GOVERNMENT OF BANGLADESH
MINISTRY OF ENVIRONMENT AND FORESTS

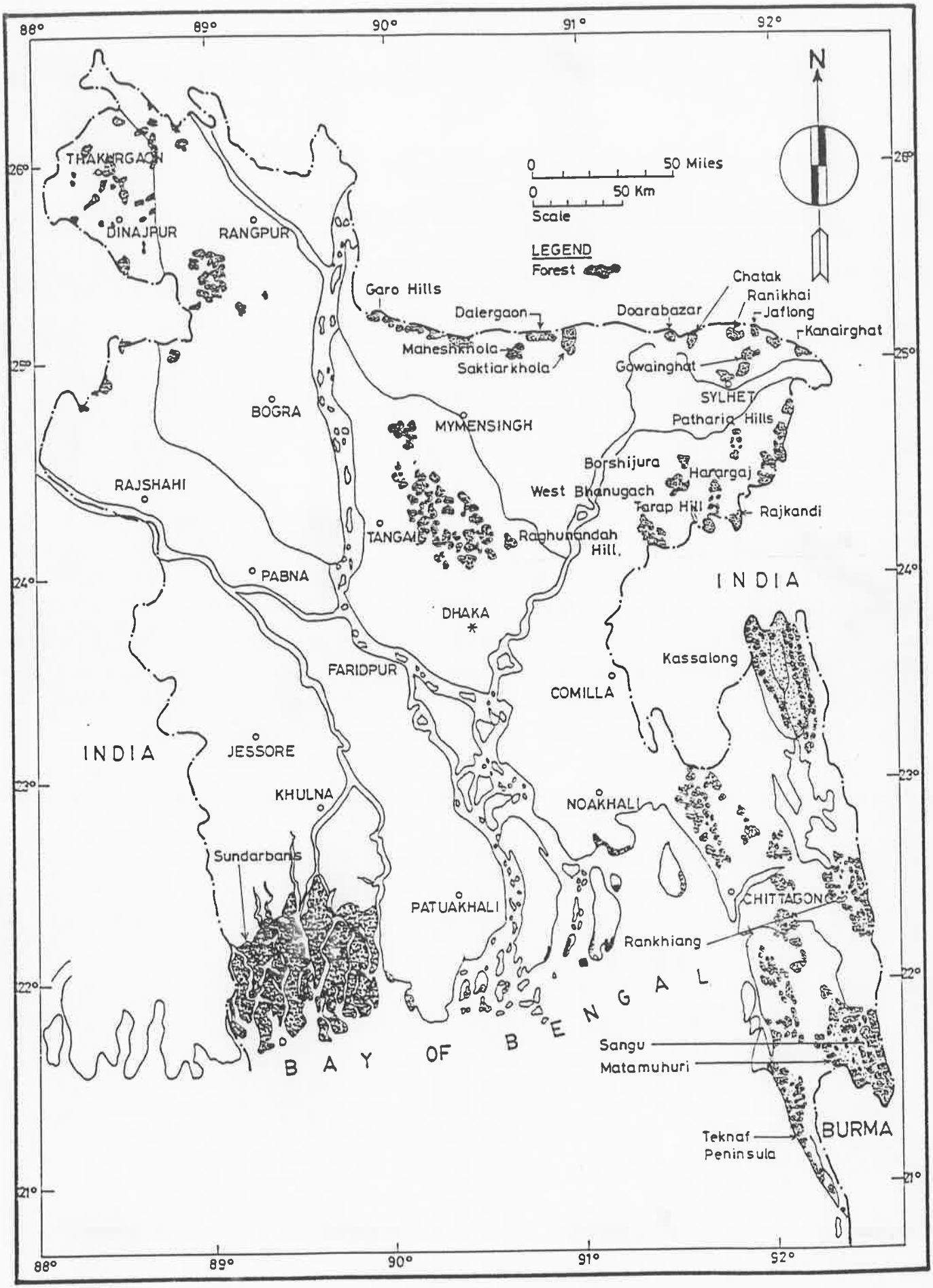
ECONOMICS AND MARKETING

FORESTRY MASTER PLAN

ASIAN DEVELOPMENT BANK (TA NO. 1355-BAN)

UNDP/FAO BGD/88/025

1993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Tarap Hill
Rajkandi
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KEY MAP

PROJECT 372001/31
FORESTRY MASTER PLAN,
BANGLADESH (TA NO.1355-BAN)

ASIAN DEVELOPMENT BANK
MANILA PHILIPPINES
DATE: JANUARY 1993

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ECONOMICS AND MARKETING

SUMMARY

Basis - The Economics and Marketing Subteam Report synthesizes and coordinates the results and recommendations of the Resource Economics, Marketing, and Financial Analyst Specialist Reports. As such it provides background information and analysis supporting the preparation of a longterm plan to preserve and develop Bangladesh's forest resources. Government of Bangladesh, Asian Development Bank and United Nations Development Programme support the planning process.

This report examines the economic basis of the national forestry sector, and evaluates available information and analyzes the costs and benefits of recommended forest management, conservation and development programmes. Marketing factors and activities affecting major forest products, distribution channels, pricing mechanisms and foreign trade policy are investigated. Also assessed are government pricing policy, private and industrial planting incentives and the long term economic potential of the forestry sector. Included as well are the required investment estimates, financing requirements and evaluations of environment social and economic impacts.

Organization - Report structuring consists of 12 major sections. An introductory chapter defines the economic background of the sector. Four chapters following describe and assess forest product pricing, marketing and foreign and domestic trade conditions. The next three sections analyse factors affecting tree planting incentives, present the strategies for placing the nations's forest resource on a sustaining basis plus present investment estimates supporting the strategies. The final four chapters present the social, economic financial and environmental impacts and benefits of the recommended programmes

Background - Bangladesh's forestry sector consists mainly of the primary production of forest products. Excluding the pulp and paper, the secondary section is weakly developed and undercapitalized; it is characterised by obsolete technology and badly designed or worn out equipment. Tertiary manufacturing is even less well developed. Primary production of logs and bamboo, the main industrial products, comes mostly from private land and secondly from government managed forest land. Government forests serve the organised manufacturing section, especially the government sector. Private manufacturing depends heavily, and in most rural areas, only on privately grown wood. Cities and larger towns consume most of the officially recorded roundwood and manufactured products.

Official records show that government forest land produces 500,000 to 600,000 m^3 of roundwood and 60-70 million bamboos annually. Before wood removals were banned in 1989, roundwood production normally reached 1.5 million m^3. Actual production is much higher, including private sources, estimated at 7.9 million m^3 of roundwood of all kinds and 656 million bamboo.

Information Base - Reliable information on the country's forestry sector is difficult to obtain. The Forest Department is a logical source of statistical data and information, likewise it is also a major user and needs accurate data for its own planning purposes. The Department lacks an internal system for collection, assessing, compiling and publishing useful statistical information. Since the Ministry is the chief beneficiary of good statistical data for its own internal process, it makes good sense that it establish an effective statistics gathering and compilation system.

Excluding up to date information on resources, the major gap is in production statistics and it lies in the lack of reliable raw production and value statistics for the major primary products, including both government and private production. The next most serious deficiencies are the lack of records for private secondary production, market prices and volumes. No econometric data or studies exist in Bangladesh measuring demand in the economic sense.

Although for planning purposes, existing industrial, commercial and rural consumption estimates are adequate, better information is required. Urban consumption needs updating in the future to reflect possible economic and demographic changes. With one exception, foreign trade information is readily available. There is an increasing need to keep better information on the volume, value and type of forest-based handicraft exports. Marketing data availability is grossly inadequate for domestic production, consumption and sales. For many products, no official government records exist in established publications.

Present Economic Importance - 1992 value added totals an estimated Tk 21 billion ($537 million), 85% of which comes from primary, 11% from secondary roundwood processing and 3% from non wood products. Sawlog production is the largest single value, making up 42% (Tk 9.1 billion), while fuelwood production creates 27% (Tk 5.8 billion). Bamboo production is third, at 13% (Tk 2.9 billion). Solidwood processing, principally sawmilling adds about 6% and pulp and paper production just over 4% of added value. Tertiary wood manufacturing production, mainly furniture making, is responsible for about 1%.

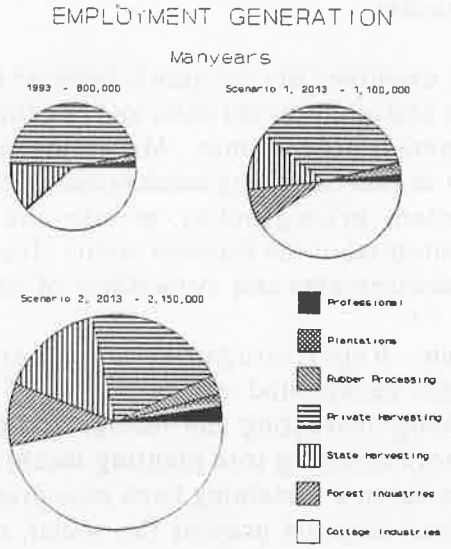

Figure 1 - Projected employment creation.

Employment - Including all sectors, estimated total employment today is 800,000 persons. However, considering the seasonal nature of most work, many people actually benefit directly from forestry-related work, possibly up to 1.3 million people.

Foreign Trade - Bangladesh depends on imports for many basic necessities as well as development requirements and generally suffers a strong balance of payment deficit. Typically, the nation exports newsprint, which peaked at 21,000 metric tonnes during the late 1970's, but growing local demand reduced exports to an average of slightly over 6,000 tonnes since 1989. Foreign exchange earnings dropped from a high of Tk 200 million to Tk 93 million. The data illustrate a regular decline in export volume, partially masked by higher prices responsible for increased values. In 1990, forest product imports totalled $67 million, and grew at an annual rate of 13% during the previous 5-year period. Paper imports make up 53% of recent imports, followed by pulp (30%) and wood products at 17%.

Expenditures and Revenues - Total government forestry expenditures averaged just over $17 million annually (Tk 595 and 636 million in 1989/90 and 1990/91, respectively). These figures exclude private and government industry spending. National planning defines the forestry sector as growing raw materials, anything to do with processing is included within the industrial sector. In the immediate five pre moratorium years, total expenditure averaged $12.7 million

annually. Revenue collection peaked in the late 1980's, averaging $18 million annually for the five year period ending 1988/89, peaking at Tk 606 million or $19.6 million. Following the 1989 moratorium, total revenues plummeted to $7.6 million, and in 1990/91 fell even further to $5.4 million (Tk 194 million).

Forest Product Pricing - Existing procedures undervalue most forest products value, support a multi-priced structure and mask inefficiency. In some cases, price controls are exercised for social equity reasons or to protect public industry. Existing values continued these anomalies beyond the optimum period, breeding inefficiency and causing economic distortions. Another factor ignored is the effect of government pricing on private wood supplies. Existing scheduled rates and the permit systems foster windfall profiteering which in turn renders sustained resource management impossible.

Forest resource pricing in Bangladesh is a paradox. Average sawlog prices are 75-85 percent of high quality Malaysian export log prices FOB Japan. Domestic newsprint prices are about 80-90 percent of FOB prices in Europe. Meanwhile, the domestic selling price for printing/writing papers exceeds international prices, typically by 15-20%. Yet, delivered major raw material prices for both wood and bamboo are extremely low as a percentage of final product values, by today's international standards. Inefficiency is one reason for the pricing gap, out of date valuation is another, direct government price setting or the indirect effect of highly priced inputs a third. Ineffective, irregular and unsystematic resource valuation appears the chief reason for continued imbalances in resource values.

The present system masks, as well as perpetuates, economically unproductive enterprises - public and private. Present royalty rates stem from 1981-82 and since 1989 are in process of revision. The nation would greatly benefit by overhauling the present system to price the various products at their true cost to society. For example, with today's costs and forest management standards, the replacement cost for teak sawlogs is Tk 44,100/m^3 (Tk 58,400/m^3 for other species). Intensive Scenario 2 forestry reduces costs to Tk 4,100/m^3 (Tk 5,300/m^3 for other species). Scenario 1 replacement costs are intermediate. In comparison, today teak sawlog scheduled royalty is Tk 300-800/m^3 on average, up to Tk 1,600/m^3 for the best quality.

A system recognizing a combination of international resource values and the actual cost of growing and managing today's harvested products better serves national goals. An acceptable general economic guideline is to price forest products so that total industrial and commercial raw material cost represent 20-25% of the final product prices.

Non wood forest products deserve separate treatment and special consideration. Royalties are currently well below market values and require regular revaluing to more closely track true market values. If used to fund local social and economic development programmes benefiting poor resident populations, non wood products should bear their true cost, and the programmes not funded by undervalued resources.

Economic Rental Valuation - Several suggestions over the recent past recommended transferring from administratively-determined low prices for forest resource to a system which reflects adequately their real value. Government policy should clearly support this transfer in order that forest management and development decisions fully respond to economic conditions more efficiently. The basic purpose of such a stumpage pricing system is to attach a more accurate economic price for forest product, not just logs. Such a policy will create conflicts requiring trade-offs sometimes.

Economic rent corresponds to the stumpage value of timber obtained from the market price of timber less the costs of reasonably efficient logging and transport, plus a reasonable margin for profit and risks. In principle, resource owners, like the government, can capture the whole

economic rent without affecting the market prices of timber, because economic rent, if captured by the timber contractor (or other party) represents an "extra unearned" or windfall profit over and above the normal "earned" profit in logging.

The report estimates the indicated stumpage values of the principal products, sawlogs and pulpwood and bamboo. Calculated average economic rent is Tk 6,870/ m^3 for logs, an amount representing 50% of the financial value of sawlogs ex-mill. This value is the highest average stumpage value, assuming 30 percent profit in sawmilling on variable and fixed cost and 20 percent profit on extraction operational and overhead costs. Attention is drawn to the fact that these assumed milling and logging profit margins are quite high, and are only justified by a fair degree of risk. Similarly, pulpwood stumpage is valued at Tk 825-1,945/ m^3, depending on the type of paper manufactured.

Sawlog stumpage price set initially at 20 percent against the present rate of 12.5 percent of market price (or millgate price) are indicated. This calculation is defensible and will not make a transition too difficult for the industry. Comparable royalty rates, as determined on the basis of replacement costs indicate very much higher rate are necessary if government is to make an economic profit on its plantation investments.

Marketing - Forest products of Bangladesh are mostly marketed within the country. A small proportion is exported and an increasingly large quantity is imported to meet the demand. Consumption is increasing, while the local supply is diminishing, and production can not keep pace with the increasing demand.

Among forest products, 65 percent gets consumed as fuelwood. The demand for fuelwood is increasing because of population pressure. In 1993, total supply is 6.18 million m^3 against the demand of 8.27 million. This gap will widen in the future if corrective measures are not taken now. Just planting fuelwood will not solve the problem. Cheap commercial energies are needed in the rural areas, otherwise, the agricultural residues and cowdung are burnt.

The estimated demand for roundlogs in the country in 1991 was 4.26 million m^3 of which 0.25 million was consumed by the process industries and the rest was by households. In comparison, the sustainable local supply was 1.28 million m^3. Roundwood consists of both direct and derived demand for domestic consumption and industrial processing. A recent moratorium on felling created a shortage in the market. This, along with tribal insurgency problems in Hill Districts, seriously affects some government-owned forest industries.

Wood markets are fed both by recognized and unrecognized sources of supply of logs. Among the unrecognized sources, unrecorded production or illicit felling of reserves and smuggling from neighbouring countries are important. A figure of 20 percent minimum is commonly accepted as coming from unrecognized sources.

Marketing panel products in Bangladesh is in its infancy. Potential for growth exists, but because of lack of standard products, market promotion and adequate marketable surplus, production, sale and consumption is the lowest among the developing countries. Local preference is for solid wood products, market promotion and effective pricing is necessary to help expand this markets.

The demand for paper, paper products and newsprint is also increasing. Lacking sufficient pulpwood and pulp processing industries, the demand is met through imports. Development of forestry with proper emphasis on plantation of pulpwood and other soft commercial wood could save the existing paper related industries and encourage future expansion.

The major consuming centre is Dhaka, the capital city, and its surrounding areas which are responsible for 60-65 percent of present national consumption. Most of the round logs and

fuelwood are transported there mainly by waterways and second by truck. Only imported consignments are carried by the railways. Most of the secondary and tertiary processing products are transported by road.

Over extraction and over cutting of commercial species from the reserved forests has lead to a shortage of plywood logs and the position is becoming critical. The popular species civit, garjan, teak, champa are in great demand. Previously identified non commercial species are increasingly used now as substitutes for preferred varieties. This shortage affects the tea industry which requires new packaging.

Bangladesh is now heavily dependent on imports of forest and forest-based products for meeting basic consumption. Import demand for development projects is more than domestic consumption demand. A huge trade deficit exists for forest products. The situation has increased because of the imposition of moratorium on fellings. Primary imports of logs and sawn timbers are from the United States, Canada, Australia, Burma, Singapore and Malaysia.

Foreign trade policy is consistent with the forest conservation and environmental protection. Nationally, this should be a short term arrangement, future policy options should undertake to attain self-sufficiently in the longrun. National selfsufficiency in forest products is a desirable social and economic goal, and much is achievable if Master Plan recommendations are implemented with a serious interest and care.

Import Duties - Duties now range from 7.5 to 125% for wood and paper products. Duties on forest products require rationalization in some categories to support a policy consistent with present and future forest resource needs and economic conditions. The current situation demands low import duties on raw wood products, intermediate rates for partially manufactured goods, and assessing manufactured products at much higher rates. This structuring favours substituting imports for local demand while still creating the maximum employment. Suggested changes rationalize current duty structure and remove anomalies.

Private Planting Incentives - Existing programmes range from a few inexpensive seedlings, to a package of free seedlings, homesite and agricultural input. Direct programme costs range from Tk 140-12,150/ benefitting family, spread over one to three years. Benefits to participants range from Tk 20,900 to almost Tk 480,000 per family over twenty years (valued by present net worth). In terms of minimum unit wood growing costs, the homestead programme is most efficient. It has the potential easily to outrank all others by a wide margin - discounted costs are Tk 12/ m^3 of estimated roundwood production - well below any other programme which range from Tk 99-270/ m^3.

Farmer planting attitudes indicate that incentive programmes are not necessary except for specific objectives, eg. encroached land, jhum control, watershed protection and poverty alleviation programmes. If used, incentives directed to private lands have the best prospect of success in terms of increasing wood volume, keeping prices low, benefiting the largest group of people, and distributing uniform benefits throughout the country. Supply potential is 20-300 times greater than any other programme. Providing the tree tenure rights get settled in favour of the participant, the public rights-of-way programmes are the next choice, followed by those for encroached forest land.

The greatest potential for private planting is concentrated in the Chittagong Hill Tracts, Chittagong, Cox's Bazaar and Sylhet Districts. However, until the question of land ownership there is finally settled, or Government develops an acceptable mechanism for long term leasing or sale, planting these presently unproductive lands privately is unsupportable. Potential area totals over 700,000 ha and is the obvious area to concentrate future commercial industries. Private potential outside the Hill regions is also significant, 660,00 ha. Of this, 80% is private (539,000

ha) and the remaining 46,000 ha (7%) is public rights-of-way and 12% (75,000 ha) encroached sal forest land.

Wood-Based Industry Assessment - The industry in Bangladesh comprises two types of users, the pulp and paper and the solidwood products industries. Most pulp and paper industry enterprises are owned and operated by Bangladesh Chemical Industry Corporation. Private industry is limited to small papermills producing most products and converted products other than newsprint.

Many of the largest solidwood processing industries are owned and operated by Bangladesh Forest Development Corporation. Most of the private mills are ill-equipped and unable to take advantage of normal conservation and lumber recovery techniques. Private sector plants dominate the panel board industry using both wood and agricultural residues for raw materials.

The Forest Corporation operates eleven solidwood processing companies. An operating assessment and a 10-year analysis of financial results (based on the data furnished by each enterprise), show a combined cumulative profit of $482,000. In the seven years preceding the cutting moratorium, the Corporation showed a $1.68 million profit. Since the moratorium, it suffered losses totalling $1.2 million in three years. The Corporation's operations breakdown into four distinct product groups: particleboard, wood seasoning and treatment; plywood; and, furniture, cabinetry and doors. The plywood and the three seasoning and wood treatment plants are the only operations with cumulative and periodic profits, totalling $3.7 million in the 10-year period ending in 1990/91. In contrast, the particleboard and tertiary processing enterprises showed losses consistently, $3.2 million over the period.

The Chemical Industries Corporation owns and operates two solidwood product companies, a hardboard mill and a match factory. Performance of both industries is not affected by the cutting moratorium. The matchworks shows an accumulated loss of $1.47 million, while the hardboard mill has a slight $0.32 million profit for 10-year's operations.

Technically, the pulp and paper companies keep their plant and equipment in reasonably good mechanical condition but operate below capacity. Financial performances gives a very gloomy picture - an accumulated financial loss of $34.9 million. Only the Karnafuli Paper Mill is in the black, a slight cumulative profit of $1.0 million, all other mills incurred net losses.

The unfavourable financial performance of public sector companies results from a myriad of operating factors. The major ones are identified. The corporations, in addition have to deal with several government-imposed constraints.

Industrial Plantation Incentives - A major constraint faced by all wood-based industries is the shortage of raw materials supply. Many perceive that if all industrial raw materials remain under the direct control of the Forest Department, the situation will not improve. For example, the Forest Development Corporation's seasoning and treatment plants sit idle while there is a strong demand for transmission poles, anchor logs and crossarms. Meanwhile, poles are imported and valuable plantations remain unthinned.

Further, vast areas of denuded forest and felled plantations alike, remain undeveloped while major industrial users of forest products desperately seek alternate sources to meet their raw material need. If this situation continues, the future of the wood based-industries will erode further. Historically, traditional wood supply arrangements have not worked. It is therefore, imperative that major, capital intensive enterprises, eg. pulp and paper mills and very large solidwood processors, become responsible for their raw material needs. Government granting long term land tenure by sale or lease (or some other workable arrangement) is enough incentive for any productive enterprise. The tenure is also the basis for long term financing, if needed.

Most of the causes contributing to poor profitability of the government-owned sector appear directly attributed to ownership operating constraints and government policy in the past. Until such time as these constraints are demonstrably inoperative, and normal economic and competitive conditions prevail, offering financial incentives would only perpetuate poor performance. Initially at least, incentives required are institutional and policy-related not financial.

Sustainable Resource Development - A policy of sustained forest development means meeting the demand and needs of today's generation from existing natural resources without jeopardizing the next generation's needs. By this definition, Bangladesh's forests today are exploited well beyond their natural productive capacity and are deteriorating steadily. Corrective action is needed to introduce development which nourishes, perpetuates and increases, rather than depletes the nation's forest resources. Although Bangladesh's forests strongly influence the state of the environment, local social and economic standards can not satisfactorly define and measure its values.

Sawlogs and fuelwood are the two primary products in greatest demand and shortest supply in Bangladesh. Any development strategy must focus on this fact. Sawlogs are a problem, simply because they take time to grow. Fuelwood is principally a cost problem, but supplies are also limited. The chief thrust of the nation's sustained resource strategy therefore must:

- Perpetuate resources within sustainable limits.
- Concentrate on sawlog production.
- Maintain and improve the quality of existing forests.
- Concentrate commercial production closer to the population.
- Improve resource utilisation.
- Intensify forestry practices to increase productivity.
- Harness, postively, the direct involvement of the rural population.

This report develops a broad menu of sustaining resource developing and conservation strategies grouped around three main themes - improved forest management, waste reduction and fuelwood conservation.

Improved Forest Management - A variety of programmes and plantation models are available for sustaining and perpetuating existing resources. Major ingredients are to: implement intensive forestry practices; eliminate industrial extraction in Hill Forests; refurbish the Sal Forests; introduce agroforestry programmes on encroached areas; replace destructive exploitation by non destructive utilization; manage the existing and enlarged protected areas more effectively; and, hold product extraction levels within the resource's sustained yield capacity.

Waste Reduction - Incorporating strategies for overall minimisation of industrial waste is fairly straight forward. Required waste reduction involves three main areas: making full use of existing species; promoting industries suitable to local species and required products; and, starting conservation programmes. Sawmilling and pulp and paper primary production are the focus of direct government involvement. A library of specific strategies are recommended for the separate sectors: primary roundwood products, non wood forest products, sawmills, other primary products, secondary products, pulp and paper and the public sector industries. Private industry or non government groups are best suited for direct involvement in the secondary industries and in non wood forest products. Government's role in the latter two sectors is facilitating and policy oriented, not direct involvement.

Fuelwood Conservation - There is a wide gap between the supply and demand. In this area the strategies required are to: develop an appropriate wood energy policy; buildup fuelwood resources; institute an energy conservation programme; reduce present wastage; and, promote increased use of substitute fuels.

Importing to Protect Environmental Values - One possible solution to preserving the diminishing Hill Forests is to import product substitutes. Based on current international prices for major forest products, the annual cost of substitute material, at the required volumes, ranges from $28-50 million for Status Quo and Scenario 1 cases, compared to $9-15 million for Scenario 2. During the life of the Master Plan, the discounted value of these imports, at 12%/A interest, varies from $119-225 million for Status Quo and Scenario 1 compared to $37-70 million for Scenario 2. The estimated direct employment loss is 1,350 jobs.

Financial and Economic Results - Master Plan forestry development parallels the overall and sector-specific national goals, objectives, policies, and development efforts of Government. Its public commitment strongly emphasizes the policy and the goals outlined in the Fourth Five Year Plan. The Fourth Plan highlights: rehabilitating degraded land; planting up vacant lands of all kinds; integrating trees with normal farming practice; improving the general environment; creating employment for the disadvantaged; practising wood conservation; and preserving national ecological and biological values.

Attaining these planning objectives requires programmes which: improve forest management and exploitation of natural and planted forests; increase biomass fuel production; establish people-oriented plantations on vacant public and private lands; initiate large scale industrial plantations on degraded state lands; and enhance the Ministry's capacity to efficiently plan, manage and protect the nation's forest areas.

The plan presumes the following basic policies in forestry development and resource husbandry:

- Forest renewal and rehabilitation is the immediate and foremost concern.
- Use forests to restore environmental stability, while providing resources for public and industrial use.
- Conservation requires much more attention.
- Transparent community-based forest management is the basic strategy for promoting more, and a more equitable distribution of forest benefits.
- Revitalization and development of the wood and other forest-based industries is undertaken based on their profitability, government revenue source, foreign exchange earner, employment and sustainable potential.

Estimated Costs - The Master Plan considers two development options. Scenario 1 represents a modest level of investment and Scenario 2 is based on a high level of investment to achieve optimum targets. Scenario 1 assumes implementation by the existing institutional setup of the Bangladesh Forest Department. Substantial strengthening is proposed in terms of infrastructure, manpower, training, research, monitoring and other support services. In contrast, Scenario 2 envisages a very significant restructuring of the forestry sector creating a new department responsible for planning and supervision, while a series of autonomous enterprises undertake the physical programmes. Development would proceed as part of a healthy entrepreneurial investment programme in Scenario 2, rather than being government-driven, as at present.

Plan costs are presented for each five-year period in the 20-year plan, separately estimated by Scenario. The plan includes five major programmes each with supporting subprogrammes. The basic costing method in all programmes is the unit cost approach. Each programme has its own set of quantitative targets, activities, and corresponding implementation schedule, as presented in the subteam reports. Since the Master Plan presents a macro level plan, the costs of each programme is indicative, specific projects and investment packages need more refined costing.

Scenario 1 - Estimated cost is Tk 54.4 billion ($1.5 billion), including physical contingencies of Tk 2.3 billion ($60 million) which is about four percent of the base cost. Foreign exchange costs amount to Tk 16.9 billion ($435 million) or about 31 percent of total plan cost. Approximately 76 percent of the cost covers the investment items and their corresponding contingencies, while recurrent costs take up the remaining 24 percent.

Scenario 2 - Cost is Tk 131.0 billion ($3.4 billion) of which physical contingencies represent about four percent of the base cost or Tk 5.2 billion ($135 million). Foreign exchange component amounts to Tk 42.4 billion ($1.1 billion) representing about 32 percent of the plan cost. Of the total cost, about 71 percent covers investment items and the rest, 29 percent, accounts for recurrent costs (mainly covering incremental staff and operation and maintenance.

Financing Plan - Suggested financing for the 20-year Master Plan is proposed for sharing between the Government of Bangladesh, donors and the private sector, as follows:

Government financing in Scenario 1 is 35 percent or $492 million. At a programme level, the range varies between three percent and 62 percent of the total financing. The financing mainly covers taxes and duties component, land acquisition, and the major portion of the incremental recurrent costs in terms of staff salaries and operation and maintenance of facilities. Proposed Scenario 2 financing is $92 million representing about three percent of the total plan costs. This amount supports the Forest Department activities supervising development activities in the sector.

Donor financing under Scenario 1 is anticipated at $885 million, about 63 percent of the total plan costs. In Scenario 2, total external financial assistance remains the same, relatively. In absolute terms, external financial requirements are substantial. About $2.2 billions is expected from the external sources, representing about 64 percent of the total cost.

Private Sector financing is assumed to participate actively in Scenario 2. The bulk of private financing occurs in participatory forestry, wood-based energy and wood-based industries. These programmes cover 81% of all private financing and are carried mainly by the participants and industrial companies. Private sector financing also includes small-scale operations in wood and non wood forest industries as well as non governmental organizations. In people-oriented forestry, the individual forest occupants' labour input is included under private financial resources.

Benefits and Profitability - Evaluation considers the prices of all inputs and outputs at financial rates at the plantation gate, expressed in constant 1992 values. Direct benefits are evaluated, some are potentially very large. Indirect ones are very subjective, these are identified, and where possible valued.

Environmental Programmes - These are incorporated into each development scenario, but principally in Scenario 2. They are all designed to assess, plan and monitor the effects of building up or maintaining existing forest resources. Programme costs are included but no financial or economic returns estimated, as benefits are all indirect or partially or wholly included in other estimates.

The forest resources of Bangladesh are depleting very rapidly to supply the needs of the increasing population for fuelwood, timber, fodder, and other forest products, as well as land for food production and settlements. The overall strategy of the Master Plan is to improve the management of the forestry resources and to better balance population needs, production systems, and sustainable resource levels. Its action programmes will have substantial, positive impact on the environment. They can restore degraded areas, control exploitation of the natural forest, and bring all forests under more productive management. Other programmes will promote soil and water conservation, protect wildlife, extend national parks and maintain plant and animal genetic resources for the benefit of future generations.

Utilization Savings - These are available in several ways. For example, engineering or design change to size the frames of wooden doors and windows to match strength needs can save up to Tk 200 per wooden frame in new construction cost and use less sawnwood. Proper seasoning and preservation of all sawntimber has annual saving potentials of $49 and $9 million, respectively. Likewise, a simple treatment preserves 340 million bamboo by 2013. This adds to annual bamboo supplies and is worth Tk 14 billion ($0.34 billion) in saved bamboo over the period.

Sawmill Industry Restructuring - Restructuring the Forest Development Corporation produces annual cash savings to Government of Tk 23 million ($0.58 million). Modernizing the sawmill industry has tremendous economic and financial potential rewards and is the single, most effective, productive resource sustaining strategy available to the nation. Potential benefits include: sawmill employment increases, by up to 45%; adds from $360- 990 million in increased manufacturing values over the plan; and environmental benefits accrue since logged area reduces by up to 27,000 ha annually by 2013.

Fuelwood Conservation - This offers major savings from energy reducing programmes, substitutions and by eliminating some industrial uses. The savings reach an estimated 3.0 million m^3/A by 2013, bringing noticeable benefits to the energy-deficit northern regions. Economic analysis shows returns vary from 24% to 54%.

Participatory Programmes and Plantations - An evaluation under Scenario 1 show economic returns from 14-19%, and with Scenario 2 from 28-30%, excluding yields from agricultural crops. Programmes exclusively target poverty alleviation, encroachment and private farmers. Financial results show yields of 16% and 30%, and economic returns of 17% and 32% for Scenarios 1 and 2, respectively.

Selected Non Wood Forest Products - An analysis of financial profitably indicates robust financial internal rates of returns, ranging from 30-50%.

Forest Plantations - Analysis considers several technical plantation models based on different rotations, species and growth rates. The models form the basis for any targeted development programme on forest land - poverty alleviation, watershed management or industrial raw materials. Internal financial rates of return, indicate that rotations of 20-30 years for sawlogs and poles and average annual growth rates of 7.5 to 30 m^3/ha are financially attractive with returns of 17-29%/A. Rotation ages greater than 40 years for teak, the most valuable species, gives about 12%/A. Short rotation pulpwood plantations show a financial returns of 14-30%/A.

Forest Management - Programmes in Scenario 2 plan to eliminate Hill Forest extraction during the plan period. Excluding an effective cutting moratorium, this option gives the maximum support to maintaining biological diversity and protecting the natural environment. Scenario 1 plans on harvesting 1,000 ha of Hill Forest annually, twice the Scenario 2 rate.

Analysis reveals that both scenarios are economically viable, but at quite different profitability levels and financial results.

Scenario 2 shows a financial return of 19%/A, while Scenario 1 yields 14%. Economic rates of returns are similar in relative values, 20% versus 16%, respectively, for Scenarios 2 and 1. Scenario 2 shows a much higher net present value compared to Scenario 1, almost double. Both cases are quite sensitive to programme cost increases but much less so to reduced benefits. Cost increases of about 2 to 10% in Scenario 1 and 2, respectively, drop returns to the 12% discount rate, but 25 to 50% reductions in benefits are necessary to achieve the same effect.

