
1960	1376	7406	3105	17195
1971	1463	9090	3056	19893
1982	1195	8671	3027	24780
1994	1129	8508	1853	16688
2004	1088	7764	2210	17553

Source: Recensement Général de la Population et de l'Habitat (RGPH) 1960 ; 1971 ; 1982 ; 1994 and 2004 ; National Statistical Office, Rabat.

A comparative analysis of the figures recorded between 1994 and 2004 shows a clear decline in the population of the two palm groves if compared to the provincial and the national level (Table 3).

Table 3 Population growth rate between 1994 and 2004

Region	Tagounite	Ktaoua	M'hamid	Prov. Zagora	Total Morocco
Rate	0.5	0.1	-0.9	0.9	1.4

Source : Recensement Général de la Population et de l'Habitat (RGPH) 1994 and 2004

Between 1971 and 2004 the two palm groves had lost a total of approximately 3666 people, which means that every year on average 111 persons left. If the same comparison is made solely for the rural population between 1982 and 2004, the result is more disturbing. In fact, M'hamid passed from 8671 to 7764 inhabitants and Ktaoua from 24,780 to 17,553 with a loss of 907 and 7227 inhabitants respectively.

The indexes of fertility in the year 2004 (3.4 for Ktaoua and 2.9 for M'hamid) show that the rate of natural increase is still very high. The age distribution of the population shows that the ratio of young people, compared with the total and the rural population of Morocco, in general, also remains high (Table 4).

Table 4 Population structure by age

Age Area	Under 6	6 to 14	15 to 59	Over 60
Tagounite	14.0	26.2	52.4	7.3
Ktaoua	14.3	27.1	51.1	7.4
M'hamid	12.6	26.0	53.0	8.4
Rural Morocco	13.1	21.7	56.6	8.6
Total Morocco	11.8	19.4	60.7	8.1

[14] During the administrative division of 1992, the palm grove of Ktaoua was divided into two rural *communes* or municipalities. The *commune* of Ktaoua and the Commune of Tagounit. The *commune* of Tagounite consists of 21 villages and a small emerging rural centre, the commune of Ktaoua consists of 42 villages. The *commune* of M'hamid consists of 15 villages (ksars).

Source: Recensement Général de la Population et de l'Habitat (RGPH) 2004

The proportion of youth below 15 years is almost 40% of the total population. The proportion of working age people barely exceeds 52%. This shows the heavy burden on the working age population, which is exacerbated by the high rate of illiteracy (almost 49%) and the low rate of the labour activity (20.5 %).

As will be argued later in this report, the sharp decline of the rural population in the palm groves appears to be related to the severe drought experienced in the early 1980s and the negative effects of the construction of the El Mansour Eddahbi dam (1972) on the environment, particularly agriculture. The decline of the rural population is also related to the increase of needs driven by the process of opening of the oasis to the wider world due to migration, the media, urbanization, and tourism.

1.1.4. Economic context

The oasis agriculture and forms of adaptation

The oasis economy is closely linked with the agricultural sector, which has been a form of adaptation for centuries. The oasis area that is constituted by the palm groves of Ktaoua and M'hamid contains two main parts that are economically and legally differentiated: the oasis or cultivable part, and the part outside the oasis, mainly reserved for collective rangeland for extensive livestock husbandry. Agricultural soils form a strip of land in the *wadi* (river bed) area. The new or old land abandoned by river courses is covered with loamy soil or sandy loam and forms a green strip along the river. Outside that green band, the land is collective and exploited mainly as rangeland. Only exceptionally, in rainy years, can the fertile flat infiltration basin (maâders) be exploited for seasonal cultures.

In the arid climate of the area, no agriculture can be practiced without irrigation. Irrigation water is essential for the constitution of the soils and for the exploitation of the fields. Because of its rarity, water is subject to a rigorous sharing scheme. Allocation is decided on the basis of ones participation in the mobilization of resources and on the basis of socio-economic status. Water can also be individually owned if located on ones property. Community management of water is a fundamental element of the oasis civilization (Ouhajou 1996; Ait Hamza 2002; Bencherifa and Popp 1990). Thus, despite the construction of a large dam upstream, the traditional division of water and land rights continues to paralyze the production structures in this region.

The fragmentation and the dispersion of fields constitute the dominant character of land ownership. Micro properties reign in the oasis; the area of holdings ranges between 0.5 and 5 hectares. Under the combined effects of old divisions and demographic pressures, more than 80% of the *fellahs* (farmers) own less than one hectare. Individual plots of farms (households) are usually small and scattered about different sites of arable land in a palm

grove. The number of parcels per farm is between 1 and 8 (See Table 5). The few farms that still have a respectable size are the newly established ones on the communal lands with water pumps. The establishment of these new plots in the oasis occurs by *de facto* privatization of communal or village lands. It is often a cause for disputes between sedentary and nomadic people.

Table 5 Structure of land holdings or ownership of Ktaoua and M'hamid

Palm grove	Land holdings	Agricultural Area Used (SAU): ha.	number of parcels	Number of parcels per land holding
Tagounite	1563	2673	1684	1,1
Ktaoua	1377	2441	12788	8,2
M'hamid	922	1280	7002	4,5
Total	3862	6394	21474	4,6

Source: Recensement Général de l'Agriculture (RGA) 1996

The trees, notably the palm trees, due to their economic and social importance, can also constitute a separate property title. A date palm tree can be owned by several tenants (inherited or purchased).

Production techniques remained traditional in general. Mechanization, given the very small size of the properties, the scattered plots and the constant presence of trees in the fields, is almost absent. Thus people tend to practice farming based on mixed farming in which trees and especially date palm trees are most crucial. The palm trees are considered as umbrellas that offer various crops underneath a favourable microclimate for their development. Below the palm trees are a variety of fruit trees (like olive trees, pomegranates, figs, almonds, peaches, and apricots), and below these are a variety of seasonal crops, such as cereals, vegetables, fodder, and vegetables. Thus agriculture and vegetation are organized by levels.

In such a context of scarcity and natural determinism, there are few products that are targeted for the markets. Only the dates and henna fall into a circuit of local and national markets. Agricultural production is mainly for home consumption and the region depends largely on imported products from the plains and plateaus of northern Morocco and even from abroad.

Due to the significance and the magnitude of physical constraints, irrigated agriculture is mainly based on human ingenuity and adaptability. In order to persist, the oasis people have developed strategies based on diversification of resources and soils, as well as community risk management. Traditionally, people focused mainly on mobile cattle herding (transhumance) and commerce as income yielding activities supplementary to farming. Today – due to the opening of the oasis and recurrent droughts - they are oriented towards migration and tourism as alternative complementary sources of income.

Cattle breeding as pillar in a mixed rural economy

In an environment as austere as the one in the pre-Saharan regions, survival requires perseverance and resorting to adaptation strategies. Coping strategies are mainly based on the diversification of resources to manage scarcity and risks. For example, mixed cropping; diversification of fodder resources (weeding fields, forage cultures, extensive cattle farming, etc.); complementarity between the sedentary lifestyle and transhumance; collective community herding; a nomadic lifestyle of part of the populations; complementarity of lands (different types of cultivation on different types of soils; private property and communal grazing lands); and diversification of types of livestock (camels, sheep, goats).

Mutual community aid is a necessary asset. Traditionally, the individual as such was not likely to withstand the natural hazards. The extended family, the lineage, the fraction, tribe or confederation of tribes are all institutions that help ensure that the individual meets his/her needs.

The colonial rule which substituted community administration has significantly impacted social organization and land distribution. The division of the territory, formerly based on the tribe and its mobilisation capacity, became determined by the political stakes of a foreign entity. The result was an increasing level of exposure of the individual to socio-economic and natural hazards. The former nomadic populations were the first victims of these transformations. Their settlement became inevitable.

Local people, who are ethnically diverse, developed different responses to the occupations. The Ait Atta[15] and the Aribs (or Aaribs) were mostly nomadic people. The first engaged in raising goats and camels. They had access to summer pastures in the High Atlas and winter pastures close to the Jbel Saghro Mountains and on the Saharan fringes. The Aribs had the tradition of criss-crossing the large Saharan ranges with their camels before they settled in M'hamid after border fights between Morocco and Algeria in 1963. The Draoui[16] are mostly attached to the land practice only sedentary farming. Their living conditions have greatly deteriorated as a result of recurrent droughts.

Table 6 Structure of livestock by municipality (Commune)

Commune	Land holdings	Cows	Sheep	Goats	Camels
Tagounite	1563	216	12572	4204	162
Ktaoua	1377	235	7852	19200	2080
M'hamid	922	51	5044	4925	2820
Total	3862	502	25468	28329	5062

Source: Recensement Général de l'Agriculture (RGA) 1996.

[15] The main branches of the confederation of the Ait Atta can be found in the two palm groves are the Ait Boudaoud and the Ait Isfoul.

[16] The Draoui consist of black populations that are often in very precarious socio-economic conditions. They are the population most affected by the rural exodus. There are numerous neighbourhoods that carry the name of 'douar draoua' (*douar* = village) within the cities of Casablanca, Rabat, Marrakesh and Kenitra.

In the oasis economy, livestock in general and sheep in particular, are part of the adaptation strategy. They are also an essential element for agriculture due to the production of manure. Sedentary livestock herding is linked to the presence of forage crops (alfalfa) and food derived from agriculture (straw, leaves, herbs, etc.) The *dmane* race of sheep is widespread and a unique asset of oases livestock farming. Goats are rather a specialty of transhumance movements from the peaks of the High Atlas, in summer, to the confines of the Sahara in the winter. The grazing rights are collective and administered by communal institutions.

Because of the harsh climate, cow ranching is difficult. The local breed is most prevalent. However, the milk and meat production of this local breed is very low. The enormous need for water and food for improved breeds of cows hinder their introduction near to the desert (in M'hamid).

The camels are one of the species well adapted to the bioclimatic conditions of the Saharan and pre-Saharan areas. Besides their importance for the local population for their supply of milk, meat, wool and leather, they are the most used means of transportation in these areas. According to specialists, the abandonment of this animal can be considered as the end of the nomadic way of life and as a form of adaptation to the local circumstances. The camels are more and more used as an element of attraction for the tourist caravan hiking trips, especially in M'hamid. Thus, despite the changes that were imposed by the new circumstances, livestock breeding remains an important activity.

