

A REFORESTATION PROJECT IN ALGERIA

What it may mean to future  
forestry and conservation activities  
in Sub-Saharan Africa

by

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## Abstract and Summary

For several years now, the Algerian government (GOA) has been successfully carrying out large-scale, nationwide reforestation programs. Launched in the mid-1960's with annual planting averaging 10,000 hectares a year, current efforts, reported to have reached 70,000 hectares in 1979, are approaching the 100,000 GOA annual target for the next five years.

Some of these activities originated almost 20 years ago in mountainous highlands in the eastern portions of North Algeria. Most of the work was based on a food-for-work approach which later was converted into a reforestation works project similar to the Civilian Conservation Corps operations in the US in the 1930's and the soil conservation/watershed improvement efforts presently going on in Cape Verde. The very real possibility of another serious drought in Sub-Saharan Africa suggests a closer look at the Algerian experience to make optimum use of food grants.

### Non-replicable factors

The Algerian efforts are not directly replicable in as-is form because a number of factors are simply not present in Sub-Saharan Africa:

Climatic physiographic uniqueness of the area: high elevations, low temperatures, winter rains and snow and Mediterranean climate are all factors that are entirely different from more tropical Africa.

Availability of cooking fuel alternative to firewood: Up to 90% of the people's energy needs for cooking are, at present, available and met in the form of subsidized bottled natural gas, Algeria's substitute for the inexpensive kerosene that was the customary alternative to fuelwood before the oil price hikes of the recent past.

### Possibly non-replicable factors

Two other factors, essential to the Algerian success, are not now present in any Sub-Saharan country, although presumably could be realised, given sufficient national and popular will:

- \* Central government exercise of strong land use authority: This enables planning and execution of large-scale reforestation and other natural resource conservation projects. Most Sub-Saharan African governments have land use authorities which they could but do not exercise for these purposes.
- \* Controlled or little grazing pressure: In contrast with nearly all countries of Sub-Saharan Africa, Algeria has relatively little free or uncontrolled grazing in the project area, a situation which is difficult, but not impossible, to bring about elsewhere in Africa.

### Replicable aspects

Despite these differences, however, there are important aspects of the Algerian experiences that may well point to new approaches that are applicable in Sub-Saharan Africa, especially the Sahel:

- \* Strong government commitment: As noted above, one of the most important reasons for the Algerian successes was the government's commitment to resource conservation as a whole. A basic will and strength on the part of an entire national government (not just the Forest Service) must be present, in order to provide the basis needed to carry out the work. Even without the political strength to enforce strong land use planning, any African government can demonstrate, by action, increased commitment to reforestation and resource conservation.
- \* Popular participation and support: A strong, grass-roots oriented conservation "movement" (awareness, motivation, skills, etc.) on the part of all levels of the area's population will ensure the necessary basic, local support, including voluntary labor, self-discipline to avoid abuse of the newly created resource, fire prevention awareness, and livestock grazing control. Governments can lead in creating this support.
- \* Combined tree planting and water/soil conservation techniques: Combining basic tree planting activities with appropriate soil and water conservation techniques produces more effective results than projects which concentrate only on tree planting or soil and water conservation, independently of the other. For instance,

in areas where water is critically short, micro-catchments can greatly enhance the survival rates of freshly planted trees. In other cases, where occasional downpours may cause surface erosion problems, other conservation techniques such as infiltration ditches, earth terraces, horizontal or gradient berms, not only will greatly reduce erosion hazards, but also provide more on-site moisture for the trees or any other vegetation.

#### Advance planning for food relief

Of particular significance for possible future reforestation efforts elsewhere in Africa, is the fact that Algeria's massive, large conservation/reforestation efforts started as a food relief operation in a case of a nationwide emergency.

If - during a future drought - food relief again is brought to the Sahel on the scale in which it was supplied during the drought of the 1970's, it would be most advantageous to have ready in advance conservation and reforestation programs, begun now on a small scale, using food-for-work approaches, that could be expanded on a large scale as soon as the next emergency arises. This requires, however, that project planting areas are identified in advance, the necessary changes in land use status made and that project operational plans (nursery production, transport requirements, etc.) are ready so larger scale food-for-work project implementation could begin immediately when massive food inputs again are needed.

