# ARGAN GROVE BIOSPHERE

## A fragile ecosystem

# ANALYSIS and DEVELOPMENT ISSUES

*(Photo: Village region of Taroudant)*

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*(Photo : Nursery & Arganiculture Essaouira region)*

# FOREWORD

In these pages, we present a manuscript that diligently exposes the current state of Arganiculture within the Moroccan Biosphere, more commonly known as the Arganeraie Biosphere Reserve (RBA).

The product of extensive studies from various literary sources and reports authored by enlightened scholars, this work sheds light on the intricacies of managing and developing forested areas, while also delving into the essential practices of rural communities.

Within these lines, we pay tribute to the invaluable contributors who have provided comprehensive expertise on the Argan tree, encompassing political, socio-economic, environmental, and scientific aspects.

Among them, we find Professor-Researcher Madame **Zoubida CHARROUF**, from the Laboratory of Plant and Organic Synthesis Chemistry, whose work on valorizing Argan products left its mark during 1998-1999 until today !

Dr. **Hassan FAOUZI**, a distinguished geographer with a Ph.D. in Geography, offered valuable insights in April-June 2013, regarding the impact of women's cooperatives on the preservation and promotion of the Arganeraie.

Similarly, Mr. **Brahim EL FASSKAOUI**, an academic researcher at Ismaël University in Meknès, enriched our understanding through his work on integrated management, participative governance, and protected areas in April 2009.

The reflections of Dr. **Aziki SLIMANE**, as presented in his Doctoral thesis at the Free University of Brussels (ULB) in 2002, have also left a lasting impression. His profound research on sustainable development and participation within an agro-silvopastoral system facing degradation proved essential for comprehending the Arganeraie in the Moroccan Southwest.

Other relevant studies, reports, and syntheses on the Arganeraie are also listed in the bibliography (on page 63), still regarded as primary references.

This comprehensive observation raises awareness about the fragility of the entire Arganeraie ecosystem. Nevertheless, it strengthens our conviction about the utmost importance of finding equitable and appropriate solutions to preserve this unique heritage, found nowhere else but in Morocco.

With this perspective in mind, we explore the opportunities presented by Fin Tech, Agro Tech, and Blockchain Technology, as well as various digital solutions to support the Argan economy.

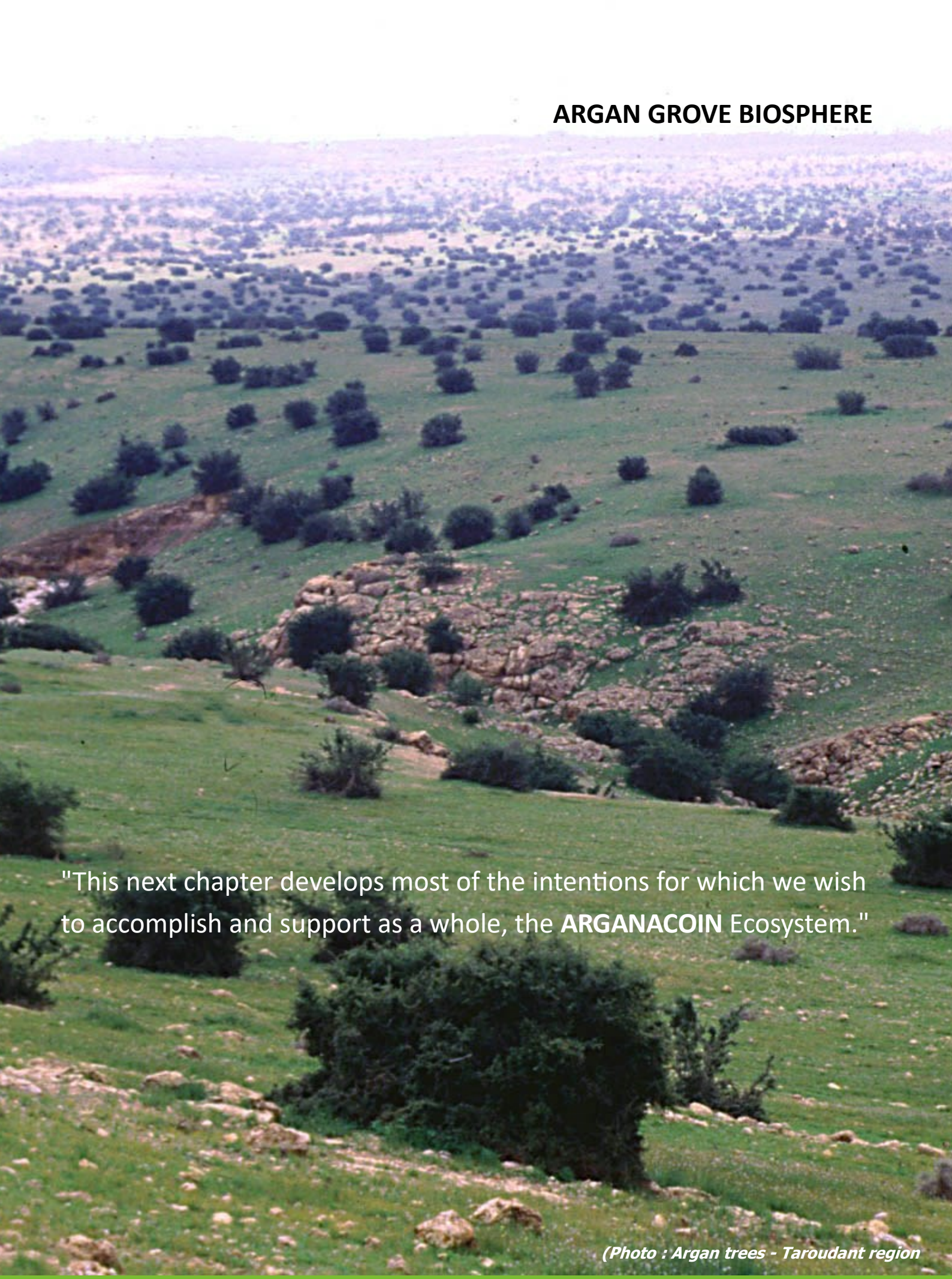
The pursuit of competitiveness and innovation in international markets prompts us to consider adopting these new approaches.

Determined to promote comprehensive and optimal solutions for valorizing local products, Morocco also encourages the use of digital potentials. The synergies between E-Commerce, the "2020-2030 Green Morocco Plan," and the "Green Deal and Green Generation 2020-2030," combined with Blockchain and utility cryptography, open up new avenues for development.

Thus, deploying the ARGANACOIN cryptocurrency, establishing an enhanced platform for acquiring NFTs linked to the Argan tree, generously replanting young seedlings through innovative sponsorship programs, and creating an international E-commerce platform exclusively dedicated to the trade of Argan oil and its derivative products, all constitute suitable, innovative, and sustainable solutions to achieve our ambitious goals.

Finally, the resulting funding will allow us to act at the heart of the Argan ecosystem, undertaking structural investments that play a crucial role in preserving Argan forests for future generations. These actions will significantly impact the Reserve of Biosphere, precisely detailed in the **ARGANACOIN** Green Paper **utility !**

**Abd-errahman ERRAMI**
**Founder ARGANACOIN Project**



"This next chapter develops most of the intentions for which we wish to accomplish and support as a whole, the **ARGANACOIN** Ecosystem."

***(Photo : Argan trees - Taroudant region***

This brilliant research by Brahim El Fasskaoui, lecturer and researcher at Ismaël de Meknès University, deals with the function, challenges and issues involved in the management and sustainable development of the Argan grove Biosphere Reserve ! The study reflects all the social, cultural and analytical aspects of the Moroccan Ecosystem !

The realization of our project is closely linked to this urgent question of the natural reappropriation of uses, its protection, the measured exploitation of the resources of the Argan tree in areas still either, little explored today or overexploited elsewhere also requiring special attention !

Federating the usefulness of the **ARGANACOIN** token is commendable for all its reasons; our efforts will be based on the possibilities of emerging all the potentialities of development; through the use of Agro Tech, Decentralized Finance, Innovative Technological Tools offered by the Blockchain solution !

## *ARGAN GROVE BIOSPHERE*

*"Morocco is one of the few countries in North Africa to boast a set of endemic ecosystems of remarkable biodiversity. These ecosystems are seriously threatened by the expansion and development of certain sectors such as tourism, agriculture and urbanization. Aware of the importance of these ecosystems to sustainable development, UNESCO has awarded some of them the World Heritage Label and the status of "Biosphere Reserve". This contribution attempts to examine the Moroccan experience in terms of protected areas policy, using this example as a starting point."*

## HISTORY & CULTURE & CUSTOMS

Argania Spinosa, the mythical and unique tree that has attracted so much attention from travelers, chroniclers and researchers.

Since the 10th century (and right up to the present day), this tree has aroused curiosity and been the subject of detailed physiognomic descriptions, as well as studies into how it is exploited and the virtues of its fruit.

The argan tree is thought to be the last survivor of the tropical sapotaceae family, a species that spread to Morocco in the Tertiary era, thanks to a warm, temperate climate, which has earned it the name of "relic tree" or "iron tree", notably due to its remarkable high density.

Among the documents consulted, we find Ibn Albeitar in the 10th century, El Bekri in the 11th, Al Idrissi in the 12th and Léon l'Africain in the 16th. In the seventeenth century, we find Hoest and Dane Schousboe. By the 18th century, the tree was already attracting the interest of Western researchers.

The 1st writings on the argan tree are those of Arab geographers and physicians who studied the Maghreb region. In 1219, in his Traité des simples, the Egyptian botanist Ibn Albeitar described the argan tree described the argan tree: "the tree called Ardjân, which bears a fruit called Berber almond, grows in the land of the Hahâ and Regraga. The oil that the Berbers of Morocco call ardjân or argân".

Jean-Léon l'Africain also wrote about it in 1515, describing the oil as being used for food and lighting.
The argan tree was first recorded by Linnaeus, who had only dried, flowerless twigs at his disposal. branches. In 1737, he gave it the name Sideroxylon spinosum, meaning "iron-hard wood".

According to the work of Peltier (1982), the Argan grove extends over several bioclimatic units and stages : from the cool semi-arid to the temperate zones. cool semi-arid to temperate zones in the south (Souss plain), via sub-humid zones in the High Atlas mountains.

Rainfall in these areas is characterized by high annual and interannual variability.
The average annual rainfall over more than sixty years is 430 mm. The Agadir weather station records dry years (0 mm in 1945, 1975, 1983 and 1990) and exceptional rainfall years (over 200 mm in 1996).

The openness of the Souss basin to oceanic influences ensures the humidity necessary for the development of the argan tree, and the finest argan forests (in terms of density, foliage and height) are located on the coast between Agadir and Essaouira.

In the High Atlas mountains, rainfall amounts are much higher (between 200 and 900 mm). Snow on the summits plays an important role in feeding the aquifers and regulating water levels by prolonging the runoff period. Here, too, you'll find some very fine argan formations.

In the Anti-Atlas, and especially on the slopes overlooking the Sahara, low rainfall combined with a geological structure of ancient rocks geological structure reduces the Argan grove to a few sparse patches.

As for thermal data, a reading of the records available between the 1960s and the end of the 1990s shows that the annual average for stations in the region is around 19.7°C. The lowest temperature recorded in January varies between 10° and 15°C. The average for the hottest month (August) varies between 25° and 34°.

The minimum temperature recorded in the High Atlas was 3° and 7° in the plain open to oceanic influences, while the maximum reached 50° in Taroudant, 65 kilometers from the coast.

Although the argan tree grows on the majority of soils, other factors come into play to explain the contrast between areas with sparse vegetation and skeletal soils and those with denser vegetation and deeper soils. According to Aziki (2002), denser vegetation once existed, and current degradation is the result of very early anthropic action, amplified by new forms of land use.

## Biosphere Reserves

Biosphere Reserves are recognized as terrestrial or marine ecosystems of global importance. The origins of the Biosphere Reserve concept, or rather philosophy, date back to the early 1970s, when **UNESCO** drew up its Man and the Biosphere program, commonly abbreviated to the **Mab program** (DEPRAZ, S., 2008).

The reflections of UNESCO experts and their partners led, as early as 1976, to the creation of a network of biosphere reserves. This led to the creation of the Biosphere Reserve concept, the main aim of which is to preserve the biodiversity of protected sites, coupled with a concern to promote cultural aspects and social frameworks, all of which should contribute to improving the living conditions of local populations in a perspective of **sustainable development**.

Defined within the framework of the Seville Strategy (1995), the objectives to be achieved by each reserve are threefold:

1. Conservation of landscapes, ecosystems, species and genetic variation ;
2. Encouraging sustainable economic and human development, both socioculturally and ecologically ;
3. Support for exemplary projects, environmental education and research on local, regional, national and global conservation and sustainable development issues.

**Following the example of the 105 countries that have Reserves, Morocco has responded to UNESCO's recommendations and defined a conservation policy for its fragile and/or threatened ecosystems.**

**<u>The country has 2 Biosphere Reserves:</u>**

- the argan grove Biosphere Reserve (R.B.A), recognized in 1998 by UNESCO,
- the Réserve de Biosphère des Oasis du Sud du Maroc (RBOSM) created in 2000.

A third, cross-border reserve, called Réserve de Biosphère Internationale Méditerranéenne (RBIM) or Réserve de Biosphère Andalousie-Maroc, has been set up between southern Spain and northern Morocco.

The term "ARGAN" is a vernacular designation referring either to the species or the product (oil).
Our contribution aims to give an idea of Morocco's policy to protect its areas, which are internationally recognized as threatened ecosystems.
The Argan grove, located in the south-western sector of Morocco, is the last bastion facing the Sahara.


**Source: High Commission for Water and Forests, Morocco 2008**

It should be pointed out that the argan tree has been the subject of several studies (scientific and administrative), both for its biogeography and for its multiple functions. But the Biosphere Reserve, as a concept and development tool, has not been the subject of a single study.

This contribution, based on the Argan grove Biosphere Reserve, proposes a debate on the question of protected areas in Morocco and their function, challenges and issues.

The argan tree, or argan, is a forest species that constitutes a singular ecosystem in terms of its eco-geographical and socio-economic dimensions.

With **830,000 hectares and 21 million trees**, the argan tree is Morocco's second largest forest resource after the holm oak. It occupies the Atlantic coastline from north of Essaouira to south of Tiznit, over a continental depth of up to 100 kilometers, and at altitudes of up to 1,500 meters. The largest settlements cover the southern slopes of the High Atlas and the northern Anti-Atlas, i.e. a large part of the Souss basin.

The data found in the documentation consulted is fragmentary and inconsistent. For example, the surface area of the Argan grove is estimated by the Haut-Commissariat des Eaux et Forêt (supervisory administration) at **2.5 million hectares**, while other references range from **1 million to 830,000 hectares**.

*"Some sources claim that the figures are well in excess of **100 million tree units** spread across the entire Biosphere."*

The argan forest provides multiple functions and uses for local populations, whose socio-economic activities are closely linked to the various products it provides.

