

# Chapter 7

## Research in the Todgha Oases of Morocco by University Mohammed V Rabat

*Coordinator: Prof. Dr. Abdellatif Bencherifa<sup>1</sup>*

*Ph.D. Researcher: Hassan El Ghanjou*

### 7.1. General overview of the research sites

#### 7.1.1. Introduction

As already described in the second IMAROM Annual Report, the Todgha basin is an area that extends in an extremely arid environment over the southern slopes of the Central High Atlas Mountains of Morocco. Yet, due to its comparatively superior endowment in mountain-originating water resources, the Todgha stream allowed since very early times a horticulture-based type of oasis agriculture and, concomitantly, has been characterized by high population densities. This population lived in about sixty villages located along a cross section of about 35 kilometers' distance from North-West to South-East, on both banks of the stream. The average width of cultivated parts along the stream ranges from approximately 100 meters just down the *Gorges* section of the Todgha river up to 3-4 kilometers downstream. Administratively, there are today four major administrative units along the Todgha basin: three are *Rural Communes* (i.e., Todgha El Oulia, Todgha Essouffla, and Tarhzoute) and one *Municipal Commune* (urban unit): Tinghir.

The backbone of research in the Todgha basin is an in-depth investigation of four of these villages, representing, in terms of location, the essential units that make up this long section, from the upstream, spring-based irrigation part, down to the Ghallil plain in the South-East (Büchner, 1986). The focus of this report will specifically draw on the results reached in the four villages which are, from North to South: Ichmarine and Iâadouane, on the one hand (both are part of the municipal area of Tinghir town), and on the other Taghia and Boutaghate (both belong to Taghzoute rural commune). In 1999, population estimates for the four villages indicate the following: Ichmarine: 502 inhabitants; Iâadouane: 974; Taghia: 520; and Boutaghate: 512.

#### 7.1.2. Historical aspects of the research oases

The essential characteristics of the villages under scrutiny are consistent with the overall environmental, historical, and social pattern of the Todgha basin in general (Beaurpère, 1931). While the environmental conditions are the essential level of determination and causality, it is, however, the very social and economic structure of the villages that ultimately shape the context of human action in the area and accounts for its old standing sustainability. This is especially true when it comes to the ethnic structure of the current population, as well as the particular roles, functions and property access rights of each ethnic group. Two major ethnic groups are relevant here:

---

<sup>1</sup> Faculté des Lettres et des Sciences Humaines, Rabat, Morocco

The so-called *Ahl Todgha* are said to be authentic Berbers (Imazighen), the oldest settlers whose livelihood has been based on the use of the permanent flow of surface water of the Todgha river, which made their oasis economy the most sustainable. Their location lies in the upper half section of the Todgha basin, where spring-based water resources provide permanent opportunities. The *Ahl Todgha* groups are surrounded in the lower section by dark-skinned communities living, respectively, in the villages of Hart Lamrabtine and Hart Iamiine districts.

In the lower, South-East, section of the basin, villages belonging to the Ait Atta confederacy (formerly, largely pastoral nomadic) are found; these villages reflect essentially the social, kinship structured features that make up the originality of this confederacy.

Two out of the four research oases, namely Ichmarine and Iâadouane, belong to the *Ahl Todgha* groups, while the two others (i.e., Boutaghate and Taghia) are part of the Ait Atta. The oral-historical literature dealing with the formative aspects of these villages, collected at the local level, though not necessarily always scientifically reliable, provides, however, some of the essential clues. The latter highlight not only the past of each of these villages separately, but more importantly provide a pattern of evolution that characterizes the history of the Todgha basin in general.

\* *Ichmarine*

The oasis of Ichmarine, located some four kilometers north of the current town of Tinghir, is divided into three major lineages (locally called *âadam*): the *Ait Hamou*, the *Ait Ali*, and the *Ait Omar*. Only one family in the village is of black ascendancy. Two lineages (*Ait Ali* and *Ait Hammou*) originate from the northern Middle Atlas mountains; their ancestors migrated to the Todgha basin in circumstances unknown to us. It is also said that these two groups have been fighting between them for many years, each of them willing to gain better access rights to water resources and arable land. The third lineage, *Ait Omar*, settled in relation to these conflicts, as it is said that its arrival led to the end of the fights. But conflict between the two lineages have had ramifications until the present time: For example, no inter-marriage between them has ever been recorded so far!

\* *Iâadouane*

The oasis of Iâadouane, the largest among the four research sites, is located approximately four kilometers South of the town of Tinghir. The village belongs to the *Ahl Todgha*, and its creation may well be the result of early demographic and territorial expansion originating from the upstream section. Oral history indicates that this village is composed of what used to be two separated communities: Iâadouane *sensu stricto*, and another village called *Ait Yahya*. The two villages may have merged into one in conditions that are as yet unknown. The lineage structure may offer a clue as to what these conditions were, as the *Ait Yahya* represent today one, and only one, lineage in the segmentary system of the village (the lineage is called *Ait Yahya*, but history kept the names of its previous lineages, namely *Ait Aissa*, *Ait Ben Ali* and *Ait Brahim*). On the other hand, four other lineages (belonging to the historical Iâadouane group) are found (these are: *Ait Omar*, *Ait Lhaj*, *Ait Lghazi* and *Ait Ikkou*). At the southern limit of the village are found four Chorfa families with no kinship relation with the *Ahl Todgha* lineages.

\* *Boutaghate*

The population of the oasis of Boutaghate belongs to one of the main branches of the Ait Atta Confederacy, the *Ait Aissa Ou Brahim* (which, itself, is a fraction of the *Ait Wahlim* fifth-tribe of the confederacy). They originate from the Jebel Saghro, a mountain system located to the South of the Central High Atlas. The settlement of the population is relatively recent (less than two centuries); this settlement seems to be associated with military support they provided to the dark-skinned population living in Hart Mrabtine village. The latter groups were struggling against other groups for ownership over the fertile Ghallil plain. In exchange for their military support (and protection), the Ait Atta received free access to land in the area (Spillman, 1931; Hart, 1981). Four major lineages are found in the village of Boutaghate: *Ait Oubrahim*, *Ait Oussâa*, *Ait Ali Bouch*, and *Ait Ouhaddach*. Additionally, about 15 families not ethnically related to the Ait Atta are found outside the limits of the old fortified section of the village.

\* *Taghia*

The oasis of Taghia is located in the piedmont of the Jbel Saghro mountains which circumscribes the Todgha watershed to the South; specifically, it lies in the contact zone between the Todgha stream and one of its tributaries, namely Assif-n-Taghia. Taghia also belongs to the Ait Atta confederacy, and it is part of the fraction called Ilemchane. The oral history reports a relatively late settlement (no more than 150 years ago), in a context of conflicts to which the group has been named. Four lineages make up Taghit: *Ait Boutaghratine*, *Ait Amer*, *Ait Sekkou*, and *Ait Daoud*. Taghia is a famous place, as one of its leaders, 'Assou Ou Baslam, led the last and most important Moroccan military resistance against the French colonial army; as a result, it was not until 1934 that the French managed to assert control over the region.

### 7.1.3. Geographic aspects of water resource distribution and management

In an arid environment such as in the Todgha basin, where technology has remained traditional for centuries, it is quite obvious that environmental conditions have directly determined the type of interplay between nature, artefacts, land and water resources, the locational aspects of these resources, and many other material (as well as non material) elements at the local level (Ait Hamza, 2000). Below is a brief review of the salient characteristics of these relational aspects.

\* *Ichmarine*

The village Ichmarine, the northernmost in terms of location, is located in a highly defensive site (as it dominates the narrow irrigated terraces that lie below) and controls them effectively over a steep scarp. The settlements (both ancient and recent) have a linear shape along the scarp dominating the lower terraces. The only paved road of the region (the one leading to the famous touristic *Gorges*) crosses the village and splits it into two parts. A major earth channel called *Seguia Tabyian* (or *Seguia Imzilne*) provides the village with its irrigation water resources. With some minor exceptions, water resources seem to be available in reasonable supplies.

\* *Iâadouane*

The village of Iaadaouane, similar to the previous one, extends over a dominating platform located in a highly defensive site that also makes possible the control of irrigated terraces. This is a large village, as are its irrigated area. Irrigation is made possible with the help of an earth channel (*Seguia Tagoumasste*), which begins immediately to the North and is also used by several other communities downstream. As a result, access to water is not permanent but is limited in time. Surface water resources are particularly limited in summertime (that is, when irrigation needs are at their highest). Thus, the village population has sought additional underground water resources, using to that effect recent motor-pumping techniques. But as shall be seen later, the water resources remain, in general, a limiting factor in the development of agriculture.

\* *Boutaghate*

The village of Boutaghate is located relatively far from the river bed. The group has no access rights to Todgha surface water. In conformity with the specific custom law of the Ait Atta confederacy, which is very egalitarian in nature, and because of the recent settlement itself, the village is characterized by the regular, geometric-shape distribution of individual houses. Yet, the old fortified *qsar* is mostly used today by outsiders, whereas Ait Atta families have moved since the early 1960s outside the fortification walls. The village has access to an irrigated area composed of three sections: two of them (making up 50 percent of the arable land) are irrigated with underground water resources authorised by a *qanat* (or, *khettara* as it is locally called) known as *Khettara Boutaghate*, whereas the other half is irrigated through water-pumping and, therefore, is of a recent creation. The water pumped, however, has a high level of salinity and is, as shall be seen, a major problem for agriculture development.

\* *Taghia*

The oasis of Taghia is composed of three separate settlement units surrounded by a minor fortification wall; many of the old houses of the *qsar* are either falling into ruin or are being used by outsiders who joined the community recently. Due to its location at the junction section of a tributary stream flowing South-North towards the Todgha, the village of Taghia itself has access to temporary water resources captured through a *qanat* (*Khettara Taghia*) originating in the very middle section of the tributary. Yet agriculture suffers from water shortages, as is evident in the very extensive oasis landscape of this village. Because of this, there are in fact clear signals of land abandonment in the area.

#### **7.1.4. The local political context**

Past political organization at present still has important implications in daily life. Inherited cultural and organizational elements are both viewed as positive assets for future development, but may also become serious limiting factors for some. Below is a brief review of some of the institutional elements that still bear relevance as far as agricultural development is concerned.

\* *The village as a global institutional unit:*

As is the case in the whole Todgha basin, each village operates with regard to the other ones as a relatively independent entity. Decision-making regarding issues of collective interest at the level of the village is usually taken by a traditional council called *jemâa*, in which representatives of the group's lineages are members in what some have described as a pristine form of democracy.

Socially, the lineage (*âadam*) is the basic social and political organizational unit within the village. The members of the lineage have kinship relations as they have an eponym ancestor to which the very name of the group refers (e.g., *Ait* means "the sons of"). Whether this affiliation is true or not doesn't matter, from an operational perspective. In a conventional segmentary society, kinship-based relations have specific implications: social, legal, political, and cultural. Typically, the number of lineages in each village is between three and five; there is, however, no fixed rule as to what the number ought to be. The number of lineages and their distribution are a dynamic process. Lower status group in the segmentary hierarchy strive to reach a higher status of a separate lineage.

Additionally, because no community is totally closed, outsiders are found almost in all villages. These are either dark-skinned groups who occupy a lower status, or families that claim being *Chorfa* (i.e., the descendents of the prophet's family), and as such enjoy the advantage conferred by the symbolic capital of sacrality and respectability.

\* *Inter- and intra-village institutions of social regulation: past and present*

The social life of Todgha communities is marked by a continuous balance of competitions and solidarity practices. In a setting where resources are scarce and environmental factors harsh, survival has never been taken for granted, but is a matter of continuous struggle. This applies surely to the past; but this also bears meaning in the present. Within each village, as well as between villages, every group activity involves competition, negotiation and even struggle: a marriage, a *moussem* (seasonal fair), an election, are *meaningful social moments* which have underlying material elements that lead, ultimately, to the issue of access to resources.