The Algeria reforestation experience clearly proves that basic criteria for an ecologically sound design, coupled with consideration for the existing socio-cultural framework, must be adhered to for success on such large scales to be possible: if trees can be supplied, if the necessary planting sites are made available, if the investment is properly maintained and protected, and if the much-needed (but often overlooked) popular participation is developed and encouraged, then forestry and conservation efforts on a much larger scale than in the past could also be successful in Sub-Saharan Africa.

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## Preface

A major task facing the national governments in Sub-Saharan Africa is how to meet their energy needs. Fuelwood, the primary source of all energy throughout this area, is in increasingly short supply. Major reforestation efforts will be needed if future rural and urban needs are to be met, calling for as much as 15 times the current levels of annual fuelwood planting. No Sub-Saharan country is as yet planning reforestation programs which even begin to approach this scale.

An Algerian project, dating from 1962 -- the "Chantier Populaire Reboisement" Project, had been reported to be outstandingly successful on many counts - enlistment of local participation in planning of the project, modest costs, accomplishing annual increments of new reforestation of about 15,000 hectares a year over a period of nearly two decades. The fact that it reportedly used micro-catchment planting techniques (said to greatly increase the amount of water effectively available to root systems) made it of special potential relevance for programs in Sub-Saharan Africa.

To explore the validity of these reports and the possible replicability of approaches and techniques used in this Algerian project, the African Bureau of the US Agency for International Development enlisted the services of Fred Weber, an independent consultant on forestry and conservation with fifteen years of experience in Sub-Saharan Africa. The following report represents his views and conclusions, based on a review of reports of the Algerian experience and a brief on-site visit in the reforestation areas. His conclusions do not necessarily reflect those of the Agency for International Development.

## Brief History of CPR/CPRA Project

In 1962, at the conclusion of Algeria's war for independence, the provisional government of Algeria appealed to, among other groups, "the Protestant Churches" to organize appropriate relief and rehabilitation efforts. As a result, the Christian Committee for Service in Algeria (CCSA) was formed including the Lutheran World Federation, the World Council of Churches, the Mennonite Central Committee, the World YMCA and YWCA, and the French Protestant Church relief organisation (CIMADE). Pilot projects were started in 1962 in the areas of Belkitane and Bir Oglia in eastern Algeria (1).

At the onset the main problem was to provide food for the thousands of people made homeless by the revolution who had no means of support of any kind. A project activity was sought that would: 1) employ a large number of people; 2) not require any particular skills; 3) have an intrinsic value to the development of rural areas.

-In this search, reforestation combined with soil conservation and restoration activities, was selected as the major endeavour. Nutrition projects, including school feeding activities, were involved on a smaller scale (2).

Based on the pilot activities of 1962, a second three-year phase was launched in the Batna and Constantine provinces. This lasted from 1962 to 1965. At that time USAID became involved, contributing "Food-for-Peace" commodities. The scale of activity was expanded: over this three-year period 21,000,000 trees, covering about 57,000 acres (average spacing 3 x 5 metres) were planted. Over 80,000 tons of food were distributed, coming from AID and CWS, as well as from CROP, the Scandinavian countries and Switzerland (1).

By 1965 the program had reached such dimensions that the Government of Algeria, in cooperation with CCSA, established the People's Reforestation Projects, the "Chantier Populaire Reboisement" (CPR), subsequently reorganised as the "Chantier Populaire de la Révolution Agraire" (CPRA). Phase III thus began with US "Food-for-Peace" phasing out and being replaced by World Food Programme (WFP) commodities.

According to World Food Programme reports, three WFP assisted reforestation and soil conservation projects have been undertaken in cooperation with the CPR and then the CPRA, on, as the figures below suggest, an expanding scale (3):

<u>WFP Project No. and Name</u>	<u>Costs (in US \$ millions)</u>		
	<u>Food</u>	<u>Total WFP</u>	<u>Other</u>
337. Reforestation and Rural Development. (Sept. 1966-August 1968)	6.2	7.0	3.3
337 PX. Reforestation and Rural Development (Dec. 1968-May 1974)	15.6	17.5	23.3
2083. Soil Erosion Control and Afforestation (September 1976-September 1981) (recommended to be continued for two more years, by WFP evaluation team).	12.0	14.8	31.5

In 1979, a Ministry for Forestry was established that absorbed the reforestation portion of the CPRA. From the preliminary contacts I was able to establish with the Ministry, it seems certain that they now are in full planning and operational control of all reforestation activities.