1.2. Brief overview of migration processes

Morocco is a main source country of migrants especially for Europe. During the colonial era (1912-1956), there were already migration flows from Morocco to France. In the period of guest worker recruitment from 1962-1972, the magnitude of migration expanded dramatically while at the same time the countries of destination diversified. After the 1973 oil crisis most migrants did not return. Instead, massive family reunification followed in the 1970s and 1980s, followed by processes of family formation in the 1990s (children of guest workers marrying partners from their parent's home countries). In the 1990s and after, as a consequence of the restrictive immigration policies in Europe, the number of undocumented migrants from Morocco to new South European destinations such as Spain and Italy increased. In 2004, the largest population of Moroccan descent could be found in France, followed by Spain, the Netherlands, Italy, Belgium and Germany (De Haas 2007a). Since the mid 1990s, Morocco has developed into a transit migration country for a diverse group of asylum seekers and labour migrants from sub-Saharan Africa countries.

Emigration from Morocco is not evenly distributed over its regions. Main traditional regions of emigration since the start of the guest worker recruitment in the 1960s are the Northern Rif region, the Sous Valley and Agadir, and some southern Oases in the province of Ouarzazate (See Annex, Figure 4 for the main traditional and recent international migration zones). Emigrants from

the last mentioned Oases region came mainly from oases north of the Drâa Valley, namely: the Dadès Valley, Todgha and Figuig (De Haas 2003: 109-112). There has also been some international migration from the Drâa Valley in the past, but not a significant amount. For example, in the beginning of the 1960s, recruitment agents from French coal mines crisscrossed the Moroccan countryside. The most famous one, Felix Mora, was the originator of the migration of thousands of oasis residents in this region. During the last two decades, some new sending areas have emerged for international migration, in particular Khenifra in the Middle Atlas and south of Tangiers (De Haas 2003: 112-113).

Although international migration from Morocco is substantial, internal migration has always remained more important in numerical terms. Rural-to-urban migration is significant, as is habitually the case in developing countries. In Morocco, this type of migration is traditionally directed to the big cities on the Atlantic coast. Internal migration processes have become more complex. Intra-regional migration processes and the migration to growing small and medium-sized provincial towns are becoming of increasing importance (De Haas 2003: 113 ff.). These processes are linked to the decline of the agricultural sector and the development of numerous centrally located villages into urban centres offering non-agricultural employment within the rural regions (De Haas 2003: 113). Internal migrants are attracted by the better job opportunities but also by better services and public infrastructure in these provincial towns. In our case study area of southern Morocco, Ouarzazate is an important growing town attracting migrants from the region. Internal migrants in Morocco tend to work as day labourers on construction sites, in retail or street trade, and other service jobs in urban centres. As agricultural labourers they mostly work in commercial agriculture in fertile areas on the Western coast, including the Sous valley, around Fes and Meknes and along the northern coast (De Haas 2003: 115).

Emigration from the marginal oases like the one in the Middle Drâa Valley (province of Zagora) is predominantly of an internal character in contrast to migration from some of the less marginal oases in the province of Ourzazate (De Haas 2003: 114-115) . Migration from the Middle Draa Valley, the palm groves such as M'hamid and Ktaoua is predominantly of an internal and temporal character. However, as will be demonstrated later in this report, there are signs of a shift towards international and more permanent migration.

1.3. Brief overview of environmental problems

1.3.1. An arid and continental climate

The Valley of the *Wadi* Drâa (*Wadi* is a valley or (dry) riverbed) is located between the High Atlas mountains - with peaks over 4000 m high - in the north and the Saharan desert in the south. As a result of its local, the region is characterized by:

- high temperatures, especially between June and September (43 to 50 °C);

- strong thermal amplitudes (20 degrees in Tagounite)
- long hours of sunshine (between 3055 and 3078 hours/year)
- high rates of evapotranspiration (evaporation and plant transpiration) particularly during the summer.
- scarcity and the high inter-annual variability in precipitation.

In the Middle Drâa oasis there is a significant inter-annual and seasonal irregularity of rainfall, as well as a spatial decrease of rainfall from upstream to the downstream areas. Table 7 shows the inter-annual variability of rainfall; see Figure 2 for the locations of meteorological stations in Agd(e)z, Zagora and Tagounite. The Tagounite station located downstream - in the Ktaoua palm grove - records the largest differences (between 4 and 150 mm) with a very high frequency of years below the average (15 of 26). The wet periods are uncommon, while dry periods are characterized by their depth and frequency (1981-1982-1983 and 1984). The rain falls often in the form of concentrated aggressive showers.

Table 7 The inter-annual variability of precipitation (1980-2005)

Station	1980	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	00	01	02	03	04	05	averag
Agdz	136	42	62	14	8	118	38	70	183	119	172	62	75	77	49	168	140	82	46	51	32	42	47	46	91	44	77
Zagora	116	38	50	19	9	102	21	35	62	46	118	60	99	53	55	127	116	30	37	40	19	21	40	41	86	36	57
Tagounite	65	28	50	4	5	93	15	5	55	50	88	11	38	32	48	150	120	16	30	23	10	11	28	30	66	27	42

Source: Bentaleb 2008

Table 8 shows a clear concentration of scarce rainfall in autumn and in February, while the rest of the year is characterized by clear skies and frequent sand storms.

Table 8 Monthly variability of precipitation in the Middle Drâa (1980-2005)

Station	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Total
Agdz	4,1	11,3	11,8	10,0	3,5	11,4	7,9	5,9	5,7	3,1	2,3	0,7	77,5
Zagora	1,6	12,1	7,1	12,3	2,9	3,4	3,6	3,6	1,8	1,1	0,1	1,1	50,7
Tagounite	1,1	8,7	6,1	9,3	3,8	5,1	4,3	1,9	1,0	0,8	0,2	0,0	42,2

Source : Bentaleb. 2008

In sum, the prevailing climate characteristics of the region are:

- Scarcity and irregularity of rainfall;
- A low level of rainfall and a movement of isohyets (lines on a map connecting places with equal precipitation) of already weak rainfall to the north;
- The high evapotranspiration rate due to the frequency of storms and high temperatures which prevail in most months of the year in the region.

The seasonal variability and irregularity of rainfall over the year, more than their scarcity, determines the behaviour of the population and their relationship with their environment. The high temperatures, strong storms and sandstorms raging in the region exacerbate the situation.

1.3.2. Environmental change

Scarcity and salinity of surface water

The Drâa oasis is fed by the precipitation received in the peaks of the High Atlas. Despite the role the limestone bedrock of the Mountains plays in the regularity of the regime of the rivers, the bare hillsides and the steep slopes of the mountainous area cannot ensure a lasting and sustained supply of water to the basin because of a very high rate of surface run-off. The average flow recorded in the *Oued* Drâa in Zagora was 13.4 m^3/s and the maximum that was ever recorded was in 1965 and reached 213 m^3/s. However, in August of the same year, only 0.13 m^3/s was recorded. The testimony reported by Ch. De Foucauld during his visit in the late 19th century, compared with the current reality, shows that the valley is experiencing an increasingly high frequency of dry periods and severe environmental degradation.

> *«… All Drâa has the same enchanting look: same freshness everywhere, same abundance of water, same lush vegetation. However, there is no place where water is never dried up in the river: in some summers, parts of its basin dry up, but the years when this happens are rare. Even then, the channels that serve to feed and water the Drâa do not cease to flow at full edges. In the Drâa, floods are more frequent then droughts. It is not uncommon to see in winter the river flooding the whole valley even till the walls of the Ksars. The water from the Oued Drâa, even of it is a little yellow, it is pleasant to drink. Among the countless trees that shade the river, palm trees dominate everywhere… there was a large quantity of fruit trees, figs, pomegranates, peaches, grapes and so on. ... Throughout the Drâa country, bees are numerous and honey is abound".... Ch De Foucauld 1888: 286.*

In parallel to the increasing rarity of water, the rate of salinity is increasing as well. Thus, the oasis has become the theatre of many devastating disasters.[17]

Advancement of the desert

The advancement of desert sand is not a new phenomenon, though its intensity and dimensions seem to gain alarming proportions nowadays. In fact, the evidence collected on the site agrees with the analysis of the aerial photos. The desert sand is advancing with big steps. Today, the phenomenon is of concern not only to the Saharan provinces, but all those surrounding provinces which are in the foothills of the Atlas Mountains (Figuig, Errachidia, Zagora, Tata and Guelmim, etc.). Advancing sands constitute a real threat for the poor rural population. Today, the Services of Agriculture, and those of Waters and Forests must be constantly mobilized against salinisation and

[17] See also HELP (2005): "Drâa (Morocco)". HELP, Hydrology for the Environment, Life and Policy, UNESCO, the International Hydrological Programme. 25-10-2005. http://portal.unesco.org/science : observations show that the surface temperatures and weather variability have increased over the last 40 years. One cause for this climate change are changes in the Northern Atlantic Oscillation and the West African Monsoon activity.

sanding that invade palm groves, mainly those located downstream (M'hamid, Ktaoua and Fezouata).

The Bayoud disease

The bayoud is a fungus (*Fusarium oxysporum f. sp. albedinis*) which attacks mainly palm trees. The fungus enters the tree by its roots and causes death once it and its toxins reach their terminal bud. The disease spread through the contact between healthy and infected roots. Infection can be spread as well through irrigation water and through soil. According to experts the bayoud disease has destroyed more than 2/3 of palm trees in Morocco (12 million trees) within a century. Investigation in 1981 by Djerbi in the Drâa Valley revealed 165,574 killed palm trees per each 2 million. Thus in most oases, more than half of the commercial date palm trees have been destroyed. The numbers of unproductive and poor quality palm trees are increasing. The disease has not only caused the loss of a basic element of food for the population (consumption is estimated to be 187 kg per head per year), but also the loss of a source of income and foreign currency. In addition it reduced tremendously the extension of annual crops protected by the palm trees (because palm trees offer a suitable microclimate for these crops) and accelerated the desertification process.

