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STAFF APPRAISAL REPORT

HAITI

FORESTRY PROJECT

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Projects Department
Latin America and the Caribbean Regional Office

CURRENCY EQUIVALENTS

Gourde (G) 1 = US$ 0.20

WEIGHTS AND MEASURES

Metric System

GLOSSARY OF ABBREVIATIONS

AFVP	-	French Association of Volunteers for Progress
BCA	-	Agricultural Credit Bureau
BRH	-	Bank of the Republic of Haiti
CARE	-	Cooperative for America Relief Everywhere
CIDA	-	Canadian International Development Agency
DARNDR	-	Department of Agriculture, Natural Resources and Rural Development
FA	-	Agricultural Fund (Germany)
FB	-	Forestry Bureau
FAO	-	Food and Agriculture Organization
FAMV	-	Faculty of Agriculture and Veterinary Medicine
GOH	-	Government of Haiti
GTZ	-	German Agency for Technical Cooperation
HACHO	-	Organization of Haitian Communities
IDA	-	International Development Association
IDB	-	Inter-American Development Bank
IDRC	-	International Development Research Center
NGOs	-	Non-Governmental Organizations
ODN	-	Development Organization for the North
OAS	-	Organization of American States
PVOs	-	Private Voluntary Organizations
SACs	-	Agricultural Credit Societies
SHADA	-	Haitian-American Society for Agricultural Development
SONAMAR	-	Society of Friends of the Tree
USAID	-	United States Agency for International Development
VP	-	Volunteers for Progress (French)

GOVERNMENT OF HAITI

FISCAL YEAR

October 1 - September 30

HAITI

FORESTRY PROJECT

STAFF APPRAISAL REPORT

TABLE OF CONTENTS

This report is based on the findings of an appraisal mission which visited Haiti in June 1981 and a post-appraisal mission in September 1981. The appraisal mission comprised Messrs. J. Pelissier (IDA), W. Beattie (IDA) and H. Kernan (FAO Consultant), and the post-appraisal mission comprised Messrs. Pelissier and Beattie.

Table of Contents (Continued)

HAITI

FORESTRY PROJECT

I. BACKGROUND

A. Project Background

1.01 In 1978, the Government of Haiti (GOH) indicated its interest in IDA support of a forestry project. Following an agricultural sector review carried out as part of the economic mission of 1978, the idea of a pilot project was developed, and a project was identified by an IDA mission in 1979. Further identification was carried out in 1979 by FAO/CP, and preparation completed in 1981.

1.02 The project would essentially provide technical assistance, and would constitute the preparatory stage of a full-scale program designed to reverse the trend toward depletion of the country's forests which constitute its major energy resource base.

B. The Energy Sector

1.03 In 1980 the population of Haiti with a land area of 2.8 million ha was close to 5 million, of which almost 25% was urban, with 750,000 living in Port-au-Prince, the capital. The IDA energy sector mission of 1980 estimated that wood currently meets about 72% of Haiti's energy needs. About 95% of the total wood consumption of the country is for energy, and consumption of this category is expected to increase by 3% annually. Oil supplies 17% of the country's energy requirements; hydro-power, 3.3%; and bagasse, 7.7%. The urban sector absorbs over 90% of the electricity supply and uses approximately 50% of charcoal production.

1.04 Petroleum consumption has increased at an average yearly rate of 10.6% since 1973 and was estimated to be worth US$45 million in 1979/80. If present trends do not change substantially, oil imports will become a heavy drain on Haiti. The hydro potential is limited. About a third of the economically feasible mean annual generating potential has already been developed.

1.05 There may be favorable prospects for hydro-carbon development and exploration is underway. Lignite deposits exist in the Central Plateau and the Southwest Peninsula. The extent of the reserves is still not well known, but it is unlikely that they will be able to alleviate the pressure on forestry resources. A major limitation is the high sulphur content, which precludes the use of lignite in cooking stoves because of toxic fumes. In view of these constraints relating to energy sources, the role of wood in meeting the country's energy needs is likely to remain highly significant in the foreseeable future.

C. The Agricultural Sector

Structure of Agriculture Production

1.06 The agricultural sector contributed about 40% of GDP and about 60% of total merchandise exports from 1977 to 1979. About 73% of the employed population worked in agricultural activities as reported in the 1971 population census. However, declining agricultural exports and increasing food imports indicate poor agricultural performance.

1.07 Cash crops account for about 34% of the total value of the production of agricultural commodities, of which the most important are coffee, comprising 20% of the total value; sugarcane, 10%; and cocoa, sisal and cotton, an aggregate of 4%. The major food crops are rice, corn, plantains and beans, which, together with millet and sweet potatoes, comprise about 56% of total agricultural production, while livestock represents some 10%. Most farmers keep a a few head of livestock; hogs are the most important (although currently affected by African swine fever), followed by beef cattle.

Land Tenure and Farm Size

1.08 According to a 1970 survey, about 60% of all farms were owned by farmer-operators, about 25% were rented and sharecropped from private owners, and the rest were under other forms of tenure, with few farmers having clear titles to their land; the lack of security of tenure is a constraint to agricultural progress. This factor also affects forestry development, which requires long-term investments. The average number of parcels per farm is around three. Fragmented landholdings, particularly in different ecological zones, are often sought by farmers because they provide some security against crop failure in any one area. Wage labor is widely used in some parts of Haiti. While evidence suggests that the number of landless laborers is relatively low, many of those who occupy land have such small holdings that they must supplement their farm earnings with income from other sources. The agricultural population density per 100 ha of crop area is 400. According to the 1971 agricultural census, about 46% of farmland was in farms of less than 2 ha and 73% in farms of less than 4 ha. Only about 8% of farmland is in farms greater than 10 ha; the larger holdings occupy the most productive flatland and are devoted primarily to sugarcane.

Technical Constraints

1.09 Haitian agriculture is characterized by low yields, the principal causes being: (a) lack of improved varieties; (b) poor cultural practices; (c) inadequate use of water resources; (d) insufficient soil and water conservation; (e) endemic pest problems and (f) little or no use of fertilizer.

1.10 It has been estimated that some 226,000 ha of soils could be suitable for irrigation. Of this area, 66,000 ha are currently under some form of irrigation, primarily from surface water, and another 11,000 ha could be irrigated without major investments. Only a few thousand hectares benefit from irrigation with full water control, and much of the irrigation system needs to be rehabilitated.

1.11 Soil erosion affects most areas of Haiti; it results from heavy population pressure on land and forests, scarcity of flat or moderately sloping land, and poor utilization of soil resources, especially in the productive valleys and plains. According to FAO estimates, the country loses some 15 million cubic meters of soil yearly, corresponding to 6,000 ha of land and, although most of the eroded land is still usable, especially for tree planting, productivity is declining rapidly. Other erosion effects are: (a) poor utilization of water because of excessive runoff and higher fluctuations of the underground water supply, causing shortages of irrigation water in dry areas; (b) disruption of irrigated agriculture; and (c) rapid siltation of the Peligre reservoir, the country's major hydroelectric resource.

Institutional Constraints

1.12 The general weakness of agricultural support services has been a major handicap in tackling the technical constraints of the sector. The various services of the Department of Agriculture, Natural Resources and Rural Development (DARNDR) are not yet sufficiently funded. Its low share in budget expenditures compares unfavorably with the sector's important contribution to the national economy and it translates directly into limited outlays for field expenditures. Of DARNDR's 400 graduate technicians, less than half are presently assigned to the districts. Moreover, staff assigned to the field lack the means to operate efficiently. Relatively adequate funding and staffing of field programs are restricted to areas or projects supported by external agencies.

1.13 Duplication of effort, lack of coordination, and lack of effective programs aggravate the weakness of the agricultural support services. The activities of the various technical assistance and voluntary agencies are not coordinated, which often results in poor utilization of scarce resources, and programs are often fragmented and lack firm orientation toward specific goals. The absence of technical packages is due to the paucity of research data, which itself reflects the lack of continuity of technical assistance programs. The establishment of regional development agencies such as the Development Organization for the North (ODN), should help improve the situation by getting all agencies within a region to move in the same direction and participate together in well-planned regional programs.

1.14 Another important aspect of the institutional framework relates to the lack of an effective community structure. The Haitian farmer is strongly individualistic, and an active cooperative tradition is absent. Different informal organizations, however, exist among rural neighbors and might be developed to become instruments of rural development. A number of agricultural credit societies (SACs) have been created to secure credit and ensure collective guarantees, and community councils have been established throughout the country for community improvement (road repair, maintenance of irrigation works, school building and maintenance) through self-help. Some of these councils are effective, while others seem unable to distribute benefits equitably among their members.

World Bank Group Strategy in Agriculture

1.15 Taking into account the inadequate infrastructure, weaknesses of the support services, especially at the central level, and lack of skilled local staff, the Bank Group's strategy, and that of other sources of external

assistance such as IDB and GTZ, has been to support the Government's policy of regionalization by financing regional development programs. This strategy is currently applied in support of the Rural Development Project in the Northern Department (Credit 675-HA), details of which are given below. FAO, OAS, USAID and IDB are providing technical assistance to DARNDR to help its institutional development.

Experience with the Rural Development Project in the Northern Department

1.16 The project, started in 1977, aimed at the improvement of physical infrastructure (irrigation, roads, markets, water supply) and crop production through applied research, credit and extension. It has, however, experienced serious problems during its early stages, because of: (a) initial delays in recruiting international and national staff; (b) weaknesses of local staff and participating agencies; (c) slippage in counterpart financing; (d) lack of technical packages; and (e) inadequate knowledge of the physical and human environment. The irrigation component was substantially reduced, mainly because of institutional weaknesses, but a good beginning has been made recently on the organization of farmers for effective water distribution. With the input of effective technical assistance provided by the aid agencies of France and the Federal Republic of Germany, a replicable regional development institution has been established and staffed, and a regional coordinating mechanism has been set up; this could lay the basis for sustained improvement, provided Government funding and support are maintained at adequate levels. Constraints to development in the region have been identified and though Government support was slow until 1981, progress is being made. A successful program of field trials is helping develop suitable technical packages; and potable water supply systems are being established to serve thousands of people in rural areas. The implementation of other components, especially roads, has improved; the pace of IDA credit disbursement has accelerated; and a follow-up project is under consideration. A major unresolved issue, however, relates to the inadequacy of arrangements for cutting and milling of sugarcane in the project area. Some steps have been taken by the Government but further action is necessary. The matter will be pursued with the Government on the basis of the findings of a consultant who is now engaged in determining the present status of these problems.

1.17 The other IDA-supported project in agriculture is the Agricultural Rehabilitation Project (Credit 1106-HA) which is intended to help restore agricultural production in the area affected by hurricane Allen, through the supply of inputs, credit, the expansion of nurseries and the construction of farm service centers. The project became effective in October 1981.

D. The Forestry Subsector

Resources

1.18 Of a total of 2,770,000 ha of the total land area of Haiti, forest lands comprise about 930,000 ha, or 33% of the land area; a total of 830,000 ha is cultivated and 500,000 is in pastures. Much of the forest land is highly degraded, with only a few trees per hectare. Of the total forest land, broadleaf species in scattered clumps occupy about 150,000 ha. Another 70,000 ha of humid highland are occupied by highly degraded forests of West Indian

pine (Pinus occidentalis), and some 20,000 ha of mangrove occupy tidal marshland. The remaining 691,000 ha consist of degraded woodland, primarily on land with limited rainfall, scattered in various parts of the country, especially the Northwest Peninsula and the coastal areas along the Gonave Gulf (Map 15925). The formerly abundant forest resources of the country have been severely depleted over the years. Exports of mahogany, for instance, plummeted from 18,600 m^3 in 1845 to 5,300 m^3 in 1860 and to zero in 1934.

1.19 The natural tree vegetation varies widely according to the ecology:

(a) In the humid highlands (800 to 2,000 m elevation, and over 1,000 mm rainfall), the main trees are Didymopanax tremulum, Brunellia comocladifolia, Ofcocanax capitatum, Weinmannia pinnata, and Carya fagdenni; they also include the best stands of Pinus occidentalis (West Indian pine).

(b) The forests of the sub-tropical lowlands with high rainfall (over 2,000 mm) include Didymopanax morotoni, Byrsonima spicata, Alchornea latifolia, Guarea trichilioides, Buchenavia capitata. and Pinus occidentalis.

(c) The humid lowlands (1,000 to 2,000 mm) are the habitat for the main economic hardwoods: Swietenia mahogani (mahogany), Catalpa longissima (oak), Haematoxylon (logwood), Simaruba glauca (ash), Colubrina ferruginosa (ironwood); other common trees include Roystonea regia (royal palm), Anacardium occidentale (cashew nut), and mangoes.

(d) The dry subtropical forest (500 to 1,000 mm rainfall) occupies large areas; the main tree species are Phyllostylon brasiliensis (boxwood), Prosopis juliflora (bayahonde), and Guaiacum officinale; the latter two are in high demand for charcoal. Other common species include Coccoloba laurifolia, Metopium brownei, Ouratea ilicifolia, Jacquinia, Leucaena glauca, Amyria, Samyda, Crythroxylon, Exostema, and legumes of the Croton and Capparis spp. In many areas, the desirable fuelwood species (bayahonde, guaiacum) are subject to overcutting and are in regression, being replaced by xerophytic species, especially Opuntia antillana (cactus) and Euphorbia lactea (milkstripe euphorbia).

Fuelwood Production and Marketing

1.20 Total estimated wood consumption for energy is estimated at 4 million m^3 annually, of which some 640,000 m^3 are converted to charcoal. They are equivalent to some 80,000 ha of dry forest cut every year. The rate of natural regrowth and the current rate of reforestation (para 1.27) are not sufficient to keep pace with the rate of consumption. About half the production is in the Northwest peninsula and the balance comes from other low rainfall areas, especially along the Gonave gulf and portions of the Southern Coast on the Caribbean Sea. Production has declined in the area near Port-au-Prince as a result of heavy deforestation. Production increased in the Northwest because of depletion of forests in areas close to the capital and the droughts of the 1970s which resulted in charcoal becoming a major source of income in the context of crop failure.

1.21 Firewood for direct use is collected as dry or dead wood for home consumption or for sale, and is used mostly in rural areas. It is sold directly to the consumers by the harvester, or through a wholesaler. Some wood for charcoal production is harvested green, either from public land, or under a sharecropping arrangement on private land. Charcoal is produced in pit kilns in which the wood is piled on the ground, and covered with an inside layer of grass or leaves, and an outside layer of soil. Charcoal makers sell charcoal to intermediaries who, in turn, sell to shippers who supply the urban areas. Charcoal makers can be local farmers working part-time, or full-time workers who are usually landless and otherwise jobless; in either case, they usually have no economic alternative, and their incomes are extremely low. It is estimated that charcoal-making and fuelwood and charcoal marketing give employment to some 50,000 people.

1.22 Until recently, sawtimber production amounted to some 5,000 m^3 per year. Poles are commonly used in low-cost construction, but the amount so used is difficult to estimate. There were four sawmills in the country but none is currently in operation. Cutting for these mills in recent years was indiscriminate, and led to waste and to ecological deterioration. In late 1980, the Government terminated all logging contracts with private interests, assumed the management of existing pine stands, and forbade cutting of pine trees. With the exception of a few scattered hardwoods including mahogany, these pine forests are Haiti's only potential source of commercial lumber.

Land Tenure

1.23 Much of the forest and scrubland belongs to the state and is administered by the Land Division of the General Revenue Service, an autonomous agency of the Ministry of Finance. DARNDR has no jurisdiction over this land; efforts to create national forests managed by a forestry division have been opposed by the Revenue Service which is collecting revenues by renting land to individuals. Yet some 164,000 ha of land have been declared classified forests; these forests, however, have no well-defined boundaries and are not adequately protected. In agricultural areas which include woodland, a majority of farmers claim ownership of at least part of the land, but few can back their claim with clear titles. As a rule, trees on private land are better protected and cared for; for instance, species such as mahogany and West Indian pine are preserved, as integral parts of the traditional agro-forestry system.

Legislation

1.24 The current legislation includes the rural code of 1962, a number of organic laws which have an incidence on forestry, and some 50 laws, decrees or administrative decisions dealing directly with forestry. It provides for the protection of natural resources, the control of logging, and the creation of forest reserves. However, the legislation has not been effectively enforced, for lack of funds and personnel, and because of institutional weaknesses. In 1975, FAO forestry specialists submitted to the Government a proposed law on forestry development which would imply a thorough revision of the existing legislation. The proposed text deals with institutions, forest classification, forest management, funding, protection, and logging. It would be an objective of the proposed forestry project to have a revised forestry law adopted for Haiti by the end of PY4 (para 3.14). The FAO proposal would be revised or at least serve as a starting point for a forestry legislation review by a consultant.

Institutions

1.25 The DARNDR has responsibility for forestry. It includes a Division of Natural Resources and Irrigation. One of the branches is the Forestry Bureau (FB) manned by two of the only three employees in the country with forestry training. The official field personnel list includes 37 forestry agents, 96 forest rangers, 25 timber control agents, and five reforestation agents, none of whom has forestry training. They are poorly paid and concern themselves primarily with fiscal and police functions.

Research and Education

1.26 No forestry research is currently being carried out by DARNDR. Some adaptation trials of imported tree species have been conducted under various projects, with external assistance, especially from FAO, but with little or no follow-up after termination of the assistance. An inventory of the pine forest resources by photo-interpretation was carried out in 1976/77 under an FAO sponsored project. There is no forestry education program in the country, except for a course in forestry and soil conservation as part of the general curriculum of the agricultural institute of Damien. Of the agronomists who have received overseas training, three are employed in this field in the DARNDR. In 1979 a center was established at Limbe in the North to train DARNDR field staff in soil conservation techniques, but forestry as such is not included in the program.

Forestry Programs and Projects

1.27 The program of DARNDR is limited largely to the operation of a tree nursery in each of the 12 agricultural districts of the country. The nursery program for 1980/81 provides for the production of 1.4 million trees, enough for about 1,000 ha for the year. Tree planting programs under various projects, however, covered only 120 ha, showing a wide gap between seedlings produced and trees actually planted and surviving. The total area planted to date under the various programs is probably between 500 and 700 ha. Current activities in forestry development include (a) reforestation and stand improvement in the Northwest under the auspices of the Organization of Haitian Communities (HACHO) on several hundred hectares; the operation is carried out by the German-sponsored "Fonds Agricole" and (b) "Operation Double Harvest" with planting of fast growing leucaena and other species near Port-au-Prince. USAID approved in July 1981 a grant of US$8 million to finance forestry development by semi-governmental and private organizations, without involvement of the Forestry Bureau. Over a four-year period, this project includes (a) support of the Operation Double Harvest to develop seed and seedling production and establish demonstration tree farms in a variety of ecological zones; (b) support CARE/HACHO to establish three nurseries and implement agroforestry plantings in the Northwest through private voluntary organizations (PVOs) and community groups; (c) support the Pan American Foundation with an agroforestry extension program, especially in the Southwest and near Port-au-Prince, through PVOs and community groups; and (d) provide an overall project coordinator and backstopping. The proposed IDA-supported project is designed to avoid duplication and would complement the USAID project through institution building and technical assistance. In 1981 the Government created a Society of Friends of the Tree (SONAMAR) which is intended to (a) educate the population about soil conservation and forestry, and (b) promote tree planting and terracing by local communities.

Development Objectives and Strategies

1.28 The main elements of the Government's emerging policy include: (a) reforestation of critical areas for erosion control; (b) reduction of sawtimber deficit through management of existing pine stands and tree planting; (c) training of Haitian personnel in forestry and conservation; and (d) updating of forestry legislation. A master plan prepared by DARNDR aims at (a) creating a national forest domain; (b) reforesting; (c) soil and water conservation; (d) control of logging; and (d) reinforcement of the Forestry Bureau. More recently, the DARNDR has been giving top priority to preserving the remains of the natural pine forests, especially the forest of La Selle in the South, and is preparing a program of conservation of natural resources under the new five-year plan.

1.29 Haiti faces a critical energy situation. Prospects for alternative sources at prices which the population can afford are in doubt (paras 1.04 and 1.05); the possible contribution of the lignite deposits and of solar energy is not yet known. Assuming a growth in demand of 3% per annum, fuelwood consumption would reach 4.6 million m^3 in 1985, and 7.2 million m^3 by 2000, leaving a large deficit of 2.9 million m^3 and 4.3 million m^3, respectively, even under the most optimistic assumptions for natural forest growth and plantation establishment. This would lead to an accelerating depletion of the remaining forest resources since the deficits will have to be made good by cutting the growing stock to supplement the imports of energy sources which will be required to fill the gap. It is therefore necessary to counter this possibility through proper land-use management and large-scale reforestation. However, given the lack of experience with such programs in the country, the lack of trained personnel and the institutional weaknesses, the first steps to consider are the strengthening of the Government staff, training, and pilot programs in key areas, so as to provide the basis for a comprehensive larger effort.

