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STAFF APPRAISAL REPORT

MALI

FORESTRY PROJECT

January 10, 1979

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CURRENCY EQUIVALENTS

Currency Unit	=	MF (Malian Franc)
US\$1.00	=	MF 440
MF 1,000	=	US\$2.273

WEIGHTS AND MEASURES

metric system

1 st ₃ ere of fuelwood (st)	=	1 stacked m ³ of fuelwood
1 m ₃ (r)	=	1 solid cubic meter of round wood <u>1/</u>
1 m ³ (s)	=	1 solid cubic meter of sawn wood
1 stere of natural forest fuelwood	=	0.50 m ³ (r) = 225 kg
1 stere of plantation fuelwood (Gmelina Arborea)	=	0.60 m ³ (r) = 350 kg
1 m ³ (r) of natural forest fuelwood	=	2.00 st = 450 kg
1 m ³ (r) of plantation fuelwood (Gmelina Arborea)	=	1.60 st = 560 kg

1/ Quantities of wood, when expressed in cubic meter₃ (m³) in the report, correspond to solid cubic meters of roundwood (m³ r).

LIST OF ABBREVIATIONS

CCCE	Caisse Centrale Cooperation Economique
FAC	Fonds d'Aide et de Cooperation
FED	Fonds Europeen de Developpement
IDA	International Development Association
IER	Institut d'Economie Rurale
IPR	Institut Polytechnique Rural
OAPF	Operation Amangement et Productions Forestieres
OPM	Operation Peche MOPTI
OPNBB	Operation Parc National de la Boucle du Baoule

FISCAL YEAR

(Government and Project)

January 1 - December 31

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This staff appraisal report is based on the findings of an IDA/CCCE mission which visited Mali in April-May 1978, comprising Messrs. J. Gorse, A. Otten (IDA), Bailliez (CCCE), C. Bailly and B. Faye (Consultants).

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No. 13714	Forest Reserves Under Project

MALI

FORESTRY PROJECT

I. BACKGROUND

A. Project Background

1.01 Following the severe drought of the early 1970's, a conference was held in 1976 on the possibilities for forestry development in the Sahelian countries of West Africa. During this conference, each country submitted a list of project ideas in the forestry sector. A Bank/Cooperative Program mission visited Niger, Mali and Upper Volta in February/March 1977 and concluded that a forestry project in each of these countries would be justified if priority was given to:

- (a) increase fuelwood and building pole supplies, especially for the main urban areas where demand for wood is rising fast, through rainfed and/or irrigated plantations; and
- (b) improve management of natural forests and assist rural forestry activities, which would counteract the gradual destruction of the fragile natural forest cover due to agrarian and grazing pressures.

1.02 A pilot and technical assistance forestry project in Niger was subsequently prepared and appraised, and was approved by the Board on May 16, 1978. A forestry project in Upper Volta is presently under appraisal. For Mali, a feasibility study was prepared by the Cooperative Program and was submitted to the Bank in March 1978. The French bilateral aid agency (FAC) and the "Caisse Centrale de Cooperation Economique" (CCCE) participated in project appraisal in April/May 1978 to examine the possibilities for co-financing.

B. The Sectoral Context

1.03 Mali has a total area of 1.24 million km² and a population of 6.3 million, growing at 2.7% per annum, but with an urban growth rate of 7%. About 90% of the population is engaged in agriculture or related pursuits, and per capita income is only US\$110 per year (1977) which classifies the country as one of the 25 poorest in the world. For the 1973-1976 period which covers the drought and post-drought years, real GDP growth averaged 3.7% per annum, corresponding to an increase in GDP per capita of 1% annually; GDP growth in 1977 is likely to have been less, however, due to a return of drought conditions over extensive areas.

1.04 Cotton and groundnuts are the country's main cash and export crops. Main food crops are millet and sorghum, and paddy: in years of satisfactory rainfall, output of these crops is estimated at 1 million tons and 250,000 tons respectively, at which levels no significant cereal imports are necessary. Cattle is an important source of revenue, providing slightly less than half of the value of agricultural output; exports of live cattle were significant until the drought of the early 1970's but herds have not yet fully recovered from losses during the drought years.

1.05 Less than 25% of the territory receives over 500 mm of rainfall in normal years and is suitable for crop production; about 75% of the population lives in this area. Yet, because of the size of the country and relatively low population densities, the per capita endowment of land suitable for crop production or pasture is still higher than in other countries (about 5 ha per inhabitant). This is particularly true for land in the Sudano-Guinean zone with rainfall over 800 mm annually (90% probability) and where two thirds of the population lives: with 1 ha of arable land in this zone for each inhabitant, Mali is about 50% better off than the Sahelian countries as a whole; and 100% with respect to grazing land. As a result, agrarian and grazing pressures on the natural forest cover are significantly less than in other Sahelian countries.

C. The Forestry Subsector

Resources

1.06 Mali's natural vegetation consists of:

- (a) 6% Guinean Savannah (annual rainfall above 1,200 mm) in the southern part of the country, characterized by bush vegetation with Isoberlinia Doka, Uapaca Somon, Erythrophleum guineense, and Lophira Alata and some dry but dense forests with Khaya Senegalensis, Azizelia Africana, Pterocarpus Erinaceus, Daniella Olivieri, and Cordyla Pinnata.
- (b) 27% Soudanian Savannah characterized by: (1) Park savannah (annual rainfall, 750-1,200 mm) with Butyrospermum Parkii, Parkia Biglobosa, Acacia Albida, Tamarindus Indica, Adansonia Digitata and Bombax Costatum and (2) Grass Savannah (annual rainfall 500-750 mm) with bush species such as Combretum species, Guiera Senegalensis, Zizyphus and Acacia.
- (c) 16% Sahelian steppe (annual rainfall 200-500 mm) with characteristic bushes of Acacia, Zizyphus, Calotropis Procera and Hyphaena Thebaica.
- (d) 21% Tropical subdesert steppe (annual rainfall 50-200 mm); and
- (e) 30% Desert.

The forest and fauna reserves and parks cover some four million hectares and represent about 3% of Mali's total area. Man-made forests only cover some 1,500 ha, planted mainly in Gmelina arborea, Teak, Neem (*Azadirachta indica*) and Eucalyptus.

1.07 The forestry sector accounted only for about 1.9% of GDP in 1976 and 5.2% of exports in 1975 (mainly sheanuts, sheanut butter and oil, and gum arabic). However, official statistics on the value of forest output do not adequately reflect the important role played by the natural forest savannah and bush in providing fuelwood, building poles and minor forest products to meet the population's basic needs. The country's total fuelwood requirements are estimated at about 1.7 million ton per annum of which 17% are used by the urban population - nearly 800,000 inhabitants - on the basis of a yearly consumption of 360 kg per person in the urban areas and 270 kg per person in the rural areas. About 10% of the total fuelwood production is consumed as charcoal. Building poles represent some 10% of total consumption. Moreover the natural forest provides fruits, tree fodder and dry weather grazing reserves for livestock, protects the soil against erosion, and - as bush fallow - regenerates soil fertility under the traditional shifting cultivation system.

1.08 Due to the size of the country and relatively low population densities (para. 1.05) the cutting of fuelwood in the rural areas has not generally led to a decline in the forest cover with its inherent dangers of ecological destruction, and fuelwood availability is still sufficient. There are, however, two areas in Mali where the situation is fundamentally different.

1.09 Firstly, there is an accelerating decline in the natural forest cover around the capital city of Bamako. Rapid population growth in this city has led to an equally rapid growth in fuelwood consumption, now estimated at 200,000 tons annually and expected to rise to 500,000 tons per year by 1990. This compares with a theoretical wood yield of 250,000 tons per year in the Bamako area but, due to distance and difficulty of access, only about 50% of this is actually being exploited. As a result, distances are getting longer, wood transport to the city is becoming more costly, and fuelwood prices have been rising by 15% each year on average over the past five years.

1.10 Secondly, there is a noticeable decline in the natural forest cover east of the Inner Delta of the Niger River; the decline is mostly concentrated around the towns of Segou and Mopti and adjacent rural areas. Although urban population levels are considerably lower here than in and around Bamako, urban growth rates are about as rapid while fuelwood supplies are more precarious; most of the Inner Delta is seasonally flooded and has only a sparse forest and bush cover, and, in areas where the forest cover is still in existence, sustained wood yields are small due to slow forest regrowth because of low rainfall (700 mm annually at Segou, and 500 mm annually at Mopti). Moreover, the traditional fish smoking industry in the Niger Delta area is an important additional consumer of fuelwood. The supply situation is perhaps the most preoccupying in Mopti: the distance between the town and its fuelwood sources

is now between 50 km and 100 km, and fuelwood prices are some 40% higher than in Bamako.

Institutions

1.11 The Forestry Department under the Ministry of Rural Development has overall responsibility for forest protection, forest products, inland fishing, fauna conservation and wildlife management. It has three divisions at headquarters, concerned with forestry, fishing and wildlife, and is organized into seven field districts each with its normal policing duties. The Ministry has, however, delegated important functions in the forestry sector to so-called Opérations de Développement, institutions charged to carry out specific projects, mostly assisted by foreign aid and enjoying a considerable amount of financial and managerial autonomy. Three such "operations" presently exist in this sector: the Forestry Management and Production Agency (OAPF) assisted by French bilateral aid (FAC), the Mopti Fisheries Development Agency (OPM), assisted by the European Development Fund (FED), and the Baoule Park Wildlife Management Agency (OPNBB), assisted by Dutch aid.

1.12 OAPF was established in 1972 with the task to create some 18,000 ha of tree plantations over a 30-year period, mostly to satisfy the fuel and construction wood requirements of the main urban centers. Since then, it has rehabilitated some 300 ha of old plantations and has planted about 400 ha mostly with a relatively fast growing species of Gmelina, in two forest reserves close to Bamako. Overall planting quality has been quite satisfactory, and about 95% of all plantings have been successful. All forestry operations have been carried out by local personnel (it has a permanent staff of about 50 employees) and foreign technical assistance to date has been minimal, limited to equipment maintenance and accounting. Present FAC financing provides for another 900 ha of plantations to be established during 1979 and 1980.

1.13 OAPF is now entering into a phase of rapid expansion: it is presently building a small saw mill in Bamako; it has obtained financing from Swiss bilateral aid to establish two tree plantations and two saw mills, and to manage natural forests in Southern Mali, and it would also be entrusted with the execution of the proposed project. The additional activities would require further strengthening of the organization, especially in the managerial and administrative field (paras. 4.04-4.05).

1.14 Forestry education is provided by the "Katibougou Polytechnic Institute", which delivers university trained graduates ("ingenieurs des eaux et forêts") and specialized undergraduates ("ingenieurs des travaux forestiers"). The institute is the only forestry training school existing in the Sahelian countries and, as a result, Mali has a large reservoir of well trained forestry staff: in 1977 some 50 forestry specialists - mostly trained at Katibougou - were working in Mali, compared to only four in Senegal and six in Niger. Furthermore, forestry training for field agents is provided at the OAPF-managed Tabacoro Training Center near Bamako. The quality of training is on the whole sufficient especially in the technical

field. For key personnel in the forestry services, however, additional training in administrative and financial management would be beneficial.

1.15 Forestry research is formally linked to the Rural Economic Institute (IER) but has its headquarters at Katibougou. Research is presently limited to small scale trials and its most important component, tree growing under irrigated conditions in the Niger delta area, has so far had unsatisfactory results.

1.16 As a whole, Mali is institutionally well ahead in the forestry field compared to other Sahelian countries. Its main asset is the presence of trained Malian forestry staff with the capacity to be efficient in the field. Another important advantage is the existence of a National Forestry Fund which receives all revenue from logging, hunting and fishing permits and by law allocates 50% of its revenue to the Forestry Department for investment and protection purposes. Since the Fund's creation in 1967, it has channeled some MF 500 million (US\$1.1 million) to the Forestry Department. Nevertheless, all forestry services suffer from severe budget constraints which make it impossible for them to cover operating costs and thus effectively carry out their assigned tasks. The only exception to this is OAPF which has its own revenue from the sale of wood products from plantations and classified forests which it manages: its wood sales, which exceeded MF 77 million (US\$0.2 million) in 1977, are sufficient to cover its operating costs.

Objectives and Strategies

1.17 The immediate priority in Mali's forestry sector would be the improvement of fuelwood and building pole supplies to the main urban centers by establishing tree plantations. This would help (a) to contain the rapid rise in fuelwood prices in the future, which would be directly beneficial to the lower income urban groups who cannot afford other types of fuel; and (b) to contain and, eventually, remedy the decline of the natural forest cover around the towns, thus preventing further environmental destruction. Experience has proven that rainfall around Bamako (averaging 1,100 mm annually) is sufficient to provide satisfactory wood yields for selected species under rainfed conditions (Gmelina and Eucalyptus yielding about 9.5 m³/ha/year) and that there are sufficient grounds to start large scale rainfed tree plantations in this area. No such experience, however, exists elsewhere in the country; while rainfed plantations are still thought to be possible around Segou, it is believed that around Mopti tree plantations would have to be irrigated at least during the first years after planting. Pilot plantations would therefore have to be started to obtain further data on these areas.

1.18 The next priority would be to devise appropriate actions in the rural forestry field. Although the natural forest cover outside the urban areas is not yet declining, it is expected that within ten to fifteen years, with increased population pressures, a disequilibrium between demand and natural supplies will arise in more regions than has hitherto been the case. It is therefore imperative to start testing rural forestry actions, i.e. aimed at increasing the supply of fuelwood and wood products close to

villages, and with the active participation of the rural population. Activities carried out in this field in the past, notably the establishment of village wood lots and the prevention of bush fires, have been largely unsuccessful because of disinterest on the part of the local population. Such actions have therefore to be reformulated with a view to provide sufficient incentive to the population to participate.

