

The Desertification Phenomenon in Morocco

Diagnosis and Policies



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Aims of the Study

The goal of this study is to provide a preliminary evaluation of the available information on the state of desertification in Morocco, to draw conclusions from this information in terms of the principal problems connected with the degradation of environments (rural and urban), and to determine its major causes;

- to analyse the policies followed by the Moroccan authorities and in particular by local representatives with respect to the struggle against desertification;
- to identify the areas where the representatives of the civilian population could intervene.

The study also aims to promote the exchange of points of view and to provide a better understanding of the principal questions associated with the phenomenon of desertification in Morocco, both with respect to our representatives as well as the world in general. This approach could serve as a basis for establishing contacts between our representatives and those from other countries or with funding organizations that are involved with the struggle against desertification.

The study does not profess to be complete; in due time, however, it will enable us to integrate the question of desertification into the dialogue concerning the economic and social well-being of current generations and the inheritance left to future generations.

Sources of Information

This document has made use of a variety of sources, in particular the data of the Ministry of Agriculture and the Ministry of the Environment, various reports and studies which were elaborated for international organizations, university research projects, and, finally, interviews with the decision-makers at the administrative and representative levels, as well as several NGOs working in the area of natural resources and the environment in general.

Introduction

The phenomenon of desertification is commonly associated with the advancement of the desert and thus many tend to think that this problem concerns only those zones that are adjacent to deserts (in the case of Morocco, the Sahara desert). According to some authors, the notion of desertification means the degradation of the biophysical elements of the soil. However, it affects ecosystems that are natural (forests, grazing lands) or developed (lands for pluvial or irrigated agriculture, oases) and, finally, the coast. The origins of such a process may indeed be found in natural occurrences but human activity greatly contributes to its acceleration. It is estimated that, at a world level, approximately 2 billion hectares of agricultural land have been degraded by the doings of mankind since 1945; in other words, 11% of the surface of the Earth covered by vegetation have been partially or completely deteriorated, thus seriously reducing agricultural productivity in these areas. In the case of Morocco, the aridity of the climate as well as the scarceness and fragility of water and soil resources are the principal natural factors involved in the desertification process. By contrast, the human factors are based on a rampant population explosion, evident disparities between the urban and the rural world, and a poverty factor as a result of which land utilisation is increasing in a manner which is incompatible with its destined purpose and capacity. These two determining factors (natural and human) are compounded by a land management policy that is unfavourable to development and an administration that shows little concern for the well-being of future generations (as in the case of collective properties or usufruct). Reforestation, for example, takes place at a rate of only 8%, i.e. well below the generally accepted standard of 20% required for maintaining a healthy ecological balance. Forest resources display a disturbing degree of degradation that is jointly caused

by excessive logging, forest fires, land clearing, and the excessive collection of firewood. The excessive collection of firewood represents the equivalent of 30 000 ha per year that are removed from the forests, and yet no one can deny the role played by forests in stabilizing the soil and in regulating the water cycle.

The mountain chains (Atlas and Rif), often considered to be the water reservoirs of the country and a protective wall against the hot southern winds, are currently subject to a triple imbalance that condemns them to further and further desertification:

- the excessive exploitation of their resources (flora and fauna) by an ever increasing population;
- the constantly decreasing productivity of their scant soils, thus making for poorly paid labour;
- and, finally, the mountains remain under-equipped due to their remote location and the low return on investments.

The mountain zones will be further exposed to the dynamics of continual desertification if nothing is done to alleviate the consequences in terms of the ecology and the food system in general. Indeed, grazing lands play a crucial economic and social role and are thus continuously subject to excessive pressure as a result of grazing activities; this results in the impoverishment of their vegetation layers and thus provides favourable conditions for water and wind erosion as well as the salinization of a number of streams and rivers.

The pluvial agricultural lands in turn are subject to different types of wind and water erosion which result in a decrease of fertility and arable soil layers estimated at 22 000 ha per year.