Production Benefits - By the end of the plan period, sawlog production from both forest production and participatory forestry increases substantially under both development options. Incremental production under Scenario 1 is 2.7 million m^3/A (valued at Tk 12.3 billion or $317 million) at the plantation gate. Under Scenario 2, sawlog production is 5.9 m^3/A (valued at Tk 26.5 billion or $680 million). Based on the plantation programmes, peak incremental production occurs at year 35 under Scenario 1 and year 30 under Scenario 2. The estimated value of this incremental production is Tk 365.9 billion ($9.4 billion) and Tk 473.2 billion ($12.2 billion) under Scenario 1 and 2, respectively. Incremental production of other roundwood product, is estimated at Tk 219 billion ($5 billion) and Tk 338 billion ($9 billion) under Scenario 1 and 2, respectively.

Employment Generation - On-farm employment opportunities increase by about 0.86 million person-years under Scenario 1 and 1.3 million person years under Scenario 2 over the 20-year period. The development and maintenance of the physical facilities generates about 1.18 and 3.32 million person-years under Scenario 1 and 2, respectively. Increased labour absorption will reduce the present high level of unemployment and underemployment of family labour, particularly on the smaller farms and landless families. Further employment opportunities occur due to increased demand for logging, transportation, processing and marketing services, excluded from these estimates.

Participatory programmes generate additional employment amounting to about 0.28 million person-years under Scenario 1 and about 0.65 million under Scenario 2. Increased employment generates wage income for those participating families equal to Tk 15,000/A, supplementing their farm incomes. Participants also benefit greatly from the extra fruit and other forest products produced.

Poverty alleviation under the Master Plan contributes positively towards Government's efforts to improve the rural economy. Plan implementation fosters a better quality of life in the rural areas, a result of more fuelwood for cooking, more timber for shelter, increased security from natural disaster because of a better soil cover and better amenities from protected areas. The overall increase in the demand for labour for plantation development in state forests is estimated at 0.56 and 0.67 million person-years under Scenario 1 and 2. This increase employs 192,000 rural families (over 1.0 million people), increasing their wage income Tk 15,000/A/family.

Women are involved in implementing the nursery, agroforestry, woodlot plantation and strip plantation activities in the participatory programme, contributing substantially to family income. As well as increasing their welfare, increased fuelwood production will reduce the time spent collecting fuel and allow them to undertake other economic activities to gain income. This additional income improves the living conditions of themselves and their children.

Many other indirect benefits occur from the environmental, forest management, participatory, industrial and non wood forest product and wood energy programmes. Some returns depend on implementing two or more programmes. Benefits are very real, but difficult to quantify economically or financially. For example, introducing manual or power-driven saws in extraction operation saves an estimated annual sawlog volume up to 237,000 m^3/ A by 2013. This is equivalent to adding close to $6.2 million annually in sawntimber values. However, this benefit becomes possible only when a stable, well-trained year around labour force exists. This in turn, depends mainly on the existence of a permanent road system.

Master Plan Economic and Financial Results - The two main programmes - forest production and participatory - analyzed together form the basis for the Master Plan. Analyses compares the incremental costs and benefits associated with Scenarios 1 and 2 to Status Quo conditions. The analyses take into account the felling and plantation programme and the associated growth targets. The reader's attention is drawn to the fact that Scenario 2 income estimates exclude direct income flows coming from the environmental programmes, and that Scenario 1 costs exclude the cost of the benefit sharing arrangements required to achieve the physical programme and growth targets.

Economic internal rates of return show 17 percent and 24 percent for Scenarios 1 and 2, respectively, revealing that both are economically viable. Economic returns under both scenarios are higher because many of the forest resources are already in place creating benefits from the sunk costs of existing plantations.

Indicated internal rates of return on a financial basis are 14 and 20 percent, respectively, for Scenarios 1 and 2.

Sensitivity analysis also indicates that both development options are viable, but show more sensitivity to increased costs than to reduced benefits. The major risk assessed is failure to protect the existing and newly established forest resource. Transparent benefit sharing formulae and effective extension are the principal means to manage this risk.

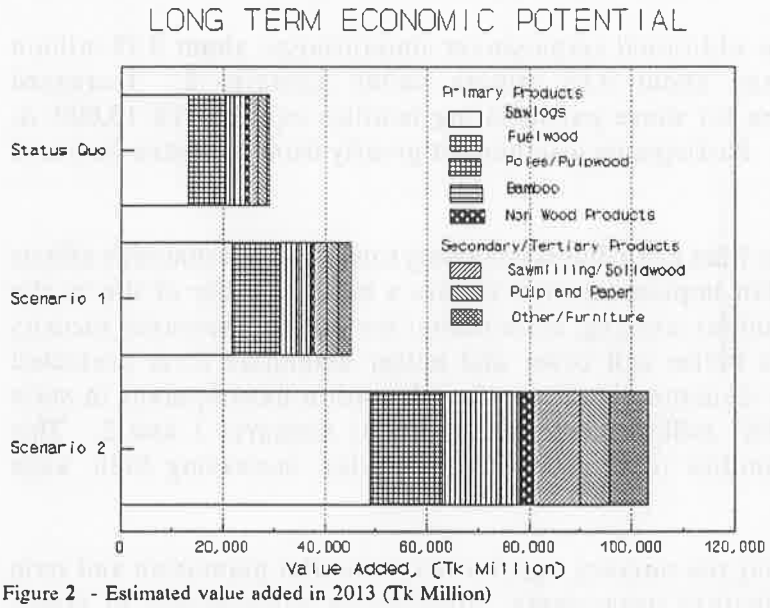

Figure 2 - Estimated value added in 2013 (Tk Million)

Future Economic Potential - Measured by value added, the potential economic contribution of the forestry sector by the Year 2013 ranges from Tk 29 billion to Tk 103 billion ($0.7 to 2.6 billion). Contribution level is very dependent on the development scenario adopted and implemented. Under Status Quo, the Tk 29 billion potential is contingent on totally eliminating all deforestation right from the plan start. If deforestation continues at the present indicated rate of 3% annually, value added will hold just above the present level of Tk 21 billion. This anomaly holds due to the maturing of the present plantation inventory. Scenario 1 development generates an intermediate value of Tk 45 billion ($1.1 billion) annually. Estimates exclude added values from increasing royalty rates over present levels.

Revenue Potential - Estimated future annual revenue potential by 2013 varies from Tk 17-40 billion ($0.43-1.02 billion) for the Status Quo and Scenario 2 development options. Intermediate Scenario 1 has a revenue potential of Tk 34 billion ($0.85 billion). This estimate considers only the major forest products, forecast roundwood supplies and prices resources on a replacement cost basis. Status Quo estimates assume total elimination of deforestation: if deforestation continues at the 3%/A rate forecast, anticipated revenue by 2013 falls to Tk 16 billion ($0.41 billion). Non wood forest products brings about Tk 20-25 million annually today. If Scenario 2 non wood programme generates similar revenue increases as projected for traditional products, non wood products revenue could reach Tk 170-210 million ($4.2-5.3 million) yearly by 2013.

Economic Development Vehicle - The most indisputable benefit to government of sustained forest resource development and utilization is the massive potential it offers as a vehicle for constructing strong poverty alleviation and socioeconomic development programmes. Such an approach benefits a wide range of participants, the poor, women, and tribal shifting cultivators, while building up and perpetuating favourable environmental conditions. If designed and managed on entrepreneurial principles, government's financing responsibility and direct involvement are minimized.

primary non wood forest products provide raw materials for industries outside of the forestry sphere. In addition, Bangladesh Bureau of Statistics summaries and records exclude small manufacturing units (fewer than 10 employees) from their reporting bases. Consequently, a significantly large number of small sawmills, wood working and handicraft manufacturers remain outside the official statistics.

Major Products

Official records of primary production from state lands record 480,000 m^3 of roundwood and close to 70 million bamboo pieces. There is no record of the production from private owners nor the volume removed illegally or that under recorded. Private growers contribute significant volume of wood and bamboo. Table 1 shows the official volume recorded for selected years. The data indicate a maximum production of 1.5 million m^3 of roundwood, 40-50% sawlogs and poles and 50-60% of fuelwood quality. Bamboo production ranges normally from 50-70 million pieces. During and after the 1971 civil war, state production dropped to less than 0.5 million m^3 and less than 60 million bamboo. Since the cutting moratorium, national roundwood production runs at similar levels. Unofficial estimates of state land illegal and unrecorded volumes range from 20-60% in the case of timber. Appendix 2 records the recent timber and fuelwood production from forest land on a divisional basis.

Table 1 - Wood Production, State Forest Land - Selected Years

Year	Roundwood (Million m^3)			Bamboo (Million Pieces)
	Timber	Fuelwood	Total	
1947/48	0.25	0.35	0.60	49.9
1965/66	0.73	0.79	1.52	56.2
1971/72	0.13	0.24	0.37	na
1975/76	0.22	0.31	0.53	62.6
1980/81	0.43	0.68	1.11	74.0
1984/85	0.58	0.95	1.53	na
1985/86	0.57	1.00	1.57	75.8
1988/89	0.35	0.84	1.19	na
1989/90	0.20	0.45	0.65	na
1990/91	0.24	0.24	0.48	na

Owing to the unreliability and the unavailability of actual production statistics, the Master Plan equates the estimated regulated supply as a better measure of production. This estimate is low, since empirical evidence and existing opinion both agree that degradation of forest resources beyond natural capacity continues, even at an accelerated pace. Table 2 presents estimated major primary production by source and broad category.

Table 2 - Estimated Roundwood and Bamboo Supply 1993

Item	Units	Forest Source		Total	
		State	Private	Quantity	Percent
Roundwood					
Timber	Million	0.81	0.91	1.72	22
Fuelwood	m3	2.13	4.01	6.14	78
Total		2.94	4.92	7.86	100
Percent		37	63	100	
Bamboo	Million				
Total	Pieces	128.7	527.5	656.2	100
Percent		20	80	100	

Information Base

1. General

Bangladesh development and economic planning is overseen by the Planning Commission and summarized in regular 5-year plans. The current Fourth Year Plan runs from 1990/91 to 1994/95. Plans reflect the various guidelines and overall strategies directed to all Ministries and Departments by the Commission and submissions by these groups to the Commission. In the past, several attempts to introduce an effective forestry planning unit in the Department, Ministry or Commission occurred. Owing to its short term outlook, the present planning cell in the Department is inadequate from the viewpoint of the Ministry. Moreover, current 5-year forestry plans consider departmental and state-owned corporations or agencies but overlook private sector involvement.

GOB is a major wood grower in Bangladesh. As well, Government is extensively involved in the forest industry through Bangladesh Forest Industries Development Corporation and Chemical Industries Corporation, BFIDC and BCIC, respectively. Private landowners produce 60% and 80%, respectively, of the regulated roundwood and bamboo supply used in the country. Privately run cottage industries employ over 280,000 people while up to two thirds of the traditional forest industry employment is private sector. Given the potential which forestry-driven development offers, strengthening planning capability is a critical requirement. Effective planning calls for up to date and accurate information and records. In Bangladesh, this is a particularly important requirement.

2. Information Gaps

Natural resources (including forests) are declining rapidly while existing resources are exploited beyond their capacity. Even so, there is a dearth of technical information about the quantity and productivity of forests - this applies both to traditional wood and non wood products. Excluding technical forest management information requirements, potential forestry sector information needs fall into two major types and three main groups. The major information types are product volume and value at various stages of production from tree growing to retail sales point. The chief information groups are consumption, production and trade statistics. The reverse order reflects the increasing need for reliable information or in other words, the increasing unavailability and unreliability of existing statistical data and information sources. Forest management requirements are dealt with in another FMP report (FMP 1992h).

The first obvious gap in the forestry sector information base is the omission of the private sector in official manufacturing statistics, especially the multitude of small establishments with less than ten employees. BBS's 1986/88 Census of Manufacturing Industry covers units engaged in forest

products manufacture and employing more than ten people. BFRI also provides some data on the sawmilling industry but excludes pitsawing from its data. With wood supply, the position is slightly different, a BBS 1988 farmer survey provides some information on the economic impact and benefits to householders. However, the survey has no measurement of resource extent, size, or yield potential, nor state of the existing growing stock.

Data availability is a serious problem hindering forest product market analysis. Data are available for exports and imports in great detail, but grossly inadequate for local production, consumption and sales within the country. Many products are not mentioned in official government records.

Bangladesh Forest Department (BFD) is a major source of statistics data and information in addition to requiring extensive and accurate data for its own planning purposes. BFD lacks an internal system for collecting, assessing, compiling and publishing useful statistical information. The last officially published administrative report was 1981. Since the Ministry is the chief beneficiary of good statistical data for its own internal process, it makes good sense that it establish an effective statistics gathering and compilation system. The basic system framework requires three major elements:

a. Definition of required information needs - This means the information needs of past and future programmes with two or three priority levels - ranging from critical to helpful but not essential. During the process, this definition procedure analyses and eliminates duplicate records and collection procedures.

b. Establish the procedures for collection, information type, frequency of collection and specify analytical techniques.

c. The final stage is to set up a single agency to assemble, collect, compile and publish the needed information. Since the Ministry is the largest customer, it makes sense for it to assume this responsibility. Furthermore, the data base assembled for forestry applies to other areas under the ministry, this also eliminates duplicating the information systems and procedures in other departments. Funding other agencies, by contract or contribution, would facilitate and establish an effective basis to ensure coordination in addition to keeping the planning unit within manageable size and staffing levels.

3. Production

Since production originates from a few locations it normally serves as the major recording point for planning forestry programmes. Knowledge of production at key points in the processing routine permits tracing the relative product volume backward to the basic raw material input or forward to its final consumed stage. Owing to measurement difficulties in Bangladesh, production records and statistics must assume an extremely important role in forest resource planning. The problem is similar for raw or processed products.

In the case of raw forest products, the Forest Department is the dominant single producer - 40% of roundwood volume and 20% of bamboo at a few select locations. On the other hand, a multitude of small growers produce the remaining 60% or roundwood and 80% of bamboo at numerous locations throughout the country. With processing, a few large producers dominate in the major sectors. Excepting pulp and paper, particleboard and hardboard, a host of very small producers account for the greatest number of establishments. Non wood forest products is the other exception, here production takes place in a multitude of small unorganized units.

The two important starting points are initial primary and final product production volumes, costs and sales values. Establishing reliable records at these control points is the basic minimum to support forest resource planning in Bangladesh. As a starting point, this information is needed

for at least 80% of the total forest products values in terms of volume and cost of production. Include the remaining 20% of the production information once the main ones are properly done.

The major gaps in production statistics lie in four areas. Reliable raw production and value of major primary products, overall, is the most serious deficit. This situation includes both government and private production and extends for traditional roundwood products, bamboo and non wood forest products. The second most serious deficiency is the lack of records for private solidwood production - sawnwood, panels and paper. Third, market prices and volume for standard and major products are not centrally kept in a uniform manner. Finally, rapid and free dissemination of market prices and volume data for buyer and seller information is lacking. Several examples clearly illustrate the problem.

As far as raw wood production goes, there is absolutely no record, or estimate, of private production on homesteads or non forest land. With the Department, production statistics are centrally available but are outdated, often in conflict with different versions and lack details except at the highest summary level. When and if detail is ever required this is obtained by circulating different Divisions. It should be possible to get from each Division within six months of fiscal year end a country-wide summary of production. The summary needs to recognize product, species and grade for any product contributing more than one percent of total revenue. Such standards need to form part of the normal reporting system. Exactly matched to this production record and required at the same time is a product revenue summary. Furthermore, the records must use common definitions, recording standards and measurement units. The present system prevent reliable analysis and discussion focuses on information used not on analytical results and conclusion.

Getting comparable information from private owners is much more difficult considering the public mistrust of government. This is probably best obtained by periodic, regular surveys of growers and timber merchants conducted by some private contract or industry group, rather than government itself. Many of the products involved are concentrated in recognized parts of the country. They are insignificant in other areas and therefore, can be ignored in the latter case or estimated based from other results.

In the case of private secondary and tertiary producers, the most serious gaps are in the cottage industry sector, small sawmills and other small wood manufacturing establishments - eg. boat building, furniture, package making. Concerning match, panel and paper products, there are not too many private producers but no official record is kept of their production and value eg. tea chest production, matches, paper and converted paper products.

BFD maintains records of regional market prices for logs and sawntimber by species. This information needs expanding to include more and standard products not just logs and sawnwood. This means including prices for poles, bamboo, non wood products and forestry-related animal fodders. Furthermore, these prices need disseminating throughout the country on a regular and reliable manner to keep private growers better informed of their product values. Log prices are better tracked by a price index or by quoting prices for the one or two common species. Price quotation standard should recognize true solidwood volume not the current trade measurement the Hoppus standard. A common measurement system which truly reflects both quantity and quality for each separate product group is a basic technical necessity. The best way to distribute the price information is regularly every quarter through the local Agriculture Extension Officer or service, publish it in local papers and quote it on local agriculture information radio broadcasts, as part of normal farm prices.

4. Consumption

Consumption in Bangladesh originates chiefly in three groups. In order of volume, and depending on product involved, these groups are commercial, industrial and home. Government agencies are defined within the commercial sector. Individual consumption very much depends on location, urban versus rural, and income level. Rural and urban population income levels are highly correlated to the size and type of home and range from the landless poor to the rich urban location and dwelling type.

Traditional industrial consumption of raw and semi processed products is easiest to determine, but official data excludes the very small enterprises. Commercial consumption becomes increasingly difficult because of more diverse uses and widespread locations. While industrial users are few, they locate in the largest cities. Commercial users like hotels, brick kilns and potters locate much closer to the consuming point and are found throughout the country down to the large town level. Industrial and commercial consumption is best obtained by regular survey of the large consumers and periodic survey of the many small consumer locations.

In principle, individual consumption is easy to determine. The estimating problem comes from individuals incorrectly remembering consumption data and amounts, and depending on product sites. Normally, this is derived by measuring volume consumed over a fixed period or existing volume in use. Wood volume included in homes, furniture, boats are a case of the latter, fuelwood is a good example of the former. Two sets of nationwide surveys exist measuring rural consumption (FAO 1981, FMP 1992d). Aliff (1984) determined urban consumption patterns, these need checking again in the near future to reflect current patterns.

Provided that production and trade patterns are well kept, consumption estimates can be derived as an overall check and balance against survey estimates. This is typically the most common way of determining consumption. No data exist in Bangladesh to determine or even estimate consumption volumes expected at different price levels to ascertain true economic demand. The standard assumption is that whatever volume is produced will sell. Since the Nation consistently is in a scarce resource exercise, and therefore a seller's market, this assessment has never happened. Once large volumes of teak begin entering the market, local prices may collapse since the market for this expensive wood likely is not very large in Bangladesh.

For planning purposes, existing industrial, commercial and rural consumption estimates are adequate, urban consumption needs updating in the future to reflect possible economic and demographic change since the 1981 study. Consumption patterns are best determined by periodic surveys of particular population groups or as a subset of national population, manufacturing or economic surveys.

5. Trade

This field includes imports and exports of wood and paper products in raw, semi processed or processed form. With one exception, information here is readily available in detail within two years based on a standard trade classification system.

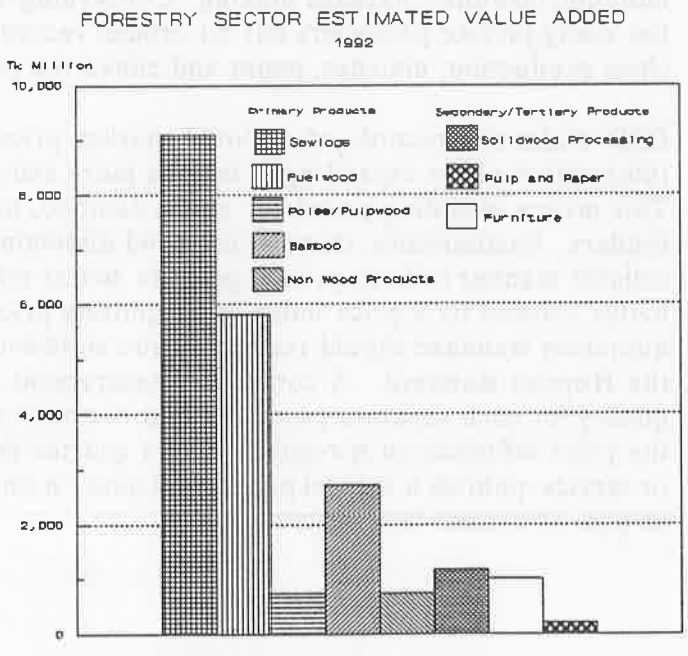

Figure 3 - Forestry sector 1992 value added.

Summaries of major trade categories are available within six months to one year of fiscal closure and data are reported regularly at six month intervals. Under present conditions, the existing trade classification is adequate, but may require expanding or redefinition in some categories as the type, amount and range of forest products change in the future.

In terms of trade statistics, the major need is to accurately differentiate between the different wood and non wood forest products in the handicrafts and cottage industry exports. It is not possible now to properly evaluate the contribution of forest materials to the major employment section. Since this is becoming an important export area, proper segregation of forest-based handicraft items will be important for evaluating and planning programme support, especially if forest-based handicraft opportunities are properly developed.

Another need is to keep records in standard volume or weight not normal trade measurement units. For example, maintain pole statistics in m^3 not lineal metres and particleboard, plywood and veneer in m^3 not m^2. Furthermore, adopt the metric system fully to avoid the confusion of two systems as at present, rather than using both the imperial and metric system. Another obvious requirement is to maintain a separation between coniferous and non coniferous raw and semi processed products in certain products.

Economic Importance

1. Value Added

1992 value added totals an estimated Tk 21 billion (U$ 537 million), 85% of which derives from primary, 11% from secondary processing and 3% from non wood products, Table 3. Sawlogs are the largest single value, making up 42% (Tk 9.1 billion), while fuelwood production creates 27% (Tk 5.8 billion). Bamboo production is third largest at 13% (Tk 2.9 billion).

Table 3 - 1992 Estimated Forestry Sector Value Added, (Tk million)

Products	Tk, Million	Percent
Primary		
Sawlogs	9,091	42.3
Fuelwood	5,804	27.0
Poles	614	2.9
Pulpwood	127	0.6
Bamboo	2,724	12.7
Total	18,360	85.4
Non Wood	743	3.4
Secondary/ Tertiary		
Sawmilling/ Solidwood	1,174	5.8
Pulp and Paper	1,008	4.7
Furniture	217	1.0
Total	2,399	11.2
Total	21,502	100%

Solidwood processing, principally sawmilling, accounts for about 6% and pulp and paper production just over 4% of value. Tertiary wood manufacturing production, mainly furniture making is responsible for about 1%. The contribution from pulp and paper is low as a result of the large proportion of imported and intermediate materials. Figure 3 illustrates the current situation. In Table 3, Solidwood Processing includes the organized particleboard, plywood and match producers included in official surveys.

The basis for valuation is the market value of each item, less the value of raw material or supplies contributed by prior products or operations contained in the valued item. Table 3 values under estimate actual values since a large volume of forest production goes unrecorded. Some Department officers estimate that 20-60% of actual removals remain unrecorded due to illegal cutting. Furthermore, the multiplicity of small production units are not considered in the sawmilling, other solidwood and furniture sections. In the case of Other Primary Products, value added by processing outside the forestry sector is ignored, eg. traditional medicines.

2. Employment

Including all forestry sector elements, estimated total current employment is 800,000 persons, (see Table 4, based on a 300-day working-year). This is approximately 2.3% of the existing labour force. Only 50,000 from the forest industry and a portion from the cottage industry sector appear in the official employment figures. Considering the seasonal nature of most work, excepting the organized industrial sector, many more people actually benefit directly from forestry related work, possibly another 50-65%, or upto 1.3 million people.

Primary processing occupies most people, about 55%, cottage industries are second in providing employment - 36%. The industrial sector employs 6%, while government professional, technical and administrative supervision and forestry plantation and cultural operations engage 3% (FMP 1992c).

Table 4 - Estimated Current Employment Generation

Item	Employment	Percent
Traditional Products		
Private Land	345,2000	43.1
Forest Land	97,900	12.2
Secondary Processing		
Cottage Industry	288,000	36.0
Forest Industries	50,000	6.2
Professional, Administration, Plantations	19300	2.5
Total	800,400	100.0

* Includes rubber plantations and processing

3. Foreign Trade

Bangladesh depends on imports for many basic necessities as well as development requirements and generally suffers a strong balance of payment deficit. In 1989/90 the overall trade balance deficit was U$ 1,5 billion (Tk 51.2 billion). This amount increased to U$ 1.7 billion (Tk 62.8 billion) in 1990/91. This situation perpetuates itself in the forest products sector as well.

Traditionally, the nation has both exported and imported forest products. Recently, this historic pattern of a $20 million deficit has begun to change. Abnormal conditions, beginning in 1971, partially mask the effect of change. A cutting moratorium in natural forests was imposed in 1986.

Since then the ban has been gradually relaxed in terms of type of natural forest and exploitative agency affected. Based on current trends, exports cease after 1995 and all production goes to domestic consumption. This produces an ever increasing annual trade imbalance, estimated to reach $115 to $140 million by the end of the plan unless Bangladesh expands its forest resources. Figure 4 shows past and projected trends.

EXPENDITURES AND REVENUES

Expenditures

Total government forestry sector expenditures average just over $17 million annually (Tk 595 and 636 million in 1989/90 and 1990/91, respectively). These figures exclude private and government industry spending and follow imposition of the cutting moratorium. In the immediate five pre moratorium years, total expenditure averaged $12.7 million.

Normal expenditures financed by the revenue budget make up about 30% of annual spending and development assistance the remaining 70%. Figure 5 represents expenditures since 1980/81, during which period annual spending rose from about $9 million to over $17 million, increasing 8% annually.

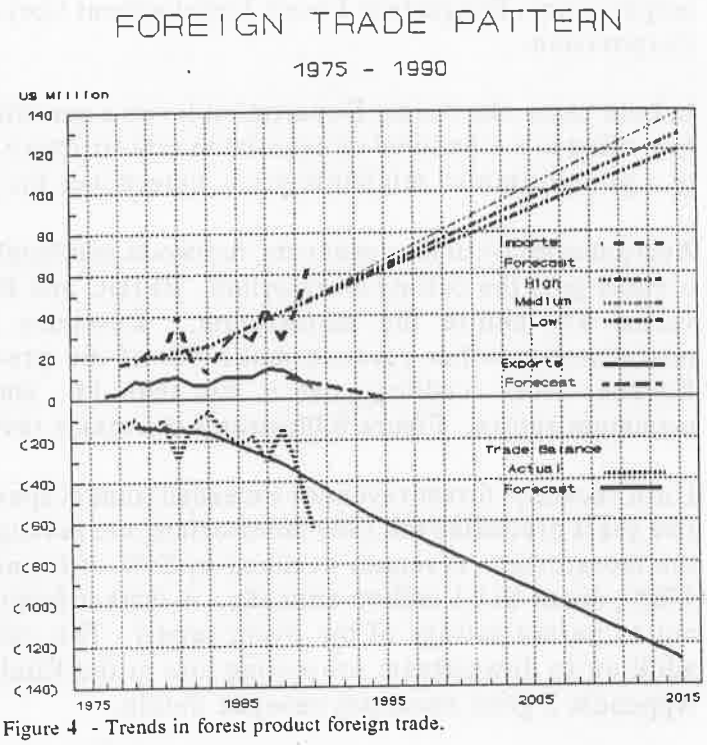

Figure 4 - Trends in forest product foreign trade.

Staff salaries and allowance, 84%, physical work programs 12% and contingencies 4% is the pattern of normal expenditure, details are in Appendix 2. Development spending goes with specific donor-sponsored projects Regionally, four Circles account for over 70% of annual spending - Coastal Plantations, Chittagong Central and Rangamati, Table 5 and Figure 7 provide further details. In the figure, Other includes, in order: Bogra, Management Planning, Jessore, FDTC, and the National Botanical Gardens.

Revenues

Revenue collection peaked in the late 1980's, averaging $18 million annually for the five year period ending 1988/89. 1985/86 was the peak year when revenue reached Tk 606 million or $19.6 million. Following the cutting moratorium imposed in 1989/90, total revenues plummeted to $7.6 million and in 1990/91 fell even further to $5.4 million, equivalent to Tk 194 million.

Included as major components of forest revenue in Bangladesh are royalties, fees, tax levies, miscellaneous other charges and auction sale proceeds. The resource system mainly relies on auction sales from fixed depot locations. Royalty charges apply strictly to non wood forest products, except in the case of the government owned

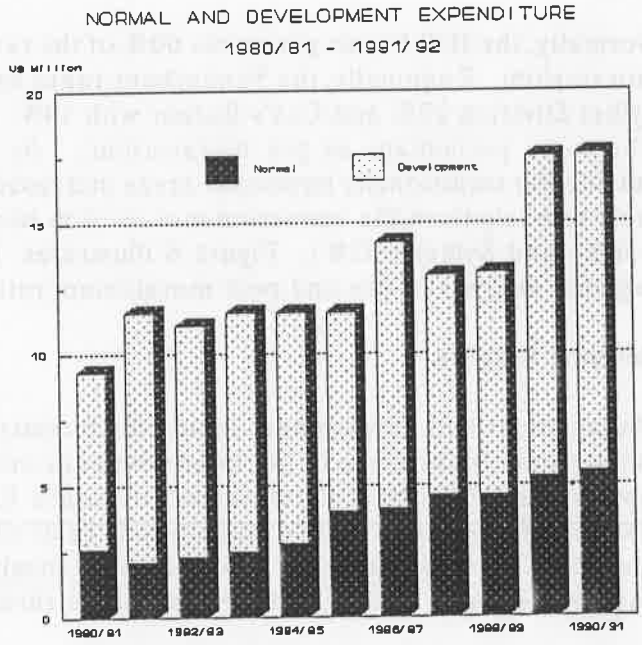

Figure 5 - Forestry expenditure pattern.

corporations, Bangladesh Forest Development Corporation and Bangladesh Chemical Industries Corporation.

In both cases, the Forest Department levies a specified unit charge according to quantity removed according to a scheduled or negotiated rate structure. With auction sales, net sale revenue, subject to a predetermined minimum price, determines the revenue collected.

Auction sales of timber products, fuelwood and bamboo yield the bulk of revenue - 81% and 63% pre and post the cutting moratorium. BFIDC and BCIC lease agreements contribute 15% today versus 8% before the moratorium. Revenues from abandoned or seized products and miscellaneous other revenue make 6% of the pre-moratorium amount and 7% subsequently. Revenue from seedling sales is less than 1%, amounting to Tk 1.0 million in 1990/91, the maximum return. Figure 6 illustrates the major revenues sources and trends.

Until recently, forest revenues exceeded annual spending, on average by 40%. In the immediate five years preceding the 1989 moratorium, net revenues averaged $5.2 million annually. Following the moratorium, revenues declined by 54% of former levels. Expenses now exceed revenues by 170%, about $11.1 million annually. A further factor affecting revenue collection is the decision not to permit salvage of top dying sundri. This caused a 50% drop in Sundarbans revenue, in addition to downstream processing loss to the Khulna economy. Figure 8 illustrates the effect, Appendix 2 gives necessary revenue details.

Table 5 - Normal Circle Expenditures Pattern

Circle	Percent
Plantation	24
Chittagong	18
Central	17
Rangamati	16
Forest Research	12
Headquarters	3
Other	10
Total	100

Normally, the Hill Forest generates 60% of the revenue flow, this percentage fell to 46% after the moratorium. Regionally, the Sundarbans ranks first in revenue generation with 44%, followed by Sylhet Division 22% and Cox's Bazaar with 14%. Hill Tract Divisions produce only 10% of total (the same percentage as pre moratorium). As revenues declined, the proportion originating outside the traditionally important areas increased to 10% from 3%. Areas in which revenues fell most severely from the extraction moratorium were Chittagong/ Cox's Bazaar (-76%), Hill Tracts (-56%) and Sylhet (-52%). Figure 6 illustrates historical revenue sources. Table 6 presents a regional analysis of pre and post moratorium total revenues. Figure 8 graphs the results.

Revenue Systems

Management and development inputs for forestry get provided only at a cost, and in general the quality and effectiveness of the inputs depends on the funds available for the purpose. Therefore, revenues are important determinants of future funding. The components of the forest revenue system of Bangladesh include: auction sale value of products, royalties, fees, taxes, levies and other charges. Of these, auction proceeds and royalties dominate. Existing procedures appear to undervalue many forest products, support a three-tiered price structure and mask inefficiency.

The nation would benefit greatly by an overhaul of the revenue system which prices the various resources at their true cost.

A major purpose of the overhaul would be the separation of the cost of growing or producing the product from the cost of manufacturing secondary products. This means pricing at its true economic value standing on the stump not by an obsolete royalty rate. Any forest revenue system design must:

a. Achieve Government policy objectives with minimum number of charges;
b. Be simple to administer and enforce;
c. Not depend on a single dominant revenue source;
d. Exclude charges that yield low revenue, and have weak and ineffective incentive effects; and,
e. Closely estimate the true economic cost of growing the product for the nation.