II. THE PROJECT AREAS

2.01 The major forest resources of the country consist of (a) the dry, degraded subtropical forests and scrubland prevailing in the northwest and along the gulf of Gonave down to the foothills surrounding the Cul-de-Sac plain near Port-au-Prince; and (b) the remnants of hardwood and pine forests, in the humid higher elevations of the southern peninsula and the Central plateau. The project areas would be representative of these types (Map 15925).

A. The Foothills Area near Port-au-Prince (Cul-de-Sac)

2.02 An area of at least 250 ha would be identified within 100 km of Port-au-Prince in the foothills surrounding the Cul-de-Sac plain. This area is representative of the type of land which could satisfy a good part of the charcoal needs of the capital, as it did before large-scale deforestation. While the Cul-de-Sac plain is devoted to irrigated agriculture, the foothills are unsuitable for agriculture and are occupied by scrubland. The rainfall ranges between 600 and 800 mm, with peaks in March-May and August-November.

The soils of the scrubland are thin, overlying limestone, and lie on land of variable slope. Some pockets of deeper soil on flat land are cropped with sorghum, cowpeas and melons. The area has a high population density in spite of the scarce resources. The area is also crossed by the main highway going to the north, and by roads going to the Dominican Republic, the eastern part of the Southern Peninsula, and the Central Plateau. The thin foothill soils used to be covered by dry forests which were a major source of fuel, until this vegetation was exhausted by abusive cutting and the source of supply moved further north.

2.03 The sites for pilot fuelwood planting and species trial under the project are yet to be selected but large tracts of land are Government owned; a representative site would need to be selected for the project and be transferred to the Forestry Bureau (para 3.06).

B. The Northwest Peninsula

2.04 Because of its dry climate and the predominance of hilly thin soils, the northwest peninsula is the poorest section of the country -- the Haitian Sahel. The driest sections, especially the central areas of the middle peninsula, receive less than 400 mm average rainfall. Much of middle and western sections of the peninsula receives less than 1,000 mm, except for the plateau area of Bombardopolis which receives 900 to 1,100 mm and the mountain ridge which crosses the peninsula. There is no consistent pattern of dry and wet seasons, but rather one of wide variations within each year and between years. The ratio between annual minimum and maximum can reach as high as 1 to 5.7. Generally, about half of the annual precipitation falls within four months. The water deficit is high throughout most of the middle and western portions of the peninsula.

2.05 The dry hills and arid plains are sparsely covered with dry tropical forest and scrubland. Some subtropical forest vegetation remains in isolated areas at higher elevations. Besides fishing along the coast, tree-cutting and charcoal manufacture are the only economic activities in those areas which are too dry, or with soil too marginal for agriculture. The major source of charcoal is bayahonde (Prosopis juliflora). Guaiacum, which is the best wood for charcoal, and which is also in demand for wood carvings, has largely disappeared. Instances have been reported of people digging up guaiacum roots to make charcoal. Other indications of the critical fuelwood scarcity are the use of cactus and wood from old fences for making charcoal. Charcoal is produced in traditional earth kilns (para 1.21). According to an FAO study, the method is effective and surprisingly efficient. It would be counterproductive at this point to try to introduce portable metal kilns or other alternative technologies as these would represent an investment beyond the means of the charcoal makers, and the charcoal yields would not be significantly improved, if at all. All available resources should be directed at rebuilding the natural resource base (woody plants) since the very survival of the charcoal industry is already in jeopardy due to wood scarcity. Pyrolitic conversion cannot be considered for this area because of high investment costs.

2.06 The area presently produces about half of the charcoal consumed in Port-au-Prince. Charcoal production is the main activity of people who have

no land suitable for agriculture and no alternative source of income. It is literally an activity of last resort. Landless charcoal makers enter into sharecropping arrangements with land owners, and receive credit from charcoal dealers (para 1.21). The dealers operate collection points, from which charcoal bags are shipped by truck or by sailboat to Port-au-Prince.

2.07 Tree plantings have been made for watershed protection in the Jean Rabel area with USAID support. A number of PVOs and missionary organizations have been engaged in plantings of fast growing species, or are interested in initiating such programs. One of the larger programs in this area has been sponsored by the Fonds Agricole, with funding by the Federal Republic of Germany (FRG). Plantings have consisted mostly of slow-growing native species such as mahogany for sawnwood, and fast growing exotics for fuelwood, including eucalyptus, Casuarina, neem, Leucaena, and Albizzia. Results in terms of areas established have been generally poor because of lack of protection, poor choice of site and inadequate site preparation. All plantings have been heavily subsidized with food for work, on the assumption that no farmer will plant trees unless he receives payment. Also, many of the PVO groups have food distribution and nutrition improvement as their principal objectives, with reforestation being simply a medium for that activity. Poor follow-through on the reforestation is common. The Fonds Agricole program also includes a project to clean underbrush from native bayahonde stands in order to improve productivity. No measurements have been made, however, to determine the effectiveness of these treatments. The creation of three charcoal producers' cooperatives has also been carried out by Fonds Agricole.

2.08 Dry-land agriculture is carried out in the more humid areas, especially the Bombardopolis plateau which is intensively cropped with beans, sorghum, castor beans, and perennial cotton. Agriculture is marginal in many areas and subject to drought. The irrigated valleys, especially Jean Rabel, are devoted to plantain and foodcrops.

2.09 The infrastructure of the region is poor, the road network is limited, and truck traffic hampered during the rains. There is also some coastal shipping. Many communities are served only by mule paths, and water supply and medical facilities are poorly developed. The main development activities in the region have been carried out by HACHO, with USAID financing. Since the termination of USAID support, however, HACHO lacks the necessary funds and staff to continue their programs at the desired level of activity.

C. The Pine Forest of La Selle

2.10 The La Selle highlands are located in the southeastern corner of the country. They form the highest mountain chain in the country, with the highest peak at 2,600 m. The hilly terrain is calcareous, with thin soil on the slopes, but some flat areas and valleys have deep soil suitable for agriculture. The rainfall is high--2,300 mm average at Fonds Verrette, just north of the project area (Map 15926), with peaks in April-June and August-November. The natural vegetation is that of the humid mountain forest, with West-Indian pine (Pinus occidentalis) the dominant species. The La Selle national pine forest area occupies some 32,000 ha of highland of which approximately 20,000 ha are in forests of varying density.

2.11 Between 1941 and 1957, the forest was managed and logged by the Haitian-American Society for Agricultural Development (SHADA), a private firm with American capital, which developed a sustained yield management program, operated four sawmills, and developed the region's infrastructure (such as roads, aerial cableways for log/lumber extraction, housing, offices, and water supply). In 1957 SHADA terminated its activities and the logging concession was given to private Haitian interests. This latter arrangement was terminated in 1980 and the administration and management of the forest entrusted to the Forestry Bureau. Logging of all pine has now been forbidden in Haiti but some cutting and pit sawing is taking place illegally, with the lumber being sold mostly in Port-au-Prince. As would be expected, the price of this lumber increased considerably with the official ban on cutting and consequent reduction in supplies.

2.12 Currently, the pine stands are thinly stocked and degraded because of overcutting, overgrazing, encroachment by agriculture, and frequent burning. Vigorous regeneration is present in some areas and needs release thinning while in other areas planting or direct seeding is needed. Some areas have failed to regenerate because of repeated burnings. The stands are also characterized by a large number of fallen and diseased trees. The larger fallen trees, however, are not being utilized for fuelwood or charcoal, since pine charcoal is softer and has a lower caloric value by volume than charcoal from hardwood, although about the same value by weight. Also, the abundant small sized firewood in the area is easier to collect and transport. This contrasts sharply with other areas of Haiti where fuelwood scarity has led to the collection of any available wood material, including stumps and roots.

2.13 Even though the entire forest is on state land, it contains a squatter population estimated at over 15,000, primarily on non-forest areas estimated to cover about 10,000 ha out of the total of 32,000 ha. Much of this area is cultivated and almost all land in the reserve is grazed to varying degrees. There are examples of good agricultural practices, including contour farming, and temperate fruits and vegetables are produced in the valleys. An agricultural extension agent operates in the area. Nevertheless, much of the agriculture is marginal, including shifting cultivation on steep slopes and the burning of forest land to produce better grazing conditions. As a result of these practices, the humus soil has virtually disappeared, having been washed away by rain in many areas.

2.14 The eastern portion of the forest is accessible by the all-weather road which links Thiotte and the southeastern coast to Port-au-Prince. The western portion can be reached only through Jacmel in the southern coast by a road made difficult by the rough terrain and poor maintenance. Throughout the area the infrastructure and services are limited. The farmers of the project area have access to extension services (and receive the support of the Agricultural Experiment station at Savanne Zombie) but not to agricultural credit.

III. THE PROJECT

A. Objectives and Brief Description

3.01 Extensive reforestation is needed to meet the demand for fuelwood in the absence of alternative sources of energy, and to stem the depletion of forest

resources and the subsequent deterioration of the environment. A large-scale program is not feasible at this time, in view of the weakness of the Forestry Bureau, the paucity of information on suitable species and the need to develop efficient methods of seedling distribution and planting by the rural populace. The absence of a fuelwood tree-planting tradition among farmers, who view wood from natural stands as a "free good," and the prevalence of land tenure problems are major impediments to reforestation on private lands. There are also serious difficulties encountered in protecting trees from fire, grazing, and uncontrolled cutting. All agricultural land in Haiti, and a good part of the marginal land, are under cultivation, leaving only dry and shallow soils available for reforestation. The project would aim at (a) building up the operational capacity of the Forestry Bureau, including a strong extension element, (b) enacting and applying new forestry legislation compatible with the nation's forestry development goals and its socio-economic environment, and (c) developing economically viable reforestation and forest management practices for Haiti. The forestry management aspects would be concerned primarily with protection from fire and grazing. On the consumption side, the project would aim at promoting fuel efficient cooking stoves in order to reduce demand for wood and charcoal.

3.02 This project should be considered as the first time slice of a long-term program of forestry development, which, however, is difficult, at this stage, to define in any but broad dimensions. It is estimated, on a rough reckoning, that the overall program would aim at (a) the establishment of about 100,000 ha by year 2000, and 300,000 ha by year 2020 of fuelwood plantations in various parts of the country- with an annual rate of afforestation increasing to, and leveling off, at 10,000 ha per year after 10 years, and (b) the management and commercial logging of 30,000 ha of pine forest. The preliminary estimate of the total cost is of the order of US$110 million spread over the next 25 years. The Government has indicated its commitment to forestry development (para 1.28), and a number of donors (USA, Canada, FRG, UNDP) are giving priority to forestry and resource conservation in their aid programs. Long-term goals would be determined, and a plan designed for the following 15 years, building upon the experience developed in this phase.

3.03 The principal objective of the proposed project would be to develop a substantial reforestation and forest management capacity through the following components:

(a) Re-inforcement of the Forestry Bureau. An international forestry consultant, several short-term consultants, and forestry technicians would be appointed to support the activities of the Bureau. The Bureau would also be supplied with vehicles and equipment.

(b) Forestry Training and Education. Besides in-service training of existing staff, the project would finance: (i) at the graduate level, eight fellowships for studies in foreign forestry schools; and (ii) at the primary level, the introduction of forestry and conservation education in grade schools; and (iii) the creation and operation of a two-year forestry curriculum at the Agricultural School of Damien.

(c) Pilot Plantings and Trials of Fuelwood Species. Pilot plantings of species of suitable potential would be made on about 250 ha of state land near Port-au-Prince, and species elimination trials for planting and direct seeding of exotic and local species would be carried out at that site, at two sites in the Northwest (Map 15925), and also in other ecological zones as the technical ability and resources of the Forestry Bureau permit.

(d) Management of the Pine Forest. The pine forest of La Selle would be demarcated and surveyed, and a comprehensive management plan would be prepared and initiated for the 20,000 ha of forest on the 30,000-ha area. Direct seeding tests and species trials for exotic pines would also be carried out.

(e) Promotion of Fuel Efficient Stoves. Existing designs of charcoal and wood cooking stoves, and the stoves developed by the Ministry of Mines and Energy, would be tested and promoted.

(f) Preparation of a Follow-up Project. The preparation of a large-scale forestry project would be undertaken by the Forestry Bureau, using the experience gained under the proposed project and with the assistance of the senior forestry consultant (para 3.03(a)).

B. Detailed Features

Reinforcement of the Forestry Bureau

3.04 The Forestry Bureau presently has a staff of only two professionals with forestry training. Its field staff is sizeable but untrained and has purely regulatory functions. There has been no sector planning and the Bureau has had no involvement in the forestry activities being carried out by PVOs. The Bureau would be reinforced under the project by the assignment of a senior expatriate forester, whose terms of reference are in Annex 1. This consultant would be responsible for organizing and supervising the various forestry activities under the project, train field personnel, monitor and evaluate forestry programs in the country, and assist in formulating a large-scale reforestation and forest management program as a follow-up to this project, including staffing requirements of the Forestry Bureau. Assurances were obtained at negotiations that the consultant would be selected by September 15, 1982. The Bureau would appoint three field managers for the project's planting, management and extension operations described below (para 3.06), and each of these would be supported by a forestry technician. The appointment of the field managers would be a condition of effectiveness. The Forestry Bureau would be progressively strengthened and built up as the recipients of fellowships and students graduating from the technical level school (para 3.05) become available. The necessary vehicles and equipment needed by the Bureau would be financed under the project. It is expected that the Bureau would require continuing support, possibly under a follow-up project, to carry out the long-term forestry program after the completion of the proposed project.

Forestry Training and Education

3.05 In order to carry out the needed forest planting and management programs in the country, it is necessary to improve the level of technical competence of the field staff and the public understanding of the importance of forestry to the country's economy and environment. The project would therefore initiate forestry training and education at three levels.

(a) Graduate Training. At the present time, the only graduate training in forestry available in the country consists of a course in silviculture given to fourth year students at the Faculty of Agriculture and Veterinary Medicine (FAVM). To supervise the forestry technicians (para 3.05(b)), it is estimated that the country needs to develop a core of 10 to 15 graduate foresters over a few years to properly administer reforestation and forest management. This number cannot justify the establishment of a professional forestry school, since it would take classes of at least 15 per year to justify the cost of facilities and teaching staff. The immediate needs can be met by sending eight students overseas for study during project implementation. Under the project, six fellowships would be established for graduates of the FAMV or the School of Natural Science of the University of Haiti to train in general forestry. The duration of each fellowship would be two years. In addition, the two teaching counterparts of the technical forestry school (para 3.05(b)) would receive training in forestry education. Training would be arranged at forestry institutions geared to tropical environments. During negotiations, assurances were obtained from the Government that (i) the selection of candidates would be subject to IDA agreement, and (ii) the graduate foresters would be appointed and retained in employment in forestry for at least twice the number of years of fellowship study.

(b) Technical Level Training. The country has no forestry technicians at present and would need a sufficient corps to carry out in the field large-scale afforestation and management programs outlined in paragraph 3.02 with at least eight available to start a follow-up project, building up to about 50 to carry out reforestation at the rhythm of 10,000 ha per year after 10 years. Additional foresters will be needed for forest management. There is need to strengthen consciousness of the importance of forestry among DARNDR personnel. A forestry curriculum would therefore be established at the medium-level agricultural school operating at Damien near Port-au-Prince. The yearly enrollment would be 15 to 20 starting with at least five the first year; the forestry curriculum would cover two years, after one year of scientific studies; about one-third of the forestry curriculum would consist of practical training, including farm forestry, principally at the pine forest of La Selle, and also at nurseries and fuelwood planting sites. As construction and equipment of training facilities (classrooms and student accommodations) Damien would depend on the availability of funding through additional co-financing, such costs are not included in the present project. Meanwhile, teaching would start in the available facilities at Damien. The project would include the rehabilitation of existing

buildings and complementary construction at La Selle for practical training. The program would require two full-time professors and one instructor (forestry technician) to be recruited internationally, and nationals would be recruited for the support staff. To ensure continuity after the project, three graduates of FAMV would be appointed to assist in teaching and receive in-service training. Two of them would be selected for one year of overseas training before joining the teaching staff.

(c) Primary School Training. In order to bring about an awareness and understanding of forestry among the population, the Ministry of Education is preparing to introduce forestry education at the primary school level. Besides classroom teaching, the program would include the establishment of tree nurseries in rural schools and tree plantings on grounds of the students' families. Under the project, the technical forestry school would organize training of rural teachers during the vacation period. Some 133 teachers would receive training each year. The project would finance teacher training costs, and also the seeds and teaching materials to be used by the rural schools. It is expected that the SONAMAR program (para 1.27) would help educate the population to appreciate forestry problems.

Fuelwood Species Trials

3.06 Because of lack of reliable data on the performance of fuelwood trees, especially on the marginal land available for fuelwood, controlled trials would be carried out to test both exotic and local species in representative areas. The trials would test promising species, primarily for fuelwood but also for fruit or forage production and for industrial uses (guayule for rubber, jojoba for industrial oil, and such). A trial design has been prepared and is available in the project files. One set of trials would be located on state land near Port-au-Prince in connection with pilot plantings (para 2.01), and two sets would be located in the Northwest, near Baie de Henne and Jean Rabel. Land in these areas would be made available by the Government and the identification of an area of at least 250 ha near Port-au-Prince, 50 ha each near Baie de Henne and Jean Rabel, and the turning over of that land to the full control of the Forestry Bureau would be a condition of effectiveness. A simple soil survey (slope, depth, texture, pH) would be made on each site. An agronomist would be appointed as field manager at each of the three locations and receive in-service training. An expatriate volunteer would be appointed to the principal Port-au-Prince vicinity site, and another to the Northwest area. The project would include funds for the infrastructure, vehicles, equipment, and operating costs at selected sites during the project period. Due to the long-term nature of forestry research, the trials would be continued under the larger follow-up project.

3.07 Because of the difficulty of ensuring, through planting, a sufficient pace of reforestation to catch up with deforestation by planting, direct seeding approaches would be tested in different environments of the country, especially on rough inaccessible terrain. The tests would include a number of different species for each environment being evaluated for this reforestation method. Special attention would be given to developing adequate protection of the seeded areas from fire and free ranging animals.

Pilot Fuelwood Plantings

3.08 In order to test techniques for reforestation and subsequent management of public land, and to develop the capacity of the Forestry Bureau to carry out that reforestation, some 200 ha would be planted near Port-au-Prince, on the area to be administered by the Forestry Bureau. Although precise information on species performance is not available, a number of species are considered promising and appropriate for pilot plantings. These include: Leucaena leucocephala, Albizzia lebbek, neem (Azadirachta indica), Cassia siamea, and other Cassia species, Acacia spp., Parkinsonia aculeata, Prosopis juliflora (a native species) and other Prosopis species. The program would be under the direct supervision of the field manager of the Port-au-Prince area site (para 2.01) with the help of a volunteer technician. Seedlings for the project would be produced at the central nursery of DARNDR at Damien. A seed laboratory for procuring seed internationally and nationally and for testing and preparing seed for Haiti's needs would be established at Damien as part of the training component. Planting and maintenance would be carried out with hired labor. Arrangements would be studied to contract labor for harvesting the wood under a sharecropping agreement with neighboring farmers. An area of existing scrub forest near the Port-au-Prince area site which would be neither planted in species trials nor pilot reforestation plots, would be protected from fire, agricultural encroachment and grazing. Sample plots would then be established to measure the growth of natural stands with and without protection. The program would be supervised by the field manager assisted by a volunteer technician.

3.09 In the Northwest, tree planting activities are being carried out on private farms by PVOs with heavy subsidies, generally in the form of food for work. These activities are to be expanded under the USAID-supported project (para 1.27). The Forestry Bureau field managers appointed for establishing species trials under the project would contact and monitor these PVO projects. This monitoring would include exchange of technical information and have the objective of assuring proper planting and follow through in the reforestation activity. After establishing the trials in the first year, each field manager would initiate test programs for the distribution of seedlings of promising species to demonstration farmers, using no direct subsidies. Farmers who are receptive to trying new ideas and techniques and also are respected in their communities would be sought for these demonstration plots. The seedlings could initially be sold at low cost to encourage planting. Once such a program is developed the Government role would only be to assure an adequate production of quality seedlings and good planting techniques by the landowners. A minimum goal for the four-year project period is to have three trial sites established and 500 ha planted.