In this way, the argan tree offers a wide range of economic opportunities through various emerging sectors, which are likely to contribute effectively to the socio-economic development of the Souss-Massa-Drâa region, one of the most dynamic in Morocco:

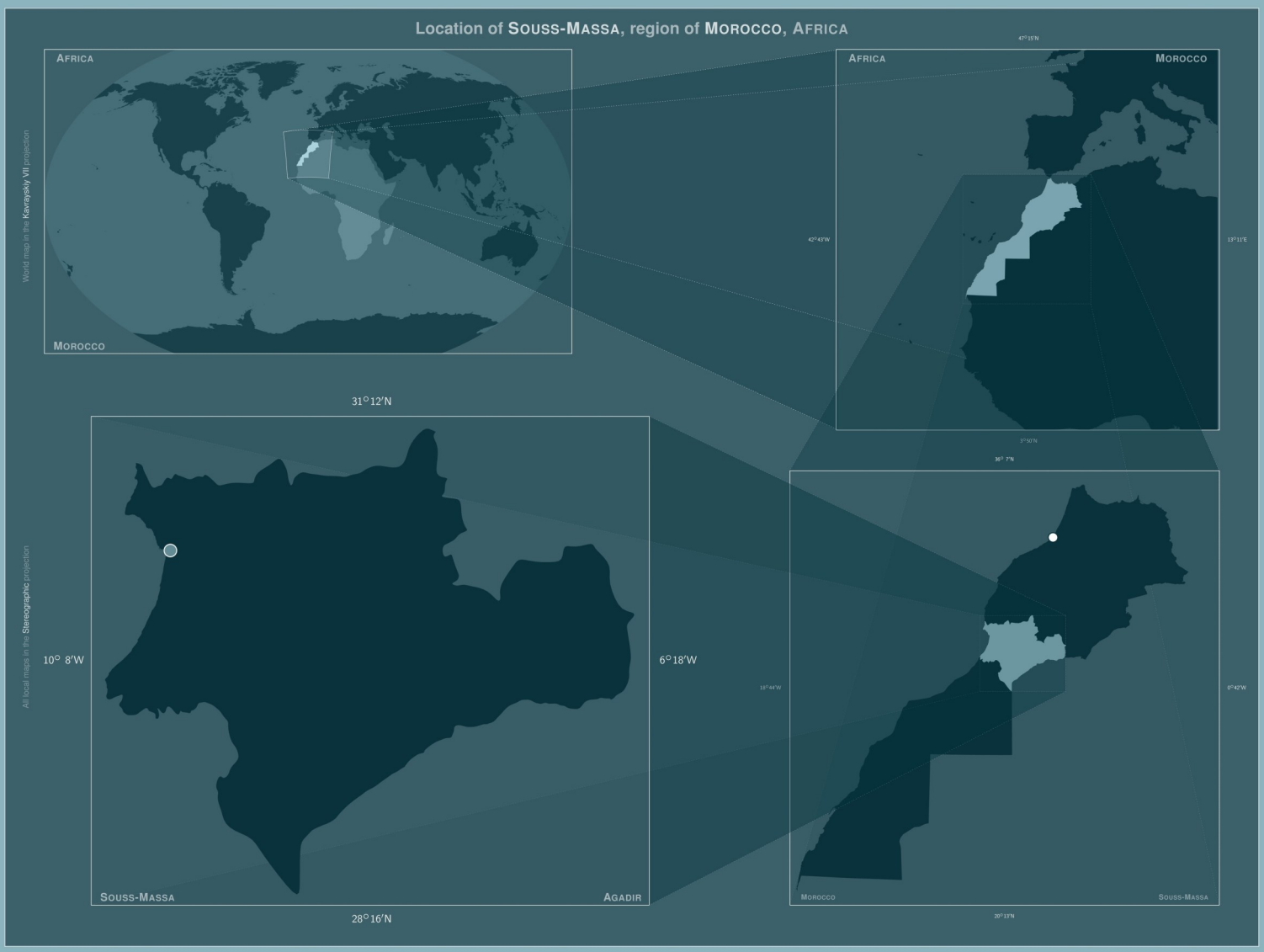
- Argan oil ;
- Ecotourism ;
- Local products... ;

However, this ecosystem, on the edge of the desert, is under a great deal of pressure.

Climate-related environmental degradation (drought, erosion) is compounded by the effects of rapid urbanization and the development of economic sectors with high demands on natural resources.

The overexploitation of these resources is contributing to the dysfunction of the physiological, biological and socio-economic mechanisms specific to the Argan grove.

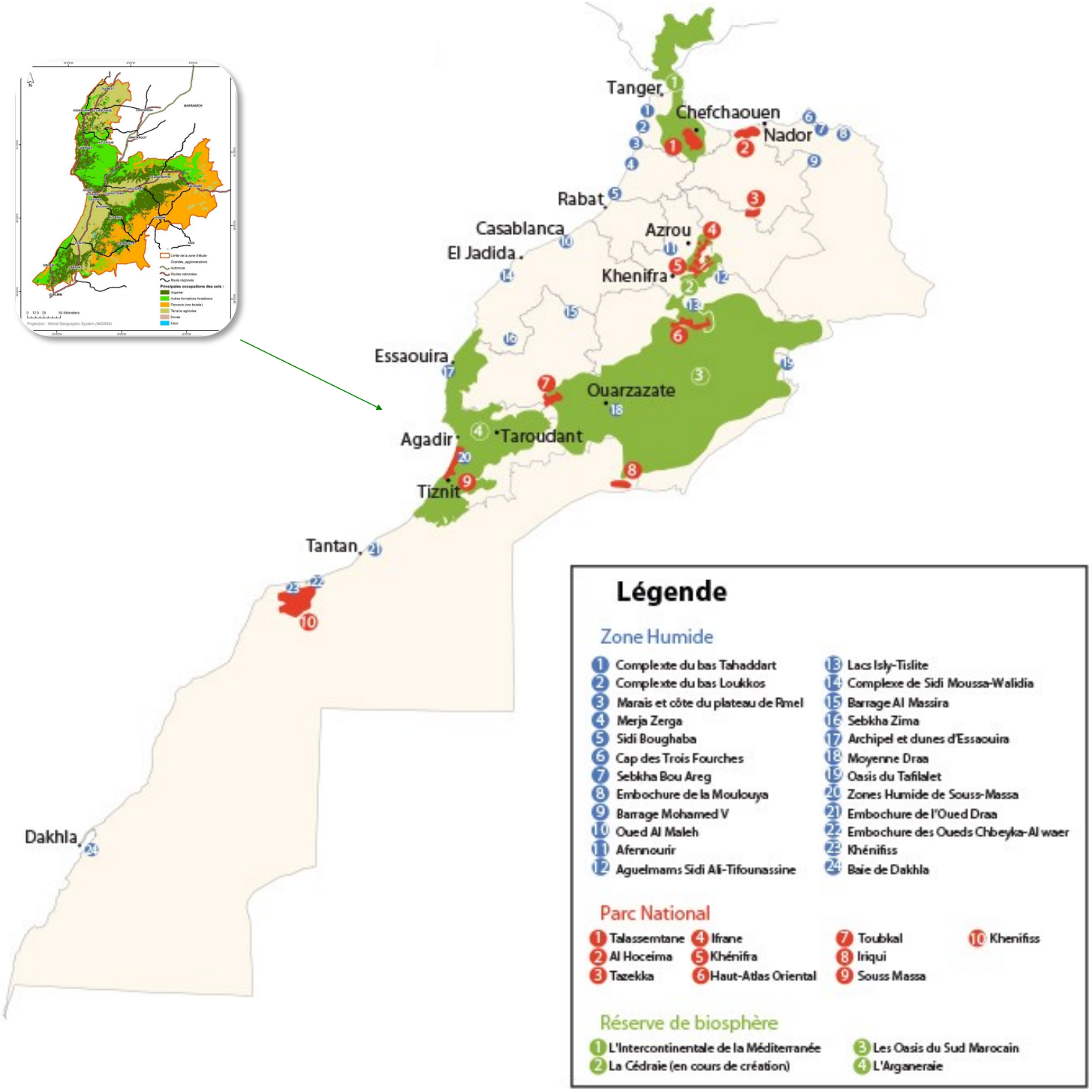
Aware of the need to preserve this balance for the sustainability of economic sectors considered to be pillars of national wealth, the authorities are attempting to take action to preserve and develop the "argan system". This concern coincides with international recommendations in the field of biodiversity conservation.

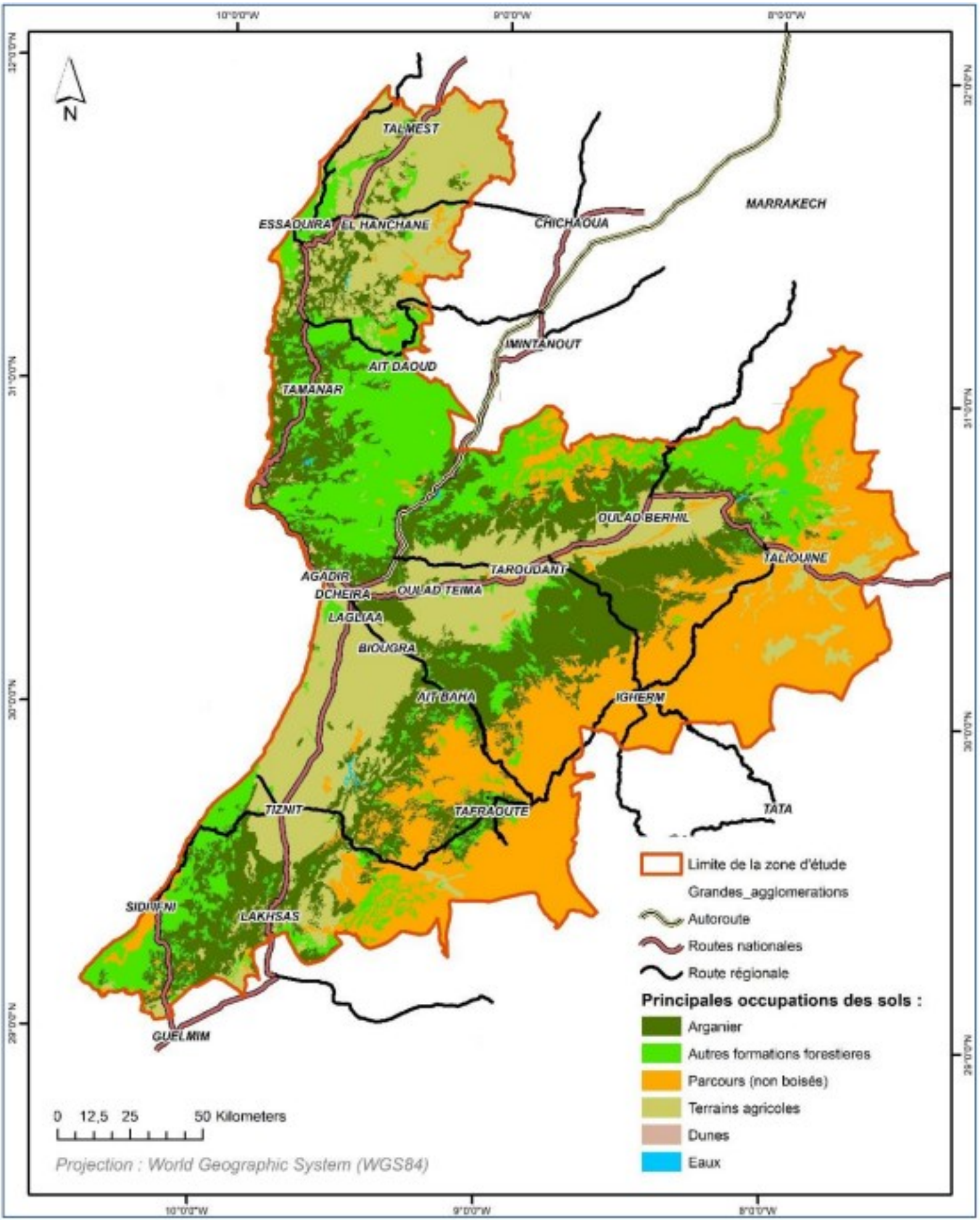

Location of Souss-Massa, region of Morocco, Africa
Africa
Morocco
World map in the Kavrayskiy VII projection
Africa
Morocco
47°15'N
42°43'W
13°11'E
3°50'N
36° 7'N
31°12'N
10° 8'W
6°18'W
18°44'W
0°42'W
20°13'N
28°16'N
All local maps in the Stereographic projection
Souss-Massa
Agadir
Morocco
Souss-Massa


-10°
-9°
-8°
-7°
-6°
31°
30°
29°
Agadir
Taroudant
Tiznit
Taliouine
Morocco
Souss-Massa
Morocco
Africa
0 15 30 45 60 75 90 105 120 km
0 15 30 45 60 75 mi
Souss-Massa, Morocco
9°34'38"W ✣ 30°24'55"N → Agadir

# Protected areas of Morocco






N
TALMEST
ESSAOUIRA
EL HANCHANE
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MARRAKECH
IMINTANOUT
AIT DAOUD
TAMANAR
OULAD BERHIL
TALIOUINE
AGADIR
TAROUDANT
DCHEIRA
OULAD TEIMA
LAGLIAA
BIOUGRA
AIT BAHA
IGHERM
TIZNIT
TAFRAOUTE
TATA
SIDI IFNI
LAKHSAS
GUELMIM
Limite de la zone d'étude
Grandes_agglomerations
Autoroute
Routes nationales
Route régionale
Principales occupations des sols :
Arganier
Autres formations forestieres
Parcours (non boisés)
Terrains agricoles
Dunes
Eaux
0 12,5 25 50 Kilometers
Projection : World Geographic System (WGS84)

## Definition of Argan grove ?

*« What functions does it perform in the Biosphere Reserve? Is it possible to reconcile economic objectives with biosphere conservation? These are the three questions we will attempt to answer as we examine the Moroccan experience of Biosphere Reserve preservation ».*

### A fragile ecosystem

Despite its fragile and limited resources, the Argan grove has always been under pressure.

But since the beginning of the 20th century, it has had to cope with demographic overload and a pressing need for economic activity that promises continual expansion.

The Souss plain, Morocco's "Eldorado", is opening up new fronts of expansion every day for greenhouse production (market gardening) and citrus growing.

In an area where water is scarce, this activity can only satisfy its enormous water needs by drawing on groundwater. In some areas, wells are over 400 meters deep. The overexploitation of water inevitably leads to the emptying of the aquifers.

The desire to rebuild the city quickly after the earthquake has made Agadir (the capital of the Argan grove) the center of attraction for a large population. This pressure is reflected in the search for new land for the facilities needed by this region, which is experiencing dizzying growth: (agribusiness, mass tourism, industry, urbanization...).

**Agadir's international airport occupies 800ha at the expense of the Argan grove, and the surrounding area is being appropriated for simple rain-fed cultivation (Bour) in preparation for the arrival of greenhouse crops.**

**Source : André Humbert, CERPA, Nancy 2, 2003**

The construction of Agadir international airport and the road linking it to the city of Agadir alone required the clearing of more than **1,000 hectares** of land, at the expense of the finest argan forests in the Admin and Mseguina regions.

The attraction of the city of Agadir and the entire Souss plain has created an urban system that is all the denser for having been rapidly set up in a hurry. The expansion of Agadir and its satellite centers now form an urban complex along the coast, stretching from Taghazout in the north to Aït Melloul in the south.

At the heart of the Argan grove, the town of Taroudant is a second urban hub from which anarchic and uncontrolled urbanization is developing over entire areas of the Argan grove (such as Aït Iaazza, Sebt El Guerdan, Ouled Berhil, Amsagroud, etc.).

While the first wave of construction in the tourist zone, now saturated, was characterized by relatively high-rise establishments, the new forms of investment (from petrodollars) are spreading out horizontally to the detriment of the Argan grove (between Anza and Taghazout).