The competent authorities recognized the importance of the threat to the palm groves, and began a fierce campaign to hinder the spread of the disease. The quarantine and incineration of infected palm were the most prevalent techniques. The selection of resistant cultivars and breeding from these bayoud-resistant, high quality varieties, in addition to putting into quarantine the infected areas, is seemingly the most promising strategy. The declaration of the area as an "Oasis Du Sud Marocain" Biosphere Reserve[18] will be able to preserve this heritage. Nevertheless, even today, losses from the effects of diseases, but also transplantation and transport of palm trees to cities for decorative purposes remains enormous.

Locust invasions

The oasis environment favours the multiplication of the homes and outbreaks of locusts. The oases of the south of Morocco has experienced a number of severe plagues of locusts, notably from 1942 to 1945, in 1950, in 1955, in 1958-1959, in 1987-1988 (Roy 2001) and in 2004. They arrive from the tropical zone and subsequently the swarms move towards the north up to the hillsides of the Atlas. This phenomenon recurs seasonally in particular during rainy years and typically in winter and spring seasons until the months of February - March. The insects devastate crops in entire regions.

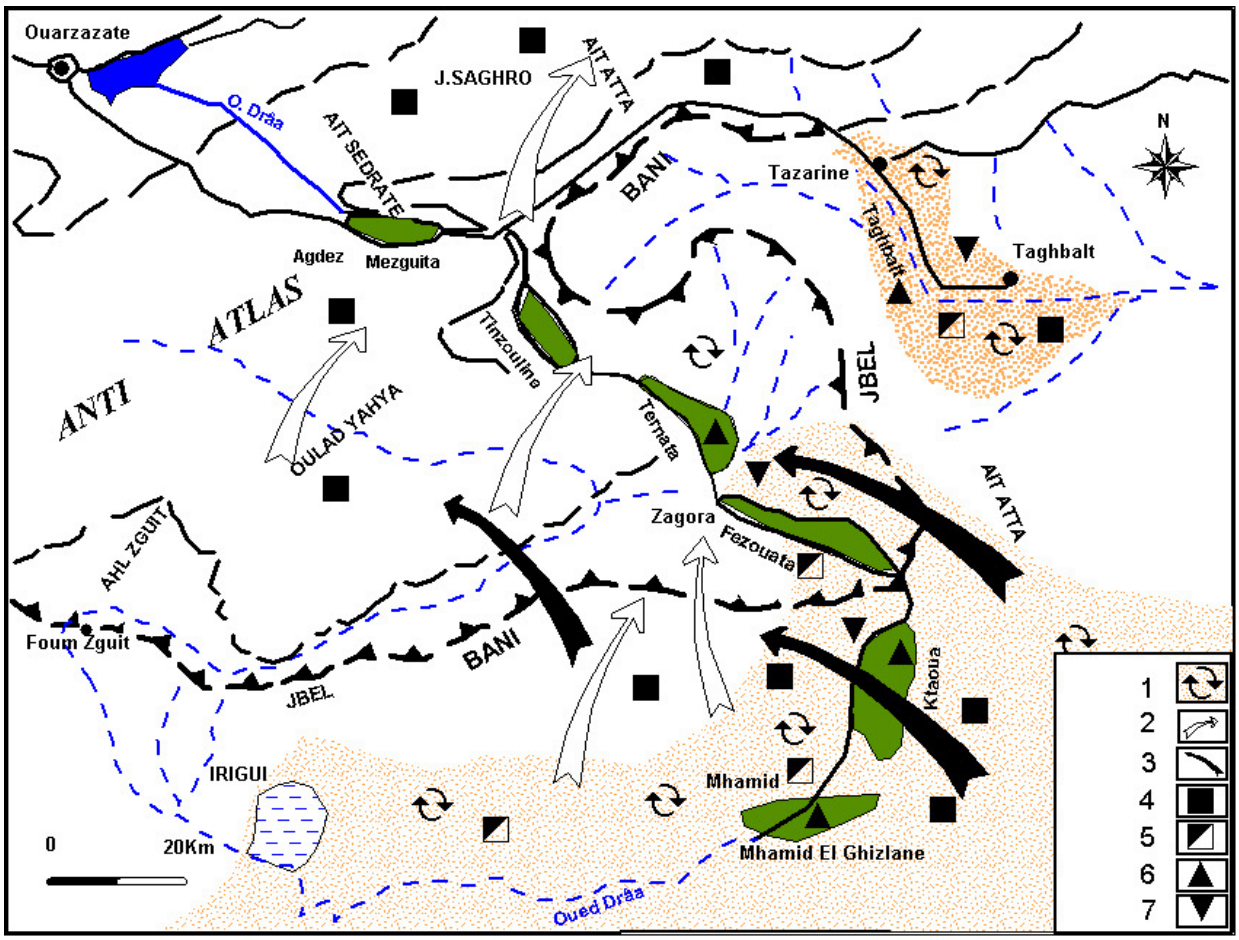
There is absence of significant means for control and fight against swarms of migrating locusts that have invaded, since the second half of February 200,4 not only the regions of Oued Drâa, Bouarfa and Tiznit, but also the cities of Essaouira and E Jjadida. After palm trees, argan trees and olive trees, the locust invasion is now at the gates of the large agricultural plains of the Kingdom, threatening the cereal harvest. (Maroc Hebdo International newspaper, issue no. 597 of 19-25 March, 2004.

[18] See: http://www.unesco.org/mabdb/br/brdir/directory/biores.asp?code=MOR+02&mode=all

Destruction of vegetation by human activities in certain areas encourages the increase of the most arid habitats with which populations of locusts are associated. Furthermore, locust control operations cause enormous damage. The fragile desert or semi desert areas are often heavily affected by massive spraying of toxic products (the best known being DDT). Between 2003 and 2004, Morocco treated over 5 million hectares of land with insecticides. The quantity of pesticides used is estimated at 32,000 tons over a two-year period. (Luong- Skormand, Rachadi and Lecoq 1999). The environment and consequently the lives of humans, animals and plants, are endangered.

The environmental threats to the Drâa Valley are summarized in Figure 3.

Figure 3: Environmental pressures and risks in the Drâa Valley.



Sources: observations and personal field surveys 2005; B. El Faskaoui 2007.
1. Advancement of sand and sand storm. 2. Locust invasions. 3. Hot and drying winds. 4. Deforestation and overgrazing. 5. Lowering of the water tables. 6. Salinisation of water tables and soils. 7. Bayoud disease.

1.3.3. Changing society, spatial organisation and the environment

Faced with the increasing water demand, to ensure a maximum degree of regular supply, the State built the Al Mansour Eddahbi[19] dam upstream from the oasis in 1972. This construction, built initially to regulate flows and ensure the irrigation of areas located downstream created many human and ecological problems, including:

- Disruption to the feeding of the downstream water table;
- Disruption to soil fertilization which was previously ensured naturally by the floods and the natural flow of water
- Increase in soil salinity in downstream palm groves;
- Conflict with traditional irrigation system based on water rights, which is hampering the implementation of a modern system based on the needs of plants;
- The irrigation technique based on submersion is being used without taking into consideration the scarcity of water;
- The legal status of lands, waters and trees does not allow any operation of regrouping of lands and consequently any modernization of techniques[20] or of cultures.
- The stopping of the natural flow of waters from the river resulted in the drying up of old lakes located downstream (Lake Iriki or Irigui) and consequently the disappearance of the related biological life.

Parallel to this alarming environmental situation, the population which used to adapt to the geographical context has witnessed profound changes, due mainly to demographic growth, urbanization and to the pressures on resources. Notably, the last four decades of the last century witnessed a huge restructuring of the zone. The settlement of nomadic populations, encouraged by the Sands war between Morocco and Algeria, has been accelerated by recent developments. The following are some of the consequences this settlement has had on the socio-spatial situation:

- The settlement of nomads and the conquest of new agricultural lands on the edge of traditional oasis. The resort to water pumping as a means of irrigation is strongly encouraged by the remittances of migrants.
- Unending conflicts between old oasis settlers and old nomads compelled to settle down, who claim the right to land, water and recognition.
- The urbanization of the oases.

Facing the demographic pressure and its impact on resources that are already fragile, and facing the new needs generated by intensive contact with the outside world (the effect of media, the school, urbanization, and tourism),

[19] The capacity of the dam is 560 million m^3 of water. However, since its construction, it is rare that the dam exceeds 60% of its capacity. Among the nearly sixty big dams built in Morocco, only two are built in oasis regions: the El Mansour Eddahbi dam and the Hassan Eddakhil on the Ziz River. These two dams are the few exceptions in Morocco where water is given freely to the population for irrigation.

[20] With the exception of the main canals, the traditional irrigation networks continue to operate. There have not been any changes to the plan of parcels and agricultural techniques.

the indigenous populations make their way towards local, regional and national centres. The concentration of basic and socio-educative facilities in centres attracts rural populations. Thus, the percentage of the urban population in the Kingdom of Morocco has moved from 29.1% in 1960 to over 55.1% in 2004.

Despite the neglect of small centres in the statistics[21] (M'hamid, Tagounite, Tamegroute, Tighoumar, Nkob, Tazarine etc.), we notice that the urban population has tripled in about 30 years. The policy of decentralization advocated by the state has led since 1976 to the reinforcement of the role of Communal districts. Zagora, a centre considered previously as part of Ouarzazate, became an independent province in 1997. The small localities previously counted as administrative centres themselves have experienced significant development. The creation of seats of Communes added to this system. Despite their still basic facilities, these centres attracted the rural population who are victims of natural conditions, and who strive to improve their standard of living. (See table 9)

Table 9 Evolution of the urban population (Province of Zagora)

Place of residence	1971		1982		1994		2004	
	pop	%	pop	%	pop	%	pop	%
Urban Population	7262	4,7	13634	6,7	32044	12,5	42802	15,1
Rural Population	148226	95,3	189510	93,3	223761	87,5	240566	84,9
Total	155488	100,0	203144	100,0	255805	100,0	283368	100,0

Sources : Recensement Général de la Population et de l'Habitat (RGPH) : 1971 – 1982 -1994 et 2004

Tourism, which has for long been centred on coastal areas and imperial cities of the North, did not discover interior regions until the last decades. Today, with the desire to diversify tourism and with the emerging market of eco-tourism, these areas have started to emerge as fully-fledged destinations. The cities of the south, Ouarzazate, Zagora and Erfoud start to present themselves as very dynamic tourist poles. Ouarzazate, with its different studios, is already considered as the capital of cinema.