Pine Forest Management

3.10 The remaining pine stands of La Selle (para 2.10), which have been severely affected by overcutting, fire, and encroachment of agriculture, have now been placed under the control of the Forestry Bureau which has set up two management units totalling approximately 32,000 ha. Logging is now forbidden by law, but, after rehabilitation and with proper management, these forests

could undergo controlled logging and become an important source of lumber. Under the project, aerial photos at a 1:12,000 or 1:15,000 scale would be produced and interpreted by an expatriate consulting group. The interpretation would consist of classifying the stands by age, density and need of treatment and of mapping agricultural areas. If necessary, soil surveys would be undertaken to determine if an area is suitable for further agricultural development or if it should be converted to forest. Field surveys would be carried out by Forestry Bureau personnel to confirm or modify the results of the interpretation. The inventory would lead to the preparation of a preliminary management plan aimed at the rehabilitation of the stands. Actual management would be initiated under the project and would consist of planting and seeding of bare areas, sanitary cutting (removal of diseased trees), culling (removal of dead and poorly formed trees), protective measures against further agricultural encroachment, fires and overgrazing, and release thinnings of dense, stagnated natural regeneration. The labor would be provided by four crews of 20 men each, hired by the Bureau, and the harvested timber would be utilized for fuelwood charcoal, poles, posts and construction wood. It is expected that 10 years of such management would be required before large-scale commercial logging could be resumed. The Forestry Bureau would gradually expand its management activities on an area control basis to cover the 20,000 ha area within the 10-year period. The proposed schedule is as follows: year 1, 500 ha; year 2, 750 ha; year 3, 1,000 ha; year 4, 1,500 ha; year 5, 2,000 ha; and years 6 through 10, 2,850 ha each. Immediate revenues may accrue from some initial sawnwood cuttings in mature stands and possibly from naval stores production (turpentine and rosin extraction) if preliminary studies show its technical and economic feasibility.

3.11 The presence of some 2,000 households settled in the pine forest would require careful attention. An estimated 2,000 ha of marginal lands now used by them would be converted to forestry and the farmers encouraged to carry out forestry-related work. Their crop cultivation activities would be restricted to the arable land defined by the land use survey. To achieve these results, agriculture support provided by the DARNDR services would be intensified in the area. Assurances were obtained from the Government that it would intensify support services, in particular, by the provision of credit and the appointment of additional extension agents. The employment generated under the forest management program would give farmers an added source of income and would help ensure improved land use.

3.12 The project would include the construction of new buildings in management unit 2, the maintenance of the main logging roads through labor intensive methods, the supply of vehicles and equipment, and the financing of operational management costs. Each of the two management units has been placed under the direct supervision of a field manager, who would receive the support of an expatriate technician.

Development and Promotion of Fuel-Efficient Stoves

3.13 Because the improvement of cooking stoves (charcoal and wood) can substantially reduce the use of fuel and the demand on forest resources, the development of efficient stoves would be given impetus under the project. The Directorate of Energy Resources of the Ministry of Mines and Energy has developed a charcoal stove model and has started work on improved wood stoves. Equipment for the Directorate would be financed and consultant support provided

through the project to conduct the necessary efficiency testing in the laboratory and in households. A survey of cooking practices, which affect stove design, would be made both in Port-au-Prince for charcoal and in rural areas for wood. The survey would be designed and data analyzed with the help of a consultant financed under the project. A condition of disbursement under this component would be the appointment of a staff member of the Directorate of Energy to carry out the survey in Port-au-Prince and a staff member of DARNDR for the survey in rural areas. The program would focus on the introduction and testing of a few selected models of low cost stoves developed in other countries; their acceptance by users and methods for promoting their adoption would be tested in the field. If a favorable response is obtained, a number of stoves would be built by artisans and distributed to volunteer organizations for promotion.

Preparation of a Second Phase

3.14 Using the experience gained under the project, and other forestry projects in Haiti (para 1.27), the Forestry Bureau would prepare a larger scale project, with the help of the senior forestry consultant. This exercise would include the definition of a national forestry policy, the definition of the responsibilities, organization and program of the Forestry Bureau and the identification of potential reforestation areas. The second project is expected to include an expansion of fuelwood plantings, continuation of pine forest management (para 3.02), and further technical assistance and forestry training. To this end, the Bureau would receive the support of short-term consultants on forestry legislation and forestry institutions. During negotiations, assurances were obtained that the Government would (a) review the existing legislative and regulatory framework applicable to forestry development; (b) exchange views on such framework with IDA at the time of the review mission (para 3.15); and (c) make such modifications in the framework as shall be necessary or appropriate. A sociologist would also assist in assessing the rural population's receptivity to reforestation and in developing and testing ways to improve interest and participation in tree planting. The identification/preparation work by the Forestry Bureau, which would be responsible for issuing the preparation report, would be supported by the Programming Unit of DARNDR.

C. Project Implementation

3.15 Since most of the activities to be undertaken under the project would be new initiatives, a start-up period would be needed to field the staff, organize procurement, and order equipment. It is expected that the local and expatriate personnel would be appointed promptly. An implementation schedule is presented in Chart 1. An interim review would be carried out at the end of the second year, and the project would receive close supervision by IDA staff. The supervision missions would maintain close liaison with other agencies involved in forestry, especially those participating in the USAID-sponsored project.

D. Project Cost Estimates

3.16 The cost of the project is estimated to be of the order of US$5.07 million, of which US$3.44 million (about 68%) are foreign exchange costs. The costs are summarized below and detailed in Annex 3, Tables 1 to 10.

3.17 Project costs are based on projections for July 1982, assuming an inflation rate of 15% from July 1981 to July 1982. The costs have been calculated net of all identifiable taxes and duties, from which agricultural development projects are exempt. Total costs include physical contingencies estimated at 20% of estimated costs for building construction (because of the absence of design), 10% for equipment, forestry operating costs, supplies, and costs of operation and maintenance. Price contingencies were calculated by compounding annual price increases over the implementation period as follows: for foreign costs, 8.5% for 1982, 7.5% for 1983-85, and 6% per annum for 1986; for local costs, 12% annually throughout the period. The average cost of short-term consultant services is estimated at US$11,000 per man-month (including benefits and subsistence). The cost of long-term consultants is estimated at US$8,300 per man-month (including man-month rate, travel and allowances), except for the volunteer technicians whose cost is US$2,000 per man-month.

Summary of Project Costs

Project Components	Local	Foreign	Total	% of Foreign	% of Total Base Costs
	--------US$'000--------				
Reinforcement of Forestry Bureau	45.6	528.8	574.4	92.1	14.1
Forestry Training	537.9	1,145.7	1,683.6	68.1	41.5
Fuelwood Plantations	143.8	411.1	554.9	74.1	13.7
Pine Forest Management	473.3	487.6	960.9	49.3	23.7
Development of Cooking Stoves	60.3	56.7	117.0	48.5	2.9
Preparation of Second Phase	0.2	168.8	169.0	99.9	4.1
Total Baseline Costs	1,261.1	2,798.7	4,059.8	68.9	100.0
Physical Contingencies	54.9	77.4	132.3	58.5	3.3
Price Contingencies	322.8	561.9	884.7	63.5	21.8
Total Project Costs	1,638.8	3,438.0	5,076.8	67.7	125.1

E. Proposed Financing

3.18 The United Nation Development Program (UNDP), which normally finances this type of technical assistance, has no funds for this purpose. The French Association of Volunteers for Progress (AFVP) has agreed in principle to appoint the five forestry technicians with French government financing. The International Development Research Center (IDRC) of Canada has agreed in principle to finance the research aspects (fuelwood trials and stoves). Financing would be shared by IDA, IDRC, AFVP and the Government as follows:

Project Financing
(US$'000)

Project Component	Government	IDRC	AFVP	IDA	Total
Reinforcement of Forestry Bureau	20.4	-	-	554.0	574.4
Forestry Training	38.4	-	96.0	1,549.2	1,683.6
Fuelwood Plantations	68.1	118.0	176.0	192.8	554.9
Pine Forest Management	60.0	-	192.0	708.9	960.9
Development of Cooking Stoves	-	117.0	-	-	117.0
Preparation of Second Phase	-	-	-	169.0	169.0
Total Base Cost	154.5	235.0	464.0	3,173.9	4,059.8
Physical Contingencies	-	15.0	-	117.3	132.3
Price Contingencies	30.9	50.0	95.0	708.8	884.7
Total Project Cost	217.8	300.0	559.0	4,000.0	5,076.8
Percentage of Total	4.5	5.9	11.0	78.6	100

The proposed IDA credit of US$4.0 million, for financing about 79% of total project costs, would be made available to the Government on standard terms. It would finance about 80% of foreign exchange costs and about 76% of local expenditures, which is justified on country grounds. The contribution of AFVP, in terms of the salaries of the volunteers, and that of IDRC would be provided as grants. The Government's contribution would meet the salaries of incremental Government employees. If additional co-financing were to become available, it would cover the building costs of the technical forestry school (para 3.05(b)) which are not included in the above figures and project costs. Active discussions are underway on this point with the OPEC Fund and bilateral donors (Canada, France, FRG, and USA).

3.19 To ensure that funds would be available in a timely manner for efficient implementation, a Special Account estimated to cover all local project expenditures over a three-month period would be established for the project in a commercial bank. IDA would make the initial deposit of US$50,000 into the Special Account after the project had been declared effective. Subsequent replenishment of the Special Account by IDA would be subject to submission by the Project Unit of withdrawal applications. IDA would commence recovery of the initial deposit when the amount undisbursed in the Credit is reduced to US$50,000. The Special Account would be subject to audit each fiscal year in accordance with appropriate auditing principles consistently applied, by auditors acceptable to IDA. Establishment of the Special Account by the Government would be a condition for Credit effectiveness.

F. Procurement and Disbursement

Procurement

3.20 Procurement of vehicles and equipment to be financed under the Credit that are similar in nature and time of purchase would be grouped in packages where possible. Contracts for four-wheel drive vehicles for a total of US$0.19 million would be procured through international competitive bidding. Contracts for other items costing more than US$25,000 but less than US$100,000 (and totalling US$0.09 million) would be procured on the basis of competitive bidding procedures, advertised locally, which are satisfactory to IDA. Contracts for less than US$25,000 (amounting to US$0.29 million) would be procured by direct shopping on the basis of at least three quotations. Contracts for civil works and buildings are expected to be for less than US$0.2 million. As project experience in the country has shown that contracts for less than US$1.0 million would not be attractive to international contractors, they would be awarded on the basis of competitive bidding advertised locally, for a total amount of US$0.14 million. Services of consultants to be financed by the IDA credit (US$1.22 million) would be obtained according to IDA guidelines.

Disbursements

3.21 The IDA credit of US$4.0 million would be disbursed over four years under the following categories:

Category I	-	100% of civil works costs (US$139,000).
Category II	-	100% of foreign costs of vehicles, equipment, and furniture (US$494,000).
Category III	-	100% of incremental field forestry expenses for the fuelwood and pine forest components, including operating costs, inputs, surveys, and seasonal labor (US$1,184,000).
Category IV	-	100% of foreign costs of expatriate and consultant salaries financed by IDA, and of fellowships abroad (US$1,474,000).
Category V	-	Initial deposit in Special Account (US$50,000).
Category VI	-	Unallocated (US$659,000).

3.22 Applications for credit withdrawals, including applications for replenishment of the working fund, would be fully documented, except for applications under Category V and those under Category III which would be against certified statements of expenditures, the supporting documentation for which would be verified by the independent auditors as well as reviewed by IDA supervision missions. The schedule of disbursements shown below takes into account the disbursement profile for IDA projects in Haiti, and especially the disbursement record of the Rural Development Project in the Northern Department (para 1.16), which reflects a slow start-up of operations. It takes into account the recent experience in speeding up implementation (especially through the establishment of a revolving fund and frequent supervision), and the substantial proportion of project funds to be used for financing consultants. The estimated phasing is as follows:

(US$ Million)

IDA FY	1983		1984		1985		1986		1987
Semester	1	2	1	2	1	2	1	2	1
During Sem.	0.05 1/	0.02	0.35	0.45	0.63	0.70	0.75	0.75	0.30
Cumulative	0.05	0.07	0.42	0.87	1.50	2.20	2.95	3.70	4.00

D. Accounts, Audits and Reports

Accounts and Audits

3.23 The accounting department of the DARNDR would keep separate accounts for the project, maintained in accordance with acceptable accounting practices to reflect the operations and financial position of the project. The accounts would be maintained separately for each of the components.

3.24 The accounts and statements of expenditures and the Special and Project Accounts (para 3.19), together with the associated internal controls, would be audited by independent auditors. The auditors' report would be furnished to IDA no later than four months after the end of the Haitian fiscal year. Assurances were obtained to this effect.

Reports

3.25 The Forestry Bureau would prepare and submit to IDA a semi-annual progress report on the implementation of the forestry development aspects within two months of the end of each semester. The same schedule of reporting would be observed by the Directorate of Energy for stove development, the Ministry of Education for the primary school forestry program, and the school of agriculture for the forestry school development. Performance indicators and format of the reports have been drafted and would be discussed with the relevant services during the first supervision mission.

IV. ORGANIZATION AND MANAGEMENT

A. Organization

4.01 With only two employees who have received forestry training and uneducated forest guards at the field level, the Forestry Bureau cannot manage large-scale forestry development programs at this time. Its role remains to be defined, and its responsibilities to be established. It should, however, eventually be given full jurisdiction over state forests. The Bureau would be strengthened to carry out project activities, define policies, and pave the way for an expansion of reforestation and silvicultural

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1/ Initial payment to the working fund.

management programs. Because the Forestry Bureau needs strengthening, the Director for Natural Resources would have overall responsibility for all forestry activities and expenditures under the project and for the coordination with other agencies (School of Agriculture, Ministries of Mines/ Energy and Education) for related activities under the project. During negotiations, assurances were obtained from the Government that IDA would be given an opportunity to comment on the appointment of any new chief of the Bureau. The Chief of the reforestation and trial unit of the Bureau would have direct responsibility for field planting and fuelwood species trials. The staff of the Forestry Bureau would be assisted by the senior forestry consultant. The preparation of a second phase project would include a definition of the responsibilities of the Forestry Bureau and of the organization required to carry out the long-term forestry program.

4.02 The DARNDR would have overall responsibility for project implementation. The Dean of FAMV would coordinate the fellowship program with the DARNDR and the forestry program in primary schools with the Ministry of Education. The Director of Energy Resources of the Ministry of Mines and Energy would have responsibility for the cooking stove component. A condition of effectiveness would be the conclusion of arrangements satisfactory to IDA for the participation of the Ministry of Education and the Directorate of Energy Resources in the project.

B. Staffing

4.03 The Forestry Bureau has already appointed two agronomists to be field managers for the pine forest. The Bureau would appoint three more for fuelwood trials and pilot planting operations in the Port-au-Prince area, Jean Rabel and Baie-de-Henne, respectively. Volunteer technicians would assist at the site near Port-au-Prince and in the Northwest. While the volume of operations cannot justify the assignment of a full-time administrator to the Forestry Bureau, there is need to avoid slippage in project implementation because of supply problems; to this end a senior procurement officer of the administrative section of DARNDR would be assigned to handle procurement and administrative matters under the project, in liaison with the Director of Natural Resources and the Senior Forestry Advisor. During negotiations, assurances were obtained that a senior procurement officer acceptable to IDA would be assigned to handle project procurement, as a condition of effectiveness.

4.04 The professional expatriate attached as an advisor to the Forestry Bureau would assist in the implementation of the project throughout its duration. Five volunteer technicians would be assigned to the Forestry Bureau. The project's total consultant requirements, including volunteers, are estimated at 34 man-years. Assurances were obtained at negotiations that the qualifications, experience, terms and conditions of employment of the long-term and short-term consultants would be subject to IDA agreement. Their proposed terms of reference are in Annex 1.

V. PRODUCTION, MARKETING AND FINANCIAL RESULTS

A. Production

5.01 At this time, no data exist in the country on which to base reliable detailed production estimates. The estimates given below are approximations derived from general knowledge of the production potential under comparable environments in other countries.

Fuelwood Plantings

5.02 Current production of the dry scrub forest is estimated at between 0.5 and 1 m^3/ha/year. Fuelwood plantings of fast growing species at the site near Port-au-Prince are expected to produce an average of 5 to 10 m^3/ha yearly, to be harvested in five-year rotations. This is equivalent to some 500 to 1,000 kg 1/ of charcoal per hectare per year. With proper protection, the native scrub forest, essentially Prosopis, is expected to yield between 1.5 and 2 m^3/ha/year.

Pine Forest

5.03 During the next 10 years, the harvest from the pine forest is expected to be limited mostly to diseased, dead and over-mature trees and small trees from thinnings. In those stands where sawtimber size trees exist, sawlogs would be produced and gum and turpentine production would be established if initial investigation indicates that it would be feasible. The wood would be used for charcoal, posts, construction poles, and lumber. An average of 30 m^3/ha would be cut, of which 12 m^3 would be suitable for lumber production. Once the full productive potential of the forest is restored, production is anticipated to average 5 m^3/ha/year (or a total of some 100,000 m^3/year), 70% of it as sawtimber and the remainder as fuelwood, poles and posts.

B. Marketing

Markets

5.04 The small amount of fuelwood produced under the project would be readily absorbed by local consumers. Charcoal would be shipped to Port-au-Prince. The demand for building poles is high, and sawtimber has to be imported. Thus, all forest wood produced under the project would find a ready market.

Prices

5.05 Trees are being cut for charcoal free of charge, especially those growing on state land. However, trees growing on private land are now often

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1/ 8 m^3 of wood = 1 ton of charcoal.

cut by charcoal makers under a sharecropping arrangement with the owner, under which he would receive some charcoal. There are no reliable data on the distribution of revenues in this case, but it is generally believed that the owner receives half of the charcoal produced. With the value of charcoal at the production site averaging US$55/ton and a conversion factor of 8 m^3 wood to 1 ton charcoal, the value of wood can be estimated at US$11.00 per ton. From this should be deducted the labor cost for collection, which, in the case of plantations, would be much lower per unit weight harvested than collection from dispersed natural forests.

5.06 Charcoal sells at an average price of US$150/ton to the consumer at the retail level in Port-au-Prince, or approximately three times the price at the collection points in the rural areas. The consumer price of kerosene is US$1.24 per gallon. In caloric terms, these prices correspond to a range of US¢6.7 to 11.4 per kcal for charcoal, depending on the type, and US¢11.3 for kerosene (calculation in Annex 2, Table 6). Regardless of prices, charcoal remains the poor man's preferred fuel supply, because the low income group cannot afford the investment in kerosene stoves costing about US$15 each, while locally made charcoal stoves cost only US$3 to US$5.

5.07 The retail price of charcoal does not reflect the value of wood to the economy. Given the importance of encouraging conservation of available fuelwood resources, and of involving the rural population in the reforestation effort, Government policies should aim at demonstrating the value of fuelwood planting. Wood gatherers and charcoal producers, for example, would be shown how their costs are reduced and productivity increased (in terms of quantity of wood produced per hour of work) by the availability of concentrated supplies of better quality fuelwood from plantations. During a second phase, consideration would be given to a system of charge for fuelwood from plantings on public land. The plantations on both public and some private land would eventually become cash crops, and fuelwood and charcoal production elevated to a full-time activity, not restricted, as at present, to persons with no alternative income source.

5.08 Cutting of pine is now forbidden by law, but some logging and sawing are carried out illegally. Sawn timber currently sells for US$0.65 per board foot in Port-au-Prince, or US$270 per m^3 (conversion factor used: 412 bd ft per m^3). This value essentially reflects imported lumber prices. It should be pointed out, however, that the price which was around US$.45/board foot, or US$185/m^3 rose sharply after cutting was prohibited and the supply declined. For purposes of the financial analysis of this component, it is assumed that, when the pine forest lumber re-enters the market legally, the price will be US$.45/bd ft, or US$185/ m^3. Since the only logging going on in the country is illegal, no stumpage value is being paid. On the managed pine forest, however, the stumpage value will at least have to cover the costs of managing the forest. The prices of imported timber and the projected price for pine forest lumber (US$270 and US$185 per m^3, respectively) are such that stumpage values could easily reflect such costs without pricing the pine lumber out of the market. Basing estimates on the calculations shown in Annex 2, Table 1, a stumpage price of US$12.00 per m^3 of sawtimber during the first

10 years would cover all of the fixed and variable of pine forest management during that period (i.e. yield an internal rate of return of 10). During the disbursement period, much of the wood removed in stand improvement cuttings would be suitable only for fuelwood and no charge would be made to the local population who collected it. All commercial sawtimber harvested, however, would be subject to a minimum stumpage charge of G 60 (US$12) per m^3 by the Forestry Bureau and would be increased periodically, taking into account factors such as changes in operating costs and price of imported lumber. During negotiations, assurances were obtained from the Government to this effect.