In these particular social moments, identity and institutional structures become decisively important. Yet, the Ahl Todgha (e.g., Ichmarine and Iâadouane villages), because of their old settlement, are characterized somehow by the dissolution of the tribal ethnicity level (Ahl Todgha is becoming more and more a meaningless level of reference, let alone a functional one). This change takes place in favor of village affiliation as a source of identity. On the other hand, the villages of the Ait Atta (e.g., Boutaghat, and Taghia) are very much tribal in a general sense. Their relatively recent pastoral cultural background accounts for this. For example, they all elect their *cheikh* (or big man), accept unquestionably the authority of custom law and abide by decisions taken in the interest of the community.

Finally, it is important to mention that in the context of the nation-state and modernization trends in contemporary Morocco, the question of what becomes of these inherited practices is an appropriate one. The *jemâa* traditional council is becoming more and more marginal in favor of modern elected elites, while the *commune rurale* is aiming at eliminating the so-called "obsolete legacies" of the past. It is not sure, however, that the modern institutional elements can in fact effectively deal with the resource management problems as effectively as the traditional ones. There are indications that the path to modernization has led to the dissolution of traditional value systems without necessarily an appropriate alternative, as individual interests emerge at the expense of collective ones.

However, this trend is especially true in the villages of the Ahl Todgha, less so among those of the Ait Atta.

## 7.2. Methodological aspects

Field research methods remained consistent with the very nature of the questions and the experimental protocol, as described in the *Technical Annex* of the research proposal. After a brief period of preliminary reconnaissance, the Mohammed V University research team started the field investigation among the four villages as early as September 1998, and the research did last continuously up until June 2000. Field research has been conducted in close coordination with the University of Amsterdam research team. The main stages of the field research are summarized by the following:

- Stage One: the *General Survey* of the Todgha basin: over 60 oases were subjected to this general survey, which authorised their characterization in terms of population, historical background, migration features and resource use/management.
- Stage Two: *Design and Testing* of the research questionnaires. Two such questionnaires were administered, one for work package I and the other for work package II (see **chapter 4**).
- Stage Three: *Village Sampling* procedure and *questionnaire administration*. The representativity of the village sample has been best achieved by inter-correlating the key variables that were gathered and analyzed in stage one and two, particularly those related to migration impact on oasis resource use and management, as well as the various other implications of migration. This has been done while bearing in mind the North-South environment along the Todgha basin. Another important decision has been to administer the questionnaire to *all* households living in the four selected villages; this decision allowed access to the full details of the qualitative changes that took place in a migratory context within the villages.

In another vein, it is also noteworthy to observe that additionally a *second questionnaire* that pertains specifically to the *hydro-technical and land use aspects of oasis agriculture* has also been conducted, along with the establishment of land use thematic maps in several sections of each village.

Finally, a special research investigation has been conducted in the *Ghallil plain*, an area where an impressive process of agriculture development (land reclamation, irrigation expansion) in relation to remittance-based investments took place. The Ghallil plain provided an exceptional setting with which to also try and validate many of the observations and interpretations that were formulated in the conventional villages of the Todgha oases.

### 7.3. Demography and migration

#### 7.3.1. Population size and demographic growth

Based on the field research, the total population of the four villages submitted to the comprehensive investigation amounts to 2,307 people living inside 337 households. With the exception of Iâadouane (the largest village), the three others are of fairly comparable size (500 to 600 inhabitants). The average household size is about 7.7 persons per household, which shows the existence of a pattern of large families indicating not only the prevalence of high birth rates, but also corroborates the existence of a system of extended families.

The investigation of population dynamics during the last fifty years indicates clearly the existence of an increase that is typical within an early stage of a society in a demographic transition phase in which, however, migration effects play a strong role, as tables 7.1-7.3 indicate:

**Table 7.1 Population and household size in the investigated villages in 1999**

	Total Population number in 1999	Households	
		Total	Average size
Ichmarine	502	66	7.6
Iâadouane	974	116	8.4
Boutaghate	612	85	7.2
Taghia	520	70	7.4
Total	2608	337	7.7

**Table 7.2 Recent growth trends of the total population**

	Ichamarine	Iâadouane	Boutaghate	Taghia	Total
Total population in 1971	268	467	222	350	1750
Total population in 1982	379	611	410	589	1989
Total population in 1994	391	624	551	593	2159
Total population in 1999	502	974	612	520	2608
Average annual growth rate (1971-1982)	3.76%	2.8%	7.7	6.2%	1.24%
Average annual growth rate (1982-1994)	0.26%	0.17%	2.86%	epsilon	0.71%
Average annual growth rate (1994-1999)	5.67%	11.21%	1.92%	-2.8%	4.15%

Until the mid-1990s, the overall population growth rate has been relatively low, as a result of intensive emigration. Since then, the growth rate has increased, which reflects a slowdown in the intensity of migration but also indicates an overall improvement in living conditions, prompting lower death rates. The figures for this overall model hold both for trends observed for the total population as well as for the total number of households.

When considering demographic trends at the level of each village separately, there are, interestingly, several minor differences. The villages of the Ahl Todgha tribe (namely, Ichamrine and Iâadouane) have had a consistently low population growth rate until the early 1990s. Because of the scarcity of land and other resources, and because of the absence of any alternative solution to population growth, out-migration (internal and international) has been extremely strong and ancient. The intensity and the antecedence of migration in these two

oases are unquestionable. Only after 1990, a substantial population growth rate is observed. The figures shown in tables 2 and 3 are high, though they may have been in the past related to high in-migration levels, after the incorporation of these two villages into the municipal area of the Tinghir *commune*.

In opposition to this pattern, the two downstream villages belonging to Ait Atta former pastoralists indicate a different trend. Because of a relatively later engagement in international out-migration, the population of these villages has increased rapidly in the period 1970-1985. It was not until the migratory phase started that a process of slowdown in this trend of demographic growth took place. In the village of Taghia, this population decrease has reached dramatic proportions, as the population moved to settle in better serviced areas, near the main transportation roads, or directly in the town of Tinghir itself.

**Table 7.3 Recent trends in household size and composition**

	Ichamarine	Iâadouane	Boutaghate	Taghia	Total
Total households in 1971	47	81	36	45	235
Total households in 1982	51	84	55	84	274
Total households in 1994	56	90	74	79	299
Total households in 1999	66	116	85	70	337
Average annual growth rate (1971-1982)	0.77%	0.33%	4.8%	7.87%	1.5%
Average annual growth rate (1982-1994)	0.81%	0.59%	2.88%	-0.5%	0.76%
Average annual growth rate (1994+1-1999)	3.57%	5.77%	2.97%	-2.55%	2.54%

### 7.3.2. Migration patterns within the investigated villages

As is generally the prevailing rule throughout the whole Todgha basin, the resources generated by migration remittances are the most decisive, key factor for understanding the current situation of the oases. On average, the investigation indicates that each household hosts about *1.5 full time migrants* (and *1.15 migrants* abroad). The critical importance of migration among the active population group is better evidenced when looking into the status of the household heads themselves (table 6.4). Approximately 60 percent of these heads of household have been, or still are, engaged in an economic activity (or occupation) related to migration (internal or external): respectively 14.2 and 45 percent, migrants and return migrants included. International migration rates are by far the dominant pattern, as about 30 percent of heads of household were still operating abroad during the investigation period. Return migrants from abroad account for 9.5 percent of heads of households.

On the other hand, the comparative distribution of migration magnitude between the four investigated villages shows some differences, in that the intensity appears to be positively correlated with the antecedence of movement. Thus, for instance, the village of Taghia, which was late in entering the migration age (only in the early 1980s), has a lower rate of international migration compared to the villages of Iâadouane or Boutaghate. These differences are highlighted when we consider not only heads of household but all migrants, regardless of their specific role within the household:

**Table 7.4 Migration status of household Heads**

	Non Migrant	Migrant Status		Return migrant Status		Total
		Internal	Abroad	Internal	Abroad	
<b>Ichmarine</b>						
Total	29	3	16	8	10	66
%	43.9	4.5	24.2	12.1	15.2	100
<b>Iâadouane</b>						
Total	41	•	41	•	17	116
%	35.3	12.9	35.3	1.7	14.7	100
<b>Boutaghate</b>						
Total	37	•	30	•	3	85
%	43.5	11.8	35.3	5.9	3.5	100
<b>Taghia</b>						
Total	30	•	13	•	2	70
%	42.9	34.3	18.6	1.4	2.9	100
<b>Total</b>						
Total	137	•	100	•	32	337
%	40.6	15.4	29.6	4.74	9.5	100

**Table 7.5: Respective importance of Internal vs. International Migration (ALL migrants included)**

	Ichamarine	Iâadouane	Boutaghate	Taghia	Total
Internal Migration	39.8%	32%	22.7%	82.3%	19.2%
International Migration	60.2%	68%	77.2%	17.7%	80.8%

**Table 7.6: Destination countries of the International migrants**

	Ichmarine	Iâadouane	Boutaghate	Taghia	Total
France	84.6%	79.4%	83.1%	70.6%	81.4%
Netherlands	0	5.9%	8.8%	23.6%	6.7%
Belgium	4.6%	0	0	0	1.2%
Spain	1.5%	4.4%	2.2%	0	2.5%
Italy	0	0	0.7%	0	1.1%
Switzerland	0	0	3.7%	0	1.7%
Others	9.2%	7.3%	1.5%	5.8%	5.7%
TOTAL	100	100	100	100	100

### 7.3.3. Countries and regions of destination of international migrants

Table 7.6 indicates the main destination countries (mostly in Europe) of the international migrants originating in particular from the villages under study. The general pattern involves a very strong migration towards France, in view of the particular historical reasons that have for years created a salient antecedence for migration towards the former colonial *metropole*. All four villages show this France-oriented dominance (though the rates slightly vary, ranging between 70 and 85 percent). Otherwise, each village seems to have delimited an additional, particular niche to which most of the remaining migrants tend to go: Netherlands

(Taghia, Boutaghate, and Iâadouane), Belgium (Ichmarine), Spain (Iâadouane), and even Switzerland (Boutaghate). These unique niches have mostly been defined by peculiar individuals who, once settled, tend to create a kind of migration chain or network, whereby their relatives and friends are called upon (Bonnet et Bossard 1973; Bencherifa 1995).

### **7.3.4. Recent and predictable trends in migration**

In considering future perspectives for international migration from Todgha oases, it is essential to cast these perspectives within a macroscopic framework, involving in fact the overall future of the relationship between the European Union as the major destination area on the one hand, and the Maghreb countries as the sending area, on the other. All indications available today tend to show that migration can hardly be stopped, as the conventional wisdom anticipated, ever since the mid-1970s when European policy adopted a target of zero migration. Yet never since that time has migration been as active as it is today. Migrant populations living abroad in some areas attain ratios of 8.5 percent of their group's total population. At the global level of the Todgha basin, migrants account for up to 6 percent of the total population!

There have been various mechanisms through which the migratory trend continued and the overall number of migrants increased significantly since the early 1980s: family reunification policies, family life cycle (internal growth within migration households), marriage strategies between migrants abroad and non-migrants living in the Todgha basin, or simply and probably more importantly, so-called illegal migration. In fact, many of the villages located downstream from Todgha oases, such as Boutaghate and Taghia, entered the migration phase only in the late 1980s and early 1990s, that is long after the European non-migration option. There does not seem to be any specific reason to anticipate that this migratory trend may stop, let alone reverse, in any foreseeable future.

## **7.4. Oasis agriculture: technical and institutional aspects, and recent processes of change**

### **7.4.1. Water resources: surface water, *khattara*, and motor-pumping**

Water resources are the single most decisive production factor in the oasis ecosystem (Bencherifa and Popp, 1990; Ouhajjou, 1996). This unquestionable fact applies to the Todgha villages as well. In the four villages under study, three main sources of irrigation water supply are found:

#### *\* Surface water resources*

Two villages, Ichmarine and Iâadouane, are here concerned by this type of water resources, as they are located upstream, unlike the villages located downstream which have no access rights to these surface waters. The water resources involved in this type are those brought by the Todgha river itself. They are of two origins: on the one hand the regular flow coming from springs located in the *Gorges* section (which provide water supplies *all year* round), and the runoff and flood water resulting from the winter rain on the mountain watershed part of the stream, on the other. The latter part provides substantial, additional quantities of water for agriculture in winter. The rainfall variability, subsequently, accounts for the irregularity in

access to this surface water by downstream communities. A complex and hierarchical system of traditional derivation dams and earth channels (locally called the *souagui*, sing.: *seguia*) direct Todgha water resources downstream up to the level of cultivated plots<sup>2</sup>.