1.19 A third priority is for the forest services to undertake the management of natural forest reserves in the country. No modern management techniques are presently applied in Mali's forest reserves, mainly because of lack of funds. Yet, the application of known techniques would have three distinct advantages: it would substantially improve wood production while still maintaining the forest cover; it would put the present trained forestry staff to more effective work; and if properly managed it would produce revenue from sale of wood and wood products at least equal to the management costs. Priority areas to introduce these techniques would be near the urban centers, where effective wood demand is greatest.

1.20 The proposed forestry project emphasizes improved wood production near the urban centers and carries components dealing with all the above objectives; it therefore corresponds to the Government's expressed strategy for this subsector.

II. THE PROJECT AREA

Introduction

2.01 The project's main component, the creation of 3,400 ha of rainfed tree plantations and 1,000 ha of natural forest management, both near Bamako, would be carried out in two forest reserves, one of 14,500 ha located 20 km from the city (Monts Mandingues) and one of 80,000 ha 50 km from the city (La Faya). The Mopti and Segou pilot components and the establishment of rural nurseries would be carried out at various locations in the region between Bamako and Mopti in the northern part of the Soudanian-Savannah Zone (see para 1.06). Two maps are attached indicating the project's locations.

Climate, Topography and Soils

2.02 Both the Monts Mandingues and La Faya forest reserves are located in the southern part of the Soudanian-Savannah Zone (para 1.06) alongside the Niger River, as is the city of Bamako. The climate of the area is characterized by a seven-month dry spell and a rainy season of five months (June-October) with annual rainfall averaging 1,100 mm. Much of the countryside around Bamako especially north of the Niger River is hilly and about half of the soils are considered unsuitable for cropping or grazing: sizeable areas are made up of eroded skeleton soils and are void of vegetation. Lands in the two forest reserves, however, are relatively flat with soils of better quality, easily accessible by all-weather roads. A survey of soils and vegetation (including detailed mapping) in the two forest reserves, financed by FAC,

is being carried out and results are expected to be available by the end of 1978. Without prejudging the conclusions of the survey, it can be safely estimated that at least 30% of these lands are of good to excellent quality for tree planting, and that land availability problems are therefore unlikely to arise.

Population and Wood Consumption

2.03 The Greater Bamako urban area covers about 300 km² and has a population of some 550,000 inhabitants (of whom 430,000 live within the city limits). Most of the urban population has migrated to town over the last ten years and urban unemployment is high. A detailed survey on fuelwood consumption and prices in Bamako, made in February 1978, has shown that (a) consumption per inhabitant per year is 370 kg of wood (about 1 kg per day) and 17 kg of charcoal; charcoal therefore only covers some 7% of consumption in calory terms; (b) retail prices of wood average about 14 MF per kg and, at these prices, the satisfaction of fuelwood needs requires between 20% and 30% of an average urban family's income; and (c) most wood and charcoal are burnt on open fires, and ovens are little used, thus accounting for important energy losses.

Wood Trade and Processing

2.04 Practically all of the wood trade is in private hands and 75% of wood supplies enter Bamako by motorized transport. OAPF, which presently exploits two forest reserves, transports wood to Bamako for sale to private wholesalers, to the two saw mills and the match factory, and at present covers less than 4% of total consumption. Its share of fuelwood supplies would however more than triple with the implementation of projects now being considered and the projected saw mills (para 1.13) would enable it to enter into the expanding processed construction wood business.

III. THE PROJECT

A. Design Features

Project Description

3.01 The proposed project would be the first Bank Group-financed action in Mali's forestry sector. It would be carried out over five years (1980 to 1984) according to the implementation schedule in para 3.10 and would consist of five principal elements:

- (a) the establishment of 3,400 ha of rainfed tree plantations in two forest reserves near Bamako;
- (b) the application of modern management techniques on a trial basis over 1,000 ha of natural forest near Bamako, and 200 ha of natural forest near Segou;
- (c) the establishment, on a trial basis, of 60 ha of rainfed tree plantations near Segou and of 70 ha of partially irrigated tree plantations near Mopti;
- (d) the establishment of three forestry nurseries at Bamako, Segou and Mopti, and the rehabilitation of an existing one at San to provide trees to villagers through established extension services; and
- (e) the execution of studies to investigate more efficient wood uses, to examine the set up of rural forestry activities with a view to providing sufficient incentives for the population to participate, and to examine the scope of a possible follow-up project.

Detailed Features

3.02 Bamako Rainfed Tree Plantations (see Tables 4 and 16). Of a total of 3,400 ha to be planted mostly with *Gmelina Arborea*, 1,100 ha would be in the Monts Mandingues forest and 2,300 ha in La Faya forest. Works, which would be carried out on force account by OAPF with its own material and material which would be provided by the project, would include the establishment of three nurseries of 1.5 ha each, clear felling of the natural forest followed by full destumping, harrowing and subsoil ripping to improve the water holding capacity of the soil. The seedlings would subsequently be planted, and for two years after planting, two weedings per year would be made to avoid weed infestation among the young plants. Simultaneously, all plantation tracks and firebreaks would be constructed and accommodations for workers and supervisory staff built. Wood recovered from the low value natural forest would be cut and sorted, and transported to Bamako for sale.

3.03 All plantation establishment works have to be done during the rainy season and only six weeks per year are suitable for the planting of

seedlings. Experience has shown that most works have to be carried out with machinery rather than manual labour because of (a) the very tight work schedule; (b) the fact that during the rainy season few workers are available for hire due to peak labour requirements for cropping; and (c) the lack of manpower availability around plantation sites which would require costly transport and accommodations. It is estimated that in addition to the use of equipment about 90 mandays of labor input would be required over three years to establish 1 ha of rainfed tree plantation (see Table 11).

3.04 Natural Forest Management (See Tables 6, 7 and 17). Natural forest management would be undertaken in the La Faya forest reserve near Bamako and in the Dioforongo forest reserve near Segou. Natural forest management would lead to better natural regeneration and regrowth through protective measures against encroachments and bushfires, intermediate and regeneration cuttings, complementary seeding, harrowing and weeding. The application of these techniques would be preceded by the setting up of a working plan including site location, a forestry inventory, the marking of trees, and the construction of roads, tracks and firebreaks. Promising results have been obtained with these techniques in Nigeria, in areas of similar rainfall volume and intensity as around Bamako, with sustained yields increasing from 0.5 m³/ha/year to 1.0 m³/ha/year. No experience yet exists in areas with lower rainfall, such as around Segou, and provisions are made for a careful follow up on the results of both trials. It is estimated that about 50 mandays of labor input would be required over three years to manage 1 ha of natural forest (see Table 11).

3.05 Rainfed and Irrigated Plantation Trials (See Tables 5, 8 and 16). For the 60 ha pilot rainfed plantation near Segou in the Diogorongo forest reserve, the same clearing and planting techniques would be used as described in para. 3.02. In view of the absence of planting experience and the more marginal rainfall conditions in this area, however, three different species would be tried: *Gmelina arborea*, *Eucalyptus camaldulensis* and *Azadirachta indica* (Neem), and each species would occupy about 20 ha. Estimated establishment cost per ha, excluding contingencies, would amount to US\$720 in Bamako and US\$560 in Segou without taking account of receipts from sales of salvage wood.

3.06 The 70 ha tree plantation trials near Mopti would, in view of low rainfall locally, be irrigated during the first two years after planting to enable tree roots to reach the groundwater table. Trials would take place at two different locations: (1) along the Niger River at Tongorongo, 40 ha would be planted with *Eucalyptus* with water provided by pumping from the river to test various irrigation techniques, and (2) at Sevare, 15 km inland from Mopti, 30 ha would be planted also with *Eucalyptus* but with water provided by tubewell. As the latter site necessitates a higher investment, it would only be started in the third project year, when tree growth performance on the first site is already known. Both sites, which already belong to the Forestry Department, would be fenced and all-weather plantation tracks and firebreaks would be constructed. A preliminary estimation of establishment cost per ha, including fencing and excluding contingencies, would amount to approximately US\$1,000. There will be no competition for water with rice cultivation practiced in the Mopti area.

3.07 Rural Forestry Nurseries (See Table 9). One existing rural forestry nursery (at San) would be rehabilitated and three new ones (at Bamako, Segou and Mopti) would be established together with the project plantation nurseries. Each would be designed for a capacity of 50,000 to 100,000 seedlings per year. In order to avoid the poor results obtained in this field previously, the nurseries would (a) as a first stage, only provide shade, fodder and fruit tree seedlings in which villagers are more directly interested; (b) provide seedlings only through established extension services so that advice can be given and results can be followed up; and (c) promote plantings in family compounds rather than in communal (village) woodlots. Meanwhile, a detailed survey would be undertaken on rural forestry possibilities (para. 3.08) and the results of this survey would be taken into account in project implementation as they become available. Field training would be provided for extension workers on rural afforestation techniques and possible approaches to encouraging the participation of rural people.

3.08 Studies and Surveys (See Table 10). The project would execute three studies in the forestry sector: (a) on better uses of wood, ways and means would be sought to obtain more efficient wood usage such as through preservative treatment and the use of wood burning stoves and charcoal, and cost comparisons would be made between the various alternatives and present methods; (b) on rural forestry possibilities, a survey would be made in a number of villages on wood and wood product requirements, and on the villagers' motivation to participate in projects that would satisfy such need; this study would make proposals regarding practical actions to be taken to promote rural forestry schemes; and (c) a feasibility study would be made in 1983/84 to examine the scope of a follow-up project from the data gathered by the OAPF monitoring and evaluation system.

3.09 It is expected that 12 man-months of consultant services - at an average cost of US\$8,900 per month excluding contingencies (of which salary and related benefits are US\$6,300) - would be needed to implement the above studies, and assurances were obtained during negotiations that such consultants would be appointed on terms and conditions of employment, and with qualifications and experience acceptable to the Association.

Implementation Schedule

3.10 Most of the equipment would be procured during the first two years and studies would be started from the first year onwards with priority being given to the rural forestry study. Implementation of the various physical project components is scheduled as follows:

	<u>1980</u>	<u>1981</u>	<u>1982</u>	<u>1983</u>	<u>1984</u>	<u>Total</u>
	-----ha-----					
Bamako tree plantations						
- felling and clearing	600	800	1,000	1,000	-	3,400
- land preparation and planting	-	600	800	1,000	1,000	
Natural forest management						
- near Bamako	-	250	250	250	250	1,000
- near Segou	-	50	50	50	50	200
Tree plantation trials						
- near Segou						
felling and clearing	30	30	-	-	-	60
land preparation and planting	-	30	30	-	-	
- near Mopti						
land preparation and planting	-	20	20	30	-	70

B. COST AND FINANCING ARRANGEMENTS

Project Costs

3.11 Total project costs over the five-year development period (1980-1984) are estimated at MF 4,150 million (US\$9.4 million) of which the foreign exchange component would be US\$6.4 million or 68%. Project costs exclude import duties and all clearly identifiable taxes since Government has indicated its intention to waive them. Base cost estimates are based on prices and quotes obtained during appraisal in 1978 and include physical contingencies amounting to 10% of base cost estimates on all categories except personnel costs. The expected price increases applied as shown below are those presently foreseen by the Bank.

	<u>1979</u>	<u>1980-1984</u>
Vehicles, Equipment	6.5	6.0
Salaries, Technical Assistance and Consultants	6.5	6.0
Buildings	7.5	7.0

Contingencies total US\$2.5 million, 26% of total costs or 35% of base cost. Estimated project costs are summarized below and detailed in Tables 1, 2 and 3.

SUMMARY OF PROJECT COSTS

	Local	Foreign	Total	Local	Foreign	Total	% Total	% Foreign
	-----	MF million	-----	-----	US\$ million	-----	Costs	Exchange
<u>Bamako Tree Plantations</u>								
Buildings and Nurseries	87.4	131.1	218.5	0.2	0.3	0.5		60
Machinery and Vehicles	65.5	589.3	654.8	0.2	1.3	1.5		90
Equipment Operating Costs	165.7	386.6	552.3	0.4	0.9	1.3		70
Local Staff Salaries	400.3	-	400.3	0.9	-	0.9	-	-
Staff Operating Costs	42.8	64.2	107.0	0.1	0.1	0.2		60
Subtotal	761.7	1,171.2	1,932.9	1.8	2.6	4.4	47	60
<u>Pilot Tree Plantations</u>	40.8	58.0	98.8	0.1	0.1	0.2	3	59
<u>Natural Forest Plantations</u>	83.2	55.5	138.7	0.2	0.1	0.3	3	40
<u>Rural Forest Nurseries</u>	23.7	24.3	48.0	-	0.1	0.1	1	51
<u>Technical Assistance Staff, Consultant Services, Audits and Training</u>								
Salaries and Allowances	-	659.1	659.1	-	1.5	1.5		100
Operating Costs	62.6	93.9	156.5	0.1	0.3	0.4		60
Subtotal	62.6	753.0	815.6	0.1	1.8	1.9	20	92
TOTAL BASE COSTS	972.0	2,062.0	3,034.0	2.2	4.7	6.9	74	68
<u>Contingencies</u>								
Physical	74.1	140.2	214.3	0.8	0.3	0.5	5	65
Expected Price Increases	302.4	599.6	902.0	0.6	1.4	2.0	21	66
TOTAL CONTINGENCIES	376.5	739.8	1,116.3	0.8	1.7	2.5	26	66
TOTAL PROJECT COSTS	1,348.5	2,801.8	4,150.3	3.0	6.4	9.4	100	68

Financing Arrangements

3.12 FAC and CCCE would participate in the financing of the proposed project. Of total project costs of US\$9.4 million, IDA would contribute US\$4.5 million, FAC US\$1.3 million and CCCE US\$1.4 million, while the Government of Mal. would cover the remaining cost of US\$2.2 million.

