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Strategy for adapting to climate change: Algeria's experience with the Green Barrage

by Nedjma RAHMANI

Foreword

From the moment of its independence, Algeria devised a plan for fighting the encroachment of the desert that has become known as the “Green Barrage”. Effectively, the progressive yet massive disappearance of the plant cover and, correlatively, of the potential grazing value of the pastoral base have been central features in the deterioration of the steppes, resulting in the formation of dunes and sandy grasslands: these are the threatening harbingers of desertification.

Aware of the grave impact of such a risk, with its likely affect on social and economic development and, consequently, the country's capacity to feed itself, the Algerian Republic's then president, Houari Boumediene, announced in 1970 a vast programme to tackle desertification: truly national in scope, this programme was known as the “Green Barrage”.

This undertaking, which has known difficult times and faced obstacles, has now been relaunched in a more organised and structured fashion than nearly fifty years ago. It is now capable of bringing vital technical information to the populations living on the edges of the desert and the steppe lands, both in the North as in the South.

Introduction

Forested lands sustain some of the most important ecosystems in Northern Algeria. These possess a rich biodiversity and provide a positive variety of environmental services.

Today, desertification, on account of its aggravation by climate change, has become one of our most preoccupying issues: it threatens the totality of natural ecosystems through a reduction in biological potential and the breakdown of ecological and socio-economic equilibria.

Climate change, amplified by the growth in population and the demands resulting from it, leads to an exponential increase in the requirements for basic goods and commodities such as water and food and, also, in the need for other natural resources and energy.

It is within this context that Algeria has undertaken to re-launch the implementation of its all-encompassing project of the "Green Barrage" centred on a buffer zone where the phenomena of desertification are at work. The methodology for carrying out the project is based on new concepts of sustainable development, combating desertification and adapting to climate change.

To further the project, a study was commissioned from a consultancy whose brief was to produce an account and an assessment of earlier work done and propose an action plan for an updated re-launch integrating new constraints: notably, limiting greenhouse gases by fixing carbon and fighting desertification by an effective soil conservation policy. Involving the local population in the project continues to be an indispensable condition for successfully implementing a panoply of actions and interventions across the various sectors (fight against poverty and conservation of natural resources).

Presentation of the Green Barrage

The sector concerned by the Green Barrage is a pre-Saharan swath of the country falling between the 300 mm isohyet in the north and the 200 mm isohyet in the south, stretching from the Moroccan border to the Tunisian. This represents a band 1,500 km in length and 20 km wide, encompassing 3 million hectares and over 13 wilayas.

Stages of the Green Barrage

The programme for implementing the Green Barrage has been made the responsibility of the Ministry of National Defense (supervising entity) and the former National Secretariat for Forests.

Overall, the project has been through four periods.

From 1970 to 1980

During the project's first decade, the work carried out was done on a performance basis and only involved planting and infrastructure. This stage was characterised by monoculture plantations of Aleppo pine (*Pinus halepensis*).

The reforestation was aimed at increasing the poor extent of forest cover in the zone by reconstituting the declining forests in the Saharan Atlas region.

Throughout this first decade, the planting of essentially Aleppo pine met with only modest success on account of locally unfavourable ecological conditions and inadequate studies as to the techniques and species best adapted to each context.

From 1981 to 1990

Starting from a qualitative and quantitative assessment of the first, preceding stage, shortcomings were gradually overcome and improvements made in distinct but complementary respects:

- A joint adoption of the "Green Barrage" by the Forestry Service and the National Service regime.
- Diversification of the species planted, thus ending the monoculture of the Aleppo pine in favour of the use of some 15 other tree varieties, including Lombardy cypress, Arizona cypress, ash (dimorpha), locust (*Gleditsia triacanthos*), *Acacia* sp., ironwood (*Casuarina* sp.), Russian olive, jojoba.
- Better control of the provenance of seeds of indigenous species through delimiting seed stands.
- Extension of the network of nurseries into the "Green Barrage" area in order to limit the transport of seedlings over big distances and to obtain plants raised in similar ecological conditions.
- Improvements to the methods of soil preparation, planting seedlings and subsequent upkeep.
- Studies on integrated land use and development.
- Classification of land (plots...) into homogeneous zones for more rational use.

From 1990 to 1993: Transition stage

Following on the decision of the Ministry of National Defence, as indicated in note 591/90/MDN/E3 of 10 October 1993, to withdraw its manpower involved in the "Green Barrage" programme over the preceding 20

years, the Forestry Service was advised that it should take all necessary steps to take over responsibility for the project, as much for its management as its practical operations.

A restructuring of the forestry sector then followed, with the setting up of the National Forestry Agency (NFA) and the six Regional Offices for Forest Development (ROFD) of which three were put in charge of realising the work involved in carrying out the project.

From 1994 to 2000

In November 1994, the government started the major works programme, giving new impetus to the "Green Barrage" project. The aim of this programme was to relaunch the economy and create jobs. Several aspects of forestry were concerned by the programme including forest and woodland heritage and its protection, the fight against desertification and bolstering infrastructure.