This hierarchical network of water distribution departs from the *primary channels*, each of which having ramifications into *secondary* and then, at times, *tertiary channels*, each of which in turn carries water to a particular agricultural sector. Here, through small ditches, the water reaches the plot to be irrigated. The plots are divided into small rectangles or squares, called *guemmoune*, which are in fact submerged one after the other. The village of Ichmarine is irrigated thanks to the *Seguia Imzilne* (or *Tabyane*), which transports water shared with the village Taourirt located immediately to the south. This *seguia* enjoys abundant water resources in winter as well as in summer. Iâadouane, on the other hand, is associated with five other villages using the *Seguia Tagoumasst*, and experiences shortages in summer (depending on the level of the discharge). Therefore, it needs to use complementary underground water resources.

*\* The underground water resources tapped through the Qanat (or Khattara) system*

This water tapping technology is essentially applicable in the two downstream villages of Boutaghatte and Taghia. A *khattara* is an underground tunnel that captures by gravitational force water from the aquifere; because the slope of the tunnel is lower than that of the water table, the *khattara* brings water to the surface in a spring-like exurgence, over a variable distance ranging from a few hundred meters up to several kilometers. Once water exurges to the surface, it is directly distributed through a hierarchical system of *Souagui*, similar to the one described above, to the cultivated plots. Most *khattaras* of the Todgha basin have been dug in the alluvial plain of the river itself. The *khattara* of Boutaghatte is 7 kilometers long<sup>3</sup>, whereas Taghia's *khattara* is only 3.5 kilometers long.

*\* The underground water resources tapped through motor pumps*

It was not until the French colonial penetration in the Todgha basin (by 1930) that the first motor pumps were built (though at first originally intended only for drinking purposes). But motor-pumping experienced an extraordinary development since the early 1970s, when important changes prompted Todgha peasants to look for additional water resources. They started digging wells at a rapid pace and installed modern, energy-based motor pumps. Water-pumping developed dramatically during the 1980s and 1990s. Two major factors are behind this rapid expansion: first, the villages of the lower Todgha basin suffered from water shortages, as they have institutionally been denied any access right to surface water due to their downstream location. This shortage prompted an intense search for alternatives. A second factor contributed to this expansion, namely the remittances authorised by international labour migrants. In a sense, motor-pumping development exemplifies, as shall be seen in more detail later, one of the most important means by which international migration leads to a radical transformation in oasis agriculture.

Motor pumping initially was seen as a means to intensify agricultural production within the traditionally irrigated arable sectors of the villages. Later, its main purpose has been to open new frontiers of land for irrigation, such as among the Aït Atta villages of

<sup>2</sup> In the Todgha basin, *seguia* is the only way to transport water to the irrigated plots. A *seguia*'s length may vary from approximately 50 meters up to many kilometers. The *seguia* of derivation is always found upstream of the section to be irrigated, as the flow of water is based on gravity.

<sup>3</sup> Because of this length, Boutaghatte must "pay" a passage right to the village of Tloul (in form of water shares).

Boutaghate and, to a lesser degree, Taghia; as shall be seen, this is particularly true in the Ghallil alluvial plain<sup>4</sup>.

**Table 7.7 Migration status of individual households in relation to the use of motor pumping**

	Access to private well and motor pump		Access to collective well and motor pump	
	no	yes	no	yes
Non migrant	33.50% <b>(82.5%)</b>	7.10% <b>(17.5%)</b>	26.10% <b>(64.2%)</b>	14.50% <b>(35.8%)</b>
Internal Migrant	12.80% <b>(82.7%)</b>	2.70% <b>(17.3%)</b>	9.50% <b>(61.5%)</b>	5.90% <b>(38.5%)</b>
Migrant Abroad	18.10% <b>(61%)</b>	11.60% <b>(39%)</b>	16.60% <b>(56%)</b>	13.10% <b>(44%)</b>
Return Migrant, Internal	4.20% <b>(87.5%)</b>	0.60% <b>(12.5%)</b>	4.90% <b>(93.8%)</b>	1.30% <b>(6.3%)</b>
Return Migrant, Abroad	7.40% <b>(78.1%)</b>	2.10% <b>(21.9%)</b>	3.30% <b>(34.4%)</b>	6.20% <b>(56.6%)</b>

### 7.4.2. Oasis agriculture

The cultivation system in the four investigated villages is consistent with the overall pattern of oasis agriculture prevailing in the arid lands of Maghreb countries in general. There are indeed features found in the agricultural system of these villages that have nothing original as such, as they can in reality be applied to all the oases of the Old World. But there are also, at a lower but more practical level of observation, several contextual elements of variability, which will also be discussed below.

In general, the cropping system in the four villages maintains a production rationale aimed at the achievement of self-subsistence. This means that the intended destination of production is, first of all, to ensure self-consumption at the household level. This objective goes along with the existence of a “package” of elements (technical and plant oriented) that are *traditional*, in the sense that while inherited from centuries old trial-and-error practices of the founding fathers, these practices have also proven to be effectively adjusted to the very nature of the oasis setting.

Several crops are pursued by peasants in the four village oases. In the old inherited irrigated portions of agricultural land, a sort of *cultura promiscua* type of cropping system is found, that is, various crops coexist at the same time in a synergetic system within the same plot. This is indeed the stereotypical picture of the oasis as a system that has several layers of plants. These crops are comprised of cereals, leguminous crops, fodder crops and various types of trees. The field investigation, however, indicated also that there are incipient, albeit limited, processes of change in this model. Two such changes are important to mention, as migration figures heavily in their genesis. Migration interferes through the power of capital (*remittances*) it allows, and through the labour supply (*shortage in manpower*) available to the traditionally labour-intensive oasis agro-ecosystem.

Areas allocated to cereals and leguminous crops tend more and more to diminish. This is because in an open economy, where the market-based exchange of products is the rule, the comparative advantage of oases lies no longer in the pursuit of these crops, as oases have neither large supplies of land, nor can they, as a result, achieve scale economies through

<sup>4</sup> In 1999, the services of the Agriculture Ministry estimated the number of motor pumps in the Todgha to be 1100, about 94 percent of them found in the downstream section of the basin (irrigating nearly 89 percent of the total land irrigated by this means, while only 11 percent is found upstream). Motor-pumps account for more than 70 percent of the total irrigated land in the Todgha basin.

the use of modern machinery. This trend towards a decrease in cereal production is specifically observed in Ichmarine, and, to a lesser degree, in Iâadouane.

The area dedicated to fodder crops (alfa alfa; maïze) tends to increase in importance. This is a fundamental change in that, behind the fodder crops, there is an important interest given to animal raising, particularly cattle, for both milk and for meat production. In the past, natural manure was an absolute necessity in order to maintain the intensity of oasis cultivation; in fact, this was one the most important factors which accounted for animal rearing. For many producers, natural manure remains a decisive factor in decision-making, though industrial fertilisers are used to an increasing extent.

In general, the level of agricultural intensity may vary from one household to the other, depending on specific contextual factors. When looking into the variability between the four investigated villages, the intensity of cultivation appears to have heavily decreased in the village of Taghia as a result of the lack of interest shown towards the maintenance of the old *khettara* irrigation channel. This is the most noticeable instance of extensification observed within the Todgha basin (see below). Other villages do keep up with a more or less intensive cropping system.

Another aspect that characterizes all four villages is the predominance of micro-land properties. There is indeed a micro-fundium type of tenure. Individual plots in this context are usually small and scattered about different sites. The need to compensate for the small size of individual land resources accounts for the high levels of intensification that traditionally is a characteristic of the cropping system. Thus, for instance, a minimum of two major harvests are usually the rule whenever water supplies are not a limiting factor; indeed, fodder productivity is continuous over a period of 4 to 6 years.

**Table 7.8 Access to land and migration status among investigated households**

	Non migrant	Internal Migrant	Migrant Abroad	Remigrant, Internal	Remigrant, External
Landless	9.5 (23.4%)	3.3 (21.2 %)	2.4 (8.05%)	0.9 (18.7%)	0
Less than 500 m <sup>2</sup>	7.1 (17.5%)	5.7 (36.5 %)	3.3 (11.1%)	0.9 (18.7%)	0.9 (9.5%)
501-1000m <sup>2</sup>	6.2 (15.3%)	0.9 (5.8%)	2.4 (8.05%)	1.2 (25%)	1.2 (12.6%)
1001-5000m <sup>2</sup>	11.6 (28.6%)	3.9 (25%)	9.5 (31.9%)	0.6 (12.5%)	5.3 (55.8%)
> 5000m <sup>2</sup>	6.2 (15.3%)	1.8 (11.5%)	0 (0%)	1.2 (25%)	2.1 (22.1%)
<b>Total</b>	<b>40.6</b> (100)	<b>15.6</b> (100)	<b>29.8</b> (100)	<b>4.8</b> (100)	<b>9.5</b> (100)

### 7.4.3. Social and institutional aspects of resource management

The oasis agro-ecosystem owes much of its existence to the social and institutional elements that underlie its organisation, as much as to the natural water resources that authorise it. Nature and culture interact intensely to ensure the long-term sustainability of this agro-ecosystem. In the four villages subject to field work investigation, this fact is confirmed. Below are a few elements observed in the villages under study which corroborate this.

\* *Water distribution: technical and cultural aspects:*

Access to water resources is ruled by a complex, legal and institutional body of water rights and water share systems (*nouba* system). These systems apply to the communities living in the basin, as much as they apply to their social and ethnic ramifications: villages, lineages and individuals. Whether it be water resources derived from the Todgha stream itself, or that captured from the traditional *khettara*, access is regulated through a system called *nouba*, or ‘time turn cycle’, in which access rights are well defined along a duration standard. This standard is usually longer in the wintertime (41 days) than in summer (22 days)<sup>5</sup>. Within this cycle, time periods are allocated to particular fractions, then within each fraction access duration is allocated to villages. Finally, down the pyramid (i.e., within the villages), time blocks are allocated to lineages, which in turn deliver to individual families. The *nouba* is, therefore, an ever revolving water distribution cycle system.

In the Todgha basin there are *eight fractions* of units in the 41 days of *nouba* in winter time. To each fraction there corresponds a specific number of days of water access rights. In winter, Ichmarine shares its *nouba* time block of 6 days with the village Taourirt. However, Iâadouane has access to no more than 30 hours. Then each of the village allocates its *nouba* share of water to its members in conformity with their immemorial rights. Irrigation actually takes place by successively submerging the plots involved in the maximum of their respective individual water shares. The situation is relatively simple in the upper Todgha basin, as water rights and irrigated plots are proportionately distributed, for land and water go along together and are said to be ‘married’; that is, ownership of a plot in the ancient oasis corresponds automatically with the right to irrigate it.

The situation is different in the downstream villages of Boutaghate and Taghia. True, a *nouba* system is still applicable, in general, to the resources authorised by *Khettara* techniques used by these villages. The *khettara*, however, is owned by a village, and at times only by some specific lineages within that village. Unlike the flow of natural water resources in a stream, *khettaras* have been built *ex nihilo*; that is, the construction has required an important *investment*. Therefore, only the descendants of those who supported the costs of this first investment own the water brought by the *khettara*. In fact, individual water shares are proportional to the respective contribution in labour and/or capital investment provided by the founding fathers. Each water shareholder can use its part as he sees fit; in other words, land and water are not married. Water distribution from the *khettara* is organised according to a *nouba* system, and each share is measured by means of time units (though the clock has replaced the traditional *clypsedra*, locally called *Tanast* in all of Southwest Morocco). The standard time duration of the *nouba* in Boutaghate village is 10 days in the winter, against 20 days in the summer. In Taghia, this duration is fixed at 15 days for the whole year<sup>6</sup>.

---

<sup>5</sup> In 1942, the French formalized for the first time the *nouba* system between fractions and villages, a reform revisited after independence. Thus, two seasonal *noubas* (winter and summer) are created. The winter *nouba* extends from 15/21 September until 15/18 March the year after (six months); during this season, all the villages of the Todgha, with the exception of those of Aït Atta, have access rights over a 41-day cycle. The summer *nouba* is in force from 15/18 March until 15/21 September, and only has a duration of 22 days (due to higher plant needs). Only villages located in the upper Todgha have access rights (see for more details El Ghanjou & De Haas 2000).