The Valley of Drâa today receives numerous flows of tourists, attracted by desert and oasis landscapes and the Ksar-type architecture. Although these crowds constitute an opportunity for the zone to diversify its economic resources, it poses a serious threat given their huge needs in terms of space, water, and the enormous waste they produce (hotels, camps, and bivouacs).

2. METHODS

2.1. Justification of the selection

The choice of the two palm groves for a case study was dictated by the presence of two important elements of the subject of study, namely:

[21] Only the two municipalities of Zagora and Agdez are considered urban.

emigration and environmental degradation problems, in that they possess the following characteristics:

- Their out-of-the-way location far away from the centre of the country;
- Their arid, desert and continental climate;
- Scarcity and irregularity of water flows in the river feeding the palm groves;
- Disruption of water flows due to the construction of a dam upstream;
- The high salinity of soils and of the water tables;
- Advancement of the desert and sand;
- Their population pressure;
- Increasing needs both in quantity and quality and increasing pressure on resources (urbanization, tourism, modernisation);
- Emigration traditions (nomads, merchants).

2.2. Discussion of methods

The standard EACH-FOR method is the starting point for this research. Limits of time and resources ruled out more extensive fieldwork. However, the standard approach was elaborated to make it possible to take some of the complexities of the relationship between environment and migration into account. However, the method was considered far from perfect by the research team to investigate all the complexities of the interrelationship between environment and migration thoroughly. In investigating this relationship we should take into account a time perspective, the various internal and external factors besides those of the environment that encourage migration, as well as processes of 'cumulative causation' of migration once migration flows have started.

Ideally, the method should reflect the fact that migration phenomena in general and their relations to the environment in particular are extremely complex. There is no natural or human determinism in this domain. The role of factors that encourage, discourage, stimulate or aggravate these movements and their scale can vary from one place to another and from one community to another, depending on crises and changing circumstances. Scientific precaution requires the precise definition of central concepts, such as those of physical and human environment, of degradation, and the types of individual or collective responses to particular phenomena or needs. Answering the central questions with regard to the relation between environment and migration would ideally require not a one-time survey, but a continuous observation and repeated surveys as a basis for analysis of collective and individual behaviour and decision-making processes. It is clear that such a study would require much more time and resources than was available for this case study.

To make it possible to take some of the complexities of the relationship between migration and environmental degradation processes into account, the standard EACH-FOR approach was supplemented with an extensive desk research on relevant contexts. To understand this relationship, the researchers have analysed what could be referred to as "the factors

encouraging migration". This implies both the analysis of natural and of human conditions. The basis of the analysis of factors that encourage migration was laid by studying relevant literature, data and research reports. It implies the analysis of natural conditions, climate constraints, hydro-geological constraints such as irregular rainfall, scarcity and impoverishment of arable land, and the effects of the always onward creeping sands on living conditions in the palm groves. However, to understand the complex relationship between environmental constraints and migration, we have to analyse the human conditions as well: the social, economic, cultural and political contexts.

All these contexts are presented in broad lines in the chapter 1 and they function as background knowledge for analysing the survey results in the chapter 3. For example, demographic characteristics and developments are of crucial importance for this analysis, in that population growth and the consequences of increasing pressure on resources create vulnerable conditions that could constitute a motive for people to migrate. Moreover, economic analysis of the production factors and their limitations and shortages is important when assessing the survival of populations and migration as a survival strategy. Furthermore, analysis of social transformations of the rural oasis society in contact with the outside world and the resulting erosion of traditional institutions is of utmost importance. Furthermore, political analysis is important. For example, the inter-tribe conflicts and the political context within which the decision was taken to build a dam on the Drâa River.

The study of secondary sources constituted the basis for the fieldwork. For the fieldwork, the standard EACH-FOR approach and surveys was the departing point, while taking into consideration the numerous imperatives that surrounded the research. For example, while filling in the standard EACH-FOR questionnaires, stories about the lives of respondents were also written down and these were used to analyse the survey data and illustrate the analysis.

To start the survey in the case study sites, the team had to decide on the criteria to select the respondents. The choice of individuals to be interviewed was done randomly in public spaces during the field trips. However, the team ensured that all relevant aspects were represented among the selected respondents. Within the villages or *Ksour*, quarters occupied by the Aribs, the Ait Atta, the Chorfas , and the Draouas were selected. For example, in order to clarify the question on the perception of environment, it is also important to take into account the socio-ethnic and socio-economic profiles of the interviewed persons.

For the survey, only respondents in rural parts of the palm groves were selected that were considered to be affected by environmental problems and by migration. The migrant questionnaires involved 30 migrant household heads. Likewise the questionnaire for non-migrants involved 30 respondents or households. This means that every questionnaire involves in one way or another, a whole household, and within the same household several migrants

could be found. When absent, the questions designed for migrants were sometimes posed to other members of the family. About 50% (14 cases) of migrant respondents were present at the time of the survey. For the rest (16 cases) we resorted to parents or to another relative to fill in the questionnaire. While this method brings relevant information regarding the migrating person, it could still miss certain information concerning the personal life of the migrant. But since we dealt with traditional families that are tightly knit and where the individual is only one element in a system and where all decisions are made within the family, we considered that the questionnaire was duly filled in. There is regular contact between migrants and those who stay behind. Migration is predominantly of a temporary or seasonal nature; permanent migration is very rare and less frequent.

Three types of informants were selected for interviews.

1. Interviews with 30 older migrants or the heads of households having emigrants in their families aimed at detecting the initial causes of emigration. Here the researcher, while having in mind the objective of investigating the correlation between migration and environmental developments, also considered related problems, such as unemployment, the loss of production, and the loss of the livestock. Relatively old respondents were selected because of the nature of the subject of research: the evolution of the environmental impact on migration.

2. Interviews with 30 non-migrants. These could also shed light on the obstacles, the resistance or the strategies each individual or group of individuals develop to be able to resist and not leave the territory.

3. Interviews with experts, namely agriculture technicians, administrative officers, Water and Forests technicians and researchers that have carried out studies in the area. These interviews enabled the case study researchers to open up to reflections on future developments of the territory.

3. FIELDWORK FINDINGS & ANALYSIS

3.1. General characteristics of migration in the region

According to interviewees, migration is an old tradition in the Drâa region in general and in particular in the selected sites. It is a phenomenon caused by several factors, among which the environmental factors related to the scarcity or lack of production factors prevail. However, the influence of the environment or the degradation of living conditions appears to be only slightly decisive in more recent migration flows. As will be demonstrated in this chapter, among migrants and non-migrants, the degradation of living conditions is frequently mentioned, but its role in the decision to migrate varies according to the circumstances and the period of the first migration in the life of each person.

The reading of the surveys shows that 70% of the respondents mentioned the poor quality of the environment as a motive for their decision to migrate. For this category, environmental degradation and consequently economic and social deterioration left no choice. Their economic basis (agriculture or livestock) no longer ensured a minimum income to enable them to stay. Migration to "improve" their conditions and that of their families was considered the only option. For this category, the dates of departure are quite different.

- For the majority, the construction of the Dam in the early 1970s and the drought of the 1980s were fatal to their families. The consequences of blocking of the water flow by the barrier coincided with this harsh drought. This accelerated the degradation of the oasis ecosystems of the Drâa and notably those of the downstream ones of Ktaoua and M'hamid.

- There are however within this category those who were already migrants before these two events. These had migrated to remedy the scarcity of arable land or water. The emergence of these new factors (the dam in 1972 and the drought of the early 1980s) only strengthened the tradition of migration by opening the path to family reunification.

- For others, the environmental problems have only relatively recently been felt in their history.

In the category directly affected by the poor quality of the environment, we can distinguish three social groups.

a) Oasis farmers: that is, those who owned, before migration, land, water for irrigation and some cattle. These were small farmers, "vulnerable" to environmental problems, because their subsistence margins were very small.

b) The livestock farmers on the grazing or rangelands, whose economic activity was closely related to rainfall and climate conditions, implemented adaptation strategies based on the movement of the livestock and on the transfer of capital during the major crises. With the Moroccan-Algerian border conflicts, their lifestyle was complicated by the sudden forced sedentarisation. Consequently, they became more exposed to environmental constraints.

   Within this group there are two types of livestock herding practiced mainly by two different ethnic communities:

   - The Ait-Atta, are Berber nomads who roam desert territory mainly with herds of sheep and goats and some camels. These nomads have rights over arable land of their mother-tribe or their protégés (the *Draouis*). This means that they had the opportunity to reconvert into farmers whenever necessary. This conversion – massive and suddenly

'forced' by the consequences of dam construction and drought - has increased the pressure on natural resources and thus stimulated further environmental degradation. The massive sedentarisation of nomads and their conversion into farmers has had a direct impact on the decision to migrate of members of this group. Their installation resulted in the extensions of the oasis by water pumping that led to a lowering of the water table.

- The community of the Aaribs, Sahrawi nomadic Arabs originating from the Western Sahara, worked primarily as camel and goat breeders. Their pastoral area stretched several zones along the Algeria-Morocco border. With the border conflict and the recurrent droughts, the pastures grew poorer and inaccessible and these people without rights to arable land found themselves forced to settle in quarters of the rural centre of M'hamid. This nomadic ethnic group is the poorest in the region, but their social and cultural membership to the tribes of the Western Sahara gave them a special tradition of migration.

c) The *Draouis*, a black community without land or pastures, had the tradition of working on the land of others (*Ahrar* (= the free) landowners). The status of agricultural workers of this category made their tradition of migration particularly different. It is in this group that one observes a deep-rooted, prolonged or even permanent migration in several cases.

The migration destinations are closely linked to this ethnic diversity. This means that in most cases, the destinations of migration are mapped out because of their membership of a particular group. The migration occurs by making use of socio-ethnic or family networks.

For the Aaribs, the cities throughout the territory of the Western Sahara are the main destination. The choice of this destination is dictated first and foremost by the family and cultural ties to the Sahara and its people. The cultural dimension is a key facilitator in their settlement and integration. This advantage is supplemented by the attraction of high wages in comparison to other regions of Morocco. The opportunities offered by this region of the country are great (high urbanisation, maritime and mining activities). The Aribs start with any profession and eventually end up by switching to comfortable and lucrative activities such as trade and public administration.

