

Reforestation in Algeria: History, current practice and future perspectives

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Abstract

Reforestation in Algeria has been recognized as a priority in different programs for the development and enhancement of forest heritage. Degradation factors of forest and soil contribute significantly to the decline in land values. The Algerian forests in the past, during the colonial period suffered considerable degradation. The degraded forest heritage has been undertaken with serious programs since independence. Several programs for the development of the forest sector through reforestation have been carried out. Unfortunately, the achievements were still below expectations. The launch of the National Reforestation Plan in 2000 has given the forestry sector a new lease of life with a vision that incorporates the productive aspect of reforestation, the industrial aspect, and the recreational aspect. Before the end of the NRP timeline, significant reforestation projects are completed. In a future projection, reforestation is integrated into the land use planning within the framework of the National Plan of Land Use Planning.

Keywords

Algerian Forests; History; Reforestation; Afforestation; Future Strategies

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1 Introduction

According to the Global Forest Resources Assessment 2015 (FAO 2015); Algeria has 1.956 million ha of forests and 2.569 million ha of other wooded lands, which means 4.525 million ha in total. Algeria is the largest country in the African continent, with an area of 2,381 km². Different natural divisions characterize this huge territory: the desert, which occupies more than 80% of the national territory, a steppe ecosystem covering an area of 20 million ha (Slimani et al. 2010) in the high plains, coastal plains in the north, and forests in mountainous regions represented by the Atlas and the Tell mountains. Forest cover accounts for only 3% of the territory (Tatar 2012).

Algerian forests are classified as Mediterranean forests. These forests are deeply disturbed (Quézel and Barbero 1990), the different civilizations have contributed greatly to the reduction of the forest cover, the disturbances continued during the colonial period. In 1830, the forest cover was 5 million ha (Bensaid et al. 1998). After independence, the Algerian forest had only 2.4 million ha (Letreuch 1995). In view of this situation, the Algerian Government has undertaken various programs for the protection and extension of the forest heritage by reforestation.

The degraded forest ecosystem located largely in the mountains is the priority in reforestation works. These areas are the most affected by fires and soil erosion. Reforestation activities were particularly focused on promoting higher value species such as cork oak and Atlas cedar.

2 History

2.1 Reforestation before the independence

After the French invasion of Algeria in 1830, all Algerian forests are considered property of the state, and the French Forest Code of 1827 is applied automatically in Algeria. This code limits the access and use of forests by the local population. The colonial state amended to the Forest Code, which becomes more restrictive (Davis 2004). According to Fredj (2013), plantation and nursery works began in 1838 with the establishment of the Forest Service. However, only some reforestation work has been carried out (Bensaid et al. 1998).

During the period from 1852 to 1910, only 5,400 ha were planted, and in 1912 a special reforestation service was established. Later, in 1948, reforestation was carried out in western Algeria, reforestation was carried out with stone pine, eucalyptus, and acacia (Bensaid et al. 1998). Eucalyptuses were introduced to Algeria between 1854 and 1860, successful results were observed in sub-humid and semi-arid regions with more than 400mm of precipitation (FAO 1982). The eucalyptus reforestation continues after independence, covering an area of 28,200 ha in 1965.

According to FAO (1982), different species of Eucalyptus were planted according to the region to be reforested. In humid and temperate regions: *E. botryoides* Sm., *E. cladocalyx* F.Muell., *E. diversicolor* F.Muell., *E. maculata* Hook., *E. siderophloia* Benth.. In highland areas: *E. cypellocarpa* L.A.S.Johnson, *E. melliodora*

A.Cunn. ex Schauer, *E. ovata* Labill., *E. smithii* R.T.Baker, *E. viminalis* Labill.. In the calcareous soils: *E. astringens* (Maiden) Maiden, *E. gomphocephala* A.Cunn. ex DC.

2.2 Reforestation after the independence

After the independence (1962), the forest heritage was much degraded; it became very necessary to adopt a strategy for the development of the forest sector. The latter contributes to the economy of the country, providing various services and goods, and plays a very important socioeconomic role (Tatar 2012). The increasing need for timber and the necessary intervention for the protection of forest resources have prompted the state to implement important programs for reforestation. The forestry sector has experienced several stages, including the Green Dam project from 1970 to 2000 (Merdas et al. 2015). Several plans and projects have succeeded in the development of the forestry sector through reforestation, soil conservation, and restoration. In our case, we focused on reforestation achievements.