Two categories of disruptive factors can be identified: direct factors linked to land clearing and factors accentuating the loss of vegetation cover.

The Souss plain, which acts as a sort of sponge to regulate water inflows, is being overexploited by uncontrolled pumping, threatening its strategic function. The Souss aquifer is not only empty, it is also being invaded by saltwater infiltration from the sea front.

Food-producing farms are seriously threatened and the **3 million inhabitants** of the Argan grove are short of drinking water. Local authorities are now talking of a real crisis situation, and are multiplying the means of transporting water over long distances.

Agribusiness, which is moving up the plain where water resources are still "available", is one of the factors responsible for this situation.
**Urbanization, tourism, agriculture and the food industry** are major consumers of water, but also major **producers of wastewater**.

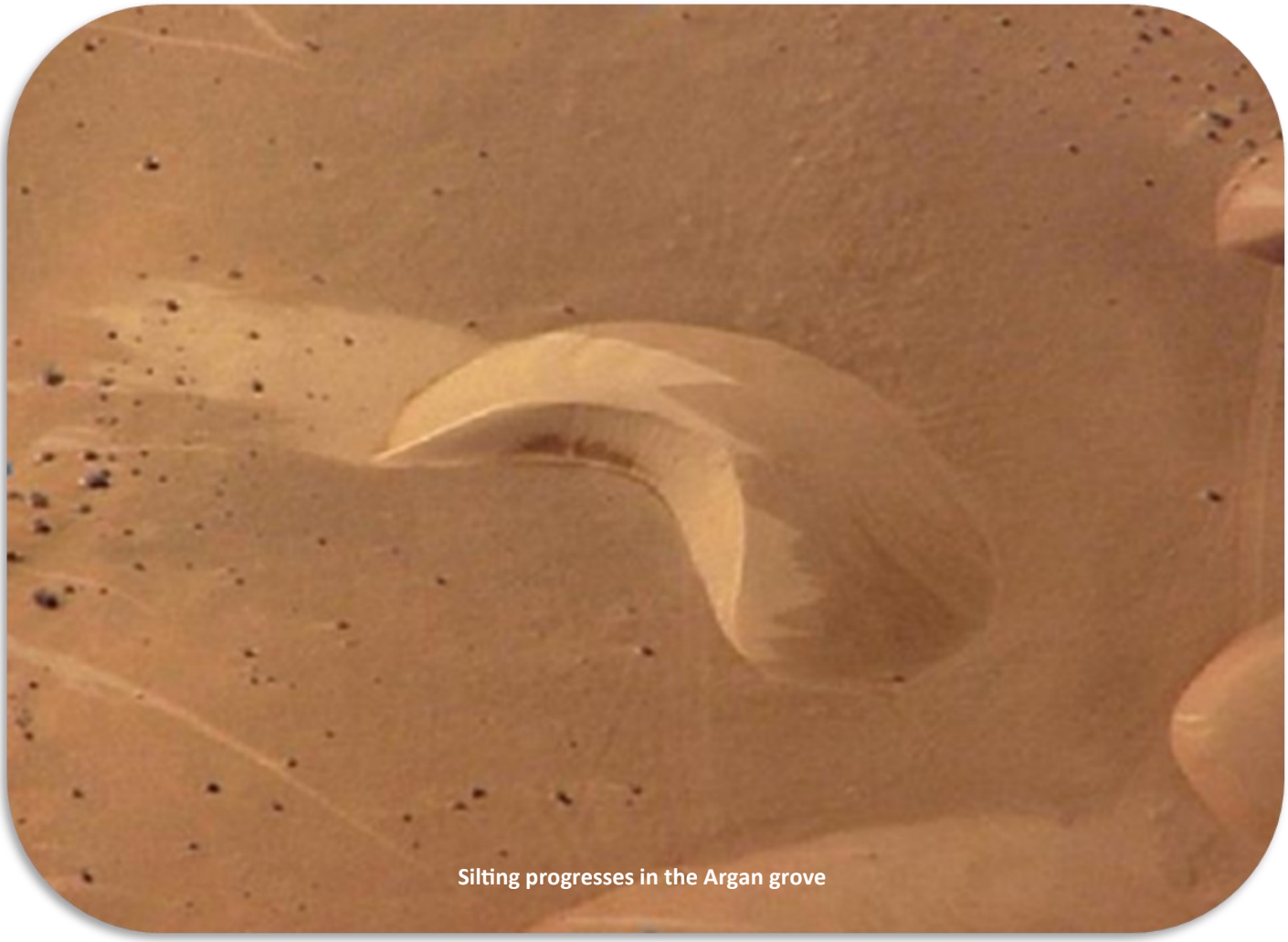
This water is discharged either directly into the environment or into cesspools in the towns on the plains. Despite some efforts at purification, the majority of urban and industrial wastewater in the coastal zone is discharged directly into the sea.

Faced with these problems, many initiatives and players have come up with solutions to this imbalance. But these actions are not integrated into a global, concerted prevention or intervention framework (Ouhajou, 2007).

The Biosphere **Reserve project** aims to provide stakeholders with knowledge of the state of the environment and a framework for **harmonious development**.

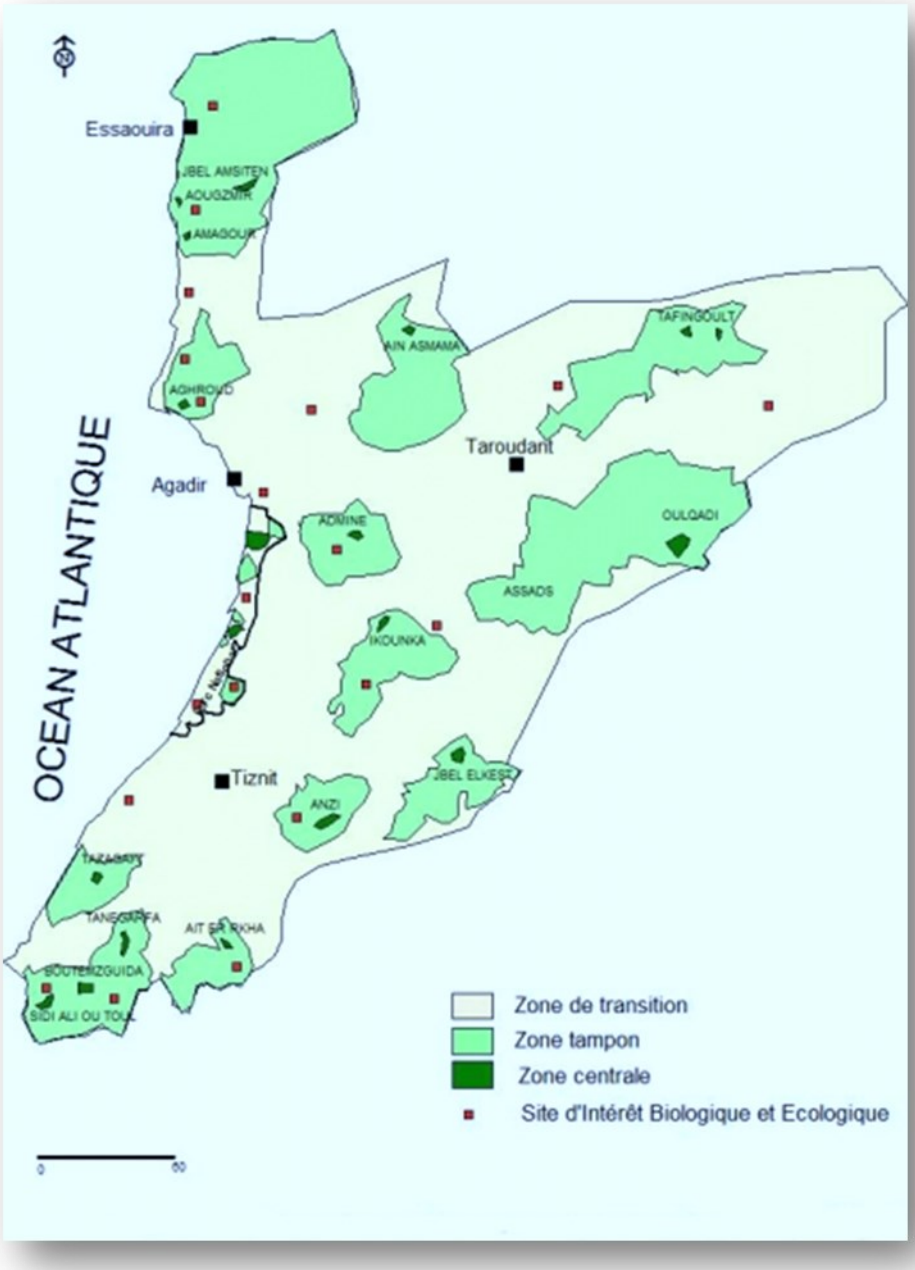
The Argan grove is being "plasticized" by an agro-business with unlimited needs for natural resources.
Source : André Humbert, CERPA, Nancy 2, 2003

Clearing land accelerates and intensifies erosive dynamics



Silting progresses in the Argan grove

## What are the functions of the Argan grove Biosphere Reserve?




From the very definition of the M.A.B. "Man and the Biosphere" (1987) and the UNESCO recommendations, we can deduce the concerns and objectives pursued by this special status.

The Reserve is a management tool with appropriate objectives.
The Argan grove has been compartmentalized into protected areas.

First of all, the main vocation of a Biosphere Reserve is to achieve the sustainable conservation of an entire ecosystem or representative biogeographical unit.

To maintain the continuity of the processes and mechanisms of natural or semi-natural ecosystem evolution, it is essential to maintain the genetic diversity of species.

## "The Argan grove, with all its natural and human complexities, extends over several biogeographical units":

- Mountains;
- Plains;
- Wetlands;
- Drylands.

To control the objectives and the working method, the managers and their partners have decided to divide this ecosystem into 26 "**Sites of Biological and Ecological Interest" (S.I.B.E.)**.

"Classic landscapes of the Argan grove. This forest provides many functions for the rural mountain population. It is still protected from the covetousness that threatens it on the plains".

This distribution, specific to the Argan grove Biosphere Reserve, is based on the richness and biodiversity of these units. There are 12 Sites of Biological and Ecological Interest (S.I.B.E.) on the mainland, and fourteen on the Atlantic coast, including one nature park. Although the coastline is narrower than the continental part of the reserve, its resources are by far more coveted (tourism, industry, urban development, fishing).

Secondly, the conservation, enhancement and regeneration of the Reserve's natural resources refer to what is known as sustainable development, which implies the rational use of renewable resources, the preservation of cultural and social traditions, and equity between all regions.

This cannot be achieved without the direct and sustained participation of the local population, without respect for and use of local know-how, and without valorizing the traditional skills of the local population.

The State, represented by its various departments, must support local efforts by committing all the logistics at its disposal in a region :

Ministry of Housing and Planning ;
Ministry of Water and Forests ;
Ministry of Agriculture ;
Water authorities ;
Ministry of Tourism ;
Ministry of Culture and Local Authorities...

ACTORS AND ACTIONS TO DEVELOP THE RESERVE

The conservation and development of a Biosphere Reserve is everyone's business.

All stakeholders must be involved in the process of implementing measures and practices for the sustainable use of natural resources.

But the extent to which this happens differs from one society to another. Reserves in developed countries benefit from substantial resources and the evolution of the structures that manage them :

- **Financing;**
- **Research;**
- **Civil society;**
- **Economic partners.**

In developing countries, on the other hand, reserves can count, at almost all levels, only on the **assistance of rich countries**.

- **Financing;**
- **Research;**
- **Logistics;**
- **Management.**

Based on the experience of the Moroccan Arganeraie, we highlight the interplay of these contradictions and the ways in which the Reserve operates.

# PARTICIPATION AND USE OF LOCAL KNOW-HOW

Let's start by recalling that the Argan grove is one of the most densely populated forest formations in Morocco, where an agrarian civilization dating back to time immemorial has created an organic relationship with the argan tree.

Local communities have implemented and continue to implement customary rules to respect and "obey" this tree, which is the father of all.

With their particular socio-ecological structures, they have been able to use the resources of the Argan grove to the maximum of their ability.

**"In the High and Anti-Atlas regions, customary law goes so far as to prohibit the burning of argan wood for cooking".**

The Agdal is a set of rules which consist in closing and opening specific areas according to a concerted schedule or according to the specific conditions of the Argan grove terroirs. Anyone violating these rules is punished by the community (Jmâa).

If natural conditions are favorable to the argan tree, pastures can be used according to rhythms that comply with community regulations.
When the year is bad, the pastures are completely closed. In extreme cases of drought, the herd is sold en masse to minimize the burden on the Argan grove and preserve the necessary balance between livestock farming and the protection of the Argan grove.

The cutting of wood for domestic purposes (cooking, heating or construction) is also subject to community controls.
Any amputation of even a single dry branch of the Argan tree requires the unanimous approval of the village assembly.

In the case of timber, the village assembly decides which trees are to be cut. Each vital resource (water, pasture and land, for example) is governed by an arsenal of adapted customary provisions.

# ARGAN WOOD

## Wood energy in the Argan grove: between sustainability and degradation - (Haha region, Haut-Atlas Occidental, Morocco)

**De Hassan FAOUZI**

Ranked as the 2nd most worrying environmental issue, after climate change, **deforestation** is often a major process in developing countries (**World Bank, 2003).**

One of the main causes of deforestation is population growth, which has led to the overall to high levels, resulting in a rapid reduction in forest resources.

One of these needs is to supply families with wood fuel.
Wood fuel is the primary source of energy, especially for the poor. Nearly **80%** of people in developing countries use it as an energy source (**Lawani, 2007**).

In Morocco, it is estimated that **6.35 million tonnes of fuelwood** are removed from forests every year, resulting in the loss of more than 20,000 hectares per year. Most of this wood is consumed in rural areas (88%) for domestic use, primarily for cooking and heating in the coldest mountain regions.

The Moroccan Argan grove provides a livelihood for some **2 to 3 million people**: it is an example of the Moroccan forest ecosystems that suffer most from the harvesting of fuelwood and the clearing of land by local populations to meet their domestic needs.

The overexploitation of the Argan grove is not recent and is particularly linked to the production of fuelwood from the argan tree. The latter produces wood and charcoal of excellent quality, much appreciated throughout Morocco for cooking meals; for a long time, it supplied most large towns. During the 1st World War, it was even exported to France. Considerable areas of forest were exploited to produce this sought-after fuel, resulting in the disappearance of around **200,000 hectares of Argan** grove (**Monnier, 1965**).

Faced with this mining of the Argan grove, which threatened the whole region with desertification, a dahir (royal decree) was promulgated in 1925 to protect the argan tree and regulate forest use (Chaussod et al., 2005).

Today, this dahir remains one of the foundations of legislation concerning the argan tree. It makes the Argan grove a state forest in which local populations have extensive rights of use.

But exploitation of the Argan grove is also governed by other sources of law: Koranic law and customary law. Despite this legal arsenal, the balance of the Argan grove ecosystem is still very much under threat (Chaussod et al., 2005).

In southwest Morocco, almost all household fuel energy needs are met by forestry production.
Over 80% of the population living in the Argan region use wood energy, demand for which is increasing due to factors such as population growth and poverty (Faouzi, 2009).