The majority of the Draouis are attracted to the cities of Casablanca and Rabat. Because of their long history of settlement (native population), the Draouis have established family ties (endogamous marriages) and community relations dictated by the constraints of oasis environments. This situation has undoubtedly encouraged their concentration in agricultural occupations and in the building sector, but also their ability to switch to other professions. The Draouis have a high level of solidarity to one another (See fore example: Zainab, thesis in progress).

For the Ait Atta their range of destinations is linked to family networks (Casablanca, Rabat, Marrakech, Agadir, and Tangier). Shepherds at first and

then warriors throughout their turbulent history, they currently work in these cities in commerce and on large construction sites. Thus, the socio-ethnic structure, as demonstrated by the survey, also explains the variety of jobs performed by migrants.

The analysis of the relationships between migrants and their villages of origin shows that the commitment varies from one community to another. As an example, when the land of one community could no longer support the increasing needs of its inhabitants, none of the respondents had sold his land after departure. For them, land constitutes their 'roots'. However, one can perceive the beginning of a trend of permanent emigration and the selling of land property.

Mr T.H left the oasis of Ktaoua at the beginning of the 50's following the drought period in the country.. He settled in Casa & worked as a worker and quickly learned to be a plumber. One of his kids has just finished a thesis in medicine in Germany. His brother's child who joined him to study too became a high ranked clerk. He is living in Rabat after marrying the daughter of his cousin. The family's belongings back home are still taken care of by the family members who remained in Tagounite. "Selling one's land is shameful" declares Mr T. M.

Access to basic services such as electricity, schools, and health care explains partially the migration phenomena, even though the availability of such services today does not affect the decision to stay in the village.

Access to financial services does not have any weight. In this context, exchange is done by barter (to trade by exchanging goods or services without using money). Loans are not well considered and are perceived as a Jewish practice from the past. Accordingly, using bank services remains limited. Similarly, belonging to a (formal) organization does not have an important place in the society. Belonging to the community is what still counts for most persons and successful associations in the region are modelled on an ethnic or village basis.

The consequences of this migration are varied. The remittances of migrants injected in the zone are of huge importance since they guarantee the immobility and maintenance (survival) of the other family members in the village (*bled*). They also permit the creation of other businesses (commerce, transportation, tourism) or the continuation of agricultural activity, and dynamism in the construction sector.

3.2. Socio-demographic characteristics of migrants

The general socio-demographic characteristics of the 30 interviewed migrants are quasi similar: men, married, intermarried, same religion, aged between 48 and 58, and illiterate. A detailed analysis of the socio-demographic characteristics of the migrants could have explained many facets of the relation between the migrants and his/her environment. However, due to limits of time for this case study we limit ourselves to presenting the general characteristics only. These are:

- Relatively aged migrants segment. As indicated and justified in chapter 2, the selected migrant respondents were quite old. More than 60% are aged 50 years or over and about 40% are aged less than 50 years. Yet, once we look at the date of migration, it becomes clear that they were only 20 or 30 when they first left the village. The migrant population has aged far from its home village.

- Exclusively male migrants. In a traditional and conservative society, the women who do not join their migrant husband will not leave their village. The study showed that only males participate in the migration movement. Women stay in their village and play a key role in oasis life. They assure continuity and the transmission of the cultural heritage. Leaving one's village and family to work elsewhere used to be an impossible thing to do for a woman, for it endangers the dignity of the entire family and in particular, that of her husband and her siblings. Today, schooling and migration helped to alter the situation slightly. Unmarried women or widows may leave to work in the city, or even in Europe within the framework of bilateral agreements (agricultural work in Spain). It is the start of a new cultural era in the zone.

- Mostly illiterate migrants. The high rate of illiterates among the migrants is a very telling indicator of the insecure conditions that prevail in oasis life. It is also an indicator that elucidates the difficulties they face in taking part in regular life. In fact, 63% answered that they have never received any education. About 25% declared that they received primary education, while 12% went to traditional religious schools.

- Married people taking care of parents and children. Taking into consideration the age of the respondents, it is normal that all the interviewed people are married. However, it is worth mentioning that early marriage in the society is a tradition. The woman takes part in every agricultural and domestic activity and the children constitute an added value to the family work force. They constitute an important capital to cope with the different hazards and an insurance for the parents as they grow old. Thus, 63% of the emigrants take care of their parents and 50% declared that they have five children to care for. 38% of the respondents have 4 children to take care for and 12 respondents have 6 persons or more to care for. In a society known for the solidarity of its members, it is not exceptional to find brothers, sisters and sometimes even nephews supported by one single person.

3.3. The non-migrants or potential migrants

3.3.1. Characteristics of the non-migrants

The perception of the environment by the non-migrants does not differ from that of the migrants. The respondent's answers to the questions show their growing awareness of the degradation of essential elements of the environment. The non-migrants say that this degradation of the environment

and the resulting decline of economy pressed the men to look for adequate solutions in Moroccan cities or abroad.

So why did they not leave? All the problems that the emigrants encountered are raised while talking with those that stayed behind: problems with the environment, no access to financial resources, not belonging to organisations that might help to find solutions and the overburdened family. However, each interviewee had one or more reasons not to leave. These can be listed as follows:

- The non-migrant lives from the remittances of a brother or an emigrant parent.
- S/he has an activity that generates sufficient revenues to stay in the region.
- S/he has old parents whom s/he cannot leave behind (no pension) ;
- The children are still young and there is no one to care for their needs ;
- He waits for his turn in a tradition of role-taking between males in the family;
- S/he is handicapped and makes a living through a local activity;
- S/he does not leave the region except to go to a foreign country. The revenues of working in a city are not an incentive to leave the home village.

With all this in mind, we note that the majority of these non –migrants have migration plans and they intend to migrate as soon as the conditions are positive. Besides the reasons shared by all, the personal profile of the respondent plays a role in the decision-making process. The main characteristics of the interviewed non-migrants are:

- Relatively young population. The average age of the category is about 42 years. More than half are younger than 45 and about 30% are less than 30 years. Yet in this category we also found men of more than 55 years.

- An increasingly educated population. Because the Drâa valley was isolated and under-equipped in the past, the majority of the migrants are illiterate. The category of the non-migrants is in majority literate or has at least attended school. Only 25% are illiterate compared to 75% of respondents who are relatively educated. More than 30% have been to secondary school. This can be explained by the young age of this category and because of the construction of schools in the region since the 1960s and the general spreading of schooling over the last decades.

- A relatively high rate of single people. This category of population demonstrates characteristics different from the migrants' as far as

married life is concerned. More than 50% of respondents are single[22]. Those who are married show socio-economic and familial characteristics of families with a migration tradition. 25% of the interviewed population are migrants who came back to the region because of their age (between 55 and 62), or after having guaranteed a job position for their children or having secured an activity back home that provides them a good income. Thus, if the majority of respondents declare that they are single, it is not because of a difference in culture due to schooling. In a Muslim country like Morocco, the general opinion is that anyone who has reached the legal age to be eligible to marry should do so, depending of course on the availability of resources. These means are precisely lacking in many cases.

3.3.2. What does the home village offer to keep them from leaving?

The perception of the environment of non-migrants does not differ from that of the migrants. On the base of an analysis of the different responses, four explanations become evident for the decision of persons to remain in the home village (bled) can be discerned:

a. The respondent has a physical or social constraint:

   Aging parents whom you cannot leave behind due to cultural and religious reasons

   My wife and I live on the help provided by our kids who are settled in Casablanca. Since we cannot go abroad at our age, we care for the small family which remains here.

Or the case of a handicapped person who did well to manage a business and who gets money from migrants via an intermediary who stayed in the village.

b. Practicing seasonal migration as a temporary solution:

   I left and came back after installing a son in the place of migration. Then I returned to care for the remaining members of the family and retired.

   No matter what, we cannot all go. There should be a man at home to look after the house and its remaining inhabitants. I am now in the process of setting up a hotel with my migrant brothers in Casablanca to boost the family income and eventually to improve the situation of our family.

   I am 24 and I have already left the village several times. When I noticed that our land is not that productive, I had to do

[22] It is noticeable that the average age of marriage is increasing. The long phase of celibacy is more remarkable in the case of men than in that of women. This should be linked to schooling, joblessness and the crumbling of the extended family.

something to help my parents. I left school because of these problems with our agriculture. It is agriculture that allowed my parents to raise us and assure all our needs. But when I work elsewhere, the salaries are so low. I was getting 40 MDH (Moroccon Dirhams) per day to pay the rent, food and other needs. By the end of the month, I had nothing to send to my parents. That is why I decided to go back. Here I would not pay the rent, eat and at night I could give something to my parents.

c. Manage a non-agricultural enterprise. Those who stay in the home village are commonly those who utilise the money of those who migrated to invest in service activities. For example, a grocery store, a means of transportation like a taxi, a tourist hotel that generates money and even foreign currency.

d. Waiting for an opportunity to migrate far away. Most non-migrants, have aspiration to go abroad.

   If I have to leave this zone, it is to go to Europe or America and why not Australia. Now, I manage a shop (multipurpose commerce), it is only to amass money and once I find a way out through a visa, a work permit or even a wedding I will definitely leave. However, I would never accept being a clandestine migrant.

   Like everybody else, life conditions were not favourable. I had to leave my town many times at an early age to work in many cities. I tried many jobs but the wages were too low and everything I earned only covered my expenses but I could not save anything or send anything to my parents. I go back home for some months when my father's land is relatively productive. But when things go bad I restart my migration, without success. Finally, I decided to remain in my village and build my life here or to go far away…

Today and due the opening of the oasis, staying in the village does not mean forgetting about leaving, it rather pushes to think about it. The 'success' exposed by emigrants during their visits home is largely sufficient to incite everybody to hope to leave and be part of that group; thus, a culture of migration has spread in the villages

3.4. Analysis of the results and perceptions of the environment

3.4.1. Perception of the environment by the respondents

The first question asked of all the respondents - migrants and non-migrants - aimed at finding out what they knew about environment in general and their local environment in particular. For the non-migrants - relatively educated persons - the concept is clear, while further clarifications were required for interviews with migrants. The environment and its changes are viewed as a

constraint with which they have to comply and adapt to, because it is a resource, and even more because it is viewed as a revelation of divine will against which humans have no power.