C. Income and Financial Results

Income

5.09 Over the four-year implementation period, the project would create new employment and thereby distribute a total of US$330,000 in additional wages paid to nationals involved in the execution of the project. Of special significance would be the employment generated by the management of the pine forest. The income from the sale of pine, assuming a US$12.00 stumpage fee, would be about US$554,000 over the four years and would help defray some of the project expenditures. A financial analysis of the pine forest component is given in Annex 2, Table 1.

Government Cash Flow

5.10 At the end of the disbursement period, recurrent costs required to maintain the project would amount to an average of about US$195,000 per year, including replacement costs for vehicles and equipment. This amount does not include costs that would be incurred under the medium-term afforestation program (para 3.02) estimated at US$110 million, most of which is expected to be supplied by external donors.

VI. BENEFITS AND JUSTIFICATION

A. Benefits

Direct Benefits

6.01 The main direct benefit from the project would be the development of of large-scale fuelwood reforestation approaches to help reverse the trend toward depletion of the country's major energy resource base, the restoration of the productive capacity of the major remaining forest in the country, and strengthening of forestry staff. During the implementation period, the pine forest would provide some 600,000 m^3 of wood for charcoal, building poles, fuelwood and lumber. These activities would generate employment and income for the rural population settled in the forest area. Over the four years of implementation,

the pine forest component would generate about 360 man-years of employment for unskilled labor and 40 man-years for skilled labor. The project would pave the way for a resumption of commercial logging for pine sawtimber. It is estimated that 10 years after initiation of the proposed management activities the pine forest would annually produce sawtimber, which as lumber would have a market value of US$18.5 million and an economic value, in terms of import substitution, of US$27 million. The fuelwood component would make it possible to reduce kerosene imports; each hectare in full production would yield the equivalent of US$250 worth of kerosene annually. This component would generate about 200 man-years of employment for unskilled laborers for every 1,000 ha planted and pave the way for the establishment of increasing areas of high yielding fuelwood species. The long-term afforestation program (para 3.02) would generate substantial additional employment.

Indirect Benefits

6.02 A major indirect benefit of the project would be the improvement of the environment and soil and water conservation. The improvement in fuelwood output and the expected improvement with efficient cooking stoves would help relieve the severe pressure on wood resources and reduce the cost of imports of fuelwood substitutes such as kerosene. The project would also help develop positive attitudes toward forestry and the environment among the population and develop approaches to expanded afforestation and management of timber stands. Finally, it is expected that the pilot fuelwood component would help coordinate afforestation programs supported by PVOs and other donors and thus improve their effectiveness.

B. Economic Analysis and Rate of Return

6.03 An economic and financial analysis, made for the pine forest management, the one component which will have direct and immediate cash income, indicates a favorable outlook. It is feared that the pine forest would virtually disappear in about 30 years without the proposed project. With the project, on the other hand, timber yields would increase gradually and reach full productivity after 10 years, at which time sustained commercial exploitation would begin. In the case of fuelwood planting, it is premature to make credible projections on the impact of the proposed component, which is designed to supply the data for large-scale reforestation. However, while in the absence of the project a severe fuelwood deficit, leading to a virtual disappearance of the natural forests, is expected, with the project, the country's reforestation capacity is expected to grow to 10,000 ha per year within 10 years, and help reduce the deficit by some 20%. Details are in Annex 2.

C. Risks

6.04 IDA's experience in the agricultural sector in Haiti shows slow disbursement and implementation, primarily because of lack of technical staff, institutional weaknesses, budgetary constraints and slow authorization

of expenditures by the Government bureaucracy. There is the risk of similar difficulties developing with the proposed project. However, the establishment of a special account (para 3.19) would reduce the risk of financial constraints. The lack of success of attempts at reforestation to date, due in part to the unfavorable attitude of the rural population, and the absence of a viable forest service together represent a negative trend which can only be overcome through vigorous efforts. However, the projected critical fuelwood supply situation and the continuing deterioration of the environment justify the efforts proposed under the project, while the risks are sought to be minimized by ensuring flexibility in implementation, and by close IDA supervision of the project.

D. Environmental Impact

6.05 The project and the program to follow would have a very positive impact on the Haitian environment. Through the educational efforts at the elementary school level and its extension work in rural areas, the project would lay the groundwork for an improved appreciation by the population of the economic and ecological benefits of reforestation and protection of watersheds.

6.06 Reforestation would reduce pressure on native forests as a source of fuelwood and in doing so contribute directly and indirectly to reducing erosion and enhancing water quality and flow.

6.07 Pine forest management work and complementary agricultural extension efforts by the DARNDR in the pine forest and other areas would help develop rational land use practices and reduce destructive grazing and burning patterns while promoting more profitable employment alternatives for the rural populace.

VIII. AGREEMENTS REACHED AND RECOMMENDATION

7.01 During negotiations, assurances were obtained from Government on the following principal points:

(a) the senior forestry consultant would be appointed by September 15, 1982 (para 3.04);

(b) the selection of candidates for fellowships would be subject to IDA agreement and the foresters receiving fellowships would be appointed and retained in employment in forestry for at least twice the number of years of fellowship study (para 3.05(a));

(c) agricultural support services would be intensified in the pine forest area, in particular by the provision of credit and the appointment of additional extension agents (para 3.11);

(d) the Government would review the existing legislative and regulatory framework applicable to forestry development, exchange views on such framework with IDA at the time of the review mission (para 3.15), and make such modifications in the framework as shall be necessary or appropriate (para 3.14);

(e) the auditors' report would be furnished to IDA no later than four months after the end of the Haitian fiscal year (para 3.24);

(f) IDA would be given an opportunity to comment on the appointment of any new chief of the FB (para 4.01);

(g) the qualifications, experience, terms and conditions of employment of the long-term and short-term consultants would be subject to IDA agreement (para 4.04); and

(h) the Forestry Bureau would levy a minimum charge of US$12.00 equivalent per m^3 for sawtimber as soon as harvesting of commercial sawtimber begins and the charge would be increased periodically, taking into account factors such as changes in operating costs and price of imported lumber (para 5.08).

7.02 Conditions of effectiveness would be:

(a) the appointment by the Forestry Bureau of three field managers for the fuelwood component (para 3.04);

(b) the official transfer of at least 250 ha of land near Port-au-Prince and at least 50 ha each near Baie de Henne and Jean Rabel to the full control of the Forestry Bureau (para 3.06);

(c) the establishment of a Special Account by the Government (para 3.19);

(d) the conclusion of arrangements satisfactory to IDA for the participation of the Ministry of Education and the Directorate of Energy Resources in the project (para 4.02); and

(e) a senior procurement officer of DARNDR satisfactory to IDA would be assigned to handle project procurement (para 4.03).

7.03 A condition of disbursement against the stove component would be the appointment of a staff member of the Directorate of Energy to carry out a survey of cooking practices in Port-au-Prince, and of a staff member of DARNDR to carry out the survey in rural areas (para 3.13).

7.04 With the above assurances and conditions, the proposed project is suitable for an IDA Credit of US$4.0 million on standard terms.

May 12, 1982

HAITI

FORESTRY PROJECT

Terms of Reference of Internationally Recruited Staff

A. Senior Forestry Consultant

Duties

1. The incumbent will undertake a four-year assignment in support of the Forestry Bureau, to give such advice, information and guidance as may be necessary for the successful completion of this project. He will have an office in the Forestry Bureau and will deal directly with the head of that agency. He will have access to project files and accounts, and will co-sign expenditures for the project working fund. He will furthermore:

(a) collect and evaluate all the available information on forestry in the country;

(b) give such advice, information and guidance to the Forestry Bureau and other agencies of the Haitian Government as may be requested;

(c) train Forestry Bureau personnel, especially the field managers;

(d) advise upon the selection, timing and support of short-term consultants;

(e) supervise the work of the technical volunteers;

(f) prepare a second-phase forestry project consonant with a long-range forestry development plan approved by the Government of Haiti;

(g) collect and organize such economic information regarding forestry and forest products as may clarify and support such a plan; and

(h) carry out such other activities appropriate to the objectives of this project.

Qualifications

2. The candidate must have the ability to read, write, speak and understand French fluently. He must have a graduate degree in forestry and have had at least 10 years' professional experience and at least five in developing countries. His specific areas of expertise should be fuelwood plantations and pine forest management. He will also be expected to advise the Haitian Government on general forestry subjects such as forest policy and law, watershed management and seed procurement and should be familiar with the basic concepts of economic analysis, administration and public relations/extension. He will have to acquire a thorough knowledge of the Haitian countryside and its people and will be concerned with bringing the benefits of forestry to the Haitian people.

B. Professor of Forest Management

Duties

3. Under the general guidance of the Director of the School of Agriculture at Damien, the incumbent will teach two-semester courses in ecology and foretforest management, and one-semester courses in dendrology, agro-forestry, extension methods and law. Each semester will normally consist of 16 weeks of instruction, including two examinations. Instruction will consist of lectures, assigned reading, assigned reports and field trips. Field instruction will be no less than 30% and use will be made of the forest teaching facilities at La Selle. The incumbent will be assisted in field teaching by the instructor in forest technology. During the school vacation, he will participate in giving instruction to primary school teachers in forestry and conservation. In the course of his assignment, the professor will train a counterpart, who will be an agronomist assigned to FAMV for in-service training.

Qualifications

4. A graduate degree and at least 10 years' professional experience, including teaching. Fluency in French.

C. Professor of Forest Science

Duties

5. Under the general guidance of the Director of the School of Agriculture at Damien, the incumbent will teach one-semester courses in serveying, inventory, wood technology, wood utilization, reforestation and soil conservation. Each semester will normally consist of 16 weeks of instruction, including two examinations. Instruction will consist of lectures, assigned reading, assigned reports and field trips. Field instruction will be no less than 30% and use will be made of the forest teaching facilities at La Selle. The incumbent will be assisted in field teaching by the instructor in forest technology. During the school vacation, he will participate in giving instruction to primary school teachers in forestry and conservation. In the course of his assignment, the professor will train a counterpart, who will be an agronomist assigned to FAMV for in-service training.

Qualifications

6. A graduate degree and at least 10 years' professional experience, including teaching. Fluency in French.

D. Instructor in Forest Technology

Duties

7. Under the guidance of the Director of the School of Agriculture at Damien and the senior Professors, the incumbent will teach a one-semester

course in machine mechanics and a one-semester course in nursery practice. The instruction will be entirely in practice and demonstration with no lectures or examinations. The incumbent will also help the senior professors in the field instruction of their courses. During the school vacation the incumbent will participate in giving instruction to primary school teachers in forestry and conservation.

Qualifications

8. Technical degree in forestry. Fluency in French.

E. Forest Management Assistants

Duties

9. Under the general direction of the senior forestry consultant, the incumbents will assist the Haitian managers in carrying out the project activities specified for the two management units of the La Selle forest. Among the activities will be:

(a) surveying and marking the boundaries of the state-owned pine forest of La Selle;

(b) on the basis of ground observations and information supplied from aerial photo-interpretation under contract, making a work schedule for thinning, sanitation cutting and planting;

(c) making a road and trail construction and improvement program;

(d) making a fire control program;

(e) hiring, organizing and supervising the work of approximately 80 forest workers;

(f) dealing with and supervising the utilization of the products of thinnings and cuttings;

(g) supervising the development of a naval stores industry;

(h) supervising and training forest guards;

(i) establishing and monitoring good relations with the local inhabitants;

(j) cooperating with the forestry education and training aspects of the project, which will have installations and sessions in the forest of La Selle; and

(k) cooperating with the senior forestry consultant in preparing a second phase of this project and a long-range development and management plan for the forest.

Qualifications

10. Graduation from a forestry technical school. Fluent command of French. Ability and willingness to learn and communicate in Creole.

F. Reforestation Technician

Duties

11. Under the general direction of the senior forestry consultant, the incumbent will assist the Haitian assigned to the reforestation component of the project. Among the activities included are:

(a) surveying and marking the boundaries of the reforestation area;

(b) identifying the areas for planting, for agriculture and for protection;

(c) identifying the areas for planting 200 hectares during the project period;

(d) providing for seedlings either by arrangement with an existing nursery or by establishing one;

(e) supervising the site preparation, planting, protection, aftercare and monitoring of the tree plantings.

Qualifications

12. Graduation from a forestry technical school. Fluent command of French and willingness to learn and communicate in creole.

G. Reforestation Technician, Northwest

Duties

13. Under the general direction of the senior forestry consultant, the incumbent will assist the Haitians assigned to this component of the project to initiate and supervise fuelwood planting trials in the Northwest. He will also assist them in monitoring other fuelwood plantings in the area, and will investigate and compare different schemes for bringing about fuelwood plantings on private land.

Qualifications

14. Graduation from a forestry technical school. Fluent command of French. Ability and willingness to learn and communicate in creole.

H. Consultants in Rural Sociology

Duties

15. Under the general direction of the senior forestry consultant, the incumber will design an agricultural and demographic survey of the La Selle pine forest, and will train enumerators. He will organize, evaluate and report upon the results, making recommendations regarding the most appropriate ways to coordinate intensive management of the pine forest with the existing agricultural activities, with such changes as may be necessary.

Qualifications

16. The candidate must have a graduate degree in sociology with competence in economics, statistics and demography and 10 years' professional experience, at least five in developing countries. He must be fluent in French.

Duties

17. Under the general direction of the senior consultant, the incumbent will study and report upon the social implications of reforestation in the Northwestern peninsula of Haiti, with the purpose of finding out what motivates farmers to plant and protect trees and what impedes them.

Qualifications

18. The candidate must have a detree in rural sociology and experience in developing countries, and be fluent in French.

I. Soil Survey Consultant

Duties

19. Under the general direction of the senior forestry consultant, the incumbent will design land use surveys fot the Fine forest of La Selle and the fuelwood reforestation area in enough detail to classify the soil capability for agriculture and for forestry (based opn slope, depth, texture and erodibility). He will train field crews and will prepare maps on the basis of the information gathered.

Qualifications

20. The candidate must have a graduate degree in soil science, with professional experience in the design and carrying out of soil surveys, and be fluent in French.

August 1981

HAITI

FORESTRY PROJECT

Financial and Economic Analysis

A. Financial Analysis of Pine Forest Management

Financial Costs

1. The estimated financial costs of the project are detailed in Table 1.

Financial Returns

2. The price of the wood on the stump in the forest must be at least enough to cover all recurrent management costs. It will be the only direct revenue from the forest. 1/ These costs are estimated to be an average of about US$195,000 per year. If the 20,000 ha can be developed to produce 5 m^3/ha/yr by the end of year 10, this implies a total annual production of 100,000 m^3 of which 70% will be sawtimber. The minimum saw-timber stumpage price would therefore be US$2.80 m^3, which is quite low in view of the current price of US$270/$m^3$ for pine sawnwood in Port-au-Prince and the projected price of US$185/$m^3$ when production starts up again. 2/ It is probable, therefore, that a higher price, sufficient to cover operating costs and amortize all investments could be charged without pricing the wood out of the market. Any stumpage charge would have to be backed by an effective surveillance system to prevent continued pilfering of trees (at zero stumpage) from the forest. In the financial analyses, the stumpage price is varied to test the sensitivity of the internal rate of return to changes in this variable and to determine the minimum stumpage price necessary to amortize all costs through year 10 (the end of the forest rehabilitation period) and through year 50 (the end of the first full rotation).

1/ Naval stores may be produced in the forest but preliminary tests must be carried out first to determine feasibility. There will be no charge for wood residues and other wood destined for fuelwood or charcoal.

2/ A survey of pine lumber vendors yielded an average price of US$0.65 per board foot of lumber; using a conversion factor of 412 bd ft per m^3 the price per cubic meter is obtained. Before th ban on cutting pine, the price was US$0.45/bd.ft. or 185 m^3 which is approximately the present border price for southern pine of equal quality, imported from the US. It must be kept in mind that there is a 50% conversion factor from logs the lumber. In other words each two cubic meters of logs will yield one cubic meter of sawnwood. The minimum stumpage price of US$2.80/$m^3$ would therefore account for US$5.60 of lumber's final price of US185/m^3.

B. Economic Analysis of the Pine Forest Management

Economic Analysis Assumptions

3. To correctly measure the impact of the pine forest management component, the "with and without project" concept is applied. The basic objective of the project would be to create a sustained increase in the quantity and quality of the wood produced in the pine forest. With the project, the cutting of pine would be permitted within the guidelines of the management plan, as outlined above. It is assumed that the cutting of timber would also be permitted without the project, without any controls as to volume and timing of cuts.

4. Without Project. The FAO study of the pine forests of Haiti indicated that "dense" stands in La Salle were decreasing at a rate of over 330 ha per year. By 1977, the stands of central Haiti had virtually disappeared. It will be assumed that, without an effective management and protection plan, the remaining forest would continue to be degraded at the same rate. This means that in 31 years from the time of the FAO study (1977), the La Selle pine forests would for all practical purposes cease to exist. That year, 2008, coincides with the 25th year of the project. It is also assumed that valuable trees would be removed more quickly and cut areas would be burned and grazed or placed under marginal agricultural cultivation. This would interfere with natural regeneration and effectively reduce the absolute size of the forest. Although the potential volume of timber which could be removed from the forest is high (about 40 m^3/ha over 9,000 ha or 360,000 m^3), a large portion would be lost to fire, insects, disease and indiscriminate clearing. In the best of circumstances, it is assumed that a maximum of 8,000 m^3 of sawtimber or the equivalent of 4,000 m^3 of sawnwood would be produced annually without the project through the year 2008. The economic value or boarder price of this wood per cubic meter has been calculated at US\$75/m^3 as follows. Retail price in Port-au-Prince is equal to the opportunity cost or the border price of imported lumber of equivalent quality. This has been calculated to be approximately US\$185/m^3. Economic costs of transport and handling of the wood from La Selle through the retail dealer in Port-au-Prince are calculated at US\$28.50/m^3. Economic cost of sawing the lumber in the forest is US\$10/m^3 based on the assumption that a two-man pit saw operation can produce 1 m^3 in a five-day period. The opportunity cost of labor is estimated at US\$1/man-day. The net economic value of the wood on the stump in the La Selle forest is therefore US\$185 less US\$38.50, or US\$146.50 for 2 m^3 of round wood (for conversion factor from logs to lumber is 2 to 1). The net economic stumpage value of pine is, therefore, US\$73.25/m^3 or rounded, US\$75/m^3.

5. With Project. Table 2 shows the production estimated economic value of sawtimber and sawnwood produced each year with (and without) the project. The economic value of firewood in the La Selle region is zero because of its abundance there. The value of fuelwood, which would be converted to charcoal and shipped to Port-au-Prince, however, is calculated at US$17.75/$m^3$. Despite its lower quality as a fuelwood, pine could provide considerable volumes of charcoal to the Port-au-Prince market. It is assumed that 50 m^3 of non-sawtimber wood will be removed per hectare over a 40-year rotation of which one third, or 16 m^3 would be used for local fuelwood needs 1/ and another 16 m^3 would be used for posts and other purposes. These products would be free of charge to local people. Because of their relative abundance in the pine forest area their opportunity cost is assumed to be zero. The amount available for charcoal would then be 18 m^3/ha. This is equivalent to a total production of 9,000 m^3/year on the 20,000-ha forest. To this must be added sawmill residues (slabs and edgings which make up about 40% of the log volume with sawdust being another 10%) and tops and branches of trees (forest residues) which will yield another 40,000 m^3 of wood annually. Assuming a 50% conversion ratio (wood to charcoal by volume), about 25,000 m^3 or 6,250 tons of charcoal could be produced per year. This is about 8% of Haiti's present annual consumption. Without the project it is assumed that only enough wood to satisfy local demand will be produced. At the present value of G 7.00, or US$1.40 per 30-kg bag in the forest, this by-product of forest management would create a local income of over US$290,000 per year. At the economic value of US$17.75/$m^3$, the 49,000 m^3 of wood suitable for charcoal production has a value of US$869,750/year after year 10 (Table 3). The net "with project" less "without project" economic value of this fuelwood on the stump is shown in Table 4.