<sup>6</sup> However, the *khettara* of Taghia is literally collapsing, as it hasn't been used for 7 years.

*\* Institutional aspects of water distribution:*

The supervision and control of water distribution, as well as the maintenance of the overall artefacts associated with this distribution, required direct community-based institutional involvement<sup>7</sup>. At each village level, an elected council of representatives, called *Jemâa*, chaired by *Amghar-n-tamazirht* (also known as *amghar-n-taqbilte*), is in charge of the task of water management. Maintenance of the irrigation network (i.e., the deviation dams, the cleaning of the *Seguia* channel, the cleaning and enlarging the *Khettara*, etc.) is based on collective labour in which shareholders must participate.

#### **7.4.4. Land and water resource management issues: recent processes of change**

Regarding the intense labour migration that has taken place, several changes have been recorded in the management aspects of land and water resources:

*\* Extension of arable land*

Among the four villages, Ichmarine and Iâadouane found themselves encapsulated by their location upstream, with no viable arable land to be fit for cultivation expansion. This encapsulation is unlike the situation observed in the downstream villages of Boutaghate and Taghia. The former, in particular, has had a pioneer role with respect to this process, as it has been leading the expansion of irrigation and cultivation in surrounding arid lands as early as the beginning of the 1970s. Migration remittances were, as shall be seen, instrumental in this regard. Investing in agriculture has been a general objective among early migrants. For instance, in Boutaghate there has been a 50 percent increase in total irrigated land area. Digging wells, equipping farms with motor pumps and developing tree cropping are the three package components that are part of this land expansion.

*\* Technological advances: machinery and fertilisers*

It is hardly conceivable to think of machinery use in the traditional garden-like plots, given the micro-fundium structure. Thus, there is a limited magnitude of machinery use: only 1 percent of farmers possess machinery, while 7 percent would use them, but rather on a rental basis. The phenomenon of machinery use is mostly observable among migrants/return migrants from abroad, and is circumscribed only in the lower part of the Todgha basin, where land expansion could indeed take place.

An incipient, albeit significant, trend towards the use of chemical fertilisers is also observed within the four villages under study. Again, the trend is heavily skewed towards migrant-related farms.

---

<sup>7</sup> With the formalization of the nouba system by the State, violent conflicts between villages over the control of water stopped. The local state authority is in charge of enforcing the application of the system.

**Table 7.9 Use of fertilisers among households of investigated villages, by migration status**

	No use	Use of 1-10kg	Use of 11-20kg	More than 20kg
non migrant	32.60% <b>(80.3%)</b>	6.20% <b>(15.3%)</b>	0.90% <b>(2.2%)</b>	0.90% <b>(2.2%)</b>
Migrant, internal	13.40% <b>(86.5%)</b>	2.10% <b>(13.5%)</b>	--	--
Migrant, abroad	16.90% <b>(57%)</b>	11.00% <b>(37%)</b>	0.90% <b>(3%)</b>	0.90% <b>(3%)</b>
Remigrant, internal	3.00% <b>(62.5%)</b>	1.50% <b>(31.3%)</b>	0.30% <b>(6.3%)</b>	--
Remigrant, abroad	4.70% <b>(50%)</b>	3.90% <b>(40.6%)</b>	0.90% <b>(9.4%)</b>	--
<b>Total</b>	<b>70.60%</b>	<b>24.6</b>	<b>3.0%</b>	<b>1.8%</b>

\* *Overall evaluation*

The future of land and water management, as well as the overall future stake of oasis-based agro-ecosystems, raise several questions pertaining to their sustainability, in view of the recent changes that have taken place. First, we have to mention the decline of institutional structures; in almost all cases, the very existence of the *jemâa* traditional council is now put into question by the rise of individualism. This institutional change represents a serious threat to the overall sustainability of the oasis-based hydro-agro-ecosystem. Off-farm income has led to a comparatively decreased economic role and value of cultivation in some villages, so much so that not all members abide by the collective obligations of their parents as in the past. The problem affects in different ways both the upstream part, where irrigation is based on surface water, and the downstream part, where irrigation is based on *khettara* underground tunnels. In the latter case, the problem has reached dramatic levels.

The decline of the *khettaras* is one instance in which the institutional collapse described above is having a tremendous impact. In almost all four villages concerned, interest in *khettara* irrigation has been lost. Of an original total of 39 *khettaras* in the valley, 21 have stopped functioning or authorise only a negligible flow of water in relatively wet years, which has either led to the abandonment of cultivation, or, alternatively, to over-pumping. Two main reasons lie behind this trend: 1) the decline in the authority of the *Jemâa* Council, and 2) a decline itself in relation to the reduced motivation for agriculture among some households. Obviously, the latter decline is related to increased capital power gained from migration. It may also well be that excessive pumping has had side effects on the discharge level authorised by the *khettara*<sup>8</sup>.

The rapid expansion of motor-pumping is creating a latent risk of natural hazard and, ultimately, threatens the overall sustainability of the oasis. The rise of motor pumping took place outside any institutional regulation, either by the state (the need for an authorisation to dig a well is not, for instance, enforced), or by the traditional *Jemâa*. In the medium term, this matter represents one of the most decisive limiting factors in the development, or simply the persistence, of the oases.

<sup>8</sup> Note that there are also unexpected reasons for this trend. The inhabitants of the villages of the Aït Atta Confederacy most involved in this trend are former pastoralists whose cultural system considers the digging of a *Khettara* or its maintenance as a task to be performed by lower social status groups.

Based on observations made in the four villages under study, there seem to be mixed, and at times, conflicting signals regarding the future of traditional oasis agriculture. On the one hand, there are clear indications of agricultural intensification and land expansion in some parts, or among some individuals. But on the other hand, agricultural resources are more and more becoming subsidiary, while intensification and expansion processes seem to be achieved at a very high ecological cost. The interference of migration impact on these processes is a decisive element in this trend. As shall be seen below, the gains of the positive aspects of migration impacts have been attained at some serious costs, requiring careful action before it becomes too late to reverse this trend.

#### **7.4.5. The role of the State**

In Morocco, despite special efforts devoted to arid land management, oases are generally considered to be marginal agricultural areas and, therefore, have traditionally not attracted much interest from the state. The Todgha basin did not as such benefit in any significant way from state efforts. With a few exceptions, all developmental initiatives have been private, and ultimately related to migration impacts. One area where state intervention has been important so far is related to *khattara* maintenance and preservation. In the 1970s and 1980s, through the agricultural department of the so-called *Office Régional de Mise en Valeur Agricole of Ouarzazate (ORMVAO)*, some *Khattaras* have been protected with concrete. Compared with previous initiatives, this has proven to be an effective way of reducing the requirements of maintenance.

### **7.5. The impact of international migration in the Todgha basin**

#### **7.5.1. Introduction**

Unquestionably, international migrant groups (including *return migrants* from abroad) have had a dramatic impact on all aspects of life in their respective villages within the Todgha basin. These impacts have taken place since the late-1960s, when the migratory movement accelerated. As already mentioned, almost all households have been affected directly, or indirectly, by international migration.

The interference of migration with non-agricultural aspects of village life has been operative through different mechanisms and processes (Belguendouz 1979; Charef 1981; Ait Hamza 1987; Simon 1990). The most important are, of course, those mechanisms triggered by *remittances* sent by migrants towards their oases of origin. Remittances have authorised a wide-scale accessibility to resources, services and amenities that is unprecedented in their magnitude and variety. In order to provide evidence for the importance of this factor, it is necessary to highlight the potential of migrant remittances involved, and to assess their implications.

Fieldwork indicates that nearly all migrants transfer money to their families and to their villages on a regular basis (see tables 7.10, 7.11, and 7.12). Furthermore, it is estimated that the transfer of *nature products*, a practice developed during the last fifteen years, is also on the rise and represents in value up to an additional 30 percent of direct financial remittances. Those *in-nature* products incorporate a wide variety of used articles that are either for domestic consumption or are even oriented towards productive use: motor pumps, cars, etc. (Bencherifa and Refass 1994). The power of this financial component is, therefore, of an unprecedented magnitude.

Nevertheless, migration has also interfered with local communities through processes involving: (i) the size of the labour supply pool available for the traditionally labour intensive agro-ecosystems; (ii) changes in skills and know-how levels, as well as through (iii) changes in the overall behavioural and cultural value system of migrants/return migrants that might result from their migratory experience. Ultimately, the overall social structure has been transformed.

**Table 7.10 Remittances from international migrant workers among investigated households, by migration status**

	1	2	3	4	5	6
Non migrant	35.90% <b>(88.2%)</b>	2.10% <b>(5.1%)</b>	1.50% <b>(3.7%)</b>	1.20% <b>(2.9%)</b>		
Migrant, Internal	13.90% <b>(90.2%)</b>	0.60% <b>(3.9%)</b>	0.30% <b>(1.9%)</b>	0.30% <b>(1.9%)</b>	0.30% <b>(1.9%)</b>	
Migrant, External	1.80% <b>(6%)</b>	5.00% <b>(16.8%)</b>	5.60% <b>(18.8%)</b>	11.90% <b>(40%)</b>	2.10% <b>(7%)</b>	3.30% <b>(11.1%)</b>
Remigrant, Internal	3.90% <b>(81.2%)</b>	0.30% <b>(6.2%)</b>	0.30% <b>(6.2%)</b>		0.30% <b>(6.2%)</b>	
Remigrant, External	3.30% <b>(34.3%)</b>	0.30% <b>(3.1%)</b>	0.60% <b>(6.2%)</b>	2.70% <b>(28.1%)</b>	2.70% <b>(28.1%)</b>	

1. No remittances ; 2. Less than 1000 Dhs ; 3. 1001 to 2000 Dhs; 4. 2001 to 5000 Dhs;  
5. 5001 to 10000 Dhs; 6. More than 10000 Dhs.

**Table 7.11 Remittances from internal migrants to investigated households, by migration status**

	1	2	3	4
Non migrant	38.90% <b>(95.6%)</b>	1.50% <b>(3.7%)</b>	0.30% <b>(0.7%)</b>	--
Migrant, Internal	9.20% <b>(59.3%)</b>	3.30% <b>(21.3%)</b>	2.40% <b>(15.4%)</b>	0.60% <b>(3.9%)</b>
Migrant, External	27.60% <b>(92.9%)</b>	1.20% <b>(4%)</b>	0.60% <b>(2%)</b>	0.30% <b>(1%)</b>
Remigrant, Internal	3.90% <b>(81.2%)</b>	0.90% <b>(18.7%)</b>	--	--
Remigrant, External	8.30% <b>(93.2%)</b>	0.30% <b>(3.4%)</b>	--	0.30% <b>(3.4%)</b>

1. No remittances ; 2. Less than 1000 Dhs ; 3. 1001 to 2000 Dhs; 4. > 2000 Dhs

**Table 7.12 : Total yearly remittances by family relatives (other than head of household) among investigated households, by migration status**

	1	2	3	4	5	6
Non migrant	36.20% <b>(90.3%)</b>	1.80% <b>(4.5%)</b>	1.50% <b>(3.7%)</b>	0.60% <b>(1.5%)</b>	--	--
Migrant, Internal	13.60% <b>(91.6%)</b>	0.60% <b>(4.5%)</b>	0.30% <b>(2%)</b>	0.30% <b>(2%)</b>	--	--
Migrant, External	26.70% <b>(29.7%)</b>	--	0.60% <b>(2.1%)</b>	0.90% <b>(3.1%)</b>	0.60% <b>(2.1%)</b>	--
Remigrant, Internal	4.50% <b>(83.3%)</b>	--	0.30% <b>(5.5%)</b>	--	0.30% <b>(5.5%)</b>	0.30% <b>(5.5%)</b>
Remigrant, External	8.30% <b>(75.6%)</b>	--	0.30% <b>(2.7%)</b>	0.90% <b>(8.2%)</b>	1.20% <b>(11%)</b>	0.30% <b>(2.7%)</b>

1. No remittances ; 2. Less than 1000 Dhs ; 3. 1001 to 3000 Dhs; 4. 3001 to 10000 Dhs;  
5. 10001 to 30000 Dhs; 6. More than 30000 Dhs.