- From 1962 to 1967 (the popular reforestation projects) - The reforested land is evaluated at 38,400 ha, situated in eastern Algeria in the regions of Batna, Khenchela, Constantine, Annaba, and Setif. The main objectives of this period were reforestation works, training of technical staff, and mobilization of the population for reforestation. According to Berriah (2015), this period was not successful due to the lack of supervision and the absence of a strategy or a policy of reforestation.

- From 1967 to 1969 (the three-year plan) - In the year 1967 forestry legislation began, and the main objectives were the promotion of employment in rural areas through reforestation work and the installation of an organizational chart that will allow planning of forestry activities. Two-thirds of reforestations were carried out compared to the forecast, i.e. an area of 28,099 ha due to the absence of a forest policy (Tatar 2012).

- From 1970 to 1973 (the first four-year plan) - In this period, 84.7% of the reforestation forecasts were completed, which represents the total area of 76,000 ha. The main objectives of this plan were to: 1) fight against soil erosion and the preservation of this resource, 2) promote reforestation to increase wood production, 3) improve forest management by establishing the National Forestry Office, and 4) integrate the fight against desertification in reforestation programs through the Green Dam project.

- From 1974 to 1977 (the second four-year plan) - Only 49% of reforestation areas have been completed, with an area of 100,310 ha. The objectives of this plan were: 1) reinforcement of the previous plan, 2) support of forestry actions for economic purposes and 3) to meet local wood needs. Despite the creation of consulting firms attached to the National Forestry Office to improve management and realization, the reality was far from the forecasts.

- Special programs - These programs were carried out during the period of the two quadrennial planes. Reforestation goals were the development of degraded regions, encouraging the participation of local populations by providing jobs and improving the living environment. The achievements in these programs reached 101,891 ha, which represents 55.6% of the forecasts.

- The communal plans - These plans were made during the second quadrennial plan, with a surface area of 4,815 ha on a forecast of 9,420 ha. Reforestation works were around urban agglomerations and along roadsides.

- From 1980 to 1984 (the first five-year plan) - In this plan, an area of 297,244 ha was replanted on a forecast of 330,000 ha, the objectives were protection of watersheds against erosion, protection of dams (siltation), development of industrial reforestation, large-scale reforestation and integration populations in mountain areas and rangelands.

- From 1985 to 1989 (the second five-year plan) - During this period, significant financial resources were made available for reforestation in order to achieve the forecasts. Unfortunately, the reforested area represented 39% of the forecasts with 141,000 ha. This period is also marked by the diversification of species and reforestation through Fruit Tree (Berriah 2015).

- From 1990 to 2000 - Other contributions have been made to the forestry sector by the establishment of the National Forest Agency (NFA) in 1990 and the National Agency for the Conservation of Nature (NACN). The NFA was subsequently set up in the Directorate General of Forests (DGF) belonging to the Ministry of Agriculture in 1995. The objectives in this period were the extension of reforestation through the Green Dam project, conservation and management Forest heritage, and watershed management. Over a period of 10 years, 196,010 ha of reforestation has been completed, which represents 84.91% of the forecasts.

During the period from 1962 to 2000, the instability of the forest sector had a negative impact on the achievement. The majority of Algerian forests is subject to public land tenure (property of the state), which is an asset for decision-makers to propose a policy and strategy for the development of the forestry sector. Despite this, obtained results were not satisfactory (Fig. 1).