SUMMARY OF PROPOSED FINANCING

	<u>TOTAL</u>	<u>IDA</u>	<u>FAC</u>	<u>CCCE</u>	<u>GOVT.</u>
	-----US\$ million-----				
1. Tree Plantations, Forest Management and Rural Forest Nurseries	5.0	2.4	-	1.0	1.6
2. Expatriate Staff	1.5	0.4	1.1	-	-
3. Consultants Services, Audits, and Training	0.4	0.4	-	-	-
4. Contingencies	<u>2.5</u>	<u>1.3</u>	<u>0.2</u>	<u>0.4</u>	<u>0.6</u>
5. TOTAL COSTS	9.4	4.5	1.3	1.4	2.2
Percentage	100	48	14	15	23

3.13 Total external financing required would be equivalent to US\$7.2 million or 77% of project cost. This amount would include US\$0.8 million of local costs. The standard term IDA credit of US\$4.5 million would cover 48% of project cost and would be equivalent to 70% of foreign exchange costs. FAC would finance the services of expatriate personnel, at no cost to Government. The CCE loan, the terms of which are to be defined between CCE and Government, and the IDA credit would finance pari passu categories listed under item 1 in the above summary. The IDA and CCCE funds would be added by Government to the present OAPF capital to improve its financial base. A financing agreement would be signed between Government and OAPF. Fulfillment of conditions preceding initial disbursement of the CCCE loan, assignment of expatriate personnel for the first two years of Project execution by FAC, and the conclusion of a financing agreement satisfactory to IDA between Government and OAPF would be conditions of effectiveness.

3.14 The Malian Government would contribute MF 980 million (US\$2.2 million) or 23% of project costs. Of this amount MF 180 million (US\$0.4 million) would be directly appropriated from the national budget to pay the salaries of

civil service staff seconded to OAPF and the remainder would come from revenue accruing to OAPF from wood sales derived from the clearing of forest areas under the Project. Assurances were obtained during negotiations that OAPF would deposit all such revenue into a separate account (para 3.20).

3.15 Expenditures to be financed in the first project year (1980) would total some MF 825 million including contingencies (about US\$1.9 million). Assuming a lag of four months between the time the expenditure is incurred and the time it is reimbursed, and taking into account that machinery and equipment will probably be financed by direct payments to the supplier or by letters of credit, the interim financing requirements would be MF 110 million (US\$0.25 million). Experience with on-going projects indicates that cash availability is a major factor limiting the pace of project implementation and the rate of IDA disbursements. Therefore, an initial disbursement of US\$0.25 million equivalent will be made jointly by IDA and CCCE into the special project account (para. 3.20), which would serve as a revolving fund to finance project expenditures. The procedure would be similar to that adopted for the Drought Relief Fund (Credit 443-MLI). IDA and CCCE agreed at negotiations that the respective contributions to the revolving fund will be 70% and 30%. IDA would replenish its share of the fund upon receipt of satisfactory evidence that expenditures made were eligible for financing out of the proceeds of the Credit. Should, however, any disbursement out of the special account fail to meet this condition, Government would be under obligation to deposit the corresponding amount into that account. Assurances to that effect were obtained at negotiations.

C. PROCUREMENT, DISBURSEMENTS, ACCOUNTS AND AUDIT

Procurement

3.16 Contracts for machinery and vehicles (US\$1.6 million excluding contingencies) to be financed jointly by IDA and CCCE would be awarded on the basis of international competitive bidding in accordance with IDA guidelines. Domestically manufactured goods would be allowed a preference of 15% or the level of import duties, whichever is lower. Contracts for the construction of houses, offices and workshops (US\$0.6 million excluding contingencies) would not be attractive to international contractors, and would be awarded on the basis of competitive bidding advertised locally in accordance with local procedures acceptable to IDA. For contracts of less than US\$20,000 local shopping on the basis of several quotations would be acceptable.

Disbursements

3.17 The IDA credit would be disbursed during 1980-1984 as follows, and details are in Table 19.

	Amount Allocated (US\$ million)	% of expenditures to be financed
1. Plantation Establishment, Forest Management and Rural Nurseries		60% of total expenditures
(a) Building and Nurseries	0.5	
(b) Machinery and vehicles	1.0	
(c) Operating Costs	1.5	
2. Consultants' Services, Audits, Training, and Experts's Services (except salaries)	0.8	100% of total expenditures
3. Initial disbursement	0.2	
4. Unallocated	0.5	
	4.5	

3.18 Applications for credit withdrawal would be fully documented for vehicles and equipment as well as for expatriate staff, consultants and training, and certificates of expenditures would be required for Category 1 (other than vehicles and equipment). In the latter case, works would be led by the chief of the Fieldworks Division, accounts would be kept and controlled by the Financial Director who would retain documentation supporting these certificates of expenditure for inspection by supervision missions and external audits.

Accounts and Audit

3.19 OAPF, as a state enterprise, is required each year: (1) to have its accounts audited by the State Controller ("Commissaire aux Comptes"), and (2) to prepare a balance sheet and profit and loss statement for approval by its Board. However, while OAPF keeps its regular revenue and expenditure accounts up to date, it does not prepare annual budgets and has not issued a balance sheet or profit and loss statement since 1975, nor have its accounts been audited since 1974. As a result the management has little knowledge of OAPF's financial position through the year.

3.20 To remedy the situation, FAC has accepted a request from OAPF to send two financial assistance missions which would help (1) to review OAPF's accounting system; (2) to prepare a balance sheet and profit and loss statement for the agency as of December 31, 1978; and (3) to prepare a budget for the agency for FY 1979. The first mission carried out in November 1978 produced a preliminary report which shows that OAPF's financial situation would be sound.

The second mission, scheduled for February 1979, would produce a final report, including the 1978 balance sheet, on the financial position of OAPF. A condition of effectiveness of the proposed credit would be that this final report, on the financial position of OAPF would be satisfactory to IDA and approved by the Board of OAPF. Assurances were further obtained during negotiations that (1) OAPF would open a special project account which would be a condition of effectiveness of the Credit; (2) OAPF would maintain separate project accounts; (3) the project accounts as well as the accounts of OAPF as a whole would be audited annually by independent auditors acceptable to IDA; and (4) the audited statements would be submitted to IDA within six months after the end of the financial year. The employment of independent auditors would be initially financed out of the proceeds of the IDA Credit and then by Government (Table 10).

IV. ORGANIZATION AND MANAGEMENT

Organization

4.01 The project would be implemented by OAPF under the technical and administrative supervision of the Forestry Department, and the Director of OAPF would be the Project Director. Assurances were obtained during negotiations that the Project Director would have qualifications and experience acceptable to the Association.

4.02 The proposed project would be implemented by the existing organizational structure of OAPF at its Bamako headquarters, notably the four divisions dealing with field works, equipment and input supplies, marketing, and administration and finance. Each of these divisions would be strengthened and the field works division and equipment and supply division would be expanded with field sections in the La Faya and Monts Mandingues forest reserves. The pilot operations at Segou and Mopti would be managed by OAPF field agents under the administrative supervision of the Forestry District Inspector of the Forestry Department at Segou and Mopti. The design and technical supervision of the pilot operations would however be carried out in association with the consultants (para. 4.07). Similarly, the rural forestry nurseries at Segou, San and Mopti would be managed by OAPF field agents and supervised by the Forestry District Inspector in these towns, while the nursery near Bamako would be fully under OAPF authority. An OAPF organization chart is presented in Table 18.

4.03 The Project Director would be responsible for introducing a project monitoring and reporting system with the assistance of consultants (para 4.07). Assurances were obtained during negotiations to this effect. A further assurance was obtained that Government would, by the completion date, prepare a project completion report.

4.04 While a reorganization of OAPF for purposes of the proposed project would thus not be necessary, it is likely that, in view of the other activities in which OAPF is about to engage (para. 1.13), additional field divisions would be created which would add to the workload at headquarters, notably of the marketing and the administration and finance divisions. Assurances therefore were obtained during negotiations that, before implementing any organizational reforms during the project implementation period, an organization plan together with the proposed staffing would be submitted to the Association for approval.

Staffing (See Table 12)

4.05 To implement the project, it is estimated that ten additional forestry engineers, graduates from the Katibougou Polytechnic Institute, would be recruited by OAPF, most of which would fill the positions of field sector and subsector chiefs in the La Faya and Monts Mandingues forest reserves. Given the large availability of Katibougou graduates in the country, no difficulties are foreseen for their recruitment.

4.06 The post of Financial Director would be created: (a) to provide the OAPF director with financial management and accounting information; and (b) to strengthen the administration and finance division, and provide in-service training to its members. In addition, two mechanics would be required to manage the central OAPF workshop at Bamako and the two equipment maintenance units that would be established in the field. As persons with the desired qualifications for these three positions are not available in the country, it is expected that they would be recruited internationally and serve over the full five years of the implementation period at a total cost, excluding contingencies, of US\$9,500 per working month for the Financial Director (of which salary and related benefits are US\$5,700) and US\$7,700 for the mechanics (of which salary and related benefits are US\$4,400). Assurances were obtained during negotiations that these posts would be filled by persons on terms and conditions, and with qualifications and experience acceptable to the Association.

Consultant Services

4.07 In addition to the 12 man-months of consultant services needed to implement the complementary studies (para 3.09), provision has been made under the project for 27 man-months of consultant services at an average cost of US\$8,900 per month excluding contingencies (of which salary and related benefits are US\$6,300) to implement the different components of the project. Of these 27 man-months, 12 man-months, ranging from two to four man-months per year over four years, are necessary to design and supervise the irrigated pilot plantation at Mopti; the supervision would include in the last project year (1984) an in-depth analysis of the results obtained. The remaining fifteen man-months have been retained: (1) to monitor the tree plantation and natural forest management techniques that will be applied in the forest reserves close to Bamako and Segou; (2) to examine the feasibility of using different tree species for planting; and (3) to set up a monitoring and evaluation program and supervise its initial implementation by the field works division of OAPF. Draft terms of reference for the services of consultants have been made and assurances were obtained during negotiations that consultants would be appointed on terms and conditions, and with qualifications and experience acceptable to the Association.

Training

4.08 As specialized training in forestry techniques is already provided at Katibougou, and the Swiss Aid project includes a large component for the training of forestry field agents at the Tabacoro Center, training under the proposed project would be limited to practical in-service training by the OAPF expatriate staff in equipment maintenance and financial management, and by consultants in tree plantation techniques and natural forest management. Furthermore, US\$57,000, excluding contingencies, has been included in the project to provide scholarships for OAPF key personnel (visits to African forestry research centers and projects, participation in forestry seminars and workshops).

V. PRODUCTION, MARKETS, PRICES AND INCOME

Production

5.01 Bamako Rainfed Plantations. Gmelina, the main species to be planted over 3,400 ha near Bamako, is a tropical hardwood that can be used both as fuel and for construction purposes. The plantation production program is based on the first results of the ongoing rainfed plantations and the following assumptions:

- (a) a distinction of three soil types in descending order of soil quality, whereby on Type III soils (estimated to occupy 70% of the area) the quality of produce would only permit its use as fuelwood and building poles;
- (b) a plantation life of 24 years, after which trees would be cut and the land cleared for replanting;
- (c) a thinning cycle to harvest fuelwood, starting the sixth year after planting and ranging from once every six years to once every two years depending on soil quality; and
- (d) a cutting cycle to harvest timber starting the eleventh year after planting and repeated once every two to five years depending on soil quality.

5.02 On the basis of these assumptions, one average₃ ha of planted Gmelina would produce a mean annual increment (m.a.i.) of 8.17 m³ of fuelwood including building poles, and 1.42 m³ of timber, or a total m.a.i. of 9.59 m³ which is in line with wood yields from the existing plantations. Following the implementation schedule as outlined in para. 3.10, total production from the Bamako rainfed plantations would be as summarized below. Detailed production data are presented in Table 14.

Period	Fuelwood and Poles ----- '000 m ³ -----	Timber ----- '000 m ³ -----	Total
1981-85	83.5 /1	6.8 /1	90.4 /1
1986-90	150.4	-	150.4
1991-95	166.3	4.7	171.0
1996-2000	110.6	12.1	122.7
2001-05	130.0	49.3	179.3
2006-07	110.0	48.8	158.8

/1 From clearing of natural forest before planting. Total of five year period. For details see Table 14.

5.03 Plantation and Forest Management Trials. Given the experimental nature of the small tree plantations at Segou and Mopti and the forest management zones at Bamako and Segou, it would not be feasible to make well-founded production estimates at this stage. However, if managed correctly, a tentative m.a.i. estimate of the Segou rainfed plantation would be between 3 and 4 m³ per ha, while for the Mopti irrigated plantation it would vary between 6 and 15 m³ per ha. Management of the natural forest is expected to double present yields; thus, a m.a.i. of 1 m³ per ha could be reached around Bamako, and 0.7 m³ per ha around Segou.

Markets

5.04 Wood produced by the project is all expected to be absorbed by the domestic market. In view of the growing fuelwood shortage in Bamako, no marketing difficulties are foreseen; due to the dearth of regular truck transport facilities, however, OAPF itself would have to transport the wood to Bamako for sale to wholesalers. With the project, OAPF would about double its fuelwood supplies to Bamako, bringing up its share of the market from 4% to almost 8% on the basis of present (1978) consumption.

5.05 The sale of timber would enable OAPF to become a supplier to the construction business. The small but growing timber market (20,000 m³) is at present supplied partially through imports from the Ivory Coast; supplies from Southern Mali will become available when the Swiss bilateral aid project has been completed (para 1.13). As transport distances from these two sources of supply to Bamako are longer and transport costs higher than from the project plantation sites, no problems are expected in marketing project produce.