### 7.5.2. The impact of international migration on non-agricultural sectors

In this section we will address the general repercussions of international migration on developmental trends and sustainability issues at two levels: non-agricultural impacts, on the one hand, and direct impacts on oasis agriculture on the other.

#### *\* Migration remittances and the persistence of traditional communities*

Levels of resource scarcity and of overall, generalised poverty have been such that the oasis communities were certainly among the neediest, even compared to surrounding pastoral nomadic communities. Because the conventional profile of the migrant has been essentially that of the single active male, migrants have kept direct close ties with their families, thus the flow of remittances that is recorded. Unquestionably, the remittances authorised by migrants have contributed into a radical change in sending areas. This change has been such that, surprisingly, the very persistence of traditional communities in their areas of origin could hardly be conceivable without the subsistence power authorised by migrant resources. It is somehow ironic to observe that, whereas migration was considered originally as an alternative response of the local population to overpopulation, poverty, and resource scarcity, it has actually contributed (as striking as this might be) to the alleviation of these conditions. At the same time, however, it has paradoxically contributed to the perpetuation of the very social and economic system that has been behind the poverty itself (Heinemeijer et al. 1977; Hamdouch et al. 1979).

In fact, thanks to various processes of resource redistribution, migration has led to salient multiplier effects on the overall local economy. These multiplier effects are best shown by the general importance of non-agricultural activities developing within the Todgha basin, so much so that this basin attracts today poor internal labour migrants originating from outside marginal areas which had no past international migratory experience. On the other hand, the indirect impact of international migration on non-migrant groups should not be underestimated; nearly 48 percent of heads of households that have had no direct migration experience so far are engaged in non-agricultural, off-farm income generating activities, resulting from the overall process of income redistribution arising from remittances.

#### *\* Migration and non-agricultural investments:*

One of the most attractive areas in which the remittances and the savings generated by migrants have been operating intensively is the *housing construction sector* (Najib 1986; Lazaar 1993). There have been questions raised by some scholars regarding the extent to which the use of migrant remittances in the construction sector is in fact a productive investment. There is no need here to elaborate on this matter. Suffice it to say, however, that such use has been the most important redistributive means and catalyst for the overall economic activity in migrant regions of origin, in that: (i) it provides important employment opportunities; (ii) it favours several sectors of activity; and (iii) it best exemplifies the overall improvement in standards of living in the region. The following tables give a comparative indication between various migration statuses and housing types. These tables highlight the extent of changes introduced through this particular mechanism:

**Table 7.13 Type of housing (using as an indicator the type of construction material), by migration status**

	Adobe	Mixed	Modern, Concrete
Non Migrant	30.30% <b>(74.4%)</b>	0.60% <b>(1.5%)</b>	9.80% <b>(24%)</b>
Migrant, Internal	12.50% <b>(80.6%)</b>	--	3.00% <b>(13.9%)</b>
Migrant, External	8.90% <b>(30%)</b>	0.30% <b>(1%)</b>	20.50% <b>(69%)</b>
Return Migrant, Internal	2.70% <b>(56.2%)</b>	0.30% <b>(6.2%)</b>	1.80% <b>(3.8%)</b>
Return Migrant, External	3.60% <b>(37.9%)</b>	--	5.90% <b>(26.1%)</b>

**Table 7.14 Type of houses (using as indicator the number of floors), by Migration Status**

	1 Floor	2 Floors	3 floors
Non Migrant	26.50% <b>(64.9%)</b>	13.70% <b>(33.6%)</b>	0.60% <b>(14.7%)</b>
Migrant, Internal	10.70% <b>(69%)</b>	4.80% <b>(40%)</b>	
Migrant, External	11.90% <b>(12.2%)</b>	17.30% <b>(58.6%)</b>	0.30% <b>(10.2%)</b>
Return Migrant, Internal	3.60% <b>(75%)</b>	1.20% <b>(25%)</b>	
Return Migrant, external	3.90% <b>(40.6%)</b>	5.10% <b>(53.1%)</b>	0.60% <b>(6.3%)</b>

**Table 7.15 Ownership of more than one house by migration status**

	non migrant	Migrant, Internal	Migrant, Abroad	Remigrant, Internal	Remigrant, Abroad
Only one	33.80% <b>(49.7%)</b>	13.60% <b>(20%)</b>	13.40% <b>(19.7%)</b>	4.20% <b>(6.2%)</b>	3.00% <b>(4.4%)</b>
2 houses	5.00% <b>(23%)</b>	1.20% <b>(5.5%)</b>	11.60% <b>(53.5%)</b>	0.30% <b>(1.4%)</b>	3.60% <b>(16.6%)</b>
3 houses	0.90% <b>(10.7%)</b>	0.60% <b>(7.1%)</b>	4.50% <b>(53.6%)</b>	--	2.40% <b>(28.6%)</b>
4 houses	0.30% <b>(33.3%)</b>	--	0.30% <b>(33.3%)</b>	0.30% <b>(33.3%)</b>	--
More than 4	0.60% <b>(50%)</b>	--	--	--	0.60% <b>(50%)</b>

Differences between housing in relation to migration status (depending on their level of comfort) can also be shown through several additional indicators of innovation, such as the existence of regular bathrooms in the house, the total used area of the house, the level of accessibility to tap water and electricity, etc. In utilizing these indicators, we find the existence of superior categories for houses inhabited by international migrants and international return migrants. Furthermore, many of the latter categories of migrant have constructed more than just one house, and have engaged in real estate speculation by building at times up to 3 or 4 houses!

*\* Other types of migrant investments outside the construction sector*

As a result, an interesting process of investment diversification has taken place. Whereas for many years the construction of houses seems to have been the almost exclusive arena for investment (in addition to agriculture, see below), an important change has occurred within the last fifteen years. Once some migrants managed to satisfy their needs for new housing, they soon became attracted to the returns of other economic sectors and started saving for them. These sectors are mainly to be found in the service industries. The following tables provide some indications in this direction:

**Table 7.16 The primary activity of the head of household, by Migration Status**

	Migration Status				
	Non Migrant	Migrant, Internal	Migrant, External	Remigrant, Internal	Remigrant, External
None (disabled)	3.30% <b>(8.3%)</b>	0.30% <b>(2.2%)</b>	1.20% <b>(4.5%)</b>	--	0.60% <b>(14.3%)</b>
Agriculture, Head	5.10% <b>(12.8%)</b>	2.70% <b>(19.6%)</b>	4.80% <b>(17.8%)</b>	0.90% <b>(20%)</b>	1.20% <b>(28.6 %)</b>
Agriculture, Worker	2.70% <b>(6.8%)</b>	1.20% <b>(8.7%)</b>	0.60% <b>(2.2%)</b>	0.30% <b>(6.7%)</b>	--
House lady	2.70% <b>(6.8%)</b>	1.20% <b>(8.7%)</b>	1.20% <b>(4.5%)</b>	0.30% <b>(6.7%)</b>	--
Commerce	4.50% <b>(11.3%)</b>	0.30% <b>(2.2%)</b>	0.60% <b>(2.2%)</b>	--	--
Handicraft	1.20% <b>(3%)</b>	1.20% <b>(8.7%)</b>	0.60% <b>(2.2 %)</b>	--	--
Construction Worker	11.30% <b>(28.5%)</b>	3.90% <b>(28.3%)</b>	10.10% <b>(37.5%)</b>	1.20% <b>(26.7%)</b>	0.60% <b>(14.3 %)</b>
Other Services	7.10% <b>(17.9%)</b>	0.90% <b>(6.5%)</b>	5.70% <b>(21.2 %)</b>	1.20% <b>(26.7%)</b>	1.20% <b>(28.6%)</b>
Industry	0.90% <b>(2.3 %)</b>	--	1.50% <b>(5.6%)</b>	--	--
Civil Servant	0.60% <b>(1.5%)</b>	1.50% <b>(10.9%)</b>	0.60% <b>(2.2%)</b>	--	0.30% <b>(7.1%)</b>
Teacher	0.30% <b>(0.75%)</b>	0.60% <b>(4.4%)</b>	--	0.60% <b>(13.3 %)</b>	0.30% <b>(7.1 %)</b>

**Table 7.17 Investment in commerce activities (by migration status of households)**

	Non Migrant	Migrant, Internal	Migrant, Abroad	Remigrant, Internal	Remigrant, Abroad
No Investment	38.90% <b>(95.6%)</b>	15.40% <b>(100%)</b>	28.50% <b>(96%)</b>	4.50% <b>(94%)</b>	8.60% <b>(90.6%)</b>
300 to 10000 Dhs	0.60% <b>(1.5%)</b>	--	0.30% <b>(1%)</b>	--	0.30% <b>(3.2%)</b>
10001 to 40000 Dhs	0.90% <b>(2.2%)</b>	--	0.30% <b>(1%)</b>	0.30% <b>(6 %)</b>	0.60% <b>(6.3%)</b>
40001 to 100000 Dhs	--	--	0.30% <b>(1%)</b>	--	--
More than 100000	0.30% <b>(0.7%)</b>	--	0.30% <b>(1%)</b>	--	--
Total	40.7% <b>(100%)</b>	15.4% <b>(100%)</b>	29.7% <b>(100%)</b>	4.8% <b>(100%)</b>	9.5% <b>(100%)</b>

**Table 7.18 Investment in a shop (by migration status of households)**

	Non Migrant	Migrant, Internal	Migrant, Abroad	Remigrant, Internal	Remigrant, Abroad
No Investment	37.70% <b>(92.6%)</b>	15.10% <b>(98%)</b>	25.50% <b>(85.9%)</b>	4.50% <b>(93.7%)</b>	7.70% <b>(81.1%)</b>
10000 to –50000 Dhs	2.10% <b>(5.2%)</b>	0.30% <b>(5%)</b>	1.50% <b>(5%)</b>	0.30% <b>(6.3%)</b>	0.90% <b>(9.5%)</b>
50001 to 100000 Dhs	0.60% <b>(1.5%)</b>	--	1.50% <b>(5%)</b>	--	0.90% <b>(9.5%)</b>
100001 to 180000 Dhs	0.30% <b>(0.7%)</b>	--	0.90% <b>(3%)</b>	--	--
More than 180000 Dhs	--	--	0.30% <b>(1%)</b>	--	--
Total	40.7% <b>(100%)</b>	15.4% <b>(100%)</b>	29.7% <b>(100%)</b>	4.8% <b>(100%)</b>	9.5% <b>(100%)</b>

*\* Social and Educational Impacts*

Migration has been instrumental in *promoting education* in the regions of departure. This finding has been confirmed in all cases. The relationship between migration experience and better educational indicators is due to the mediation of two interacting factors: (i) migration provides higher financial means with which to pay for educational needs; (ii) culturally, the experience of migration has led to a higher appreciation for the social value of education.

Migration has been instrumental in authorising an *effective promotion in the status of women*. According to the pattern of migration that prevailed for long, only the male workers migrated, whereas women remained in their places of origin with their off-spring. Faced with the need to take on managerial leadership decisions within households, and simply to cope with daily tasks, the status of women has undergone a substantial change from this perspective (Steinmann 1993a; 1993b; Ait Hamza 1995).

One of the main changes that has occurred pertains to the rise of a kind of new social order, in which the formal hierarchy between groups and individuals is no longer exclusively determined on the basis of traditional factors of ascription (e.g., descent from a Sherifian family and its related symbolic capital, or in belonging to a category of former quasi-slaves, as were the so-called *hartani* groups). Material wealth has been instrumental in these changes, and it is all the more important to stress the fact that becoming wealthy, through migration or otherwise, is socially perceived as an indicator of social achievement.