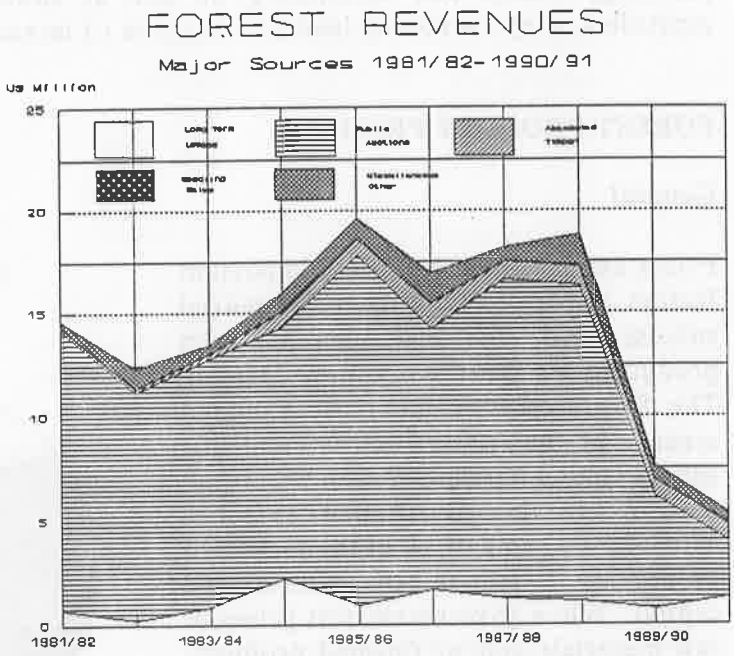

Figure 6 - Major forest revenue sources.

Table 6 - Regional Average Annual Revenues, Before and After Moratorium, (Tk million)

Region	Before[a]		After[b]		Change %
	Amount	Percent	Amount	Percent	
Sundarbans	$ 5.05	37	$ 2.76	44	-45
Chittagong/ Cox's Bazaar	3.87	29	0.90	14	-76
Sylhet	2.85	21	1.37	22	-52
Hill Tracts	1.36	10	0.60	10	-56
Total Hill Forests	8.08	60	2.87	46	-64
Other	0.39	3	0.60	10	+54
Total	13.52	100	6.23	100	-54

[a] 3-year average [b] 2-year average

Supplying raw material to industries at low royalty rates and selling forest products at schedule rates on a permit system are two prime instances of subsidy. Royalties on supplies to government-owned industrial units were pitifully low in the past. Some improvement appears recently, but forest products pricing needs to recognize market conditions and has to respond to changing market conditions.

Existing scheduled royalty rates, periodically issued for the different Forest Divisions need regular, realistic updating. This need can not be overemphasised. Tropical forest exploitation has never been priced by what it costs to renew or replace it. One valid argument is that since it cannot be exactly replaced because of its complexity, it is beyond value. What really happens, of course, is that valuable resources get sold at very low prices which allows windfall profits. Individuals perceive windfalls as short term benefits and maximise them as long as they last.Even when subsidies (concealed or open) are consciously allowed by the Government, either for social or

incentive considerations, it is necessary to properly quantify them. This is necessary for proper planning, control and accounting, as well as subsidy compensation. Unless subsidies are controlled, they eventually lead to distortion of intended government policy and goals.

FOREST PRODUCT PRICING

General

Prices and pricing method are important factors in determining entrepreneurial success and financial health when producing to meet consumer demand. The free market is the most accepted means of balancing or rationalizing supply and demand. Cases are often seen where the government exercises control over some or all of the factors of production - labour raw material and capital. When government sets prices of raw materials and/or finished products, the situation is upset by hidden subsidy, lack of arrangements for subsidy compensation, and efforts to coverup losses. Price controls are also often exercised for considerations of social equity (eg to provide basic goods at affordable prices), or to provide incentives for an infant industry. If continued beyond the minimum required period, subsidies and price control breed inefficiency.

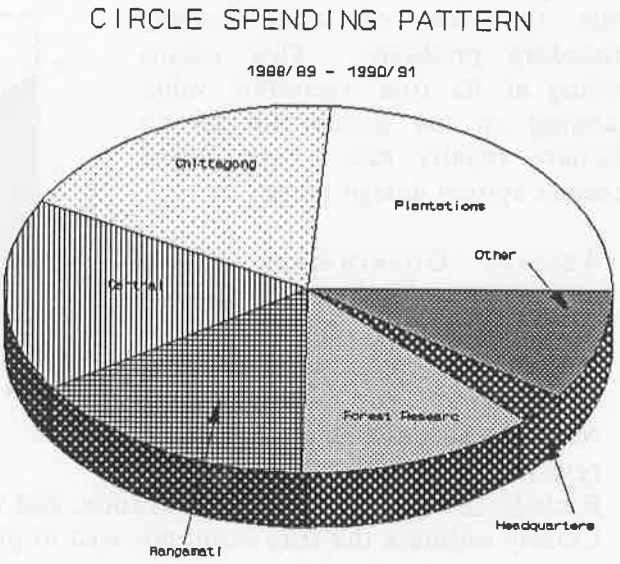

Figure 7 - Main Circle expenditure.

Primary Pricing System

In Bangladesh, the effects of forestry sector pricing is evident in several ways, shown below:

a. Supplying raw materials to State-owned enterprises under long term agreements at rates much lower than true stumpage and market values. The rationale for this is that the raw material and the processing enterprises belong to the government, so undervalued resources increased the profitability of processing operations. This intended incentive cheapens wood raw material and stimulates inefficiency, wood waste and environmental degradation. Moreover, it

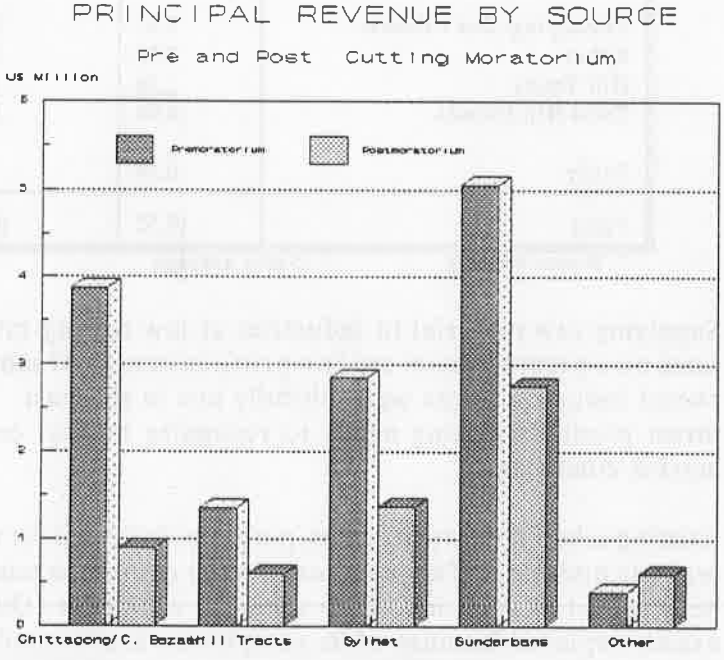

Figure 8 - Effect of cutting moratorium on forest revenues

acts to discourage enterprises from establishing their own raw materials source - they perpetually rely on government raw material supply.

b. Government setting of enterprises re finished product prices. This is intended to protect State enterprises from competition of imported goods. Setting prices this way does not recognize economic factors or market conditions. Often, prices are set too high for the quality of the product, causing stockpiling. More often, prices are held down and subsidies paid, causing losses. Such practices lead to inefficiency and prevent government enterprises from modernization and obtaining the funds necessary for proper maintenance and repair work.

c. A system of selling forest products at scheduled rates applies in each forest division. Rates are revised periodically without fixed periodicity or required research and analysis. They are generally concessional. The system works if confined to bonafide persons or to families or communities living in and around forest areas. It fails when permits go for commercial purposes.

The system was introduced at a time when market, infrastructure and communication facilities were undeveloped. All these conditions no longer exist but the system remains. It favours windfall profits and creates powerful speculators. Where windfall profits exist, it is impossible to practice sustained management, the resource is swamped by profiteers. However, the system has relevance when used to support communities in remote/ backward areas, or to help poor and landless people meet their bonafide domestic needs.

d. Auction sales - Purchasers may bid in an auction to buy products growing, or found, in the forests for extraction, processing or sales into urban markets. Auctions are also conducted to sell products from forests, mainly timber brought to a government depot. In such cases, government sets automatic minimum auction prices based on previous auction sales without recognizing existing market conditions. Auction remains the best disposal system since the bid better reflects market conditions. The danger is that low upset prices encourage bid rigging.

For depot sales, improved classification and grading are equally important to ensure proper pricing. The present system of Hoppus log measurement results in underestimation of true geometric volume. Both the present systems of log classification and measurement need review and rationalisation to provide a better basis for economic judgements.

Prior prices and pricing obviously had some rationale. Then it was impossible to properly calculate cost of growing forest products in natural forests and resource scarcity didn't exist. Furthermore, private sector and market mechanisms had not developed, nor was the demand for investment funds a major factor in making decisions. Now, the role of forests in environmental conservation is better understood. Forest plantations and other forestry activities compete with other investment projects and cost considerations, prices and profitability becomes vital.

Overlooked in the past is the effect of prices and pricing systems adopted by the Government on prices to the homestead grower. Prices for comparable products from government forests are fixed without considering all relevant factors. Even though most wood and bamboo in Bangladesh comes from homesteads, the grower cannot affect the Government's pricing policy. Small holders are unable to obtain equitable prices for their products from organised buyers and middlemen. Promoting and supporting homestead and community forestry requires management of the government forest resource as an enterprise, unless it is prepared and has the funding, to provide all investment funds.

Product Prices

Forest resource pricing in Bangladesh is a paradox. Average sawlog prices are 75-85 percent of Malaysian export meranti prices FOB Japan, domestic newsprint prices are about 80-90 percent of FOB prices in Europe. Meanwhile, the domestic selling price for printing/writing papers exceeds international prices, typically by 15-20%. Yet, major raw material prices for both wood and bamboo are extremely low as percentage of final product values, by today's international market standards. Inefficiency is one reason for the pricing gap, out of date valuation is another, direct government price setting or the indirect effect of highly priced inputs a third. Ineffective, irregular and unsystematic resource valuation appears the chief reason for continued imbalances in resource values.

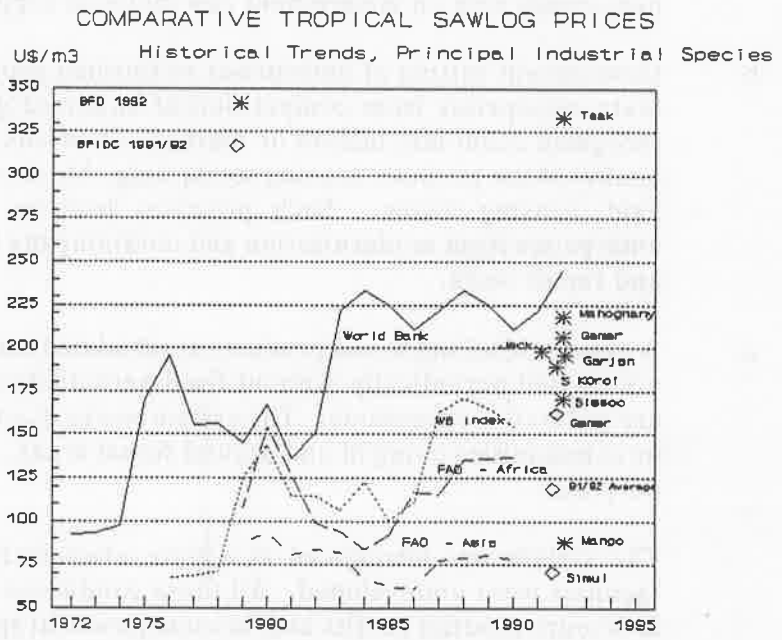

Figure 9 - Comparative sawlog prices.

1. Sawlogs

Major market prices in 1991 ranged from Tk 2,800-3,100 ($72-80)in Dhaka, Chittagong and Noakhali for the cheap softwood species simul and mango. Expensive species like gamar and mahogany came in at Tk 8,000-8,600/m^3 ($205-220$m^3$). Meanwhile, teak the most expensive species sold at Tk 13,000/m^3 (335m^3$) and jack, the most common sawlog species averaged Tk 7,600/m^3 ($195/$m^3$). In comparison, the World Bank's Malaysian log prices averaged just over Tk 9,600/m^3 ($245/$m^3$). Considering the 1991 prices for the very common Bangladesh species jack, gamar, shil koroi and garjan which ranged in prices from Tk 7,200-8,200/m^3 ($185-210/$m^3$), Bangladesh sawlog prices are equivalent to 75-85% of the more valuable Malaysian species landed in Japan. In contrast, to the major market prices, BFIDC's average internal transfer log selling price in 1991-92 was Tk 4,600/m^3 ($120)/$m^3$. Figure 9 compares current prices in Bangladesh to historical international prices.

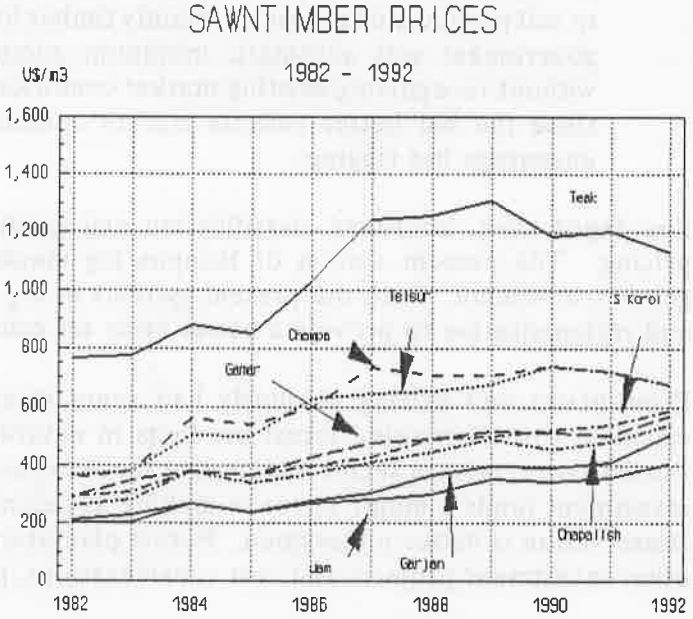

Figure 10 - Historical sawnwood prices in Bangladesh.

According to the official record, the average auction prices increased at slightly over 4% annually since 1981, averaging Tk 6,900, 7,200 and 7,500/m^3 in 1989, 1990 and 1991, respectively. Overall,

jack is the most common sawlog species throughout the country. Using the 1991 prices for jack as the base, other species sawlog prices are easily comparable on a percentage prices as follows:

Species	%	Species	%
Garjan	100	Teak	170
Mahogany	110	Shil koroi	95
Gamar	105	Sissoo	80

Regionally, average sawlog market prices vary considerably reflecting 58 species, different qualities and various levels of availability. Noakhali and Rajshahi markets have the highest prices recently, 15-30% above the national average of Tk 7,500/ m^3 in 1991. Dhaka, Sundarbans, and Chittagong market prices sat just over the average. Sylhet averaged slightly lower, while Mymensingh, and Cox's Bazaar register the lowest prices.

2. Sawntimber

Present day sawnwood market prices in Bangladesh range from Tk 12,500-15,000/ m^3 ($410-510/ m^3) for common construction species like jam and garjan to Tk 20,800/ m^3 ($680/ m^3) for more expensive champa. Teak sells on average for Tk 34,700/ m^3 ($1,130/ m^3). Since 1982, sawnwood prices increased by 12-26% annually, depending on species. Cheaper priced species accelerated more quickly than the expensive ones. In terms of dollar prices, the annual increase ranged from 4-12%. Gamar and shil koroi, two popular carpentry species increased 9% annually in dollars value since 1982 (20% in local currency).

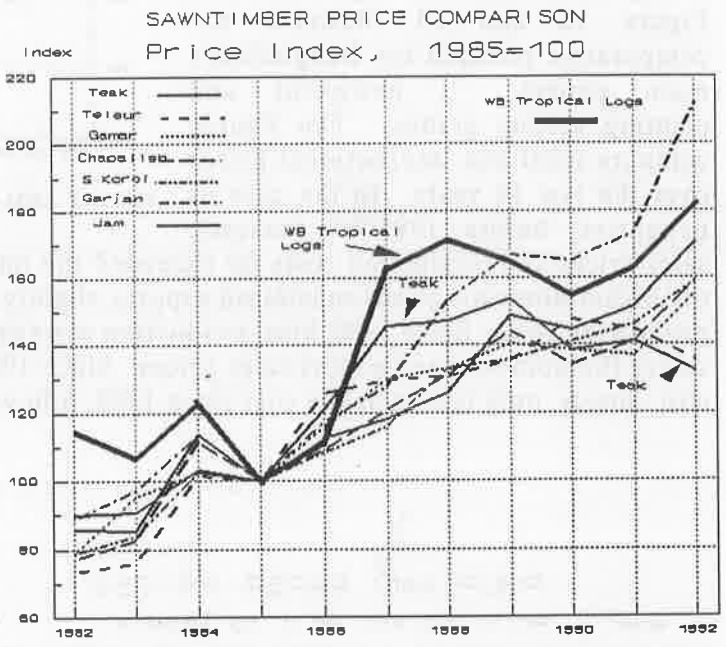

Figure 11 - Sawnwood price indices 1982-92, Bangladesh and World comparison.

Table 7 -Present Royalty Charges to Pulpmills, Tk/ADT

Basis	Pulpwood			Bamboo
	Gewa	Melocanna	Gamar	
Khulna Newsprint Mill				
Old Rate	10	-	-	-
New Rate	1,632	-	-	-
Sylhet Pulp and Paper				
Old	-	466	-	645
New	-	1,166	-	2,283
Karnafuli Pulpmill				
Old	-	-	-	140
Proposed	-	-	1,066	140

Figure 10 illustrates species prices from 1982-92, Figure 11 shows local sawnwood index prices compared to the World Bank tropical log index (based on 1985=100). The figures illustrate a sudden 3-year spurt in teak prices beginning in 1987. Since 1990, there is a marked down turn in prices, especially the expensive varieties. Meanwhile, in 1992, garjan the standard construction species averaged $\$510/m^3$ (Tk $15,500/m^3$). In comparison, standard North American coniferous construction lumber ranged from $\$95$-$110/m^3$ (Tk $3,700$-$4,300/m^3$).

3. Papers

GOB controls the distribution of printing/writing paper and with newsprint sets the market price as well. Figure 12 and 13 illustrate the comparative position for Bangladesh's main papers - newsprint and printing/writing grades. The figures compare local and international prices over the last 10 years. In the case of newsprint, before 1985/86 domestic sales prices and production costs far exceeded the international selling price. At the same time, the higher domestic prices subsidized exports, slightly over 30% by volume, which rarely exceeded production costs. Since 1986, local production costs are well below international selling prices, but so are the domestic and export sales prices. Since 1988, domestic selling price tracks production cost closely, only falling below cost since 1989, followed by the export price in 1990.

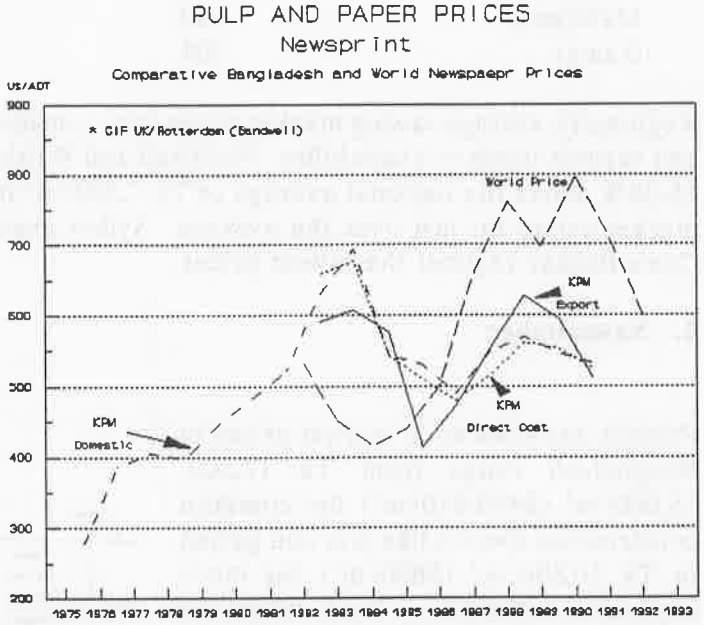

Figure 12 KNM newsprint prices compared to international prices.

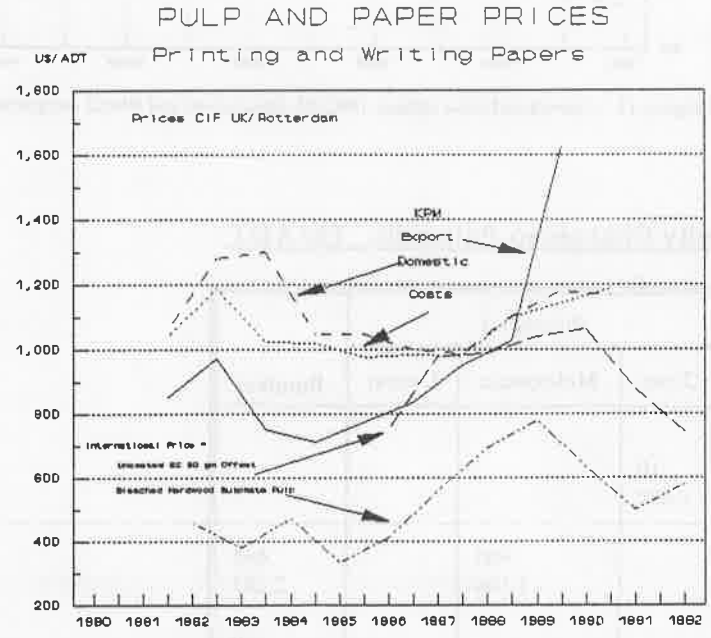

Figure 13 - Comparative Bangladesh and World paper prices.

The situation for printing/writing papers is similar (Figure 13). Both domestic price and production cost were well above international prices since 1980. They approached the international price for about one year in 1987, but are now above the current price. Export prices exceeded the international price except from mid 1986 to mid 1988. The recent sharp climb is not significant since export volumes are very small. In theory, Government subsidizes the price difference between newsprint production cost and market price. In practice, however, the subsidy can get deferred or reduced rendering the newsprint operation unprofitable. The 1991-92 approved subsidy of Tk 234 million (Tk 4,800/ADT) was never released. Figure 14 displays the subsidized price relative to

international price levels over the last ten years. The order of magnitude of GOB subsidy is indicated by the comparison of GOB selling prices and the domestic selling price.

Taking the case of newsprint, GOB since 1979 subsidized newsprint prices for an estimated $34 million in total. This estimates assumes an average of 60% of production during that time went to domestic sales. Excluding 1981 and 1982, the subsidy was necessary every year. During the recent five years, that annual subsidy is about $5 million.

Prior to 1987 Karnafuli Pulpmill's (KPM) direct production costs and domestic selling prices greatly exceed the international price of printing/writing papers. Export prices also exceeded international prices at the same time except during the two years 1986/87 and 1987/88. The 1988/89 price is not reliable as the export volume was minimal. KPM's direct production cost during this time were well above the international price and domestic price levels were even higher. However, beginning in 1987/8, the domestic selling price is only marginally higher than local prices, and in fact, dropped below the production cost in 1990/0. Even so, both domestic price levels and product cost remain above world market prices. The gap has widened increasingly since 1988. At current prices, over $1,100/ADT, KPM's price is well above the international price, close to $770/ADT.

Khulna Newsprint Mill (KNM) newsprint export price typically is 80-90% of the World price, FOB Europe. While printing/writing pulp and paper production costs exceeded average world prices. Since 1979, Bangladesh consumers, on average paid $4.5 million more for subsidized local papers than the international CIF market price for higher quality newsprint.

4. Other Products

Pulpwood and Bamboo - The situation regarding bamboo is contradictory. KPM's royalty charges represent slightly over two percent of finished paper costs. In the case of SPPM, bamboo royalty charges in 1991/92 were 10 percent of international paper prices, while in 1992/93 the Department increased them to over 30%. Table 7 points out current pulpwood royalties.

High Density Fuelwood - Prices ranges from Tk 1,600-2,200/MT ($41-56), while light softwood species sold for Tk 800-1,000/MT) ($20-26/MT). Peak prices occur in the southern regions and northcentral regions where the high density species occur commonly, eg. sundri, sal and goran. The northwest has the lowest prices, even though wood all kinds is more scarce. Western areas have an intermediate price of Tk 1,800/MT ($47/MT) and the southeastern areas lower even still. Tree branches, leaves and twigs, the fuel material most rural people use themselves, sells in the market from Tk 1,400-1,700/MT ($35-45/$m^3$. Bamboo fuels are more costly, Tk 2,000-2,600/MT ($51-67/MT). Dung cake prices vary greatly. In the western regions prices are lowest -

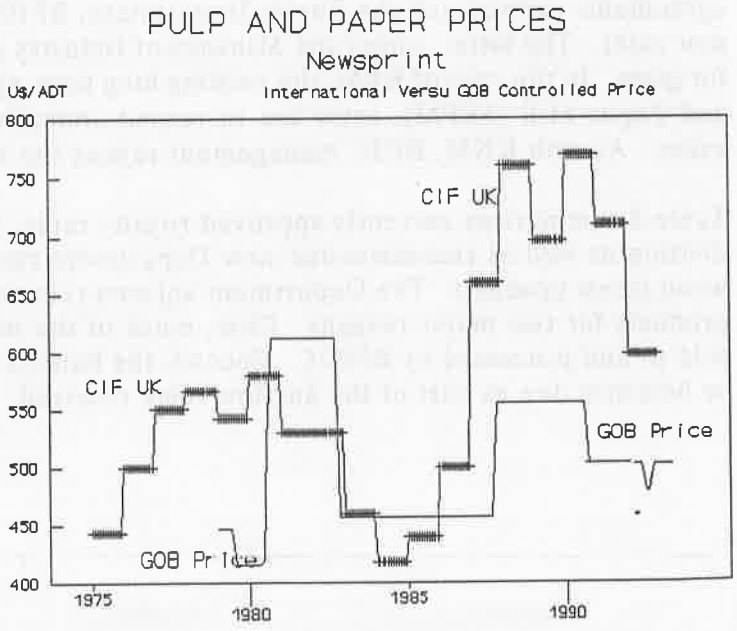

Figure 14 - Subsidized versus world newsprint price trends.

Tk 1,700 or $43/MT while the highest prices occurred in the northcentral region at Tk 2,600/m^3 ($67/MT). Jute sticks are also a very common fuel in the rural country side. Jute prices range on average from Tk 2,400 to Tk 4,200/MT ($61-108/MT). Bamboo roots have the lowest value for fuel purposes, Tk 600-700/MT ($15-18/MT).

Fodders - Animal fodder is not a commonly marketed rural product, despite the large volumes collected for personal use. This is mainly attributed to the unorganized dairy industry and the fact that peasants consider fodder, like fuelwood, as free in the countryside. Most people rely on their own supply source since milk production is a rare rural economic activity. Agriculture residues are the chief fodders used. Rice straw and husks sell for Tk 1,500-1,700/MT ($38-43/MT). Oilseed cake sells for Tk 8,900-9,200/MT ($228-235/MT) and pulse bran for Tk 7,500-8,00/MT ($191-206/MT). Dry grass is the cheapest fodder and goes for Tk 1,000-1,400/MT ($33-36/MT). Green fodders command no premium - the price of jack leaves ranges from Tk 1,500-1,900/MT ($38-48/MT) while green grass only gets Tk 750-1,300/MT ($19-32/MT).

Other Products - Market prices for village bamboo depends highly on species - varying from Tk 5,000-72,000/1,000 stems equivalent to $130-1,850/1,000 culms. The principal species difference is culm diameter and wall thickness. The popular thinwalled muli forest species goes for Tk 5,000/1000 or $130/1,000, while the large thick-walled barua village species averages Tk 62,000 or $1,600/1,000 culms. Average culm prices are muli Tk 5, bone 10, jai and basine 13, tarala 31, barak 52 and barua 62 per piece. Palm tree stems range in value from Tk 125-2,500 ($3-64) each. Umbrella palm (Borassus flabellifera) commands the highest price on average Tk 2,000 ($52) each. Date and coconut palms are much less valuable, going for an average of Tk 220 and 160 ($5.60 and 4.10) each, respectively.

Roundwood Pricing

1. Current Royalty Rates

Present royalty rates originated in 1981-1982 and remain unchanged since. Proposals to reset the rates, completed in 1989 are in process of approval, except for the Sundarbans non wood products. Here, new non wood forest products were adopted in 1990 In the case of existing government enterprises, until recently most operated under long term agreements with royalty rates left unchanged since the original signing dates. In the case of BFIDC and KNM, the original agreements expired and the Forest Department, BFIDC and KNM management are negotiating new rates. The latter, under the Ministry of Industry and Commerce, does not accept new rates for gewa. In the case of KPM, the existing long term agreement is still in place. With Sylhet Pulp and Paper Mill (SPPM), rates are increased annually as no long term BFD-SPPM agreement exists. As with KNM, BCIC management rejects the new royalty rates set Departmentally.

Table 8 summarizes currently approved royalty rates, Appendix 3 has full details by product and division as well as recommended new Department rates. Proposed increases mainly affect non wood forest products. The Department appears reluctant to set royalty rates for traditional wood products for two major reasons. First, much of the main commercial roundwood products gets sold to and processed by BFIDC. Second, the balance is sold by auction and royalty is collected or becomes due as part of the auction value received.

Table 8 - Current Royalty Rates

Item	Minimum	Average	Maximum
Sawlogs, Tk/ m^3	120	300/ 800	1,660
Special	100	210	410
A	40	170	280
B	35	120	220
C	30	55	170
D			
Poles, Tk/ m^3			
Special	6.70	12	60
A	6.70	16/ 25	92
B	3.30	5	49
C	3.00	4	33
D	2.00	3	26
Pulpwood, Tk/ m^3	44	150	275
Fuelwood, Tk/ ADT *	50	100	130
Fuelwood, Tk/ m^3			
Gewa, keora	4.60	7	46
Sundri, goran	20.00	63	130
Bamboo, Tk/ 1,000			
Thin-walled	40	50	1,000
Thick-walled	300	600	2,000
Sungrass, Tk/ ADT	50	80	125
Cane, Tk/ 1,000m			
Large Diameter		70	
Small Diameter		30	
Honey, Tk/ MT	.67	1.07	1.07
Golpatta, Tk/ ADT		50	

* Dry solidwood volume

Roundwood Pricing

1. General

Production of sawlogs from state forest resources is partly carried out by BFIDC within their concessions. BFD also makes direct allocations of pulpwood to BCIC enterprises. Prices of wood products are fixed by the BFD in agreement with the BFIDC and BCIC which are well below the market prices. A substantial undervaluation of the forest products in Bangladesh in the form of low royalty, forest charges and other forest fees is a major causes of forest depletion. Given that a forest performs both protective and productive functions, optimal management of forests requires that those logging the forest pay an appropriate price for the forest products. This price must take into account the full cost of conversion, including the economic value of lost forest products and the loss of the protective value of the forest to the environment. Charges to both BFIDC and BCIC do not consider the full opportunity cost of forest use and conversion, indicating a weakness in price mechanism, which sound forest management policies should seek to offset. Several past suggestions strongly favoured the transfer from administratively determined low forest charges to a timber pricing system adequately reflecting the real value of forest products.

Bangladesh with its high population, small and dwindling forest resource simply cannot permit this improper valuation to continue. The present system masks, as well as perpetuates, economically unproductive enterprises - public and private, to continue.

Historically, Bangladesh's forest resources sold at under valued prices. This system creates manipulation, speculation and windfall profiteering. More importantly, however, it has meant misallocation of investment funds. The under valued forest is unable to give a competitive return against other investments from GOB's viewpoint. Meanwhile, available resources are becoming more scarce due to over exploitation and under management.

In addition to other institutional requirements, correcting this deficiency means pricing products according to their true market value in the economy. This requires a systematic evaluation process applied uniformly and at regular intervals to keep abreast of changing market conditions. At the same time the pricing system needs regular review to avoid rigidity and consequent under or over pricing. Over pricing always gets flagged by prospective buyers but under pricing is never called to attention. The system and procedures used can become complicated and none is foolproof or even fully satisfactory. Presently, the absolute accuracy of the system is not extremely important. What is important is to introduce a valuation procedure which recognizes real economic value and responds to market changes. As the size of the resource expands with future development, system refinements and modifications are easily introduced to recognize conditions more specifically or to favour policy goals. Today's priority is to create or devise a system which works under Bangladesh's economic conditions and places more value on the nation's environment, social and economic goals.

Currently North American FOB long fibre export prices range for raw material range from 20-25% of the delivered CIF European cost. This relationship applies to both newsprint (low percent) and printing/writing papers (high range). These rates correspond to delivered wood cost of Tk 6,600 and Tk 8,200/ADT in Bangladesh for newsprint and writing papers. Excluding any pulpwood stumpage charges, current costs are approximately Tk 1,020 and Tk 1,180, well below the cost of major world producers. Since local paper production is not profitable overall due to high production cost. What is happening of course, is that a scarce and fast diminishing forest resource is subsidizing inefficiency and high costs in the industrial or other economic sectors, or it supports or pays the cost of policy which benefits a non forestry sector, eg. energy or labour.

Government can increase revenues substantially by pricing existing and future to reflect its much higher value. This policy will cause the existing industry to eliminate inefficiencies in other areas. There is no logical economic reason why low price forest resource should camouflage these inefficiencies. If subsidies remain approved government economic policy, it is always better to clearly identify the full cost and implications so that facts and decisions are available for regular reassessment.

Increased forest revenues derived from increasing primary product prices, however, is no guarantee the forestry sector receives the full benefits of additional funds. There is still the critical need to put in place an effective funding process to properly fund resource development. This funding process has to recognize the serious requirement of forestry programmes for long term stable investment. Efficient forest development simply can not withstand the vagaries of rapid, unplanned or sudden changes in investment levels. Under such conditions funds get spent, but very ineffectively and wastefully.