Prices

5.06 OAPF presently sells fuelwood to wholesalers at an average price of 2,800 MF per stère of 350 kg, which is equivalent to 8 MF per kg. One stère, as it is cut in the forest, contains about 10% of wood long and straight enough to be used as building poles, which are sold at 450 MF (US\$1.02) per pole at wholesale level. Assuming that on average thirteen poles weigh one stère, the actual weighted price of a stère of fuelwood is 3,105 MF (US\$7.05). For Gmelina logs to be used as timber, the actual price is about 25,000 MF (US\$57) per m³ delivered at Bamako mills.

5.07 Average annual fuelwood output from the project, estimated at about 44,500 steres, would not be sufficient to cover annual increases in consumption due to urban population growth (about 51,000 steres). It therefore cannot be expected that project output would succeed in containing price increases in real terms. Fuelwood prices would continue to rise as a consequence of increased fuelwood scarcity so that charcoal and, eventually,

kerosene would have to be used as a source of energy. The economic value of fuelwood would thus continue to rise until it equals the value of imported kerosene in terms of energy equivalent; based on IBRD projections of oil prices, this would be the case from 1990 onwards when one stère of fuelwood would be worth 5,600 MF in constant terms.

5.08 Prices for tropical hardwood logs in constant dollar terms, following IBRD projections, are expected to be between 20 and 30% higher in 1985 than in 1978, depending on the species. Gmelina logs produced on plantations, although not of primary hardwood quality, would be of good construction quality and able to compete with Samba wood presently imported from the Ivory Coast at a log price equivalent to between 30,000 and 35,000 MF (US\$68 to US\$80) per m³ at the Bamako sawmill. Taking into account that the first Gmelina logs would be produced only in the eleventh year after planting (1991), an average conservative price rise of 25% in constant terms has been assumed to value Gmelina timber output at that time.

Income

5.09 The project would generate revenue through the sale of wood from plantations and from managed natural forests. Revenue from tree plantations, which would constitute 85% of project-generated revenue, would materialize slowly, as the first fuelwood cuttings would only take place in the sixth year after planting and the first log cuttings from the eleventh year after planting onwards. However, wood from the low value natural forest, cut in order to establish the tree plantations, would be sold and produce revenue during the first five project years, estimated to total about MF 1,080 million (US\$2.5 million). Revenue expected to be generated over the life of the plantations would be as follows:

<u>Period</u>	<u>MF Million</u>	<u>US\$ Million</u>
1981-85	1,080	2.5
1986-90	1,070	2.4
1991-95	1,310	3.0
1996-2000	1,225	2.8
2001-05	2,560	5.8
2006-07	2,545	5.8

5.10 All revenue would accrue to OAPF. The project cash flow forecast (Table 20) shows that the above revenue would be sufficient to cover OAPF's contribution to the financing of the project as well as maintenance expenditures and operating costs on plantations and managed forests from the sixth project year onwards. Assurances were obtained, at negotiations, that OAPF would continue to operate and maintain the project's plantations and managed natural forests after the end of the project period out of this cash-flow.

VI. BENEFITS AND JUSTIFICATION

A. Project Benefits

6.01 The project would generate direct benefits through increased plantation wood production. It would also lay the groundwork for future investment decisions in the forestry sector as it would: (1) provide information on sustained wood yields and introducing irrigation trials as a means to accelerate tree growth in dryer areas; (2) provide tree plants to villagers and carry out studies that should lead to appropriate actions in the rural forestry field; and (3) introduce natural forest management techniques which if applied successfully would increase wood yields from the natural forest and, at the same time, provide much needed revenue for the Forestry Department.

6.02 Environmental Impact. The impact of the project on the environment would be substantial. Calculations show that fuelwood production from the 3,400 ha of plantations would be sufficient to forego the cutting of large areas of bush fallow -- some 10,000 ha at the beginning of production to some 30,000 ha in later years when population pressure would have obliged farmers to cultivate all the available land in the Bamako area. This would (a) help to prevent soil erosion and (b) lengthen the time that land would remain under bush fallow, thus increasing fertility generation. Under the traditional shifting cultivation system still common in Mali, which depends heavily on natural fertility generation through long fallow periods rather than fertilizer applications, longer bush fallows represent an important benefit.

B. Economic Analysis

6.03 In calculating the economic rates of return, the following assumptions were made:

- (a) calculations were made only on the Bamako tree plantation component in view of the experimental nature of the other project components. For the Bamako tree plantation component, both the direct benefits from increased wood production and the benefits derived from longer bush fallow periods in the form of higher crop yields (increase of 100 kg/ha of millet production), have been calculated;
- (b) project life has been based on the average life of a Gmelina plantation block of 24 years;
- (c) a standard conversion factor of 0.88 was used for all local costs to express them in terms of border prices;

- (d) the market wage rate of 545 MF (US\$1.24) per manday has been used for project laborers; this is about 10% above their average opportunity cost and reflects the general scarcity of labor during the tree planting season; and
- (e) wood output has been valued at import substitution prices. For fuelwood a time lag has been assumed in reaching such prices, expressing the time it would take for fuelwood to become so scarce that its price would equate import prices in terms of energy equivalent. For timber, value assumptions are based on actual 1978 prices of comparable hardwoods presently imported and have been adjusted according to IBRD price projections for 1985.

6.04 Based on the above assumptions, the estimated internal economic rate of return on the Bamako tree plantation component is about 11%. Excluding the benefits due to longer bushfallow periods, the estimated economic rate of return is about 9%. This, however, does not fully express the project's importance to Mali's forestry sector: it excludes probable values to be derived from the trials and experiments; it does not reflect the strengthening of OAPF that would result from the project through better financial management and increased revenues; nor does it account fully for the environmental impact the project would have, notably the prevention of soil erosion which in the area around Bamako is shown to have strong desertification effects.

6.05 Sensitivity Analysis. Several tests were made to determine the sensitivity of the rate of return to various alternative assumptions. With a 10% increase in cost, the estimated rate of return would fall to 9.5%. A delay in plantation establishment of one year without any changes in costs would reduce the rate of return to 9.0%. Slower tree growth reducing the benefits by 10% would reduce the rate of return to 9.3%. If benefits would increase by 10% without any increases in costs, the rate of return would increase to 12.2%.

6.06 Risks. There are no known abnormal technical risks for the Bamako tree plantation component as the Gmelina species has proved itself to be well adapted to local conditions and to give satisfactory yields. The results of the pilot plantations are inherently uncertain, given the experimental nature of these plantations.

VII. AGREEMENTS REACHED AND RECOMMENDATION

7.01 During negotiations, the Bank obtained assurances from Government that:

- (a) consultants would be appointed on terms and conditions and with qualifications and experiences acceptable to the Association (paras 3.09 and 4.07);
- (b) OAPF would deposit all revenue from wood sales derived from clearing of forest areas under the Project into a separate account (para. 3.14);
- (c) should any disbursement out of the special account fail to meet the conditions for financing out of the proceeds of the Credit, Government would deposit the corresponding amount into that account (para 3.15);
- (d) OAPF would maintain separate accounting of the project funds (para 3.20);
- (e) the project accounts as well as the accounts of OAPF as a whole would be audited annually by independent auditors acceptable to IDA and the audited statements would be submitted to IDA within six months after the end of the financial year (para 3.20);
- (f) the Project Director would have qualifications and experiences acceptable to the Association (para 4.01);
- (g) the Project Director would introduce a project reporting and monitoring system (para 4.03);
- (h) Government would, by the closing date, prepare a project completion report (para 4.03);
- (i) before implementing any organizational reforms during the project implementation period, an organizational plan together with the proposed staffing would be submitted to the Association for approval (para 4.04);
- (j) the post of Financial Director and the two posts for Mechanics would be filled by persons with qualifications and experiences and employed under terms and conditions acceptable to the Association (para 4.06); and
- (k) OAPF would continue to operate the project's plantations and managed natural forests after the end of the project period (para 5.10).

7.02 Conditions of credit effectiveness would be:

- (a) a special project account has been opened by Government (para 3.20);
- (b) the Association has been informed that all conditions precedent to the assignment of expatriate personnel for the first two years of the Project have been met (para 3.13);
- (c) the Association has been informed that all conditions precedent to the disbursement to Government of the CCCE loan have been met (para 3.13);
- (d) the financing agreement between OAPF and Government has been signed (para 3.13); and
- (e) a report satisfactory to IDA on the 1978 financial position of OAPF has been approved by the Board of OAPF (para 3.20).

7.03 With the indicated assurances and conditions, the project would be suitable for an IDA credit of US\$4.5 million to the Government of Mali.

MALI

FORESTRY PROJECT / PROJET FORESTIER

Total Annual Project Costs per Component / COUTS TOTAUX DU PROJET PAR ANNEE ET PAR COMPOSANTE
(In Million Fc / EN MILLIONS FM)

Component COMPOSANTE	PY0 1980	PY1 1981	PY2 1982	PY3 1983	PY4 1984	Total Before Contingencies AVANT IMPREVUS	Contingencies/IMPREVUS		Total After Contingencies APRES IMPREVUS
							Physical PHYSIQUES	Price HAUSSE DES PRIX	
1. Bamako Rainfed Tree Plantation/ PLANTATION FORESTIERE EN SEC BAMAKO	614.3	542.2	428.1	508.4	484.9	<u>2,577.9</u>	183.5	765.5	<u>3,526.9</u>
2. Segou Rainfed Tree Plantation/ PLANTATION FORESTIERE EN SEC SEGOU	10.8	7.0	6.1	3.3	2.7	<u>29.9</u>	2.3	7.6	<u>39.8</u>
3. Bamako Natural Forest Management/ AMENAGEMENT FORET NATURELLE BAMAKO	-	44.6	21.4	22.2	21.6	<u>109.8</u>	9.4	35.6	<u>154.8</u>
4. Segou Natural Forest Management/ AMENAGEMENT FORET NATURELLE SEGOU	8.4	5.0	5.0	5.4	5.1	<u>28.9</u>	2.3	8.4	<u>39.6</u>
5. Mopti Partially Irrigated Tree Plantation/PLANTATION FORESTIERE PARTIELLEMENT IRRIGUEE MOPTI	21.7	35.5	25.0	44.2	4.9	<u>131.3</u>	7.9	37.7	<u>176.9</u>
6. Rural Forestry Nurseries PEPINIERES RURALES FORESTIERES	6.8	10.3	10.3	10.3	10.3	<u>48.0</u>	4.3	15.5	<u>67.8</u>
7. Training, Studies and Audit FORMATION, ETUDES ET AUDIT	5.0	46.4	25.8	10.2	20.8	<u>108.2</u>	4.6	31.7	<u>144.5</u>
Total before Contingencies TOTAL AVANT IMPREVUS	<u>667.0</u>	<u>691.0</u>	<u>521.7</u>	<u>604.0</u>	<u>550.3</u>	<u>3,034.0</u>	214.3	902.0	<u>4,150.3</u>
Physical Contingencies IMPREVUS PHYSIQUES	56.3	47.6	32.7	41.3	36.4	<u>214.3</u>			
Price Contingencies IMPREVUS POUR HAUSSE DES PRIX	101.3	155.1	155.1	232.4	258.1	<u>902.0</u>			
Total after Contingencies TOTAL APRES IMPREVUS	<u>824.6</u>	<u>893.7</u>	<u>709.5</u>	<u>877.7</u>	<u>844.8</u>	<u>4,150.3</u>			

MALI

FORESTRY PROJECT / PROJET FORESTIER

Total Annual Project Costs per Category of Expenditure / COUTS TOTAUX DU PROJET PAR ANNEE ET PAR CATEGORIE DE DEPENSE

(In million ~~FF~~/EN MILLION FM)

	PY0 1980	PY1 1981	PY2 1982	PY3 1983	PY4 1984	Total Before Contingencies AVANT IMPREVUS
1. Building & Nursery Establishment BATIMENTS ET CREATION DE PEPINIERS	160.9	77.3	11.0	11.5	-	<u>260.7</u>
2. Machinery & Vehicles ENGINS & VEHICULES	321.9	148.8	27.3	80.1	113.3	<u>691.4</u>
3. Forestry Field Works TRAVAUX FORESTIERS	38.9	175.8	224.8	258.5	193.2	<u>891.2</u>
4. Supervisory Staff PERSONNEL ENCADREMENT	30.3	50.1	50.1	50.1	50.1	<u>230.7</u>
5. Expatriates & Consultants EXPATRIES ET CONSULTANTS	74.1	163.8	144.3	140.4	136.5	<u>659.1</u>
6. Staff Operating Costs FRAIS FONCTIONNEMENT ENCADREMENT	40.9	75.2	64.2	63.4	57.2	<u>300.9</u>
Total before Contingencies TOTAL AVANT IMPREVUS	<u>667.0</u>	<u>691.0</u>	<u>521.7</u>	<u>604.0</u>	<u>550.3</u>	<u>3.034.0</u>
Physical Contingencies IMPREVUS PHYSIQUES	56.3	47.6	32.7	41.3	36.4	214.3
Price Contingencies IMPREVUS POUR HAUSSE DES PRIX	101.3	155.1	155.1	232.4	258.1	902.0
Total after Contingencies TOTAL APRES IMPREVUS	<u>824.6</u>	<u>893.7</u>	<u>709.5</u>	<u>877.7</u>	<u>844.8</u>	<u>4.150.3</u>

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Table 2

MALI

FORESTRY PROJECT / PROJET FORESTIER

Total Project Costs per Category of Expenditure and per Component / COUTS TOTAUX DU PROJET PAR CATEGORIE DE DEPENSES ET PAR COMPOSANT

(in Million MF / EN MILLION FM)