**Table 7.19 Educational attainment of heads of households in the investigated villages**

	1	2	3	4	5	6
Non Migrant	18.8% <b>(46.6%)</b>	5.7% <b>(14.1%)</b>	11.9% <b>(29.5%)</b>	3% <b>(7.4%)</b>	0.9% <b>(2.2%)</b>	--
Migrant, Internal	6% <b>(39.2%)</b>	1.5% <b>(9.8%)</b>	4.5% <b>(29.4%)</b>	1.2% <b>(7.8%)</b>	0.6% <b>(3.9%)</b>	1.5% <b>(9.8%)</b>
Migrant, External	12.5% <b>(40.8%)</b>	6.5% <b>(21.2%)</b>	9.8% <b>(32%)</b>	1.2% <b>(3.9%)</b>	0.3% <b>(0.1%)</b>	0.3% <b>(0.1%)</b>
Remigrant, Internal	0.9% <b>(20%)</b>	0.6% <b>(13.3%)</b>	1.8% <b>(40%)</b>	0.3% <b>(6.7%)</b>	--	0.9% <b>(20%)</b>
Remigrant, External	6% <b>(62.5%)</b>	0.9% <b>(9.4%)</b>	2.4% <b>(25%)</b>	--	--	0.3% <b>(3.1%)</b>

1. Non schooling ; 2. Religious schools ; 3. Primary education; 4. Low secondary education; 5. High secondary education; 6. University Education.

**Table 7.20 Household yearly spending for educational purposes (per migration status)**

	1	2	3	4	5	6
Non Migrant	12.5% <b>(31%)</b>	6.8% <b>(16.9%)</b>	12.8% <b>(31.8%)</b>	6.2% <b>(15.4%)</b>	2.1% <b>(5.2%)</b>	0.3% <b>(0.8%)</b>
Migrant, Internal	6.8% <b>(43.9%)</b>	2.1% <b>(13.5%)</b>	2.7% <b>(17.4%)</b>	3% <b>(19.4%)</b>	0.9% <b>(5.8%)</b>	--
Migrant, External	8.6% <b>(29%)</b>	1.2% <b>(4%)</b>	7.4% <b>(25%)</b>	7.1% <b>(24%)</b>	5% <b>(16.9%)</b>	0.3% <b>(1%)</b>
Remigrant, Internal	2.1% <b>(43.7%)</b>	0.6% <b>(12.5%)</b>	0.6% <b>(12.5%)</b>	0.9% <b>(18.8%)</b>	0.6% <b>(12.5%)</b>	--
Remigrant, External	2.7% <b>(28.1%)</b>	0.6% <b>(6.2%)</b>	1.8% <b>(18.7%)</b>	3% <b>(31.2%)</b>	1.5% <b>(15.6%)</b>	--

1.No spending in education ; 2. Less than 500 Dsh; 3. Between 501 and 1000 Dhs;  
4. Between 1001 and 2000 Dhs; 5. Between 2001 and 4000 Dhs; 6. More than 4000 Dhs.

### 7.5.3. The impact of migration on agriculture

The research essentially targets the impact of this particular aspect of migration on overall oasis agriculture. It does not follow from this, however, that conceptually defined “non-agricultural impacts” of migration are independent of purely agricultural ones. The real sustainability of any oasis agriculture is, by definition, contingent upon the very sustainability of oases systems as societies, communities, heritage, etc. Thus, by shaping outside agriculture, migrants have in fact contributed in this way to maintaining oasis agriculture.

However, what this section involves are those elements which are strictly a direct part of the agricultural production system *per se*. The research has allowed for the collection of a wide range of observations falling within this objective. They will be reviewed in the following, involving items related to: (i) migration and capital goods; (ii) migration and investment in land and water resources; (iii) migration and the intensification of the production system; and (iv) migration, access to credit and income issues.

#### *\* The impact of migration remittances on capital investment in agriculture*

Given the power authorised by remittances, international migrant and return migrant household categories have unquestionably engaged in a process involving the generalised modernisation of their capital goods. This has partially entailed the use of machinery, but more importantly required the acquisition of motor pumps and the digging of wells so as to capture additional, underground water resources, as well the use of fertilisers to increase agricultural output. The following tables provide data with which to document this fact:

**Table 7.21 Overall investments, by migration status**

	1	2	3	4	5	6	7
Non migrant	0.60% <b>(14.5%)</b>	9.50% <b>(22.9%)</b>	1.90% <b>(4.6%)</b>	9.8 0% <b>(23.6%)</b>	1.60% <b>(3.9%)</b>	1.00% <b>(2.4%)</b>	17.10% <b>(41.2%)</b>
Migrant, Internal	--	2.20% <b>(14.2%)</b>	1.30% <b>(8.4%)</b>	6.30% <b>(40.6%)</b>	0.30% <b>(1.9%)</b>	0.30% <b>(1.9%)</b>	5.10% <b>(33%)</b>
Migrant, External	0.30% <b>(1.1%)</b>	7.30% <b>(25.9%)</b>	1.30% <b>(46.1%)</b>	6.30% <b>(22.3%)</b>	0.60% <b>(2.1%)</b>	0.30% <b>(1.1%)</b>	12.10% <b>(42.9%)</b>
Remigrant, Internal	--	0.60% <b>(12.8%)</b>	--	1.00% <b>(21.2%)</b>	0.60% <b>(12.8%)</b>	--	2.50% <b>(53.2%)</b>
Remigrant, External	--	1.90% <b>(19.4%)</b>	1.00% <b>(10.2%)</b>	0.60% <b>(6.1%)</b>	0.60% <b>(6.1%)</b>	--	5.70% <b>(58.1%)</b>

1. No Investment ; 2. Agriculture ; 3. Livestock raising ; 4. Commerce; 5. Construction;  
6. Transportation; 7. Other Sectors.

Obviously the acquisition of machinery is still limited, because the *micro-fundium* structure of plots distribution and the gardening-like system of oasis agriculture would hardly justify such heavy investments. Still, the only instances of such types of investments are associated with international migrants or return migrants, the superiority of those categories confirmed again when looking at indicators revealing the use of machinery, regardless of the ownership status of the latter (tables 7.22 and 7.23).

Only 17 percent of non-migrants invested in the digging of wells and acquisition of motor-pumps, against 38 percent among current migrants abroad and 25.2 percent among return migrants (Table 7.24). Whereas 19.7 percent of non-migrant households do use fertilisers in their production systems, this percentage is much higher among migrant and return migrant households (43 and 50.5 percent, respectively), as indicated in table 7.25.

**Table 7.22 Capital goods investment by migration status (acquisition of machinery)**

	Non migrant	Migrant, Internal	Migrant, External	Remigrant, Internal	Remigrant, External
No Investment	40.70% <b>(100%)</b>	15.40% <b>(100%)</b>	29.10% <b>(98%)</b>	4.50% <b>(93.7%)</b>	9.20% <b>(96.9%)</b>
50000 to 100000 Dhs	--	--	0.30% <b>(1%)</b>	--	0.30% <b>(3.1%)</b>
> 100000 Dhs	--	--	0.30% <b>(1%)</b>	0.30% <b>(6.3%)</b>	--
Total	40.7% <b>(100%)</b>	15.4% <b>(100%)</b>	29.7% <b>(100%)</b>	4.8% <b>(100%)</b>	9.5% <b>(100%)</b>

**Table 7.23 Use of machinery by migration status**

	Tracteur			Combine		
	No use	Use by Ownership	Rent	No use	Use by ownership	Rent
Non migrant	38.60% <b>(48.4%)</b>	--	1.20% <b>(15%)</b>	38.70% <b>(48.6%)</b>	--	1.20% <b>(15%)</b>
Migrant, Internal	15.40% <b>(49.2%)</b>	--	0.30% <b>(0.9%)</b>	14.70% <b>(46.9%)</b>	--	0.90% <b>(2.8%)</b>
Migrant, External	24.40% <b>(40.6%)</b>	0.60% <b>(0.9%)</b>	5.10% <b>(8.4%)</b>	24.90% <b>(41.4%)</b>	--	5.10% <b>(8.4%)</b>
Remigrant, Internal	4.50% <b>(46.8%)</b>	--	0.30% <b>(3.2%)</b>	4.50% <b>(46.8%)</b>	0.30% <b>(3.2%)</b>	--
Remigrant, External	8.70% <b>(45.3%)</b>	0.30% <b>(1.6%)</b>	0.60% <b>(3.1%)</b>	8.70% <b>(45.3%)</b>	--	0.90% <b>(4.7%)</b>

**Table 7.24 Capital goods investments by migration status (well digging and acquisitions of motor pumps)**

	Non migrant	Migrant, Internal	Migrant, External	Remigrant, Internal	Remigrant, External
No Investment	33.50% <b>(82.3%)</b>	12.80% <b>(8.3%)</b>	18.40% <b>(62%)</b>	4.20% <b>(87.5%)</b>	7.40% <b>(77.9%)</b>
2000 to 10000 Dhs	1.20% <b>(29.5%)</b>	0.60% <b>(3.9%)</b>	0.60% <b>(2%)</b>	--	0.90% <b>(9.5%)</b>
10001 to 20000 Dhs	2.10% <b>(5.2%)</b>	0.60% <b>(3.9%)</b>	2.40% <b>(8%)</b>	--	--
20001 to 100000 Dhs	3.00% <b>(7.4%)</b>	1.20% <b>(7.7%)</b>	7.70% <b>(25.9%)</b>	0.60% <b>(12.5%)</b>	1.20% <b>(12.6%)</b>
100001 to 200000 Dhs	0.90% <b>(2.2%)</b>	--	--	--	--
> 200000 Dhs	--	0.30% <b>(2%)</b>	0.60% <b>(2%)</b>	--	--
Total	40.7% <b>(100%)</b>	15.4% <b>(100%)</b>	29.7% <b>(100%)</b>	4.8% <b>(100%)</b>	9.5% <b>(100%)</b>

**Table 7.25 Use of fertilisers, by migration status**

	No use	1 to A0 Kgs	11 to 20 kgs	More than 20 Kgs
Non migrant	32.60% <b>(80.3%)</b>	6.20% <b>(15.3%)</b>	0.90% <b>(2.2%)</b>	0.90% <b>(2.2%)</b>
Migrant, Internal	13.40% <b>(86.5%)</b>	2.10% <b>(13.5%)</b>	--	--
Migrant, External	16.90% <b>(56.9%)</b>	11.00% <b>(37%)</b>	0.90% <b>(3%)</b>	0.90% <b>(3%)</b>
Remigrant, Internal	3.00% <b>(62.5%)</b>	1.50% <b>(31.3%)</b>	0.30% <b>(6.2%)</b>	--
Remigrant, External	4.70% <b>(49.5%)</b>	3.90% <b>(41%)</b>	0.90% <b>(9.5%)</b>	--

*\* Migration and investment in agricultural land and water*

First, the main findings corroborate the hypothesis that not only are the oases of the Todgha basin still living and productive agro-ecosystems, but that there is a large scale process taking place of land and irrigation expansion. With the exception of the Ghallil plain, which is a separate entity, the main expansion is related to the process of digging new wells and the reclamation of new arable land. In both processes, migrants and return migrants are in a superior position compared to non-migrant groups, which is again a reflection of higher capital power.

Table 7.26 indicates that the categories of migrants and return migrants have a higher and a qualitatively better access index to land than non-migrants. Among non-migrants, 23.4 percent of households are landless, and 43.8 percent have a land area greater than 1000m<sup>2</sup>. Among non-migrant categories, landless households represent only 10.25 percent, whereas households having land properties of more than 1000m<sup>2</sup> represent 72.8 percent. These figures are even higher among return migrants; there are no land-less households among them, whereas households owning individual plots of more than 1000m<sup>2</sup> represent 77.8 percent. These basic data clearly show evidence of greater access to arable land among

households exposed to migration, due to a greater capital endowment and better accessibility to the land market. This is revealed, for instance, in the dominance of the mortgage land market by migrants and return migrants (table 7.27).