For the population of the Drâa valley the degradation of the environment affects the agricultural production negatively. The scarcity of water, the salinisation of water and land, sand coverage, the bayoud disease and the degradation of grazing spaces constitute handicapping elements. These factors, even if they have always existed, have increased in frequency, duration and amplitude in recent decades.

When we enlarge the scope of the environment to include the economic, political, cultural and social dimensions, responses were provided with much more certainty. It was clear to the respondents that the region is marginalized, under-equipped and suffers from local conflicts. Access to arable land, water and grazing land being determined by the social status, is highly relevant for migration decisions, at least for the predecessors.

For the sedentary peasants, the oasis could produce three agricultural crops per year. Today one cannot cultivate anything. Some remarks:

> My memories go back more than 25 years, I was 10 and we suffered at the time from summer heat, dust storms and water scarcity, but our palm groves were productive... The crop of dates was abundant, the livestock from each family was “big”. But since 1984 we witnessed a decline of vital elements … According to the worsening degradation, people leave to look for additional revenue in the hope of going back to take up their normal life.
>
> 30 years ago, the palm grove of M’hamid was relatively prosperous … it is true that there had always been dust in the form of ergs (erg = a vast desert area of deep, rolling sand dunes), sand storms, droughts, but we were producing our basic necessities. Today we hardly cultivate anything on the land, fruit-bearing trees disappeared and palm trees do not produce regular and sufficient crops as they used to. Knowing that the mouths to feed are numerous, only one solution can be thought of by the people- finding alternative revenues at the construction sites of the big cities.

For the nomads, the degradation of the environment manifests itself in the decrease of grazing land, the meagre vegetation coverage and hence the decline of their activity. Confronted with such an environmental and economic crisis situation, the people chose to migrate.

> When the conditions were good, the group of Aaribs were nomads. It was the best lifestyle: no frontiers and many horizons. Rain does not fall as it used to. The pastures are scanty and the movement of shepherds is decreasing with shrinking horizons.

> This leads to increasing pressure on the pastures and to worsening conditions. Consequently, we are obliged to settle. Confronted with this situation, looking for other alternatives elsewhere is a solution.

3.4.2. Environment and the migration decision

In response to the question on the relation between environmental conditions and the decision to migrate (see Annex, Table 10 on Factors impacting on migration decisions), 28 out of 30 respondents confirmed that degradation of the environment is one of the major causes that motivated them to take the decision to migrate. 2 respondents said that environmental degradation did not pose a problem for them; the migration decision was dictated by other motivations.

About 20 respondents said they left their residence of origin because of environmental problems. 6 cases confirmed that environmental problems did not emerge until later in the course of their migration itinerary. This means that migration was dictated by other factors or motivations. A conflict in the family, an adventurous spirit, or else the quest for independence from the extended family could explain this tendency. For this category, while the migration adventure started provisional, the environmental constraints intervened to prolong it.

Four respondents declared that environmental problems are recent. This makes us think that this category is not affected by these problems. However, when we analyse their stories – old tenant farmers who worked for big families all the year for 1/5 of the harvest plus nourishment - we find out that it is only a question of shifting the problem.

> Degradation affects only families exercising agricultural activities. As far as we are concerned, we left because we had nothing to lose. We worked for others here and we will do the same thing somewhere else, it is all the same.

When we bring up the diversity of dimensions of the environmental issue, other parameters emerge and the responses vary. The oases of Ktaoua and M'hamid have a unique situation as a geographically marginalized and under-equipped local. This reality is also reflected in the answers. Concerning socio-educational facilities (education, health, leisure), their absence is an important factor for migration in about 20 of the cases. Thus, despite the effort made by the state, a huge delay is still recorded in this area of basic services. The attitude of the population towards the school, at least in the beginning, was negative and children did not go to school because they had to work in the fields or as shepherds. The first *collège* (the second stage of the primary education) did not open its doors in Zagora (around 100 km from M'hamid) until the beginning of the 1960s, while a general secondary school (*lycée*) was located in Ouarzazate or even in Marrakech. Today, the majority of rural communes have a *collège.*

Similarly, the absence of health services is seen as a major concern (big hospitals are restricted even today to capitals of provinces). This fact is increasingly affecting migration decisions. Existing facilities are distant (Zagora, Ouarzazate, or even Marrakech) and transportation means are either scarce or inaccessible.

Concerning the responses related to political problems and conflicts (See Annex, Table 10), the respondents, with the exception of two, answered that these factors played no important role in their migration decisions. Undoubtedly, these declarations conceal all the frictions due to the border conflict that turned into a lasting reality over time. The conflict was at the origin of the settling process of many camel herding nomads.

The problems related to the economic environment illustrate the problems with the natural environment. The inadequacy of revenues and its relation to migration decision were raised in 26 cases. Unemployment, an outcome of the factors mentioned above, is also raised by many people.

All the respondents declared that the construction of the El Mansour Eddahbi dam upstream of the oasis is an important factor that led to the degradation of production conditions (See Annex, Table 11). For them, stopping the natural flow of Drâa River has had particularly negative effects on oasis life. Water tables dried up and intensive evaporation increased the salinity of water and soils. The rise of salinity has rendered soils infertile. The decline of yields and their irregularity is considered decisive in over 21 cases.

The drought of the 1980s is considered by nearly half the interviewees as a huge natural disaster. It affected all the socio-economic classes and all types of agricultural activities, including pastoral activity. In a society where agriculture and cattle breeding constitute the backbone of economy, environmental change had a major impact on the livelihood of the population.

Thus, even if the concept of 'environment' is not explicitly apparent in the discourse, conducting a more in-depth analysis, as summarized above, shows that it is strongly present in people's life and influences their socioeconomic and demographic behaviours. Problems posed by pests and diseases are also widely raised by all, in particular the date palm disease and locust invasions.

The survey shows that the availability of fertilizers, seeds and the costs of water are among the least relevant factors, given the free availability of water ("a divine good") and the self-production of organic fertilizers and seeds. The strategy of farmers is predominantly based on the diversity of resources, mixed farming and multiple cropping and utilizing the large size of households to resort to workers from the family. Transhumance and livestock mobility are also a form of adaptation to fragility and hazards.

The reactions of the respondents to this decline vary according to the main activity they performed. While nomads start by selling off their cattle to purchase fodder and to maintain their activity, cultivators refuse to sell their

land or their water rights. Men show a strong attachment to their land. On the other hand they mostly have livestock that constitutes savings that can be used in hard times (See Annex, Table 12). Nomads, especially those without land property, have only the option of selling part of their herd depending on the circumstances. Many times, they end up selling their entire herd and settle down for good. The case of the Aarib group is very indicative in this regard.

> Before the present situation, our family used to own over forty camels, some goats and sheep. Since the beginning of the eighties, drought took worrying dimensions, and we had no choice but to sell our livestock to be able to survive and provide for the rest of the herd. Everything happened very quickly and our activity crumbled. Thus we became poor overnight…

The logical reaction was for the majority to migrate in quest of revenues that would allow the rest of the family to stay in the village "waiting to see things return to how they used to be", says one respondent.

3.4.3. Access to services and the migration decision

The small rural centres that serve the two palm groves have some basic services (administration, school, basic health care room, weekly market; see Annex, Table 13), while they used to lack nearly all elements of comfort during the colonial era. The wide distribution of gas, electricity, telephone and drinking water did not start until the end of the last century. In the rural areas, the last decade experienced a number of improvements to services.[23] However, it is worth noting that the presence of services does not necessarily indicate that the population has access to them. Furthermore, these services do not bind populations to their home region. In contrast, modern facilities and equipment (electricity, telephone[24], etc.) encourage consumption and thus departure.

Financially, the capital of the farmer and his treasury are constituted by his buildings, land property and livestock. Credits for farmers have not yet been introduced in this society (See Annex, Table 14). The resort to credit is even considered to be a social and religious offence. In case of real need, the option of mortgage or family support constitutes the main solution. However, today, these practices are acceptable especially in case of bank loans. The presence of government employees, tourists and emigrants made this service a necessity, while in the past it was exclusively urban. In the non-migrants category, many persons have resorted to loans to fund their projects.

3.5. Experts on environmental problems and migration

[23] The Moroccan government has launched many programs to reduce poverty among the rural population and to discourage rural exodus, including: PAGER (program of supplying rural populations with potable water), the PERG (program of global rural electrification), the PNRR (national program of rural roads), and the operation to of safeguard livestock.

[24] Mobile telephones are almost universal in Morocco.

Interviews with experts living in the Drâa basin areas or who worked on the issue enables us to have a more objective view on the assumed relation between migration and the environment. We have tried to diversify the profiles of these experts. These interviews were with technical agricultural specialists, elected representative of the Commune, civil society representatives (NGOs) and researchers. A selection of their arguments is recorded here in order to give life to the story.

3.5.1. The state of the environment: are oases in agony?

> The tone is a bit exaggerated, but worrying. Certainly, ecosystems are fragile and highly vulnerable. The crisis situation is linked to many factors. Poor management of water resources coupled with shortage of water and worsened by an uncontrolled waste (motor pumping). The breakdowns of traditional community institutions, the crumbling of lands, the complexity of land rights, and overpopulation together suffocate agriculture, considered as the foundation of the rural economy.
>
> Over time, the population managed to create a balance between the frailty of natural resources and the satisfaction of its needs. With the arrival of modern administration, the State took charge of the management of space through different departments (Ministry of Agriculture and the Office of Agricultural Development (ORMVA, l'Office de la Mise en Valeur Agricole), the High Officer of Waters and Forests, the Territorial administration)". This crumbling resulted in the tremendous malfunctioning and consequently in often disastrous environmental consequences.
>
> Hydro-agricultural development carried out in the Drâa Valley is considered among the most important large hydraulic operations undertaken on the fringes of the desert of the Maghreb. The project aimed at regulating floods, protecting agricultural lands and equipment. Regarding the perverse effects, as they are inherent to any intervention, we should just find out how to manage them and render them positive." Thus, "if the installation of the hydraulic equipment has had as a corollary the emergence of urban centres, the development of extra-agricultural activities, the development of tourism, and consequently of new water consumers, new disruptions, the improvement of landscapes and of local culture could constitute ways to a more integrated development.
>
> We should hence not give up and let down the civilization of our ancestors. Research and experiments on the possibilities of improving, initiating and innovating in these spaces should be reinforced.