	Investments INVESTISSEMENTS		Forestry Field Works TRAVAUX FORESTIERS		Staff Salaries SALAIRES PERSONNEL ENCAIEMENT			Staff Operating Costs FRAIS FONCTIONNEMENT ENCAIEMENT			TOTAL before Contingencies AVANT IMPREVUS	CONTINGENCIES IMPREVUS		TOTAL after Contingencies APRES IMPREVUS
	Buildings BATIMENTS Nursery Establishment CREATION DE PEPINIERS	Machinery & Vehicles MACHINERIE & VEHICULES	Machinery & Vehicles FONCTIONNEMENT MACHINERIE & VEHICULES	Part Time Laborers MANOEUVRES SAISONNIERS	Supervisory Staff PERSONNEL D'ENCAIEMENT	Overheads FRAIS GENERAUX	Expatriates & Consultants EXPATRIES & CONSULTANTS	Supervisory Staff PERSONNEL D'ENCAIEMENT	Overheads FRAIS GENERAUX	Expatriates & Consultants EXPATRIES & CONSULTANTS		Physical IMPREVUS	Price HAUSSE DES PRIX	
1. Bamako Rainfed Tree Plantation PLANTATION FORESTIERE EN SEC BAMAKO	218.5	654.8	552.3	207.1	134.0	59.2	549.9	55.2	51.8	96.1	2,577.9	183.3	765.5	3,526.9
2. Segou Rainfed Tree Plantation PLANTATION FORESTIERE EN SEC SEGOU	1.6	7.7	6.7	2.5	6.2	p.m.	p.m.	5.2	p.m.	p.m.	29.9	2.3	7.6	39.8
3. Bamako Natural Forest Management AMENAGEMENT DE LA FORET NATURELLE BAMAKO	22.5	1.5	36.6	31.6	15.4	p.m.	p.m.	2.2	p.m.	p.m.	166.8	0.6	35.6	154.8
4. Segou Natural Forest Management AMENAGEMENT DE LA FORET NATURELLE SEGOU	0.4	8.3	4.1	4.7	6.2	p.m.	p.m.	5.2	p.m.	p.m.	28.9	2.7	8.4	39.6
5. Mopti Partially Irrigated Tree Plantation PLANTATION FORESTIERE PARTIALEMENT IRRIGUE MOPTI	15.4	15.9	16.5	4.0	5.1	p.m.	46.8	12.0	p.m.	15.6	151.3	7.9	37.7	176.9
6. Rural Forestry Nurseries PEPINIERS FORESTIERS RURALES	2.3	3.2	17.6	7.5	4.6	p.m.	p.m.	12.8	p.m.	p.m.	48.0	4.4	15.5	67.8
7. Training, Studies & Audit FORMATION, ETUDES ET AUDIT	-	-	-	-	-	p.m.	62.4	25.0	p.m.	20.8	108.2	4.6	31.7	144.5
Total before Contingencies TOTAL AVANT IMPREVUS	260.7	691.4	633.8	257.4	196.5	59.2	652.1	117.0	51.8	131.5	3,036.0	214.3	802.0	4,150.3
Physical Contingencies IMPREVUS PHYSIQUES	26.0	69.2	63.3	25.7	-	-	-	11.7	5.2	13.2	214.3			
Price Contingencies IMPREVUS POUR HAUSSE DES PRIX	50.6	178.8	221.2	90.6	51.9	17.0	195.8	30.4	17.2	62.5	902.0			
Total after Contingencies TOTAL APRES IMPREVUS	337.3	939.4	918.3	373.7	223.4	76.2	854.9	165.7	74.2	187.2	4,150.3			
Foreign Currency DEVISES ETRANGERES	60	90	70	-	-	-	14.0	0	60	60	67.5			
Million MF FM	202.4	845.5	647.8	-	-	-	854.9	99.4	64.5	112.4	2,811.8			

MALI

FORESTRY PROJECT / PROJET FORESTIER

BAMAHO - Rainfed Tree Plantation Component / COMPOSANTE PLANTATION FORESTIERE EN SEC

Total Costs / COUTS TOTAUX
(In '000 MF/EN '000 FM)

	PY0 1980	PY1 1981	PY2 1982	PY3 1983	PY4 1984	Total Before Contingencies AVANT IMPREVUS
1. Building & Nursery Establishment BATIMENTS ET CREATION DE PEPINIERES	153,000	54,500	11,000	-	-	<u>218,500</u>
2. Machinery & Vehicles ENCINS & VEHICULES	300,650	141,650	21,400	78,050	113,000	<u>654,750</u>
3. Forestry Field Works TRAVAUX FORESTIERS	37,800	141,060	190,240	224,380	165,920	<u>759,400</u>
4. Supervisory Staff PERSONNEL ENCADREMENT	27,549	41,433	41,433	41,433	41,433	<u>193,281</u>
5. Expatriates & Consultants EXPATRIES & CONSULTANTS	66,300	120,900	120,900	120,900	120,900	<u>549,900</u>
6. Staff Operating Costs FRAIS FONCTIONNEMENT ENCADREMENT	28,950	42,650	43,150	43,650	43,650	<u>202,050</u>
Total before Contingencies TOTAL AVANT IMPREVUS	<u>614,249</u>	<u>542,193</u>	<u>428,123</u>	<u>508,413</u>	<u>484,903</u>	<u>2,577,881</u>
Physical Contingencies IMPREVUS PHYSIQUES	52,040	37,986	26,579	34,608	32,257	183,470
Price Contingencies IMPREVUS POUR HAUSSE DES PRIX	93,280	121,838	127,316	195,487	227,550	765,471
Total after Contingencies TOTAL APRES IMPREVUS	<u>759,569</u>	<u>702,017</u>	<u>582,018</u>	<u>738,058</u>	<u>744,710</u>	<u>3,526,822</u>

MALI

FORESTRY PROJECT / PROJET FORESTIER

SEGOU - Rainfed Tree Plantation Component / COMPOSANTE PLANTATION FORESTIERE EN SEC

Total Costs / COUTS TOTAUX
(In '000 MF/EN '000 FM)

	PY0 1980	PY1 1981	PY2 1982	PY3 1983	PY4 1984	Total Before Contingencies AVANT IMPREVUS
1. Building & Nursery Establishment BATIMENTS & CREATION DE PEPINIERES	1,575	-	-	-	-	<u>1,575</u>
2. Machinery & Vehicles ENGINS & VEHICULES	7,050	300	-	375	-	<u>7,725</u>
3. Forestry Field Works TRAVAUX FORESTIERS	898	4,145	3,565	408	180	<u>9,196</u>
4. Supervisory Staff PERSONNEL ENCADREMENT	690	1,380	1,380	1,380	1,380	<u>6,210</u>
5. Expatriates & Consultants EXPATRIES ET CONSULTANTS	pm	pm	pm	pm	pm	pm
6. Staff Operating Costs FRAIS FONCTIONNEMENT ENCADREMENT	575	1,150	1,150	1,150	1,150	<u>5,175</u>
Total before Contingencies TOTAL AVANT IMPREVUS	<u>10,788</u>	<u>6,975</u>	<u>6,095</u>	<u>3,313</u>	<u>2,710</u>	<u>29,881</u>
Physical Contingencies IMPREVUS PHYSIQUES	1,010	560	471	193	133	2,367
Price Contingencies IMPREVUS POUR HAUSSE DES PRIX	1,652	1,582	1,838	1,262	1,251	7,585
Total after Contingencies TOTAL APRES IMPREVUS	<u>13,450</u>	<u>9,117</u>	<u>8,404</u>	<u>4,768</u>	<u>4,094</u>	<u>39,833</u>

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Table 5

MALI

FORESTRY PROJECT / PROJET FORESTIER

BAMAHO - Natural Forest Management Component / COMPOSANTE AMENAGEMENT FORET NATURELLE

Total Costs / COUITS TOTAUX
(In '000 MF/EN '000 FM)

	PY0 1980	PY1 1981	PY2 1982	PY3 1983	PY4 1984	Total Before Contingencies AVANT IMPREVUS
1. Building & Nursery Establishments BATIMENTS ET CREATION PEPINIERES	-	22,500	-	-	-	<u>22,500</u>
2. Machinery & Vehicles ENGINS & VEHICULES	-	750	-	750	-	<u>1,500</u>
3. Forestry Field Works TRAVAUX FORESTIERS	-	16,930	17,008	17,085	17,163	<u>68,186</u>
4. Supervisory Staff PERSONNEL ENCADREMENT	-	3,840	4,840	3,840	3,840	<u>15,360</u>
5. Expatriates & Consultants EXPATRIES ET CONSULTANTS	-	pm	pm	pm	pm	pm
6. Staff Operating Costs FRAIS FONCTIONNEMENT ENCADREMENT	-	550	550	550	550	<u>2,200</u>
Total before Contingencies TOTAL AVANT IMPREVUS	-	<u>44,570</u>	<u>21,398</u>	<u>22,225</u>	<u>21,553</u>	<u>109,746</u>
Physical Contingencies IMPREVUS PHYSIQUES	-	4,073	1,756	1,839	1,771	9,439
Price Contingencies IMPREVUS POUR HAUSSE DES PRIX	-	10,215	6,483	8,663	10,263	35,624
Total after Contingencies TOTAL APRES IMPREVUS	-	<u>58,858</u>	<u>29,637</u>	<u>32,727</u>	<u>33,587</u>	<u>154,809</u>

MALI

FORESTRY PROJECT / PROJET FORESTIER

SEGOU - Natural Forest Management Component / COMPOSANTE AMENAGEMENT FORET NATURELLE

Total Costs / COUTS TOTAUX
(In '000 MF/EN '000 FM)

	PY0 1980	PY1 1981	PY2 1982	PY3 1983	PY4 1984	Total Before Contingencies AVANT IMPREVUS
1. Building & Nursery Establishments BATIMENTS & CREATION DE PEPINIERES	375	-	-	-	-	<u>375</u>
2. Machinery & Vehicles ENGINS & VEHICULES	6,750	300	300	675	300	<u>8,325</u>
3. Forestry Field Works TRAVAUX FORESTIERS	-	2,145	2,181	2,217	2,253	<u>8,796</u>
4. Supervisory Staff PERSONNEL ENCADREMENT	690	1,380	1,380	1,380	1,380	<u>6,210</u>
5. Expatriates & Consultants EXPATRIES & CONSULTANTS	pm	pm	pm	pm	pm	pm
6. Staff Operating Costs FRAIS FONCTIONNEMENT ENCADREMENT	575	1,150	1,150	1,150	1,150	<u>5,175</u>
Total before Contingencies TOTAL AVANT IMPREVUS	<u>8,390</u>	<u>4,975</u>	<u>5,011</u>	<u>5,422</u>	<u>5,083</u>	<u>28,881</u>
Physical Contingencies IMPREVUS PHYSIQUES	770	360	363	404	370	2,267
Price Contingencies IMPREVUS POUR HAUSSE DES PRIX	1,282	1,120	1,505	2,097	2,399	8,403
Total after Contingencies TOTAL APRES IMPREVUS	<u>10,442</u>	<u>6,455</u>	<u>6,879</u>	<u>7,923</u>	<u>7,852</u>	<u>39,551</u>

MALI

FORESTRY PROJECT / PROJET FORESTIER

MOPTI - Partially Irrigated Tree Plantation Component / COMPOSANTE PLANTATION FORESTIERE PARTIELLEMENT IRRIGUEE

Total Costs / COUTS TOTAUX
(In '000 MF/EN '000 FM)

	PY0 1980	PY1 1981	PY2 1982	PY3 1983	PY4 1984	Total Before Contingencies AVANT IMPREVUS
1. Building & Nursery Establishments BATIMENTS & CREATION DE PEPINIERES	3,640	270	-	11,485	-	<u>15,395</u>
2. Machinery & Vehicles ENGINS & VEHICULES	4,250	5,800	5,600	250	-	<u>15,900</u>
3. Forestry Field Works TRAVAUX FORESTIERS	-	5,262	5,588	8,205	1,434	<u>20,490</u>
4. Supervisory Staff PERSONNEL ENCADREMENT	1,020	1,020	1,020	1,020	1,020	<u>5,100</u>
5. Expatriates & Consultants EXPATRIES ET CONSULTANTS	7,800	15,600	7,000	15,600	-	<u>46,800</u>
6. Staff Operating Costs FRAIS FONCTIONNEMENT ENCADREMENT	4,992	7,592	4,992	7,592	2,392	<u>27,560</u>
Total before Contingencies TOTAL AVANT IMPREVUS	<u>21,702</u>	<u>35,544</u>	<u>25,000</u>	<u>44,152</u>	<u>4,846</u>	<u>131,244</u>
Physical Contingencies IMPREVUS PHYSIQUES	1,288	1,892	1,618	2,753	383	7,934
Price Contingencies IMPREVUS POUR HAUSSE DES PRIX	3,219	7,862	7,453	16,885	2,301	37,720
Total after Contingencies TOTAL APRES IMPREVUS	<u>26,209</u>	<u>45,298</u>	<u>34,071</u>	<u>63,790</u>	<u>2,530</u>	<u>178,898</u>

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Table 9

MALI

FORESTRY PROJECT / PROJET FORESTIER

Rural Forestry Nurseries Component / COMPOSANTE PEPINIERES FORESTIERES RURALES

Total Cost / COUTS TOTAUX
(In '000 MF/EN '000 FM)

	PY0 1980	PY1 1981	PY2 1982	PY3 1983	PY4 1984	Total before Contingencies AVANT IMPREVUS
1. Building & Nursery Establishments BATIMENTS & CREATION DE PEPINIERES	2,350	-	-	-	-	<u>2,350</u>
2. Machinery & Vehicles ENGINES & VEHICULES	3,200	-	-	-	-	<u>3,200</u>
3. Forestry Field Works TRAVAUX FORESTIERS	-	6,250	6,250	6,250	6,250	<u>25,000</u>
4. Supervisory Staff PERSONNEL ENCADREMENT	510	1,020	1,020	1,020	1,020	<u>4,590</u>
5. Expatriates & Consultants EXPATRIES & CONSULTANTS	pm	pm	pm	pm	pm	pm
6. Staff Operating Costs FRAIS FONCTIONNEMENT ENCADREMENT	750	3,000	3,000	3,000	3,000	<u>12,750</u>
Total before Contingencies TOTAL AVANT IMPREVUS	<u>6,810</u>	<u>10,270</u>	<u>10,270</u>	<u>10,270</u>	<u>10,270</u>	<u>47,890</u>
Physical Contingencies IMPREVUS PHYSIQUES	630	925	925	925	925	4,330
Price Contingencies IMPREVUS POUR HAUSSE DES PRIX	1,042	2,351.	3,135	4,030	4,926	15,484
Total after Contingencies TOTAL APRES IMPREVUS	<u>8,482</u>	<u>13,546</u>	<u>14,330</u>	<u>15,225</u>	<u>16,121</u>	<u>67,704</u>