**Table 7.26 Land ownership, by migration status**

	1	2	3	4	5	6	7
Non migrant	9.50% <b>(23.4%)</b>	4.70% <b>(11.6%)</b>	2.40% <b>(5.9%)</b>	6.20% <b>(15.3%)</b>	11.60% <b>(28.6%)</b>	0.60% <b>(1.5%)</b>	5.60% <b>(13.8%)</b>
Migrant, Internal	3.30% <b>(21.1%)</b>	4.50% <b>(28.8%)</b>	1.20% <b>(7.7%)</b>	0.90% <b>(5.8%)</b>	3.90% <b>(25%)</b>	--	1.80% <b>(11.5%)</b>
Migrant, External	2.40% <b>(8%)</b>	2.40% <b>(8%)</b>	0.90% <b>(3%)</b>	2.40% <b>(8%)</b>	9.50% <b>(31.8%)</b>	--	12.20% <b>(40.9%)</b>
Remigrant, Internal	0.90% <b>(18.7%)</b>	--	0.90% <b>(18.7%)</b>	1.20% <b>(25%)</b>	0.60% <b>(12.5%)</b>	0.30% <b>(6.3%)</b>	0.90% <b>(18.7%)</b>
Remigrant, External	--	0.60% <b>(6.3%)</b>	0.30% <b>(3.2%)</b>	1.20% <b>(12.6%)</b>	5.30% <b>(55.8%)</b>	--	2.10% <b>(22.1%)</b>

1. Landless ; 2. Less than 250m<sup>2</sup> ; 3. 251 to 500m<sup>2</sup> ; 4. 501 to 1000m<sup>2</sup>; 5. 1001 to 5000m<sup>2</sup>; 6. 5001 to 10000m<sup>2</sup>; 7. more than 10000m<sup>2</sup>.

**Table 7.27 Land acquired by monetary Rhen (mortgage)**

	1	2	3	4	5
Non migrant	39.50% <b>(97%)</b>	--	0.90% <b>(2.2%)</b>	0.30% <b>(0.8%)</b>	--
Migrant, Internal	15.10% <b>(98%)</b>	--	0.30% <b>(2%)</b>	--	--
Migrant, External	23.40% <b>(78.8%)</b>	2.70% <b>(9%)</b>	2.70% <b>(9%)</b>	0.30% <b>(1%)</b>	0.60% <b>(0.6%)</b>
Remigrant, Internal	4.50% <b>(93.7%)</b>	--	0.30% <b>(6.3%)</b>	--	--
Remigrant, External	5.00% <b>(52.6%)</b>	1.50% <b>(15.8%)</b>	2.10% <b>(22.1%)</b>	0.90% <b>(9.5%)</b>	--

1. No mortgage acquisition ; 2. Less than 250m<sup>2</sup> ; 3. 251 to 500m<sup>2</sup> ; 4. 501 to 750m<sup>2</sup>; 5. 751 to 5000m<sup>2</sup>;

**Table 7.28 Sources of irrigation water, by migration status**

	Surface water		Khetara	
	No	Yes	No	Yes
Non migrant	21.40%	19.30%	28.80%	11.90%
Migrant, Internal	10.70%	4.70%	8.30%	7.10%
Migrant, External	14.20%	15.40%	19.60%	10.10%
Remigrant, Internal	2.40%	2.40%	3.60%	1.20%
Remigrant, External	1.50%	8.00%	8.00%	1.50%
<b>TOTAL</b>	<b>50.2%</b>	<b>49.8%</b>	<b>68.3%</b>	<b>31.8%</b>

Access to land ownership is meaningless unless coupled with the issue of water resource access. Thus, again, the clear superiority of migrant and return migrant groups, compared to non-migrant ones. For instance, the former categories have purchased shares of surface water, as is clear in table 27 indicating this type of water resource. In this instance there are more households with access to surface water among them than the reverse. Non-migrant

households with access to surface water represent 47.2 percent, against 52.2 percent for current migrants abroad, and reaching up to 84.2 percent for return migrant households.

*\* Migration and intensity of land use*

To account for this indicator of variability between households based on their migration status, the frequency of particular cropping will be used as a surrogate with which to make comparisons and infer conclusions. Based on the indications of tables 7.29, 7.30 and 7.31 below, it appears that among non-migrant households the frequency of cereal production involves 51.8 percent, the frequency of vegetable production involves 55.5 percent and the frequency of tree cropping amounts to 76.6 percent. Among migrant households, those figures are, respectively, 65.1, 74 and 89.8 percent. The figures are far higher among return migrant households: 87.5, 78.1 and 93.7 percent, respectively. Clearly, land use and agricultural productivity increase with migration.

**Table 7.29 Cereals cultivation, by migration status**

	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
Non migrant	19.60% <b>(48.2%)</b>	16.60% <b>(40.8%)</b>	2.70% <b>(66.3%)</b>	1.80% <b>(44.2%)</b>	--
Migrant, Internal	10.10% <b>(65.2%)</b>	4.20% <b>(27.1%)</b>	0.60% <b>(3.9%)</b>	0.60% <b>(3.9%)</b>	--
Migrant, External	10.40% <b>(34.9%)</b>	10.70% <b>(35.9%)</b>	3.00% <b>(10.1%)</b>	4.20% <b>(14.1%)</b>	1.50% <b>(5%)</b>
Remigrant, Internal	2.70% <b>(56.3%)</b>	1.50% <b>(31.3%)</b>	--	0.60% <b>(12.5%)</b>	--
Remigrant, External	1.20% <b>(12.5%)</b>	4.50% <b>(46.9%)</b>	--	1.20% <b>(12.5%)</b>	2.70% <b>(28.1%)</b>

1. No cereal cultivation ; 2. Less than 5000m<sup>2</sup> ; 3. 5001 to 15000m<sup>2</sup> ; 4. 15001 to 30000m<sup>2</sup> ;  
5. More than 30000m<sup>2</sup>;

**Table 7.30 Vegetable cropping, by migration status**

	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
Non migrant	18.10% <b>(44.5%)</b>	6.80% <b>(16.7%)</b>	10.70% <b>(26.3%)</b>	2.40% <b>(5.9%)</b>	2.70% <b>(6.6%)</b>
Migrant, Internal	7.10% <b>(45.8%)</b>	2.40% <b>(15.5%)</b>	4.20% <b>(27.1%)</b>	1.20% <b>(7.7%)</b>	0.6% <b>(3.9%)</b>
Migrant, External	7.70% <b>(26%)</b>	2.70% <b>(9.1%)</b>	13.90% <b>(46.8%)</b>	2.10% <b>(70.7%)</b>	3.30% <b>(11.1%)</b>
Remigrant, Internal	3.00% <b>(62.5%)</b>	0.60% <b>(12.5%)</b>	0.9% <b>(18.7%)</b>	0.30% <b>(6.2%)</b>	--
Remigrant, External	2.10% <b>(21.9%)</b>	0.90% <b>(9.4%)</b>	4.50% <b>(46.9%)</b>	2.10% <b>(21.9%)</b>	--

1. No vegetables; 2. Less than 100m<sup>2</sup> ; 3. 101 to 500m<sup>2</sup> ; 4. 501 to 1000m<sup>2</sup> ;  
5. 1000 to 2000m<sup>2</sup>;

**Table 7.31 Tree copping, by migration status**

	No trees	Less than 50	51 to 100	101 to 500
Non migrant	9.50% <b>(23.3%)</b>	22.30% <b>(54.8%)</b>	5.60% <b>(13.8%)</b>	3.30% <b>(8.1%)</b>
Migrant, Internal	3.30% <b>(21.3%)</b>	9.20% <b>(59.4%)</b>	2.10% <b>(13.5%)</b>	0.90% <b>(5.8%)</b>
Migrant, External	3.00% <b>(10.1%)</b>	13.40% <b>(45.1%)</b>	5.90% <b>(19.9%)</b>	7.4% <b>(24.9%)</b>
Remigrant, Internal	1.50% <b>(31.2%)</b>	2.40% <b>(50%)</b>	0.30% <b>(6.2%)</b>	0.60% <b>(12.5%)</b>
Remigrant, External	0.60% <b>(6.2%)</b>	3.60% <b>(37.5%)</b>	3.30% <b>(34.4%)</b>	2.10% <b>(21.9%)</b>

*\* Agricultural Income, access to credit, and migration status*

Agriculture-based income is indeed a good indicator with which not only to measure the role of agriculture in income generation, but also with which, indirectly, to assess the perception of farming's role in income making among the investigated households, based on their migration status. Table 7.32 offers valuable information in this regard:

Whereas 17.4 percent of non-migrant households have no income generated from agriculture, this ratio is only 6.25 percent among return migrants. Clearly, within this category there is an inclination to consider agriculture as a viable option. Among those currently occupying a migrant status, 22 percent of households do not rely on agriculture, a fact related to the absence of a head of household.

When engaged in income-generating activities in agriculture, the returns are far greater among migrants/return migrants than among non-migrants. This is a clear reflection of the higher capital and technological power available to the former compared to the latter. Thus, whereas only 27 percent of non-migrant households manage to gain more than 5000 Dhs/year from agricultural activities (and only 4.4 percent more than 15000 Dhs), these percentages reach, respectively, 58.1 percent (and 30 percent) for those currently in a migrant status, and 53.1 percent (21.87 percent) among return migrants.

**Table 7. 32: Yearly household incomes from agriculture, by migration status**

	1	2	3	4	5	6
Non migrant	7.10% <b>(17.4%)</b>	3.90% <b>(9.6%)</b>	18.70% <b>(46%)</b>	9.20% <b>(22.6%)</b>	1.50% <b>(3.7%)</b>	0.30% <b>(0.8%)</b>
Migrant, Internal	6.50% <b>(42%)</b>	0.60% <b>(3.9%)</b>	3.30% <b>(21.3%)</b>	3.90% <b>(25.2%)</b>	1.20% <b>(7.8%)</b>	--
Migrant, External	6.50% <b>(22%)</b>	0.90% <b>(3%)</b>	5.00% <b>(16.9%)</b>	11.00% <b>(37.2%)</b>	5.60% <b>(18.9%)</b>	0.60% <b>(2%)</b>
Remigrant, Internal	1.80% <b>(37.5%)</b>	0.30% <b>(6.2%)</b>	1.20% <b>(25%)</b>	0.90% <b>(18.7%)</b>	0.60% <b>(12.5%)</b>	--
Remigrant, External	0.60% <b>(6.2%)</b>	0.60% <b>(6.2%)</b>	3.30% <b>(34.4%)</b>	3.00% <b>(31.2%)</b>	1.80% <b>(18.7%)</b>	0.30% <b>(3.1%)</b>

1. No remittances ; 2. Less than 1000 Dhs ; 3. 1001 to 5000 Dhs; 4. 5001 to 15000 Dhs;  
5. 15001 to 50000 Dhs; 6. More than 50000 Dhs.

In terms of opportunities for accessing credit services, rates of access do not show any significant differences (7.3 percent among non-migrants; 8 percent among migrants; and 6.3 percent among return migrants; Table 33). But the similarity between the three status groups

is due to divergent reasons. Among non-migrants, limited use of credit services is due to a lack of resources with which they can warranty their loans. For migrants and return migrants, however, the reason lies rather in the availability of good financial resources via migration.

**Table 7.33: Access and use of bank loans for investments, by migration status**

	No access to Bank Loans	Do have Bank Loans
Non migrant	37.70% <b>(92.6%)</b>	3.00% <b>(7.4%)</b>
Migrant, Internal	15.40% <b>(100%)</b>	--
Migrant, External	27.30% <b>(91.9%)</b>	2.40% <b>(8.1%)</b>
Remigrant, Internal	4.50% <b>(93.7%)</b>	0.30% <b>(6.3%)</b>
Remigrant, External	8.90% <b>(93.7%)</b>	0.60% <b>(6.3%)</b>

## 7.6. Conclusions

### 7.6.1. Are migrant households more inclined to invest in productive activities than non-migrant households?

The answer to this question is surely affirmative. In general, the research clearly shows that households exposed to international migration are inclined to higher and more diversified investments than those households with no migration exposure. Although field research indicates that the majority of households tends to engage in some sort of investment in one particular economic sector or another, the difference between them, on the basis of their respective migration status, lies in the magnitude of capital invested and in the nature of investment projects pursued.

In fact, due to differences in capital power there is an observably clear pattern in the types of investment obtained by sector according to migration status. Migration capital resources are used first in domestic equipment spending, to increase family comfort; once the needs in this particular area are satisfied (which is usually quickly attained), clear productive investments are undertaken either in the housing construction sector or in capital equipment such as motor pumps, electricity generators and the like.