Judging from project reports, newspaper articles and comments made by other persons contacted, there exist several different modalities for getting the nursery and planting work done, a wide array of arrangements -- from paying hired labor to spontaneous, voluntary efforts sponsored by the party and highly encouraged by the central government bodies (1, 4, 6).

#### Annual and total volume of planting

It should be noted that Algeria has several relatively major reforestation efforts, in addition to those attributable initially to the CPR projects and programs.

The "green barrage" program, now in the third phase of three successive five-year plans, is an ambitious planting effort intended to establish a 25 kilometer - wide strip across the country, south of the mountains, to keep the desert from advancing northwards. Over the long term, this envisages planting a total area of three million hectares.

The Federal Republic of Germany is assisting in a six-year (1974-81) project in intensified forest and timber management in the Aures region, in mountainous areas with

relatively high rainfall where considerable natural forests remain. Here the accent is on timber production, silviculture, rational management and exploitation, though considerable planting efforts go into re-establishing recently deteriorated forested areas.

Many voluntary reforestation projects are part of the national program. February is planting season in Algeria and the daily papers carried frequent articles indicating that in one or another location "thousands of trees" had been planted "recently", mostly by volunteers (teachers, workers, party members, youth organisations, etc.) (4).

Consequently, it is difficult to determine specifically which of the current planting estimates can or should be attributed to the initial CPR projects and programs.

On the basis of somewhat sketchy information from different sources, it appears that by 1975, approximately 100,000,000 trees had been planted, covering about 100,000 hectares of total area, at perhaps as many as ten different major sites. Jean Carbonare, a French technician who was virtually the sole expatriate technician for the CPR reforestation projects, estimates 10,000 to 15,000 hectares annually from 1965-75. According to a WFP report (4), approximately 60,000 hectares per year were planted during the period 1974-77. This does not include the green barrage but certainly includes areas being covered by activities other than the CPR projects.

For 1980-84, approximately 100,000 hectares a year are scheduled for reforestation alone and another 100,000 hectares a year for conservation-protection type tree planting efforts, which apparently includes efforts in connection with the green barrage (4). The closest estimate I can offer for the actual amount of area being reforested each year, at present is 80,000 hectares per year, not counting the green barrage.

An important component in the Algerian success in mounting reforestation efforts on this scale is, in my judgement, the fact that "forestry" activities per se are well integrated with other natural resource conservation, and some fuelwood production activities, particularly water and soil conservation efforts. Tree planting often is listed together with soil conservation efforts, growing of forage (mainly alfalfa), forest management, etc. There is no doubt that the Government of Algeria is sincerely and firmly committed to the conservation and more rational exploitation of their natural, renewable resources. The "charte de la R.A." (see 7) describes the basic GOA commitment and philosophy. The

Forestry Ministry (SEFOR) has established long range guidelines and goals according to which in Northern Algeria between 10 and 25% of the total surface area should, ultimately, be returned to natural vegetation and forest so that a physical and biological balance can be maintained (4, page 6).

### Nursery Production

Not having been able to come in direct contact with any host country technicians I was not able to gain any insight into their present system of growing and distributing nursery stock to the various project sites. The WFP report mentions "satisfactory" status of nurseries. Total production for 1980/81 for all of ONTF\* activities was reported to be around 100,000,000 trees, enough for about 100,000 hectares (4).

The main species used, and seen on the project site grounds, are different pine species (on drier sites: Aleppo pine), eucalyptus (many of which have given disappointing results in many of the drier areas), cypress and cedar. Among these, eucalyptus is the only true exotic.