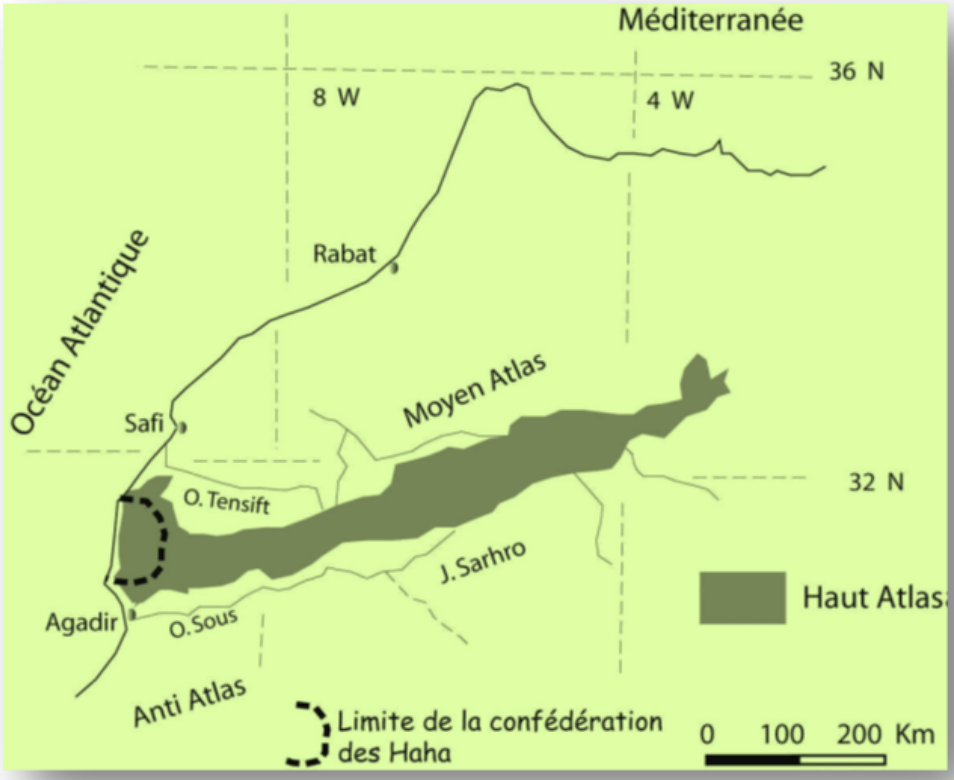
**"This article invites here a deep analysis of wood-energy consumption and its impact on the Argan grove, with the aim of raising the issue of sustainable domestic fuel supply in the in the Argan grove, and this through the Haha confederation (Western High Atlas)."**

The Haha confederation is one of the regions of Morocco that has suffered most from crises in recent decades.

The natural (drought) and (economic) crises of the 1980s and 1990s, combined with strong demographic growth, have reinforced poverty in this region.

Faced with this situation of extreme poverty, populations have developed survival strategies that include the use of wood fuel to supply households.

And so, despite the fragility of their argan ecosystem, the local people attack the woody cover to produce firewood, charcoal and cooking fuel.
Charcoal is the predominant energy source in the region, accounting on average for 90% of total energy consumption. It is demanded by families whose low incomes prevent them from obtaining domestic gas or access to electricity.




**Source H. Faouzi, january 2003**

With around 870,000 hectares of woodland, the Argan grove is a veritable reservoir of woody biomass. Argan wood yields excellent quality charcoal, and considerable areas have been exploited to produce this fuel.

Despite the scale of the problem, very few studies have been carried out on the exploitation of fuelwood, its consumption, and its impact on deforestation in the Argan grove, and this remains an area little addressed by geographers, even though energy has long been identified as a fundamental key to territories. (**Mérenne-Schoumaker, 2007**).
Data on wood energy supply and demand are largely incomplete or obsolete.

National fuelwood consumption has always been subject to various estimates.
Only the volumes sold and controlled by the Administration are known. These figures show that the rural household sector is :

No. 1 consumer of wood energy, with 6 to 10 million tonnes taken annually from the forest heritage, i.e. over 88%; 2nd is the urban sector, with **1,273,801 tonnes a year, or 11.2%.**

Wood, including its derivative charcoal, accounts for 30% of total energy consumption in Morocco.
According to ADEREE, national demand for wood energy exceeds **11 million tonnes per year**, representing **30%** of Morocco's total energy demand.

Almost 88% of this demand for wood energy comes from rural areas, where poverty is on the increase.

The scarcity, inconsistency and imprecision of studies and statistical data on the subject, as well as the reluctance of stakeholders to be interviewed, prevented us from carrying out a more detailed study.
The study is based on a survey of 20 households in the Haha region carried out in 2003, supplemented in 2012 by a second survey of 30 households.

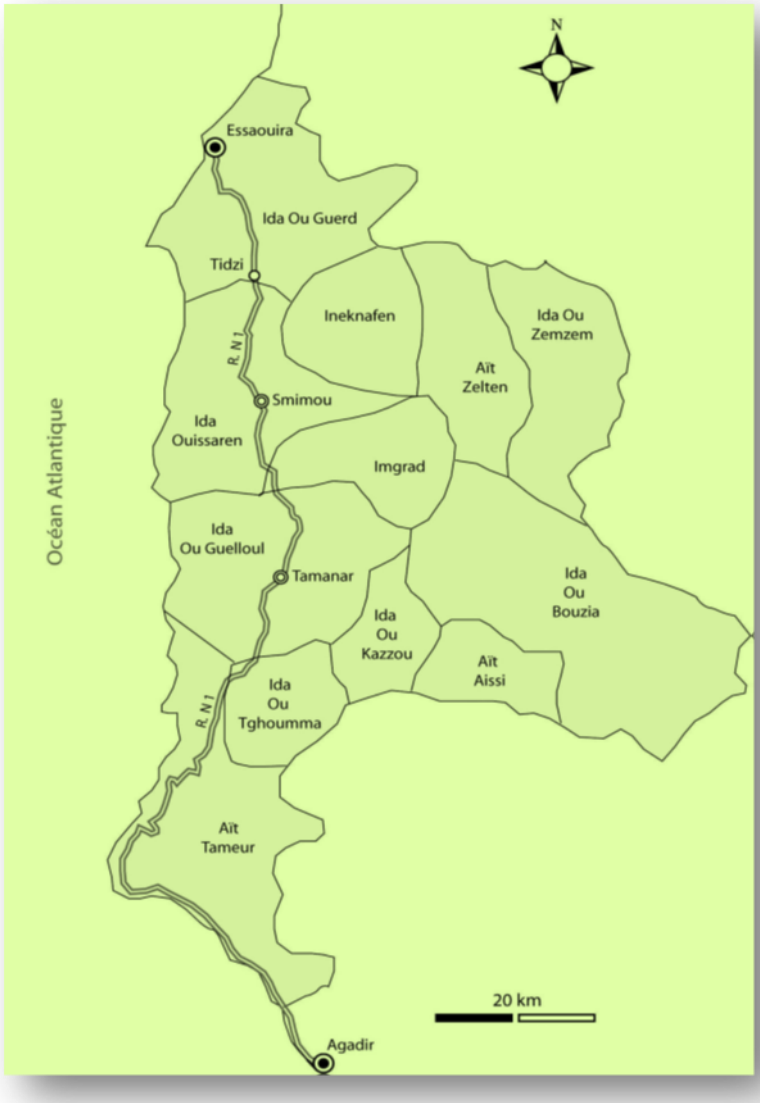
These two field surveys, which were carried out in six douars (villages) in the Haha region, enabled us to collect data on wood consumption, the number of people per family, family incomes, etc.

They were supplemented by direct observations in the field and interviews with farmers, charcoal makers and traders, charcoal makers and traders.

Most of the people studied were women: they and their children are responsible for collecting wood in the forest.

An analysis of various documents shows that, at present, no one is able to provide reliable data reliable data on the issue of wood energy and its environmental consequences, especially as the majority of wood harvesting escapes government control.

3. National Agency for the Development of Renewable Energies and Energy Efficiency (http://www.aderee.ma/)
4. Les *douars* sont : Aït Ignane appartenant à la tribu des Aït Zelten ; Ihoumache, Taghzoute, Id Wachma qui appartiennent à la tribu Imgrade, douar Tidzi qui fait partie de la tribu des Ida Ou Gourd, et *douar* Aderdare de la tribu des Aït Aïssi.




**Haha tribes (Source : H. Faouzi, 2003)**

## Wood energy - "A product in great demand"

The hybrid concept of wood energy refers to all applications of wood as a fuel.

In addition to oil, the Argan tree provides hard, resistant and heavy wood, fuel for cooking and heating. With the growing needs of an ever-growing population, the Argan grove is in great demand for more wood : woody plants are perceived as an open-access resource that satisfies primary needs :

- wood energy for cooking daily meals ;
- heating and lighting in the most remote regions.

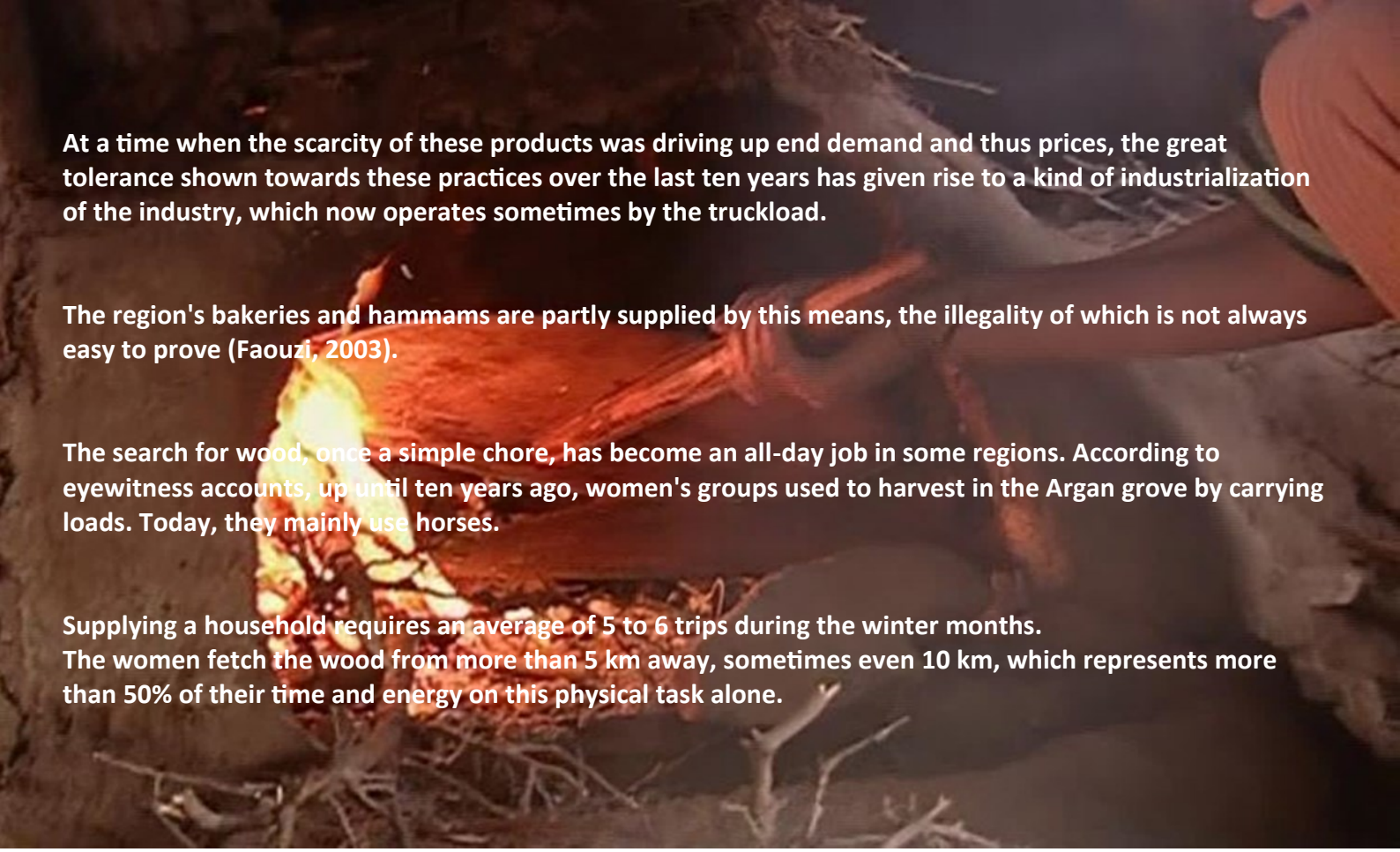
Those who can't afford to buy firewood send their children or travel themselves to surrounding areas to cut argan branches or collect twigs, leaves or any combustible material.

**Argan tree with branches cut for domestic energy needs**
**(Photo H. Faouzi, January 2013)**

Because of the region's climate, heating is necessary in winter, especially in larger homes.

Add to this strong demographic growth, with an average annual rate estimated at 3.1% for the period 1982-2004, wood is becoming a major necessity in domestic energy consumption.

More than 80% of the population of the Haha depend on wood from the Argan grove for their energy. According to the Essaouira Water and Forestry Department, the demand for wood energy is estimated at 250,000 tons/year.



**At a time when the scarcity of these products was driving up end demand and thus prices, the great tolerance shown towards these practices over the last ten years has given rise to a kind of industrialization of the industry, which now operates sometimes by the truckload.**

**The region's bakeries and hammams are partly supplied by this means, the illegality of which is not always easy to prove (Faouzi, 2003).**

**The search for wood, once a simple chore, has become an all-day job in some regions. According to eyewitness accounts, up until ten years ago, women's groups used to harvest in the Argan grove by carrying loads. Today, they mainly use horses.**

**Supplying a household requires an average of 5 to 6 trips during the winter months.**
**The women fetch the wood from more than 5 km away, sometimes even 10 km, which represents more than 50% of their time and energy on this physical task alone.**

The tools used to cut the trees are traditional and manual. The absence of any roads means that carts cannot be used, and the main means of transport is by mule or donkey, which can carry up to 70 kg, but women and girls often collect and carry the wood on their backs.

The woman supplies the house with fuel directly from the surrounding vegetation, using her intimate knowledge of plants and plant resources according to the seasons and transhumance routes, and collecting dead wood.

The division of labor between the sexes is rigorous. Collecting wood and preparing food are both women's activities, although some farmers also take part.

Collecting wood can be extremely arduous: the heavy loads (up to 40 kg) carried over several kilometers are dangerous (steep gradients, treacherous paths).

The forests are remote and sometimes located in areas that are difficult to access, in hollows, a characteristic feature of the Haha plateau (Faouzi, 2003).

Timber harvesting areas are lands subject to the forestry regime and of collective status, access to which depends closely on genealogy and tribal affiliation. It is important to note that, administratively, the Argan grove is a state forest under the protection of the Water and Forestry Department.

However, the regulations grant very broad usage rights to the local population.

The study of domestic wood-energy consumption begs the question of energy behavior: to fully understand domestic consumption of wood fuels, and the factors that determine it, it is essential to take into account the changes that have taken place. consumption of wood fuels and the factors that determine it.

In addition, we need to understand the specific nature of energy consumption, i.e. the differences in behaviour differences in behavior according to use (heating, washing, lighting, cooking) and over time.


**Haha gas and wood consumption rates - (95% Wood & 5% Gas) rural commune of Imgrad**

To understand the energy behavior of the Haha, we divided the year in two: the winter period when wood is used more for heating than for cooking, and the rest of the year when wood is used for other purposes (cooking, tea, couscous, etc.).