On the other hand, households exposed to migration invest far more than others in agricultural activities. Digging wells, buying motor pumps, taking risks in the quest for additional irrigated land, etc. are prevalent among households exposed to migration. This applies also to other areas such as investing in mechanical agricultural equipment, and buying additional arable land, the latter type usually taking place outside the limits of the traditional oasis. Another important element with which to confirm the statement above is related to the impact of migration as a catalyst for the overall economic activity of the Todgha basin. Income redistribution has been of such a magnitude that even non-migrant households manage to get access to part of the resources and, ultimately, become agents of economic investment.

## 6.2. Under what conditions are migration remittances invested in agriculture?

While the ideal-typical approach basically overlooks the specific, contextual conditions of particular sites, privileging the generalized approach, in reality, contextual conditions are decisively important in that they account for observed diversity and differences (Bencherifa and Popp 1990). Hence, they deserve interest.

Specifically, migrant investments in agriculture are very much to be considered in relation both to the natural and the social-cultural contexts in which they occur. Ontologically, this context is highly diversified from one site to the other. There are contexts, natural, social, and cultural which favour investment in agriculture, while others may present obstacles to it; this is unlike non-agricultural investments, which seem to transcend this kind of contextuality, as they are largely diffused throughout the whole Todgha basin.

The matrix of variables which accounts for variability in the nature and the magnitude of investments in agriculture entails two sets of considerations:

- (i) Potential resources at the local level: this concerns the location of the investment target itself (i.e., within, or without, the limits of the conventional historic oasis);
- (ii) The objectives of investment: ensuring basic subsistence needs, or targeting prestige (i.e., a symbolic investment), or aiming at profit making in terms of real entrepreneurship.

One important element to be emphasized is the prevailing perception among oasis agriculturalists that real economic opportunities exist in agriculture investment. Unlike what the conventional view might admit about perspectives on profit making in those arid lands, it is obvious from field research that farmers investing in agriculture are now profit-seekers, behaving along the lines of an economically driven rationality. It is also interesting to observe that this behaviour is the result of imitation power, that is, it is a result of diffusion through “contamination” from the successful pioneers to the others (Blaikie, 1973). At times, such imitative behaviour has led to individual problems, when contextual and natural conditions are overlooked (e.g., scarcity of water resources; unsuccessful digging of wells; soils with high levels of salinity; etc.).

This fact is best demonstrated when considering observed differences between the four villages under study. There are instances of important investments that have been achieved despite the lack of proper infrastructure and the scarcity of land/or water resources, to the extent that these investments might appear to be the result of the need to respond to a kind of social pressure, rather than them being soundly considered economic initiatives. The imbrication here between pure economic considerations and the socially-determined need to ensure self-esteem and prestige is paramount. In addition to instances where migrants or re-migrants invested in the construction of many houses, there are also cases in which they invested in agricultural initiatives located in areas situated at very large distances from the oases themselves.

As regards the various types of agricultural investments, the majority involve the acquisition of new land, the digging of wells and the acquisition of motor pumps. Access to additional water resources has led to two different results: either a vertical intensification with no extension of arable land or a horizontal intensification (i.e., an increase in the area of arable land).

Finally, research has recorded instances in which agricultural investments were done beyond the limitations of the ecological setting. The time span productivity of these investments, in particular, is overlooked: a promising well may dry out after a couple of years, when heavy investments in land reclamation and tree cropping have already taken place. Boutaghate village shows instances of questionable agricultural investments: digging wells in sites of limited water supplies, or with water containing high level of salinity. Thus many investment failures: in Taghia village, such failures account for the largely advanced process of abandonment.

### **6.3. How can the spatial variability between research sites and different oases in terms of agricultural development and agricultural investments be explained?**

Indeed, an important variability between the four investigated villages has been documented. The variability that is involved here entails the following:

- Levels of intensity in the management of water resources, land use and agricultural output;
- The importance of inputs used to reach high intensity levels (i.e., machinery, motor pumps, fertilizers, etc.);
- The magnitude of new land reclaimed for purposes of irrigation and cultivation.

Through all four villages, the basic elements of the conventional oasis hydro-ecosystem are found and, therefore, all four show many similarities with regard to these elements; they also vary between themselves with respect to the three former indicators.

Water supplies are the single most prominent factor of variability. These supplies decrease from upstream to downstream. Thus, they somehow circumscribe the basic limits of ecological potential. It is because of this fact that, in view of their relatively important historical water rights, the two upstream villages (Ichmarine and Iâadouane) perpetuate an oasis cultivation system based on tree cropping, fodder and cattle herding.

The use of machinery in the historical oases is not possible, due to the microfundium structure of plot distribution, particularly in the upstream section of the basin. It is observed only in the downstream section, where land supplies are greater and plot sizes are larger. This locational factor is again a clear limiting determinant for the use of machinery.

Once the limitations of the natural setting are controlled for, then variability occurs in view of the social context of each individual farmer. Below are the main elements that explain these individual action contexts:

- The role of time antecedence in the migration process: there seems to be a real migratory cycle taking place in the Todgha basin. In the first stage of this cycle, symbolic and prestige-related investments dominate individual behavior (e.g., as relates to house construction). It is only at a later stage that clearly productive investments in agriculture take place (Bencherifa 1992).
- The balancing movement between the two following options: either a simplification of the oasis system that ensures its persistence, or the speculative intensification of land and water resource use. The two ideal-typical options entail

also a decision-making process regarding the individual assessment of the role of farming in income-generation. The first choice goes along with an option for a decisive role given to off-farm activities. The second choice gives priority to direct farm income generation. For instance, the latter option corresponds with a new oasis physiognomy, one in which palm trees are no longer dominant, as they are replaced by new trees, such as almond and olive trees. Because speculative investments predominate in the downstream section, the oasis landscape indicates a higher frequency of these trees as well.

- Variability and ethnicity: the field research indicates the existence of four ethnic groups, each exhibiting a specific attitude towards investment in agriculture.

The former pastoral communities of Ait Atta, whose settlement is fairly recent, are the ethnic groups which by far exhibit the most positive attitude towards oasis agriculture. Their engagement in agricultural investment is at its highest, and they do believe in the future of farming. The Boutaghate oasis is good evidence for this statement. The Ait Atta are the last real oasis builders in the region. The case of Taghia doesn't corroborate the statement, but this is due to the sharp limitations of its ecological setting; however, many households from Taghia have migrated to better ecologically endowed sites where they engaged in agriculture.

The Ahl Todgha ethnic group is essentially located upstream (Ichmarine and Iâadouane). Their dominant pattern, as far as attitudes towards oasis agriculture is concerned, entails a process of persistence through simplification. Whether this model is related to limited land resources or to their being settled for many centuries is an open question. It has been observed that several individuals have decided to engage in intensive cultivation, but only outside their villages as they move downstream. It may well be that land scarcity accounts for this model of behaviour.

Other ethnic groups (i.e., the *chorfa* and the *haratine*), do not appear in any significant number within the four investigated villages. Therefore, at this stage no certain inference can be made regarding their attitudes pertaining to oasis agriculture.

#### **6.4. Question Four: what social, economic and bio-physical factors seem to constitute the largest obstacles for agricultural development and for investments in agriculture?**

The field investigation reveals indeed the existence of several factors, both socio-economic and bio-physical, which at times may in the future pose serious problems for agricultural development:

##### *\* Bio-physical factors:*

- Water resources and land supplies: that potentially arable land is hardly expandable towards the upstream section of the valley is already a very significant problem in those sections of the Todgha basin. This goes along with a parallel decrease in surface water supplies available to downstream communities, a fact which accounts for centuries-old conflicts between villages, ethnic groups, lineages and even simply individuals. No doubt any large-scale scheme of agricultural development will have to face the limits presented by shortages of the basic resources that are land and water.

- A second bio-physical factor relates to variability in the evolutionary state of the natural environment. When irrigation is based on surface water (either directly, or in view of the necessity of water table recharge), then the variability that is a feature of the rainfall pattern is directly reflected within the agricultural production system. Yet another type of hazard, clearly a man-made one, is developing as well. This is related to the uncontrolled and unregulated development of motor pumping, which has led to a progressive increase in water table depths; this, in turn, in a few cases has resulted in several wells drying up altogether. All this not to mention the problem of salinity also looming on the horizon.

Among the four investigated villages, three do face water shortage limitations. Iâadouane is a good example: located at the cutting edge between year-long and winter-only access to surface water, this village relies heavily on additional water resources (through motor pumping) in order to irrigate half of its arable land. In Boutaghat, water discharge flowing from the traditional *Khettara* is decreasing, thus leading also to a large scale development of motor pumping, but also to serious environmental threats, particularly salinization. Finally, in Taghia village, water scarcity is at such a magnitude that indicators of agricultural abandonment are on the rise.

\* *Socio-economic factors*

At the socio-economic level, obstacles to agricultural development are essentially institutional in nature. They involve the collapse of traditional regulatory institutions such as the Jemâa Council, with no viable, better (or simply other) alternative.

- The traditional function of the *jemâa* has been mostly that of regulating the managerial sides of collective life, including the access rights and the control over collective resources, and the collective obligations that go with it. This function may seem ambivalent: on the one hand, these very collective obligations encapsulate individual initiatives to such an extent that its negative side may be decisive. Indeed, the Jemâa order is also about maintaining the traditional order; it can be anti-innovation and anti-progress. The water rights system, the nouba water distribution protocol, the micro-fundium structure of plot distribution are all evidence of obstacles presented by the *jemâa* order. But at the same time, the oasis hydro-ecosystem is hardly conceivable without this collective encapsulating framework. And when the Jemâa order falls, the oasis system follows: the Taghia community has lost this collective constraint, could not maintain any more its *khettara* and as a result has witnessed the beginning of the collapse of its oasis!
- The absence of any institutional alternative, such as the intervention of the state, is a prominent feature. This absence is mostly effective in the downstream section of the basin, where opportunities for agriculture development do exist. Not only are those opportunities exploited outside any state control, but also the lack of state-related support institutions (such as access to credit, or extension services, for example) create a clear discrimination between capital owners (i.e., migrants / or remigrants), and those deprived of capital. The poor transport infrastructure is also a determining locational factor for agricultural development initiatives: most of the latter are observed within a reasonable distance of the main paved road Tinghir-Tinjdad!

Ultimately, and in view of these obstacles, it is legitimate to wonder about the overall future of oasis agriculture, particularly in relation to the way it is perceived by individual farmers. The youth show clearly less inclination towards farming in general. They have different values and goals. It may well be that the new ideology is ultimately the most serious threat to oasis agriculture.

**6.5. Question Five: Which policy measures adapted to the social, economic and political circumstances seem to be most appropriate for preventing desertification and improving the efficiency of water and land resource use?**

In view of the types of problems and obstacles already described above, any action-oriented policy should consider the following: Academic scholarship has demonstrated for some time now the effective nature of the oasis agro-ecosystem throughout the arid lands of the Old World. This is indeed among the most intensive systems that are found, despite the harsh environmental conditions that characterise their location. The viability of this oasis system is related to the social system underlying its very function, grounded in a social order that contains interactive components involving water and land management, types of settlements, cropping and livestock raising systems, as well as the ethnic order itself. The social order behind the oasis is a sort of heritage package within which individual self-interest is meaningless, while the collective interest is overwhelming.

Nowadays, the very rationale of the traditional social order is about to collapse, in favour of an individualistic ideology. Is there still a future for oases in view of this radical change? Here lies a prominent area for policy-oriented action. This policy should first help preserve the old inherited oases that are kept alive through surface/ or *khettara* water resources. The responsibility of the state is decisively important in this regard, as institutional factors will define the future of these oases. The power of the state should be extended to lead a process of local readjustments, for instance through “users associations” resulting in modern forms of Jemâa.

A second direction for urgent policy action is more technical in nature. It should target a better, more effective allocation of water resources, particularly in the areas outside the historical oases, which have witnessed a large-scale process of arable land reclamation and motor pumping expansion. This objective may be approached by measures ranging from the simple concrete-construction of earth irrigation channels (*seguia*), the review of plot submersion practices, to more significant actions such as drip irrigation technology, the use of renewable energy resources (wind-based or photo-voltaic), etc.

Finally, environmentally-oriented measures are also urgently needed, particularly with respect to the threat of desertification. An oasis is a fragile ecosystem, badly in need of urgent preservation and protection. The role of the state is, again, paramount in this regard.