6. Agricultural Production. With respect to overall agricultural production, it is assumed that this will be the same with and without the project. With the project, 2,000 ha of marginal lands will be taken out of cultivation or grazing, and it will cost the equivalent of US$100 per lost hectare to increase the productivity of the remaining agricultural land and maintain total agricultural production at a stable level. Efforts will be made to employ those marginal farmers in forestry activities. Once the proposed forest area is under effective

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1/ Assumes 0.8 m^3 annual per capita consumption x 10,000 people, or 8,000 m^3 per year over 20,000 ha. This is equivalent to 0.4 m^3/ha/yr over 40 years, or 16 m^3/ha total over the rotation.

forestry activities. Once the proposed forest area is under effective management 10 years hence, the Forestry Bureau could consider adding other non-agricultural lands to the National Forest's domain. The expansion of marginal agricultural activities without the project will be an important factor in the reduction of the total forest area. These activities would consist principally of extensive burning of forests (ostensibly to improve grazing conditions), and shifting agriculture. While the burning will kill natural pine regeneration and have a considerably negative impact on the area and productivity of the forest, it will not add to total agricultural production. This is because the soils and understory vegetation in the forest are so badly degraded that "improvements" through burning will be negligible. The same is true for shifting agriculture which has a relatively constant yield but destroys forest cover with every move. The economic costs and benefits and analysis are shown in Table 2.

Other Indirect Benefits and Costs

7. Soil conservation and erosion control would improve with the project and deteriorate significantly without it. The deterioration would be evidenced by the constant agricultural production from the area despite an increase in the cultivated and grazed area in the "without" project situation. The reduction of erosion with the project would have benefits which must be kept in mind by Haiti's planners but which cannot be quantified or have an economic value placed on them at this point. These benefits include: improved water flow and quality from pine forest watersheds through the year; reduced road maintenance costs; reduced river bank erosion control costs; improved crop yields as sheet erosion and top soil losses are reduced.

8. Haiti's balance of payments situation will improve to the equivalent of the value of the lumber produced with the project. "With project" estimates of sawtimber and lumber production are found in Table 4. Without-project production of lumber is estimated at a maximum of 4,000 m^3 per year through year 25. As the table indicates, the potential net foreign exchange savings with the project from not having to import an equivalent amount of lumber would be an average of US$1.5 million per year for years 1 through 10, US$5.7 million for years 11 through 25 and US%6.5 million from years 26 through 50. This is significant for Haiti, which has very serious balance of payments and trade problems. Despite improvements in export earnings, imports increased 37% per year between 1978 and 1980, and the balance of trade for 1980 has been estimated at negative US$76.8 million. 1/

C. Economic Analysis of Fuelwood Reforestation

9. The lack of reliable statistics in the country make it difficult to make quantitative estimates of the economic impact of the project. However, reasonable assumptions can be made because the general trends are clearly identified.

1/ World Bank, Memorandum of the Haitian Economy, Report No. 3444-HA, May 13, 1981. The post-appraisal mission will investigate imported lumber prices and forest products trade statistics.

Assumptions - Without Project

10. In the absence of a fuelwood project, the present deterioration of the fuel supply is expected to continue unchecked. Deforestation would continue to outspace regrowth, and the deficit in the fuelwood balance would continue to increase. With an annual increase of 3%, fuelwood demand is expected to exceed 7.2 million m^3 by the year 2000, compared to the current demand of 4 million m^3.

11. The fuelwood supply in 1980 came from a total "forest" area of 930,000 ha (1980) of which approximately 69,000 ha were pine, 150,000 ha scattered groves of closed hardwood forest, 20,000 ha mangrove, and 690,000 ha of open degraded woodland (scrub and brush with a few scattered trees). 1/ There were also some 1,500 ha of plantations scattered throughout the country. Annual yields per ha are 1 m^3 for degraded woodland, 5 m^3 for "closed" forests including mangrove, and 10 m^3 for plantations.

12. Without the project the supply from existing forests is estimated to approximate 1.9 million m^3 matters by the year 2000, assuming annual plantings of about 900 ha with international support and aggregate plantings stabilizing at 10,000 ha from 1990 onward. This means a large and growing deficit of some 5.1 million cubic meters of wood for the year 2000, as compared with the current deficit of 2.4 million m^3.

13. A grave situation can be anticipated. The low income families, which make up the overwhelming majority of the country's population, do not have the means to switch to alternative sources of energy. The use of kerosene or gas requires an investment in a stove which is beyond the means of most families. It is expected, therefore, that the deficit will be made up mostly by cutting the growing stock in the forests, and reducing their area and production accordingly. The 691,000 ha of open degraded forests, for example, are assumed to be capable of indefinitely supporting the renewal of 1 m^3 of wood per year. If we assume that these forests have a total volume of 30 m^3 per ha, and if all the deficit is made up by cutting this wood, then the 691,000 ha would disappear in less than 10 years. The fuelwood deficit in subsequent years would become more severe as these forests are eliminated.

14. The virtual disappearance of the natural forests would lead to the use of crop residues and dung in the countryside. This would lead to a

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1/ Estimates of forest cover in Haiti vary widely. The above figures are adapted from: Sayn-Wittgenstein, L. "Haiti Energy Mission - Report on Forestry Related Sections", The World Bank - November 1980; and Berry, M.J. and H.D. Mangrove, "Reboisement et lutte contre l'erosion: Etude qualitative et quantitative de l'evolution du couvert forestier entre 1955-1958 et 1977 en Haiti." FAO, Rome, 1978.

depletion of the soil organic matter, and a further deterioration of agricultural productivity. The per capita fuelwood consumption may be reduced by preparing fewer cooked meals or cooking food less thoroughly. This latter activity is apparently already responsible for an increase in gastro-intestinal diseases in some rural areas. Migration of the rural populace to urban centers is likely as fuelwood becomes more difficult to come by, but it will not significantly reduce demand, since urban dwellers use charcoal which is essentially wood in an easily transportable form. The supplies of charcoal will of course also dry up. The growing fuel deficit, combined with the growing food deficit, and the decline in exports, may result in increased outmigration, and/or increased requirements for concessionary assistance, including massive food and fuel and programs to deal with the crisis.

Assumptions - With Project

15. If the pilot plantings and species trials described above are successfully carried out, it is considered a reasonable assumption that by the end of the project, Haiti could be planting about 2,000 ha per year. Of this, 1,000 ha would be Government planting on Government (Forestry Bureau) land and 1,000 ha would be on private lands. A follow-up project would have the objective of multiplying fuelwood reforestation efforts using the technology and organizational expertise developed in this project. It is expected that trained manpower will be available in the form of fellows returning from overseas graduate studies and the graduates of the technical school established by the project. Land will be made available by the Government for planting through the systematic identification and requisition of suitable areas by and for the Forestry Bureau as part of a program to build a National Forestry Estate for Haiti.

16. With the proposed project, additional or incremental reforestation will grow at the rate shown in Table 5. Existing international assistance projects will plant approximately 900 ha per year with or without the project.

17. It is assumed that if reforestation development efforts begun by this project are well executed, Haiti's reforestation capacity could rise to about 10,000 ha per year within 10 years (by 1992). This would be divided evenly between direct Government planting programs and private plantings with Government-produced seeds or seedlings. It is assumed that the plantations will have an average yield of 10 m^3 per hectare per year and that a cycle of four clearcuts every five years for 20 years will be followed before replanting is necessary. Total area reforested will therefore level off at 210,000 ha (10,000 ha x 20 years plus 10,000 ha maintained by private groups outside of the project) in 20 years. Total wood production will then reach about 1 million m^3 per year.

18. Haiti has large areas of marginal land suitable for reforestation, specifically the 691,000 ha of open degraded forest which has relatively limited rainfall, and much of which is said to be Government land. This land is non-agricultural, and competition with agricultural crops is limited. There is a large surplus of labor available for reforestation. In addition, there is scope for farm woodlots for the family fuel supply, and for plantings of dual-purpose trees which can produce forage or fruit or serve as wind breaks, in addition to yielding wood. The 576,000 farm families in the country would be motivated to plant at least some 600 trees each (0.4 ha), which should allow firewood self-sufficiency for a total of 230,000 ha. Planting costs are estimated at some US$325 per ha, including maintenance for the first two years.

19. Even with the project, however, it would not be realistic to envisage annual reforestation at a rate faster than 10,000 ha per year, given the administrative and technical constraints. As shown in Table 4, the project would make it possible to reduce the fuelwood deficit by some 1 million m^3, or by nearly 20%. While unable to completely resolve the Haitian energy situation, the project would help relieve the pressure on forestry and agricultural resources, reduce the fuelwood substitute import costs, ease the severity of social problems and reduce the social costs to be incurred as the result of a growing fuelwood shortage.

20. The impact of the project could be substantially increased if the direct seeding trials are successful and can lead to faster reforestation at moderate cost. However, the outcome of the trials cannot be anticipated at this time, since the aerial seeding experience in reforestation is currently limited to industrial countries and temperate environments.

Economic Value of Fuelwood on the Stump

21. Using the relative calorific values of charcoal (7,800 kcal/kg) and kerosene (10,300 kcal/kg) and the relative thermal efficiency when used in Haitian conditions (0.20 for charcoal, 0.3 for kerosene), it is calculated that 1 Kg of charcoal is equivalent to about one-half Kg of kerosene (Table 6). With imported kerosene priced at US$.41 per kg, fob Port-au-Prince, the economic opportunity cost of charcoal is US$0.20 per kilogram. The economic cost of producing charcoal and transporting it to Port-au-Prince is US$22.85 per ton (using US$1.00 per manday as the opportunity cost of labor).

22. The net value of wood on the stump is therefore the opportunity value of charcoal (US$200 per ton) less the economic costs of production and distribution (US$58.00 per ton) divided by eight (assumes 8 m^3 of fuelwood consumed per ton of charcoal produced). This yields a value of US$17.75 per m^3 wood on the stump.

23. Financial costs of charcoal production and marketing are shown in Table 7.

October 1981

HAITI

FORESTRY PROJECT

Financial Analysis of the Pine Forest Management Component
(US$1,000)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
COSTS																							
Capital Costs																							
Infrastructure /1	70.5	50.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Vehicles /2 & Equipment	181.8	-	-	-	-	181.8	-	-	-	-	181.8	-	-	-	-	181.8	-	-	-	-	181.8	-	-
Surveys	101.6	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.
Operating Costs																							
Salaries /3	150.0	150.0	150.0	150.0	102.0	102.0	102.0	102.0	102.0	102.0	102.0	102.0	102.0	102.0	102.0	102.0	102.0	102.0	102.0	102.0	102.0	102.0	102.
Materials & Supplies	23.0	36.5	45.0	51.5	56.0	23.0	36.5	45.0	51.5	56.0	23.0	36.5	45.0	51.5	56.0	23.0	36.5	45.0	51.5	56.0	23.0	36.5	45.
Total Costs	526.9	248.5	207.0	213.5	170.0	318.8	150.5	159.0	165.5	170.0	318.8	150.5	159.0	165.5	170.0	318.8	150.5	159.0	165.5	170.0	318.8	150.5	159.
INCOME/REVENUES																							
Sawtimber Sales																							
Stumpage at $ 2/m³	12.0	18.0	24.0	36.0	48.0	68.4	68.4	68.4	68.4	68.4	200.0	200.0	200.0	200.0	200.0	200.0	200.0	200.0	200.0	200.0	200.0	200.0	200.
" " $ 5/m³	30.0	45.0	60.0	90.0	120.0	171.0	171.0	171.0	171.0	171.0	500.0	500.0	500.0	500.0	500.0	500.0	500.0	500.0	500.0	500.0	500.0	500.0	500.
" " $10/m³	60.0	90.0	120.0	180.0	240.0	342.0	342.0	342.0	342.0	342.0	1,000.0	1,000.0	1,000.0	1,000.0	1,000.0	1,000.0	1,000.0	1,000.0	1,000.0	1,000.0	1,000.0	1,000.0	1,000.
" " $12/m³	72.0	108.0	144.0	216.0	288.0	410.4	410.4	410.4	410.4	410.4	1,200.0	1,200.0	1,200.0	1,200.0	1,200.0	1,200.0	1,200.0	1,200.0	1,200.0	1,200.0	1,200.0	1,200.0	1,200.
NET CASH FLOW																							
Stumpage at $ 2/m³	-514.9	-230.5	-183.0	-177.5	-122.0	-250.4	-82.1	-90.6	-97.1	101.6	-118.8	49.5	41.0	34.5	30.0	-118.8	49.5	41.0	34.5	30.0	-118.8	49.5	41.
" " $ 5/m³	-496.9	-203.5	-147.0	-123.5	-50.0	-147.8	20.5	12.0	5.5	1.0	181.2	349.5	341.0	334.5	330.0	181.2	349.5	341.0	334.5	330.0	181.2	349.5	341.
" " $10/m³	-466.9	-158.5	-87.0	-33.5	70.0	23.2	191.5	183.0	176.5	172.0	681.2	849.5	841.0	834.5	830.0	681.2	849.5	841.0	834.5	830.0	681.2	849.5	841.
" " $12/m³	-454.9	-140.5	-63.0	2.5	118.0	91.6	255.5	251.0	244.5	240.0	1,063.0	1,049.5	1,041.0	1,034.5	848.2	1,063.0	1,049.5	1,041.0	1,034.5	848.2	1,063.0	1,049.5	1,041.

Internal Rate of Return - Through year 10: Stumpage US$ 2 - Highly negative
5 - Highly negative
10 - + 1.4
12 - + 9.88

Through year 50: Stumpage US$ 2 - - 5.1
5 - +11.1
10 - +23.6
12 - Highly positive

/1 It is assumed that buildings have a life of 25 years.
/2 It is assumed that vehicles have a life of 5 years.
/3 These figures include the foresters and forest guards which, although they will incur no costs for the proposed project, are part of the direct costs of managing the forests, and must be included in the financial analysis. Also, after year 4 there will no longer be French volunteers.

ANNEX 2
Table 1

Year																											
24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	
-	-	70.5	50.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
-	-	181.8	-	-	-	-	181.8	-	-	-	-	181.8	-	-	-	-	181.8	-	-	-	-	181.8	-	-	-	-	
12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	
102.0	102.0	102.0	102.0	102.0	102.0	102.0	102.0	102.0	102.0	102.0	102.0	102.0	102.0	102.0	102.0	102.0	102.0	102.0	102.0	102.0	102.0	102.0	102.0	102.0	102.0	102.0	
41.5	56.0	23.0	36.5	45.0	51.5	56.0	23.0	36.5	45.0	51.5	56.0	23.0	36.5	45.0	51.5	56.0	23.0	36.5	45.0	51.5	56.0	23.0	36.5	45.0	51.5	56.0	
65.5	170.0	389.3	200.5	159.0	165.5	170.0	318.8	150.5	159.0	165.5	170.0	318.8	150.5	159.0	165.5	170.0	318.8	150.5	159.0	165.5	170.0	318.8	150.5	159.0	165.5	170.0	
200.0	200.0	200.0	200.0	200.0	200.0	200.0	200.0	200.0	200.0	200.0	200.0	200.0	200.0	200.0	200.0	200.0	200.0	200.0	200.0	200.0	200.0	200.0	200.0	200.0	200.0	200.0	
500.0	500.0	500.0	500.0	500.0	500.0	500.0	500.0	500.0	500.0	500.0	500.0	500.0	500.0	500.0	500.0	500.0	500.0	500.0	500.0	500.0	500.0	500.0	500.0	500.0	500.0	500.0	
1,000.0	1,000.0	1,000.0	1,000.0	1,000.0	1,000.0	1,000.0	1,000.0	1,000.0	1,000.0	1,000.0	1,000.0	1,000.0	1,000.0	1,000.0	1,000.0	1,000.0	1,000.0	1,000.0	1,000.0	1,000.0	1,000.0	1,000.0	1,000.0	1,000.0	1,000.0	1,000.0	
1,200.0	1,200.0	1,200.0	1,200.0	1,200.0	1,200.0	1,200.0	1,200.0	1,200.0	1,200.0	1,200.0	1,200.0	1,200.0	1,200.0	1,200.0	1,200.0	1,200.0	1,200.0	1,200.0	1,200.0	1,200.0	1,200.0	1,200.0	1,200.0	1,200.0	1,200.0	1,200.0	
34.5	30.0	-139.3	-0.5	41.0	34.5	30.0	-118.8	49.5	41.0	34.5	30.0	-118.8	49.5	41.0	34.5	30.0	-118.8	49.5	41.0	34.5	30.0	-118.8	49.5	41.0	34.5	30.0	
34.5	330.0	-439.3	-300.5	341.0	334.5	330.0	181.2	349.5	341.0	334.5	330.0	181.2	349.5	341.0	334.5	330.0	181.2	349.5	341.0	334.5	330.0	181.2	349.5	341.0	334.5	330.0	
34.5	830.0	-989.3	-800.5	841.0	834.5	830.0	681.2	849.5	841.0	834.5	830.0	681.2	849.5	841.0	834.5	830.0	681.2	849.5	841.0	834.5	830.0	681.2	849.5	841.0	834.5	830.0	
34.5	848.2	1,063.0	1,049.5	1,041.0	1,034.5	848.2	1,063.0	1,049.5	1,041.0	1,034.5	848.2	1,063.0	1,049.5	1,041.0	1,034.5	848.2	1,063.0	1,049.5	1,041.0	1,034.5	848.2	1,063.0	1,049.5	1,041.0	1,034.5	848.2	

HAITI

FORESTRY PROJECT

Economic Costs and Returns of the Pine Forest Management
(US$1,000)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
COSTS																							
Capital Costs																							
Infrastructure /1	71	50	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Vehicles & Equipment /2	182	-	-	-	-	182	-	-	-	-	182	-	-	-	-	182	-	-	-	-	182	-	-
Surveys	102	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
Operating Costs																							
Salaries /3	100	100	100	100	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52
Materials & Supplies	23	37	45	52	56	23	37	45	52	56	23	37	45	52	56	23	37	45	52	56	23	37	45
Costs of increasing agricultural productivity on cultivated areas	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200
Total Costs	678	399	357	364	320	469	301	309	316	320	469	301	309	316	320	469	301	309	316	320	469	301	309
RETURNS																							
Value of Wood (US$1,000)																							
Fuelwood	18	98	178	337	497	769	769	769	769	769	728	728	728	728	728	728	728	728	728	728	728	728	72
Sawtimber	-150	75	300	750	1,200	1,965	1,965	1,965	1,965	1,965	4,650	4,650	4,650	4,650	4,650	4,650	4,650	4,650	4,650	4,650	4,650	4,650	4,65
Total Returns	-132	173	478	1,087	1,697	2,734	2,734	2,734	2,734	2,734	5,378	5,378	5,378	5,378	5,378	5,378	5,378	5,378	5,378	5,378	5,378	5,378	5,37
Net Economic Value	-810	-226	121	723	1,377	2,265	2,433	2,425	2,418	2,414	4,909	5,077	5,069	5,062	5,058	4,909	5,077	5,069	5,062	5,058	4,909	5,077	5,06

Rate of Return: extremely positive.

/1 Assumes 25-year life for buildings.
/2 Assumes 5-year life for vehicles.
/3 Assumes opportunity cost of unskilled labor is US$1 per day. All other wages and salaries are unchanged from financial analysis.

Year																										
24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50
–	–	71	50	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
–	–	182	–	–	–	–	182	–	–	–	–	182	–	–	–	–	182	–	–	–	–	182	–	–	–	–
12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52
52	56	23	37	45	52	56	23	37	45	52	56	23	37	45	52	56	23	37	45	52	56	23	37	45	52	56
200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200
316	320	540	351	309	316	320	469	301	309	316	320	469	301	309	316	320	469	301	309	316	320	469	301	309	316	320
728	728	728	728	728	728	728	728	728	728	728	728	728	728	728	728	728	728	728	728	728	728	728	728	728	728	728
4,650	4,650	5,250	5,250	5,250	5,250	5,250	5,250	5,250	5,250	5,250	5,250	5,250	5,250	5,250	5,250	5,250	5,250	5,250	5,250	5,250	5,250	5,250	5,250	5,250	5,250	5,250
5,378	5,378	5,978	5,978	5,978	5,978	5,978	5,978	5,978	5,978	5,978	5,978	5,978	5,978	5,978	5,978	5,978	5,978	5,978	5,978	5,978	5,978	5,978	5,978	5,978	5,978	5,978
5,062	5,058	5,438	5,627	5,669	5,662	5,658	5,509	5,677	5,669	5,662	5,658	5,509	5,677	5,669	5,662	5,658	5,509	5,677	5,669	5,662	5,658	5,509	5,677	5,669	5,662	5,658

ANNEX 2
Table 3

HAITI

FORESTRY PROJECT

Estimated Value of Fuelwood Produced at the Pine Forest

Year	Local Firewood Consumption 1/	Fuelwood Produced 2/	Balance for Charcoal	Value of Balance at US$17.75/m^3
	US$'000 m^3			
1982	8.0	9.0	1.0	17.7
1983	8.0	13.5	5.5	97.6
1984	8.0	18.0	10.0	177.5
1985	8.0	27.0	19.0	337.2
1986	8.0	36.0	28.0	497.0
1987	8.0	51.3	43.3	768.5
1988	8.0	51.3	43.3	768.5
1989	8.0	51.3	43.3	768.5
1990	8.0	51.3	43.3	768.5
1991	8.0	51.3	43.3	768.5
1992-2032	8.0	49.0	41.0	727.7

1/ Firewood demand and population in the pine forest are assumed to remain constant throughout the project as it is one of the objectives to prevent expansion of population into the forest area.