2. Pricing Recommendations

Several approaches exist to ensure that Bangladesh's forest resources are better priced according to their proper value. However, regardless of any adjustment to the pricing system, one change is mandatory - immediate elimination of the present Hoppus cubic foot log measurement system.

This measurement system masks inefficiency and can not be tolerated in country with such scarce resources. Five main pricing systems are potentially suitable for the major primary forest product pricing systems. Non wood forest products are a special case which deserve separate treatment. The five systems are:

a. Present auction system.
b. Scheduled royalty rates, periodically established.
c. Stumpage appraisal valuation based on standard products and reasonably efficient manufacturing.
d. Formula approach, tied to standard international forest products or local final product prices.
e. Cost of replacing the product with today's available technology and actual costs.

The auction system offers the safety of familiarization, and if unfettered by participants, responds to changing market conditions. If is also quite a simple to operate and in effect generates its own internal data to compare prices. In contrast, it does not avoid bidding collusion. In Bangladesh, the upset prices is constrained so prices don't truly mirror economic conditions. It depends very much on internal resource values. On the other hand, a well-implemented stumpage appraisal system which truly reflects local cost, sales, and business risk is economically fair and workable. However, simply by its very nature, an appraisal system demands high levels of technical analysis and data collection. Stumpage appraisal is complicate and it becomes further complicated when the range of products increases. Appraisal is an ongoing process since market conditions change continuously. Effective stumpage appraisal requires a major support framework to introduce and to maintain assessed values accurately. Another approach worth considering is to price today's product based on the cost of growing and producing the product.

Table 9 - Comparative Pulpwood and Bamboo Stumpage Valuations

Percentage of finished product value[f]	Pulpwood	Bamboo Tk/ 1,000	
	Tk/ m^3	KPM [d]	SPPM [e]
Newsprint[a]			
- 25%	1,395-1,945	na	na
- 20%	1,055-1,525	na	na
- 15%	715-1,110	na	na
- 10%	375-690	na	na
- 5%	45-270	na	na
Printing/ writing[b]			
- 25%	1,070-1,320	1,570	470
- 20%	825-1,025	675	(135)
- 15%	580-735	(220)	(740)
- 10%	340-440	(1,120)	(1,340)
- 5%	95-145	(2,010)	(1,700)
Replacement Cost, short rotation plantation[c]			
Status Quo	520	-	-
Scenario 1	460	-	-
Scenario 2	210	2,300	2,300

[a] Applies to gewa, eucalyptus or melocanna
[b] Applies to gamar, eucalyptus or melocanna
[c] Applies for eucalyptus, muli bamboo and 12%/A interest
[d] 1.8 ADT/ 1,000 culms
[e] 1.66 ADT/ 1,000 culms
[f] Production cost includes stumpage and royalty, indicated payment rate assumes a conversion return sharing of 80:20 and 70:30 between government and producer. Increasing GOB's proportion significantly increases government share.

Depending on the frequency and change and manner of value determination, a scheduled royalty rate system is similar to stumpage appraisal if done regularly with up to date production, cost, and price changes. If done irregularly, it gets quickly out of date and becomes unresponsive. Since forest product price trends are continuously upwards a scheduled royalty rate system always under values resources. If rates are not carefully assessed, they do not properly reflect community and economic values properly, therefore distorting government policy. Furthermore, they become difficult to change as they require parliamentary approval.

The indicated pricing system of major forest products needs to incorporate several new elements as follows:

a. Select a common product and species as the standard article in each major value category - sawlog, poles, fuel, pulpwood.

b. Determine the prices of all similar product in each category relative to the standard product.

c. Set and publish the standard product prices every quarter based on a consideration of two values - the standard product replacement cost and the duty free cost of importing an equivalent international substitute.

d. If Item a is not possible, then price all other standard major category product relative to the main product using present day values.

e. If government wants to subsidize a particular product, eg fuelwood for social goals, this is better done through the consumer or market, not by lowering the grower's price. This type of approach masks the real value of the primary product and leads to misjudgments in resource management.

f. Considering the low state of Bangladesh's forests and to need to encourage more efficient use an substitution place environmental tax on high value or high volume products, such as sawlog, poles and pulpwood - also fuelwood designated to large towns and cities. Ensure the tax proceeds are tied to funding special environmental protection programmes.

3. Stumpage Appraisal System

As a general rule, it is not unreasonable to price forest product so that total industrial and commercial raw material cost represent 20-25% of the final product prices as an economic guideline. This standard is not fixed nor immutable, but does recognize resource values. For example, current North American export FOB long fibre pulpchips price run from 20-25% of the delivered CIF European paper and pulp prices. This percentage relationship depends on the type of paper and species used. Newsprint raw material cost approximate the low and printing / writing paper cost the high percentage. These rates correspond to delivered wood cost of Tk 6,600 and 8,200/ ADT in Bangladesh for newsprint and printing/ writing - levels well above current raw material rates. Excluding royalty, local costs currently are about Tk 1,000 to 1,200/ ADT well below international standards. Even so, local paper production is not profitable due to the high production cost of other materials and supplies. What is happening of course is that a scarce and the fast diminishing forest resource subsidises inefficient, high cost industry or bears cost of GOB policy in other areas - energy, petroleum and labour. This is not necessarily wrong, but in the meantime, poor forest management practice carry the blame for deforestation and government is reluctant to fund forest sector investment since forestry is not seen to compete with other sectors for development funds.

Non wood forest products royalties are currently well below market values and require revaluing based on true market values on a regular basis. Furthermore, the established rates should apply

to all buyers. Disposition by auction or long term contract is the indicated way not by permit system. This pricing procedure is needed to make sure these products receive attention parallel to their economic value. With one or two exception they do not produce much revenue, they receive, therefore, little attention and are not managed according to the productive capacity of the land. Pricing needs basing on annual surveys of market price and royalty charged to recover at least 15-20% of their market value. If used to fund local social and economic development programmes benefiting resident population, other economic instruments can lessen the financial cost to the participants. The non wood products should receive their proper economic value relative to the other resources and uses to ensure better resource management decisions occur.

The basic purpose of a stumpage pricing system is to attach a price for logs harvested which:

a. Adequately represents the true market value of logs of different species and wood products made from them.
b. Captures a fair and reasonable public share of economic rent of timber harvested to facilitate public funding for forest resource rehabilitation and development programs.
c. Covers in every situation at least the cost of reforestation and possible environmental off-site costs of logging (otherwise, the public carries the erosion and regeneration costs).
d. Encourages national and economic raw material use and sustainable development of forest resources.
e. Adequately takes account of the varying logging and transport costs.
f. Allows sound development of forest industries with investment level balanced to modern technology and supporting the manufacture of high value-added products.

These goals may be sometimes conflicting and trade-offs between them may be required.

Economic rent for timber is the value left after subtracting the minimum amount required to harvest and transport it to the market (including a reasonable profit for a extraction or timber operator). Thus, economic rent corresponds to the stumpage value of timber which is obtained from the market price of timber less the costs of reasonable efficient logging and transport and a reasonable margin for profit and risks. In principle, resource owners, like the government, can capture the whole economic rent without affecting the market prices of timber, because economic rent, if captured by the timber contractor (or other party) represents an "extra unearned" or windfall profit over and above the normal "earned" profit in logging.

Master Plan estimates of economic rent value the prime product sawlogs for the wood industry product prices ex-mill. Four calculations model the economic rent available from the major grades of sawlogs and corresponding timber grade prices (low, medium, high). Calculations in Appendix 3 give economic rents (stumpage value for timber) of Tk 8,400, Tk 7,200, Tk 4,200 and Tk 4,800 per m^3. Assuming the quality distribution of the log grades is 30 percent (low quality sawlogs), 40 percent (medium) and 30 percent (15 percent high quality sawlogs and 15% high quality peeler logs), the average economic rent is Tk 6,870/ m^3 (FMP 1993b). This amount represents the highest average stumpage value assuming 30 percent profit in sawmilling on variable and fixed cost and 20 percent profit on extraction operational and overhead costs. Attention is drawn to the fact that these assumed milling and logging profit margins are quite high, and infer support for a high degree of risk.

4. Replacement Cost Valuation

A system which recognizes or combines international resource values and the actual cost of growing and managing the resource is required. Primary products market value is high, if not higher than comparable international products, yet return to government ostensibly are lower than the real cost of growing the material. Table 9 compares estimated pulpwood and bamboo stumpage values for different products and by separate valuation methods. Table 10 summarizes

timber replacement costs for selected rotation ages and growth rates, Appendix 3 has calculation details. Past reliance on natural forests masked this cost since the resource was already there naturally and management's intensity was low and not costly. Basing the price on replacement cost always ensures GOB gets back its investment but makes the private sector full cost of forest management standards or any government misjudgment, efficiencies, inefficiencies. Such costs may become excessive or misleading if manufacturers have no control on raw material and government is the only seller.

Table 10 - Major Forest Product Replacement Cost, Tk/m^3

Plantation Type	Sawlogs	Poles	Pulpwood	Fuelwood	Average
Long Rotation					
Teak					
Status Quo	44,080	11,060	-	4,420	33,180
Scenario 1	18,320	4,600	-	1,840	13,790
Scenario 2	4,160	1,020	-	400	3,060
Other Species					
Status Quo					
Scenario 1	58,370	14,650	-	5,860	43,940
Scenario 2	23,460	5,890	-	2,360	17,660
Medium Rotation	5,260	1,290	-	520	3,870
Teak					
Status Quo	-	-	-	-	-
Scenario 1	1,770	380	-	220	1,330
Scenario 2	1,340	330	-	130	990
Other species					
Status Quo	-	-	-	-	-
Scenario 1	2,270	480	-	280	1,710
Scenario 2	1,690	420	-	170	1,250
Short Rotation					
Status Quo	-	-	520	-	520
Scenario 1	-	-	460	-	460
Scenario 2	-	-	210	-	210
Coastal					
Status Quo	-	-	180	-	180
Scenario 1	-	-	150	-	150
Scenario 2	-	-	145	-	145
Sal Enrichment					
Status Quo	-	-	-	-	-
Scenario 1	4,120	980	-	430	3.090
Scenario 2	5,820	1,430	-	570	4,290

Policy Implications

The economic rent calculations present the highest stumpage value attainable from timber resources under assumptions concerning normal profits in processing and in logging. Normally, under a stumpage system these calculations would be appraised for different products, mill sizes, geographical locations, wood supply conditions, and market assumptions throughout the country. However, the recent calculations confirm indisputably the earlier studies and discussions that the government can substantially raise the timber stumpage prices. But by how much is a policy and distributional issue. There is no single answer to this question. As stated above, there are many purposes in proper pricing of standing timber and some of the goals may and will conflict. The basic principles should be that price paid should reflect an appropriate economic rent based on the value of log at millgate (or product value); an assessed price which in all cases, covers the necessary regeneration and environmental on-site and off-site environmental costs.

It is suggested to set the stumpage price initially at 20 percent against the present rate of 12.5 percent of market price (or millgate price) of timber harvested. The above calculations and reference show that this magnitude is defensible and will not make a transition too difficult for the industry. The most accurate basis for stumpage price determination is to charge the economic rent, not a percentage of the market value of logs although the latter is easier to implement.

MARKETING

General

The demand and supply position of a commodity along with the availability of its substitute determines the type of market competition, price, quantity and the nature of equilibrium. The market situation for primary products is essentially different from that of finished products. Primary products are mostly used as raw material in the large or small processing units to manufacture finished goods. High volume, low value, perishability and less sustainability of primary products often commands a buyers market for bulk purchases, whereas the finished products are for final consumption by households and usually command a seller's market.

It is often difficult to draw a distinction between primary and intermediate products in the case of forest products because the same product can be termed primary or intermediate product depending on the use. For example, three different uses of fuelwood are final consumption by households, in the brickfields as fuel energy and as raw materials in the pulp and paper or hardboard industry. This is often noticed in the case of other forest products as well.

The product classification by stage of processing is shown in Table 11.

Table 11 - Product Classification by Stage of Processing

Item	Primary Processing	Secondary Processing	Tertiary Processing
Action	Logging, timbering, sawing and transportation	Sawing, smoothing, planing, shaping, profiling, twinning, curving and surface finishing	- Assembling, mixing with other wood-based or non-wood-based materials, finishing
Products	Round logs and sawn wood	Tongue and grooved, boarding, moulding, beading, dowelling, flooring, panelling, furniture components, other components of vehicle	- Packing boxes, cartoons, - Door - window frames - Furniture including kitchen or bathroom cabinets, prefabrication, buildings etc.

The Forest Products Demand Projection Report (FMP 1992d) assessed, estimated, and projected the demand and supply of major items of forest products. That report also indicated the national as well as regional distribution of demand and supply of different forest and forest-based products. This section reviews and examines the market situation, marketing activities, channel of distribution, price mechanism, government policies and other relevant issues without detailed discussion on demand and supply. Discussion of primary products precedes secondary products.

Fuelwood

1. Assessment

Nationally, tree fuels provide 44% of the biomass energy consumed today (Table 12), amounting to 225 kg per capita. Market fuelwood accounts for only 6% of biomass energy, while branches

and leaves provide 14 and 24% of rural household energy. The national demand estimate made by this study shows that total demand for fuelwood in 1991 was 7.98 m^3, which 5.12 m^3 was for domestic consumption and 2.86 m^3 for industrial consumption. The consumption demand by source for 1991 is presented in Table 13 by user sectors and by geographical regions. Projected demand shown is not the actual market demand related to the purchasing power of the consumers but projected consumption at the present percapita rate.

Table 12 - Percapita Fuel Consumption in Rural Bangladesh, 1991

Item	Quantity/ capita Kilogram	percent of Quantity	Energy/ capita (100 kilo calorie)	percent of total energy
Fuelwood	30.39	6.0	93.87	6.0
Branches	71.78	14.0	221.73	14 .0
Tree waste	125.21	24.5	377.51	24.3
Bamboo	21.84	4.0	65.85	4.2
Agri-residue	187.61	36.4	565.64	35.5
Cow Dung	74.90	14.6	209.05	13.5
Charcoal	2.46	0.5	19.90	1.5
Total	514.19	100.0	1553.55	100.0

Source: Wood Energy Report, FMP 1992g

Fuelwood is a basic need for food preparation and domestic cooking. The demand for it is overwhelmingly distributed throughout the country. Table 14 shows the demand and supply projections (FMP 1992d), the nature of markets for fuelwood and the large gap existing today and projected to 2013. Except for the Chittagong Hill Tracts, a huge deficit in supply occurs for all regions of the country. Five-year forecasts of Status Quo amounts are in Appendix 2. The gap is met through diverting other biomass materials, particularly agricultural residues, which could have more beneficial uses in agriculture. Other fuelwood scenario demand projections are separately reported (FMP 1992d), for the various development levels by five-year periods.

Table 13 - Regional Fuelwood Demand, 1991 (000 m^3)

User Group	North West	North Central	West	South	South East	North East	Hill Tracts	Total
Urban								
Rich	27.05	79.94	24.82	13.43	47.71	18.34	2.03	213.33
Poor	71.59	211.53	65.68	35.55	126.24	48.54	5.37	564.49
Rural								
Rich	131.67	227.52	165.97	136.50	184.22	151.81	10.89	1,190.58
Poor	830.03	602.05	439.18	361.21	487.47	401.72	28.81	3,150.29
Total								
Domestic	1,242.35	1,121.03	695.65	546.70	845.64	620.41	47.09	5,118.69
Industrial	690.40	625.70	426.20	271.10	472.00	346.20	22.20	2,856.80
Total	1,935.75	1,746.73	1,121.8	817.80	1,317.64	966.61	69.29	7,975.49

Source: Forest Products Demand Projections, FMP 1992d.

Note:

a. Results are derived on the basis of actual population of 1991.
b. Rich and poor in urban and rural areas are assumed to be 1:4 in ratio.
c. Industrial consumption includes commercial and institutional demand.
d. Same level of consumption percapita is applied for Chittagong Hill Tracts region as well.

Table 14 - Fuelwood Supply-Demand Projection, Status Quo, (000 m^3)

Item	North	North	West	South	South	North	Hill	Total
1993								
Demand:								
Domestic	1288.61	1162.78	721.56	567.05	877.13	643.51	48.85	5309.49
Industrial	719.06	648.85	441.97	281.13	489.46	359.01	23.02	2962.50
Total	2007.67	1811.63	1163.53	848.18	1366.59	1002.52	71.87	8271.80
Supply	882.00	763.00	546.00	860.00	857.00	391.00	1880.00	6179.00
Balance	-1125.67	-1048.63	-617.53	-12.82	-509.59	-611.52	-1808.13	-2092.80
2013								
Demand								
Domestic	1751.25	1580.24	980.61	770.64	1192.03	874.54	66.38	7215.69
Industrial	1052.77	949.98	647.09	411.60	716.62	525.63	33.71	4337.40
Total	2804.02	2530.22	1627.70	1182.24	1908.66	1400.17	100.09	11553.10
Supply	1300.00	1155.00	813.00	1346.00	1518.00	590.00	1486.00	8208.00
Balance	-1504.02	-1375.22	-814.70	+164.76	-390.66	-810.17	+1385.91	-3345.10

Source: Forest Products Demand Projection, FMP 1992d

Major suppliers of fuelwood are the village households/ farmers who grow different type of trees in their homestead. The village households supply about 75 percent of the fuelwood in the country while Government forestry programmes provide the remaining 25 percent. Tree branches and tops and sawing residue are the common fuelwood for domestic consumption. All fuelwood consumed in the country does not enter the market as a monetized transaction, most of the domestic uses are outside the market.

A small portion of total consumption enters the market providing jobs for several thousand people throughout the year. For household permit holders, extraction of fuelwood from the reserved forest is virtually free, involving a day's labour for collection and payment of a token amount as a permit fee to the Forest Department.

It is expected that future supplies will improve with the maturation of the recently planted fuelwood forests throughout the country. Supplies for commercial consumption are traded in the market. Fuelwood for industry, used in hard, plain, and particleboard mills, pulp and paper industries, is supplied from the reserve forests under special agreement with the consuming industries and the Forest Department.

The quantity of fuelwood collected from the reserved forest ranges from 0.8-1.1 million m^3 annually, which brings an amount Tk 150 - Tk 200 million to the Forest Department as royalties. Total value of fuelwood used and transacted in the market today is approximately Tk 3,588 million, based on present prices.

2. Distribution Channel

Villagers are the major suppliers of fuelwood for domestic and commercial uses. They sell the standing trees to buyers or small traders. Purchasers have the trees cut and supply the logs to the brickfields and other processing industries. The fuelwood market is seasonal, concentrated mainly during the dry season, when movement is easier and the logs dry in the sun. The commercial activities that require fuelwood for processing their products are also mainly seasonal such as brick making, lime processing, and tobacco drying. During the dry season, small traders in towns and cities build up their stock for the wet season when the demand for fuelwood is suspected to be mostly for domestic cooking. In villages only rich people can afford to buy the standing tree for

fuelwood. The poor try to collect it from the nearby reserved forest, if any, or use leaves, branches and wastes from his own groves or from public places.

Government forests are the next important source of supply of fuelwood. Domestic consumers around the forest fringe collect their fuelwood directly in headloads from the forest after paying permit fees to the Forest Department. Traders also collect boat/ truck loads of fuelwood from the reserves after paying appropriate royalty. In other reserved forests, fuelwood in bulk, as a separate product, is sold on rare occasions. Purchasers buy the timber along with the fuelwood unless otherwise specified in the terms of Agreement. Auctioneers then sell to the local middlemen and traders who in turn sell to the consumers.

The Sundarbans is the largest forest source for collection of fuelwood. The Department employs a permit system as the means of sale for fuelwood and other products like golpatta, fish, honey, wax and hantal from the Sundarbans. During the extraction season, the registered boat owner/traders obtain seasonal permits to collect/extract fuelwood from a specified area on payment of royalty. The loaded boats are taken to the market place for sale. Most of the Sundarbans fuelwood is carried out by country boats and used in the south and southwest of the country.

Fuelwood is also required for Khulna Hardboard Mills, Kalurghat Particleboard and Veneer Plant (PBVP), Chittagong Board Mills, Sylhet Paper and Pulpmills and for Karnafuli Paper Mills. Annual requirement of Khulna Hardboard Mills is 16,000 cubic metres of sundri and goran wood for its processing operation, all of which is supplied from the Sundarbans under special agreement between BCIC and the Forest Department. Supplies for KPM, PBVP and others are received from Chittagong Hill Forest under similar types of special agreements. Contractors are appointed by the user industries to extract raw materials including fuelwood from the forests under joint supervision of BCIC and the Forest Department. Private particleboard industries also get their supplies from the Department through BFIDC. Because of the present cutting moratorium, and the insurgency problem in the Chittagong Hill Tracts, both BFIDC as well as private enterprises, buy from private sources.

3. Price Mechanisms

Fuelwood prices in different parts of the country vary but is more or less uniform for the same species. Shortage is the norm in all regions. Price determination mostly depends on middlemen as well as the bulk customers rather than the primary sellers. It is a monopoly market because most of the bulk consumers are members of some organized body and they calculate their costs and profit well before start of the season. As a result, an average price of fuelwood for the season is maintained throughout the season.

At present, the price per ton of fuelwood for mango and similar quality is Tk 800 - Tk 1,000/ tonne or Tk 560 - Tk 600/ per m^3. Fuelwood with high calorific value (sundri, sal, gauzier) commands the higher price per tonne which is Tk 1,200 - Tk 1,500. The retail price of higher quality fuelwood is Tk 1,340 - 1,610/ MT compared to mango.

The royalty fixed for firewood from the forest seems very low compared to market prices. For example in the Sundarbans the royalty is Tk 135/ tonne. Labour, transportation, food and accommodation, costs are higher than the royalty rates. Since production costs plus royalty almost equal the market price, the vendors make little profit by selling fuelwood.

The royalty rates are different for different reserved forests and for different species in the same reserve. Examples of existing and proposed rates of fuelwood royalties (Sundarbans) are in Appendix 4. Royalty rates are flexible and changed periodically to reflect market rates. Usually,

rates are fixed as 12.5 percent of the existing market rate in the case of permits or three years average of previous tender price in the case of tender sale.

4. Marketing Problems

The major problem of marketing of firewood is the high transportation cost compared to its low value. High transportation cost often results in unprofitable and uneconomic fuelwood trading. This is for two reasons, firstly, the reserved forests are located far from the high demand areas and secondly, excessive handling at different stages of marketing is required, increasing costs.

It is clear from Table 14 that the northwest and north central part of the country are the major deficit areas. Projected shortages grow quickly during the plan horizon if present forest management levels continue. However, observed price differentials between these regions and other regions are negligible. The government wants to replenish the demand-supply gap of fuelwood by creating fuelwood forests of short rotation in Chittagong and Cox's Bazaar regions, but because of low values the economics of growing fuelwood in remote zones require in-depth investigation. The solution may be to encourage villagers to plant fuelwood trees of short-rotation instead of horticulture trees and to speed up the programme of social forestry throughout the country.

Problems of fuelwood marketing include the gradual shortage of supply and shrinkage of forest areas due to encroachment and other reasons. It is believed that stocks in the villages are also depleting quickly without being sufficiently replenished. Over the years there has been encroachment and over cutting of trees throughout the country. No one has planted fuelwood for the purpose of using it as fuelwood only. Most of the trees being cut are horticulture trees which provide food, fodder, fuel and timber together. The population explosion is the major reason for increasing demand for fuelwood. Another important reason is the lack of cheap commercial fuels in the country, particularly in rural areas.

The lack of cheap fuel energies in the rural areas push the still surviving forests to a disastrous position of extinction. Finding no other alternatives, people are substituting cowdung and agricultural residue for fuelwood which depletes soil fertility. The use of agriculture residue and fuelwood in Bangladesh is shown in Table 12, agriculture residues provide an estimated 36% of rural enregy and cowdung 15% In the past, fuelwood plantation received little attention in government programmes. Hammermaster (1983) highlighted this for the first time. Subsequently, Government began fuelwood programmes in Chittagong Hill Tracts and Cox's Bazaar regions. Now, as the plantations mature, Government faces the practical problem of selling the output at a fair price in the hard hit areas of north and central regions of the country.

5. Fuelwood Strategy Implications

The demand projection forecasts a huge future deficit if alternatives are not provided. Fuelwood plantation alone can not cope with the situation. Government has to provide alternative sources of cheap energies like coal, natural gas and others.

Agricultural waste and cow dung is used increasingly as fuel energy in rural areas. Traditionally, agricultural waste and cow dung are used as manure with humus nitrate to protect the fertility of the soil. Greater use of cow dung as fuel leaves very little surplus for use as manure. The soil fertility deteriorates in the longrun if chemical fertilizers are used without natural manure. Government wants to reduce the use of cow dung and agri-waste for fuel energy and prefers to redivert them as humus nitrates. Government intends to provide the consumer with an increased supply of fuelwood in future, uniformly throughout the country. Consequently, there have been several programmes involving fuelwood plantation. Thana Banayan Prokalpo, woodlot plantation

and many programmes of NGOs are working to this effect. These are good attempts by the Government because the projects are meant to cover all rural areas.

The economics of fuelwood plantation need objective assessment before beginning large scale plantation programmes. Fuelwood is a low value single use product and requires careful evaluation. Both financial and economic returns need analyzing. In future, when commercial energy becomes available, people may shift to those alternatives even if fuelwood is cheaper. Moreover, once Government policy restricting the use of fuelwood for brickburning and other processing activities is implemented effectively, the severity of shortage may decline.

Traditionally, the rural people in Bangladesh grow horticulture trees as a source of multiple products. Most of the fuelwood supplies now are products of horticulture trees of the villages. Acceptability of fruit trees is more than other trees. Therefore, the selection of species commands high priority for large scale afforestation even plantation of fuelwood, in the rural areas and homestead groves. People may be motivated to grow high yielding varieties of fuelwood like local koroi and raintree.

Large scale plantation in one region will not help meet the gap in other deficit areas because of inaccessibility and higher transportation costs. Because fuelwood is a basic need the price should not be high. Ability to pay criterion is also part of the pricing criteria. Those who could afford higher price for fuelwood would immediately change to gas, kerosene and other commercial fuels in place of fuelwood. Recommended policy options to meet the increasing demand in future are in the Wood Energy Report (FMP 1992ge).

Sawlogs

1. Assessment

Sawlogs are the main products of reserved forests and all types of wood and wood-based industries depend on sawlogs for their activities. In Bangladesh wood-based industries play a vital role in the economy and cannot be over emphasized.

The demand for sawlogs arises from a variety of sectors of the economy and for various uses. The demand/ supply projection shows an acute shortage of sawlogs in the country and this will continue in the future until some positive measures are taken to offset the deficits. The projected shortage is 3.4 million m^3 in 1993 and 4.8 million m^3 in 2013. This represents only 30 percent of the projected demand under Status Quo situation. Unless corrective programmes are begun, the gap between supply and demand can only be met through imports, supplies from unrecorded sources or by reduced consumption and consequent living standards. Table 15 projects the Status Quo sawlog demand and supply for the next 20 year period, the full projection is included in Appendix 2. Projections for other development options are reported separately (FMP 1992d).

The major supplies of sawlogs are coming from village sources but the quality of village timber is not of high commercial value like teaks or garjan. The total supply is dominated by horticulture trees like mango, jackfruit and others grown in the homestead groves. Hard and exotic species are supplied by the reserved forest. The sawlogs supplied by the villages are consumed in most part by the rural areas and urban fringes. Only the best logs come to the urban areas for furniture manufacturing and building construction. Village supply trend has increased in the cities and urban centres with the imposition of the cutting moratorium in reserved forests.

Table 15 -Sawlog Supply-Demand, Status Quo (000 m^3/ A)

Commodity	N-West	N-Central	West	South	S-East	N-East	CHT	Total
1993								
Sawlog:								
a. Domestic Urban	196.56	542.18	173.62	96.54	326.25	129.91	14.04	1479.53
b. Domestic Rural	734.05	531.23	388.19	319.41	430.47	355.16	25.46	2783.80
c. Commercial [a]	56.20	155.04	49.65	27.61	93.29	37.15	4.01	423.07
Total	986.81	1228.45	611.46	443.56	850.01	522.22	43.51	4686.40
Supply	178.00	154.00	112.00	330.00	192.00	103.00	216.00	1285.00
Balance	-808.81	-1074.45	-499.46	-113.56	-658.01	-419.22	+171.49	-3401.40
2013								
a. Domestic Urban	341.97	804.37	277.86	164.14	494.32	213.92	21.91	2319.09
b. Domestic Rural	970.69	697.68	512.49	422.24	566.71	469.23	33.58	3672.40
c. Commercial	95.48	224.58	77.58	45.83	138.01	59.73	6.12	647.49
Total	1408.14	1726.63	867.93	632.21	1199.04	742.88	61.61	6638.98
Supply	2661.00	243.00	165.00	425.00	334.00	132.00	263.00	1828.00
Balance	-1142.14	-1483.63	-702.93	-207.21	-865.04	-610.88	+201.39	-4820.98

Source: Forestry Master Plan, 1992d.

[a] Includes Government, commercial and other industrial users

The supplies of quality timber of hard and sophisticated species come from the reserved forests or USF. In the past, supply of timber was abundant in relation to total market demand. BFIDC was established during the 1960's to utilize the forest resources of the country for productive economic purposes and to satisfy the nation's demands. Gradually the demand has reached a position that local supply can not cope with even for higher prices. A substantial proportion of the supplies of hard and sophisticated species are now imported since 1988-89. The import of sawlog has increased dramatically during the last three years. Small quantities of supplies have entered into the market from neighbouring countries as drifted timber or through illegal trafficking.

The Department classifies all commercial species according to the quality and sophistication of the timber; royalty and market price depends on this classification. The classification reflects durability, strength and density and employs three classes. These range from light coloured, low density softwoods to the darker coloured, high density hardwoods - Class C to A respectively. Class D includes all the present non commercial species. A special class includes the very expensive high priced species. Suitability of the species for a particular purpose determines the market demand and price even if the royalty is the same. Some species have higher demand than others within the same class. Species included in the current categories are listed in Appendix 4. Typical species in the existing system are:

Special - teak and mahogany
A - sal, gamar, sundri, garjan
B - dakijam, shil koroi, civit, satian
C - white koroi, simul, other jams
D - miscellaneous

The major customers of sawlogs are sawmilling industries which process it up to the level of intermediate products sawnwood. Most of the sawmills are under private sector ownership. A few modern sawmills are operating under the public sector corporation. BFIDC and a few private mills have composite units of wood treating, seasoning and planning along with sawmilling.

Logging and timbering from the reserved forest is done mostly by BFIDC, the only operation with mechanical logging equipment. Private purchasers rely totally on manual methods. Village logs are also handled manually by small trades.

2. Price Mechanisms

Price determination of major forest products reflects the demand and supply of the commodity either directly or indirectly. Different methods of sale are practised in the country by the private sector and Forest Department. Methods of sale and price determination are discussed in the following paragraphs.

Village Supplies - The price of village species is determined by the forces of demand and supply in the market. In recent years the price of wood and wooden furniture has gone up. Different rural regions are differently endowed with forest resources but the price of village species is almost uniform with a 10-15 percent variation throughout the country. Village supply is mostly horticultural trees which are grown for other purposes than producing timber. Therefore, the price of timber does not reflect the cost of production. Timber is the final output of a horticulture tree sold only when the fruit bearing capacity is reduced or the owner faces financial crisis. Nobody in the rural areas tends to grow trees for the purpose of commercial and financial motive other than consumption of fruits. Recently, awareness is growing regarding tree plantation among the people and villagers are now selecting timber trees like mahogany and teak to plant in their premises.

Forest Supplies - The price determination for the forest supplies follow certain set procedures established by the Forest Department. The price of garjan in Chittagong, the most used timber, has increased from Tk 3,000 per cubic meter in 1980 to Tk 10,500 in 1991, ie. three times higher. This has occurred in most species of timber. The Government issued an order of moratorium on felling trees in the Hill forests of Chittagong and CHT in September, 1989. Immediately after the moratorium, the price jumped 50-100 percent on a case basis and an artificial shortage in market supply was created. With the passage of time, supply became normal but price remained more or less static for the last three years. This leads to the conclusion that the objectives of the moratorium were not achieved and timber has been coming out from the forests as before the restriction.

The method of sales of round timber and sawlog of the Forest Department is specified by Articles 25 and 31 of section 14 of the Forest Manual. The provisions of the Article 25 empower the Forest Department or a professional representative of Forest Department to identify the extractable log quantity and to organize their sales. On his recommendation the administrative section sells the product according to manual provisions. Article 31 gives details of the methods of sale of forest products by the Department. Depot sales are on a cash basis only and purchasers cannot remove more timber than the amount paid for.

Article 25 specifies that timber is sold subject to a working plan drawn up by a professional forest officer based on full examination of the capabilities of the forest, considering the demands, local and other, and with careful regard to the order and rules of the Government under the Forest Act,1927 (Act XVI of 1927, section 15, clause (c)).

Article 31 specifies the types of forest products for disposal and the disposal methods, which are by:

(a) Auction or by sealed tender at rates fixed by competition under conditions contained in sale notices approved by the conservator.

(b) Permit at rates fixed by schedule.

(c) Private sale in exceptional cases, subject to Chief Conservator approval.

(d) Special grant.

3. Pricing Forest Supplies

The royalty on forest species depends on the policy of the government as well as the Department. For private customers the price is normally determined by auction or through open tender. A reserved price is fixed as the last three years simple average. This system is assumed to reflect the market price at the forest site. Traditionally, the official royalty rates for BFIDC and other permit holders are fixed on the basis of 12½ percent of the market price. The Department is happy with this system and the 12½ percent rate for all products except for special class of timber. Special class timber carries higher rates than 12½ percent of the market rate. The sale of special type of timber is normally done by auction and the price fixed by such method applies to all customers, private or public. Recently, all special class timber went to auction, no royalty sales have occurred.