It is important to note that the reforestation sites are located on a hilly plateau (basic elevation: 700 meters above sea-level at Constantine, 1,000 metres at Setif) with a mean annual rainfall of 600 and 600 mm respectively. Average temperatures on this plateau are around 15°C, mean maxima: 20°C, mean minima: 9°C, evapotranspiration around 1,100.

The question of whether these recent, rather extensive reforestation efforts had an influence on the general rainfall in the area could not be raised with anyone since contact with project technicians could not be made during the trip. Similarly no information is available on planned forest management systems: rotation, type of cutting, thinning, etc.

### Type of Workers Employed

Project reports (1 and 2) indicate that at the beginning people were employed who had no other means of support or income, due mainly to the generally chaotic situation during and immediately following the liberation war. In fact, the original

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\* ONTF is the Algerian Government's executing agency for World Food Program aided projects, including forestry.

CPR project was primarily a food-for-work project to provide large-scale employment; that it took the form of reforestation was almost accidental. Now, however, labor shortages constitute a special problem for forestry projects (see 4, p. In some exceptional cases, laborers now have to be recruited from as far away as 100 or 200 kilometers, due to rapidly increasing demand for labor. Several interesting papers (8, 9) analyse the social and communal dynamics involved in the organization and motivation of the people who have worked in these "People Reforestation Projects".

### Wages and Costs per Hectare

The WFP evaluation (4) gives a detailed account of the rations delivered for each day worked. The basic salary for a truck-driver or semi-skilled laborer in Algiers today is around US \$ 200 per month. The minimum wage is around \$ 200 as well. An equivalent amount, as converted into value of food provided or as most recently in cash wages, has been the wage level for workers in the project.

If this amount is applied to the 120 mandays the WFP report states it takes to reforest one hectare, labor costs per hectare alone would amount to \$ 1,080\* considerably higher than those reported by Carbonare as average per hectare costs prior to 1975, i.e. \$ 263 per ha. (2). The WFP estimates the overall cost per hectare of reforestation as \$ 1,600 (4).

### Effectiveness of Micro-Catchments

Virtually all the trees I saw planted in the Constantine area are planted in a depression (basin) carved into the hill-sides, obviously by hand or are planted behind horizontal earth terraces. Even after several years of no obvious recent maintenance, the catchment systems were functional and the plantation gives a generally carefully carried out appearance.

### Policing, Fencing

Although there is herding and domesticated animals are present, grazing pressures are relatively slight. The plateau land is predominantly farming country (except for the higher elevations) and animal densities are estimated to be between one-tenth and one-fourth of those encountered in the drier Sahel or Savanna areas.

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\* \$ 200 per month ÷ 22 working days in a month = \$ 9 a day x 120 = \$ 1,080 per hectare for labor alone.

There is a great deal of motivation and interest in the basic, sedentary population in keeping animals out (1). Most of the domestic animals which I saw appear to belong to local farmers who therefore can give explicit instruction to the herders as to where he may let them graze, where not. Although there may have been fences somewhere in the project area, on my field trip I saw no fences anywhere.

#### Number of Expatriates and Other Supervisors

Apart from the West German project, there seem to be no expatriate advisors involved in the GOA's reforestation efforts in the field.

The Algerian executing agency (ONTF) for the WFP aided forestry project has a permanent staff of approximately 2,000 and was employing an average of 43,000 to 47,000 seasonal or casual workers in 1979. The following table, from the WFP report (5, page 6) shows the increase in its permanent staff and skilled workers between 1971 and 1979:

	<u>1971</u>	<u>1975</u>	<u>1979</u>
Senior staff	28	76	126
Middle-level staff	110	201	271
Skilled workers	400	899	1,522

#### Comparison with other Algerian Forestry Programs

It is certain that the CPR/CPRA reforestation efforts were among the earliest reforestation efforts carried out in the country. From what I could gather, and see, they are successful and have done the job well. The other grand-scale project, the green barrage (mainly started with armed forces personnel) seems to have much less success. However, in the area with which the green barrage is concerned the physical conditions encountered are much more extreme, livestock pressure is much greater and the areas involved much less under direct government supervision.

The German project, as said above, is more focussed toward timber management and forest production (sawlogs, etc. so that a comparison can not be made.