Irrigated lands are not spared by the degradation phenomenon either, salinity being the most wide-spread result. It is estimated that 500 000 ha of land are threatened by excess water and salinity and that 37 000 are seriously affected by salinization.

The oases are threatened by two scourges, namely salinity and sanding-up. In addition to the rigours of the climate, these forms of degradation are exacerbated by the overgrazing of spontaneously growing vegetation and an excessive removal of ligneous plants for firewood which is used in the grazing zones surrounding the palm groves. Dwellings, agricultural lands, irrigation channels, road infrastructure, and the Moroccan palm groves are permanently threatened by encroaching sand. In order to fully understand the extent of the damage that sanding-up can cause, the example of the sandstorm which raged for three hours in 1977 in the region of Jorf, destroying 16 ha of palm groves and 78 dwellings, is enlightening.

The socio-economic expression of the salinization of the soils and the sanding-up of the oases is the drastic decline in crop yields, the shrinking of cultivated surfaces in zones where soil is already a rare commodity, the decline in the standard of living of the population, and emigration towards urban centres.

With respect to the coast, where 50% of the population is concentrated, the destruction of the vegetation and wind erosion are promoting the disappearance of the dunes. Sections of the border dune suffer from trampling and from aggressions caused by vehicles. A study on the erosion of the beaches which was carried out by the Ministry of Public Works showed that in 1993-1994, seven out of 47 beaches had disappeared and 16 were in a state of advanced erosion. The frantic construction of "concrete jungles" along the coast is nothing other than an additional form of desertification.

What Can Be Done in the Face of Desertification?

The only solution to desertification is in a global approach that regroups the various socio-economic, technical, legislative, and organizational aspects of the problem. The projects implemented by the departments of the ministries are necessary. On-site solutions, however, in this case at the communal level as well as the projects undertaken by NGOs, have a more immediate impact on the behaviour and practices of the population.

1. Some General Considerations Related to the Phenomenon of Desertification

The Natural Environment, the Climate

Morocco covers a surface of approximately 500 000 km² with a population of approximately 28 million inhabitants. It is the only African country with both an Atlantic and a Mediterranean coastline, covering 3 000 and 500 km respectively. The country's has a very distinct physiognomy with several peaks reaching 4 000 m, separated by high plateaux and mountain plains. The Atlas chain, which contains most of the country's water reserves, separates the Atlantic plain from the pre-Saharan steppes and the high plateaux in the east. The climate is essentially arid and semiarid with moderate winters and dry summers. The usually very erratic rainfalls occurs between October and April.

In addition to mineral resources (primarily phosphate), Morocco possesses a relative amount of sufficient arable land and an extensive coastline which makes it predestined to be an agricultural and tourist country. This supposed vocation, however, is not without its problems, in particular in terms of the degradation of the principal ecosystems. In the following, we shall examine the various facets of deterioration in both the rural and the urban environment, their causes, and the conservation policies being applied.

General Problems Related to the Phenomenon of Desertification

1. Depletion and degradation of water resources
2. Rapid deforestation, decline in the productivity of and the search for marginal agricultural lands, degradation of forest expanses, increasing damage to the mountains and the valleys due to erosion
3. Rapid and uncontrolled urbanization is putting increasing pressure on the urban population and environment. The expansion of cities and shanty towns is occurring at the expense of their vital agricultural and peripheral recreation space which, up to the post-colonial period, characterized Moroccan cities.
4. In addition to the principal direct causes for the degradation of the urban and rural environments, the imperfections of the market and of policies are largely contributing to their decline.

2. Early-warning Signs for the Desertification of the Principle Ecosystems

Natural Ecosystems

1. The Forests

The forest is the principle protective wall against water and wind erosion. This is particularly true outside the temperate zones – which is indeed the case for Morocco. The potentiality of the Moroccan forest is limited. The total expanse of forest is equivalent to

close to 9 million hectares of which approximately 1/3 is covered with Esparto grass. The process of deforestation is becoming increasingly alarming (245 350 hectares over a period of ten years according to a 1996 estimate by the Ministry of Agriculture), whereby reforestation is taking place at a rate of approximately 1/3 of what would be necessary to maintain an ecological balance.