2/ Assumes 30 m^3/year production of wood of which 18 m^3 are fuelwood quality. Also assumes treatment of the following areas from years 1 through 5 respectively: 500 ha; 750 ha; 1,000 ha; 1,500 ha; 2,000 ha; and 2,850 ha through year 10. After year 10, the annual fuelwood production is estimated at 49,000 m^3 per year.

HAITI

FORESTRY PROJECT

Estimated Incremental Sawnwood Production with Project

Item/ Year	1	2	3	4	5	6	7	8	9	10	11 through 25	26-50
With Project												
Hectares harvested or trimed	500	750	1,000	1,500	2,000	2,850	2,850	2,850	2,850	2,850	2,000	2,000
Sawtimber yield (m^3)	6,000	9,000	12,000	18,000	24,000	34,200	34,200	34,200	34,200	34,200	70,000	70,000
Lumber yield (M^3)	3,000	4,500	6,000	9,000	12,000	17,100	17,100	17,000	17,100	17,100	35,000	35,000
Without Project												
Sawtimber yield (m^3)	8,000	8,000	8,000	8,000	8,000	8,000	8,000	8,000	8,000	8,000	8,000	-
Lumber yield (m^3)	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	-
Net Yields with project												
Sawtimber (m^3)	2,000	1,000	4,000	10,000	16,000	26,200	26,200	26,200	26,200	26,200	62,000	70,000
Lumber (m^3)	1,000	500	2,000	5,000	8,000	13,100	13,100	13,100	13,100	13,100	31,000	35,000
Net Economic value with project (US$'000)												
Sawtimber stumpage (US$75/$m^3$)	150	75	300	750	1,200	1,965	1,965	1,965	1,965	1,965	4,650	5,250
Lumber (US$185/$m^3$)	185	92.5	370	925	1,480	2,423.5	2,423.5	2,423.5	2,423.5	2,423.5	5,735	6,475

HAITI

FORESTRY PROJECT

Estimated Forest Area, Potential Fuelwood Production and Fuelwood Balance with the Forestry Project

	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	19
TYPE OF FOREST																
Open Degraded Forests																
Area	691.00	691.00	691.00	691.00	691.00	691.00	691.00	691.00	691.00	691.00	691.00	691.00	691.00	691.00	691.00	691
Fuelwood Production 3/	691.00	691.00	691.00	691.00	691.00	691.00	691.00	691.00	691.00	691.00	691.00	691.00	691.00	691.00	691.00	691
Open Degraded Pine Forests																
Area	69.00	69.00	68.50	67.75	66.75	65.25	63.25	60.40	57.55	54.70	51.85	49.00	49.00	49.00	49.00	49
Fuelwood Production 3/	69.00	69.00	68.50	67.75	66.75	65.25	63.25	60.40	57.55	54.70	51.85	49.00	49.00	49.00	49.00	49
Dense Pine Forests 1/																
Area	-	-	0.50	1.25	2.25	3.75	5.75	8.60	11.45	14.30	17.15	20.00	20.00	20.00	20.00	20
Fuelwood Production 2/	-	-	9.00	22.50	40.50	67.50	103.50	154.80	206.10	257.40	308.70	360.00	360.00	360.00	360.00	360
Closed Hardwood Forests																
Area	150.00	150.00	150.00	150.00	150.00	150.00	150.00	150.00	150.00	150.00	150.00	150.00	150.00	150.00	150.00	150
Fuelwood Production 4/	750.00	750.00	750.00	750.00	750.00	750.00	750.00	750.00	750.00	750.00	750.00	750.00	750.00	750.00	750.00	750
Mangrove Forests																
Area	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20
Fuelwood Production	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100
Plantations (non-project) 6/																
Area (cumulative)	1.50	2.40	3.30	4.20	5.10	6.00	6.90	7.80	8.70	9.60	10.00	10.00	10.00	10.00	10.00	10
Fuelwood Production																
Plantations (project created) 6/																
Area (cumulative)	-	-	0.05	0.125	0.225	0.35	1.00	2.50	5.00	9.00	14.00	21.00	30.00	40.00	50.00	60
Fuelwood production from all plantation areas	-	-	-	-	75.00	45.00	47.50	48.75	50.00	136.25	122.50	167.50	218.75	295.00	446.25	497
Total																
Total Fuelwood Production	1,610	1,610	1,619	1,631	1,723	1,719	1,756	1,805	1,855	1,989	2,025	2,118	2,169	2,245	2,396	2,4
Estimated Fuelwood Demand 5/	4,000	4,120	4,244	4,371	4,502	4,637	4,776	4,920	5,067	5,219	5,376	5,537	5,703	5,874	6,050	6,2
Fuelwood Balance (1000 m3)	-2,390	-2,510	-2,625	-2,740	-2,779	-2,918	-3,020	-3,115	-3,212	-3,230	-3,351	-3,419	-3,534	-3,629	-3,654	-3,7

1/ The figures in this table refer to dense pine forests brought into production by the project according to the management plan. Without the project th gradually disappear (see text).
2/ Assumes 18 m^3 of fuelwood removed per hectare in forest rehabilitation phase.
3/ Assumes 1 m^3/ha/year of fuelwood produced on this forest type.
4/ Assumes 5 m^3/ha/year of fuelwood produced on this forest type.
5/ Assumes 0.8 m^3 of wood per capita per year, 5 million population and a 3 percent per year increase in demand.
6/ For plantations, the fuelwood production figures correspond to areas planted five years before since we assume a five year growth period before the

ANNEX 2
Table 5

Area in 1,000's of hectares
Fuelwood in 1,000's of cubic meters

1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
691.00	691.00	691.00	691.00	691.00	691.00	691.00	691.00	691.00	691.00	691.00	691.00	691.00	691.00	691.00	691.00	691.00
691.00	691.00	691.00	691.00	691.00	691.00	691.00	691.00	691.00	691.00	691.00	691.00	691.00	691.00	691.00	691.00	691.00
49.00	49.00	49.00	49.00	49.00	49.00	49.00	49.00	49.00	49.00	49.00	49.00	49.00	49.00	49.00	49.00	49.00
49.00	49.00	49.00	49.00	49.00	49.00	49.00	49.00	49.00	49.00	49.00	49.00	49.00	49.00	49.00	49.00	49.00
20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00
360.00	360.00	360.00	360.00	360.00	360.00	360.00	360.00	360.00	360.00	360.00	360.00	360.00	360.00	360.00	360.00	360.00
150.00	150.00	150.00	150.00	150.00	150.00	150.00	150.00	150.00	150.00	150.00	150.00	150.00	150.00	150.00	150.00	150.00
750.00	750.00	750.00	750.00	750.00	750.00	750.00	750.00	750.00	750.00	750.00	750.00	750.00	750.00	750.00	750.00	750.00
20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00
100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00
70.00	80.00	90.00	100.00	110.00	120.00	130.00	140.00	150.00	160.00	170.00	180.00	190.00	200.00	200.00	200.00	200.00
642.50	743.75	820.00	971.25	1,022.50	1,167.00	1,268.75	1,345.00	896.25	977.50	1,120.00	1,220.00	1,295.00	845.00	900.00	1,000.00	1,050.00
2,593	2,694	2,770	2,921	2,973	3,117	3,219	3,295	2,846	2,928	3,070	3,170	3,245	2,795	2,850	2,950	3,000
6,419	6,611	6,810	7,014	7,224	7,441	7,664	7,894	8,131	8,375	8,626	8,885	9,152	9,426	9,709	10,000	10,300
-3,826	-3,917	-4,040	-4,093	-4,251	-4,324	-4,445	-4,599	-5,285	-5,448	-5,556	-5,715	-5,907	-6,631	-6,859	-7,050	-7,300

approximately 9,000 ha of dense pine forests already existing will be exploited immediately and

first cut and five years between subsequent cuts.

ANNEX 2
Table 6

HAITI

FORESTRY PROJECT

Retail Price of Charcoal and Kerosene (Port-au-Prince, June 1981)

	Retail Price US$/kg	Caloric Value Kcal/kg	Price in gross kwh 1/ US¢/kwh	Thermal Efficiency 2/	Price per useful kwh US¢/kwh
Charcoal 3/	0.155	7,800	1.71	0.15 - 0.25	6.84 - 11.40
Kerosene 4/	0.408	10,300	3.41	0.3	11.36

1/ 1 kwh = 860 kcal
2/ Thermal efficiency is the efficiency of converting fuel to beat. It varies for different fuels and for different users.
3/ Retail price if charcoal delivered to the user.
4/ Retail delivered price, corresponding to US$1.24 per gallon, or a CIF price of US$1.09 per gallon.

HAITI

FORESTRY PROJECT

ANNEX 2
Table 7

Financial Price of Charcoal

	per ton (US$)	per bag (30 kg) (US$)
Charcoal delivered to shipping point	53.32	1.60
Tax	1.65	0.05
Loading	1.20	
Transport to Port-au-Prince 1/	33.33	1.00
Agent's margin	21.80	
Price delivered Port-au-Prince	111.30	
Unloading	1.20	
Wholesaler's margin	18.50	
Wholesale Price	131.00	2-2.8
Transport Market	6.60	2-.3
Retailer's margin	9.00	
Retail Price	146.60	

1/ Cost of truck shipping. Transport by sail boat costs - $0.30 per bag or $10 per ton.

September 3, 1981

ANNEX 3
Table 1

HAITI
FORESTRY PROJECT
Reinforcement of Forestry Bureau
Detailed Cost Table
($ '000)

	Unit	Quantity 1982	1983	1984	1985	Total	Unit Cost	Base Costs 1982	1983	1984	1985	Total	Phy. Cont. Rate	For. Exch. Comp.
I. CAPITAL COSTS														
A. SALARIES														
1. LOCAL														
SECRETARY	MANYEARS	1	1	1	1	4	3.6	3.6	3.6	3.6	3.6	14.4	0	0
DRIVER	MANYEARS	1	1	1	1	4	1.5	1.5	1.5	1.5	1.5	6.0	0	0
Sub-Total LOCAL								5.1	5.1	5.1	5.1	20.4		
2. INTERNATIONAL														
FORESTRY CONSULTANT	MANYEARS	1	1	1	1	4	100	100.0	100.0	100.0	100.0	400.0	0	1
Sub-Total SALARIES								105.1	105.1	105.1	105.1	420.4		
B. VEHICLES AND EQUIPMENT														
4-WHEEL DRIVE	UNIT	3	-	-	-	3	17	51.0	-	-	-	51.0	0	0.9
OFFICE FURNITURE AND EQUIPMENT 1/	UNIT	-	-	-	-	-		13.0	-	-	-	13.0	0.1	0.9
OFFICE SUPPLIES 2/		-	-	-	-	-		2.0	2.0	2.0	2.0	8.0	0.1	0.9
Sub-Total VEHICLES AND EQUIPMENT								66.0	2.0	2.0	2.0	72.0		
C. FELLOWSHIPS														
SEMINARS AND STUDY TOURS 3/	UNIT	-	-	-	-	-		-	5.0	5.0	-	10.0	0	1
Total CAPITAL COSTS								171.1	112.1	112.1	107.1	502.4		
II. OPERATING COSTS														
VEHICLE OPERATION AND MAINTENANCE		-	-	-	-	-		10.0	18.0	22.0	22.0	72.0	0.1	0.75
Total OPERATING COSTS								10.0	18.0	22.0	22.0	72.0		
Total BASELINE COSTS								181.1	130.1	134.1	129.1	574.4		

1/ INCLUDES CALCULATORS AND TYPEWRITERS
2/ INCLUDES PUBLICATIONS
3/ FOR HAITIAN FORESTERS

February 12, 1982 10:31

ANNEX 3
Table 2

HAITI
FORESTRY PROJECT
Total Training and Education 1/
Detailed Cost Table
($ '000)

	Unit	Quantity 1982	1983	1984	1985	Total	Unit Cost	Base Costs 1982	1983	1984	1985	Total	Phy. Cont. Rate	For. Exch. Comp.
I. CAPITAL COSTS														
A. INFRASTRUCTURE														
1. BUILDINGS - DAMIEN														
DORMITORY/60 STUDENTS -- 561m2 2/	M2	-	-	-	-	-		2.0	70.0	70.0	-	142.0	0.2	0.7
3 CLASSROOMS/20 STUDENTS -- 135 M2	m2	-	-	-	-	-		3.6	14.7	14.7	-	33.0	0.2	0.7
CAFETERIA FOR 300	m2	-	-	-	-	-		5.2	23.4	23.4	-	52.0	0.2	0.7
LIBRARY -- 90m2	m2	-	-	-	-	-		2.6	10.2	10.2	-	23.0	0.2	0.7
OFFICES -- 120m2	m2	-	-	-	-	-		3.0	13.5	13.5	-	30.0	0.2	0.7
LABORATORY -- 125m2	m2	-	-	-	-	-		3.2	14.4	14.4	-	32.0	0.2	0.7
WAREHOUSE -- 30m2	m2	-	-	-	-	-		1.0	6.0	1.0	-	8.0	0.2	0.7
GARAGE (4 VEHICLES) -- 45m2	m2	-	-	-	-	-		1.2	9.0	1.8	-	12.0	0.2	0.7
Sub-Total BUILDINGS - DAMIEN								21.8	161.2	149.0	-	332.0		
2. BUILDING - LA SELLE														
DORMITORY/20 STUDENTS -- 120m2 3/	m2	-	-	-	-	-		2.0	13.0	-	-	15.0	0.2	0.7
FACULTY QUARTERS FOR 3 4/	m2	-	-	-	-	-		2.0	13.0	-	-	15.0	0.2	0.7
KITCHEN AND DINING ROOM FOR 25 -- 3 m2 EACH	m2	-	-	-	-	-		1.0	3.0	-	-	4.0	0.2	0.7
CLASSROOM FOR 20 STUDENTS -- 2.5 m2 EACH	m2	-	-	-	-	-		1.0	8.0	-	-	9.0	0.2	0.7
WAREHOUSE -- 30m2	m2	-	-	-	-	-		2.0	9.0	-	-	11.0	0.2	0.7
GARAGE - 30m2	m2	-	-	-	-	-		1.0	4.0	-	-	5.0	0.2	0.7
Sub-Total BUILDING - LA SELLE								9.0	50.0	-	-	59.0		
Sub-Total INFRASTRUCTURE								30.8	211.2	149.0	-	391.0		
B. VEHICLES AND EQUIPMENT														
4-WHEEL DRIVE	UNIT	3	-	-	-	3	17	51.0	-	-	-	51.0	0	0.9
20-PASSENGER BUS	UNIT	1	-	-	-	1	46	46.0	-	-	-	46.0	0	0.9
FURNITURE - 15% OF BASE COST	UNIT	-	-	-	-	-		-	28.0	50.0	-	78.0	0.1	0.9
EQUIP. AND MATERIALS		-	-	-	-	-		24.0	36.0	30.0	14.0	104.0	0.1	0.9
Sub-Total VEHICLES AND EQUIPMENT								121.0	64.0	80.0	14.0	279.0		
C. SALARIES														
1. LOCAL														
ADMINISTRATOR	MANYEARS	1	1	1	1	4	6	6.0	6.0	6.0	6.0	24.0	0	0
CONTROLLER	MANYEARS	1	1	1	1	4	4.8	4.8	4.8	4.8	4.8	19.2	0	0
SECRETARY	MANYEARS	1	1	1	1	4	3.6	3.6	3.6	3.6	3.6	14.4	0	0
LIBRARIAN	MANYEARS	1	1	1	1	4	3.6	3.6	3.6	3.6	3.6	14.4	0	0
PROPERTY MANAGER	MANYEARS	1	1	1	1	4	2.4	2.4	2.4	2.4	2.4	9.6	0	0
DRIVERS	MANYEARS	2	2	2	2	8	1.5	3.0	3.0	3.0	3.0	12.0	0	0
Sub-Total LOCAL								23.4	23.4	23.4	23.4	93.6		
2. INTERNATIONAL														
PROFESSORS	MANYEARS	-	2	2	2	8	100	200.0	200.0	200.0	200.0	800.0	0	1
VOLUNTEER INSTRUCTOR	MANYEARS	1	1	1	1	4	24	24.0	24.0	24.0	24.0	96.0	0	1
Sub-Total INTERNATIONAL								224.0	224.0	224.0	224.0	896.0		
Sub-Total SALARIES								247.4	247.4	247.4	247.4	989.6		
D. FELLOWSHIPS														
FORESTRY TRAINING	UNIT	-	3	6	3	12	12	-	36.0	72.0	36.0	144.0	0	1
INSTRUCTOR TRAINING	UNIT	-	-	2	-	2	12	-	-	24.0	-	24.0	0	1
Sub-Total FELLOWSHIPS								-	36.0	96.0	36.0	168.0		
Total CAPITAL COSTS								399.2	558.6	572.4	297.4	1,827.6		
II. OPERATING COSTS														
STUDENT SUBSISTENCE		25	45	60	60	190	1.4	35.0	63.0	84.0	84.0	266.0	0.1	0
TEACHER PARTICIPANT SUBSISTENCE		-	133	133	134	400	0.07	-	9.3	9.3	9.4	28.0	0.1	0
VEHICLE O & M		-	-	-	-	-		10.0	20.0	26.0	26.0	82.0	0.1	0.75
SUPPLIES AND PARTS		-	-	-	-	-		2.0	3.0	3.0	4.0	12.0	0.1	0.75
Total OPERATING COSTS								47.0	95.3	122.3	123.4	388.0		
Total BASELINE COSTS								446.2	653.9	694.7	420.8	2,015.6		

1/ Total cost assuming co-financing available to finance Damien school buildings (not included in cost calculations).
2 9.35 m2 PER STUDENT @ US$254 PER m2 INCLUDING SITE WORK AND ARCHITECT FEE
3/ 6 m2 PER STUDENT @ US$125 PER m2 INCLUDING SITE WORK AND ARCHITECT FEE
4/ 40 m2 FOR EACH FACULTY MEMBER

ANNEX 3
Table 3

HAITI
FORESTRY PROJECT
Training and Education under Project
Detailed Cost Table
($ '000)