Key facets of the project

This project has several aspects:

- Protection against erosion: modifying torrential run-off, wall building, works for soil and water conservation (CES), mechanical protection of banks, reinforcement with gabion baskets;
- Restoring and increasing the land's production potential: improving land holdings, fencing off grazing land, fixing dunes, windbreaks (5,000 ha.);
- Reconstituting former forest stands and afforestation of areas suitable for planting (300,000 ha.);
- Harnessing the water resource (90 water supply points);
- Connecting settlements: creating forest tracks (5,000 km);
- Raising the inhabitants' standard of living: planting orchards, sowing fodder crops and grazing areas (25,000 ha.)

Project budget

The investments devoted to work involved in the "Green Barrage" project since its inception in 1995 have amounted to 25 billion dinars (\$US340,187,000). Even so, this sum is well below the actual cost if account is taken of the services provided by the National Service regime (labour and equipment supplied free).

Analysis of results and outlook for the future

Analysis of results

First period

Damage and decline began to appear along the Green Barrage as soon as the stands reached adulthood; the deterioration resulted from:

- vulnerability to the processionary moth caterpillar on some 100,000 ha.;
- poor growth, with a weak appearance, dwarfish and struggling to develop in some areas;
- dying off of standards planted on soils developing a limestone crust.
- These negative features resulted from certain technical shortcomings during planting (which, it should be said, was carried out under pressure) : i.e. seed quality, poor choice of species, care of seedlings, plant transportation, soil cultivation, planting technique).

Despite the failures recorded, the "Green Barrage" has made a significant contribution to improving the conditions of life for the population who inhabit the area.

This improvement is manifested in:

- job creation;
- enhanced income for the rural inhabitants;
- opening access to isolated areas;
- the inception of new activities, integrated into the programme to involve the resident population, such as fruit-growing (family orchards) etc.
- the main source of income for the populations concerned is pastoralism (80% of the nation's sheep), so the "Green Barrage" programme has focused its efforts in this direction via planting for fodder, improving grazing land, a rational use of the grazing potential...

The "Green Barrage" project, in its strategic dimension, has contributed to the re-establishment and maintaining of the ecological equilibria at the local level.

Second period (major works between 1994 and 2005)

The "Green Barrage" should have achieved better results in the light of the improvements made:

- the involvement of the population;
- the diversification of the species planted with the introduction of fruit trees;
- a greater mastery of planting methods.

Today, the Green Barrage is undergoing pressure from different sources characterised

by various factors: prolonged drought, grazing, increasingly widespread diseases, unauthorised felling, clearing, to which must be added the region's primary livestock grazing activity and the legal framework for landholding.

Outlook for the future

The experience acquired through the "Green Barrage" project has made it possible both to delimit the actual causes of desertification and to perceive the problem in its ecological, social and economic dimensions.

Rehabilitating the "Green Barrage", an emblematic achievement of our country as the leader in Africa for the effective awareness needed in the struggle against desertification, is one of the priorities for the whole area in the forthcoming programmes.

This explains why it has become indispensable to design a plan for the middle and long term, covering the entire steppe-like region, which will have the following aims:

- broadening the "Green Barrage" experience;
- implementing a multi-sectorial approach;
- setting up the requisite organisation along with the corresponding means.

This is the outlook governing the Ministry of Agriculture, Rural Development and Fisheries as it embraces the relaunch of the huge "Green Barrage" project, integrating the new inter-related principles of sustainable development, the fight against desertification and the adaptation to climate change.

Additionally, within the framework of adaptation to climate change and the implementation of the PNR towards 2030, there will be a refocusing on drought-resistant forest species, in particular the Mt Atlas mastic tree (*Pistacia atlantica* Desf.), twisted acacia (*Acacia raddiana*), Saharan cypress and the argan:

- rehabilitation and development of these species thanks to ongoing scientific research on conservation and reproduction techniques;
- establishing a regulatory framework, such as exists for the Tindouf argan orchards, for its protection throughout its habitat and classification as a protected area.

Such measures are in pursuit of the objective of increasing the forests' resistance to ecological changes while at the same time reinforcing their role in limiting climate change.

General conclusion

Significant experience was acquired which greatly facilitated setting up the organisation

and the means for carrying out numerous undertakings.

This pioneering initiative endures today as an achievement of enormous scope which must be preserved and consolidated and, where possible, extended.

The "Green Barrage" is by no means the whole extent of the programme for combating desertification; there must be other measures taken for the regeneration and conservation of grazing land whose durable cover constitutes the best rampart against the deterioration of soils.

Finally, the "Green Barrage" project is an undertaking that has the merit of having been carried out in hostile conditions inimicable to any planting success. Whatever the success rate of plantations in arid regions, it must be considered a positive result insofar as the possibility of achieving any such success always remains uncertain.

The Algerian experience acquired through the "Green Barrage" project has been turned to good account elsewhere in Africa by other countries taking part in the continent-wide project "The Great Green Wall of Africa" aimed at combating desertification.

The synergy between the struggle against desertification, the conservation of biological resources and the adaptation to climate change has permitted success in the following aims:

- reducing the vulnerability to climate change of the different populations and their systems of production;
- raising the income of the inhabitants and reducing poverty;
- avoiding migration while preserving social cohesion;
- enhancing agricultural production and consolidating food supplies;
- the conservation of ecosystems and natural resources.

N.R.

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