The main causes for this degradation are excessive logging, forest fires, land clearing, and, above all, the excessive collection of firewood. The latter represents the equivalent of 25 000 hectares per year.

2. The Mountain Zones

The mountains in Morocco are a populated zone. They represent 15% of the national territory but are home to 35% of the rural population of the country. Traditionally, the Moroccan mountains play an economic, ecological, and cultural role.

The mountains are subject to a triple imbalance that condemns them to triple marginalization. First, their resources are too heavily exploited and cannot meet the needs of an ever increasing population alone; second, the yields from agricultural and pastoral activities in this zone are low; third, the Moroccan mountains are an enclave and remain under-equipped.

These three factors are feeding a cumulative dynamism which, for the moment, is uncontrollable. The starting point is the excessive pressure put on resources which then tend to degrade, hence a decrease in the productivity of crops and livestock, hence lower investments in the technologies of conservation, hence the decline in the standard of living of the population, hence an expansion of agricultural and pastoral activities ... and a new degradation cycle has begun. The normal result of this chain of events is a faster rate of erosion in the mountain bowls and a massive rural exodus towards urban centres.

The erosion of mountain bowls furthermore causes costs in both economic and social terms:

The silting-up of dams

- The deterioration of secondary works
- The flooding of crops
- The destruction of dwellings ... etc.



Damages caused to harvests during the 1996 floods



Flooded dwellings in the Gharb

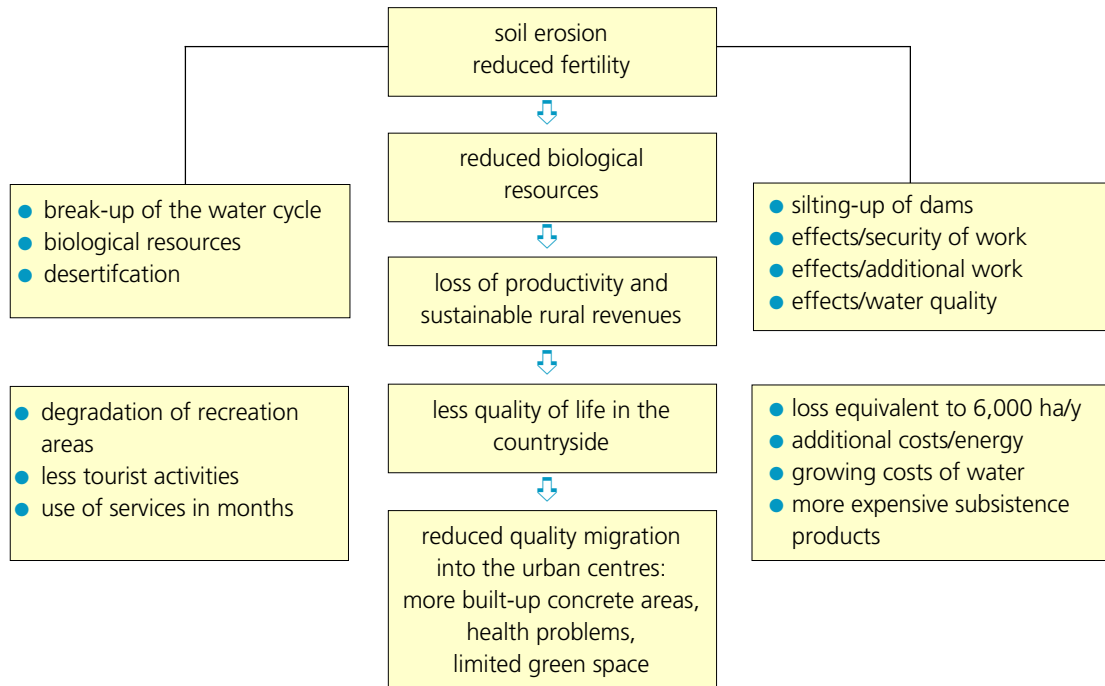


3. Grazing Lands

A study conducted by the Ministry of Agriculture (1993) classified the pastoral ecosystem into three categories: low degradation, medium degradation, and severe degradation.