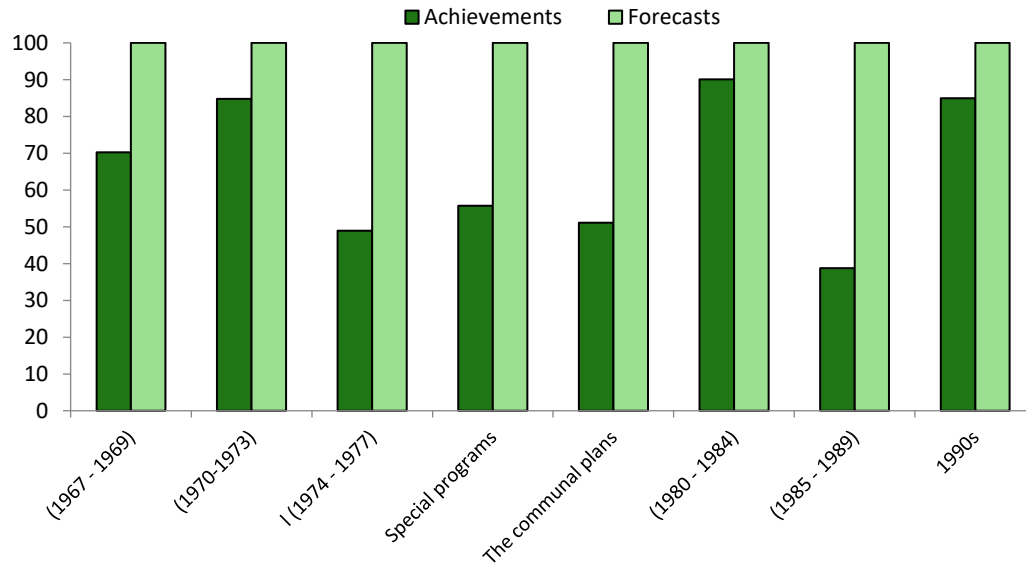


Figure 1. Reforestation achievements compared to forecasts during the period from 1967 to 1990s.

3 Current practices

3.1 The National Reforestation Plan (NRP)

At the end of 1999, the Governing Council adopted the National Reforestation Plan (NRP), which was implemented in 2000. This plan is part of the National Plan for Agriculture and Rural Development (NPARD). The duration of this program is 20 years (2000-2020), therefore in the medium term with possibilities of revision and updating.

The NRP reflects the current vision and forest policy, the formulation, and organization of the NRP makes it likely to have harmonious actions with other plans and programs, such as the national plan to combat desertification.

The main thrusts of the NRP are the inventory of forests and suitable lands for reforestation, the inventory of suitable species for reforestation and their provenance, the inventory of materials for the production of seedlings and necessary materials of the implementation of reforestation works, and the assessment of the medium and long-term needs of timber.

The NRP has two main objectives: 1) Forest management of productive forest carried out on 1,329,400 ha, with 900,000 ha of them already assessed and have management plans; 2) Reforestation with an overall area of 1,245,000 ha over 20 years, which means an annual average of more than 60,000 ha. During the period from 2000 to 2010 reforestation achievements were 494,432 ha compared to forecasts 632,646 ha (Fig. 2). According to the (FAO 2016), Algeria is among the 15 countries that showed an increase in the area of agriculture land and the forest area from 2000 to 2010.

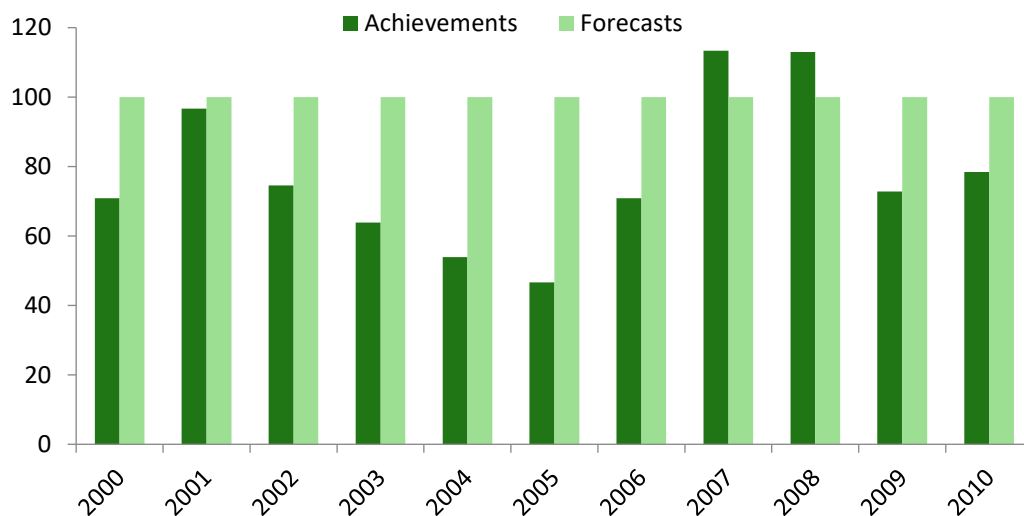


Figure 2. Reforestation achievements compared to forecasts during the period from 2000 to 2010.