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Table 9

MALI

FORESTRY PROJECT / PROJET FORESTIER

Training, Studies and Audit / FORMATION, ETUDES ET AUDIT

Total Costs / COUTS TOTAUX
(In '000 MF/EN '000 FM)

	PY0 1980	PY1 1981	PY2 1982	PY3 1983	PY4 1984	Total Before Contingencies AVANT IMPREVUS
1. Building & Nursery Establishments BATIMENTS ET CREATION DE PEPINIERES	-	-	-	-	-	-
2. Machinery & Vehicles ENGINS & VEHICULES	-	-	-	-	-	-
3. Forestry Field Works TRAVAUX FORESTIERS	-	-	-	-	-	-
4. Supervisory Staff PERSONNEL ENCADREMENT	-	-	-	-	-	-
5. Expatriates & Consultants EXPATRIES & CONSULTANTS	-	27,300	15,600	3,900	15,600	62,400
6. Staff Operating Costs FRAIS FONCTIONNEMENT ENCADREMENT	5,000	19,000	10,200	6,300	5,200	45,800
Total before Contingencies TOTAL AVANT IMPREVUS	<u>5,000</u>	<u>46,400</u>	<u>25,800</u>	<u>10,200</u>	<u>20,800</u>	<u>108,200</u>
Physical Contingencies IMPREVUS PHYSIQUES	500	1,910	1,020	630	520	4,500
Price Contingencies IMPREVUS POUR HAUSSE DES PRIX	770	10,145	7,510	3,899	9,381	31,705
Total after Contingencies TOTAL APRES IMPREVUS	<u>6,270</u>	<u>58,455</u>	<u>34,330</u>	<u>14,729</u>	<u>30,701</u>	<u>144,485</u>

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Table 10

MALI

FORESTRY PROJECT / PROJET FORESTIER

Labor Requirements / BESOINS EN MAIN D'OEUVRE

		PY0 1980	PY1 1981	PY2 1982	PY3 1983	PY4 1984	TOTAL
Bamako Rainfed Tree Plantation PLANTATION FORESTIERE EN SEC BAMAKO	'000 man-day / HOMME-JOUR	12.0	55.3	73.7	87.2	67.6	295.8
	Million MF/FM						207.1
Segou Rainfed Tree Plantation PLANTATION FORESTIERE EN SEC SEGOU	'000 man-day / HOMME-JOUR	0.3	1.7	1.5	0.1	-	3.6
	Million MF/FM						2.5
Bamako Natural Forest Management AMENAGEMENT FORET NATURELLE BAMAKO	'000 man-day / HOMME-JOUR	-	11.3	11.3	11.3	11.3	45.2
	Million MF/FM						31.6
Segou Natural Forest Management AMENAGEMENT FORET NATURELLE SEGOU	'000 man-day / HOMME-JOUR	-	1.7	1.7	1.7	1.7	6.8
	Million MF/FM						4.7
Mopti Partially Irrigated Tree Plantation PLANTATION FORESTIERE PARTIELLEMENT IRRIGUEE MOPTI	'000 man-day / HOMME-JOUR	-	1.8	1.7	1.9	0.3	5.7
	Million MF/FM						4.0
Rural Forestry Nurseries PEPINIERES FORESTIERES RURALES	'000 man-day / HOMME-JOUR	-	2.7	2.7	2.7	2.7	10.8
	Million MF/FM 1978 prices						7.5
TOTAL	'000 man-day / HOMME JOUR	12.3	74.5	92.6	104.9	83.6	367.9
	Million FM/MF (1968 constant prices)	8.6	52.1	64.8	73.4	58.5	257.4

Table 12

		PY0 1980	PY1 1981	PY2 1982	PY3 1983	PY4 1984
<u>MALI</u>						
<u>FORESTRY PROJECT / PROJET FORESTIER</u>						
<u>Supervisory Staff Requirements / BESOINS EN PERSONNEL D'ENCADREMENT</u>						
<hr/>						
1.	<u>Bamako Rainfed Tree Plantation</u> <u>PLANTATION EN SEC</u>					
	Forest Officers / INGENIEUR FORESTIERS	Cat A ₁	9(6m)	9	9	9
	Technicians / TECHNICIENS	Cat B ₂	10(6m)	10	10	10
	Clerks / COMMIS		6(6m)	6	6	6
	Drivers / CHAUFFEURS		6(6m)	6	6	6
2.	<u>SEGOU Rainfed Tree Plantation</u> <u>PLANTATION EN SEC</u>					
	Technician / TECHNICIEN	Cat B	1(6m)	1	1	1
	"Preposé"	Cat C 3/	0,5(6m)	0,5	0,5	0,5
	Forest District Staff / PERSONNEL INSPECTION FORESTIERE		p.m.	p.m.	p.m.	p.m.
3.	<u>BAMAKO Natural Forest Management</u> <u>AMENAGEMENT FORET NATURELLE</u>					
	Forestry Officer / INGENIEUR FORESTIER	Cat A	-	1	1	1
	Technician / TECHNICIEN	Cat B	-	2	2	2
4.	<u>SEGOU Natural Forest Management</u> <u>AMENAGEMENT FORET NATURELLE</u>					
	Technician / TECHNICIEN	Cat B	1(6m)	1	1	1
	"Preposé"	Cat.C 3/	0,5(6m)	0,5	0,5	0,5
	Forest District Staff / PERSONNEL INSPECTION FORESTIERE		p.m.	p.m.	p.m.	p.m.
5.	<u>MOPTI Partially Irrigated Plantation</u> <u>PLANTATION PARTIELLEMENT IRRIGUEE</u>					
	Technician / TECHNICIEN	Cat B	1	1	1	1
	Forest District Staff / PERSONNEL INSPECTION FORESTIERE		p.m.	p.m.	p.m.	p.m.
6.	<u>Rural Forestry Nurseries</u> <u>PEPINIERES FORESTIERES RURALES</u>					
	Technician / TECHNICIEN	Cat B	1	1	1	1
	OAPF and Forest District Staff PERSONNEL OAPF ET INSPECTION FORESTIERE		p.m.	p.m.	p.m.	p.m.
	Total Supervisory Staff TOTAL PERSONNEL ENCADREMENT		34(6m)	39	39	39
			2			
7.	<u>OAPF Headquarters (OAPF who spend 50% of their time on the project) / SIEGE OAPF (PERSONNEL OAPF TRAVAILLANT A 50% POUR LE PROJET)</u>					
	Director / DIRECTEUR	Cat A ₂	1	1	1	1
	Division Chief / CHIEF DE DIVISION	Cat A ₁	5	5	5	5
	Division Deputy Chief / CHEF ADJOINT DE DIVISION	Cat B ₁	2	2	2	2
		Cat C	7	7	7	7
	Clerks / COMMIS		8	8	8	8
	Drivers / CHAUFFEURS		5	5	5	5
	Subtotal / SOUS TOTAL		28	28	28	28

MALI

FORESTRY PROJECT / PROJET FORESTIER

Civil Servants Salaries / SALAIRES DES FONCTIONNAIRES

(In Million MF / EN MILLION FM)

including contingencies

	PY0 1980	PY1 1981	PY2 1982	PY3 1983	PY4 1984	TOTAL
Bamako Rainfed Tree Plantation PLANTATION FORESTIERE EN SEC BAMAKO	17.7	28.6	30.3	32.2	34.0	<u>142.8</u>
Segou Rainfed Tree Plantation PLANTATION FORESTIERE EN SEC SEGOU	0.5	1.2	1.2	1.3	1.4	<u>5.6</u>
Bamako Natural Forest Management AMENAGEMENT FORET NATURELLE BAMAKO	-	3.1	3.3	3.5	3.7	<u>13.6</u>
Segou Natural Forest Management AMENAGEMENT FORET NATURELLE SEGOU	0.5	1.2	1.2	1.3	1.4	<u>5.6</u>
Mopti Partially Irrigated Tree Plantation PLANTATION PARTIELLEMENT IRRIGUEE MOPTI	0.8	0.9	0.9	1.0	1.0	<u>4.6</u>
Rural Forestry Nurseries PEPINIERES FORESTIERES RURALES	0.4	0.9	0.9	1.0	1.0	<u>4.2</u>
	<u>19.9</u>	<u>35.9</u>	<u>37.8</u>	<u>40.3</u>	<u>42.5</u>	<u>176.4</u>

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Table 14

MALI
FORESTRY PROJECT / PROJET FORESTIER
BAMAKO - Rainfed Tree Plantation Component /
COMPOSANTE PLANTATION FORESTIERE EN SEC
Total Wood Production / PRODUCTION TOTALE DE BOIS 1/ 2/

	<u>Fuelwood and Poles</u>		<u>Timber</u> m ³	<u>TOTAL</u> m ³
	<u>st 3/</u>	<u>m³ 3/</u>		
0	-	-	-	-
1	33,000	16,500	1,200	17,700
2	44,000	22,000	1,600	23,600
3.	55,000	22,500	2,000	24,500
4.	55,000	22,500	2,000	24,500
5.	-	-	-	-
6.	37,800	23,625	-	23,625
7.	50,400	31,500	-	31,500
8.	69,600	43,500	-	43,500
9.	71,800	44,875	-	44,875
10.	11,000	6,875	-	6,875
11.	17,000	10,625	480	11,105
12.	47,000	29,375	1,000	30,375
13.	62,000	38,750	1,240	39,990
14.	75,000	46,875	1,400	48,275
15.	65,000	40,625	600	41,225
16.	7,200	4,500	1,500	6,060
17.	9,600	6,000	2,080	8,080
18.	44,400	27,750	2,600	30,350
19.	55,200	34,500	2,600	37,100
20.	60,600	37,875	3,240	41,115
21.	62,800	39,250	4,320	43,570
22.	11,000	6,875	5,400	12,275
23.	11,000	6,875	5,400	12,275
24.	52,800	33,000	14,640	47,640
25.	70,400	44,000	19,520	63,520
26.	88,000	55,000	24,400	79,400
27.	88,000	55,000	24,400	79,400

1/ Clearing of existing natural forest (from Year 0 to Year 4)
 Fuelwood and poles 55 st/ha, Timber 2 m³/ha.

2/ Tree plantation mean annual increment (MAI)/ACCROISSEMENT MOYEN ANNUEL DE
 LA PLANTATION FORESTIERE

<u>Year</u>	<u>Fuelwood and Poles (st)</u>	<u>Timber (m³)</u>
6	63	-
8	11	-
11	10	0.8
12	65	0.6
16	12	2.6
18	54	-
20	11	5.4
24	88	24.4
TOTAL	314 st	33.8 m ³
	or	
	196.3 m ³	

3/ Mean annual incurrent/
 ACCROISSEMENT MOYEN ANNUEL $\frac{196.3 \times 33.8}{24}$ 9.59 m³/ha/year

From Year 0 to Year 4 1 m³(r) 2.0 st (Natural Forest Wood/BOIS FORET NATURELLE)
 From Year 5 to Year 27 1 m³(r) 1.6 st (Plantation Wood/BOIS DE PLANTATION)

MALI

FORESTRY PROJECT / PROJET FORESTIER

Wood Sales Revenue / RECETTES PROVENANT DES VENTES DE BOIS
(In Million MF / EN MILLION FM)
(1978 constant prices)

	PY0 1980	PY1 1981	PY2 1982	PY3 1983	PY4 1984	TOTAL
Bamako Rainfed Tree Plantation PLANTATION FORESTIERE EN SEC BAMAKO	-	120.5	160.6	200.8	200.8	<u>682.7</u>
Segou Rainfed Tree Plantation PLANTATION FORESTIERE EN SEC SEGOU	-	0.9	0.9	-	-	<u>1.8</u>
Bamako Natural Forest Management AMENAGEMENT FORET NATURELLE BAMAKO	-	28.6	28.6	28.6	28.6	<u>114.4</u>
Segou Natural Forest Management AMENAGEMENT FORET NATURELLE SEGOU	-	<u>1.2</u>	<u>1.2</u>	<u>1.2</u>	<u>1.2</u>	<u>4.8</u>
	-	<u>151.2</u>	<u>191.3</u>	<u>230.6</u>	<u>230.6</u>	<u>803.7</u>

5

MAI

FORESTRY PROJECT / PROJET FORESTIER

Rainfed Tree Plantation / PLANTATION FORESTIERE EN SEC

Direct Establishment Costs & Revenue from Extraction of Existing Vegetation
COUTS DIRECTS DE PLANTATION ET RECETTES PROVENANT DE L'EXPLOITATION DE LA VEGETATION EXISTANTE/ha
 (In MF/EN FM)
 1978 prices