During the cold season, all households use wood exclusively for heating.

People with the means to buy butane gas canisters do without wood for cooking. For those who can afford it, butane gas is used only for lighting.
To save wood, families cook their food at the same time as heating.
During the rest of the year, some people use wood only to bake bread, while butane gas is used to cook other foods.

The open stone hearth (afarnou) is mainly used for cooking, as well as for baking bread cakes (aghrum n'tafarnoute) in an earthen pan.
Bread baked under embers in the sand is also frequently prepared in the region.

Energy consumption is still dominated by traditional fuels (especially wood and its derivatives).

Consumption of butane gas is still low, given the difficulties of supply and, in particular poverty.

(Cliché Association Tigouga, 2011)

It's hard to estimate the scale of coal mining activity in the region. According to the Essaouira Department of Water and Forests, charcoal production in the region is estimated at 41,000 tonnes/year, of which around half is marketed :

in urban centers (Hammams, Boulangerie) and the other half, sold at various Haha outlets (Tamanar, Smimou, Imgrad, etc.).

## The wood-energy sector: a lucrative business

The Haha wood-energy industry is well organized, from top to bottom :

- wood producers ;
- charcoal makers ;
- wholesalers;
- transporters and retailers.

As poverty increases, more and more charcoal micro-retailers are appearing on the scene.

From the wholesalers has developed a network for retailing wood fuel.

2 types of vehicle are used for distribution: trucks and pick-ups.
Transporters provide road transport to Essaouira or Agadir.
On average, they make 3 trips a week between towns, rural centers and douars.

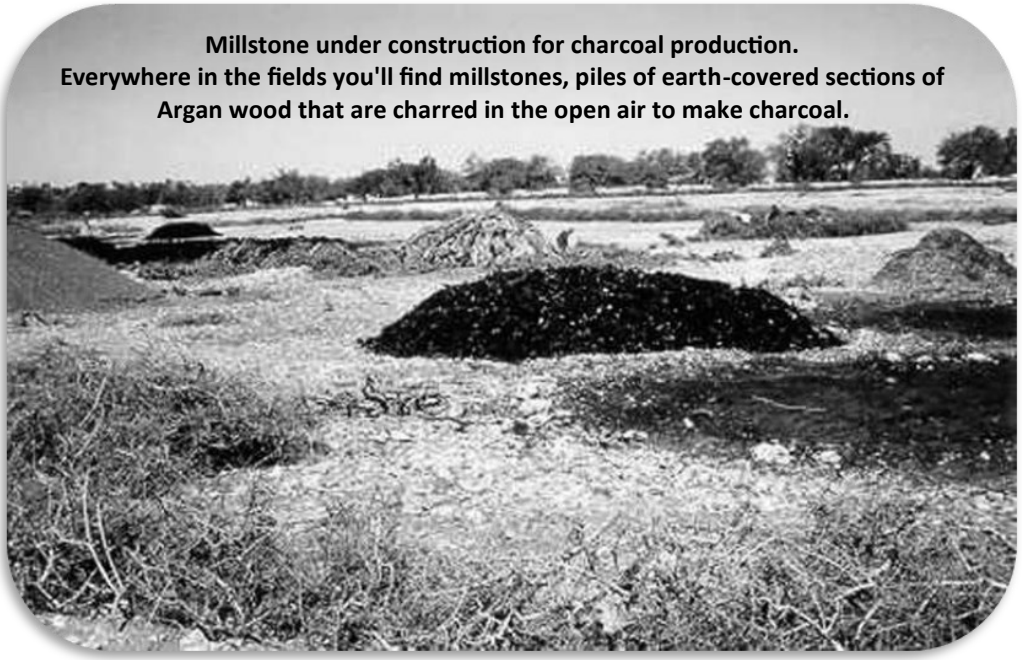
The price of wood fuel varies from place to place. While it costs less in the **douars** where the wood is produced, it is more expensive in Essaouira, Agadir and the towns of southern Morocco.

A charcoal-maker earns an average of **85,000 dirhams a year, or 8,500 euros.**
As for wholesalers, they earn **21,000 dirhams or 2,100 euros** per branch of wood.
If this activity is profitable, enabling the vast majority to survive and a small number, especially wholesalers and charcoal burners, to enrich themselves, it is not without consequences for the Argan grove. In addition to increased collection distances and skyrocketing prices, the consequences for the landscape are landscape.

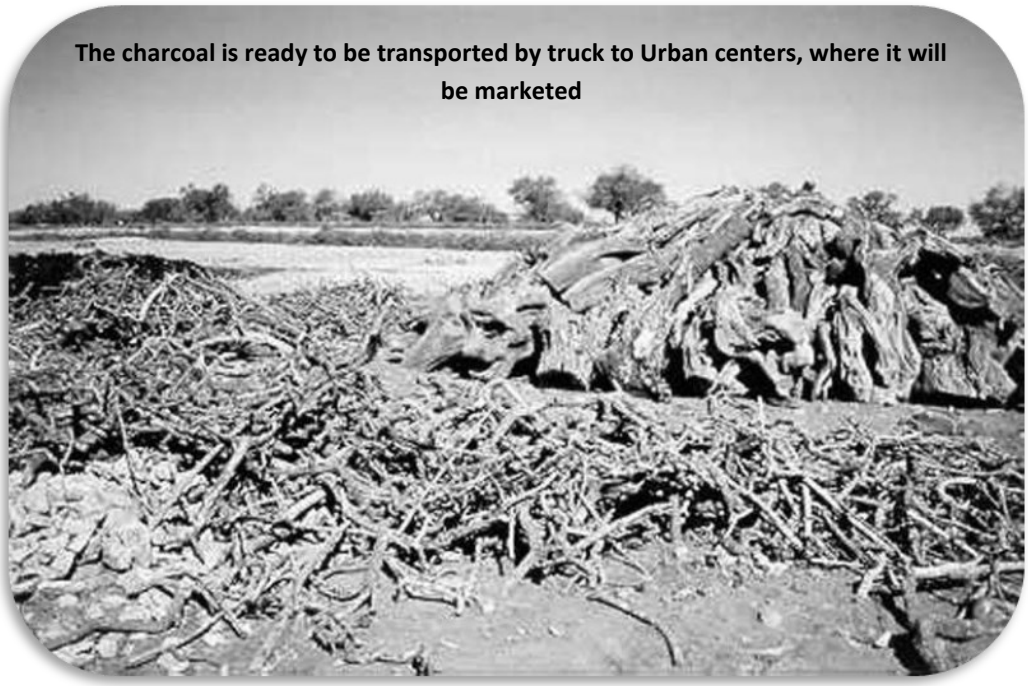
All the people interviewed in the region agree that both human activity and drought have and drought have contributed to the decline, or even disappearance, of many formerly wooded areas.

Many people remember wooded areas that are now completely bare.
In recent decades, several factors have contributed to the significant deterioration of the Argan grove in relation to the demand for wood energy.

Demographic growth and the very high poverty rate mean that the population is heavily dependent on wood energy.



**Millstone under construction for charcoal production.
Everywhere in the fields you'll find millstones, piles of earth-covered sections of Argan wood that are charred in the open air to make charcoal.**



**The charcoal is ready to be transported by truck to Urban centers, where it will be marketed**

As in other regions of Sahelian Africa, the decline in vegetation cover and deadwood resources (**Minvielle, 2001**) is leading rural dwellers to harvest living wood, which is gradually replacing the traditional collection of deadwood from increasingly distant locations. wood from ever greater distances, whereas in the past, wood supply was limited to the immediate the immediate vicinity of douars.

During our field interviews, several farmers stated that they were gradually noticing the disappearance of several woody species due to the felling of argan trees. Our field observations field observations confirm these statements: large areas of deforestation have been observed around the villages and within the Argan grove.


Satellite photo of Ihoumache douar, Imgrad rural district.
A mutilated Argan grove with no undergrowth can be seen around the douar.

**(Source : CNES/Spot, 2013)**

The living conditions of the Haha people (poverty rate in excess of 80%) make wood from the argan tree the main source of energy for their domestic needs. Its low cost (collection is free) and consumer tastes and preferences have made it a mass-market product.

Poverty remains the main factor in the degradation of the Argan grove ecosystem. We therefore need to apply a systemic approach to the problem of degradation.
the problem of degradation, by studying all the interacting mechanisms involved in the ecosystem.

It is recognized among conservationists and elsewhere that forest ecosystems in general cannot be managed in a practical, rational and effective way without taking into account the populations living in the surrounding area (Fisher, 1999).

The study shows that urban poverty is also a significant factor in the degradation of the Argan grove, due to the high urban demand for charcoal from the argan tree. This charcoal is preferred in urban areas for its excellent quality, and is much appreciated throughout Morocco for cooking meals.

From an ecological point of view, population dynamics have a significant impact on energy needs significant impacts.
The population of the Haha region has been growing at a fast pace for 40 years, of around 3% per year, doubling in the space of 40 years.
But cities are growing much faster.
The consumption patterns of city dwellers differ from those of rural dwellers.

In a dual context of increasing demand for wood energy and a desire to preserve ecosystem functions (Courbaud et al., 2010 cited by Avocat et al., 2011), the Argan grove is more than ever an ambivalent area, between satisfying the population's needs for wood energy and a natural heritage to be protected (Avocat et al., 2011).

In a context of :

- climate change,
- population growth ;
- increased poverty.

it seems essential to consider the resilience of the Argan grove, in order to guarantee a sustainable development of the wood-energy sector.

**"This study illustrates the relevance of a truly regional approach to energy, environmental, socioeconomic and cultural concerns. environmental, socio-economic and cultural concerns.**
**In the end, wood-energy use must be considered in an integrated way, as a component of a complex territorial system, each with its own singular local configurations."**

Over the past twenty years, efforts have been made to determine the conditions for truly sustainable development of the Argan grove.

Most research work has focused on argan oil as the product on which socio-economic development projects can be based, without taking into account the other products of the Argan grove.

It is now accepted that approaches centred on the creation of argan oil production cooperatives have shown their limitations and lack of effectiveness in solving the problem of the consumption of argan wood.

The repressive measures taken against the illegal harvesting of wood in Argan groves have also proved ineffective, which means that forestry legislation in the Argan grove is no longer adapted to the current situation. adapted to the current situation.

The Moroccan forest is not what it used to be.
In ancient times, it covered 30% of the national territory. Today, it represents only 8% of this area.

The use of woody species for firewood is making an alarming contribution to forest destruction (Boudy, 1952).

Energy issues should be considered in their global perspective, i.e. social, economic and ecological, economic and ecological. People don't demand energy as such, but the services it provides: heating, cooking and lighting (Fridleifsson, 2000).

This will be possible thanks to the development of ecotourism in the Argan grove, which will create jobs jobs and help reduce poverty in the region, as well as enabling wood to be replaced by other energy sources.

# Wood energy in the Argan grove...

The current challenge is not simply to increase the income of the people living in the Argan grove, but to do so within a framework of sustainable development. Argan grove, but to do so within a framework of sustainable development of the environment, which necessarily requires overcoming the situation of conflict between the population and the foresters.

This can only be achieved by legislation.

The popularization of natural gas and, above all, solar energy, given the region's very high level of sunshine (3,000 hours/year), could make an effective contribution to reducing the intensity of this activity. ethnobotany, relieving the Argan grove of destructive wood harvesting.

Research (Benzyane, 1989) is focusing on renewable forms of energy by converting forest biomass from Argan tree stands into energy equivalents.

**"These studies have shown that one hectare of Argan tree produces fifty tonnes of dry matter: translated into energy terms, one hectare of Argan tree is equivalent to 22,875 liters of fuel oil, or 143 barrels of crude oil".**

The Argan grove, which is currently fragile, needs to be protected because of its many assets in terms of biological diversity, its impact on the country's socio-economic balance (Fikri et al., 2004) and its role in combating desertification.

Admittedly, the Argan grove d'Admine and the Chtouka Aït Baha are far removed from the Haha region, where degradation is very advanced, but similar signs can be seen on the horizon.

The Argan tree is a social product deeply rooted in people's daily lives.
Its disappearance will jeopardize the existence of an entire region, with all the far-reaching consequences, economic, social, political and environmental consequences !

## THINGS ARE EVOLVING … !

When the forest became State property and came under the supervision of Eaux et Forêts agents, its use was sanctioned by regulations "foreign" to community assemblies.

A break in the ecosystem then appeared, provoking aggressive reactions towards the Argan grove. Penalization by the new forest rangers and the new legal provisions for communities who have protected the argan tree because it is "God's providence", the object of ancestral rituals, have not been accepted and are giving rise to "revenge" which is reaching worrying limits due to the aggressive reactions of local populations towards the argan tree.

Local people, excluded from the management of the Argan grove where they survive, are developing uncontrollable practices of maximum exploitation of this tree which no longer belongs to them.

This observation demonstrates the failure of growth strategies perceived as indicators of development, and marks the limits of the efforts (technical, material and financial) made by state managers.

« In fact, the technical spirit of state agents, and the brutality of their decisions without recourse to the principles of community management, or to the disapproval and appreciation of villagers, means that the state's efforts often have very limited impact ».

Today, man is the means and the end of development, and the "experts" want to involve this actor/target in the processes of conservation and enhancement of its resources.

"The Argan grove Biosphere Reserve as a socio-ecological space is an "ideal" space for mobilizing populations around their resources and motivating them to achieve self-development.

This is what we call participation.
However, appealing to local populations and their know-how is no longer possible, because they have acquired other behaviours that are incompatible with the expectations of the Biosphere Reserve managers.

Indeed, the opening up of communities to the outside world (through emigration, schooling, the media and tourism) has led to more individualistic attitudes towards resources, condemning traditional collective management to falling into disuse.

A new elite has emerged as a result of these changes, and it is this elite that needs to be sensitized in the communities in order to implement the objectives of the Biosphere Reserve.

These new notables, who have taken the place of the traditional assembly, play an important role in facilitating the presentation of the Reserve concept.

In fact, they have the means to welcome the teams who will explain the objectives and philosophy of sustainable development, and introduce them to the participatory approach and various methods "from elsewhere".

The 2004 National Population Census showed that, despite efforts to increase school enrolment, the problem lies in the very low level of education among the target population.

The problem lies in the very low educational level of the target populations.