Government planning figures indicate that, apart from these projects, other reforestation efforts are being made. An example, perhaps is the one described in a recent article near Laghouat, in central Algeria, south of the Atlas mountains (6). There, a reforestation project has been undertaken concurrently with an adjacent urbanization program. Surfaces essentially bare of vegetation have been reforested while, at the same time, tree-covered areas have been cleared for housing developments. In addition, fruit tree and vegetable gardens are converted into urban areas, thus further reducing valuable agricultural land in a zone that is already extremely arid and thus bare and dry. "To plant trees on denuded surfaces while at the same time tolerating the destruction of surfaces previously reforested is not far from the absurd", the article states. This gives an indication that there may be occasional logistic or planning problems.

From these few reference points, it appears that the CER/CPRA efforts were quite effectively carried out. The WFP evaluation report suggests that, at least during the first year under reorganized management by the new Ministry of Forestry, the pattern of large-scale and successful plantations has continued.

## Replicability Elsewhere

### Physical site conditions:

The CFR/CPRA project (as distinguished from other Algerian reforestation efforts such as the green barrage which is located in much drier, lower areas to the south, or the German project which concentrates on higher elevations with more rainfall) addresses revegetation needs of a high land area consisting of a series of hills and gentle mountain ranges. Rainfall is high enough here to cause considerable erosion if the ground is not adequately covered: 500 to 700 mm mean annual precipitation. Evaporation rates are relatively modest: in the first place, temperatures are tempered by elevations, valley floor being around 700 to 800 metres, and much of the rain falls during the cooler winter months.

There are obviously only a few areas in Africa (and none in the Sahel) that could replicate this setting. Areas with higher elevations (thus having a climate moderated by cooler temperatures) exist mainly in east and southern Africa, along the Rift valley (Burundi, Rwanda, for instance). Also the hills and mountains of Swaziland show a certain affinity. In West Africa, only some areas in the Fouta Djallon (Guinea). The Jos and Adamaoua plateaux (Nigeria, Cameroon) provide some of the same basic similarities.

The big difference in rainfall is that in Algeria rains occur in winter while it is quite cool. While I was in Constantine (February 1981), the snow line was around 900 meters. Constantine earlier this winter experienced a heavy snowfall clogging traffic in town and early morning temperatures were around 5°C.

This kind of a rain regime obviously is entirely different from the tropical monsoon rains typical of Sub-Saharan Africa where most of the rain occurs as heavy downpours following the hottest season of the year. As a result, much of it evaporates. As a rule of thumb, one should approximately double the Mediterranean winter rainfall amounts to get the equivalent results or plant growth patterns in the tropics: that is to say, 500 mm mean annual precipitation in the mountains of Algeria would be, in terms of effective rainfall, about equal to areas south of the desert receiving 1,000 mm.

This is clearly reflected in the species chosen for reforestation efforts and in the vegetation types found on the Algerian sites. Many of the Mediterranean pines do quite well, so do cypress as well as fruit trees associated with this part of the world: olives, almonds, etc. Natural vegetation is of an evergreen mountain type (cypress, juniper, cedar, etc.). Open areas are covered by semi-arid grasses.

These vegetation types (as well as reforestation species that do best in Algeria) are completely different from types and species grown in the more tropical parts of Africa.

#### Land tenure

A strong centralised government has complete control over all land surfaces. Generally, all agricultural land has been nationalised and is farmed under a collective system where people can be and are told what to do, where, when and how. Land uses are established by government control. Under these circumstances choice of sites to be used for forestry projects is relatively easy. Areas of special concern (conservation) or interest (production) are simply identified, earmarked and set aside by government planners; reforestation efforts can begin. The government clearly has the strength as well as the will to see that reforestations are successful. Trees are not only properly planted but also maintained, grazing is rigorously controlled, fire suppression is carried out systematically.

#### Grazing pressure

Although some grazing takes place in the surrounding areas, grazing pressures in the CPR/CPRA reforestation areas are not nearly as severe as in the wide-open areas of the African savanna, or as they are in Algeria farther south of the mountains in the open areas toward the desert. There, the area in which the green barrage program is being attempted, grazing is a major problem which even the Algerians, so successful in their other reforestation and land conservation programs, do not seem able to overcome (7).