The expected results of the NRP are:

- Extension of forest heritage and soil conservation.

- Timber production and forestry.
 - Protection of agricultural land through the installation of windbreaks.
 - Protection of catchment basins of dams.
 - Reforestation of the steppe zones with potential and fight against desertification.
- Job creation with a target of 509,460 jobs over 20 years.

3.2 Reforestation types

Reforestation work concerns degraded marquis, reconstitution of degraded forests, erosion control and protection of existing or planned dams. Forest plantations account for the largest part of reforestation compared to fruit plantations.

3.2.1 Industrial reforestation

This type of plantation is mainly for wood production in the potential zones located particularly in the eastern part of the country where annual rainfall is favorable (DGF 1999). These reforestation operations are carried out to cover the demands of wood and cork oak, the most used species are cork oak, cedar, pine, maritime pine, and poplar. The planned reforestation area is 325,000 ha.

3.2.2 Reforestation for protection

These reforestation activities are carried out with the aim of protecting soils against erosion, agricultural perimeters such as windbreaks, and around socioeconomic infrastructures. In addition, the creation of green belts and windbreaks located around built-up areas and along roads.

3.2.3 Reforestation and recreational reforestation

The awareness about recreational forests is becoming more and more important, both in urban and rural areas. Reforestation is carried out at the level of the municipalities in order to provide areas for recreation and leisure for the population. This reforestation has an important role in improving the quality of the air and the landscape.

The General Directorate of Forestry (GDF) estimates that in 2011, 580,000 ha have been reforested in Algeria since the launch of the National Reforestation Plan (NRP) in 2000 (Nourhane 2011). In 2016, GDF estimates that an area of 800,000 ha has been reforested since the beginning of the National Reforestation Plan (Morad 2016).

3.3 The reforestation strategy

The new forestry strategy concerns the management and sustainable development of forest and Alfa steppe rangelands. It was developed as part of an FAO project (TCP / ALG / 3101) (DGF 2007). Several national and international experts participated in the development of this strategy. In particular, FAO provided technical assistance in legislation, training, and research. Several workshops were conducted during the years 2006 and 2007 for forest sector diagnostic analysis, identification of forest sector issues and challenges, international trends in sustainable forest development, guiding principles, and the government's vision for the sector and its role in the economy.

In terms of reforestation, the new strategy aims for forestry extension to achieve a 24% reforestation rate in northern Algeria by 2020, modernization of seedling production techniques, encouragement of private nurseries for the production of seedlings, and the encouragement of the private sector involved in reforestation work.

The priority actions in this strategy are:

- Diversification of reforestation work (erosion control, windbreaks, combating desertification, green belts).
- Planting 3 million ha of forestland.
- Quality control of reforestation by developing appropriate techniques and selecting relevant species.
- Modernization of seedling production in nurseries.
- Selection/collection of seeds and identification of biological material for each species.
- Qualification of companies working in the field of forests.
- Encouragement of industrial plantations.

4 Future perspectives

The National Land Use Plan (NLUP) is part of the vision of the state in terms of sustainable development, equity and attractiveness of the territory in all its components including defense and national security. The NLUP extends over a period of 20 years until 2030.

The NLUP is structured around four guidelines that respond to the challenges of national development. These Guidelines are implemented through 20 Territorial Action Programs "TAP". The Territorial Action Programs are operational programs. Reforestation is included in two TAPs. The TAP No 2, which concerns soil conservation and the fight against desertification, and TAP No 3, which concerns ecosystems (Fig. 3).