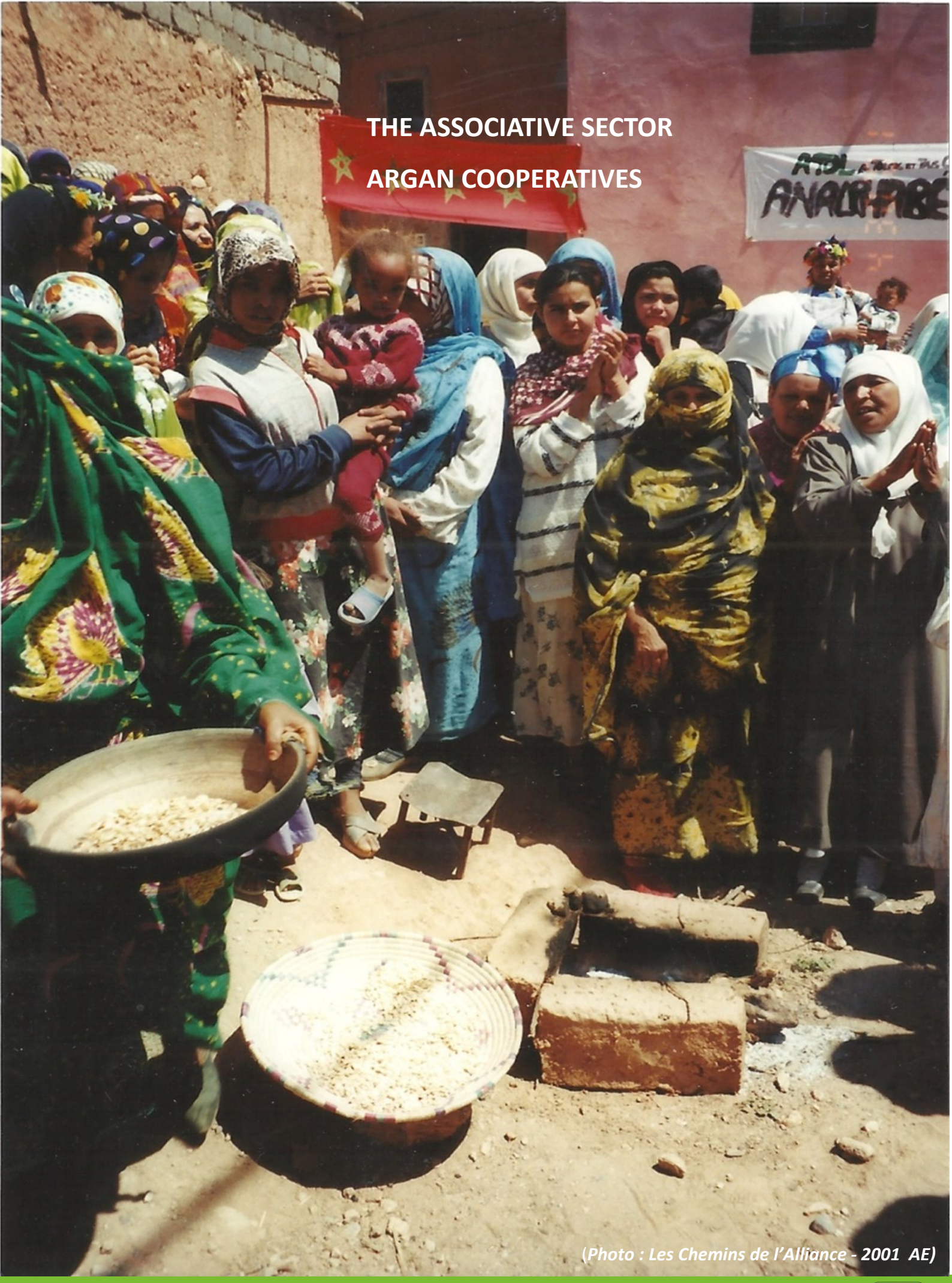
All censuses show that the illiteracy rate in rural areas in general, and in the mountains in particular, is high, especially among women. mountains in particular, is high, especially among women, who do most of the housework and live in a state of poverty. and live in alarming poverty.

« How do you explain to someone who has never been to school "the meta plan method" or the "figurines" talking about the participatory approach designed by foreign technicians ? »

This is one of the constraints on sustainable development in this region.

# THE ASSOCIATIVE SECTOR

# ARGAN COOPERATIVES



*(Photo : Les Chemins de l'Alliance - 2001 AE)*

## ASSOCIATIONS

Over the last few decades, an important movement of associations has been initiated by the educated elites from the areas in question. The associations thus created are important structures in the perception and implementation process of the Biosphere Reserve concept.

Led by intellectuals attached to the land (tamazirt), they are credible players who can, however, come into conflict with traditional assemblies.

In any case, it is necessary to reconcile these two forms of organization and intervention.

To give everyone their place in this participatory approach, the Biosphere Reserve's experts have created other structures, compatible with the profiles of traditional structures :

- Agricultural Water Users' Associations (AUAE) ;
- Associations for the Rehabilitation of Biodiversity through Transhumance ;
- Collective Land Management Associations are frameworks where traditional village communities can express themselves and promote local know-how to experts.

**"In short, the associative movement has proliferated throughout the area, because the projects conceived in the Argan grove today cannot see the light of day without the help of associations."**

In each village, each association displays its concerns even in the name it bears (Village X association for the protection of the argan tree, Village Y association for culture and development, Village Z association for sustainable development, etc.).

To focus their efforts on the Argan grove, the experts and local authorities have decided to federate all the associations into the Réseau des Associations de la Réserve de Biosphère de l'Argan grove (RARBA).

This federation should enable experts and managers to think globally about the problems, potentialities, opportunities and expectations of the local population, without neglecting local issues (think globally and act locally).

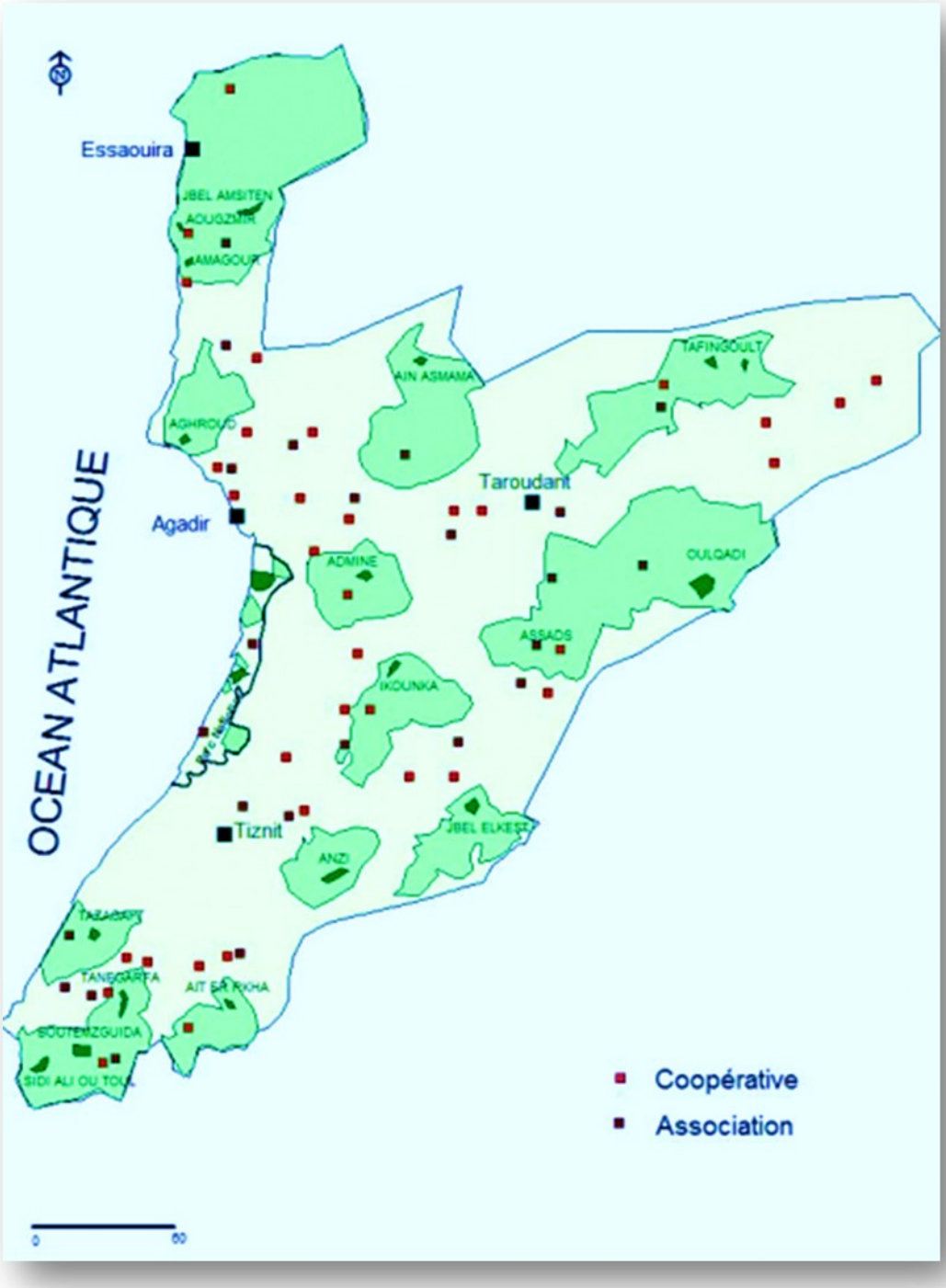
In partnership with several international NGOs (German GTZ, USAID, Japanese JICA, Spanish CARRITAS, etc.), the associations have carried out a number of substantial projects.

The use of local know-how, in all its forms, and the strong social cohesion of the Berber communities in the Argan grove, has enabled a diagnosis to be made of the resources to be conserved and the actions to be taken.

Among the actions proposed and defended by all those involved in the Argan grove, we note as a priority the enhancement of the argan tree and the creation of an appellation of origin.

## COOPERATIVES

**Figure 3: Geographical distribution of associations and cooperatives in the RBA**




**Source: Network of Associations of the Argan grove Biosphere Reserve (RARBA), 2006**

In the rural society of the Argan grove, women do a lot of work on the family farm: fetching wood and water, cooking from 5am, tending the fields until the harvest season and sometimes even ploughing, and herding cattle.

She receives nothing in cash from her efforts, and her every need must be negotiated at length with her husband. negotiated with her husband. Without his authorization, she cannot leave the house except in cases of absolute necessity (births, weddings and family condolences, and often accompanied).

## Cooperatives and the development of Argan grove resources

The performances that have enabled argan oil to gain recognition on international markets prompted the managers to form an Economic Interest Group (EIG).
Its mission is to help cooperatives market their products according to the values of what is known as "**Fair Trade**".

The GIE de l'huile d'argan works with European partners committed to "fair trade".
In general, women's cooperatives have enhanced the value of women's work, particularly in production and marketing.

Thanks to these cooperatives, Argan oil and its by-products are sold under the organic label and stock store shelves abroad.

**Bottling, packaging and hygiene are key to the success of this product.**

While the price of a liter of traditionally extracted Argan oil used to vary between 4 and 7 euros, the price of the cooperative's product varies between 9 and 35 euros (in 2007).

**Today, the price of Argan oil is between 25 and 45 euros a liter !**

These revenues provide two thousand women members with an income likely to reach **5,000 dirhams per year (+/- 500 Euros).**

This income is considerable for women who had previously been totally dependent on men. of total dependence on men ; they have emerged from their submissiveness and learned to act and make decisions freely.

Even if we can't generalize these successes to all the women of the Argan grove, their situation is the subject of debate and discussion, creating a mutation in the relationship between men and women and town and country.
A participatory approach that relies solely on the efforts of the local population and random dissemination cannot achieve the objectives of resource conservation and development.

Civil society and cooperatives can only succeed locally and to a limited extent.

The Argan grove must be part of a comprehensive regional development policy involving all stakeholders :

- Representatives of Ministries ;
- Local authorities.

Each biogeographical unit of the Argan grove has at least one resource other than the Argan tree that can be valorized while generating employment and income. As the women have the closest relationship with the resources, the managers adopted a species-based approach.

The argan tree and its fruit have given rise to a number of women's cooperatives, supported by associations and government services and operating within a local system.

Any woman who so desires can become a member of the cooperative. In addition to the economic objective, the cooperative, with the help of other partners, benefits from literacy courses, hygiene awareness and other training that can improve their standard of living :

- weaving ;
- raising chickens, rabbits, goats or bees...).
-

The Reserve's other forest resources include the cactus (prickly pear), a drought-resistant species whose virtues are on a par with those of the argan tree. Nothing is lost from the cactus.

The leaves and dried fruit pulp are used as fodder. The fruit is eaten fresh or dried.

The cactus is also a valuable pasture for **bees**, producing high-quality honey with a high market value.

The cactus has been the subject of a number of scientific and socio-economic studies, all of which agree that it is an element in the self-development of target groups.

Several cooperatives have been set up to can cactus leaves (like pickles) or make jams from them.

This gives them a place in local and, above all, foreign dishes. Canning the fruit is another innovation in the use of figs.

While dried figs are only consumed locally, canned figs are exported abroad.

But the revolution in this **field is the extraction of cactus oil from its seeds.** This oil, which costs up to around **1,000 euros** a liter, is exported abroad for the pharmaceutical and cosmetics industries.

We could multiply the examples of cooperatives set up around other trees or species growing in the Argan grove (olive, almond and saffron processing cooperatives...).

**(Charrouf Z.), one of the initiators of the argan cooperative movement**, points out that "the turnover of the cooperatives founded, which was almost zero in 1997, rose from 6 million dirhams (around 546,000 Euros) in 2004 to 8 million dirhams (around 727,000 Euros) in 2005".

## Fair Trade

" Trade, Not Aid! "

By definition, Fair Trade means working primarily with groups of small, "underprivileged" producers in developing countries, and building with them fair trade relations based on solidarity.

This support has two main objectives: to guarantee decent working conditions and remuneration for workers, and to promote the autonomous, sustainable development of production centers.

As for consumers, Fair Trade gives them the opportunity to make a qualitative, well-founded and responsible purchase, and to choose a form of consumption in line with their own values.

### Requirement criteria :

1. **Solidarity:** Priority given to working with the most underprivileged producers in a spirit of and sustainable development ;

2. **Fair:** Contractually define the price in agreement with the producer.
   This must guarantee fair remuneration and take into account the needs of the producer and his family in terms of training, health and social protection ;

3. **Direct:** Establish the most direct relationship possible between producer and consumer to maximize the producer's margin ;

4. **Transparent:** Provide full information on the producer and the products: their origin and route. Accept control at every stage of the process ;

5. **Dignified:** Guarantee decent wages and working conditions for employees at all stages of product production, particularly in terms of hygiene, safety and working hours.
   Refuse all forms of slavery or forced labor.

### Criteria of the Charter of the French Fair Trade Platform

**Progress criteria :**

1. Promote participative organizations that respect freedom of expression and the opinions of everyone without discrimination.
   In a group, this translates into democratic decision-making, or in a company, into negotiations between management and unions.

2. The elimination of child labor by the most appropriate means and in the best interests of the child. Child labor can only be tolerated during a transitional period or as part of a schooling or vocational training program.

However, in many cases, an immediate end to child labor would lead to even  children and their families.

3. Making the most of producers' local potential: using available natural raw materials or traditional know-how.

4. Encouraging producers to become self-sufficient, with a focus on diversifying outlets, particularly on the local market.
   Economic activity must be profitable.

5. A commitment to the economic, social and environmental environment.
   For example, profits are reinvested in the company and/or in collective, economic, ecological or social development programs, including training.

6. Providing information that enables consumers to make informed and responsible cultural exchange and mutual respect with the producer.

# ARGAN OIL

The Argan tree, which anticipates periods of drought, loses its leaves and appears dead, but as soon as it perceives the humidity of rain, it buds and new leaves appear, enabling it to remain leafless for several years.

It uses the latent moisture of the morning dew, which it absorbs through its foliage, so it doesn't need to be irrigated.

The Argan tree is thorny and evergreen; it is perfectly adapted to aridity, thanks to its powerful root system that can go down to a depth of **30 meters.**

It maintains soil fertility and protects it from erosion.

Argan oil extracted from the Argan tree resembles that of an olive, but is thicker and rounder.

They contain a very hard nut, which in turn contains up to 3 kernels from which argan oil is extracted.

The fruits of the argan tree are harvested by pole-beating and then dried in the sun.

The dried fruits are pulped and the nuts are cracked to extract the kernels.