	<u>BAMAKO</u>		<u>SECOU</u>	
	<u>Before Amortization</u> <u>AVANT AMORTISSEMENT</u>	<u>After Amortization</u> <u>APRES AMORTISSEMENT</u>	<u>Before Amortization</u> <u>AVANT AMORTISSEMENT</u>	<u>After Amortization</u> <u>APRES AMORTISSEMENT</u>
<u>1. Direct Costs / COUTS DIRECTS</u>				
1. Plant Supply FOURNITURE DES PLANTS	21,590	31,880	20,000	28,900
2. Roads, Tracts & Firebreaks Construction CREATION ROUTES, PISTES ET PARE-FEU	14,250	18,355	14,250	18,355
3. Land Preparation/ REPARATION DU TERRAIN	72,870	111,220	97,935	133,880
4. Wood Extraction/ EXPLOITATION FORESTIERE	36,390	40,450	12,600	12,600
Wood Transport/ TRANSPORT DU BOIS	33,930	55,445	-	-
5. Planting Weeding & Maintenance Year 1 / PLANTATION, DESERBAGE ET ENTRETIEN ANNEE 1	34,840	44,620	32,740	39,545
6. Weeding & Maintenance Year 2 ENTRETIEN ET DESERBAGE ANNEE 2	<u>10,570</u>	<u>14,030</u>	<u>10,570</u>	<u>14,030</u>
Total Direct Costs/ COUTS DIRECTS MF/FM	<u>224,440</u>	<u>316,000</u>	<u>175,495</u>	<u>247,310</u>
US\$	510	716	399	562
<u>11. Revenue/RECETTES</u>				
MF/FM	<u>200,775</u> ^{1/}		<u>30,000</u> ^{2/}	
US\$	451		68	

1/ 35 ct x 3105 FM + 1 m³ x 15,000 FM BAMAKO
 2/ 30 ct x 1000 FM Road Side / BORD DE ROUTE

MALI

FORESTRY PROJECT / PROJET FORESTIER

Natural Forest Management / AMENAGEMENT DE LA FORET NATURELLE

Direct Management Costs & Revenue from Extraction of Existing Vegetation

COUTS DIRECTS D'AMENAGEMENT ET RECETTES PROVENANT DE L'EXPLOITATION DE LA VEGETATION EXISTANTE/ha

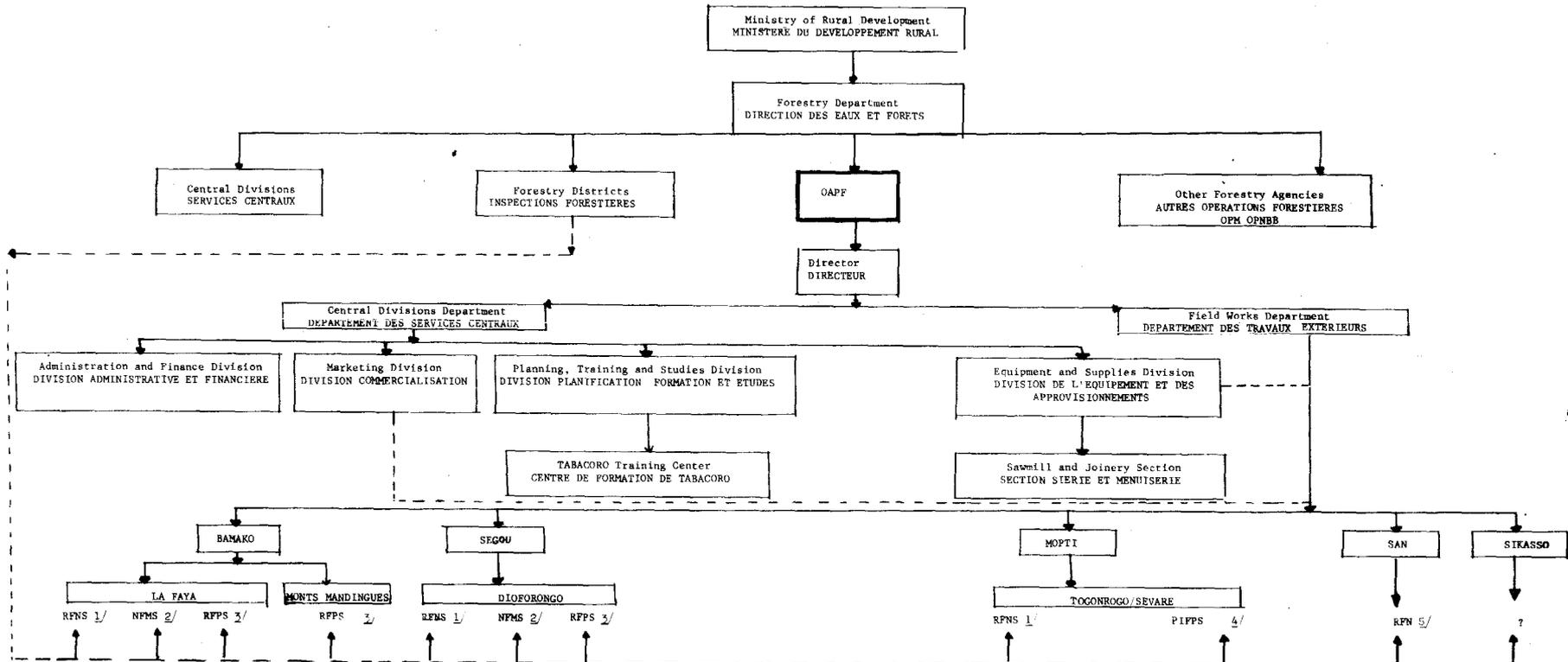
(In MF/EN FM)

1978 prices

	BAMAKO		SEGOU		
	Before Amortization AVANT AMORTISSEMENT	After Amortization APRES AMORTISSEMENT	Before Amortization APRES AMORTISSEMENT	After Amortization APRES AMORTISSEMENT	
I. Direct Costs/COUTS DIRECTS					
1. Site Selection/LOCALISATION	280	280	280	280	
2. Tree Marking/MARTELAGE	175	175	175	175	42
3. Roads & Firebreaks/ ROUTES ET PARE-FEU	11,950	16,395	19,170	26,560	
4. Logging Tracks/ PISTES DE DEBARDAGE	2,130	3,382	850	1,350	
5. Cutting & Stacking/ COUPE ET ENSTERAGE	11,900	16,800	8,400	8,400	
Wood Transportation TRANSPORT BOIS	24,050	31,300	-	-	
6. Harrowing/PULVERISAGE	3,170	4,987	-	-	
7. Seeding/SEMIS	60	60	-	-	
8. Weeding/DESHERBAGE	<u>14,000</u>	<u>14,000</u>	<u>14,000</u>	<u>14,000</u>	
Total Direct Costs/ COUTS DIRECTS					
MF/FM	<u>67,715</u>	<u>87,379</u>	<u>42,875</u>	<u>50,765</u>	
US\$	154	199	97	115	
II. Revenu/RECETTES					
MF/FM		<u>114,360</u> ^{1/}		<u>23,500</u> ^{2/}	
US\$		280		53	

- ³
 1/ 1 m x 15,000 + 32 st x 3,105 BAMAKO
 2/ 23.5 st x 1,000 Road Side / BORD DE ROUTE

MALI
FORESTRY PROJECT / PROJET FORESTIER
OAPF Chart / ORGANIGRAMME DE L'OAPF



- 1/ RPNS Rural Forestry Nursery Sector
SECTEUR PÉPINIÈRE FORESTIÈRE RURALE
- 2/ NPMS Natural Forest Management Sector
SECTEUR AMÉNAGEMENT FORÊT NATURELLE
- 3/ RPPS Rained Plantation Sector
SECTEUR PLANTATION FORESTIÈRE EN SEC
- 4/ PIPPS Partially Irrigated Forestry Plantation Sector
SECTEUR PLANTATION FORESTIÈRE PARTIELLEMENT IRRIGUÉE
- 5/ RFN Rural Forestry Nursery
PÉPINIÈRE FORESTIÈRE RURALE

Table 19

MALIFORESTRY PROJECT / PROJET FORESTIEREstimated Schedule of Disbursements / PREVISIONS DE DEBOURSEMENT

IDA Fiscal Year	Semester	Disbursements	Cumulative Disbursements	%
1980	Second	1,270 ^{1/}	1,270 ^{1/}	28
1981	First	500	1,770	39
1981	Second	500	2,270	50
1982	First	330	2,600	58
	Second	330	2,930	65
1983	First	410	3,340	74
	Second	410	3,750	83
1984	First	375	4,125	92
	Second	375	4,500	100

^{1/} of which 250,000 revolving fund
 910,000 machinery and vehicles (direct IDA payments to the suppliers)
 1,160,000

MALI
 FORESTRY PROJECT / PROJET FORESTIER
 CASH FLOW/MARGE ROUTE D'AUTOFINANCEMENT (MBA)
 (in million MF/EN MILLION FM)

	PY0 1990	PY1 1991	PY2 1992	PY3 1993	PY4 1994	5	6	7	8	9	10 1990	11	12	13	14	15	16	17	18	19	20 2007	21	22	23	24	25	26	27 2007	
A. Cash Inflow/ENTREES DE CAPITAUX																													
1. Financing/FINANCEMENT																													
IDA Credit/CREDIT 2/	550	440	280	365	315	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
COCE Loan/PRÉ 1/	200	140	80	110	90	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
FAC Grant/SUBVENTION	30	120	130	140	150	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Government Budget / BUDGET GOUVERNEMENT	20	40	40	40	40	30	16	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	
Subtotal/SOUS TOTAL	800	740	530	655	595	30	16	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	
2. Revenue/RECETTES																													
Sales of wood/VENTE DE BOIS	-	185	244	314	333	-	159	226	311	321	48	94	134	184	226	285	342	400	460	527	592	663	732	803	873	943	1,013	1,072	1,072
Total Cash Inflow/ TOTAL DES ENTREES (1 + 2)	800	925	774	969	928	30	185	239	324	334	60	107	157	207	257	320	382	442	502	569	635	701	766	831	896	961	1,026	1,216	
B. Cash Outflow/SORTIES DE CAPITAUX																													
1. Project Cost/COUT DU PROJET	322	326	710	350	340	37	114	144	171	174	73	101	154	177	187	177	182	186	187	171	123	193	167	147	261	312	363	359	
2. Debt Service/SERVICE DE LA DETTE																													
IDA	-	4	7	10	12	15	15	15	15	15	15	35	34	34	34	34	34	33	33	33	33	72	71	71	71	70	70	70	
COCE	-	7	12	15	19	22	22	22	22	22	22	74	74	74	74	74	74	74	74	74	74	-	-	-	-	-	-	-	
Subtotal	-	11	19	25	31	37	37	37	37	37	37	109	108	108	108	108	107	107	107	107	107	72	71	71	71	70	70	70	
Total Cash Outflow/ TOTAL SORTIES (1 + 2)	322	337	729	370	371	74	151	181	208	211	110	210	282	285	295	285	293	293	293	293	293	175	264	238	218	332	382	429	
C. Net Cash Flow after Debt Service/ MBA NETTE APRES SERVICE DE LA DETTE	5	80	45	54	57	(104)	35	57	116	125	(42)	(103)	(52)	32	94	(40)	(109)	(31)	41	75	110	40	35	130	444	649	652	686	
D. Cumulative Cash Flow after Debt Service/MBA CUMULEE APRES SERVICE DE LA DETTE	5	85	70	134	191	37	122	129	295	418	370	267	212	264	354	394	285	204	245	320	430	470	508	646	990	1,659	2,491	3,347	

1/ Over the project implementation period (1990-1994) revenue and expenditures have been valued in accordance with Bank's general guidelines (see para 3.11);
 From project completion onwards (1995) revenue and expenditures have been valued at constant prices.
 2/ Standard terms: 0.75% service charge, on amount disbursed and outstanding; 50 years of which 10 year grace period; 10 next years amortization 1%; 30 last years amortization 3%.
 3/ Assuming interest 3.5%; 20 years of which 10 year grace period; equal repayments in interest and principle.

MALI

FORESTRY PROJECT / PROJET FORESTIERE

Economic Analysis / ANALYSE ECONOMIQUE

BAMAKO - Rainfed Tree Plantation Component / COMPOSANTE PLANTATION FORESTIERE EN SEC

	1980	1981	1982	1983	1984	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	2000	21	22	23	24	25	26	2007	27	
	PT 0	PT1	PT2	PT3	PT4																20									
A. Coats/DEPENSES (MF million)																														
Plantation Establishment / CREATION PLANTATION	537	542	619	506	481	(40)	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Maintenance and Operation / ENTRETIEN ET FONCTIONNEMENT	-	-	-	-	-	63	74	94	112	114	48	66	101	116	129	116	67	69	102	112	119	126	96	96	170	204	237	234	-	
Total Coats/COUT TOTAL	537	542	619	506	481	23	74	94	116	114	48	66	101	116	129	116	67	69	102	112	119	126	96	96	170	204	237	234	-	
B. Benefits/BENEFICES																														
I. Fuelwood - Poles (steres)																														
BOIS DE FEU ET DE SERVICE	-	38,000	44,000	55,000	55,000	-	37,800	50,400	69,600	71,800	11,000	17,000	47,000	62,000	75,000	65,000	7,200	9,600	44,400	55,200	60,600	62,800	11,000	11,000	52,900	70,400	98,000	88,000	88,000	
Weighted Price/PRIX PONDERE/stere (MF)	3,423	3,594	3,774	3,963	4,161	4,369	4,587	4,817	5,068	5,310	5,600	5,600	5,600	5,600	5,600	5,600	5,600	5,600	5,600	5,600	5,600	5,600	5,600	5,600	5,600	5,600	5,600	5,600	5,600	5,600
Value/VALEUR (MF million)	-	119	166	218	229	-	173	243	362	381	62	96	263	347	420	364	54	54	249	-	339	352	62	62	296	396	493	493	493	
Value converted at SCP (0.88) up to 199	-	105	146	192	202	-	152	214	310	335	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Value/VALEUR CONVERTIE FCV (0.88)	-	105	146	192	202	-	152	214	310	335	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
II. Timber/BOIS D'OEUVRE (m³)																														
Price/PIRIX (MF)	22,500	22,850	23,400	23,900	24,500	-	-	-	-	-	-	45,750	45,750	45,750	45,750	45,750	45,750	45,750	45,750	45,750	45,750	45,750	45,750	45,750	45,750	45,750	45,750	45,750	45,750	
Value/VALEUR (MF million)	-	27	31	48	69	-	-	-	-	-	-	21	44	54	51	20	58	91	114	114	142	109	236	142	142	296	396	493	493	
III. Incremental millet sorghum production due to longer bush fallow/AUGMENTATION DE PRODUCTION DE MIL ET SORGHOS DUE A UNE PLUS LONGUE JACHESE																														
Value/VALEUR (MF million)	-	43	57	72	72	-	49	66	91	93	14	22	61	81	96	88	9	12	58	72	79	82	14	14	69	92	114	114	114	
Value converted at SCP (0.88) (MF million)	-	38	50	63	63	-	43	58	80	82	12	19	54	71	86	78	8	11	51	63	69	12	12	61	81	100	100	100	100	
Value/VALEUR CONVERTIE FCV (0.88)	-	38	50	63	63	-	43	58	80	82	12	19	54	71	86	78	8	11	51	63	69	12	12	61	81	100	100	100	100	
Total Benefits/BENEFICES TOTAL	-	170	234	303	314	-	198	272	390	428	74	132	363	472	567	466	116	126	414	466	360	613	319	319	998	1,382	1,661	1,661	1,661	
C. Net Flow (A-B)	(637)	(572)	(485)	(203)	(167)	(23)	(121)	178	276	306	26	69	260	306	438	349	49	87	312	374	431	497	214	214	898	1,125	1,428	1,428	1,428	
ERR/TRE	10.5%																													