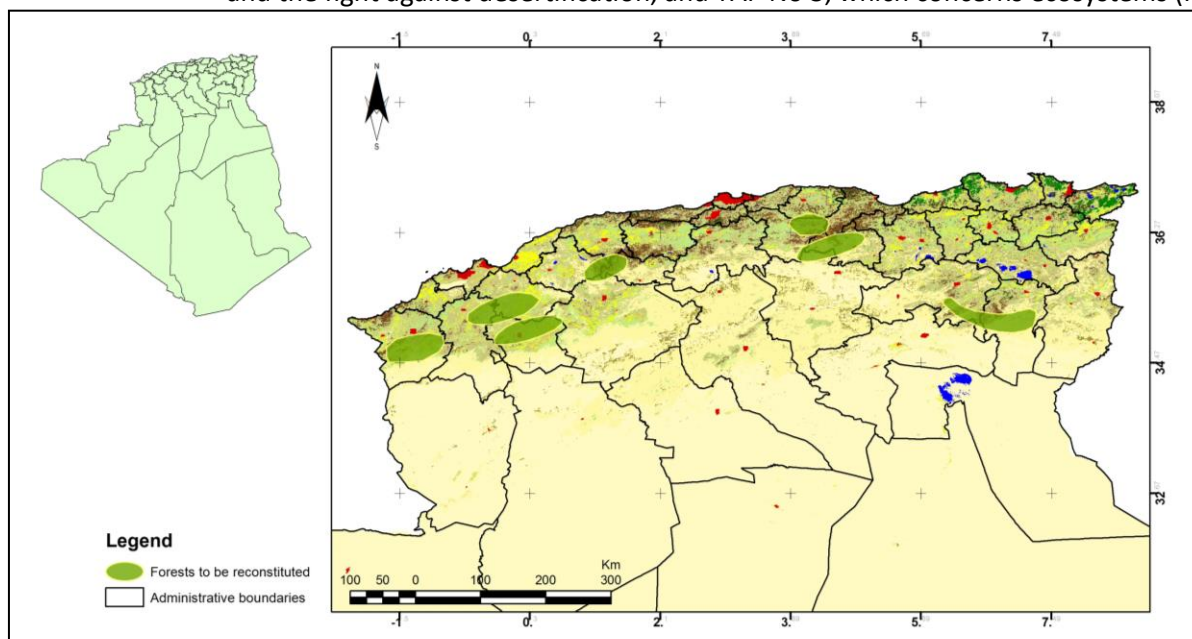


Figure 3. Forests to be reconstituted and developed (NLUP).

4.1 Soil conservation and the fight against desertification (TAP No 2)

This program aims at the development of catchment areas (52 basins), covering an area of 7.5 million ha of which 1,750,000 ha are to be treated for the next twenty years. Moreover, the extension of the national forest heritage over an area of 1,050,000 ha, the fight against desertification in dry, semi-arid and dry sub-humid zones, the re-launching of the Green Dam with a new strategy and multiple actions (agro-sylvo-pastoralism, reforestation of production, and job creation).

4.2 Ecosystems (TAP No 3)

This plan aims to protect the mountain massifs through management and development. The NLUP identified 20 mountain massifs. Development plans are defined for each massif. They include land-use plans, pastoral management plans and provide the development and strengthening of basic socioeconomic infrastructures and facilities. This plan is also used to protect and enhance the forest ecosystem. The National Forest Development Plan aims to extend the forest cover. Another action is the extension of the "Green Dam" and protection of 52 watersheds. More than 7.5 million ha of land are concerned with conservation practices. The National Forest Development Plan estimates 4,700,000 ha of land to be reforested. The annual reforestation rate is estimated at 60,000 ha per year over the next twenty years (SNAT 2010).

5 Conclusions

Forestry policy in Algeria currently aims to protect and safeguard the forest heritage through an appropriate legal framework, in particular through the systematization of forest inventory and management with a view of enhancing the value of forests and soil restoration. Despite the laws, this heritage is still subject to fires, clearing, plowing, overgrazing, prolonged cyclical drought, a collapse of the natural soil protection system and serious erosive phenomena. Hence, the loss of much of the forest cover. Nevertheless, a capital must be protected by preserving it from degradation and to seek ways and means to restore it.

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