		Quantity					Unit	Base Costs					Phy. Cont.	For. Exch.
	Unit	1982	1983	1984	1985	Total	Cost	1982	1983	1984	1985	Total	Rate	Comp.
I. CAPITAL COSTS														
A. INFRASTRUCTURE														
1. BUILDINGS - DAMIEN : NOT INCLUDED IN PROJECT COST AND FINANCING 1/														
2. BUILDING - LA SELLE														
DORMITORY/20 STUDENTS -- 120m2 2/	m2	-	-	-	-	-		2.0	13.0	-	-	15.0	0.2	0.7
FACULTY QUARTERS FOR 3 3/	m2	-	-	-	-	-		2.0	13.0	-	-	15.0	0.2	0.7
KITCHEN AND DINING ROOM FOR 25 -- 3 m2 EACH	m2	-	-	-	-	-		1.0	3.0	-	-	4.0	0.2	0.7
CLASSROOM FOR 20 STUDENTS -- 2.5 m2 EACH	m2	-	-	-	-	-		1.0	8.0	-	-	9.0	0.2	0.7
WAREHOUSE -- 30m2	m2	-	-	-	-	-		2.0	9.0	-	-	11.0	0.2	0.7
GARAGE - 30m2	m2	-	-	-	-	-		1.0	4.0	-	-	5.0	0.2	0.7
Sub-Total BUILDING - LA SELLE								9.0	50.0	-	-	59.0		
Sub-Total INFRASTRUCTURE								9.0	50.0			59.0		
B. VEHICLES AND EQUIPMENT														
4-WHEEL DRIVE	UNIT	3	-	-	-	3	17	51.0	-	-	-	51.0	0	0.9
20-PASSENGER BUS	UNIT	1	-	-	-	1	46	46.0	-	-	-	46.0	0	0.9
FURNITURE - 15% OF BASE COST	UNIT	-	-	-	-	-		-	28.0	50.0	-	78.0	0.1	0.9
EQUIP. AND MATERIALS		-	-	-	-	-		24.0	36.0	30.0	14.0	104.0	0.1	0.9
Sub-Total VEHICLES AND EQUIPMENT								121.0	64.0	80.0	14.0	279.0		
C. SALARIES														
1. LOCAL														
ADMINISTRATOR	MANYEARS	1	1	1	1	4	6	6.0	6.0	6.0	6.0	24.0	0	0
CONTROLLER	MANYEARS	1	1	1	1	4	4.8	4.8	4.8	4.8	4.8	19.2	0	0
SECRETARY	MANYEARS	1	1	1	1	4	3.6	3.6	3.6	3.6	3.6	14.4	0	0
LIBRARIAN	MANYEARS	1	1	1	1	4	3.6	3.6	3.6	3.6	3.6	14.4	0	0
PROPERTY MANAGER	MANYEARS	1	1	1	1	4	2.4	2.4	2.4	2.4	2.4	9.6	0	0
DRIVERS	MANYEARS	2	2	2	2	8	1.5	3.0	3.0	3.0	3.0	12.0	0	0
Sub-Total LOCAL								23.4	23.4	23.4	23.4	93.6		
2. INTERNATIONAL														
PROFESSORS	MANYEARS	2	2	2	2	8	100	-	200.0	200.0	200.0	600.0	0	1
VOLUNTEER INSTRUCTOR	MANYEARS	1	1	1	1	4	24	24.0	24.0	24.0	24.0	96.0	0	1
Sub-Total INTERNATIONAL								24.0	224.0	224.0	224.0	696.0		
Sub-Total SALARIES								47.4	247.4	247.4	247.4	789.6		
D. FELLOWSHIPS														
FORESTRY TRAINING	UNIT	-	3	6	3	12	12	-	36.0	72.0	36.0	144.0	0	1
INSTRUCTOR TRAINING	UNIT	-	-	2	-	2	12	-	-	24.0	-	24.0	0	1
Sub-Total FELLOWSHIPS								-	36.0	96.0	36.0	168.0		
Total CAPITAL COSTS								177.4	397.4	423.4	297.4	1,295.6		
II. OPERATING COSTS														
STUDENT SUBSISTENCE		25	45	60	60	190	1.4	35.0	63.0	84.0	84.0	266.0	0.1	0
TEACHER PARTICIPANT SUBSISTENCE		-	133	133	134	400	0.07	-	9.3	9.3	9.4	28.0	0.1	0
VEHICLE O & M		-	-	-	-	-		10.0	20.0	26.0	26.0	82.0	0.1	0.75
SUPPLIES AND PARTS		-	-	-	-	-		2.0	3.0	3.0	4.0	12.0	0.1	0.75
Total OPERATING COSTS								47.0	95.3	122.3	123.4	388.0		
Total BASELINE COSTS								224.4	492.7	545.7	420.8	1,683.6		

1/ Costs detailed in Table 2.
2/ 6 m2 PER STUDENT @ US$125 PER m2 INCLUDING SITE WORK AND ARCHITECT FEE
3/ 40 m2 FOR EACH FACULTY MEMBER

ANNEX 3
Table 4

HAITI
FORESTRY PROJECT
Fuelwood Trials and Pilot Planting - Port-au-Prince Area
Detailed Cost Table
($ '000)

		Quantity						Base Costs					Phy. Cont.	For. Exch.
	Unit	1982	1983	1984	1985	Total	Unit Cost	1982	1983	1984	1985	Total	Rate	Comp.
I. CAPITAL COSTS														
A. INFRASTRUCTURE														
RESIDENCE AND TOOL SHED FOR CARETAKERS (120 M2)	M2	24	96	-	-	120	0.125	3.0	12.0	-	-	15.0	0.2	0.7
WELL FOR DRINKING/IRRIGATION WATER	UNIT	1	-	-	-	1	2.3	2.3	-	-	-	2.3	0.2	0.7
Sub-Total INFRASTRUCTURE								5.3	12.0	-	-	17.3		
B. VEHICLES AND EQUIPMENT														
FOUR WHEEL DRIVE PICK UP	UNIT	1	-	-	-	1	17	17.0	-	-	-	17.0	0	0.9
FENCING	LOT	1	-	-	-	1	2.3	2.3	-	-	-	2.3	0.1	0.9
HAND TOOLS AND OTHER EQUIPMENT	LOT	1	-	-	-	1	2.3	2.3	-	-	-	2.3	0.1	0.9
Sub-Total VEHICLES AND EQUIPMENT								21.6	-	-	-	21.6		
C. SURVEYS														
1. SOIL SURVEY														
LOCAL SOIL SPECIALIST	MANMONTH	6	-	-	-	6	0.6	3.6	-	-	-	3.6	0	0
Sub-Total SURVEYS								3.6	-	-	-	3.6		
Total CAPITAL COSTS								30.5	12.0	-	-	42.5		
II. OPERATING COSTS														
A. SALARIES														
1. LOCAL														
FORESTER FOR GANTHIER TRIALS /DAMIEN SEED LAB	MANYEARS	2	2	2	2	8	3.5	7.0	7.0	7.0	7.0	28.0	0	0
CARETAKER	MANYEARS	1	1	1	1	4	0.875	0.9	0.9	0.9	0.9	3.5	0	0
DRIVER	MANYEARS	1	1	1	1	4	1.5	1.5	1.5	1.5	1.5	6.0	0	0
LABOR	MANYEARS	5	10	15	20	50	0.7	3.5	7.0	10.5	14.0	35.0	0	0
Sub-Total LOCAL								12.9	16.4	19.9	23.4	72.5		
2. INTERNATIONAL														
VOLUNTEERS	MANYEARS	1	1	1	1	4	20	20.0	20.0	20.0	20.0	80.0	0	1
CONSULTANT DIRECT SEEDING	MANMONTH	2	2	-	-	4	14	28.0	28.0	-	-	56.0	0	1
Sub-Total INTERNATIONAL								48.0	48.0	20.0	20.0	136.0		
Sub-Total SALARIES								60.9	64.4	39.9	43.4	208.5		
B. MATERIALS AND SUPPLIES														
TRACTOR RENTAL FOR RIPPING	25 HA	1	2	3	4	10	1.5	1.5	3.0	4.5	6.0	15.0	0.1	0.75
VEHICLE OPERATION AND MAINTENANCE		-	-	-	-	-		2.0	4.0	5.0	5.0	16.0	0.1	0.75
SPARE PARTS		-	-	-	-	-		0.5	0.7	0.8	1.0	3.0	0.1	0.95
SEEDLINGS FERTILIZER AND OTHER MATERIALS 1/		-	-	-	-	-		1.3	1.0	1.5	2.0	5.8	0.1	0.95
Sub-Total MATERIALS AND SUPPLIES								5.3	8.7	11.8	14.0	39.8		
Total OPERATING COSTS								66.2	73.1	51.7	57.4	248.3		
Total BASELINE COSTS								96.7	85.1	51.7	57.4	290.8		

1/ SEEDLINGS PROVIDED BY DARNDR'S DAMIEN NURSERY @ US$.05 A PIECE

ANNEX 3
Table 5

HAITI
FORESTRY PROJECT
Northwest Reforestation Trials and Reforestation Monitoring
Detailed Cost Table
($ '000)

		Quantity						Base Costs					Phy. Cont.	For. Exch.
	Unit	1982	1983	1984	1985	Total	Unit Cost	1982	1983	1984	1985	Total	Rate	Comp.
I. CAPITAL COSTS														
A. VEHICLES AND EQUIPMENT														
FOUR WHEEL DRIVE PICK UP	UNIT	1	1	-	-	2	17	17.0	17.0	-	-	34.0	0	0.9
HAND TOOLS AND OTHER EQUIPMENT	LOT	-	-	-	-	-		2.3	-	-	-	2.3	0.1	0.9
FENCING	LOT	1	-	-	-	1	2.3	2.3	-	-	-	2.3	0.1	0.9
Sub-Total VEHICLES AND EQUIPMENT								21.6	17.0	-	-	38.6		
Total CAPITAL COSTS								21.6	17.0	-	-	38.6		
II. OPERATING COSTS														
A. SALARIES														
1. LOCAL														
FORESTERS AT BOMBARDOPOLIS, JEAN RABEL	MANYEARS	1	2	2	2	7	3.5	3.5	7.0	7.0	7.0	24.5	0	0
CARETAKERS AT BOMBARDOPOLIS, JEAN RABEL	MANYEARS	1	2	2	2	7	0.875	0.9	1.8	1.8	1.8	6.1	0	0
LABOR AT BOMBARDOPOLIS, JEAN RABEL	MANYEARS	1	2	2	2	7	0.7	0.7	1.4	1.4	1.4	4.9	0	0
Sub-Total LOCAL								5.1	10.2	10.2	10.2	35.5		
2. INTERNATIONAL														
VOLUNTEERS	MANYEARS	1	1	1	1	4	24	24.0	24.0	24.0	24.0	96.0	0	1
CONSULTANT DIRECT SEEDING	MANMONTH	2	2	-	-	4	14	28.0	28.0	-	-	56.0	0	1
Sub-Total INTERNATIONAL								52.0	52.0	24.0	24.0	152.0		
Sub-Total SALARIES								57.1	62.2	34.2	34.2	187.5		
B. MATERIALS AND SUPPLIES														
VEHICLE OPERATION AND MAINTENANCE		-	-	-	-	-		2.0	6.0	9.0	10.0	27.0	0.1	0.75
SPARE PARTS	MANYEARS	-	-	-	-	-		0.5	1.2	1.5	2.0	5.2	0	0.95
SEED FERTILIZER AND OTHER MATERIALS	MANYEARS	-	-	-	-	-		1.3	1.0	1.5	2.0	5.8	0	0
Sub-Total MATERIALS AND SUPPLIES								3.8	8.2	12.0	14.0	38.0		
Total OPERATING COSTS								60.9	70.3	46.2	48.2	225.5		
Total BASELINE COSTS								82.5	87.4	46.2	48.2	264.1		

ANNEX 3
Table 6

HAITI
FORESTRY PROJECT
Pine Forest Management
Detailed Cost Table
($ '000)

		Quantity						Base Costs					Phy. Cont.	For. Exch.
	Unit	1982	1983	1984	1985	Total	Unit Cost	1982	1983	1984	1985	Total	Rate	Comp.
I. CAPITAL COSTS														
A. INFRASTRUCTURE														
BUILDINGS FOR UNIT II														
OFFICE(100 M2)	M2	20	80	-	-	100	0.125	2.5	10.0	-	-	12.5	0.2	0.7
RESIDENCES (200 M2)	M2	40	160	-	-	200	0.125	5.0	20.0	-	-	25.0	0.2	0.7
MAINTENANCE BUILDINGS & GARAGE (200 M2)	M2	40	160	-	-	200	0.125	5.0	20.0	-	-	25.0	0.2	0.7
Sub-Total BUILDINGS FOR UNIT II								12.5	50.0	-	-	62.5		
Sub-Total INFRASTRUCTURE								12.5	50.0	-	-	62.5		
B. VEHICLES & EQUIPMENT														
FOUR WHEEL DRIVE PICK UP	UNIT	4	-	-	-	4	17	68.0	-	-	-	68.0	0	0.9
TOOLS & EQUIPMENT	SET	-	-	-	-	-		12.0	-	-	-	12.0	0.1	0.9
CHAIN SAWS	UNIT	8	-	-	-	8	0.35	2.8	-	-	-	2.8	0.1	0.9
RADIOS	UNIT	4	-	-	-	4	1.25	5.0	-	-	-	5.0	0.1	0.9
Sub-Total VEHICLES & EQUIPMENT								87.8	-	-	-	87.8		
C. SURVEYS														
1. AERIAL PHOTO COVERAGE	MANYEARS	-	-	-	-	-		5.0	-	-	-	5.0	0	1
2. PHOTO INTERPRETATION	MANYEARS	-	-	-	-	-		5.0	-	-	-	5.0	0	1
3. STAND CLASSIFICATION	MANYEARS	-	-	-	-	-		2.0	-	-	-	2.0	0	0
4. SOIL SURVEY														
CONSULTANT	MANMONTH	1	-	-	-	1	14	14.0	-	-	-	14.0	0	1
LOCAL SOIL SPECIALIST	MANMONTH	6	-	-	-	6	0.6	3.6	-	-	-	3.6	0	0
FOREST INVENTORY	100 HA	20	20	20	20	80	0.6	12.0	12.0	12.0	12.0	48.0	0	0
Sub-Total SOIL SURVEY								29.6	12.0	12.0	12.0	65.6		
5. POPULATION & AGRIC. CENSUS														
MATERIALS,TRANSPORTATION AND SUBSISTENCE		-	-	-	-	-		10.0	-	-	-	10.0	0.1	0.75
CONSULTANTS	MANYEARS	2	-	-	-	2	14	28.0	-	-	-	28.0	0	1
LOCAL CENSUS TAKERS	MANYEARS	40	-	-	-	40	0.3	12.0	-	-	-	12.0	0	0
MATERIALS,TRANSPORT AND SUBSISTANCE		-	-	-	-	-		10.0	-	-	-	10.0	0.1	0.75
Sub-Total POPULATION & AGRIC. CENSUS								60.0	-	-	-	60.0		
Sub-Total SURVEYS								101.6	12.0	12.0	12.0	137.6		
Total CAPITAL COSTS								201.9	62.0	12.0	12.0	287.9		
II. OPERATING COSTS														
A. SALARIES														
1. LOCAL														
FORESTERS	MANYEARS	2	2	2	2	8		-	-	-	-	-	0	0
FORESTERS	MANYEARS	2	2	2	2	8		-	-	-	-	-	0	0
FOREST GUARDS	MANYEARS	10	10	10	10	40		-	-	-	-	-	0	0
FOREST GUARDS	MANYEARS	10	10	10	10	40		-	-	-	-	-	0	0
MECHANICS	MANYEARS	4	4	4	4	16	1.5	6.0	6.0	6.0	6.0	24.0	0	0
DRIVERS	MANYEARS	6	6	6	6	24	1.5	9.0	9.0	9.0	9.0	36.0	0	0
LABOR	MANYEARS	90	90	90	90	360	0.75	67.5	67.5	67.5	67.5	270.0	0	0
Sub-Total LOCAL								82.5	82.5	82.5	82.5	330.0		
2. INTERNATIONAL														
VOLUNTEERS	MANYEARS	2	2	2	2	8	24	48.0	48.0	48.0	48.0	192.0	0	1
Sub-Total SALARIES								130.5	130.5	130.5	130.5	522.0		
B. MATERIALS & SUPPLIES														
VEHICLE OPERATION AND MAINTENANCE		-	-	-	-	-		13.0	25.0	32.0	32.0	102.0	0.1	0.75
SPARE PARTS		-	-	-	-	-		5.0	6.5	8.0	9.5	29.0	0.1	0.95
WOOD PRESERVATIVES & OTHER		-	-	-	-	-		5.0	5.0	5.0	5.0	20.0	0.1	0.95
Sub-Total MATERIALS & SUPPLIES								23.0	36.5	45.0	46.5	151.0		
Total OPERATING COSTS								153.5	167.0	175.5	177.0	673.0		
Total BASELINE COSTS								355.4	229.0	187.5	189.0	960.9		

ANNEX 3
Table 7

HAITI
FORESTRY PROJECT
Development of Cooking Stoves
Detailed Cost Table
($ '000)

		Quantity						Base Costs					Phy. Cont.	For. Exch.
	Unit	1982	1983	1984	1985	Total	Unit Cost	1982	1983	1984	1985	Total	Rate	Comp.
I. OPERATING COSTS														
A. SALARIES														
1. LOCAL														
SALARY SUPPLEMENTS	MANYEARS	-	-	-	-	-		1.0	1.0	1.0	1.0	4.0	0.1	0
ENUMERATORS--10 MANYEARS	MANYEARS	-	-	-	-	-		4.0	4.0	-	-	8.0	0.1	0
Sub-Total LOCAL								5.0	5.0	1.0	1.0	12.0		
2. INTERNATIONAL														
STOVE CONSULTANT	MANMONTH	2	2	1	1	6	2	4.0	4.0	2.0	2.0	12.0	0.1	1
Sub-Total SALARIES								9.0	9.0	3.0	3.0	24.0		
B. OPERATIONS														
TESTING EQUIPMENT AND SUPPLIES		-	-	-	-	-		40.0	10.0	-	-	50.0	0.1	0.3
SUPPLIES FOR TEST STOVES		-	-	-	-	-		-	2.0	4.0	20.0	26.0	0.1	0.9
STOVE TESTING		-	-	-	-	-		2.0	2.0	1.0	1.0	6.0	0.1	0.5
SOCIOECONOMIC SURVEY	MANYEARS	-	-	-	-	-		1.0	1.0	-	-	2.0	0	0.3
ACCEPTANCE TESTING		-	-	-	-	-		-	1.0	1.0	1.0	3.0	0.1	0.3
ARTISAN TRAINIING		-	-	-	-	-		-	2.0	2.0	2.0	6.0	0.1	0.3
Sub-Total OPERATIONS								43.0	18.0	8.0	24.0	93.0		
Total OPERATING COSTS								52.0	27.0	11.0	27.0	117.0		
Total BASELINE COSTS								52.0	27.0	11.0	27.0	117.0		

February 12, 1982 10:31

ANNEX 3
Table 8

HAITI

FORESTRY PROJECT

Preparation of Second Phase

Detailed Cost Table

($ '000)

		Quantity						Base Costs					Phy. Cont.	For. Exch.
	Unit	1982	1983	1984	1985	Total	Unit Cost	1982	1983	1984	1985	Total	Rate	Comp.
I. OPERATING COSTS														
A. SALARIES														
1. CONSULTANTS														
FORESTRY LEGISLATION	MANMONTHS	-	1	3	-	4	14	-	14.0	42.0	-	56.0	0	1
FORESTRY INSTITUTIONS	MANMONTHS	-	-	2	-	2	14	-	-	28.0	-	28.0	0	1
OTHERS	MANMONTHS	-	3	3	-	6	14	-	42.0	42.0	-	84.0	0	1
Sub-Total CONSULTANTS								-	56.0	112.0	-	168.0		
Sub-Total SALARIES								-	56.0	112.0	-	168.0		
B. OPERATIONS														
PREPARATION REPORT		-	-	-	-	-		-	-	1.0	-	1.0	0.1	0.75
Total OPERATING COSTS								-	56.0	113.0	-	169.0		
Total BASELINE COSTS								-	56.0	113.0	-	169.0		

February 12, 1982 10:31

ANNEX 3
Table 9

HAITI
FORESTRY PROJECT
Summary Account by Time
($ '000)