#### Local popular participation

There seems to be a good deal of basic grass-roots support and the necessary self-discipline for tree-planting, reforestation and soil conservation efforts. Even the strongest government could not maintain these types of reforestation areas by policing and surveillance only. The people are strongly

inclined to see that the inputs are maintained and protected. Agricultural extension activities along these lines are not only enhanced but often surpassed by popular movements constantly re-encouraged by media campaigns, political activities and evoking of the revolutionary spirit.

### Land pressure

Algeria's accent on industrialisation, though a long way yet from being able to provide work for everybody, has reduced pressure on the need for additional farm land. In addition, emigration to Europe to work for wages also has reduced the need to constantly seek more land for agricultural purposes. This obviously helps getting relatively good sites set aside for reforestation efforts. On the other hand, as noted above, it has also produced a labor shortage with upward pressure on labor costs for reforestation projects.

### Alternative fuels

Bottled gas in Algeria, thanks to government subsidies, is relatively cheap: \$ 2.50 per bottle. Although there are still some distribution and production problems, this low price has made cooking with gas possible for almost everybody.

### Advance planning for food relief

Of particular significance for possible future reforestation efforts elsewhere in Africa is the fact that Algeria's massive, large conservation/reforestation efforts started as a food relief operation in a case of nationwide emergency.

If - during a future drought - food relief again is brought to the Sahel on the scale in which it was supplied during the drought of the 1970's, it would be most advantageous to have ready in advance conservation and reforestation programs, begun now on a small scale, using food-for-work approaches, that could be expanded on a large scale as soon as the next emergency arises. This requires, however, that project planting areas are identified in advance, the necessary changes in land use status made and that project operational plans (nursery production, transport requirements, etc.) are ready so that larger scale food-for-work project implementation could begin immediately when massive food (for work) inputs again are needed.

## Personal Conclusions

The various physical.. social and economic factors described above all greatly favor the successful carrying out of reforestation efforts. Growing conditions are generally quite favorable, land is available, the government is committed and has the strength to carry out these efforts, the local people are willing to protect and support these efforts. An alternate relatively cheap source of energy is available.

Together, these factors make for a scene that many foresters and conservationists working in other areas of Africa will envy. Although it can be said that since the physical conditions (rain, low temperatures, different and better soils, etc.) are so different that these efforts cannot be replicated in the rest of Africa anywhere, there are still some very important and impressive lessons to be learned from these efforts.

- \* The government has the will and the strength as well as the basic management know-how to make the necessary inputs: land use planning, integrated resource management, training of workers, supervision, and surveillance. Tree planting is taking place on a very large and impressive scale. Although like any program anywhere in the world, Algerian forestry programs could be yet more effective and better-managed, a basic, consistent and effective government commitment has rallied the necessary minimal critical interest and effort to pull it off.
- \* The people are willing to work, and volunteer to work, in communal activities of this sort: youth groups, teachers, government workers are spending some of their days off in the field digging, planting and weeding. There again: a basic minimal critical amount of energy and popular commitment is apparent that provides what may well be the most critical element in the whole affair.
- \* The Algerian reforestation experience incorporates four basic criteria for an ecologically sound design: Trees must be supplied; land must be made available; maintenance and protection must be provided; and popular participation must be encouraged and rewarded. These guidelines are equally valid for the rest of Africa. If these criteria are adhered to, I believe that forestry and conservation efforts on a much larger scale than in the past could also be successful in Sub-Saharan Africa.

The Algerian People's reforestation projects can well serve as a good example of what could be done elsewhere, even under completely different physical conditions, once the government and the people set their minds to it. A regimented, socialistic type of government, of course, makes things easier to get started. Nevertheless, one can hope that especially where cooking fuel needs are urgent and stresses on the few available natural resources that still exist are great, other African governments and their people can, if they only want to, get their act together. Then outside inputs and assistance can be put to good and effective use. If, on the other hand, indecision, apathy, personal considerations keeps things cloudy, uncertain and undecided, nothing - really - can be done regardless of how much aid is offered and injected from the outside.

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