The royalty rates for timbers are thus flexible and change with market price. The rate of royalty is fixed both on the basis of last auction price and on market price survey done by the Department from time to time. For different items the price changes are made at different intervals. If the market prices of some items are observed changing quickly then the rate of royalty is also changed quickly or vice versa.

In the case of sawlogs or sawnwood at forest depots, the price is normally fixed by open auction. The auction price again varies according to the species location, accessibility, road condition and type of transport used. Terms and conditions of different methods of disposal vary.

The royalty of raw materials for wood-based industry is fixed for a long term based on negotiations or contract with the Forest Department. Gewa for KNM, sundri for Khulna Hardboard Mills, bamboo for SPPM and KPM are supplied under agreement between BCIC and the Department. Recent schedule of royalties for corporations is presented in Appendix 4.

Because of excess unsatisfied demand, the market for forest products reflects a seller's market. Whatever quantity and quality are available in the market is sold at prevailing prices. The supply situation in the market was not seriously aggravated by the cutting moratorium. Due to expected shortage of supply from local sources and the moratorium, Government liberalised the import of round logs, sawn timber, poles, posts and other wood products in the private sector in 1988. This imported timber has also contributed to stabilising the market price to a greater extent.

4. Distribution Channels

Extraction and harvesting is done under the prescription of the working plan. Working plans set the basic requirement for forest management and harvesting of products as determined by the forest manual. According to the prescription of the Working Plan the area of extraction is first determined then marked properly determining the volume of timber and fuelwood for each tree and preparing a detail schedule of sales. The next step is getting approval from the appropriate authority and then making an announcement following the procedure for publication of gazette after which the approval announcement is published in the national newspaper. Following the set procedure an auction is announced and conducted and revenue realised. (A copy of the Gazette is presented in Appendix 4.

Successful bidders are allowed to pay the bid money by instalment through treasury receipts. This gives bidders a chance to arrange payment before the complete removal of timber from the forest. The payment condition mentioned in the rules of procedure says that bidders must pay all of the

sum before final removal. Payment procedures vary according to the method of sales. In the case of tender participation and open auction of lots, instalments are allowed at different ratio but in the case of auction in depot no instalment is allowed and the bidder has to pay full money before removing the products.

Transporting logs is difficult because of log sizes, lack of proper handling and lifting equipment and small-sized trucks. The remoteness and inaccessibility of the Hill Forest areas is also a major factor as well as the poor quality or lack of roads. Elephants are too expensive and are unavailable, as a result, human labour is commonly used to carry out the logs to the streams and then floated by river to depots. During the rainy seasons the heavy logs are drifted into the water and towed to the nearby BFIDC depot or road where they are loaded on trucks for transports to the sawmills or consumers.

BFIDC supplies log and sawnwood to the government and government agencies as well as using material within its own mills. It is the major customer of the Forest Department and gets preferential treatments and concessional prices from the Department. A considerable amount of wastage occurs during extraction operations. Wastage results from the lack of close supervision by the Departments, lack of transport and the presence of non commercial species. Reportedly, about 30 percent of timber is wasted in BFIDC's extraction operation. The corporation is responsible for extraction from the Kassalong and Matamuhuri Reserves, both of which are distant from the market, and in the latter case, inaccessible.

BFIDC does not participate in auctions. Government is considering a partial lifting of cutting restrictions in the Kassalong and Matamuhuri Reserves to help BFIDC. Since 1989 the corporation could not harvest the output because of the insurgency problem. Presently some areas in Cox's Bazaar are allocated to BFIDC near the private auction to save the corporation's operation.

Village logs are brought to the nearest market by hand cart by small traders and sold to local sawmills or accumulated by middlemen and transferred to city markets. If used within the village, pit sawyers saw the log on site according to arrangement with the owner or purchaser. Private sector participants, timber merchants, sawmills, and timber-based industries take part in the Department's log auctions. Their sawmills, mainly located in the urban centres, - Dhaka, Chittagong, Khulna, Noakhali and Rajshahi - spend more for the transportation of timber and fuelwood from the forests of Chittagong, Chittagong Hill Tracts, Cox's Bazaar and Sylhet up to their premises.

There has been no restriction on the movements of timber from one place to another on legal or administrative matters until the moratorium. After the moratorium all felling is restricted except the free permit in Chittagong and Hill Tracts Districts. Any movement of forest products from one place to another requires prior approval and a transit pass from the authorities.

Impact of Moratorium on Price and Supply

To reduce forest degradation and to protect the environment by halting the gradual destruction of natural forests, GOB placed a cutting moratorium on the reserved forests of Chittagong, Chittagong Hill Tracts and Sylhet in September, 1989. This move resulted in reduced supplies of wood and logs in the initial stage, raised prices and consumers suffered. Government opened up importing provisions of wood and timber to meet the local demand. For the first year, imports were free of customs duties and taxes, terms were liberal. Gradually, Government imposed custom duties and taxes on imports of timber, and as a result, the import by the private sector has virtually stopped, illegal felling has appeared and markets again rely on local supplies. The market price remained more or less constant during the last three years.

Because of administrative loopholes and loose enforcement of the moratorium law, the illicit felling was not stopped and the supply position has improved. The loopholes existing are the provisions issuing USF and free (jot) permit without proper verification. In the name of free permits, removal of trees continues illegally from the Reserve Forests. Market prices remained stable since the moratorium was effected, except for the first year. The supply situation was also satisfactory in the private sector depots and stores. At present, anybody can buy any amount of timber in the open market without paying additional price.

Formal evaluation of the moratorium awaaits the Depatrment's decision, but from the verbal information collected during the study it is obvious that GOB's objectives were not achieved. Instead it resulted in lost government revenue and has nearly caused BFIDC enterprises to close. In summary, the consequences were:

a. Most activities of BFIDC enterprises became less profitable, both because of the insurgency and moratorium. Former loss was increased and more jobs curtailed.

b. Government has been deprived of its share of the revenue from the proceeds of forest products, about Tk 2.0 billion during the last three years.

c. Deforestation continued because of malpractice and corruption. Reportedly, malpractice is more rampant now than before, beyond the limit of control and new interest groups have evolved in the forest areas.

d. The availability and cheaper price of local timber in market has discouraged importers to import timber for private consumption.

e. The widespread, uncontrolled cutting is beyond the remedial technical control of a regular Departmental plantation programme so more damage to the forest occurred than if normal cutting and extraction had continued.

Strategy Implications

From the projection of sawnwood demand and log supply presented in Table 15 it is clear that supply can not meet the growing demand on a sustained basis, regardless of the imposition of the cutting moratorium. Offsetting the supply gap in the future requires implementing the following measures:

a. Growing wood more quickly. This means short rotation crops of commercial species combined with improved silvicultural practices and adequate managerial care, especially for fuelwood and soft timbers.

b. Recover more sawntimber from existing log supplies. This needs import of modern sawmilling technology both for private and public sector.

c. Introduce incentive schemes or improve extension coverage to farmers and tree growers for growing more trees of horticultural as well as commercial values.

d. Liberalise import of timbers and logs in the shortrun through exemption or low import duties and taxes to keep prices of imports competitive with local timbers. Consider pricing imports lower than local products to reduce the demand for local timber species.

e. Increasing local price with the import price, so that consumption is discouraged and government gets more revenue income.

f. Formulate a national wood utilisation policy emphasizing the wood preservative treatment and seasoning for greater longevity and reduced costs.

g. Emphasize and encourage more use of substitutes of wood and wood products.

h. Increase research efficiency and manpower to determine the proper uses of forest and village timber species with the help of modern silviculture and genetic technology.

Poles and Posts

1. Assessment and Price Mechanism

Major consumers of poles and posts are households, REB, PDB, Ports Authorities and the construction industry. Households usually consume sal, sundri, keora, and goran for houseposts and pilings. Because of shortage of those species and higher prices, lower quality species are now more extensively used. The forest products demand survey (FMP 1992d) shows a gap between demand and supply for poles and posts in the country. This will gradually shrink in the future, by the year 2000 it disappears and a surplus exists. The present gap arises because of the cutting oratorium and the damage done to the sal forests of Dhaka and Rajshahi regions, formerly major suppliers of posts and poles. At present, the demand for post and poles is satisfied by import from different countries. The import of REB and PDB comprises eucalyptus, pines of different categories and garjan coming from Canada, USA, Australia, Malaysia and Scandinavia.

Timber from the Sundarbans is mostly consumed in the south and southwest of the country. Sundarbans logs are used more as poles, piles and houseposts than for manufacturing furniture because of the nature of the timber. The only mode of transport from the Sundarbans is waterways at least up to to Barisal or Khulna landing centres. Then it is carried either by country boats or by trucks, according to the suitability of the consumption centre. Because of cheaper cost of transportation by waterways, Sundarbans's products are carried out by waterways to Dhaka, Chandpur, Narayangunj and other distant places.

The price mechanism of poles for domestic consumption is similar to other forest products used for domestic purposes i.e. free play of market demand and supply. The institutional buyers purchase through open tender system nationally or internationally. According to the provision of tender regulation, price is normally fixed at the lowest quoted rate, which may be more or less similar to the market rate. The unit price varies from species to species and according to distances of destinations.

Most of the poles and posts collected from the local sources are transported by water or road or by both as per suitability and accessibility of the forest. The imported poles are often carried by railway from the port of arrival to major depots and then by trucks to the project sites.

2. Strategic Implications

The present rate of percapita consumption of poles and posts in the domestic sector is .0019 m^3/ A, equivalent to 174,000 m^3 in 1991 for the nation. The amount of industrial demand was 52,150 m^3 in the same period. The domestic demand for poles and piles is on a declining trend because of high cost of timber and preference for construction of social infrastructure like schools, mosques, clubs, godowns, and health centres in rural areas. In the urban areas, the majority of all new houses constructed use concrete. Only in southern districts are wooden houses still preferred in the rural areas.

Sal, sundri, baen, keora, eucalyptus, pine, teak and garjan are the best species for poles and posts. In the past, most of the poles and posts came from the natural sal and mangrove forests. Now

some quantity of poles are obtained from the thinning operation of the plantation forest along with felling in the Sundarbans. The supply of poles projected for the future mainly come from the plantation forests as an intermediate crop. Some supplies are expected from agroforestry and private plantations all over the country.

A substantial portion of demand for institutional buyers like REB and PDB formerly was met by BFIDC (60-70 percent) from the indigenous species, the remaining portion of demand was met by import. Now, REB, PDB, Railways and others are importing one hundred percent of poles. Recently, REB changed their policy re suitable species and some formerly non-commercial village species are accepted for cross arms and anchor logs. At present, BFIDC, along with other private parties, are supplying REB and PDB after purchasing from the village homestead.

Poles and posts are intermediate products of plantation forest and it is expected that the country will achieve selfsufficiency in poles by the year 2000 because of thinning operation of existing plantations. However, this requires proper care of the plantations. If the usual programme continues, then the country will achieve selfsufficiency in the 2005.

Pulpwood

1. Assessment

The requirement of pulpwood and bamboo under different scenarios is presented in Table 16, full details are included in the Forest Products Demand Projection Report (FMP 1992d).

Table 16 - Supply-Demand Balance of Pulpwood under Different Scenarios (000 m^3)

Source	1993	1998	2003	2008	2013
Demand for Pulpwood					
- Population	256.9	320.9	377.4	441.3	505.2
- Population/ Literacy	279.5	408.2	508.0	614.9	722.5
- Mass Literacy & High Export US	515.3446	844.7	1226.1	1499.9	1829.8
400 GDP Economy	2.2	688.2	929.2	1178.4	1448.7
Supply of Pulpwood					
- Status Quo	284	344	478	500	518
- Scenario 1	293.0	393.0	628.0	648.0	655.0
- Scenario 2	293.0	403.0	1122.0	1370.0	1640.0
Balance: Demand-Supply					
- Population	27.1	23.1	100.6	58.7	12.8
- Population/ Literacy (Scenario 1)	13.5	(15.2)	(120.0)	(330.1)	(67.5)
- Mass Literacy & High Export Economy (Scenario 1)	(222.3)	(451.7)	(598.1)	(851.9)	(1174.8)
- Mass Literacy & High Export Economy (Scenario 2)	(222.3)	(441.7)	(104.1)	(129.9)	(189.8)
- U$ 400 GDP	(169.2)	(285.2)	+192.8	+191.6	+191.3

The projected demand for paper of different grades and newsprint implies that huge quantities of pulp will be required. In 1998 the demand for pulpwood will be 0.32 million m^3 if only population increase and present percapita consumption is considered. It will be 0.84 million if mass literacy programmes continue and present export of newsprint is maintained. The supply under Status Quo will be 0.34 million which indicates a surplus of 23,000 m^3. In the case of mass literacy, the shortage will be 0.45 million cubic meters.

Raw Material - The entire paper industry originally depended on natural forest supplies like bamboo, gewa and reeds. Bamboo was the original raw material used for making pulps in KPM, Karnafuli Rayon Complex and SPPM. The only exception was gewa from the Sundarbans in KNM. Because of a shortage of bamboo and reeds in Sylhet areas and tribal insurgency and flowering of bamboo in Chittagong, SPPM and KPM are now trying to divert their consumption towards softwood and fuelwood of hardboard species. Initially, both enterprises consumed one hundred percent bamboo as principal raw material then gradually mixed local fuelwood with bamboo in suitable proportions. Recently, changes to SPPM and KPM has modified the technology to suit the use of pulpwood for producing pulps. At present, the ratio of bamboo and fuelwood is 60:40 for KPM and SPPM.

Bangladesh grows a small amount of melocanna pulpwood for the Sylhet Pulp and Papermill. It also grew gamar for the Karnafuli Pulp and Papermill but this remains unharvested due to a royalty dispute between KPM and the Department. Coniferous species, more suitable for pulp manufacturing, are on a trial basis only (Pinus caribeae near Kaptai). The demand for pulpwood arises from the demand for paper and paper products in the country.

During the early 1980's KPM started planting pulpwood around the Karnafuli and Chandraghona valleys on their leased land but later the lease was cancelled and the responsibility was pushed back to the Forest Department. The Department later completed the plantation and raised the crops. The wood is now mature but disagreement regarding royalty rates poses a serious hindrance to the use of pulpwood by KPM. The flowering of bamboos in the reserves as well as over extraction and the insurgency problem makes the collection more expensive and troublesome. Moreover, high market price for bamboo in the market outside the industry has given the Forest Department a bargaining position which threatens paper industries for all types of raw materials obtained in natural reserves. The paper industry must think of using softwood/pulpwood at current production levels instead of bamboos.

If the raw material base for the pulp industry is not expanded quickly through plantation of pulpwood the country will have to depend on imported pulps to a larger extent.

One exception is the North Bengal Paper Mills which uses bagasse as raw material for producing pulp. The capacity of the mill is 15 thousand tonnes of paper which often is not realised because of shortage of bagasse. The possibility of setting-up of other bagasse based paper mills is thus limited. The sugar mills are now using bagasse as fuel energy, substituting for furnace oil for economic reasons.

All pulpmills using raw wood in Bangladesh are under the control of BCIC. The supply of raw materials is made under agreements between BCIC and the Forest Department. The responsibility of extraction, transportation, handling and storing lies with the respective pulp and papermills. Mills are responsible to construct and maintain the infrastructures, roads, and landing depots for extraction and storage operation. Though the rates of royalties are minimum, total extraction costs including infrastructure development and maintenance, labour, transport and other social costs are similar to the market price. The rate of royalty is subject to negotiation which is below the normal market rates.

The mills also collect bamboo and firewood from the private sources at a market rate, where private parties bear the cost of collection and transport up to the storage depot or millyard.

2. Strategy

The pulpwood plantation appears to have a great future in Bangladesh's forestry sector. The ever increasing gap between supply and demand in the future even in Status Quo situation offer large scale, short rotation plantation opportunities. It is expected that when plantation is done

according to the Master Plan's recommendations, selfsufficiency in pulpwood is achievable by 2018. Pulpwood is a short or at best medium rotation crop, easily grown and produces income quickly at shorter intervals compared to long rotation products.

Sawnwood

1. Assessment

The demand for sawnwood is projected both in terms of roundwood equivalent and actual demand for sawn timber (Table 17). Another reason for severe shortage of supply of roundwood is the low recovery rates of sawn timber due to lack of modern technology and improved machinery as well as the incremental demand. The shortage can be minimized if improved technology is used for higher recovery. The demand projection presented is based on present rate of percapita consumption which is one of the lowest in the world. It is expected that the percapita consumption of timber will increase with the improvement of economic conditions of the people.

Table 17 -Demand for Sawnwood and Roundwood Equivalent,1991 (000 m^3/ A)

Users Sector	North West	North Central	West	South	South West	North West	Ctg Hill Tracts	Total
Urban Rich	45.13	135.28	42.01	22.74	80.74	31.04	3.43	361.13
Urban Poor	18.48	54.60	16.96	9.18	32.59	12.53	1.39	145.76
Rural Rich	64.26	189.88	58.96	31.91	113.32	43.57	4.82	506.89
Rural Poor	267.83	194.26	141.71	116.55	157.29	129.62	9.30	1,016.52
Other*	9.64	28.48	8.84	4.79	17.00	6.54	0.72	76.03
Total Sawnwood	341.73	412.63	209.52	153.25	287.62	179.73	14.84	1,599.44
Roundwood Equivlaent	911.29	1,100.35	558.72	408.67	766.97	479.28	39.56	4,265.18
Sawnwood Industrial	5.34	57.81	66.47	-	39.38	25.06	10.13	204.19

Source: FMP 1992b

* Government and commercial

There are about 4,500 sawmills and about the same number of pit sawyers in the country which supply the entire sawnwood to the customers at the tertiary processing level. The share for public sector is 20 percent of the total.The customers of sawnwood are furniture factories, households and industrial and commercial enterprises with furniture factories the major customers. Furniture factories are concentrated in urban centres. The supply-demand projections presented in Table 17 shows the position of sawnwood demand by region and customer group. Sawnwood demand is increasing because of increased population, more housing construction and modern furniture manufacturers.

Domestic household demand for sawnwood forms the major proportion of the total demand which includes building materials, door, window, timber, wooden furniture, agricultural implements and transport equipment. The consumption of wood percapita is higher in the urban areas than in rural areas. Other major consumers of timber and timber products are commercial and industrial enterprises. Government is also a single major consumer of timber and timber products for its various ministries and projects.

The quality timbers either in round or sawn like teak, mahogany, garjan and others is brought to the cities and urban centres because of consumers concentration and higher prices. There are hundreds of sawmills and thousands of furniture manufacturing and other wood users using the sawnwood for further processing.

2. Distribution Channels

The timbers sold by BFIDC usually go to the institutional buyers and government organizations both as semi-finished and processed goods. The share of private sector supply is smaller than that of government sectors. Until recently the supplies for REB, Railways, Ports, Food Department and other timber using corporations came only from BFIDC sources. BFIDC's sawntimber is mostly used by its own cabinet manufacturing and other units for further processing. Small quantities of sawntimber are sold to the private furniture manufacturers and other users when there is surplus.

3. Price Mechanisms

The price in the secondary and tertiary market goes up per cubic meter at each stage of transportation and processing. The cost of transportation, royalty, labour charges, loading, unloading, ferry charges and other service charges are added up along with the establishment cost and profit. The price in the secondary and tertiary markets is usually 40-50 percent and 60-70 percent higher than the primary markets respectively.

The price list included in Appendix 4 reflects the changes and trends of price movements for different species during recent years for round logs and sawn timber.

4. Marketing Problems

As in the case of sawlogs, sawnwood volumes are much less than what is needed. Consequently, like logs, it is a sellers market. The country can make use of all sawnwood it can produce for the foreseeable future.

5. Indicated Strategy

Major strategies indicated are:

- Employ more efficient technology to reduce sawing waste.
- Require/encourage wood seasoning and preservation treatment in association with all new mills.
- Promote industry wide trade associations to promote sawmilling issues.
- Promote adoption of size and strength standards.
- Reduce number of inefficient sawmills.

Other Wood-based Products

1. Assessment

Wood-based panel includes many different items resulting from primary processing of wood such as plywood, veneer board, block board, particleboard, hardboard and fibreboard. Also included are manufacturing of plywood, tea chests and flush doors. Production of many of these items is declining for various reasons and marketing is one of the major problems. BFIDC, a major solidwood processor, began entering the solidwood products industry in the mid 1960's, adopting positions in wood preservation and recovery. After 1971, the corporation assumed several other wood enterprises taken over by Government.

During the sixties the government set-up some panel industries under the BFIDC management to popularise the use of panel products as an alternative to solidwood as well as for utilisation of wastes of the sawmilling plants. Later on a few private parties came forward to establish

particleboard and plywood factories. Gradually the private sector started to dominate the plywood and panel products industry.

BFIDC factories have never achieved peak production and profitable operation in most cases because of many problems of internal and external nature. The most prominent of them involve marketing and management. People were never told the benefits of using the panels at personal or national level and the social cost involved in using solid timber in all spheres. Large scale marketing has never been initiated. The market was always limited within the urban centres.

After the liberation in 1971, many of the abandoned factories were nationalised and taken over under the management of BFIDC. The experiences with the abandoned factories in most cases is unprofitable. Capacity utilisation was low, cost of product was high, financial losses and labour problems were usual. Because of perpetual losses and management problems many of those enterprises were again disinvested to the private sector. The Wood Processing report provides complete operational and financial assessments (FMP 1992f).

The present situation of the panel factories both under BFIDC and private sector is serious and gloomy. The raw material supply from the forest has nearly stopped. Plants are trying to operate through private supply which can support only 10-15 percent of their capacity. The overall situation for existing panel industry is collapsing because of old age, obsolete machinery, poor maintenance, low quality and high cost. The survival of the factories depends on the early supplies of the raw materials in some cases and complete rebuilding of factories in others.

2. Plywood

There are 14 listed plywood factories in the country of which four are large and the remaining are smaller. According to FAO (1981), the industry suffered from many ailments including old and obsolete machinery and plant, lack of facilities, lack of management efficiency and know how, and lack of foreign exchange. The situation has aggravated further with the imposition of the moratorium and scarcity of raw materials.

Plywood Production - The industry was basically installed to produce tea chests for the tea exporting industry. The stable demand for tea chests is around 1 million boxes a year which tends to increase with good production of tea crops. The plywood manufactured for the tea chests is of specific size suitable for chests only. The equivalent quantity of plywood can be estimated to be 1.85 million m^2 a year.

The plywood factories also manufacture commercial plywood, the production of which is fluctuating and no reliable estimate of production for the last few years was found. The commercial production of plywood is subject to severe constraints of wood supply. The production of plywood and raw material used for last few years is presented in Table 18.

Large factories like Sangu Valley Plywood Plant (SVPP), Bangladesh Timber, Star and Ruby Plywood have been closed because of non-availability of raw materials from BFIDC and for high operating costs when using private sources of materials. Only small enterprises in the private sector are in operation with private supplies of local species. They are mostly engaged in tea chest manufacturing.

Location and Capacity - The industries are well dispersed and located near the available raw materials. Most are set up in Chittagong, Cox's Bazaar and Chittagong Hill Tracts regions. Some are established in Sylhet. The locational advantages reduces transport cost of raw and finished material to the tea estates processing and packaging plants.

Table 18 - Production of Plywood and Raw Materials Used, 1976-90

Year	Log Volume (m^3)	Production (Million m^2)
1976-77	14,400	8.7
1977-78	18,700	11.2
1978-79	42,500	25.5
1979-80	27,800	16.6
1980-81	45,300	2702
1981-82	10,200	6.2
1982-83	6,400	3.9
1983-84	10,000	6.0
1984-85	10,000	6.0
1985-86	9,400	5.7
1986-87	5,400	3.2
1987-88	40800	2.9
1988-89	5,600	3.3
1989-90	5,00	3.0

Source: BBS and BFIDC

Most of the factories suspect that the present stock of civit is reducing and what is still left is inadequate for future needs once restrictions disappear. The Tea Board is specially concerned about the future of chest industry and tea business. The Board has already started working on alternative packaging to substitute the chests.

Raw Material Requirement - According to Aliff (1981) the rated capacity of plywood industry is 1.58 million tea chests of standard size and 0.45 m^2 of commercial plywood. About 65 percent of the existing capacity for tea chests are utilised while only 25 percent for commercial plywood.

Traditionally, the plywood industry uses civit (Swintonia floribunda), a natural species for its manufacturing. Until recently, more than 70 percent of consumption was civit but, due to lack of supply, manufacturers are now using other soft species like kadam, pitraj, haldu, uriam, mango and others. In many cases supply is not sufficient to run the factory and the substitutes were inferior. The availability of adequate raw materials is the necessary condition for survival of the industry. To ensure the supply in future the plantation of civit and other natural species should be undertaken quickly.

The requirement of raw materials i.e. round log has been estimated by different persons differently for the tea chests. The estimate varies from 0.014 - .024 m^3 per chest, the minimum estimate given by the Tea Board. The average requirement fixed by the consensus of consultants and manufacturers is .021 m^3 per chest. According to this estimate the full capacity requirement of wood will be 34,037 m^3 for chest manufacturing only. The requirement for commercial plywood is fixed at 1.58 m^3/ 100 m^2, the requirement on this basis stands to be 7,398 m^3 of logs of good quality. According to Aliff (1981) the total utilization of wood by plywood factories in 1979-80 was 26,200 m^3.

The present consumption for tea chests is stable. Supply sources for roundwood are BFIDC and Forest Department. Only 10-15 percent comes from the villages. Factories are getting their supplies of civit from private sources but most come illegally from natural forests. Only miscellaneous non-commercial inferior wood comes from the village sources.

Transportation - The transportation of wood is done through a combination of water and land transports. Costs vary from place to place depending on the distance from the factory as well as degree of accessibility in the forest. When supplied by BFIDC from their depots only trucks are needed. Because of locational advantage the costs of transport of raw materials are minimum. Transport of plywood and tea chests is done by trucks upto the premises of retailers. Actual tea chest boxes are made in the packaging factories.

Problems - Larger factories cannot manage the activities and sustain the competition from the small producers. The small producers procure their raw materials from the villages while the big ones rely on natural forest species. Moreover, the labour and establishment costs are less in the small enterprises managed by the owner-manager.

The small enterprises lack drying and hot pressing facilities and they depend on sunshine for drying and cold presses for pressing. Quality of product in the smaller ones is inferior to those of modern plants.

The market for one million boxes of tea chests is assured and production continues even in the face of difficulties. Because of problems of production of commercial plywood from the very beginning, effective marketing was not attempted to introduce the products to the consumers. Market demand is not a problem even today as plywood is imported both legally and illegally from outside the country. Local commercial plywood has low customer preference because of its poor quality and risks due to use of unknown species. The foreign plywood, even Indian plywood made of garjan, is superior to civit, uriam and mango, and is much preferred within the market.

2. Panelboards

Panelboard includes particleboard, plain boards and veneered boards. Manufacturing of panelboard uses industrial wastes of sawmilling plants, jute sticks and fuelwood, the wood value of which is insignificant. There are six boardplants, all of which are composite units manufacturing both plain wood, textured veneers and veneer board. The prominent plants are - Star Particleboard, Particleboard and Veneering Plant, Chittagong Board Mills, and T K Particleboard Mills (Pvt.) Ltd. Among the plants the Star Particleboard in the private sector and Particleboard and Veneer plants under BFIDC are large and manufacture about 80 percent of the marketable supplies. Star Particleboard Mills (SPBM) uses jute stick as the primary raw material. The production of SPBM for 1981-82 to 1989-90 along with value is presented in Table 19. Upto 1978-79 the plant used to export particleboard, the mills also produce flush doors. Previously the mill was under Bangladesh Chemical Industries Corporation before disinvestment to the private sector in 1988.

Table 19 - Production of Particleboard of SPBM

Year	Quantity (MT)	Value (Tk '000)
1981-82	2,575	32,322
1982-83	543	7,419
1983-84	2,371	23,474
1984-85	2,308	25,348
1985-86	1,469	21,202
1986-87	2,502	47,094
1987-88	2,303	43,664
1988-89	1,397	31,013
1989-90	1,629	39,779

Source: SPBM, BCIC

Chittagong Board Mills closed for board manufacturing in 1981 and at present is producing flush doors only. The quantity produced by T K Particleboard is unavailable, it is expected that the plant is producing less than its capacity. Recently, the production of BFIDC mills averaged 0.7 million m^2/A, about 90% of target, Appendix 4 has more details. Veneer is normally 45% of production, textured panel 35% and veneered panels 20%.

Raw Materials - The capacity of PBVP is 0.8 million m^2 of textured and 1.8 million m^2 of veneered panels, at present one-third of the capacity is utilised. The raw material is not counted separately for this enterprise because it is considered as the waste of other plants. Because of crisis in other plants in recent years, the supply of raw materials also affected this plant. At present, the plant is procuring fuelwood from private sources to maintain production. All of the raw materials required by SPBM comes from private sources. The plant does not have a shortage problem but the price of jute sticks has increased substantially because of shortage of fuelwood in village areas.

Major Problems - Major problems of BFIDC mills are old and obsolete plant and machinery, unmarketable size of products, management weakness, and raw material supplies. Among other problems adhesion, shrinkage and thickness density are prominent. High wastage and low quantity of veneering pose a threat to the operation of the plant.

The problem of marketing is minor compared to production problems. When Star Particle is selling huge quantities of jute stick board the PBVP can not sell the same amount of a superior product because of its unmarketable size. While the market demands 2.4x1.2 metre size, the plant produces an odd size of 3.9x1.8 metre. Management actually can not approach the customers with such a product while better and perfect substitutes are available.

Markets are not the problem for the industry; if production grows more, sales will also be more. Since panel industries use less valuable wood, they are good substitutes for conventional solidwood and plywood products. Both the latter require more and more expensive timber.

3. Hardboard

Assessment - BCIC's Khulna Hardboard Mill is the only hardboard mill in the country. This mill was established in 1960's under public sector initiative. The raw material used for this mill was primarily sundri and keora from the Sundarbans. The production record shows a continuous trend over the years since its inception. The installed capacity of the mill is two million m^2 of boards per year at a thickness of three mm. The production of hardboard and its value as well as the consumption of raw materials are presented in Table 20.

Table 20 - KHBM Production Statistics

Year	Quantity ('000 m^2)	Value (Tk '000)	Raw Material ('000 m^3)
1981-82	1,053	13,859	19.69
1982-83	1,520	25,770	28.42
1983-84	1,333	25,783	24.92
1984-85	1,597	36,323	29.86
1985-86	1,621	41,351	30.31
1986-87	1,445	44,132	27.02
1987-88	1,554	49,681	29.06
1988-89	1,605	52,188	30.01
1989-90	1,597	52,104	29.86

Source: BCIC.

Price Mechanisms - The wholesale and retail price of hardboard is fixed at the Corporation head office. The prices are equally applicable for all areas of the country. The present ex-factory price per 2.4x1.2 metre x 3mm is Tk 153 for wholesale and Tk 176 for retail. The method of determining price is like other public sector monopolies , as described later in the pulp and paper section.

Marketing and distribution follows the BCIC standard for paper products and is sold locally. There has been no import or export of the item. The utilisation of hardboard is on the decline throughout the world, but in Bangladesh the demand remains constant at the present production level. According to BCIC, the demand for hardboard is stable because of competition from superior substitutes. There is no scope for setting up other hardboard mills in the country because of the market constraint.

Problems - The rated capacity, 75 percent of installed capacity ie. 1.5 million m^2 of production, is normally achieved. There is a problem of supply of raw wood in this plant related to the sundri top dying problem. Sundri is preferred for hardboard quality but recently the Forest Department has fixed the quota of sundri and other species for this mill because of suspected shortage of sundri species. The Department also requires the mill to use highly defective logs which badly affects product quality. Presently the mill is using a proportionate mixture of sundri and keora species.

4. Matches

Assessment - Match manufacturing occupies a prominent place among the wood consuming industries and has a long history in Bangladesh. There are 18 factories in operation. Previously the number was more than 20, when they met the requirements of both the wings of Pakistan. After liberation in 1971, half of the market was lost and the industry suffered.

According to Aliff (1981) in 1980 the match factories produced 10.0 million gross boxes of matches consuming 49,950 MT (77,825 m^3) of roundwood. Since then the production has improved year by year and in 1990 reached 14 million gross boxes. The production of matches, value and utilisation of roundwood are presented in the Table 21. The installed capacity is 18 million gross boxes a year while operating capacity is about 75% of installed capacity.

Match factories use the soft species of woods mostly grown in the village areas. Forest species are also used. Villages used to supply about 80 percent of raw materials before 1985, gewa accounted for 20%. Now villages supply 100 percent of the requirements. A few factories were closed down initially after the stoppage but all of them are now reopened.

Match factories are well dispersed, as a result, raw material supply is not a serious problem to the factories because that comes from neighbouring districts. Another big advantage of match factories for getting raw material supply are their river locations.

According to Aliff (1981) the usage of raw materials i.e. roundwood per unit of production is high, about 7.79 m^3/ 1000 gross boxes. This is a very inefficient use of resources. Today because of high cost of material, the management of factories is becoming cautious about the use of raw materials as well as interested in adopting innovative changes to reduce wastage. Some of the factories have already started using paperboard for box cover and trays, saving about 20 - 25 percent of the wood consumption.