The impoverishment of the vegetation layer results in the loss of biological diversity and a decrease in the productivity of pastoral activities. In addition, it constitutes a factor that favours water and wind erosion as well as the salinization of certain bodies of water (as is the case with the Sebou, one of Morocco's main rivers).

The Chain of Causes and Effects in the Degradation of the Natural Environment



Developed Ecosystems

1. The Pluvial Agricultural Zones

The geographical importance of an arid environment becomes evident when looking at the example of Morocco where arable land is relatively scarce.

Zone	Surface Km ²	Percentage %
A. arid zone	550,000	77
A 1. Saharan area	430,000	60.2
A2. arid area	120,000	18.8
B. semi-arid zone	110,000	15.4
C. humid zone	53,000	7.4
D. high mountains	1,000	0.01
Total	714,000	99.8

In addition, these zones are constantly subject to various forms of erosion, particularly water erosion but also wind erosion due to the poor nature of the vegetation. The disappearance of the arable soil layer is estimated to be 22 000 hectares per year. The areas, however, are not affected in the same way by specific degradation (SD), expressed in tons/km²/year. We distinguish between the following:

- zone with an SD above 2 000 tons/km²/year, as seen on the slopes of the Rif mountains, with a humid climate and a dense population.
- A zone with an SD between 1 000 and 2 000 tons/km²/year, as seen in the pre-Rif mountains
- A zone with an SD between 500 and 1 000 tons/km²/year, as seen on the slopes of the Loued oum-Rbia and the Souss mountains
- Other regions with an SD of less than 500 tons/km²/year.

This classification does not take wind erosion into account which illustrates the phenomenon of desertification more clearly.

2. The Irrigated Agricultural Zones

Salinization is a form of degradation i.e. desertification of irrigated lands. The loss of land due to salinization has not been evaluated but the phenomenon is continually increasing and is recognizable in the form of a modified structure of the affected soil, the decrease in its cohesion and productivity, as well as its alkalization which causes its sterilization and hence desertification. Fragmented studies estimate that 37 000 hectares of irrigated lands are already severely affected by salinization and that 500 000 hectares are threatened by too much water as well as salinity.



Panoramic view of an oasis in Tafilalet that is threatened by sanding-up.

The coastal plains are also affected by the threat of desertification by salinization. The anarchic development of pumping systems leads to a depletion of the ground water which in turn causes the water system to be invaded by salt water from the sea (as is the case in Oualidia, Gharb, Souss, etc.).

3. The Oases

Moroccan oases are of great economic and social importance. They are located in the large pre-Saharan valleys in the south of the country. Due to the scarcity of soil and water, the agricultural exploitation system of the oases appears as a finely tuned balance between crops and livestock. The crops are grown on poorly developed soil and are organized into three levels: date palms, fruit trees, and, finally, subjacent crops.

On an ecological level, the oases are threatened by two essential problems, namely salinity and sanding-up. In addition to the rigorous climate, these forms of degradation are exacerbated by excessive irrigation and the excessive removal of spontaneously growing vegetation on the periphery of the palm groves which in turn inevitably promotes sanding-up. The latter poses a permanent threat to dwellings, arable land, the irrigation canals, and the road infrastructure of the palm groves.



Barrier to fight desertification



Illustration of the poverty of the vegetation surrounding the palm

The economic expression of the salinization of the soil and of sanding-up, i.e. the desertification of the oases, is the drastic decline in crop yields and hence agricultural revenues which pushes the local farmers to exert additional pressure on the natural resources or, in the worst case, to leave the area entirely.

4. The Coastal Ecosystems

Whether we are dealing with the Atlantic coast or the Mediterranean coast, coastal ecosystems are fragile and sensitive by their very nature. The border dune is a privileged site for building holiday homes close to the waterfront. The uncontrolled exploitation of the consolidated dunes leads to a stripping of the surface soil and creates corridors that favour the process of sanding-up, thus endangering the neighbouring agricultural land.