Residual Value of Plantation Equipment/VALEUR RESIDUELLE DE L'EQUIPEMENT PLANTATION

ECONOMIC ANALYSIS ASSUMPTIONS

1. In calculating the economic costs, the following assumptions were made:

- (a) as the expatriate and consultants activities would be in addition to the plantation component, also benefit the organization as a whole and future forestry activities, 15% of their total cost was allocated to the other activities;
- (b) physical contingencies have been included and price contingencies were excluded;
- (c) local costs were converted at a factor of 0.88; the share of local costs was estimated to be between 70 and 72% for the first five years and 50% from the sixth year onwards;
- (d) benefits from fuelwood and building poles were converted at a factor of 0.88 up to 1990 (para 5.07);
- (e) benefits from longer bushfallow were converted at a factor of 0.88;
- (f) the residual value of plantation equipment in the sixth year after project commencement is assumed to be 5% of the original purchase price equivalent to MF 40 million.

2. In calculating the benefits from longer bushfallows, the following assumptions were made: bushfallow produces about 1.3 steres per ha at the end of a six year fallow. Thus each 1,000 acres of fuelwood produced under the project would prevent the cutting in advance of 670 ha of bushfallow. 1/ In the greater Bamako area, a minimum six years of bushfallow preceded two years of cultivation. Thus for each 1,000 steres about 220 ha would be cultivated after an adequate fallow. 2/ Under traditional methods, farmers cultivate sorghum and/or millet with yields from 1,000 kg/ha under the best conditions to 500 kg/ha when soils are eroded; assuming that longer fallows prevent a decline in yield of only 100 kg/ha the net incremental value added by ha would be about FR 1,300,000 per 1,000 steres of fuelwood produced by the project. 3/

- 1/ 1,000st=11.5st/ha = 667 ha
- 2/ 667 ha x 2 years of cultivation = 222 ha
- 3/ 222 ha x 100 kg/ha x 60 FM/kg = 1,332 FM/ha

MALIForestry Project /Projet ForestierList of Supplementary Annexes Available in Project File

- I Background Documents
- II Forestry Department
- III OAPF
- IV 1978 BAMAKO Wood Selling Prices
- V Project Basic Costs
- VI Rainfed Tree Plantation - Technical Note (in French)
- VII BAMAKO Rainfed Tree Plantation Supporting Tables
- VIII SEGOU Rainfed Tree Plantation Supporting Tables
- IX Natural Forest Management - Technical Note (in French)
- X BAMAKO Natural Forest Management Supporting Tables
- XI SEGOU Natural Forest Management Supporting Tables
- XII MOPTI Partially Irrigated Tree Plantation - Technical Note (in French) and Supporting Tables
- XIII Rural Forestry Nurseries - Technical Note (in French) and Detailed Cost Table
- XIV Training, Studies and Audit - Detailed Cost Table
- XV Research - Technical Note (in French)
- XVI Technical Assistance - Job Descriptions and Qualifications
- XVII Draft Terms of Reference for Consultants

MALI

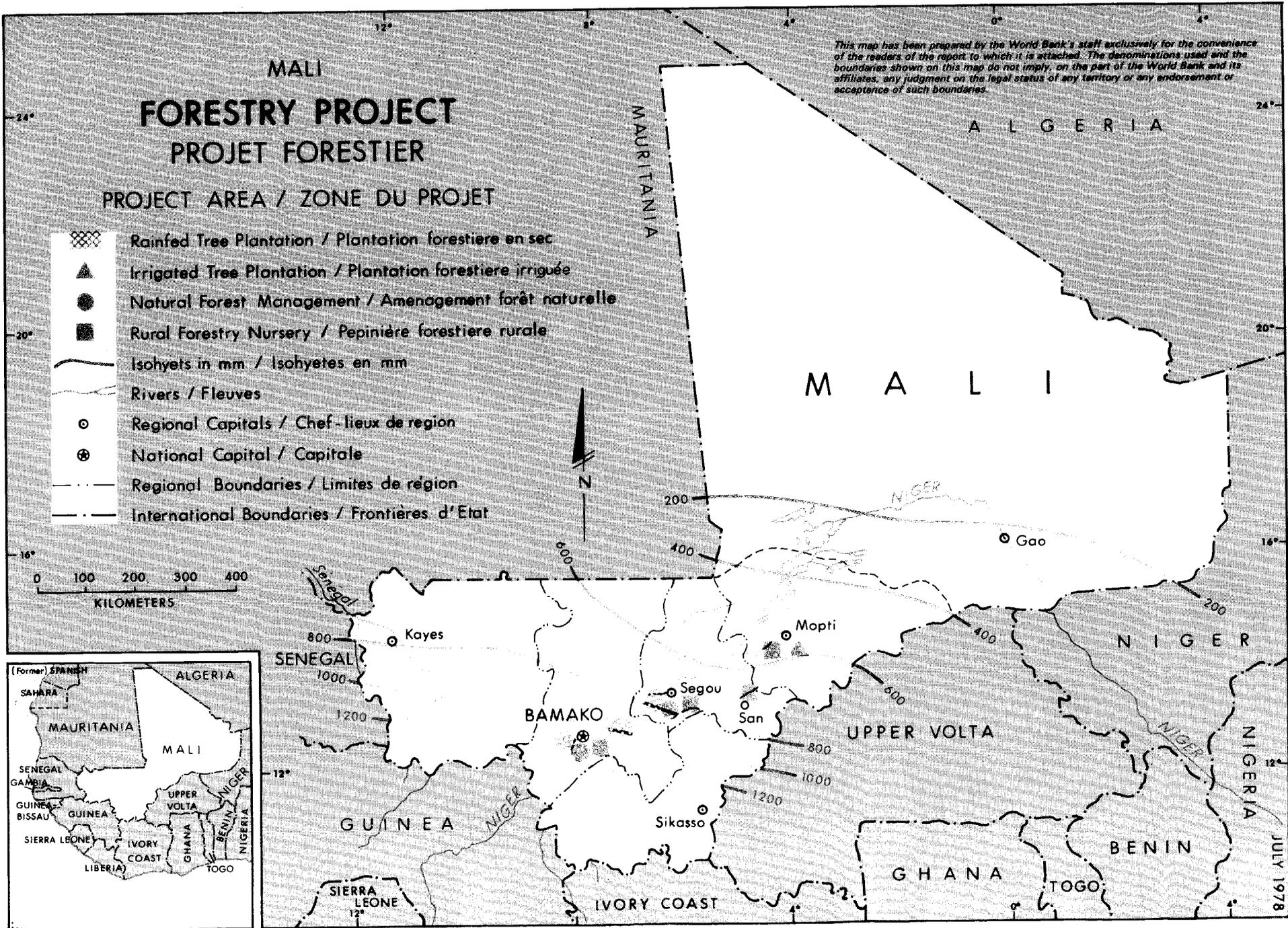
FORESTRY PROJECT

PROJET FORESTIER

PROJECT AREA / ZONE DU PROJET

-  Rainfed Tree Plantation / Plantation forestiere en sec
-  Irrigated Tree Plantation / Plantation forestiere irriguée
-  Natural Forest Management / Aménagement forêt naturelle
-  Rural Forestry Nursery / Pepinière forestiere rurale
-  Isohyets in mm / Isohyetes en mm
-  Rivers / Fleuves
-  Regional Capitals / Chef-lieux de region
-  National Capital / Capitale
-  Regional Boundaries / Limites de région
-  International Boundaries / Frontières d'Etat

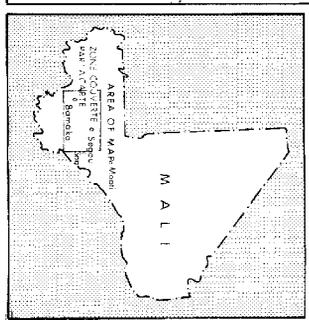
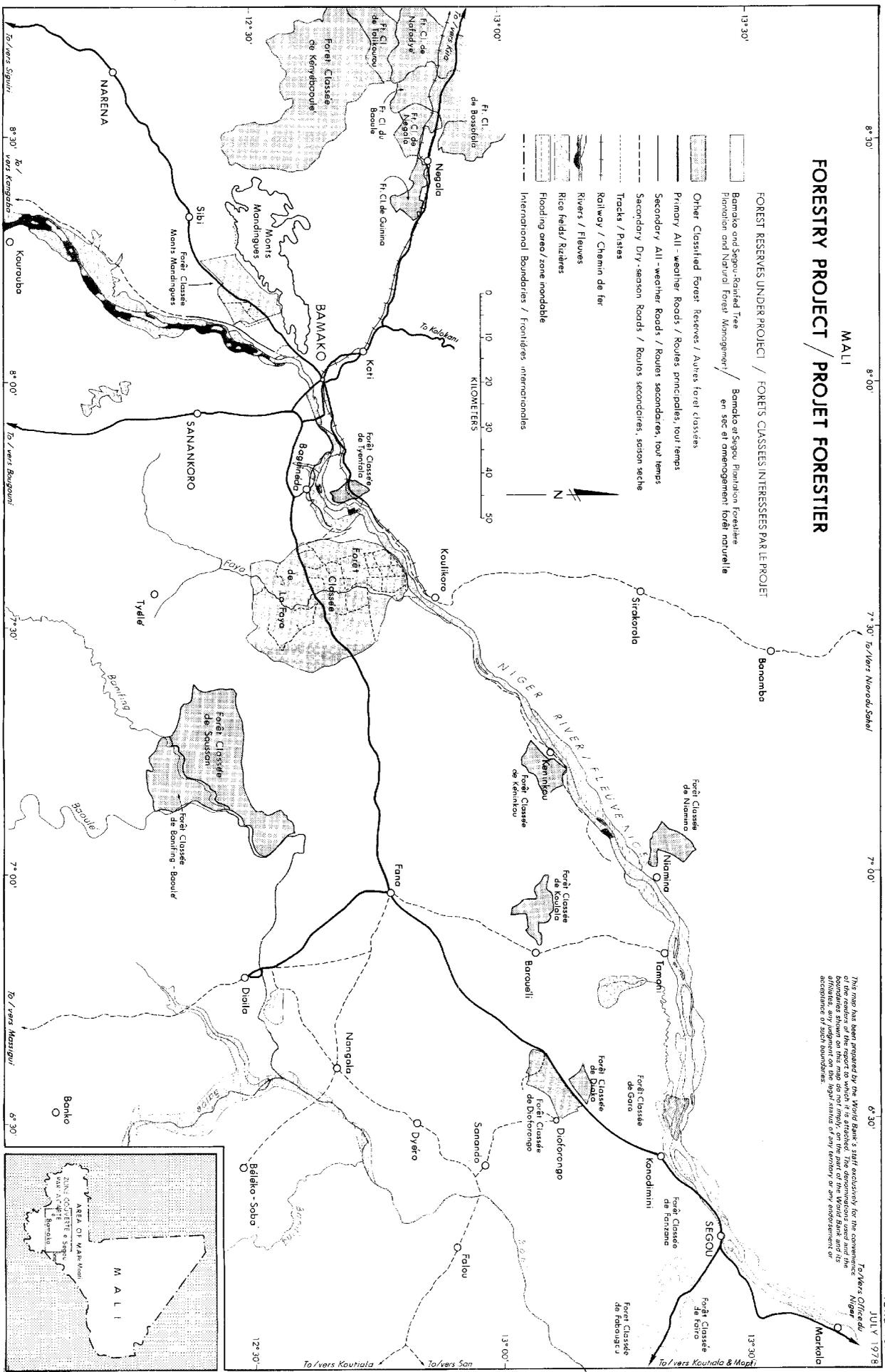
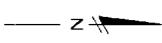
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FORESTRY PROJECT / PROJET FORESTIER

FOREST RESERVES UNDER PROJECT / FORÊTS CLASSEES INTERESSEES PAR LE PROJET

- Bamako and Ségou: Stained Tree
- Plantation and Natural Forest: Monogram
- Bamako and Ségou: Plantation Forest: en sec et aménagement forêt naturelle
- Other Classified Forest: Reserves / Autres forêt classées
- Primary All-weather Roads / Routes principales, tout temps
- Secondary All-weather Roads / Routes secondaires, tout temps
- Secondary Dry-season Roads / Routes secondaires, saison sèche
- Tracks / Pistas
- Railway / Chemin de fer
- Rivers / Fleuves
- Rice fields / Rizières
- Flooding area / zone inondable
- International Boundaries / Frontières internationales



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