Edible Argan oil is produced from the almonds, which are lightly roasted before being pressed.

**Cosmetic Argan oil**, on the other hand, is not roasted, which means that its excellent characteristics are not degraded (by heat).

Roasting results in a more fragrant oil than cosmetic oil **(unroasted).**

Argan oil requires just a few trees to produce 1 liter of oil !

« According to official figures, an estimated production of 4,000 tons of Argan oil per year requires a volume of **10,000 tons** of kernels, i.e. **120,000 tons** of fruit ».

## ARGAN OIL EXTRACTION

Argan oil production is a strictly family industry in southwest Morocco, with each family extracting the quantities they need as and when they need them.

**« Which indicates that unused nuts are stored preciously awaiting their uses ! »**

The women use their free time to carry out this task; it takes 10 hours of work to extract the nuts !

In fact, to obtain argan oil (Culinary) from the nuts, a series of operations and transformations are necessary, the most important of which are :

**PULPING THE FRUIT :**

The dried pulp is separated from the nut (harder) by crushing ;

**SHELL CRUSHING :**

To extract the kernel, two stones are used to open the nut along a cleavage plane.
It's the crushing operation that's the most fastidious, and requires particular skill !

**ALMOND TORREFACTION :**

It is made over a low heat, in earthenwar dishes : this operation consists of evaporating the water, destroying the non-lipidic saponins non-lipidic saponins holding the oil in emulsion in the cellular juice, while drying the kernels to give them a nutty taste ;

**ALMOND GRINDING :**

Is made in a special stone millstone, similar to a grindstone, producing Argan oil as well as a paste ;

**MALAXAGE :**

Paste with a little lukewarm water ;

**PRESSING THE DOUGH :**

A traditional method carried out by hand Argan oil. In the end, a brown residue "residue appears and is used in the production of cosmetics.

- **<u>Alongside this traditional process, a semi-industrial oil extraction process is practiced by the cooperatives and takes place in several stages :</u>**

  **DEPULPING :**

  **Depulping consists in separating the pulp from the nut.**

  **This is followed by sorting, which in turn separates the nut from the pulp.**

  **The pulp is then sold to farmers**

- **CRUSHING AND CLEANING :**

  **These are the stages that are still very arduous, requiring a special talent on the part of the women.**

  **The main task of the women in the cooperative is crushing.**

  **Only the adoption of a crushing machine can alleviate the drudgery of this work.**

- **TORREFACTION :**

  **The almonds thus obtained undergo roasting in a mechanical roaster roaster for +/- 10 minutes.**

  **Manual roasting is carried out by all Moroccan families, for the production of edible oil and by products (Amlou).**

- **PRESSING :**

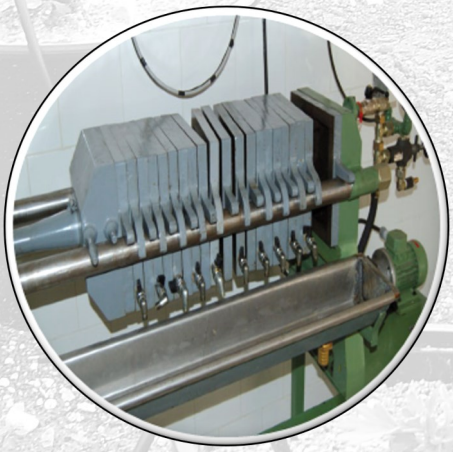
  **Unlike the traditional method, pressing is carried out using an oil press ; an oil press, followed by quality control.**

  **The kernels pass through the press, which separates the solids from the oil.**

  **The solids, known as "cake", are used in the composition of cosmetic products.**

- **DECANTATION :**
  **The oil obtained after pressing the almonds undergoes decantation for 15 days.**

- **FILTRATION AND BOTTLING :**
  **Filtration is also carried out mechanically by a machine designed for this operation.**



## COSMETICS AND MEDICINAL PROPERTIES

Argan oil's compounds facilitate digestion by increasing the concentration of pepsin in the digestive juice.

16 grams of Argan provide the total daily requirement of linoleic acid.

The ratio of polyunsaturated fatty acids (linoleic + linolenic) to saturated fatty acids (myristic + stearic) is 1.9, very close to the ratio of 1.25 to 1.50 recommended by nutritionists.

An excellent source of vitamin E, thanks to the presence of the alpha-tocopherol isomer.

The absence of linolenic acid ensures Argan oil's excellent shelf life.

Tocopherols have an anti-oxidant action and prolong the oil's shelf life.

Anti-oxidant action due to the presence of phenolic compounds (phenols, phenolic acids and polyphenols).

The specific composition of Argan oil predestines it for dietetic, cosmetological and medical uses.

## TRADITIONAL USE :

**(Source: Traditional Moroccan Pharmacopoeia).**

| | |
|---|---|
| **Acne** | Hair care and suppleness |
| **Eczema** | Scalp care & irritation relief |
| **Cracks** | Skin care, dry skin |
| **Burns** | Care for wrinkled skin |
| **Chronic deafness** | Stimulates and develops brain capacity |
| **Brittle nails** | Stimulates sperm production (azoospermia) |
| **Rheumatism** | Prevents the risk of miscarriage |
| **Joint pain & Hemorrhoids** | Varicella (reduces pimple marks) |

## Uses mentioned in university theses and researcher publications :

- Stabilizes hypercholesterolemia by reducing bad cholesterol levels and increasing good cholesterol levels ;
- Reduces hypertension ;
- Anti-obesity effect by acting as an appetite suppressant, consumed as a morning meal ;
- Neutralizes free radicals and protects connective tissue ;
- Positive effect on liver function ;
- Stimulates cellular exchanges and oxygenation by improving the quality of intercellular cement.

Argan oil combats dryness and physiological aging of the skin (anti-wrinkle) by restoring the hydrolipidic film and increasing the supply of nutrients to the cells.
Interest in the schottenol contained in Argan oil, which is said to have anti-carcinogenic properties.

***(Aristaura study - 1985: Planta med.348).***

Thanks to its high sterol content, Argan oil can be incorporated into cosmetic products, replacing cholesterol, which is often used for cost reasons and has been shown to penetrate the skin, thus constituting an exogenous source that can increase blood cholesterol levels.
Methylene-24-cycloartanol promotes fecal cholesterol excretion by increasing bile acid excretion.

# CHARACTERISTICS OF ARGAN OIL

Note: (information gathered from UFC TISSALIWINE Cooperative) & (Laboratoire de Chimie des Plantes et de Synthèse Organique et Bio organique) **Zoubida CHARROUF**
More complete information is also available from independent analytical laboratories.

## Distinctive criteria

Density at 20° 0.906 to 0.916
Acidity (expressed as % oleic acid) 0.2 to 1
Peroxide value (in meqO2/Kg) 0 to 2
Saponification number 189-199
Unsaponifiable matter 0.5 to 1.1

## Fatty Acid Composition

Myristic acid (C 14 : 0) = 0.15
Pentadecanoic acid (C 15 : 0) 0,05
Palmitic acid Acid (C 16 : 0) 12,0-13,0
palmitoleic (C 16 : 1) 0.12
Heptadecanoic acid (C 17 : 0) 0.10
Stearic acid (C 18 : 0) 5,0-7,0
Oleic acid (C 18 : 1) 43.0 - 49.1
Linoleic acid (C 18 : 2) 29.3 - 36.0
Linolenic acid (C 18 : 3) 0,1
Arachidic acid (C 20 : 0) 0.3-0.5
Gadoleic acid (C 20 : 1) 0.4- 0.5
Behenic acid (C 22 : 0) 0.2
Trans. fatty acids :
C18 :1 T 0,02
C18 :2 T = 0.03

## Sterol composition (% of total sterols)

Schottenol 44.0 - 49.0
Spinasterol 34.0 - 44.0
D-7-avenasterol 4.0 - 7.0
Stigmasta-8,22-dien-3b-ol 3,2 - 5,7 %
Campesterol 0.4
Cholesterol 0,4
Total sterols 130-220 mg/100 g

## Tocopherol composition (% of total tocopherols)

Alpha tocopherol (vitamin E) 3.0 6.5
Beta tocopherol 0.1 - 0.3%
Gamma tocopherol 81.0 - 92.0
Delta tocopherol 5,0 - 10,2 %
Total tocopherols 60 90 mg/100 g

# LABELS

Generally speaking, labels exist in order to acquire a certain notoriety; nevertheless, the initial priority is the search for consumer satisfaction and confidence.

Moroccan cooperatives have obtained the Ecocert and Afssa labels, thanks to the efforts of their various departments. They are also making every effort to obtain other labels recognized by Europe and the rest of the world.

The Ecocert label is used in Europe and the United States. "Ecocert" is a control and certification organization founded in 1991 on strong ethical values, inherited from the agrobiological associative movement of the 1970s.

Ecocert's role is to provide a guarantee of compliance with specifications applicable to specific products, systems or services.

In 2002, two labels were introduced for natural cosmetics, controlled by independent, accredited certification bodies such as Ecocert.

<u>For example, a number of ingredients are prohibited:</u>

- Silicones,
- GMOs,
- Synthetic preservatives,
- Synthetic colorants,
- Synthetic fragrances,
- Petroleum-based ingredients.

There is a tolerance of 5% of synthetic ingredients chosen from a restrictive list.

The "Cosmébio Biologique" label guarantees a minimum of 95% natural ingredients, a minimum of 10% organic ingredients in the finished product, and 95% organic ingredients in the total plant ingredients.

The "Cosmébio Ecologique" label guarantees a minimum of 95% natural ingredients, a minimum of 5% organic ingredients in the finished product, and 50% organic ingredients in the total plant ingredients.

The "AIAB" label (Associazione Italiana Agricoltura Biologiche) was set up by the Italian Association of Organic Agriculture and the Institute for Ethical Certification (ICEA).

The Soil Association label has its origins in England. It was created in 2001 according to the standards defined by The Soil Association, the UK's leading certification body for health and beauty care and food products.

Four European certification bodies are working towards harmonization:

1. "AIAB",
2. " **Soil Association**",
3. " **BDIH**"
4. " **Ecocert** ".

## Organic labels

The "organic" labels listed below generally guarantee a minimum of 50% and a maximum of and a maximum of 95% of ingredients from organic farming.

The "BDIH" (Bundesverband deutscher Industrie - und Handelsunternehmen) is the federal association of German commercial and industrial enterprises for :

- Medicines ;
- Dietetic products ;
- food supplements ;
- Body care products.

Created in 1951, this association of companies includes a working group dedicated to natural cosmetics, and in 2001 defined the criteria for the "controlled natural cosmetics" label.
Cosmetics may not contain certain substances such as :

- Petroleum derivatives ;
- Aromatic substances ;
- Synthetic colorants.

The "**BDIH**" label is also used in the rest of Europe and in the USA.
The "**Agriculture Biologique**" label applies to agricultural products and foodstuffs.
To obtain the "**AB**" label, a foodstuff must contain at least 95% organically grown ingredients.

The "Nature et Progrès" label is an association of agricultural producers, cosmetics cosmetics manufacturers and consumers. It applies to food products and, since 1998, to cosmetics.
Cosmetics bearing the "Nature et Progrès" label contain no petrochemical compounds, synthetic products, synthetic fragrances or synthetic colorants.
Vegetal ingredients are "organic", fragrances are based on essential oils and the vegetable oils used are of organic origin. used are of organic origin. Ascorbic acid is authorized as a preservative.

The specifications also cover the environmental management of production.
In 2005, 23 cosmetics companies were awarded the "Nature et progrès" label.

## ENVIRONMENT AND FAIR TRADE" label

The mission of the Rainforest Alliance label is to protect biodiversity and promote social development.
The NGO's activities are aimed at both multinationals and small-scale producers in the South who want to participate in environmental protection and development linked to forestry, agriculture and tourism.

## "EQUITABLE" labels

It should be noted that the main Fair Trade labels "IFAT" do not certify products, but producers who behave fairly !

Labelling bodies such as Max Havelaar have not yet given a definitive ruling on the minimum concentrations of fair-trade products required to ensure the labelling of cosmetic formulations.

However, some producers such as "Alter Eco" and "Natyr" indicate that their products contain a minimum of 50% Fair Trade ingredients.

## Politico Legal Environment :

Definition of the word "cosmetic" according to art.1 of the European Cosmetics Directive:

*"Any substance or preparation intended to be placed in contact with the various superficial parts of the human body (epidermis, hair and capillary systems, nails, lips and external genital organs) or with the teeth and oral mucous membranes with a view, exclusively or mainly, to cleaning them, perfuming them, modifying their appearance and/or correcting body odours and/or protecting or maintaining them in good condition. maintain them in good condition".*

These include hygiene products (shower gel, soap, deodorant, shampoo, toothpaste, etc.), skincare products (moisturizing cream) and beauty products (make-up, hair dye, etc.).

## Definitions under Belgian law : Cosmetic product

Article 1: The definition has two aspects :

1. Place of application with list of target tissues
2. The purpose of the cosmetic product, i.e. :

Cosmetic products must fulfill one of the six objectives, but this activity must also take place within the area of application of these substances.

- Cleansing: soap, shampoo, cleansing milk, toothpaste…
- Perfume: perfume, eau de toilette, eau de parfum…
- Correct body odors: deodorant, mouthwash, mouth spray…
- Modify appearance: make-up, dyes, hair colorants...

- **Protect:** suncare products, lip and hand creams…
- **Maintain:** anti-dandruff, anti-perspirants, anti-wrinkle, anti-stretch mark, ....

**Importing / Placing on the market :**

It's the act of placing a product on the market from another country.
The importer is responsible for the product he brings into the country. In the event of problems, he will be Belgian authorities on Belgian territory.

In the case of cosmetics, there must be a person in charge in the European Union, be it a manufacturer or importer. The legal requirements are the same for a manufacturer and an importer of cosmetics from a third country.

**Decree in the broadest sense :**

Royal Decree amending the Royal Decree of October 15, 1997 on cosmetic products.
It incorporates the previous provisions, i.e. rules on composition and labeling, as well as the various lists that make up the appendix and its various chapters.
The various lists that make up the annex and its various chapters, i.e. the list of cosmetic products, the list of prohibited substances, the list of substances subject to restrictions on use, the list of preservatives preservatives, colorants and authorized sunscreens.

- It introduces notification.
- It introduces the obligation to compile a set of product information.
- It establishes responsibilities in the manufacture of cosmetic products.
- It establishes responsibilities for the design, monitoring and safety of cosmetic products.
- It requires formulas to be declared to the Poison Control Center.
- It lays down labelling rules.

**MANUFACTURING :**

The definition is given in the basic law of January 24, 1977: Article 1, 4°. :
"The manufacture and preparation for trade or delivery to the consumer, including the method of manufacture or preparation, packaging and labeling. preparation, packaging and labeling."

http://admi.net/eur/loi/leg_euro/fr_376L0768.html

**LICENSE: (for ECOCERT certification)**

The license is linked to the operator, and certifies that :

The operator is subject to the control measures laid down in Articles 8 and 9 of Regulation (EEC) 2092/91;
The operator is qualified to produce, prepare or import organic products.

The licence is always issued with a certificate of conformity.

## Consumer Health and Safety Act

**European standards :**

There are many cosmetics on the European market that qualify as natural cosmetics, although they sometimes contain many ingredients that are not natural.

The use of the term "natural cosmetics" differs from country to country, as do the guidelines applicable to manufacturing, marketing and labeling.
There is a need to develop a uniform definition and establish guidelines for natural natural cosmetics in Europe.