Table 21 - Match Production and Value, 1980-1990

Year	Production (million gross box)	Value (Tk million)	Raw Material (m^3)
1980	9.3	214.36	77,825
1981	10.1	265.41	84,007
1982	11.8	370.47	98,670
1983	12.8	462.89	102,319
1984	12.1	399.89	100,470
1985	13.1	545.09	108,918
1986	13.6	643.80	113,134
1987	14.9	760.77	124,090
1988	13.8	656.83	114,592
1989	14.9	777.47	109,326
1990	11.3	790.50	114,767

Source: Statistical Year Book of Bangladesh, 1990 and 1991, BBS

Source: Statistical Year Book of Bangladesh, 1990 and 1991, BBS

[a] Million gross boxes

The Master Plan estimates the requirement of roundwood per 1,000 gross boxes at less than 4 m^3. The demand projection shows less requirement of wood at higher volume of output, about 51 percent of the forecast of previous studies. Raw material cost was estimated by Aliff (1981) as 18 percent of the total cost in 1980. This has increased to 22 percent in 1990.

The demand and consumption of matches has increased at a rate of 5 percent each year and production and consumption has increased from 9.34 million gross boxes in 1980 to 14.86 million gross boxes in 1990. Projection of demand shows that it will keep increasing in future with the population growth. The annual increment will be 2.85 percent up to 1998 and thereafter it will decline to 2.60 percent and continue up to year 2003. The demand projection and future requirement of match logs are presented in Table 22.

Table 22 - Demand Project for Matches upto 2013

Year	Population	Demand (Million Gross Boxes)	Raw Material (m^3)
1990	107.99	13.8	114,800
1993	112.01	15.6	62,500
1998	122.06	18.0	70,500
2003	132.12	20.3	79,600
2008	142.17	22.7	88,800
2013	152.23	25.0	98,00

Source: FMP 1992a

Price Mechanisms and Distribution - Domestic marketing channels follow the traditional chain of distribtion from producer to wholesaler, from wholesaler to agent, and from agent to retailer and then to the ultimate consumer, the end-user.

The price of softwood used in the match factories is the cheapest of all species, but is increasing. In 1979-80 millyard price of simul was Tk 530 - 710/ m^3 and is now Tk 1,400 - 1,600 in 1991. Kadam was Tk 880/ m^3 in 1980 and now is Tk 1,950 - 2,120/ m^3. Match factories in Chittagong get their raw materials from forest sources. Villages get approximately 50 percent of the millgate price.

The traders and middlemen carry the wood up to the millyard mostly by waterways. Sarupkathi in Barisal and Chandpur are the big log markets for match wood in the south and eastern zones. From those markets, the match factories of Dhaka city and around get their supplies.

All matches produced in the country are sold locally, demand has increased during last decade and production has gone back to the level of pre-liberation period. Because of comparative cost advantage, Bangladesh can try for export market again. Management efficiency, drive and sincerity can make it possible.

Bangladesh is self-sufficient in matches. Recently, however, Indian matches are found in the city shops entering illegally.

Strategy - Future raw material needs will remain the same or increase slightly with the increase in total production. This will happen because of awareness of management on the one hand and switching towards paperboard on the other. The improvements suggested in the Wood Processing Report (FMP 1992f) will reduce the demand for roundwood further.

The present situation of raw material markets is not comfortable for the producers. The future continuity of supply is suspected to be disrupted by the shortage. The industry mostly depends on naturally grown species of softwood. Because of high returns on investment in timbers like mahogany and sissoo, people today are not interested in plantation of soft species required by the industry, but rather go for better species.

The Forest Department along with match companies should go for effective measures to grow the match wood in the country. Management needs to adopt improved technology to control the wastage before and during the actual processing. Water treatment or storage would help reduce the huge wastage of match logs.

Pulp and Paper

1. Assessment

Newsprint - The projection of newsprint demand has been made on the basis of three alternative assumptions like paper and paper products. These assumptions are:

- demand under normal population growth and constant literacy rate of 26 percent;
- normal population growth and increasing literacy rate to 36 percent in 2013; and
- mass literacy programme to achieve 80 percent in 2000 year and 100 percent in 2003.

It is difficult to assess the demand for the third alternative. It is sufficient to say that demand will be many times more if the programme is successfully implemented. Projection for the other two alternatives is in Table 23.

Table 23 - Projection of Demand for Newsprint (000 ADT)

Year	Normal Population	Increased Literacy
1991	49.51	-
1993	53.47	55.70
1998	69.28	87.62
2003	85.14	114.22
2008	100.99	140.72
2013	116.85	167.41

Printing and Writing paper - The demand projection (FMP 1992d), is based on several assumptions regarding population growth, literacy growth and mass education programme of the government. It shows a huge increase in demand for all types and grade of papers. The present demand for writing and printing paper is 60 thousand tonnes a year of which 20 percent is met through imports. The demand will increase to 127 thousand metric tonne in 2013 if present rates of population growth continue with a modest growth in literacy to 36 percent. The demand for writing and printing paper is increasing at a slower rate than the industrial grade paper.

At present the industrial grade papers and boards are imported. Very few of them are manufactured locally. Some private enterprises have already planned joint venture projects with BCIC to manufacture the industrial grade papers to meet increasing demand in future and substitute the present imports. The present demand for industrial grade paper is said to be about 90,000 ADT, most of which is made locally from second hand papers. About 15,200 ADT are imported. Most of the imported items comprise paperboards and cartons for export industries. With the establishment of export-based industries, the industrial grade paper for packaging has already increased greatly since the 1970's and will increase further in future when more and more export industries come up.If the present growth of export industries continue, the demand for industrial grade paper will be 200,000 ADT a year in 2010.

Major consumption centres of industrial grade paper are Dhaka, Narayanganj, Chittagong and Khulna. Dealership is the method of distribution for local products as well as imported products. In many cases, exporters are also importing packaging material as back-to-back arrangements.

2. Distribution Channels

The marketing and channel of distribution is different for various items of paper products. The products can be identified in the following categories.

a. Writing and Printing Paper (Cultural grade)

b. Newsprint

c. Other Commercial Grade Paper

- Tissue, Toilet
- Cigarette, Tablet Packing
- Computer, Radio bond Paper
- Art paper & boards.

d. Packaging and Paperboards

- Corrugated Board
- Duplex Board
- Sulphate Board
- Heavy Cartoon Board
- Cartoon Board

Marketing and distribution of paper and paper products of BCIC enterprises is very organized and systematic. The market also provides for competition from the imported commodities without distorting the price mechanism followed by BCIC. The channel of distribution is designed so that the consumers pay the same price in all regions of the country. The channel of paper distribution appears in Figure 15.

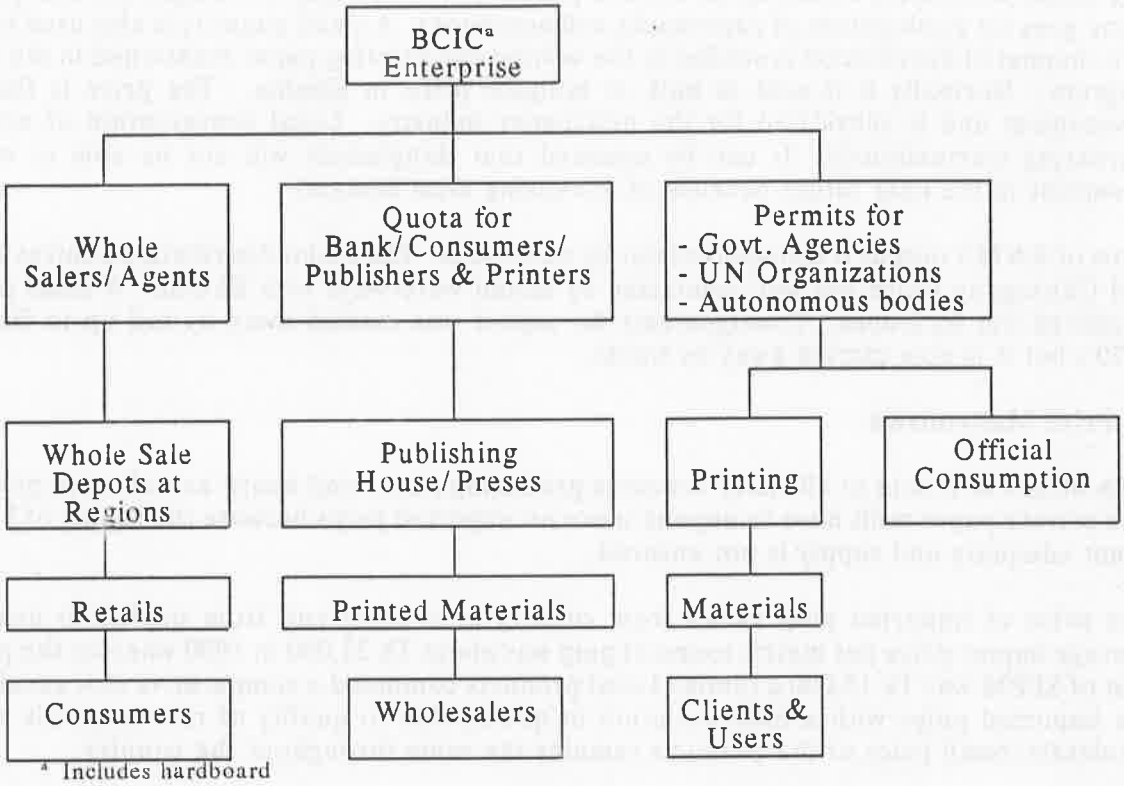

Figure 15 - Channel of Distribution of BCIC Products

Khulna Newsprint Mill is the only newsprint mill in the country. The mill depends on the Sundarbans forest for supply of gewa wood, the only raw material for the mill. The mill also uses the pulps of SPPM and of imported origins. Bangladesh is selfsufficient in newsprint. The country has been exporter of newsprint for many years. Before 1971, Pakistan was the main importer, after that, India and Nepal are the main importers. The production, consumption and export figures are presented in Table 24.

Table 24 - Export of Newsprint (ADT)

Year	Production	Export	Consumption
1976	20,060	4,940	15,120
1977	14,590	7,570	7,202
1978	27,490	29,330	6,160
1979	33,610	20,330	13,280
1980	38,070	21,410	16,660
1981	30,902	16,458	14,444
1982	44,004	10,542	25,309
1983	31,202	9,163	21,804
1984	37,764	13,984	31,988
1985	50,852	18,084	31,416
1986	55,100	16,022	37,963
1987	50,396	18,600	34,280
1988	49,859	13,899	35,136
1989	47,762	7,799	39,015
1990	50,465	4,674	46,456
1991	49,510	3,500	46,010

Source: BCIC.

The major consumers of newsprint are the publishers of newspapers, magazines and periodicals. Some goes for publications of paperbacks and notebooks. A small quantity is also used for writing. The channel of distribution is similar to the writing and printing paper mentioned in the schematic diagram. Normally it is sold in bulk at millgate price in Khulna. The price is fixed by the government and is subsidised for the newspaper industry. Local consumption of newsprint is increasing tremendously. It can be assumed that Bangladesh will not be able to export any newsprint in the near future because of increasing local demand.

Most of KNM's output is transported out by waterways. The major distribution centres are Dhaka and Chittagong which are well connected by inland waterways with Khulna. A small proportion is carried out by trucks. Consignments for export was carried away by rail up to Benapole in 1970's but it is now carried away by trucks.

3. Price Mechanisms

Pulp of SPPM is sold to all sister concerns producing paper and board as well as to private mills. The private paper mills have to depend more on imported pulps because the supply of SPPM pulp is not adequate and supply is not ensured.

The price of imported pulp varies from country to country and from quality to quality. The average import price per metric tonne of pulp was about Tk 22,000 in 1990 whereas the production cost of SPPM was Tk 15,000 a tonne. Local products command a comparative cost advantage over the imported pulps with a little variation in quality due to quality of raw materials used. The wholesale/ retail price of the products remains the same throughout the country.

Paper retailers and wholesalers get their supplies direct from the mills at millgate price on a first come, first served basis. The responsibilities of transportation lies with the buyers. Maximum retail price is fixed considering transport, distribution and establishment costs along with margins of the wholesaler and retailer.

Both wholesale and retail price is fixed by the corporation. The recent prices for wood-based products of BCIC is presented in Table 25.

Table 25 - Wholesale and Retail Price of BCIC Products, Sept 1992

Item	Specification	Price Ex-Factory (Tk)	Retail* Price (Tk)
KPM			
Cream Laid	26" x 32" - 33 lbs	600	660
White Print	23" x 36" - 36 lbs	655	721
White Print	20" x 30" - 23.47 lbs	431	474
White Print	23" x 36" - 32.39 lbs	595	655
White Print	20" x 30" - 26 lbs	473	520
NBPM			
White Writing	16" x 26" - 56 gram	305	339
White Writing	16" x 26" - 50 gram	279	310
White Print	23" x 36" - 49.50 gram	559	620
KNM			
Newsprint	20" x 30" - 52 gram	219	239
Newsprint	23" x 33" - 52 gram	265	69
KHBM			
Hardboard	8' x 4' x $^1/_8$"	153.63	176.67

Source: Marketing Department, BCIC

* Per ream except hardboard which is per piece.

4. Strategy

Paper products are a mainstay and a barometer of industrial development. Unless Bangladesh relies on importing its requirements, the major indicated strategies it must follow are:

a. Locate more pulp and paper mills in the Chittagong Zone as pulpwood becomes available.
b. Diversifiy products in the existing and newly built mills.
c. Create large scale plantation of pulpwood in Unclassified State Forests.
d. Establish other newsprint mills.
e. Emphasize the production of industrial grade papers and boards aimed at attaining selfsufficiency in those items.
f. Improve the research backup for searching out new and cheap sources of raw materials.

FOREST PRODUCTS FOREIGN TRADE

General

Bangladesh is heavily dependent on imports both for meeting its basic necessities as well as for implementation of development projects. The country has always suffered from adverse balance of trade as well as balance of payments. Government has envisaged various measures to boost exports of different commodities, traditional and new, to narrow down the gap but virtually all efforts to that effect remained ineffectual. In 1989-90 negative trade balance was Tk 51.2 billion, the next financial year it was Tk 62.8 billion. Imports growth is very rapid with the introduction of liberal import policy and through wage earners scheme. The balance of payment gap is normally adjusted with the earnings of the expatriate workers working abroad. More and more commodities irrespective of their social desirability, are included in the import list every year.

Foreign trade in forest products follows the general trend. Traditionally, Bangladesh exported some forest-based products and imported others. Roundwood and sawn timber never entered in the regular trade list before 1970's. Among the new inclusions since are sawntimber, railway sleepers, electric poles and cross arms.

The inclusions were made as measures to protect local forests and environment degradation on the one hand and to continue the developmental works on the other. The moratorium prevented extraction of electric poles, cross arms, sleepers and sawlogs from most of the indigenous forests. As a result, public utilities like the Rural Electrification Board, Bangladesh Power Development Board and Railways had to import them. The imports in these sectors will continue to grow until the moratorium is withdrawn and local supplies made available.

Exports - Bangladesh is an exporter of some wood-based products like newsprint, paper, handicraft and non wood forest products, a small volume of sawn timber and furniture including teak occurred, but irregularly. Newsprint and paper products are the major export items both in terms of volume and value.

Newsprint exports to Nepal and India normally account for 60% of export earnings and paper products 20%. Wood and bamboo products share the remaining 20%. Lately, exports are running at $10 million annually; export values peaked in 1987 and 1988 at $14 - 15 million, although values rose by 4% annually from 1986 to 1990, this increase coming directly from higher prices not increased shipments. Actually, export volumes declined at an annual rate of 2% during the same period. Figure 16 charts export activities since 1975, and clearly shows the precipitous drop beginning in 1989. Table 26 summarizes export trends over the last 15 years.

Table 26 - Bangladesh Forest Product Exports 1970-1990 (Tk million)

Product	1976-1980		1981-1985		1986-1990	
	Volume	$Million	Volume	$Million	Volume	$Million
Newsprint, ADT	15,090	$ 3.9	13,650	$ 6.9	12,200	$ 6.2
Paper/ Paper	na	2.1	na	1.2	na	3.1
Wood/ Wood	na	0.3	na	0.3	na	1.6
Bamboo	na	0.3	na	0.9	na	0.3
Total		6.6		9.4		11.2
Average Growth, %		na		+8.5		+3.8

* 5-Year average.

1. Export Details

Roundwood - There has been no evidence of export of rough wood from Bangladesh in the past but wooden articles, furniture, and some associated items were exported to different countries in small quantities. Foreign trade in wood was always unfavourable to Bangladesh. The export of wooden and bamboo articles is in Table 27.

In future, there is some scope for export of teak and teak furniture in large quantities. This is because thousands of hectares (100,000) of teak in the plantation forests of Chittagong and Chittagong Hill Tracts and Sylhet are nearing maturity. After their maturity, within a 10-20 year period a big volume of teak is possible. The present market situation and consumption pattern shows that about 10-15 percent of the total utilisation is comprised of teak and remaining 85-90 percent other timbers. Teak is sophisticated and expensive to Bangladesh consumers and is suitable for furnishing, longterm decorations, furniture manufacturing, veneering and other expensive uses. For export of teak it would be better to export finished products rather than roundwood. Furniture, fixtures, upholstery, panels, decorated doors and windows can be a better way for export. This will command high value, less volume commodities, suitable for international trade, but requires the manpower development and technology transfer. A detailed feasibility is needed for this project.

Table 27 - Export of Wood, Wood Articles and Bamboo, 1977-1990 (Tk million)

Year	Wood and Wood Article	Bamboo/ Broom	Total
1977	1.8	3.75	5.55
1978	1.9	4.13	6.03
1979	11.2	5.74	16.94
1980	6.65	5.68	12.33
1981	4.20	20.20	24.40
1982	0.93	23.37	24.30
1983	21.24	20.49	41.73
1984	1.86	28.47	30.33
1985	2.82	17.96	20.78
1986	39.00	11.89	50.89
1987	55.00	12.29	67.29
1988	52.00	3.24	55.24
1989	55.00	8.46	63.46
1990	60.00	5.00	65.00

Source: Export from Bangladesh, EPB, 1990.

The Timber Merchant Association has already submitted some proposals to the government for approval of the back-to-back arrangement of import and export of timber and timber products respectively, like garment manufacturing, to open-up a new avenue. The technology and market feasibility is to be studied for evaluating the proposal. The Associations claims that the craftsmanship of carpenters and technicians of Bangladesh are satisfactory to do the jobs required by the export markets around the world. The testimony of their claims may also be evaluated. A market search study can also be undertaken in this respect.

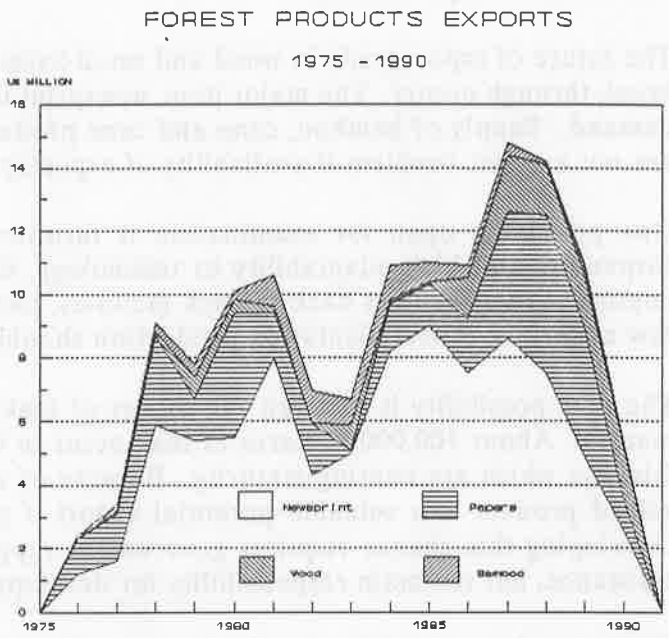

Figure 16 - Forest products exports.

Export Promotion Bureau of Ministry of Commerce and Diplomatic Missions of Bangladesh abroad can help the private entrepreneurs in locating export markets as well as sources of new and modern technology. Financing is another problem for such ventures which will require the active participation and financial support of development banks.

Matches - Before 1971, Bangladesh used to export half of its matches to Pakistan. Because of management problems and absence of government policy the market was lost and until now no effort was made to regain the export market.

Paper Products - After the liberation of Bangladesh in 1971, it was thought that Bangladesh could export paper because of surplus production over the local demand. For two-three years some exports were made to neighbouring countries like India, Nepal and Burma. That was stopped because supply could not meet the increased local demand because of serious production problems.

Bangladesh exports newsprint to Nepal and India. The export reached 21,000 ADT during the late 1970's. Recently, the local demand for newsprint increased and exportable surplus dropped to 4,600 ADT in 1989-90 and 7,900 ADT in 1990-91. Until recently, Bangladesh normally received Tk 200 million annually from the export of newsprint. The second largest export is paper, generally about Tk 100 million/A and allied products. Wood and wood articles command the third position and earns Tk 50-60 million annually.

Table 26 present annual average exports on a 5 year basis since 1976. The data point out a gradual decline in export volumes, which is masked by price increases over the period. Volume is declining at slightly more than 1.0%/A, while value recently increased by almost 4%/A. The decline is more dramatic. Exports peaked in 1987 by volume, 1990 newsprint exports were only 25% of 1987 volumes.

Gradually, items of export are disappearing from the trade list. This is because of expansion of local demand, less production and lack of exportable surplus in recent years. Recently disappearing items include: rayon, cellophane, hardboard, and plywood.

2. Future of Export Trades

The future of export trade in wood and wood-based products shows little promise until some new break-through occurs. The major item, newsprint is losing importance because of increasing local demand. Supply of bamboo, cane and cane products is also decreasing yearly. Export markets are not a major problem if availability of exportable surplus exists.

One possibility open for examination is furniture export. Because of cheap labour, skilled carpenters and high adaptability to technology, the export of furniture, doors and windows is possible. This requires back-to-back facilities, like the garment industry, which allow import of raw materials. Local plantation production should eventually replace imported logs.

The next possibility is to await the export of teak and teak furniture when existing plantations mature. About 100,000 hectares of teak occur in Chittagong, Chittagong Hill Tracts and Sylhet Division which are nearing maturity. Because of consumption patterns in Bangladesh, this high valued product is a valuable potential export if processed and exported as finished products. Developing this chance requires government support to assist in training, financing and other assistance, but the main responsibility for development is better left to private industry.

Export market potential exists for rattan and bamboo products and woodwork as well. However these require more development and improved rattan supplies through managed plantations before locating further export markets.

Imports

The import of wood and sawnwood is one of the major sources of supply in the country. Institutional imports against foreign aid under different development programmes has continued since the 1970's. The quantity was a few thousand cubic metres a year, most of which was wood in rough for electric poles, cross arms, house building materials and railway sleepers. The private sector import started in 1988 prior to the imposition of moratorium. Recently the import of wood has grown tremendously and reaching a few hundred thousand cubic meters a year. The import figure for 1979-90 is presented in Table 28.

From the table it is clear how tremendously the import has increased over the years. The import of round and sawn timber has increased 64 times in volume and 10 times in value in 10 years from 1980 to 1990.

In 1990, forest product imports totalled $67 million, growing at an annual rate of 13% during the previous 5-year period, Table 29. The nation depends on imports for consumption and development projects. Until the mid 1980's foreign trade was more balanced than recently. Currently, the cutting moratorium has exacerbated the normal trade imbalance. Paper imports make up 53% of recent imports, followed by pulp 30%, and wood products at 17%. The value of paper imports grew at 4% annually from 1977 to 1990 accelerating to 10% in the last five years. Pulp imports also grew but at a much faster rate - 20% annually from 1977 to 1990 before declining to 7% during the last five years as importers switched to importing paper instead. Overall, wood products have the fastest growth, their value increased at an annual rate of 35% since 1977, but declined to just less than 1% during the five year period 1986-90. Reduced wood supply, especially sleeper and electric transmission poles, affected by the cutting moratorium, created the rapid change.

Table 28 - Recent Imports of Forest Products

Items	1988-89		1989-90	
	Volume (000 m^3)	Value (Tk Million)	Volume (000 m^3)	Value (Tk Million)
Primary				
Fuelwood	.09	0.356	.09	0.389
Logs	298.8	68.136	7,966.61	573.596
Split Wood	.08	.412	10,21	90.474
Total	298,97	68.904	7,976.91	664.459
Secondary				
Sawn Wood	-	-	3.72	-
Veneer	.03	.339	-	-
Plywood	.01	.343	.06	2.169
Particle	.02	.435	-	-
Densified	.35	8.200	.32	9.482
Total	.41	9.317	4.10	12.320
Total wood products	299.38	78.221	7,981.00	676.779
Tertiary	ADT	Tk million	ADT	Tk million
Pulp				
Mechanical	27	.950	2,331	9.876
Dissolving	3,196	88.238	10,730	308.911
Sulphate	8,673	184.414	3,047	61.689
Sulphate	4,434	111.630	3,691	77.954
Cotton Lintons	410	2.0160	0.6	0.022
Waste Paper	807	4.598	2,094	14.055
Total	17,547	391.846	21,902	472.507
Paper				
Uncoated Paper	4,605	116.737	7,195	155.023
Coated	2,415	53.915	1,883	50.871
Newsprint	2	.033	20	.342
Tissue	2,110	61.439	4,071	113.394
Kraft	554	9.661	1,889	33.81
Writing	1,406	67.173	9,425	299.649
Printing	4,811	177,285	1,048	155.182
Specialities				
Cigarettes	2,947	142.823	2,305	109.792
Parchmas	15	1.052	23	0.421
Other	220	10.458	232	12.623
Total Paper	23,943	872.315	34,088	1197.545
Free Board	17	1.089	0.8	.205
Total Pulp & Paper	41,507	1,265.25	55,991	1,670.257
Total Forest Product		1,343.471		2,347.036
Unaccounted		21.849		65.854
Total		1,365.320		2,412.890

Source: Foreign Trade Statistics of Bangladesh, 1988, 1990, and 1992, BBS

In terms of volume, manufactured paper imports declined 2% during the late 1970's then grew 3% annually until 1990. At the same time raw paper declined 16% then increased at 24% annually, respectively. Meanwhile, annual pulp imports spurted ahead at 33% until the mid-1980's. Imports of wood products increased at an annual rate of 70% from 1986-1990. Recent annual import volumes are as follows, Appendix 4 has full details.

Product	Volume
Paper	17,400 ADT
Pulp	23,200 ADT
Wood	1.1 million m3

Paper imports, shown in Figure 17, are mainly printing and writing grades, 34% by value, specialty and uncoated paper (13% each) and tissue at 8%. Coated papers make up 5% and kraft paper 2%. Dissolving pulp accounts for 46% of pulp imports, sulphate and sulphite pulps follow at 28% and 23%, respectively. Waste paper and kraft pulp and cotton linters total 3% by value. Electric poles and crossarms made up 85% of recent wood imports, followed by sawnwood at 12% and 2% particleboard

Table 28 summarizes the major forest product imports since 1976. The data illustrate clearly strong trends in increased pulp and rough wood imports. Importation of manufactured papers and raw paper is not as clear, but both are increasing again recently after falling from late 1970's levels. By value, the picture is very obvious, imports increased by 13%/A in the five years up to 1990. Rough wood started increasing in 1980 and within last 10 years the volume increased 400 times and 15 times in value by the year 1990.

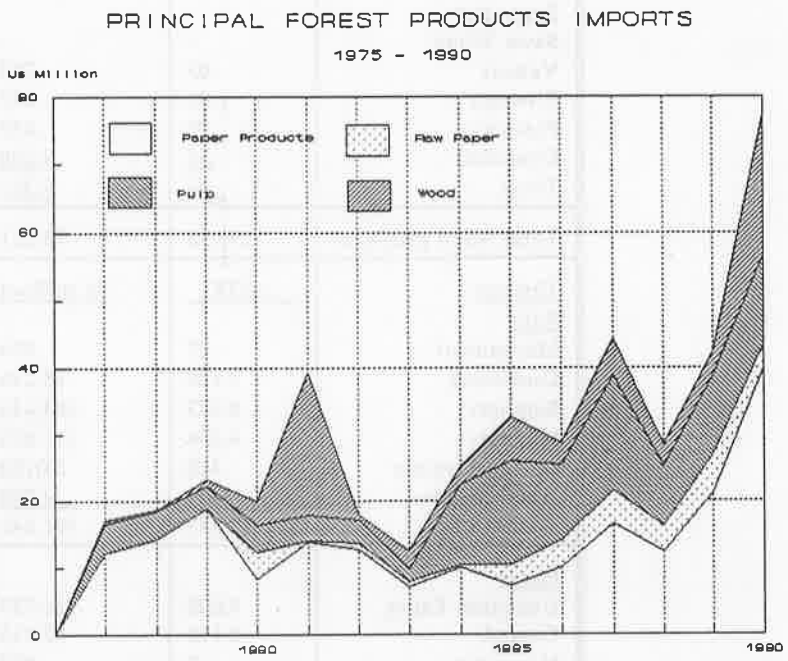

Figure 17 - Forest products imports, 1975-1990.

Wood pulp is another important item of import. Imports started increasing in 1984 and peaked in 1987. After 1987, the import declined before climbing again in 1990. Paper and paper products maintained a constant trend until 1988 but accelerated in the last two years reaching an all time high in 1990.

Table 29 -Bangladesh Forest Product Imports, 1970-90, 5-Year Averages[b]

Product	1976-1980		1981-1985		1986-1990	
	ADT	$Million	ADT	$Million	ADT	$Million
Paper Products, ADT						
Raw Paper	5,170[a]	$ 4.6	1,130	$ 1.1	3,800	$ 2.4
Manufactured Paper	10,700[a]	9.7	10,580	10.2	13,600	20.0
Total	15,870	14.3	11,710	11.3	17,400	22.4
Pulp Products	6,380	4.1	17,070	7.4	23,200	12.6
Wood Products	na	1.3	238	6.9	1,089	7.2
Total	-	19.7	-	25.6	-	42.2
Average Growth, %				+6.0		+13.0

[a] Estimated [b] 5-Year averages

1. Wood Products

The country depends on import of wood and wood products for implementation of several development projects as well as for consumption. The major import items comprise mainly pulp and paper secondary and tertiary products. Import volume increase annually as new items appear on trade lists. Import categories include:

Roundlogs	Plywood
Split Wood	Particleboard
Sawn Wood	Pulps of different category
Veneer	Papers of various kinds

Poles and Posts - Among the primary imports of forest products, round logs for poles, posts, cross arms, sleepers, and lumber are prominent. The volume of primary imports was 329,000 m^3 in 1988-89 which has increased to 798,000 m^3 in 1989-90. In value it was Tk 68.9 million in 1988-89, increasing about 10 times to Tk 664.5 million in 1989-90. In both years the imports for power sector was dominant.

From the import statistics it is difficult to quantify the amount of poles and posts imported from abroad because figures are recorded as the import of wood in rough for all round logs. It is ascertained that most of the imports, about 80 percent, was rough wood as poles, cross arms and anchor logs upto 1988. The import of poles and other electric logs was 154,000 m^3 in 1988-89 and 234,000 m^3 in 1989-90. Electric poles are being imported from abroad since the early 1970's and is a component of foreign aid for REB and PDB. Bangladesh has never exported poles and posts to other countries.

Major importers of logs and timbers (Table 30) are government and autonomous organizations like Rural Electrification Board, Power Development Board and Railways. Sometimes Port authorities have also imported some timbers for their own use. The above organisations mostly import electric poles, anchor logs, piling poles and sleepers as items of final consumption. The major sources of supplies for above organizations are USA, Canada, Australia, Scandinavian and Singapore, Malaysia and Indonesia.

Table 30 - Import of Log and Sawn Wood in 1979-90

Year	Quantity (000 m^3)	Value (Tk Million)
1979	84	60.2
1980	129	92.0
1981	72	58.6
1982	59	67.5
1983	259	66.6
1984	670	210.7
1985	326	102.2
1986	449	172.5
1988	411	102.0
1989	323	109.0
1990	8,419	742.8

Source: Foreign Trade Statistics, 1990, BBS.

Private importers import logs and timbers from countries like USA, Canada, Burma, Thailand, Singapore and Malaysia. The import usually comprised sophisticated and quality timber as

substitutes for mostly used local species. Among the private imports garjan dominates by 70 percent and all other species are 30 percent.

The import of sawnwood was 3,700 m^3 in 1989-90. Most of the sawnwood was imported by the private sector as a substitute for local timber. No import of sawntimber was recorded for the year 1988-89.

Regarding panel products, imports are negligible. Total panel imports ranged from 400 - 400 m^3 recently, valued at from Tk 9 - 12 million. Indications are that smuggled plywood exceeds official imports.

2. Pulp

The paper industry initially was not dependent on imported pulp but used it to guarantee the quality of products. All paper mills under public sector have pulp units. Among the three paper mills in the private sector, two are under operation. None of them have pulp producing units. They have to depend totally on the supply of SPPM and the imported pulp for their production. The country is depending more and more on imported pulps. Table 31 represents the import of wood pulp and other fibrous materials during the last 10 years.

The table shows the extent of shortage and expenditure of hard currency for import of wood pulp and other raw materials. The shortage up to 1983 was 7,000 tonne a year which was increased up to 41,000 ADT in 1985. The import for 1990 was 21,000 tonnes which is three times higher than that of 1980, but the amount of money spent in 1990 was seven times higher. The high figure for 1984, 85, 86, and 87 was due to process modification to SPPM and KPM.