3.5.2. Coping with the environmental crisis?

Drâa oases in general and those in difficulty such as Ktaoua and M'hamid in particular gave birth to reactions full of pessimism. These reactions disregard the efforts made by the State through the different bodies in charge of the development and the management of public affairs in this zone". "…the construction of a dam on the Drâa River determines life in oases and the creation of a regional Office of Agricultural Development (ORMVA) as a technical organ charged with the resolution of a number of problems in the Drâa Valley. Water management, the fight against desertification, the training of farmers, the introduction of new animal and vegetable species, the fight against diseases such as the bayoud in different forms (scientific research, in vitro culture of tissues resistant to the disease and the distribution of over a hundred of thousands of cultivars among farmers to save palms groves) and the organization of farmers are some of the actions aimed at promoting development in the largest meaning of the term.

The dam and the Office are in my opinion the fire-fighters that came in at a time when the valley was in need of assistance. Obviously, many things are still to be done and many others need to be reviewed in view of the new foundations and conceptions, but without the dam and the Office and other administrations, the situation in the valley would have been far more serious than today. The population considers the dam to be the only problem that is facing their oasis and the agents working with the dam as thieves of water due to their attachment to the past prosperity of their agriculture and to the abundance of water, but the circumstances have changed and they are just incapable of appreciating our efforts. Like all the other hydro-agricultural structures, that of the valley has undesirable consequences, but it saves it from an ecological and human disaster (*an engineer*).

We know that the administration and accompanying structures are inadequate. For this reason, research programs and projects are being implemented in partnership with various national and international organisations in order to remedy the observed defects. But we have to look also for new possibilities. At this level, civil society and the population itself have to be mobilized to create ownership of what others implement (*public officer*).

3.5.3. Agriculture's bankruptcy?

Climate change, the scarcity of water, soil degradation and the overpopulation of oases will certainly be factors that push people to migrate. Only a liar could tell you that we could restore the previous situation and prevent men from migrating. We strive to maintain a minimal balance to ensure the survival of palm groves in order to develop other sectors. Tourism and film

industry activities, attracted by the oasis landscapes already offer employment opportunities to people from outside the valley. There are thus people that leave and people that arrive. The equation is not totally negative!" (*civil society executive*).

Wherever you go, even in most developed countries, there is migration. We should only accompany people in order to readapt to new realities: declaring the end of the agricultural era and announcing that of tourism and cinema (*elected representative*).

This way of considering space is in our opinion very questionable, because we can reverse the question and say: will there be oases in the absence of water and agriculture? Will tourists and cinema people have the capacity and the know-how required to manage the fragility that the population of oases has been addressing for millennia? And what attraction would the oases have without their original inhabitants? (*senior expert official*).

3.5.4. Marginality and hope

Given the accumulated delays so far and the expectations stimulated by the opening of the oasis, development is not at all easy to achieve. The communes of M'hamid and Ktaoua are the last to receive help, including by nature.

We are in a zone where all natural ingredients are bad. Water arrives scarcely to the palm groves. Precipitation is among the lowest of the valley, temperature is the highest, and the evaporation rate is the highest of the valley. In addition to the bayoud and to locust invasions, the quality of underground water is worst and sand advances significantly.

At the level of the state's intervention and development efforts, taking into account the outlying situation of these palm groves, their efforts are the weakest in this zone: this is a zone situated in a deadlock, under-equipped, remote, and suffering worrying delays in socio-educational fields and the highest scores in terms of unemployment and exclusion (*civil society executive*).

However, a lot of things have changed in recent years. The arrival of paved roads and the arrival of travel agencies enabled these communes to open up towards and to be related to other regions of Morocco and to the transportation of basic provisions. Electricity plays a significant role in the population's life. The supply of drinking water to the centres of M'hamid and Tagounit by the National Office of Potable Water (ONEP) is important for the population. The programs of supplying dispersed villages with potable water by the Associations (AEP) or by public

fountains are well advanced. This equipment enables the development of different activities, mainly tourism and tertiary activities. The existence of basic administration saves people from the trouble of travelling long distances to obtain a simple administrative document. Community clinics, even if installed only in centres, ensure that the population benefits from basic treatments. School infrastructures enable all children to benefit from primary and secondary schooling. School drop out, especially for girls, still constitutes a serious problem in rural regions. The efforts made by civil society [25] are very praiseworthy, provided that they are timely (*elected representative*).

Although environmental or natural problems go beyond the means put at the disposal of local competencies, they try to fight against these problems in collaboration with different partners. The fight against the advancement of the desert constitutes a daily concern and the efforts made are important [26]. The rehabilitation of the date palm heritage, although still in its early stages, has started to yield encouraging results. With the big festival of nomads at M'hamid, the ambition is to make these zones attractive tourist destinations capable of ensuring employment for the young people in order to introduce new dynamics.

4. CONCLUSIONS AND FUTURE RESEARCH

To conclude, we can say that the study was an opportunity to test a number of paradigms *en situ*, the most central one being the relation between environment and migration. Research focussing on this subject can be considered innovative, but one should be aware of the risk of falling into ineffective determinism. There is no natural determinism in this field, and thus it is as appropriate to ask the reverse question: Why do populations resist and persist even if environmental conditions, already structurally severe, are deteriorating. To investigate the main questions, we opted to launch our study in one of the harshest areas in Morocco: the most peripheral oases most exposed to environmental risks.

[25] The Drâa Valley counts about 400 associations working in different fields. The Association of the Development of the Drâa Valley (ADEDRA) is the most important one. It works mainly in the field of the fight against desertification.

[26] Programmes to fight desertification began at the end of the 1960s. Mechanical fixation of sands, the planting of buffer zones, the replacement of the use of wood with the use of gas (for potters), and awareness campaigns are some of the actions taken by the Agriculture Services, Waters and Forests departments, Public Works services and the civil society. These efforts have been undertaken through the creation of the Biosphere Reserve for the preservation of the palm groves of the South, the establishment of the National Park of the Lower Drâa, the launching of the Project on the Preservation of Biodiversity by the Rehabilitation of the Transhumance in the High Atlas (CBTHA).

Starting with the analysis of a diverse and abundant literature, recent field work and the results of the survey, we can sum up our observations as follows:

- Migration is a normal adaptation strategy of poor people, responding to human needs. It may even be a necessary response to reduce pressure of populations on natural resources, by diversifying revenues. Authorities should be worried only if migration occurs suddenly and massively. Migration cannot be curbed, but only regulated.

- If the harshness of living conditions encourages people to leave, it is not all-determining. Otherwise, how could we explain the presence of populations in equally harsh zones such as deserts (Sahara, Arctic, etc.), and how could we explain the strong attachment of populations to these territories?

- The impact of environmental constraints is very relative. Over time, people adapt and create mechanisms and relevant strategies to adapt to these constraints and to transcend them. It is more appropriate to consider environmental constraints and degradation as weakening elements within a local society capable of triggering outmigration and other transformations at any moment, especially when they aggravate suddenly and brutally (droughts, dam building).

- Factors with regard to socio-cultural, economic and political settings are important for migration decisions. Factors that weakened traditional society and its adaptation to the oasis environment brought about by colonization, contact with cities, international migration, education, media, the interventions of the state are more pertinent than changes in the natural environment. In fact, the effects of the dam, of border conflicts and of tourism are mentioned much more as trigger factors than droughts and climate changes.

- Interviews with rural inhabitants and migrants show that according to them the negative impact of environmental degradation on agriculture and livestock farming over the last decades is a main motive for migration. The population considers the dam and the administrations in charge of it as the cause of the crisis. On the other hand, technicians think that populations' failure to keep pace with changes hinders development. The expert interviews indicate that the relation between environment and migration is much more complex and less deterministic.

- The opening of the oasis brought about by education, the media, migration, and tourism have caused a brutal confrontation between urban and rural life styles, those of developed and of underdeveloped countries. This comparison uncovers inequalities, creates aspirations and lessons, and releases the spirit of adventure that characterises migration. The improvement of one's social status and the standard of living of one's family has become a leitmotiv for the youth.

- The mechanisms of migration vary between the different occupational and socio-ethnic groups. Migration produces its own dynamics. Although internal migration of family members is still dominant, permanent migration of families is occurring more often.

- There are relevant differences between migrants and non-migrants, but not in their perception of environmental degradation. Almost all families are affected by temporary or seasonal migration; family members leave for others to stay. Those who stay behind often have to wait their turn, or because of social norms (women, care for children or parents) or because of other ways to earn a living (commercial activities). Even in harsh climate conditions people develop mechanisms and strategies of adaptation.

4. REFERENCES

Ait Hamza, M. 2002. “Mobilité socio-spatiale et développement local au sud de l’Atlas marocain (Dadès-Todgh)”, *Maghreb Studien* 13: 196.

Ait Hamza, M. 1988. “L’émigration, facteur d’intégration ou de désintégration des régions d’origines ? Cas du bassin-versant d’Assif Mgoun.” In Le Maroc et la Hollande. Etudes sur l’histoire, la migration, la linguistique et la sociologie de la culture. Série Colloques et Séminaires, 8. Pub. FLSH, Rabat: 161-175.

Ait Hamza, M. 1998. “Migration et dynamique de l’espace local : Bouteghrar (versant sud du Haut Atlas central)” in Berriane & H. Popp (Eds) *Migration internationale entre le Maghreb et l’Europe. Maghreb-Studien*, 10: 147-158

Bahanim, A. 1990. “Les structures agraires, les systèmes d’irrigation (palmeraie de Fezouata, Draâ Moyen, Maroc)”, *Thèse de géographie*. 2 T. Université Rouen (ronéo)

Bencherifa, A. and H. POPP, 1990. L’oasis de Figuig: persistance et changement. Mittelmeerstudereihe, 2.