Moroccan cooperatives, for example, have been awarded the Afssa and Ecocert labels. product is certified by Ecocert International, even if it comes from outside the EU, it can be imported and marketed in Belgium thanks to this certification.

Having analyzed the various articles of law concerning cosmetics, it is clear that the products belonging to several Moroccan Fair Trade Cooperatives meet all the characteristics and standards set out in the various norms concerning so-called "Cosmetics", whether at European or national level.

Here are two European Union directives that can be applied to products:

- ***Council Directive 76/768/EEC on cosmetic products***
- ***Directive 2001/95/EC on general product safety.***

# ECO-TOURISM IN THE ARGAN GROVE

## Towards a "tourist reception area" in the Argan grove region

This title was adopted by the Moroccan public authorities in January 2009, when they signed a partnership agreement for the development of rural tourism in the "argan countries".
The aim of this project is to develop tourism in all the natural and cultural components of the Argan grove and surrounding areas. This agreement/project, signed by all the parties involved in the region's territorial management, is also concerned with environmental safety.

**In 2009, Agadir (capital of the Argan grove region) was the country's leading tourist destination.**
**But seaside tourism dominates. The concentration of infrastructure on Agadir's coastline is creating urban management problems.**

**The Argan grove, which forms the hinterland of the tourist metropolis, can be a space for decongestion and spatial rebalancing, and meet other types of tourist demand such as :**

- ecotourism,
- cultural tourism and
- mountain tourism.

In addition to the biodiversity already mentioned, the Argan grove is also the site of an important civilization.

The valleys and irrigated oases are living museums of ancestral farming practices.

The famous collective granaries (igoudar) are the symbol of an ancient sedentary civilization, but their rehabilitation is more essential than ever to enhance the value of the Argan grove.

This is a matter for :

- Local authorities ;
- Ministry of Culture ;
- Civil society.

The development of culinary specialties and agricultural products as "produits du terroir" could be an asset for this type of tourism. Travel agencies working with local investors can offer these products, but guided tours are just one form of mass tourism.

The development of these new approaches to tourism requires real development programs.

The Argan grove must be given priority in terms of, for example, road infrastructure, appropriate to the fragility of the sites and the diversity of the ecosystems, or the construction of light, adapted visitor facilities.

The development of a policy of self-catering cottages could be a privileged way for tourists to discover this civilization of the Argan tree.

As things stand, investment in rural tourism has nothing to do with tourism that respects the environment, local architecture, local know-how and local produce.

It's just one variant of mass tourism from abroad, set in a rural area as an extension of a saturated coastline.

The consequences of these economic dynamics and urban sprawl on ecosystems are many and varied !

Projects must be undertaken with a broad vision, including structural investments and infrastructures whose standards will be demanded according to rigorous, competent and closely respectable specifications within the Biodiversity for 'A Protected Argan grove !

# CONCLUSION

The relative importance of "nature" in Morocco dates back to 1925 under French colonial rule. The French administration delimited "natural regions" to be protected for scientific and tourist purposes.

Most of Morocco's protected areas are **inherited from the colonial era**, in this case the Toubkal park in the High Altas and Ifrane or Tazeka in the Middle Atlas.

As national policies evolved after independence, the Moroccan authorities introduced nature protection laws (1983) and defined areas to be protected.

Morocco has set up a network of 158 protected areas, each with its own specific status, with the aim of reconciling local needs with national priorities.

This network, administered by the Haut-commissariat des Eaux et Forêt, is made up of :

- 6 National Parks in forests (2 million hectares) ;
- 2 Nature Parks (on a forested area of 120,000 hectares) ;
- 19 Biological Reserves on state-owned land (67,000 hectares) ;
- 127 Sites of Biological and Ecological Interest (1 million hectares);
- 2 Biosphere Reserves and a third in the pipeline and
- 1 Geo Park in the High Atlas.

"Studies on the evaluation of these protected areas are almost non-existent".

With this in mind, we examine the challenges of conservation and development policies in this type of area, using the example of the Argan grove Biosphere Reserve.

Despite the efforts made over the last decade, the Argan grove continues to be providentialist :

- people's lifestyles are changing;
- urbanization is rampant;
- tourism is expanding.

The Argan grove's continuous and enormous demand for resources (soil, land, water and various products) is making this ecosystem more fragile by the day.

According to Ms **Charrouf Z.** (2007), in less than ten years, the Argan grove has lost an area of around **4300 hectares.**

An analysis of certain aspects of the operation of the Biosphere Reserve, as a framework for harmonious, biodiversity-conserving development, reveals that little has been done in the Moroccan context, and that the policy of reconciling economic growth and the development of the region in which the Argan grove is located is far from being implemented.

Like all other projects, the Reserve is still trapped in an administrative conception that favors "action" in the form of reports, diagnoses and strategies to be considered.

The reasons for this still timid and hesitant policy lie in the fact that "**the laws on protected areas are not yet well defined on solid foundations, and there is a lack of experience in the governance of protected areas**".

In an interview with the Moroccan daily Le Matin on June 30, 2008, an official from the German Technical Cooperation (GTZ), the first foreign partner to deploy financial, technical and scientific efforts within the framework of the Biosphere Reserve, stated that ten years after the creation of the **RBA**, "although budget allocations are increasing year on year, they are still far from covering the real expenses linked to the management of these areas which, without the support of international partners, their operation risks not lasting".

Le Matin, April 28, 2009.

In April 2009, the **King's advisor** and President of the **Mohamed VI** Foundation for the Research and Safeguarding of the Argan Tree confirmed that : "The growing popularity of the argan tree and scientific confirmation of its medical, dermatological and dietary properties mean that we need to be vigilant and rigorous to ensure that these achievements are optimized within a regulated ethical and regulatory framework that guarantees the species' long-term survival and the quality of the products derived from it".

It is imperative to put in place a policy for protected areas, a policy that must ensure that the products of each ecosystem are products of the future, and not relics or fossils treated in a museological approach.

With this in mind, will the Pôle d'Excellence Pluridisciplinaire created in 2009 on protected areas have the legislative, financial and technical resources to implement conservation and development strategies for protected areas?

**Brahim El Fasskaoui**

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**UNESCO : www.unesco.org/fr/ (sur l'institution) et le programme « Man and Biosphère » :**

**www.unesco.org/mab/**, rubrique « réserve de biosphère (en anglais).



Note: Brahim EL FASSKAOUI - Université Moulay Ismaïl, Meknès, Morocco, Teacher-researcher


1. It should be noted that the argan tree has been the subject of several studies (scientific and administrative), both for its biogeography and for its multiple functions. But the Biosphere Reserve as a concept and development tool has not, as far as I know, been the subject of any study. Based on the Arganeraie Biosphere Reserve, this contribution proposes a debate on the question of protected areas in Morocco and their function, challenges and issues.
2. The term « argan » : a vernacular designation referring either to the species or to the product (oil)
3. I must point out that the data I was able to find in the documentation I consulted is fragmentary and inconsistent. For example, the surface area of the Arganeraie is estimated by the Haut-Commissariat des Eaux et Forêt (supervisory administration) at 2.5 million hectares, while other references range from one million to 830,000 hectares.
4. Documents consulted include Ibn Albeitar in the 10th century, El Bekri in the 11th, Al Idrissi in the 12th and Léon l'Africain in the 16th. In the seveteenth century, we find Hoest and Dane Schousboe. By the 18th century, the tree was already attracting the interest of Western reseachers.
5. One of the major weaknesses of the reserve's policy and management is the lack of data.
6. As the argan tree is a pastoral tree, goats eat the tender leaves of the tree as well as the pulp of the fruit, leaving the nuts on the ground for the shepherd to collect.
7. Argan oil prices vary according to several factors: demand and annual fruit production, which fluctuates from year to year and according to climatic conditions in the different zones of the Arganeraie. For this reason, and as a rough guide, I have calculated an average price of 6 euros from the figures available.
8. As you can see, the Arganeraie is compartmentalized into protected areas that are managed under different laws with sometimes heterogeneous objectives. This already poses a management problem.

9. In the High and Anti-Atlas regions, customary law goes so far as to prohibit the burning (for cooking and heating) of certain rare species that are essential for building. Poplar and rose are surrounded by a myth that anyone who burns these species will go blind or may lose everything they hold dear.

10. The purchase of motor-driven pumps in preference to the use of collective irrigation canals, the development of private agricultural farms in exchange for collective easements, the modern family home in exchange for collective housing. modern family homes versus collective housing: people feel they have been freed from collective constraints.

11. The 2004 National Population Census shows that, despite efforts to increase school enrolment, the illiteracy rate among rural women is 67%, and that of mountain women exceeds 70% in some areas.

12. In the rural society of the Argan grove, women do a lot of work on the family farm: fetching wood and water, cooking from 5am, tending the fields until the harvest season and sometimes even ploughing, and herding cattle. She receives nothing in cash for her efforts, and the smallest of her needs has to be negotiated at length with her husband. Without his permission, she cannot leave the house except in cases of absolute necessity (birth, marriage and family condolences, and often accompanied)..

13. With regard to the policy on protected areas in Morocco, an official from the German Technical Cooperation (GTZ), the main foreign partner making financial, technical and scientific efforts in the context of the Biosphere Reserve, stated in an interview given to the Moroccan daily Le Matin on 30 June 2008 that ten years after the creation of the RBA "although budget allocations are increasing year on year, they are still far from covering the actual expenditure involved in managing these areas which, without the support of international partners, are unlikely to continue to operate".

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14. Interview continued, Le Matin, 30 June 2008.

*15.* *Le Matin*, 28 april, 2009.

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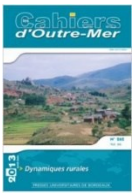


Faouzi, Hassan – April June 2013 (Rural dynamics) - **https://doi.org/10.4000/com.6832**

**Exploitation of wood energy in Argan groves: between sustainability and degradation (Haha region, Haut-Atlas Occidental, Morocco)**

**Table of contents :** (cartographies, planches photos).

**Figure 1. Distribution area of the Argan grove**
Source : High Commission for Water and Forests, Morocco 2008
**http://journals.openedition.org/etudescaribeennes/docannexe/image/3711/img-1.jpg**

**Figure 2: Form of organization and management of the Argan grove Biosphere Reserve**
Source: Network of Associations of the Argan grove Biosphere Reserve (RARBA), 2006
**http://journals.openedition.org/etudescaribeennes/docannexe/image/3711/img-2.jpg**

**Figure 3: Geographical distribution of associations and cooperatives in the RBA**
Source: Network of Associations of the Argan grove Biosphere Reserve (RARBA), 2006
**http://journals.openedition.org/etudescaribeennes/docannexe/image/3711/img-3.jpg**

**Plate 1. Classic landscapes of the Argan grove**
Classic landscapes of the Argan grove. This forest provides many functions for the rural mountain population. It is still protected from the covetousness that threatens it on the plains.
**http://journals.openedition.org/etudescaribeennes/docannexe/image/3711/img-4.jpg**

The "magic" fruit of the mythical Argan tree. With its yellow colour, the fruit of the argan tree is at the ripening stage. The Argan tree has many uses: culinary, cosmetic, medical and forage.
**http://journals.openedition.org/etudescaribeennes/docannexe/image/3711/img-5.jpg**

In the mountains as in the plains, the Argan grove is also an important pastoral complex in the socio-economic life of the Argan grove communities. But there are signs that the forest is in danger. In addition to overgrazing, signs of drought are evident in the dry undergrowth.

**http://journals.openedition.org/etudescaribeennes/docannexe/image/3711/img-6.jpg**

**Plate 2. Forms of right-of-way on the Argan grove of the Souss plain**

Agadir international airport occupies 800 hectares at the expense of the Argan grove, and the surrounding area is being taken over for simple rain-fed crops (Bour) in preparation for the arrival of greenhouse crops.

Source : André Humbert, CERPA, Nancy 2, 2003

**http://journals.openedition.org/etudescaribeennes/docannexe/image/3711/img-7.jpg**

This plot in the Argan grove represents a form of frontage opened up by the movement of agribusiness upstream, due to the lack of water for irrigation downstream.

Source : André Humbert, CERPA, Nancy 2, 2003

**http://journals.openedition.org/etudescaribeennes/docannexe/image/3711/img-8.jpg**

The Argan grove is being "plasticised" by an agri-business with unlimited needs for natural resources.

Source : André Humbert, CERPA, Nancy 2, 2003

**http://journals.openedition.org/etudescaribeennes/docannexe/image/3711/img-9.jpg**

The Argan grove receives several thousand camels from the Sahara. These newcomers do not belong to the pastoral systems of the Argan grove, but for political reasons they are accepted by the authorities.

**http://journals.openedition.org/etudescaribeennes/docannexe/image/3711/img-10.jpg**

**Plate 3. Aspects of the degradation of the Argan grove**

Faced with drought, the population is cutting down trees.

**http://journals.openedition.org/etudescaribeennes/docannexe/image/3711/img-11.jpg**

Clearing land accelerates and intensifies erosion dynamics

Source : André Humbert, CERPA, Nancy 2, 2003

**http://journals.openedition.org/etudescaribeennes/docannexe/image/3711/img-12.jpg**

Silting is progressing in the Argan grove.

Source : André Humbert, CERPA, Nancy 2, 2003

**http://journals.openedition.org/etudescaribeennes/docannexe/image/3711/img-13.jpg**

***Madame Zoubida CHARROUF.***

***Development of argan tree products for sustainable management of arid zones in southwest Morocco (1998-1999)***

***https://www.sidiyassine.com/documents/science/actes_ottawa_98.pdf***

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**DAHBI Ekram**
**EL BATIK Mohamed**
**"TARGANINE" reference cooperative** for the final project submitted for the bachelor's degree in foreign trade.
Acceptability study of argan oil-based cosmetics from Morocco on the Brussels market.

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**GLOSSARY OF ABBREVIATIONS :**

| | |
|---|---|
| **(FIMARGANE) :** | Moroccan Interprofessional Federation for the Argan Sector. |
| **(FIFARGANE) :** | Fédération Interprofessionnelle de la Filière de l'Argane. |
| **(FNADUA) :** | **National Federation of Provincial Associations of Argan Tree Growers and Users**. |
| **(FMTEC) :** | Moroccan Federation of Argan Oil Processors, Exporters and Traders. |
| **(RBA) :** | Argan grove Biosphere Reserve. |
| **(MAB) :** | Man and the Biosphere. |
| **(GIE) :** | **Economic Interest Group**. |
| **(ANDZOA) :** | National Agency for the Development of Oasis Zones and the Argan Tree. |
| **(GTZ) :** | German Technical Cooperation. |
| **(RBIM) :** | **International Mediterranean Biosphere Reserve or Andalusia-Morocco Biosphere Reserve**. |
| **(RARBA) :** | **Network of Associations of the Argan grove Biosphere Reserve**. |
| **(RBOSM) :** | Southern Moroccan Oases Biosphere Reserve. |
| **(ECOCERT) :** | Control and Certification Body. |
| **(AIAB) :** | Italian Association of Organic Agriculture. |
| **(ICEA) :** | Institute for Ethical Certification. |
| (**BDIH) :** | (Bundesverband deutscher Industrie - und Handelsunternehmen) Association Fédérale des Entreprises Commerciales et Industrielles Allemandes. |
| **(S.I.B.E) :** | Sites of Biological and Ecological Interest. |
| **(AUAE) :** | **Association of Agricultural Water Users**. |
| **(AB) :** | Organic Farming |