Table 31 - Import of Wood Pulp and Fibrous Materials, 1980-1990

Year	Metric Tonne	Value (Tk million)
1980	7,972	65.97
1981	7,371	77.42
1982	7,649	82.35
1983	3,536	50.79
1984	25,659	314.30
1985	41,157	478.13
1986	26,278	346.77
1987	33,970	541.31
1988	17,325	292.21
1989	17,546	384.00
1990	21,186	472.57

Source: Foreign Trade Statistics of Bangladesh, 1981-82 to 1991-92.

Imported pulps of different types was 17,500 ADT in 1988-89, 21,900 ADT in 1989-90. Among the wood pulps, the dissolving grade stands for 46 percent, soda/sulphite grades 28 percent and sulphite grade 22 percent. The pulps value was Tk 391 million in 1988-89 and Tk 472 million in 1989-90. The increasing import of pulps mirrors the increasing demand for paper and paper products in the country. The future requirement of pulp will increase greatly with successful future programmes of mass literacy.

3. Paper and Paper Products

Traditionally, Bangladesh has imported specialised papers for writing and printing. The import of writing and printing paper is increasing. Bangladesh cannot manufacture special types of papers like quality computer paper and high density art papers or radiobond papers. The import of papers for the last 10 years is presented Table 32.

Within the last 10 years, imports more than doubled in tonnage but quadrupled in value. The price of paper is increasing very quickly in the international market.

Table 32 - Import of Paper and Paper Products

Year	Quantity (ADT)	Value (Tk million)
1980	8,303	134.3
1981	14,474	273.0
1982	14,366	307.2
1983	7,476	180.7
1984	11,129	259.6
1985	5,540	229.3
1986	5,726	311.1
1987	5,120	513.7
1988	5,803	399.1
1989	20,107	653.0
1990	20,000	683.7

Source: Statistical Year Book, 1991, BBS.
Foreign Trade Statistics, 1988-90, BBS.

Paper and paper products are one of the major group of imports and comprise 17 different varieties. For convenience they can be group together in the following categories:

Coated Paper and Paperboard
Wood Paper and Board
Cigarette Paper
Carbon
Newsprint
Tissue Paper
Kraft

In the paper and board category, the import of uncoated grades was 13 percent, tissue 8 percent, kraft 2 percent, writing and printing 34 percent, cigarette paper 12 percent and remaining were other papers.

The import of paper and pulp in 1988-89 was 41,500 ADT of which 24,000 ADT was paper and paper products, ie. 57 percent and pulp of different type was 43 percent. The usual import of pulp and paper in 1989-90 was 56,000 ADT of which 21,900 ADT was pulp and 34,100 ADT was paper, of 40:60. In value terms the paper and pulp imports are at Tk 1.21 billion in 1988-89 and Tk 2.41 billion in 1989-90, giving a ratio of pulp and paper of 30:70 in 1988-89 and 20:80 in 1989-90. Table 28 gives recent detailed pulp and paper imports.

4. Future Imports

It is expected that if the moratorium continues with proper enforcement the import trade will grow further. It can also grow even if moratorium is withdrawn because of price advantage if duties and taxes are withdrawn. The situation is likely to continue until the REB completes implementation of its programme for covering the whole of the country. The requirement for poles and posts from abroad may decline thereafter. The import of timber for private consumption will grow further as consumers get acquainted with foreign products. It can be fantastically high if export oriented ventures go through.

5. Import Regulations

Among the forest products, fuelwood and timber were initially restricted both for import and export. Later import was shifted to controlled category while export remained in the restricted list. The rate of import duty was fixed at 200 percent for import during 1985. At this stage there has been very little commercial imports. The import by the government for implementation of development projects was opened free of duties. In 1988, the government realised the importance of import to protect the fast deteriorating forests and environment. Consequently the import was liberalised by reducing customs duty to 100 percent of advalorem cost, from the previous 200 percent.

Because of recent worldwide concern of possible global warning and environment deterioration, the Government, Bangladesh being a high risk country, promulgated the moratorium on felling of trees in the reserved forest. Before that enforcement was one for sal forests. To make the regulation successful and provide alternatives for supplies of forest products, the government has further liberalised the import of forest products. Duties and taxes were withdrawn, restrictions and controls on items were also removed. The imports of timber had a modest start in that financial year.

The provisions of liberalisation did not continue for long. In the following year, 10 percent import duty along with sales tax and other taxes were imposed. Imports became less profitable and as a result the private imports declined.

In 1991-92 the rate of duty was again raised to 20 percent along with imposition of 15 percent of VAT. With the enforcement of this duty restriction, private imports was declined further to a stage of stoppage. The Timber Merchants Association was always against the imposition of duties on the argument of protecting the local industries as well as the reserves. They took up a propaganda campaign for their cause. Ultimately, the government has been convinced to withdraw the VAT and reduce the duty to 7.5 percent of advalorem for raw logs, for the year 1991-92 and 1992-93, (see FMP 1993a for more detail on import duty rates).

6. Import Duties

Bangladesh's wood and paper import duty structure requires some rationalization to support a policy consistent with present and future forest resource needs and economic conditions. Wood resources are scarce and dwindling. Anomalies exist in the domestic price for some forest products. Every opportunity to generate employment needs grasping. Hence, the current situation demands low import duties on raw wood products, intermediate rates for partially manufactured goods, and assessing manufactured products at much higher rates. This structuring favours substituting imports for local demand while still creating the maximum employment during the subsequent downstream manufacturing. The rate assigned to manufactured products needs setting high enough to give local manufacturers a competitive edge, but not too high to shield local producers from healthy competition, otherwise high domestic prices and low quality result.

The current duty structure recognizes three major subcategories each in the wood and paper categories - unmanufactured, partially manufactured and manufactured products. Duties now range from 7.5 to 125% for wood and paper products. Broad classes recognized and range of import duties levied are in Table 33, Appendix 4 details the different items and current rates of duty.

Presently, unmanufactured wood products attract a rate of 7.5% to 60% on the advalorem value, while partially manufactured products are assessed 7.5% to 75%, and manufactured ones for 30 to 125%. Import duties should favour importation of preserved and seasoned wood over untreated, unseasoned products, thus reducing waste and future demand. Similarly, rates on wood

substitutes should be kept low. For example, non wood doors and window frames collect a 75% duty while local products are over manufactured and waste wood unnecessarily. Low duty on equipment used for manufacturing solidwood and non wood products is another area to avoid overlooking. Equipment rates should favour the more sophisticated machinery used for quality, high value wood products. Meanwhile, crude manufacturing equipment with poor conversion efficiency for primary manufacture needs discouraging by higher rates. If this type of machinery is imported it should carry a high environmental tax to discourage its use and help pay for the volumes wasted.

Table 33 - Range of Current Wood and Paper Import Duties

Item	Present Ad Valorem Rate, %		Indicated Rate
	Minimum	Maximum	
Wood Product			
Rough, Unmanufactured	7.5	60	7.5
Partially Manufactured	7.5	75	7.5/ 50
Manufactured	60	75	75
Paper and Paperboard			
Pulp/ Waste Paper	30	30	20
Paper[a]	60	125	45/ 125
Manufactured Paper[b]	30	75	60/ 75

[a] Excludes medical recording graph papers.
[b] Excluding food cartons, the minimum rate is 60%.

Permitting log imports for local products would ease the stress on local resources. However, these imports should only go to sawmills using modern equipment not the wasteful existing technology. Log imports for manufacture into high value export products are only justified if subsequent foreign exchange export earnings exceed import costs. FMP development scenarios when implemented will substantially affect wood availability. Once increased wood volumes come on stream, the import structure will need revising. At the time, revision would increase duty on raw or partially manufactured wood products with the intention of supporting the use of locally grown and available material. If imported wood continues at lower price levels, once wood supply begins increasing it will discourage local producers. This revision does not need facing immediately, but is flagged now for future review.

Presently, import duty structure would better serve national interests if revised. Modifications are required to support a consistent policy which better recognizes the scarce resource conditions facing the country. Advalorum product rate modifications indicated are as follows:

a. Unmanufactured wood - reduce fuelwood, wood chips, sawdust and rough barked or unbarked logs or squares to a uniform 7.5%. This means reducing fuelwood from 15 to 7.5%, and wood chips from 60 to 7.5%.

b. Partially manufactured wood - reduce veneer sheets from 75 to 30% and treated wood from 45 to 20%. Plywood rates should go from 30 to 50%.

c. Manufactured wood - increase to a uniform 75%, this would raise the rate for tea chests and match splints to 75 from 60%.

d. Wood pulp - lower the rate for all wood pulps from 30 to 20%.

e. Paper and paperboard - reduce waste paper and paperboard to 20 from 30% and for other papers to 45 from 60% (excluding specialty papers like cigarette, filter, decalcomania and health recording papers).

f. Manufactured paper and paperboard products - increase food carton duty to 60 from 30%.

Suggested changes rationalize current duty structure and remove anomalies. They will mainly work initially to cheapen imported costs of raw materials and lessen the pressure on local resources. This strategy also maintains present and supports increased future employment levels in manufacturing. Once local supplies increase substantially, possibly around the year 2000, modify the rate structure to favour local supplies or to equalize the price of imported and local products to consumers.

Importing strategies, in summary, have to:

- Encourage imports to reduce pressure on local resources by lowering or increasing rates when appropriate to maintaining maximum employment and value added.

- Favour seasoned and preserved woods over untreated products.

- Encourage the establishment of higher quality manufactured wood products, both from traditional and non wood forest products.

- Strengthen the pulp and paper industry to increase local production of cultural and industrial paper and to permit import substitutions.

- Promote secondary and tertiary processing to create employment and gain economically by increasing value added.

- Favour importation of required equipment and necessary spare parts to permit the forest products processing industry to modernize and keep abreast of technical advances.

When it becomes necessary to import logs for local timber use, these should be directed to modern properly equipped sawmills to avoid excessive waste. Furthermore, such material needs treated with preservatives before sale. Importing for manufacture and re-export is acceptable, provided total foreign exchange earnings exceed imported raw material costs.

Impact of Trade Regulations

The reduction of national reserves and forest resources in Bangladesh is an outcome of long neglect of the government to undertake appropriate forest management and implement development programmes in the past. The government was more interested in collecting revenue from the forests rather than enriching them with new plantations. After the imposition of moratorium, the legal extraction from the reserves was stopped and market supply was affected and consumers suffered at the initial stage of enforcement, which has adversely affected the whole sector. However, some recovery occurred through the import of logs and sawnwood from abroad. In the meantime, Government has imposed duty restriction on imports pushing the prices up with local supplies becoming cheaper than imports. Illegal felling was rampant, the moratorium could not be successful.

The impacts of moratorium and import restrictions on the economy in summary was as follows:

a. Forests could not be protected because of population pressure on the forest in the one hand and lack of proper enforcement of law on the other.

b. Market supply for logs and timber for private consumption was not affected very much.

c. Government has lost at least Tk 2.0 billion of revenue earnings from the forest during last three years.

d. Unplanned illegal cuttings have damaged the forests by indiscriminate, uncontrolled felling of all trees, mature and immature.

e. The assessment of impacts on environment, wildlife and biodiversity is yet to be done. Costs of enrichment replacement plantations are also yet to be estimated.

f. Uneconomic operation of forest industries particularly BFIDC enterprises. Financial losses along with job curtailment and market loss for the industry and creation of market gap for imported and smuggled goods.

Trade Policy and Strategy

The existing trade policy relating to the import and export of forest products is consistent with the overall economic and forest conservation policy of the government. Immediate priority of protection and development of forests and reducing the pressures on forest resources through liberalised import and restricting export is well conceived.

The present huge imbalance between imports and exports of forest and forest-based products should thus be considered a short-term arrangement. In the longterm, attainment of selfsufficiency and for export should be planned. Formulation of longterm strategy for trade and consumption of forest resources should be made. Before such an exercise, the following options require clear resolution:

a. Whether the country should go for import for consumption or for re-export.

b. Whether production should be aimed at domestic consumption or export or both.

c. Whether production should be based on economic and commercial consideration or for conservation of biodiversity and environment.

d. Whether the country should restrict consumption or emphasis on producing import substitutes.

e. Whether the objective is to attain selfsufficiency or surplus production.

As mentioned earlier, the present crisis is the result of negligence and wrong policy of the government in the past. The demand for today could not be for seen in the past. As a rèsult, the diversified demand of REB, PDB, paper industry and others commercial sectors have to depend on import for supplies. Large scale plantation of teak during last 30-40 years could not help supply increase to meet the present demand for various types of consumption.

The import figure shows that in 1989-90, electric poles, cross arms and anchor logs dominate the import trade. The imports of logs were 3.4 million m^3 for those purposes which cost this country Tk 742 million in hard currency. The situation could be saved easily if the demand was properly assessed 20-25 years ago. The recent plantation of eucalyptus and other species suitable for poles are yet to mature. The harvest of poles and logs from thinning operation of teak plantation is also disappointing.

Although the demand for sawnwood and logs could be supplemented by imports, fuelwood can not. Therefore, increasing fuelwood supplies and providing cheap commercial energy are the options for policy implementation. The indicated strategy for government to follow is:

a. Continue import liberalisation so that price can be kept less than local price in the shortrun.

b. Lift the moratorium to at least permit extraction of overmature trees through selected fellings, and so that government revenue continues and BFIDC's rationalized industry gets regular supplies.

c. Continue to import timber and logs on an interim basis but plan to restrict imports in the longrun, once large scale plantation of commercial species are available.

DOMESTIC FOREST PRODUCTS MARKETING POLICY AND STRATEGIES

Fuelwood

Among the forest products, the demand for fuelwood is the highest, representing about 65 percent of the wood consumed; the demand-supply gap is increasing. Plantations of fuelwood alone can not solve the problem. National energy policy should highlight the matter seriously. Present price policy needs revision to support profitable participatory forestry programmes. GOB's royalty rates are too low; especially for supplies easily accessible by road, higher rates are needed.

Another alternative energy supply is the viable solution to reduce the severity of demand. The commercial use of fuelwood for brickburning and road tarring should be strictly prohibited with proper enforcement. Natural gas, a reasonably priced local substitute is readily available.

Logs and Other Products

To enhance the wood product life preservative treatment and proper seasoning are important and effective. The utilisation policy should incorporate the provisions of seasoning and treatment in the case of all government, semi-government and public sector consumption. The consumption of wood should not be allowed until it is mechanically seasoned and chemically treated. Later on, this provision can be extended for all consumption small or big, private or public.

Since that REB, PDB and BSEC and others have already made provision for wood treatment and seasoning for their timber needs, industrial areas and individuals need targeting. Establishment of treating and seasoning plants should consider technology, financing and import liberalisation. Manpower development and training should also get priority in this aspect. Research for diversified use and increasing life for other forest products, like bamboo, cane, rattan, hogla and golpatta, also requires positive action.

Price Mechanism

Although the Department enjoys the monopoly in several aspects of production, competition and marketing, the prices are not fixed with the monopolistic attitude of maximising profit. Prices are initially suggested by the respective Divisional Forest Officers (DFO) considering the quality, quantity, market demand, market price, logging cost, and transport for the division. Then the headquarters along with the DFO and Ministry fixes the price for the Division or Consignment Schedule of rates for each product. The prices are therefore not uniform for all divisions even for the same products. This reflects the market price and ability to pay by the consumers.

Each DFO identifies his products by categories and classify timbers according to the guidelines of the government and enlists all other products in his jurisdiction. The prices are then proposed for each of the above items for approval. More than one alternative price is recommended subject to conditions of the products. Commodity classifications for forest products usually followed are:

Traditional Products	Non Wood Products
Sawlogs and peeler logs	Grazing and Fodder
Sawntimber	Thatching
Poles and posts	Sand, clay, stones and shingles
Firewood	Other miscellaneous products,
Bamboo	including fish and fish products

Before determination of price the market is surveyed and the new price proposed on the basis of existing market price as well as observed changes during auction prices of the last 10 years. Once approved by the Department and the Government, it becomes the price for the year. Sometimes, prices get determined by consignments or lots. However, the Department and the government reserves all rights to approve or disapprove any proposed rate for the greater interest of the public.

The general principles followed are fixation of rates for logs done first, then rates for sawn timber and poles are fixed. Normally, the prices of sawn timber is fixed double the rate of round logs. Poles and house posts command the same prices as round logs. Prices for fuelwood and other products are determined independently on the basis of past historical price trends. Veneer and plywood is charged 25 percent higher than the normal rates of logs.

Two types of prices ie. spot prices and royalties, are practice in the Department. Spot price is the auction price which is determined for a particular auction through the competition among the buyers. All prices for private sector are determined following the auction price. Royalty is admissible for public sector industries, permit holders, local domestic consumers and for government consumption. The rates are normally fixed at 12.5 percent of the market price.

The price or royalty for special class of timber like teak and mahogany is determined on a case to case basis and charged according to the merits of the case. Normally they command higher prices than other produces. Special class timber is never allowed at a concessional rate. A recent price circular explains the position, Appendix 4.

The prices of the wood-based industries under BFIDC and BCIC are determined jointly by the respective department and the government. The government may allow subsidies for some of the important products of public interest like newsprint.

Prices for other minor items are normally slow moving and once determined may continue for 10 years or above. A rate of 12.5 percent of market price is the general principle applied when the rate is first set. Unless adjusted for inflation, the rates soon get out of line with other relative values, allowing windfall profits.

Pricing Recommendations

Price determination is a complex process and normally considers the marketing objective of an organization. It becomes more difficult when the cost of production is unknown and products are essential. Mineral, forest and water resources are normally controlled by state monopoly. The timber market and pricing in Bangladesh falls under that category. Price determination by the Department is constrained by two sets of considerations - welfare of the consumer and competitions from imports. The features of price policy are:

a. The existing practice of price determination seems workable for forest products other than logs. The royalty for logs at 12.5 percent of the market price is low in terms of present improved transportation network, higher market demand. It needs increased further depending on market accessibility to the forest.

b. If import prices are higher than domestic prices they discourage imports and vice versa. The best price mechanism sets both prices similar to the customer. This is done either by increasing local stumpage value or lowering import duties and taxes.

c. Import improved technology to increase recovery under technology transfer schemes. This will help reduce the pressure on log supplies.

d. Ensure regular supplies to major operating enterprises of BFIDC and BCIC. Place special plantation programmes under these enterprises, if necessary. Industry, private or government, should have control over its raw material supply. For the shortrun, BFIDC can import timber until the moratorium is clarified.

e. Public sector management efficiency needs boosting to improve productivity. Otherwise, the cost of production continues high and losses continue . Avoid subsidizing this inefficiency by concessional prices for raw materials.

f. Encourage more forest industries in the private sector to increase the income and employment in the country. Consider importing raw materials in the shortrun. A re-export based industry can gradually shift to local materials in the longrun, once supplies become available.

g. Conduct a market demand study to assess the type of demand for furniture, fixture, panels and other items of industrial outputs. Open an information centre to promote wood products and disseminate useful information and technology.

h. Make commercial motives the prime consideration in any plantation, public or private. Assess rates of return on investment before approving investment in forest resources.

i. Popularize wood substitutes by public education campaigns and price incentives. For example steel or aluminium doors and door/window frames, plastic or cement in place of timber, and gas, coal and oil in place of fuelwood.

j. Formulate forest product utilisation policy which advocates the use of mechanically seasoned and chemically treated woods. Foster the use of panels in lieu of solidwood products where appropriate.

k. Strengthen and expand the Timber Merchant Association to look after the interests of the solidwood industry. Industry-government cooperation is essential to save and develop the forest resources and environment of the country.

Strategies

Considering the preceding analysis, Bangladesh's marketing policy and strategy must take into consideration the following:

a. The nation cannot afford to pay the huge bills of import of timber and logs for a long time. Production for domestic consumption and import substitution should get priority. Production for export should get less preference after the import substitution.

b. Pilferage and illegal fellings need stopping effectively at any cost even if it is harsh and punitive, or diverts government revenue. The purpose of the law should not be defeated. Along with the strict enforcement of the law, allow selective felling to harvest the over mature trees which otherwise get wasted.

c. Bangladesh was, in the past, and could be in the future, selfsufficient in forest resources because of its natural endowment and fertility. For that to happen, appropriate strategy needs formulating. Instead of monoculture of the past, diversification of products and plantations is the appropriate technology to meet both demands in the market as well as diversity of the nature.

d. Plantation species should match the industrial and commercial requirements of the country. In the case of plantation, research in local commercial varieties should give preference to those species passing the tests of time and nature. Further improvement of local commercial species is a priority. The experiment with exotic and foreign species needs careful evaluation because of high risk and high investment, Acacia mangium is a case in point. It does not mean discouraging the research and development efforts but avoiding the luxury of unnecessary, undirected research.

e. Encourage imports for re-export if found viable. The government should discuss the issue with the promoters of the idea and undertake experimental projects providing small incentives. If successful, this may have tremendous impact on creating jobs in the country along with serving commercial purposes.

f. Production for consumption was given emphasis in the past by Government. Although the planners might have seen the high potentiality of export market for teak and teak products in the future, large scale teak plantation is the testimony. Teak constitutes only 10-15 percent of local demand besides being a long rotation and high risk crop needing special care. So far, planted teak has not shown good promise. Growth is slow and expected MAI is hard to achieve. It appears that no comprehensive economic appraisal was done before undertaking such plantation programme. In future, all programmes must recognize economic goals before selection and implementation. Production for export can only be done when the comparative advantage is higher.

g. When teak availability increases greatly in the future, restrict the export of logs or timber. Only allow processed products for export to add more value added in Bangladesh.

h. Both conservation of biodiversity and production for consumption must go together. A resource poor country like Bangladesh can not afford to pay for conservation and imports at the same time.

i. The growing demand for pulpwood, soft industrial wood and horticulture trees should also get priority in plantation programmes. Industrialisation using wood-based products also needs consideration in industrial policy of the government otherwise the import bills will increase tremendously.

j. The exports of nonwood or minor forest products can easily be promoted within a short period of time. The gestation period is minimum for such products. What is required is coordinated and organized efforts for promotional activities. Import bills for medicinal herbs are increasing daily. The government should encourage the establishment of medicinal plant farms in the country in a commercial way so that imports could be eliminated.

k. Finally, the village homestead plantation needs much more attention by the Forest Department and the Forest Research Institute. More farmers need motivating to increase their tree growing efforts and they deserve more productive, better quality seedling stock.

PRIVATE PLANTING INCENTIVES

General

Most of the present private planting occurs in and around rural homesteads. Scope exists to increase this further in two major ways - first, increasing planting area and second by increasing productivity in the planted area. In future, the greatest potential lies in the Chittagong Hill Tracts, Chittagong, Cox's Bazaar and Sylhet Districts. Limited opportunity now exists in the Hill Districts since some khas land is not allocated and privately held, and title is disputed. Until the question of land ownership is finally settled or GOB develops an acceptable mechanism for long term lease arrangements, private planting on presently vacant land is not supported politically in Bangladesh.

In terms of areas of course, the Hill khas lands are attractive because of their large size and obvious need for well managed development. This areas presently totals over 780,000 ha. Nevertheless, considerable potential still remains undeveloped in the villages. Around farms, prospects for increasing tree planting lie in vacant homestead areas, unused pond banks, unproductive agricultural land, property boundaries and sparse planting on cultivated fields. Increasing the productivity is possible in two ways - through extension information to improve cultural practices and by provision of fast growing, higher quality planting stock.

Table 34 - Private Planting Potential

Item	Equivalent Hectares[a]	Trees/ Family	Trees (million)	Number Families
Encroached Sal Forest				
Alley Cultivation	22,200	1,375	56	40,300
Wood lot	52,700	2,500	132	52,700
Total Encroached	74,900	3.875	188	93,900
Public Rights of Way				
Embankments/ Canals				
Major	13,700	2,100	34	16,300
Minor	20,700	1,000	52	51,800
Total	34,400	1,260	86	68,100
Roads				
Major	7,200	1,600	18	11,200
Minor	3,500	1,000	9	7,900
Total	10,700	1,400	27	19,200
Railway	1,200	1,300	3	2,300
Total Rights of Way	46,300	1,290	116	89,500
Farm Land [a]				
Homestead[b]	17,200	10	43	4,325,00
Uncultivated[c]	40,000	10	100	10,045,300
Property Boundaries[d]	160,700	40	402	10,045,300
Cultivated Field[e]	321,400	80	804	10,045,300
Total Farmer	539,300	100	1,349	13,817,600
Total	660,500	110	1,548	14,000,100

[a] Equivalent area if planted at 2,500 sph

[b] Assumes 10 seedlings/ family

[c] Assumes planting at 100 sph spacing

[d] Assumes planting at 10m lineal spacing

[e] Estimated actual private hectares are:

Homestead	121,100
Uncultivated	1,158,777
Cultivated	8,160,957

Potential Planting Area

Total homestead area amounts to 391,000 ha, of which 270,000 ha is planted. Potential additional homestead planting area is 121,000 ha, slightly more than 40% of current areas. There are about 250,000 ponds and tanks throughout the country, many of whose banks are suitable for further tree and bamboo planting and uncultivated area amounts to 1.16 million hectares. Eighty percent of recent private planting took place on vacant land, 13% around the homestead and the remainder on pond sides and other land (FMP 1992l).

Farm households total ten million and have an average cultivated size of 0.81 ha, indicating an estimated 4.0 million km of property boundaries. Potentially, this boundary distance can support 400 million trees at 3m linear spacing. Limited current agroforestry experience indicates that planting narrow crowned, deep rooted species in cultivated fields at 10x10m spacing does not materially reduce crop yields. If this proves true after further experience and trials, existing agricultural fields have the capacity to support 800 million trees without affecting normal agriculture crop production. Table 34 summarizes the physically possible areas for private planting (excluding khas land in the Hill Districts) and compares the planting potential considering: encroached sal forest land; poorly used lands on public rights-of-way and private farm lands.

Private planting potential outside the Hill regions is significant (almost 660,000 ha), close to the unproductive khas land area. Even so, this private area will require extensive development, education and extension effort to fully develop its potential. Of the potential, 80% is private farm land (539,000 ha), 46,000 ha (7%) is public rights-of-way and 12% (75,000 ha) encroached sal forest land. This estimate assumes a common effective spacing of 2,500 sph for comparison

purposes. With private land, the greatest potential is sparsely planting cultivated fields, 321,000, ha, followed by planting property boundaries, 161,000 ha. Fallow land, 40,000 ha, and unplanted homestead areas, 17,000 ha contribute a further potential 57,000 ha.

Encroached sal forest land accounts for 75,000 ha for which alley cultivation is indicated for 30% and 70% suits woodlot plantation. Land controlled by GOB departments, other than BFD, could contribute 46,000 ha if fully planted. Embankments and canals are the major location (74%) followed by roadsides, 23%. Railway property is relatively unimportant - only 3% of public land is considered suitable. Significantly, private lands contributed 88% of the potential tree planting outside of Reserved Forest and Unclassified Forest Land.

Since 40% of Bangladesh floods annually, full exploitation of the potential private area presents an unique challenge to find flood-proof tree species. There are other constraints as well which block full use of this potential land area. The figure calculated is the theoretical maximum land area available. However, until such time as the ownership of the present barren, unproductive Hill District khas land is adequately resolved, investment in private forestry is really only possible in the main agricultural areas.

Farmer Planting Attitudes

Bangladesh, fortunately, has a tradition of farmer tree planting. This serves as a good foundation for increasing planting activities. This is a particularly useful factor to use in regions with severe wood shortages. About 80% of land holding households plant trees on their property (FMP 1992l). These households planted five and regenerated five trees annually from 1989 to 1991 according to FMP survey data. Farmers plant mainly to increase their income, 60% grow timber and poles, 8% want fuelwood, less than 1% plant for fodder and 30% want other products, mainly food items. Over 90% want to plant more.

Fruit species are the most popular, preferred by 70%. Women show a slight preference for multipurpose species rather than timber and fruit. Surprisingly, 70% of farmers are prepared to buy seedlings. Almost 40% of recent seedlings used, farmers grew themselves, while 20% came from private nurseries (and a similar amount from other sources than government - NGOs and neighbours). One half or more of the farmers say they cannot get their preferred species or sufficient number of seedlings.

The majority of both rural men and women need more technical information on tree growing and plantation procedures. One third of the growers use all their tree products themselves, a similar percentage sell their goods through local buyers and 16% sell to their fellow villagers. Traders and commercial buyers from nearby towns buy from 16% of the growers. One third of the growers expressed satisfaction with the price received, 40% were not, the balance consumed their products. Sixty percent believed higher prices were possible simply by withholding sales, slightly more than one third said better road access would help raise prices for them.

Incentive Programmes

GOB presently rejects disposing Hill Tract khas land to private individuals either by direct sale or long term lease. Therefore, private incentive programmes cannot operate effectively in these Divisions. Any consideration of an incentive programme is limited to encroached sal forest land, public rights-of-way controlled by other government departments and private farm lands. The only possible incentive workable in the Hill Tract area is extensive sharing of intermediate and final crop benefits between the Department and programme participants unless government alters land disposition policy. .

Based on the farmers planting attitudes just summarized, incentive programmes are not required except under special circumstances and for specific objectives. These special needs might include encroached land and jhum control, establishing watershed protection plantations and poverty alleviation programmes. It appears the major impediment to increasing farmers planting on their own land are quite few, and, superficially at least, not particularly difficult to implement. What is required, however, is quite different than past programmes or goals. In future, the major elements private planting programme need to include to increase farmer involvement include:

a. Increased supplies of popular fruit, and timber and multipurpose species.
b. Genetically improved, faster growing and better quality tree seedlings .
c. Effective, responsive extension tied to the present agricultural extension system and programmes.
d. Up to date and accurate market and product pricing and sales volume reporting.

The above factors strengthen private planting and appear to satisfy farmers present expressed planting concerns. A well-designed, responsive programme appears likely to run on its own without major financial incentives. If one is needed to get it rolling establishing the supply of genetically controlled seedling stock easily available in villages is the key. Seedling supply suits an extension system and incorporating small privately run nurseries, or government supplied stock timely delivered to villages. Of the two, the former is less costly and more easily organized. It is more difficult to ensure genetic stock standards under private nurseries. A government run system better guarantees seedling quality but will be difficult to organize efficiently.

Further incentives considered for programme inclusion are the provision of inputs during the initial year - fertilizer and insecticides. The number of trees and other inputs envisaged per family is not great so programme cost/family covered is insignificant compared to some of the present programmes. Furthermore, service costs are low. There is no need for government to restrict access only to a selected farmer class - any farmer is a suitable candidate from a family only having a housing plot to a medium or large owner with several hectares.

Incentive Valuation

There are a range of incentives combined in eight programmes proposed for FMP inclusion, ranging from a few inexpensive seedlings, to a combination of paid labour and seedlings and a package of free seedlings and agricultural input. Programmes breakdown into three groups based on total direct implementation cost. Differences in each group depend on the inclusion of fruit tree and agricultural inputs. Table 35 presents a cost summary profile, excluding supporting extension and training services required in each case, indirect programme costs and overheads. Costs, range from Tk 140 - 12,150/benefitting family, are spread over one to three years. Considerable cost differences exist amongst the programmes and depending on whose point of view is considered.

A series of planting programme models designed for: encroached sal forest land; strip plantation for public roads, canals, embankments and railways; and private land appear suitable. These programmes are compared in Table 36 based on the present worth to the various participants. In all cases, analysis is based on a twenty year period, uses a 12%/A discount rate and the yields, costs and treatments described in the Participatory Forestry Report (FMP 1992i).

Programmes are not equitable, their benefits range from Tk 21,000 to almost Tk 535,000 over twenty years, valued on the basis of present worth. Benefits are not proportional to the main programme costs. Benefits need reducing, or alternatively more families involved in the programme than present norms so that benefits are more widely shared. Appendix 3 has costing details.

Table 35 - Incentive Programme Component Costs, Tk/Family

Item	Paid Labour	Free Seedlings		Other	Total
		Forest	Fruit		
High Costs					
Major Embankment	7,750	4,000	400	-	12,150
Woodlot	6,000	5,000	-	-	11,100
Moderate Cost					
Major Roads	6,000	3,000	40	-	9,400
Railways	6,000	3,000	-	-	9,000
Alley Cultivation	-	2,750	800	3,525	7,075
Minor Roads	4,500	2,000	400	-	6,900
Minor Embankments	3,750	2,000	-	-	5,750
Low Cost					
Homestead	-	-	140	-	140

Table 37 compares discounted benefits and cost from two different perspectives - who pays for the programmes, the Forest Department or the benefitting family. Actually, excluding any middle or large size farmer family benefitting from the homestead planting programme, all other families would need financing if they pay for the initial programme costs. Financing costs are excluded from the calculation as is the costs of any subsidy to maintain the family between tree harvests. Total cost represents the full cost of developing the potential areas shown in Table 34 and wood yields are based on the projected wood harvests over a twenty-year period. The Homestead programme has the highest benefit:cost ratio 149:1 and Minor Embankment the least 4:1. Most others have ratios of about 10 to 20:1, excepting Alley Cultivation which has a ratio of 67:1.

Table 36 - Present Worth of Current Planting Incentives, Tk/Family

Programmes	F Dept Input	Twenty-Year Benefits				
		Family	Land Owner	Union Council	Forest Dept	Total
Alley Cultivation	7,100	478,900	-	-	55,900	534,800
Major Embankments	12,150	211,700	5,600	1,800	7,200	226,300
Main Roads	9,400	191,600	5,900	2,900	11,800	212,200
Minor Roads	6,900	160,700	2,800	1,400	5,600	170,500
Woodlot	11,000	117,800	-	-	42,400	160,200
Railway	8,500	77,000	4,200	2,100	8,500	91,800
Minor Embankments	12,150	51,400	2,900	1,400	5,800	61,500
Homesteads	140	20,900	-	-	-	20,900

In terms of minimum unit wood growing costs the homestead programme has the potential to easily outrank all others by a wide margin - initial costs are Tk 12/m^3 of roundwood produced. All other programmes are much less efficient. Alley Cultivation and Woodlot are next, costing about Tk 99-103/m^3. Excluding Minor Embankments, the other strip plantation models cost from Tk 133-152/m^3. Minor Embankments are least effective and cost Tk 270m^3. If the comparison is made only on log production, the preference for the Homestead programme becomes even more pronounced. Alley Cultivation looks like the next best alternative, but costs Tk 390/ m3. All other programmes costs range from Tk 875 to 1,200, except Minor Embankment plantations which ends up costing Tk 2,025/m^3.