3. A Degrading Urban Environment

1. Insalubrious Housing

Morocco is having great difficulty in providing sufficient housing and basic services to a growing number of young urban and rural inhabitants, sometimes even to entire families that have fled the countryside after years of severe drought. The incapacity of the local authorities to deal with this rapid demographic flux has led to a proliferation of shanty towns on the outskirts of most Moroccan urban centres.

According to the 1989 census conducted by the Ministry of Housing, 23% of the urban population is living in shanty towns and inappropriate housing built without permits on non-developed land.



An insalubrious scene in a residential quarter



An anarchic urbanization scene as can often be seen in Rabat-salé

2. Anarchic Urbanization

An anarchic urbanization of the coast has taken place as a result of the development of seaside recreation facilities but also due to frenzied property speculation. The consequence is the degradation of the beaches and the dunes.

The coast is the object of intense exploitation, first of all in terms of human population, as the home of industrial activities and services, and finally as a summer recreation zone. It may be noted that the rapid urbanization of Morocco is accompanied by an increasing shifting of the urban centres towards the coast. Whereas in 1982 5.3 million people lived in the cities, 18 years later, in the year 2000, the urban population will have reached approximately 10 million. The coastal provinces are home to over 50% of Morocco's population.

3. The Extreme Shortage of Green Spaces

Everyone is aware of the vital importance of green spaces in cities, particularly in large agglomerations

that face the problem of pollution. Unfortunately, this is one of the great weaknesses of all Moroccan cities, despite the fact that in former times, greenery was an omnipresent feature of all cities, great or small. Intramural gardens, Sanyas, and peripheral gardens once constituted the vital space of an entire agglomeration as well as spaces in which to go for walks (nzaha).

4. The Policies for Fighting Desertification

The Goals

The national plan to fight desertification was elaborated in 1986 in accordance with the recommendations made by the International Conference on Desertification that was held in Nairobi in 1977. The plan was elaborated by the ministries responsible.

The plan placed two issues in the foreground that were considered to have priority:

- pastoralism
- supplying ligneous combustibles

The principle actions were the following:

- improving the standard of living of the population by creating integrated development projects
- mobilizing surface water by building impounding dams and their corresponding reservoirs
- creating and improving areas by planting forests and grazing lands
- fighting sanding-up in the southern provinces in order to protect the oases
- reinforcing inventory activities, development, reforestation, and the delimitation of the forest areas
- creating national parks and biological conservation areas.

The main point of interest of the national plan to fight desertification appears to lie more in the originality of the intellectual work done towards designing it rather than the realization itself. For the first time, a concerted and dedicated approach to the problem of the degradation of the country's natural resources took place.

A major obstacle in realizing the plan to fight desertification is the absence of any institutional framework. In the absence of such a framework, each of the actors continues his or her activities as usual.

Sector-oriented programmes have been developed independently of the national plan. These are concerned with the following:

- Management guidance plan for the conservation of land in pluvial zones (1993)
- National reforestation plan, development of mountain bowls (1996)
- Guidance plan for protected areas (1994)
- National energy plan: firewood: 1994 study

The Limitations of the Implemented Policies

- A descending hierarchical structure that excludes the civilian population
- The user, actor and victim in the process of environmental degradation, is not sufficiently taken into consideration in the conception and realization of various initiatives. Little thought is given, for example, to alternative suggestions for the users of forests and flat-lands in order for them to make a living.
- The few attempts at participatory management and shared responsibility on the part of the population met with difficulties that resulted from the lack of convergence between administrative structures and the traditional communities.
- The State has no capacities flexible enough to intervene on a small scale. Its administrative and accounting structures are indeed better suited for carrying out large-scale operations.
- Future perspectives are oriented towards local actions in limited areas. The promoters of such actions could be local representatives or the NGOs.

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