	Base Costs				
	1982	1983	1984	1985	Total
I. CAPITAL COSTS					
A. INFRASTRUCTURE					
BUILDINGS	24.5	112.0	-	-	136.5
WELLS	2.3	-	-	-	2.3
Sub-Total INFRASTRUCTURE	26.8	112.0	-	-	138.8
Physical Contingencies				-	
Price Contingencies				-	
Sub-Total INCLUDING CONTINGENCIES	34.4	156.0	-	-	190.4
Foreign Exchange					
B. VEHICLES					
4-WH. DRIVE VEHICLES	204.0	17.0	-	-	221.0
BUS	46.0	-	-	-	46.0
Sub-Total VEHICLES	250.0	17.0	-	-	267.0
Price Contingencies					
Sub-Total INCLUDING CONTINGENCIES	262.7	19.6	-	-	282.3
Foreign Exchange					
C. EQUIPMENT					
TOOLS	19.4	-	-	-	19.4
RADIOS	5.0	-	-	-	5.0
FURNITURE	13.0	28.0	50.0	-	91.0
TRAINING MATERIALS	26.0	38.0	32.0	16.0	112.0
Sub-Total EQUIPMENT	63.4	66.0	82.0	16.0	227.4
Physical Contingencies	6.3	6.6	8.2	1.6	22.7
Price Contingencies	3.6	11.1	23.0	6.3	44.0
Sub-Total INCLUDING CONTINGENCIES	73.3	83.7	113.2	23.9	294.1
Foreign Exchange	65.9	75.1	101.2	21.2	263.5
D. EXPATRIATE STAFF AND CONSULTANTS					
FOREST ENGINEERS	100.0	356.0	412.0	300.0	1,168.0
TECHNICIANS	144.0	144.0	116.0	116.0	520.0
SHORT-TERM CONSULTANTS	28.0	28.0	-	-	56.0
Sub-Total EXPATRIATE STAFF AND CONSULTANTS	272.0	528.0	528.0	416.0	1,744.0
Price Contingencies					
Sub-Total INCLUDING CONTINGENCIES	279.9	606.9	658.4	557.5	2,102.8
Foreign Exchange	495.6	606.9	658.4	557.5	2,318.5
E. LOCAL STAFF					
MANAGEMENT STAFF	21.3	24.8	24.8	24.8	95.7
SUPPORT STAFF	107.7	112.7	116.2	119.7	456.3
SURVEYS	86.2	13.0	12.0	12.0	123.2
MATERIALS AND SUPPLIES	1.8	2.2	3.0	4.0	11.0
Sub-Total LOCAL STAFF	217.0	152.7	156.0	160.5	686.2
Price Contingencies	12.5	28.5	51.3	78.2	170.6
Sub-Total INCLUDING CONTINGENCIES	229.4	181.3	207.3	238.8	856.8
Foreign Exchange	55.4	1.7	1.8	2.5	61.4
F. FELLOWSHIP					
X	-	41.0	101.0	36.0	178.0
Sub-Total FELLOWSHIP	-	41.0	101.0	36.0	178.0
Price Contingencies	-				
Sub-Total INCLUDING CONTINGENCIES	-	44.7	128.6	48.1	221.4
Foreign Exchange	-				
Total CAPITAL COSTS	829.2	916.7	867.0	628.5	3,241.4
Physical Contingencies	829.2	916.7	867.0	628.5	
Price Contingencies					
Total INCLUDING CONTINGENCIES	879.7	1,092.2	1,099.2	876.6	3,947.7
Foreign Exchange	1,036.0	1,039.8	1,133.2	661.7	3,870.7
II. OPERATING COSTS					
SALARIES	44.0	81.3	96.3	96.4	318.0
VEHICLE O&M	37.0	73.0	94.0	95.0	299.0
MISCELLANEOUS	26.6	3.0	3.0	4.0	36.6
OPERATIONS	42.0	17.0	9.0	24.0	92.0
MATERIALS & SUPPLIES	13.3	16.2	19.8	23.5	72.8
Total OPERATING COSTS	162.9	190.5	222.1	242.9	818.4
Physical Contingencies	16.3	19.1	22.2	24.3	81.8
Price Contingencies	9.9	35.8	71.6	111.6	228.9
Total INCLUDING CONTINGENCIES	189.1	245.4	315.9	378.7	1,129.1
Foreign Exchange	89.8	104.3	135.0	172.2	501.2
Total BASELINE COSTS	992.1	1,107.2	1,089.1	871.4	4,059.8
Total PROJECT COSTS	1,068.8	1,337.8	1,415.1	1,255.3	5,076.8

ANNEX 3
Table 10

HAITI
FORESTRY PROJECT
Summary Account by Project Component
($ '000)

	REINFORCEMENT OF FORESTRY BUREAU	FORESTRY TRAINING	FUELWOOD PLANTATIONS	PINE FOREST MANAGEMENT	PROMOTION OF COOKING STOVES	PREPARATION OF SECOND PHASE	Total
I. CAPITAL COSTS							
A. INFRASTRUCTURE							
BUILDINGS	-	59.0	15.0	62.5	-	-	136.5
WELLS	-	-	2.3	-	-	-	2.3
Sub-Total INFRASTRUCTURE	-	59.0	17.3	62.5	-	-	138.8
Physical Contingencies	-	11.8	3.5	12.5	-	-	27.8
Price Contingencies	-	13.8	2.7	7.3	-	-	23.8
Sub-Total INCLUDING CONTINGENCIES	-	84.6	23.4	82.3	-	-	190.3
B. VEHICLES							
4-WH. DRIVE VEHICLES	51.0	51.0	51.0	68.0	-	-	221.0
BUS	-	46.0	-	-	-	-	46.0
TRUCKS	-	-	-	-	-	-	-
Sub-Total VEHICLES	51.0	97.0	51.0	68.0	-	-	267.0
Price Contingencies	2.6	4.9	4.3	3.5	-	-	153
Sub-Total INCLUDING CONTINGENCIES	53.6	101.9	55.3	71.5	-	-	282.3
C. EQUIPMENT							
TOOLS	-	-	4.6	14.8	-	-	19.4
RADIOS	-	-	-	5.0	-	-	5.0
FURNITURE	13.0	78.0	-	-	-	-	91.0
TRAINING MATERIALS	8.0	104.0	-	-	-	-	112.0
Sub-Total EQUIPMENT	21.0	182.0	4.6	19.8	-	-	227.4
Physical Contingencies	2.1	18.2	0.5	2.0	-	-	22.7
Price Contingencies	2.5	40.1	0.3	1.1	-	-	44.0
Sub-Total INCLUDING CONTINGENCIES	25.6	240.3	5.3	22.9	-	-	294.1
Foreign Exchange	23.0	215.1	4.8	20.6	-	-	263.5
D. EXPATRIATE STAFF AND CONSULTANTS							
FOREST ENGINEERS	400.0	600.0	-	-	-	168.0	1,168.0
TECHNICIANS	-	96.0	232.0	192.0	-	-	520.0
SHORT-TERM CONSULTANTS	-	-	56.0	-	-	-	56.0
Sub-Total EXPATRIATE STAFF AND CONSULTANTS	400.0	696.0	288.0	192.0	-	168.0	1,744.0
Price Contingencies	78.7	160.5	45.8	37.8	-	36.0	358.8
Sub-Total INCLUDING CONTINGENCIES	478.7	856.5	333.8	229.8	-	204.0	2,102.9
E. LOCAL STAFF							
MANAGEMENT STAFF	-	43.2	52.5	-	-	-	95.7
SUPPORT STAFF	20.4	50.4	55.5	330.0	-	-	456.3
SURVEYS	-	-	3.6	117.6	2.0	-	123.2
MATERIALS AND SUPPLIES	-	-	11.0	-	-	-	11.0
Sub-Total LOCAL STAFF	20.4	93.6	122.6	447.6	2.0	-	686.2
Price Contingencies	5.4	24.9	35.6	104.4	0.2	-	170.6
Sub-Total INCLUDING CONTINGENCIES	25.8	118.5	158.2	552.0	2.2	-	856.8
Foreign Exchange	-	-	6.1	54.6	0.7	-	61.4
F. FELLOWSHIP							
X	10.0	288.0	-	-	-	-	298.0
Sub-Total FELLOWSHIP	10.0	168.0	-	-	-	-	178.0
Price Contingencies	2.0	41.4	-	-	-	-	43.4
Sub-Total INCLUDING CONTINGENCIES	12.0	209.4	-	-	-	-	370.9
Foreign Exchange	12.0	358.9	-	-	-	-	370.9
Total CAPITAL COSTS	502.4	1,295.0	483.5	789.9	2.0	168.0	3,240.8
Total INCLUDING CONTINGENCIES	595.7	1,611.2	576.1	958.5	2.2	204.0	4,297.9
Foreign Exchange	561.8	2,125.0	410.7	568.5	0.7	204.0	3,870.7
II. OPERATING COSTS							
SALARIES	-	294.0	-	-	24.0	-	318.0
VEHICLE O&M	72.0	82.0	43.0	102.0	-	-	299.0
MISCELLANEOUS	-	12.0	4.6	20.0	-	-	36.6
OPERATIONS	-	-	-	-	91.0	1.0	92.0
MATERIALS & SUPPLIES	-	-	23.8	49.0	-	-	72.8
Total OPERATING COSTS	72.0	388.0	71.4	171.0	115.0	1.0	818.4
Physical Contingencies	7.2	38.8	7.1	17.1	11.5	0.1	81.8
Price Contingencies	19.3	127.0	19.2	40.6	22.5	0.3	228.9
Total INCLUDING CONTINGENCIES	98.5	553.8	97.7	228.7	149.0	1.4	1,129.1
Foreign Exchange	72.7	95.2	75.3	182.6	74.3	1.0	501.2
Total BASELINE COSTS	574.4	1,683.0	554.9	960.9	117.0	169.0	4,059.8
Physical Contingencies	9.3	68.8	11.1	31.6	11.5	0.1	132.2
Price Contingencies	110.5	412.7	107.8	194.7	22.7	36.3	884.7
Total PROJECT COSTS	694.2	2,164.5	673.8	1,187.2	151.2	205.4	5,076.8

HAITI – FORESTRY PROJECT
IMPLEMENTATION SCHEDULE

Activity	Agency Responsible	PY 1				PY 2				PY 3				PY 4			
		1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
A. Reinforcement Forestry Bureau																	
Assignment Senior Adviser	Forestry Bureau																
Appointment Field Managers Ganthier	Forestry Bureau																
Jean Rabel	Forestry Bureau																
Bombardopolis	Forestry Bureau																
Proucrement of Vehicles	Forestry Bureau																
B. Forestry Training and Education																	
1. Fellowships (a)	FAMV + DARNDR																
a. Forestry 1	FAMV + DARNDR																
3	FAMV + DARNDR																
1	FAMV + DARNDR																
1	FAMV + DARNDR																
b. Instructor Training 2	FAMV + DARNDR																
2. Medium-level School																	
Assignment 3 Teaching Staff	FAMV																
Design + Bidding Buildings Damien	FAMV																
Construction Buildings Damien	FAMV																
Survey + Planning Buildings La Selle	FAMV																
Rehabiliation Construction La Selle	FAMV																
Preparation Curriculum	FAMV																
Instruction First Class (5 Students)	FAMV																
2nd (20 Students)	FAMV																
3rd (20 Students)	FAMV																
4th (20 Students)	FAMV																
Procurement of Vehicles	FAMV																
3. Primary School Training																	
Training Courses for Teachers	FAMV																
Establishment School Nurseries	Min. Education																
C. Pilot Planting Ganthier	Forestry Bureau																
Soil Survey	Forestry Bureau																
Selection Site for Planting	Forestry Bureau																
Acquisition Seed	Forestry Bureau																
Nursery	Forestry Bureau																
Building Watchman House	Forestry Bureau																
Planting 1st Block	Forestry Bureau																
2nd Block	Forestry Bureau																
3rd Block	Forestry Bureau																
D. Trials Ganthier																	
Planting and Seeding																	
Measurement																	
E. Trials Jean Rabel																	
Site Selection																	
Soil Survey																	
Planting and Seeding																	
Measurement																	
F. Trial Bombardopolis																	
Site Selection																	
Soil Survey																	
Planting and Seeding																	
Measurement																	
G. Demonstrations Jean Rabel																	
Nursery																	
Planting and Seeding																	
H. Demonstrations Bombardopolis																	
Nursery																	
Planting and Seeding																	
I. Monitoring Northwest																	
J. Management Pine Forest																	
Transfer of Land to Forestry Bureau (Condition for Negotiations)	Government																
Demarcation of National Pine Forest on Ground	Forestry Bureau																
Aerial Photograph and Interpretation of Agricultural Land Use and Forest Stand Classification	Forestry Bureau																
Ground Truth Survey Sample	Forestry Bureau																
Population/Agriculture Censuses																	
Semi-detailed Soil Survey of Approximately 2,000 ha of Selected Areas to Determine Their Most Appropriate Land Use																	
Preparation of Detailed Forest Management Plan																	
Construction and Rehabilitation of Buildings																	
Implementation of Silvicultural Activities																	
K. Stove Development																	
Socio-economic Survey	Directorate Energy																
Mission Stove Consultant	Directorate Energy																
Development Improved Stoves	Directorate Energy																
Testing Improved Stoves	Directorate Energy																
Acceptance Testing	Directorate Energy																
Artisan Training	Directorate Energy																
L. Preparation Second Phase																	
Forestry Legislation Consultant	Forestry Bureau																
Forestry Institutions Consultant	Forestry Bureau																
FAO/CP Identification Mission	Forestry Bureau																
FAO/CP Preparation Mission	Forestry Bureau																

HAITI

FORESTRY PROJECT

Documents Available in the Project File

A. Working Papers

Forestry Development

A1 - Fuelwood Trials and Plantings.

A2 - Management of the Haitian Pine Forests.

Forestry Training

B1 - Foreign Fellowships in Forestry for Training at the Graduate Level.

B2 - The Work and Qualifications of a Forestry Technicians in Haiti.

B3 - Description of Subjects of Study Recommended for Training Forestry Technicians.

B4 - One Year Specialization in Forestry.

B5 - Primary Education and Training.

Development of Cooking Stoves

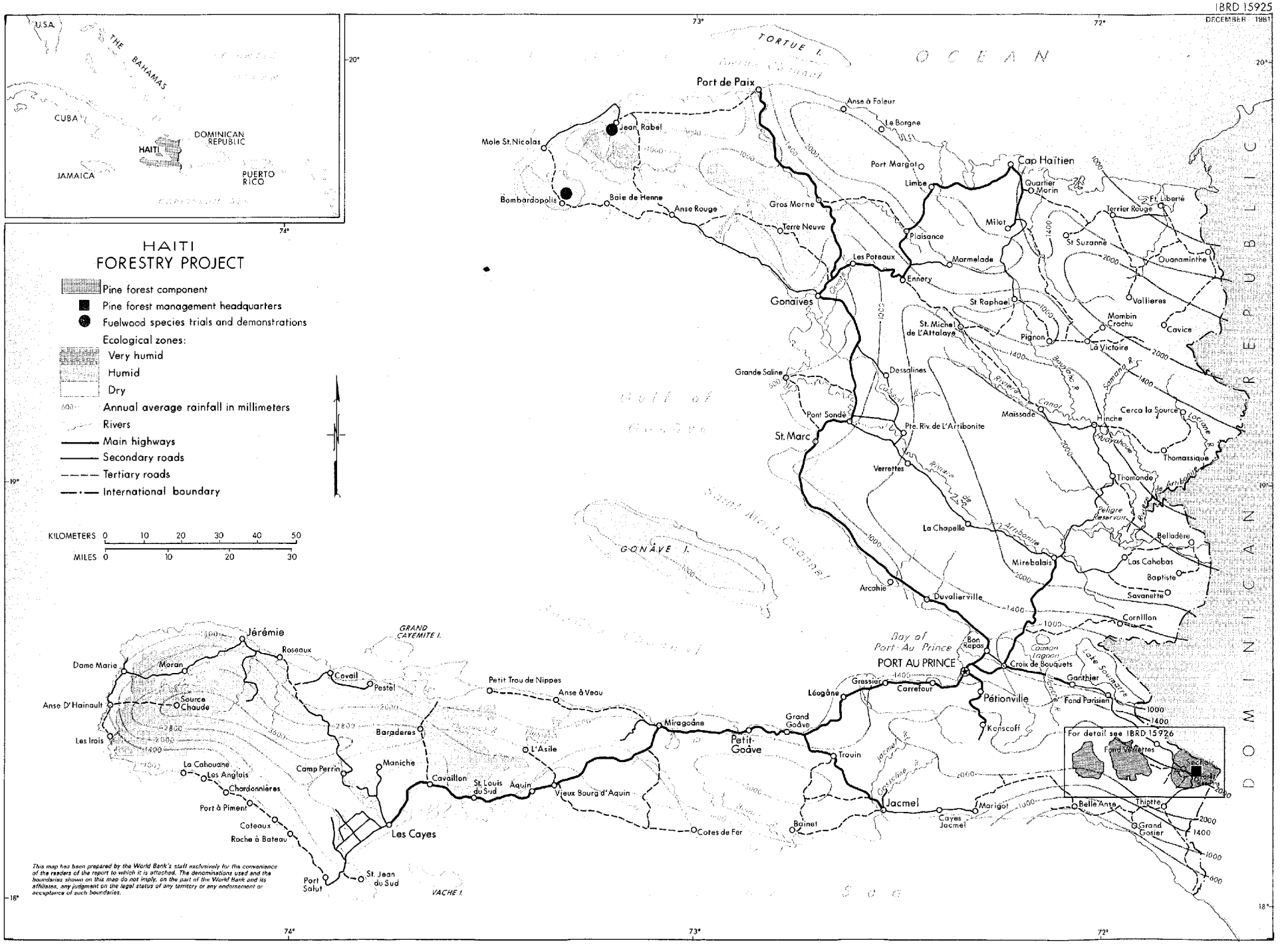
C1 - Development of Efficient Cooking Stoves.

B. Related Documents

1.	Proposal for the Protection and Management of the Acul River Wstershed (Integrated Agricultural Development Project)	
2.	Methode d'utilisation des Lignites d'Haiti	Suzie Nonez Philippe-Auguste et Max Tiphaine
3.	Considerations sur les aspects sociologiques et organisationnels de Projet Forestier Pilote	
4.	Women in Forestry for Local Community Development	Marilyn W. Hoskins

5.	Loi du 17 aout 1955 reglementant la coupe, le transport et le commerce du bois et four a chaux	DARNDR	Sept 1955
6.	CARE - Project involving 4,000 small peasant farmers in northwest Haiti in tree-growing activities	CARE Proposal	
7.	Agroforestry and Natural Resources Management	USAID/Haiti	
8.	Erosion du Sol et Reaction Sociale un Plan d'Action pour le Developpement d'Haiti	Laurence A. Lewis et Stephen L. Feldman	1975
9.	Reboisement et Lutte Contre l'Erosion - Planification, Politique et Legislation Forestieres	J.E. Raeder-Roitzsch F. Zenny	1975
10.	Reboisement et Lutte Contre l'Erosion - Le Charbon de Bois, Combustible Renouvelable	FAO - D.E. Earl	1976
11.	The Northwest Agricultural Development Region	Dr. Wolf Donner	1976
12.	Method of Inventory, Pine Forests of Haiti	M.J. Berry and K.D. Musgrave	June 1977
13.	The Qualitative and Quantitative Changes in the Forest Cover of Haiti between 1958 and 1977	M.J. Berry and K.D. Musgrave	Sept 1977
14.	Renewable Resource System for Use of the Haitian Forests	Roger D. Moeller	Oct 1978
15.	Draft Environmental Report on Haiti	The Science and Technology Division, Library of Congress, Wash. D.C.	Jan 1979
16.	A Study of the Fuelwood Situation in Haiti	Frederick J. Conway	1979
17.	Terraces, Trees, and the Haitian Peasant: An Assessment of Twenty-Five Years of Erosion Control in Rural Haiti	Gerald F. Murray	1797
18.	Essais d'Introduction d'Essences Forestieres en Haiti: Interpretation des Resultats Apres Deux Ans de Croissance	W. Van de Moortele	1979

19.	Prospects for Energy Conservation in a Low Income Developing Country: The Case of Haiti	Elizabeth Cecelski	April 1980
20.	Centre de Formation en Amenagement de Bassins Versants - Projet	FAO	Aug 1980
21.	Social Dimensions in Local Forestry/Conservation Efforts	Marilyn W. Hoskins	Oct 1980
22.	Service de Conservation du Sol, des Forets et de la Protection de la Faune - Work Programme - 1981	DARNDR	1980
23.	Agroforestry & Nat. Resource Management	AID	1980
24.	Haiti Energy Mission	L. Sayn-Wittgenstein	Dec 1980
25.	Evaluation du Programme d'Assurance Alimentaire - Haiti	Dr. J. von Braun Prof. Dr. W. Achtnich	Dec 1980 Dec 1980
26.	Trees and Charcoal in Haitian Peasant Economy	Glenn R. Smucker	Jan 1981
27.	Operation Double Harvest - Grant Details	AID	Mar 1981
28.	Programme National de Conservation du Sol et de Reboisement	DARNDR	Feb 1981
29.	The Potential of Charcoal Plantations for Haiti	Ronald Smith	Mar 1981
30.	Projet Forestier Pilote - Rapport de Preparation	M. Simeon - FAO/IBRD	April 1981
31.	La Formation et le Recyclage des Cadres Techniques Forestiers - Republique du Niger	Andre Elkrief UNESCO	May 1981
32.	Protection et Amenagement du Bassin Montagneux du Limbe	Jean Nicole Jean Louis	June 5, 1981
33.	Centre de Formation en Amenagement des Bassins Versants	DARNDR/FAO	June 1981
34.	Comments on Developing Forestry/ Agroforestry Projects in Haiti	Michael D. Benge	July 1981



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