Bencherifa, A. 1993. “Migration extérieure et développement agricole au Maroc. Etat de la connaissance. Observations empiriques récentes et perspectives de recherches futures”, *Revue de Géographie du Maroc*, 15: 51-92

Bentaleb, Aziz. 2008, La dynamique de désertification dans le bassin du Draa moyen : analyse et perspectives. Thèse de Doctorat National en Géographie. Université Mohammed V, Agdal, Faculté des Lettres et des Sciences Humaines, Rabat (ronéo).

De Foucauld, Ch. (Vicomte), 1888. *Reconnaissance au Maroc*. Edition Challamel. Paris

De Haas, H. 2003. *Migration and development in Southern Morocco. The disparate socio-economic impacts on out-migration on the Todgha Oasis Valley*. PhD diss. University of Nijmegen.

De Haas, H. 2007a. “North African migration systems: evolution, transformations and development linkages.” IMI Working Papers No. 6. International Migration Institute, University of Oxford.

De Haas, H. 2007b. “Morocco’s migration experience: a transitional perspective”, *International Migration* 45: 39-70

De Haas, h. 2007c. “The impact of international migration on social and economic development in Moroccan sending regions: a review of the

empirical literature", IMI Working Papers 2007/3. Oxford: International Migration Institute, University of Oxford.

Djerbi et al, 1986, Preliminary Results of selection of high-quality bayoud-resistant clones among natural date palm population in Morocco. In Processing of the Second Symposium on the Date Palm, Saudi Arabia. 383-399.

Haut Commissariat au Plan. Web site www.hcp.ma (RGPH, Recensement Général de la Population et de l'Habitat 2004)

Heinmeyer, W. F. et all. 1977. Partir pour rester. Enquête sur les incidences de l'émigration ouvrière à la campagne marocaine. Publication de l'Institut sociogéographique de l'Université d'Amsterdam. La Haye.

Luong-Skormand, M.H., T. Rachadi and M. Lecoq. 1999. "La lutte contre les criquets ravageurs : l'intérêt des mycopesticides", *Les Dossiers de l'environnement de l'INRA* 19: 49-52.

Noin, Daniel. 1970. La population rurale du Maroc. Publication de l'Université de Rouen, Coll. PUF. Paris.

Direction de la Statistique (Eds) 1973. Recensement général de la population et de l'habitat 1971: Population rurale. Région Sud.

Direction de la Statistique (Eds) Rabat. 1983, La population légale du Maroc selon le Recensement de 1982. Imprimerie Casablanca.

Direction de la Statistique (Eds), Rabat. 1984, Recensement général de la population et de l'habitat selon de 1982. La population rurale : Région du Sud.

Direction de la Statistique (Eds), Recensement général de la population et de l'habitat de 1994 : Population rurale par fraction et douar.

Ouhajou, L. 1996. Espace hydraulique et société au Maroc. Cas des systèmes d'irrigation dans la vallée du Dra. Thèse et Mémoire 7, Pub. Faculté des Lettres et des Sciences Humaines, Agadir.

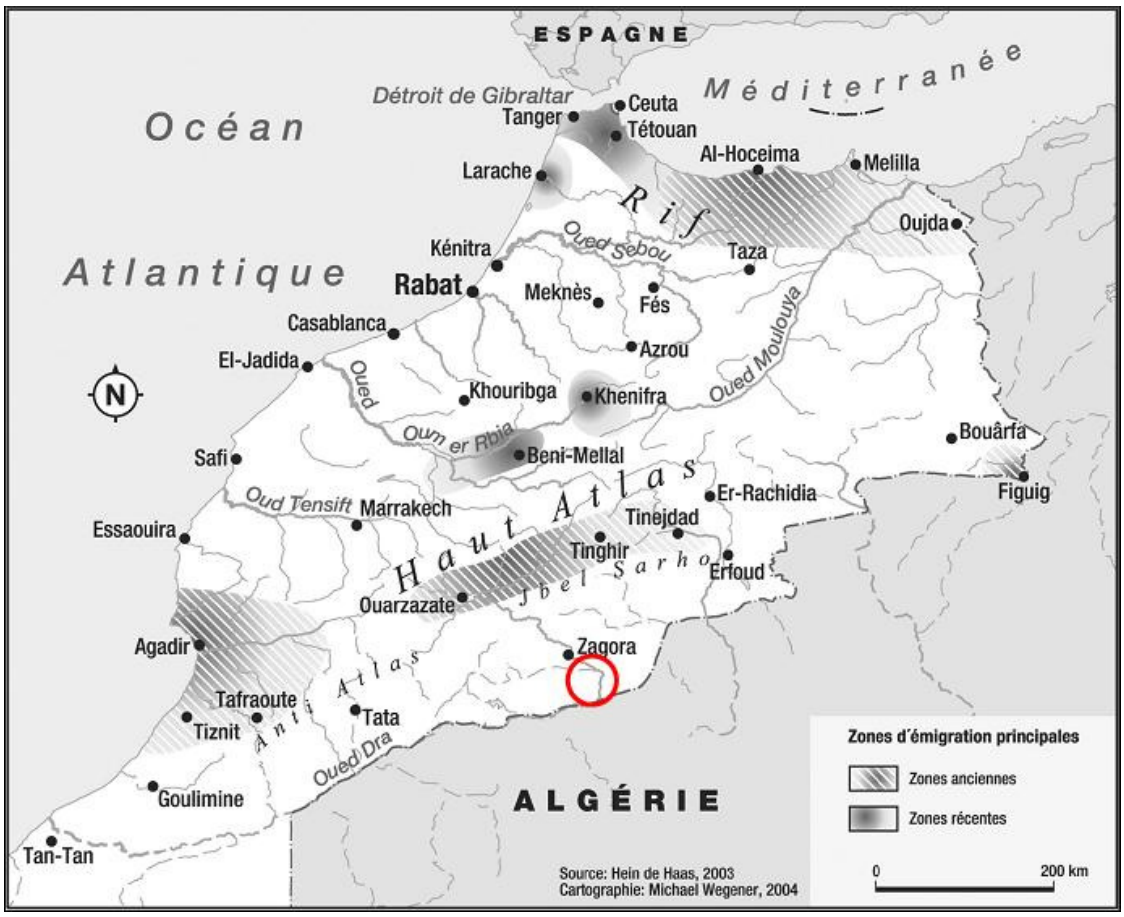
Ouhajou, L. 1993. Etude des structures socio spatiales des groupes cibles. Projet de lutte contre la désertification dans la vallée du Dra (Rapport, ronéo, ORMVAO, /GTZ).

Roy, Jean, 2001. *Histoire d'un siècle de lutte antiacridienne en Afrique. Locustes.*

Zainabi A. T. (thesis in progress). *Mouvement associatif moderne et développement local. Cas de la Province de Zagora. UFR Aménagement et Développement rural au Maghrèb*. F.L.S.H. Univ. Mohammed V, Agdal, Rabat. Sous la direction d'Ait Hamza M.

Annex 1

Figure 4: Map of Morocco with main zones of (traditional and recent) out-migration; the case study area is circled.



Source: De Haas 2007c (indication of case study area is added)

Table 10 Factors impacting on migration decisions

Reasons	Not Important	Important	Very Important
A. Social			
A1. No school for my children avai	10	20	
A2. Insufficient health services		30	
A3. No relatives and friends	26	4	
A4. No community life	22	8	
A5. Family reasons	30		
B. Politics/Conflicts			
B1. Civil War, violence	30		

B2. Minorities were persecuted	30		
B3. Religious conflicts	30		
B4. Family conflicts	30		
B5. Community Conflicts / crime	28	2	
B6. Conflicts on natural resources	28	2	
C. Economic			
C1. Insufficient income		4	26
C2. Unemployment		4	26
C3. No land available for agricultur	2	28	
C4. No land available for grazing	2	28	
C5. Not satisfied with my livelihooc		30	
C6. My neighbours were better of t			
C7. No work adapted to my skills available	4	17	9
C8. Environment degradation mad impossible for me to make a living		18	12
D. Environment			
D1. Poor water quality		30	
D2. Poor soil quality	4	26	
D3. Shortage of water/ drought		26	4
D4. Development project (construc a dam, urban development, etc		30	
D5. Sudden natural disaster like earthquake, storms, insects	4	13	13
D6. Man-made disaster (industrial Accident, etc.)			
D7. Slow environmental degradatic		22	8
D8. Unreliable harvests		22	8

Table 11 Reasons of the declining yields

REASON	Yes	No
Poor soil quality	28	2
No fertilisers available, or not allowed		30
Fertilizers too expensive	5	25
Insufficient seeds		30
Seeds too expensive		30

Not enough water available	30	
Water too expensive		30
Erosion	30	
Problems with insects, pest, diseases	30	
Conflicts in the region	2	28
Crops were stolen from the fields		30
Not enough workers available	18	12
Changing climate, precipitation, temperatures		30

Table 12 Reasons for declining livestock/animals

Reason	**Yes**	**No**
Price of animals rose, killed and sold animals		30
Poor quality of grazing land	30	
Overgrazing	16	18
Shortage of water	30	
No fodder/animal food available	22	8
Problems with diseases	22	8
Due to conflicts in the region	2	28
Stolen		30
Died from starvation / thirst		30
Died from old age		30
Used for own consumption	12	18
Sold to survive	20	10
Sold for receiving money	20	10
Sold for repaying loans	11	19

Table 13 Public services available in home village

Public Service	**Availability/access**	
	Yes *(km)*	**No**
Energy (kitchen gas, oil, electricity, etc.)	Gas, oil at 1 to 6 Km	
Water	wells (use of wells)	
Transport *(indicate the type of transport)*	Taxis and small trucks	
Health services (indicate distance)	Infirmary at 1 to 6 Km	
School *(indicate distance to school)*	Up to 6 km	
Market *(indicate distance to the market)*	In a circle of 6 Km	

Other *(indicate)*	Administrations (centre)	

Table 14 Access to financial services (non-migrants)

Type of Financial Service	Yes	No
Informal borrowing loans (money lender, family)	20	10
Micro credit, micro finance, micro insurance	18	12
Formal financial services (banks : savings and borrowings, insur investments)	10	20
Remittances / transfers from migrating family members	18	12
Other		