Incentives directed to homestead planting have the best prospect of success in terms of increasing wood volume, benefiting the largest group of people and distributing uniform benefits throughout the country. They require much less supervision and organization. Due to widespread appeal, low

cost and volume potential, this programme offer the best strategy to keep prices low, yet maximize production. Potential supplies are 20-300 times greater than any other programme (Table 37) and the low cost of establishment to both government and farmer favours lower prices than other programmes. After that, the programmes on public rights-of-way are the next choice, provided that tree or property tenure rights are settled in favour of the families involved. Although more costly than the sal forest programme, they offer the advantages of spreading the wood volume more evenly throughout the country. Alley Cultivation and Woodlots areas will concentrate yields geographically which involves more transportation for harvested products. Since fuelwood can't bear much transportation, the fuelwood produced would likely benefit fewer people and a smaller area. Even if the full potential of all programmes except the Homestead one were fully developed, the available wood supply is only 12% of the indicated potential of private land.

Table 37 - Benefit and Cost Potential of Incentive Programmes

Programmes	Benefit : Cost Ratios		20-Year Potential, Total				
	Forest Dept	Family	Cost Tk Million	Million m^3			Average Cost, Tk/ m^3
				Fuel	Logs	Total	
Homestead	na	149:1	1,406	-	113.0	113.0	12
Alley Cultivation	8:1	67:1	286	2.16	0.73	2.89	99
Minor Roads	0.8:1	23:1	55	0.31	0.05	0.36	152
Main Roads	1.2:1	20:1	105	0.65	0.12	0.77	136
Major Embankments	0.6:1	17:1	198	1.27	0.20	1.47	135
Woodlot	4:1	11:1	580	5.12	0.48	5.60	104
Railway	1:1	9:1	20	0.13	0.02	0.15	133
Minor Embankments	0.5:1	4:1	628	2.01	0.31	2.32	270

WOOD-BASED INDUSTRY ASSESSMENT

General

Wood-based industries in Bangladesh comprise two types of wood users, the pulp and paper and the mechanical or solidwood products industry. Both categories breakdown further in to other classes: the first into pulp, paper and allied products; and the second into a host of other products, including secondary products and joinery materials like doors, textile bobbins, and large numbers of other minor products with sawnwood as their base material.

Most pulp and paper industry enterprises in Bangladesh are owned and operated by Bangladesh Chemical Industry Corporation. Their enterprises include the karnafuli Paper mill, Sylhet Pulp and Paper Mill, Khulna Newsprint Mill, North Bengal Paper Mill. These enterprises are characterized by large capital investments and a high level of enterprised is required for operations and maintenance. Private industry is limited to small papermills producing most products and converted products other than newsprint.

Many of the solidwood processing industries are owned and operated by Bangladesh Forest Development Corporation. There companies include Chittagong Particleboard and Veneer Plant, Chittagong Furniture Factory, Chittagong Cabinet Manufacturing Plant, Chittagong Board Mill, Chittagong Door Factory, Chittagong Treatment Plant, Chittagong Timber Seasoning Plant, Chittagong Sawmill, Sangu Valley Plywood Plant, Dhaka Cabinet Manufacturing Plant, Eastern Woodworks Dhaka, Kaptai Wood Processing Complex, Khulna Wood Treatment Plant and Khulna Cabinet Manufacturing Plant. BCIC's interests in solidwood are the Khulna Hardboard Mill and Ujala Match Works.

There are about 4,800 sawmills in the country, of which 2,500 are in urban locations and 2,300 in rural areas. Most of the private mills are ill-equipped and unable to take advantage of normal conservation and lumber recovery techniques. Private sector plants dominate the panel board industry suing both wood and agricultural residues for raw materials. Overall, the private solidwood industry is weakly developed.

Financial Analysis

The Wood Processing specialist report assessed all the major wood-based industries. This assessment included both financial and technical performances. Financial analysis is based on the data furnished by each enterprise for the last ten years. That specialist report gives detailed analyses for each enterprise compared to the summaries reported hear.

BFIDC operates eleven solidwood processing companies. Table 38 summarizes the profit (loss) position of all these companies by three different periods:

- Pre cutting moratorium.
- Post cutting moratorium.
- 10-year periods 1981/82 to 1990/91.

10-year financial performance shows a combined total profit of $ 481,600. In the seven years before the imposition of the cutting moratorium, BFIDC showed a profit of $ 1.68 million, Since the moratorium, the Corpopration suffered losses totaling $1.2 million in three years.

Table 38 - BFIDC Consolidated 10-Year Profit (Loss) Summary

Mill/ Plant	Profit (Loss) US		
	Pre-[a] Moratorium	Post[b] Moratorium	10-year[c] Total
Chittagong Particleboard/ Veneer	(1,106,181)	(835,122)	(1,941,303)
Chittagong Furniture	(62,784)	(213,844)	(276,628)
Chittagong Cabinet	(26,718)	(92,848)	(119,566)
Chittagong Flush Door	(851,367)	(91,111)	(942,478)
Chittagong Wood Treatment	956,833	(224,777)	732,056
Sangu Valley Plywood	345,773	101,864	447,637
Dhaka Cabinet	(16,807)	(40,639)	(57,446)
Eastern Woodworks	50,932	(41,813)	9,119
Kaptai Lumber Processing	902,375	67,893	970,268
Khulna Wood Treatment	1,395,453	172,312	1,567,765
Khulna Cabinet	93,512	(1,354)	92,158
Total	1,681,021	(1,199,439)	481,582

[a] 1981/82-1987/88 [b] 1988/89-1990/91 [c] 1981/82-1990/91

BFIDC's operations breakdown into four distinct product groups as follows:

- Particleboard includes the particleboard and veneer plant in Chittagong.
- Seasoning and treatment, three facilities, one at each of Khulna, Kaptai and Chittagong. These are the only production units which demand expertise not found in the private sector.
- Plywood, one plant located at Dohazari.

- Furniture, cabinetry and doors, includes six plants, three located in Chittagong, two in Dhaka, and one in Khulna.

Table 39 presents the 10-year financial results according to product categories, split to show the effects of the cutting moratorium. Sangu Valley Plywood and the three seasoning and wood treatment plants are the only operation showing a cumulative and periodic profit position in the 10-year period ending in 1990/91. In contrast, the particleboard and tertiary processing enterprises (furniture, cabinetry and doors) show losses consistently.

Table 39 - Profit (Loss) of BFIDC Enterprises According to Product

Product Group	Plants	Profit (Loss) US		
		Pre-Moratorium	Post Moratorium	10-Year
Particleboard	1	(1,106,181)	(835,122)	(1,941,303)
Seasoning/ Treatment	3	3,254,661	15,428	3,270,089
Plywood	1	345,773	101,864	447,637
Furniture, Cabinest, Doors	6	(813,232)	(481,609)	(1,294,841)
Total	11	1,681,021	(1,199,439)	481,582

BCIC owns and operates two solidwood product companies - Khulna Hardboard Mill and Ujala Matchworks. Performance of both industries is not affected by the cutting moratorium. Ujala shows an accumulated 10-year loss of U$ 1.47 million, while Khulna Hardboard has a very modest $0.32 million profit.

Table 40 - Financial Condition of BCIC Enterprises

Mill	Profit/ Loss (US)
Karnafuli	1,052,363
Sylhet	(4,058,748)
Khulna	(10,819,923)
North Bengal	(21,085,568)
Total	$ (34,911,876)

Technically, the pulp and paper companies keep their plant and equipment in reasonably good mechanical condition but operating below capacity. Financial performances gives a very gloomy picture for the accumulated financial loss of U$ 34.9 million. Only Karnafuli is in the black with a small profit U$ 1.0 million, all others incurred a net loss.

Economic Appraisal

It is estimated that about 47 percent more raw material than required is wasted in the conversion of sawlogs to meet current sawnwood demands. About 2.16 million m^3, of sawlogs is normally required to meet the present annual sawnwood demand of 1.2 million m^3. The equivalent log volume necessary with present sawing techniques and equipment is 3.17 million m^3/A. This a simple waste of the country's scarce natural resource which would amount to 1.1 m^3 annually. This loss is due entirely to two factors: The use of out-dated and in appropriate technology; and the use of in appropriate conversion techniques.

The potential loss to the country's economy due to the continuing use of inappropriate technology and practices is staggering. If Bangladesh had sufficient resources to provide the volume needed, the estimated value of the wasted raw materials is US$ 165 million annually in 1993 market prices. For each of the approximately 4,800 sawmills in Bangladesh, this amount translates to about U$ 36,000 annually.

The unfavourable financial performance incurred results from a myriad of factors. The major ones identified as contributors are:

- Inappropriate technology.
- Raw material shortage and irregular supply..
- Extent of Forest Department control on raw materials.
- Inability to access external assistance and technology.
- Shortage of skilled labour.
- High level of import duties.
- Under capitalization.
- Wornout equipment.

Public sector corporations, in addition to the above constrains also face conditions of:

- Over employment.
- Fixed cost labour.
- High employee fringe benefit cost.
- Militant labour force; and
- Government controlled prices.
- Revolving management.
- High input costs.

Planting Incentives

One of the major constraints facing to-day by the wood based industries is the shortage of raw materials supply. It is perceived by many, that if all industrial raw materials remain under the direct control of the FD, the situation of many of the wood based industries will not be improved. As an example, BFIDC seasoning and treatment plants sit idle while there is a strong demand for transmission poles, anchor logs and crossarms. The reason cited is that the FD has delayed its silvicultural activities with respect to thinning programmes. Meanwhile, poles are being imported.

Further, vast areas of denuded forest and felled plantations alike, remain undeveloped while major industrial users of forest products desperately seek alternate sources to meet their raw material need. If this situation continues, the future of the wood based industries will be at stake which warrants to seek alternative and sustainable sources of forest products development. It is therefore, imperative that those major enterprises such as pulp and paper mills should be granted long term tenure for land for the establishment of plantation of an area appropriate to meet their raw materials requirement. This action will clearly provide an incentive to the enterprises.

Such plantation development under the management of individual enterprises will also ease the demand for timber from FD lands as well as village forest. Certain species can be grown which would serve the needs of specific end-uses, thus leaving more valuable FD and village forest species for products of higher value. In addition, the entrepreneur who wishes to invest in a forest-based industry will have a better opportunity to secure financing for the enterprise if a secure source of raw material supply can be shown.

Plantation development by the enterprise will also provide price incentives in the form of reduced cost of raw materials. The financial analysis of short rotation pulpwood species plantation model

suggests that pulpwood cost/ m^3 would be around Tk 60. If another Tk 150-200 is added for harvesting and transportation, the cost of pulpwood at millgate would still be less than proposed royalty rates. This reduction in the price of raw materials in combination with sustained supply will have a tremendous positive impact on the cash flow of the enterprises and also on the economy as a whole.

The possibilities of having control over raw material supplies at affordable prices is incentive enough for legitimate business to plan and develop productive investments. Bangladesh will however likely face having to build up suitable plantation resources before any genuine investor will grasp the opportunity. Existing companies given secure tenure on raw land should raise their own plantations, but government will have to warrant controlled prices on mature plantation wood.

Policy Recommendations

Implementation of the following recommendations (FMP 1992f) is necessary to bring about the changes needed for the growth of the forest industry and to permit the industry to make a positive contribution to the country's economy.

- Create secure raw material supplies by granting conditional long term tenurial rights to enterprise making large investments, either the an autonomous enterprise system, or as independent producers or government corporations.
- Give responsibility for ensuring sustained industrial raw material supplies to the consuming industries holding long term tenure. These groups, ie. pulp and paper mills must be held accountable and responsible for establishing intensively managed fast growing pulpwood plantation on areas appropriate to their needs.
- Reduce raw material losses in the sawmilling industry by new and efficient sawmills which utilize the resource more efficiently, thereby supporting sustainable resource development.
- Finally, it is suggested that an autonomous enterprise system, operated legitimately and in a proper businesslike manner, is the best means by which the wood processing industry in Bangladesh can grow, provide continuing employment, and make a positive contribution to the national economy.

Separate policy recommendations relate to government owned corporations only, the following apply, in addition to the above recommendations:

- Adopt standardized product sizes, make Bangladesh Standards Institute, in co-operation with manufacturers, builders, architects, and major end-users establish and implement efficient wood product standards clearly designed to conserve wood.
- Eliminate wasteful raw material measurement systems, compel the forestry sector to follow government order which placed Bangladesh under the metric system of measurement in 1982.
- Introduce log and sawnwood grading rules, have Bangladesh Standards Institution prepare, publish and enforce quality rules applicable to the timbers of Bangladesh.
- Accelerate practical research and development of lesser-known species, have the Bangladesh Forest Research Institute continue their research into all properties of the lesser-known and traditionally unused species.

- Embark upon a public education programme to encourage consumer acceptance of wood seasoning and preservative treatment. Back the programme up with a differential value-added tax structure that gives price incentive to use seasoned and preserved wood products.

SUSTAINABLE RESOURCE DEVELOPMENT STRATEGY

General

Sustainable development means providing the demand and needs of today's generation from the existing natural resources without compromising the next generation's capacity to meet its requirements. Another definition is not taking out of the natural resource product cycle more than its inherent capacity to produce. Sustained development incorporates the following basic principles, as each generation:

- Conserves existing natural resources and does not undermine the options of future generations.
- Maintains the quality of the natural environment inherited and passed on.
- Provides equitable access to natural resources for everyone's benefit.

Many environmental issues and concerns have international or global significance, but the ones of greatest potential danger to Bangladesh are the possible global causes and effects of forecast climatic change. Change may alter existing agriculture productivity, raise the sea level and increase flooding and storm surges and affect coastal ecological conditions. This concern is beyond the purview of the Master Plan. Apart from this, the major local environmental concerns for Bangladesh are two. First is the extreme stress on natural resources resulting from the already large and still increasing population. Second is reliance by the poor on natural resources for basic necessities.

Like world climate changes, population growth and existing social and economic conditions are beyond the immediate influence of the Master Plan. However, the effects of the continuing burgeoning population overwhelms resource productivity and is a direct plan concern.

Forests influence the state of the environment in three main ways; they: absorb carbon while growing and release carbon when burning or decaying; conserve plant and animal genetic diversity and natural ecosystems; and maintain land stability and productivity by protecting soil and storing water. Forests have tremendous recognized environmental importance, affecting soil, water, atmospheric conditions, ecological balances, social and economic growth as well as recreational and cultural needs. Despite these recognized forest values, in these areas society and economic science has yet to develop a satisfactory way of defining and measuring these values in comparison to other assets.

Bangladesh's forests today are exploited beyond natural capacity and are deteriorating steadily. Corrective action is needed to introduce development and actions which nourish, perpetuate and increase the nation's forest resources.

Principal Strategies

Sawlogs and fuelwood are the two primary products in greatest demand and shortest supply over the term of the Forestry Master Plan. Sawlogs are a problem, simply because they take time to grow - 20 years minimum, and present growing stocks are inadequate to produce what Bangladesh needs. Fuelwood is principally a cost problem. It is a major necessity for most of the population for cooking food and traditionally is viewed as a product free for collecting. Even as a market

item it is still a problem. Both existing and future resource locations are distanced from the population. Fuelwood needs transporting from forest to home, yet it can not bear much transportation since most people are unable to pay the cost involved. Since fuelwood is a low cost item, it is never, or only rarely (and under unique circumstances), profitable to grow. Sometimes it is economically possible or socially desirable from government's view, but again the circumstances are not common.

Fuel is a byproduct of both growing round logs and processing them into sawn timber and tertiary products. Compared to sawlogs and fuelwood, pulpwood and other timber products, are not as critical. The demand for the latter is not as great as sawlogs and fuel, nor are they difficult to produce. Like fuelwood, poles and pulpwood are byproducts of the natural process of growing sawlogs. Therefore, the principle strategy is to concentrate on sawlog production, and fuel and all other traditional industrial products come with it. That is not say that special programmes are not proposed for fuelwood. The obvious choice of expanding fuelwood supplies by plantations close to the population centres is part of increasing sawlog supplies. Special fuelwood programmes, principally lie in energy conservation.

The chief thrust of the FMP strategy lies in the following major areas:

- Utilize all available products within existing or achievable sustained yield limits.
- Concentrate on sawlog production.
- Maintain and improve the quality of existing forests, while utilizing all available products within existing or achievable sustained yield limits.
- Concentrate commercial production of principle products close to the population; first, in rural areas, and second on plantations on forest land close to consuming centres.
- Improve utilisation of existing and future resource, first in the manufacturing process, and second by using more local natural species.
- Intensify forestry practices to increase productivity in terms of both improved wood quantity and quality of wood produced.
- Increase the direct involvement of the rural population in tree planting in a positive way by offering programmes of direct and demonstrated benefit to them.

Future programmes to increase sawlog supplies should focus first on increasing supplies in the existing agriculture areas both on private land and unused government lands. This is where the population resides and the need exists. Here species selection is extremely important and local preferences need close recognition to achieve widespread participation. The primary need is for wide crowned fruit species. Such species provide fuelwood while maturing and also provide reasonable log materials when fully mature. Such programmes when directed to the available other government land are the principal focus for poverty alleviation and social improvement goals. They require special design and extreme effort to satisfactorily consider the needs for more wood and improving the economic and social conditions of participating families.

A variety of plantation models are the technical basis for sustaining and extending sawlog and fuelwood resources. Waste reduction and increasing utilization of presently unused species are inseparable components of the forest industries investment programme. Benefits also occur from benefits in expanded and improved permanent roads networks and by converting the sawmill industry into a more efficient, less wasteful industry producing better and more valuable products. In addition, profitability is indicated by the financial benefits estimated for the sawlog and

fuelwood supplies generated by the forest management (FMP 1992b) and the participatory programmes (FMP 1992i). Full details of estimating basis and analysis of indicated profitability is covered by the Financial Analysis Report (FMP 1993b).

Improved Forest Management

1. Genéral

Existing forest management practices and local condition in both the Hill and Sal Forests are either destructive or require change. With Hill Forests, natural forest conditions are impossible to maintain while supporting commercial timber extraction. Harvesting the heavy timber involved alters the conditions so much it is silviculturally impossible to replace the natural conditions. The remaining area is approaching a level which needs retention for natural environment preservation and conservation reasons. The indicated activities such areas can support are extensive uses like industries based on non wood forest products, wildlife conservation and management development, tourism focused on ecological values, and outdoor recreation.

Sal forests suffer from encroachment and the old growing stock can no longer regenerate itself. The indicated strategies in this case is a combination of programmes including agroforestry focusing on encroached areas, planting of blanks and openings and enrichment plantations on degraded areas. Sal forests are particularly well-suited to grow non wood forest products along with conventional planting and improvement activities.

Intensive Forest Management - Present day forest management practices are rudimentary. Considerably better growth potential exists in Bangladesh than exploited by current forest management practices. Traditionally, a plantation growth rate for teak of 7.5 m^3/ha/A is the accepted standard with conventional silvicultural practices and knowledge. The best estimate today it that these teak plantations only yield 2.5 m^3/ha/A due to a combination of area losses and the Department's inability to follow through with the recommended silviculture operations.

In addition to institutional and system changes, what is needed technically to achieve existing potential is a tree farming approach. An intensive approach treats trees as an extended agriculture crop and manages their development in a similar way to produce maximum economic return and faster growth. This means using high yielding, fast growing and genetically improved species and provenance, all supported by the required level of inputs - cultural operation labour, as well as the required fertilizer, herbicides and insecticides which promote maximum growth.

Part and parcel with intensified forest practice is the need to promote diversity in species to avoid the inherent risks of monocultures. Monocultures involve risk, but damage, even severe damage, is simply a possibility not a guaranteed outcome. The risk really only applies on Department land where opportunity exists to create large contiguous areas of single or restricted species. It is not really a serious problem for private planting which occurs in scattered isolated location on separate properties.

Intensive forestry requires responsive extension and research support. Much of the technology required by Bangladesh already exists in other countries and in many cases with similar species. The research path is quite short. What is needed is to adopt these results to local site conditions, tree species or provenances quickly. Provided high yield forestry is practised only by BFD, extension requirements are small. But, once private individuals become actively involved the need for an effective extension system is fundamental.

Non Wood Forest Products - Managed properly and downstream processing adequately developed, NWFP offer an excellent solution to sustained resource utilization due to their non destructive utilization. Selected products can suit local environment and social conditions.

Growing and harvesting NWFP provides regular and year around, or seasonal, employment and with a minimum of physical effects on the growing site, if properly managed. A range of non wood product exist in Bangladesh but within the natural forest area as well as relying on village-based forest resources.

A Specialist Report (FMP 1992k) considered seven different products for the greatest development potential. Two products rely on village forest resources, one depends on forest-based resources and the other two on resources occurring in either location. Lac and khair programmes depend strictly on privately grown trees, golpatta thatching material on the Sundarbans, while medicinal plant and hogla weaving material use either village or forest grown raw materials.

2. Indicated Strategy

Major ingredients to maintain and improve the natural forests are:

- Implement intensive plantation forestry practices.
- Eliminate traditional extraction in the Hill Forest.
- Build up resources in Sal Forests by replacing depleted growing stock and introducing mixed species plantations in open areas and blanks.
- Introduce specially designed agroforestry programmes on encroached areas which maintain tree cover and productivity, involving and benefitting the encroaching people.
- Replace destructive exploitation by non wood forest product or environmental-based developments which do not compromise, or which improve, traditional natural conditions.
- Manage existing protected areas more effectively and bring a larger area within the protected area system.
- Hold extraction levels of all products within the sustained yield capacity of existing resources and conditions.

Waste Reduction

1. General

Required improvements here lie in the following three main areas:

a. Full use of existing species, especially the Hill Forest species.
b. Promoting industries which use all local species and suit the products in greatest demand.
c. Start conservation programmes that decrease waste, increase working life or reduce demand.

Increasing the use of existing species is possible in several ways. The most practical one is by continued research in wood chemical and physical properties. Market promotion of new uses for both commercial and uncommercial species matches the first alternative. A major FMP objective is to eliminate Hill Forest extraction within the 20-year period, research efforts, therefore, must concentrate on payoffs on research expenses.

Suitable industries which support Plan implementation are those using the quicker growing softwoods, and can accommodate a wide range of physical properties. They should also use the smaller sized stems which become more common in the future. Solidwood industries are more suitable as their manufacturing processes are less harmful environmentally. However, pulp and

paper is the most obvious choice to develop. Industries to target are those were product value comes from requiring a high labour content, and not necessarily products using high value wood. Tertiary ones, handicrafts, furniture, possible exports, are good examples of industries to favour and encourage.

Conservation strategies appear to offer the quickest payoff and the most obvious channel for private; productive investment. With fuelwood, the options are twofold - charcoal production and improved wood stoves. The former makes use of the current Hill Forest logging waste and the latter reduces rural fuelwood demand. In the case of timber, wood seasoning and preservative treatments are indicated. However, the greatest opportunity to conserve wood lies in reducing the high level of waste in the sawmilling industry. This programme adopts more productive and less wasteful sawing technology. Improvements in the extraction road network (more and better quality roads) lessen transportation costs and provide year around access. Both factors help considerably to reduce extraction costs, increase the profitability of the current marginal species and therefore support better utilization. Improved logging practices, in addition to using more of available species, will contribute further savings, once employment is no longer seasonal.

Benefits derived from eliminating and reducing waste, through research and better roads are indirect and difficult to quantify and hence are valued in the analysis in terms of values saved or added, rather than in financial profitability.

2. Indicated Strategy

The number one development strategy is to increase raw material supplies. Strategies for overall development of the industrial forestry sector are fairly straight forward. Sawmilling and pulp and paper primary production are the focus of direct government involvement. Private industry or non government groups are best suited for direct involvement in the secondary industries and in non wood forest products. GOB's role in the latter two sectors is facilitating and policy oriented, not direct involvement.

Primary Roundwood Products - Harvesting development needs attention in two main areas - provision of mechanical logging equipment and investment in permanent extraction roads. BFIDC's extraction operations in the Kassalong Reserve Forest require new equipment and some areas of the plantations will also need mechanical harvesting. Road improvements include higher road spacing, and improved construction standards.

Strategy in Status Quo and Scenario 1 is to establish permanent, not seasonal roads. In addition, Scenario 2 allows for higher standard roads and a much denser network.

Non Wood Forest Products - NWFP industry development is not an area suitable for direct government involvement but there is good scope for building raw material supplies, selectively. This is an important area with tremendous potential in poverty alleviation and rural employment opportunities many of whom today are illicit cutters and jhummers. Scenario 2 priorizes investment, the recommended development order is: rattan/ bamboo, fisheries, lac, lali/ catechu, golpatta, murta,medicinal plants and finally hogla.

Strategically, Government's best role is supportive and facilitating in terms of arranging reasonable credit, helping make raw material available by direct or indirect means, and supplying training and possible extension services. Specific programs and project identification are better left to individual private companies or groups or active NGOs.

Sawmilling - There is major scope for improving sawnwood conversion by introducing more efficient mills better suited to raw material characteristics. Tactics are to:

- Replace existing sawmills with less wasteful mills with higher recovery.
- Phase the new mills in over the plan period in line with plantation sawlog output. Mills using plantation species should convert first, because of the more valuable species used.
- Restructuring dictates a major investment and industry will need assistance putting together the required financing. The demand is for a structured, self financing program within the normal function of a banking system, not a government funded one.
- Financing agencies will require evidence of raw material security, therefore, Government's contribution must evolve acceptable long term raw material supply arrangements satisfactory to owners and the financing authority.
- Create an industry-government board to oversee mill replacement and to supervise the rationalization.
- Start a buyout program which purchases and destroys the outdated equipment.
- Encourage creation of a sawmilling board composed of industry and government appointees to develop and coordinate plans, and to promote common positions in the modernizing programme.

Regardless of Scenario, GOB's strategy should follow the above; Scenario 2 generates more benefit overall due to high sawmill volumes judged available.

Other Primary Products - The plywood and veneer and match industries are dying as a result of lack of suitable raw material and increasing substitutes. New plantations will produce high value products, these are best suited to slicing, not peeling technology. Much of today's plywood goes into tea chests, a fairly low quality product. Decreasing and more expensive wood will force the tea industry to change their packaging standards, alternatively, their raw material needs could be easily met from privately grown wood. Government strategy is to support the development of alternate packing methods.

In the case of the match industry, the best plan is to encourage other industries to provide employment. This industry faces a decline, or at best, flat growth as smokers switch to petroleum lighters and the incidence of smoking decreases.

The plywood and veneer and match industries are best left to private initiative prepared to search out and maintain a market niche. There is plenty of opportunity for the existing industry to grow the small volume required in cooperation with private growers. The domestic panel market will expand slowly but will remain small, the export market has very little to offer except high value decorative products. Composite panels represent a growing, but very meagre market, already served by the private sector.

Secondary Products - Timber seasoning and preservation both have a future role. However, promoting public acceptance is extremely difficult under local conditions and requires a multi-pronged programme. Three strategies are indicated. First, require consumer laws to specify if wooden products are made from unseasoned wood. Second, exempt seasoned or preserved wood from all or the major portion of VAT, and customs and excise tax if imported. Third, initiate an inexpensive, long term public education program on the increased value of seasoned and treated wood.

Furniture manufacture has a good future if exporting quality components becomes more common, otherwise opportunities are limited by local purchasing powers. The furniture industry is highly

competitive and responsive to market and design changes, an area for private industry. Government's role regardless, is to require, encourage and monitor the establishment and adoption of common size standards and seasoned wood. This is best done by industry marketing promotion, trade groups and manufacturing standards associations. Once export becomes a good possibility, GOB's role has also to take on and coordinate international trade possibilities.

The remaining secondary industry products comprise a range of small specialized items, typically cottage industry-based, eg. handicrafts, bobbin manufacturing, boat building and musical instruments making. Government's role is to make suitable raw material available at affordable costs; facilitate their establishment, possibly through credit arrangements; provide technology training; and, again assist international trade for the range of products.

Pulp and Paper - Strategy here chiefly focuses on resolving the raw material problems of existing mills and placing them on an economic footing. This requires sensible pricing of raw materials and final products and making the industry responsible for supplying its own raw materials. This entails giving industry substantial, but not exclusive, control over raw material sources, while charging appropriate prices for the resources used. Production strategy concentrates on printing and writing papers, then newsprint, before industrial and wrapping papers, before allowing speciality papers.

Adding to existing plant capacity in logical increments of production, as domestic demand grows, appears the most practical expansion plan. Competing internationally is unlikely unless it becomes possible to consolidate all national production at one, newly constructed, large scale mill. This is only possible when raw material and product demands justify much higher production levels than today. Another possibility is to insist that all new production use the high yielding pulping processes to conserve existing or future wood resources. The time to install technically sound and improved pollution control measures is when upgrading old mills or building new ones.

Public Sector Industries - BFIDC operates fourteen wood products businesses, ranging from primary extraction to cabinet making. Development strategy for thirteen manufacturing units considered a combination of reconstruction, rehabilitating, liquidating and joint-sector restructuring alternatives. Also considered were financial performance and assessments of operating conditions and manufacturing equipment. The chief strategies recommended are:

- Liquidate the Chittagong: Particleboard and Veneer, and Furniture, Cabinet, and Flushdoor Factories, as well as the Kaptai Planermill, Ujala Match, Dhaka Cabinet Factory and Eastern Woodworks.

- Restructure as joint sector enterprises and rehabilitate the: Sangu Valley Plywood Plant, three seasoning and treatment plants at Chittagong, Kaptai, and Khulna; and Khulna Cabinet Plant.

- Restructure as a joint sector enterprise and rebuild the Kaptai Sawmill.

- Allocate cutting, development, and management responsibilities to BFIDC for the gamar plantations near Kaptai, conditional on a new high recovery sawmill to process the sawlogs.

Fuelwood Conservation

1. General

There is a wide gap between the supply and demand of fuelwood. Under existing management, the supply in 1993 is estimated as 6.0 million m^3 against the demand of 8.2 million m^3. The gap will further widen by the year 2013. Fuelwood is surplus in certain areas, but the excess cannot

be supplied to energy scarce areas due to high cost of transportation. The major areas of shortage are in the northwest, northern and northeastern districts from Nawabganj to Sunamganj.

The most obvious way to augment fuelwood is by planting more trees and improving their growth through better management and improved growing characteristics. Even so, plantation programmes alone will not substantially improve the overall position. There will be deficit of fuelwood in each plan period, ranging from 2.2 to 3.1 million m^3 in 1993 and in 2013.

Conservation of fuelwood is an important option for enhancing natural energy sources. Introducing efficient, improved stoves can save a significant amount of energy in domestic cooking and paddy parboiling. Reduction of wastage will also bring about improvement in supply. The demand for fuelwood can be substantially reduced using substitutes. Biogas is such an option. Cowdung used for this purpose produces both cooking fuel and agriculture fertilizer. Coal, peat and nuclear power are some commercial fuels needing exploiting to reduce the demand for fuelwood. The use of biomass fuels, particularly cow dung and agricultural residues can also be reduced by increased use of commercial fuels. Excluding plantations, there are three development programmes indicated to minimise the gap between the supply and demand. Plantation benefits get covered in another section.

2. Indicated Strategy

Five major strategies required to safeguard and conserve existing and future fuelwood resources are:

- Develop an appropriate wood energy policy.
- Buildup fuelwood resources.
- Institute an energy conservation programme.
- Reduce present wastage.
- Promote increased use of substitute.

Bangladesh has to have an appropriate energy policy formulated and integrated with development and resource conservation policy. Policy has to consider all biomass fuels, including fuelwood, and how they relate with the commercial fuels and socioeconomic conditions. New forestry policy should adequately cover wood energy demands including all relevant aspects of management and utilization. Moreover, wood energy policy has to parallel the planning development issue and needs of the whole energy sector. This indicates the following steps:

- Continue the ban on fuelwood for brick burning, if necessary subsidise coal use.

- Government agencies like Public Works and Road and Highways Departments can easily restrict buying to coal-fired bricks and exert other influences for the effective implementation of the ban.

- Encourage the use of natural gas to reduce the continued use of fuelwood and imported coal for industrial and commercial uses. An acceptable arrangement in respect of price and security deposits is required.

- After brick burning, road tarring is a major consumer of fuelwood. Public works and Highways can effectively control the use of fuelwood for road tarring. Fuelwood for this use needs banning too. Subsidising coal or bottled gas, if necessary, would easily eliminate either uses. Aid agencies are irresponsible when funding highway development or repair and wood fuels are use for road surfacing.

Tree plantations have the maximum potential to augment fuelwood supplies. Prospects exists for improving the growing stocks by intensifying the management of the existing forests and plantations. Indicated programme include planting appropriate short and medium rotation tree species under social forestry. It is necessary to develop appropriate mechanisms for effective participation of the farmers and programmes which really benefit the families involved. Strip plantation along the marginal and fallow lands need the active participation of the local farmers. Community planting of multipurpose fast growing tree species in and around homesteads, schools, colleges, mosques, is a cheap way to expand the supply of fuelwood, and timber as well, but some responsible group has to assume protection and management responsibility. Site specific, fast growing and coppicing tree species as well as high yielding multipurpose tree species are needed. Research is a basic requirement to achieve these goals.

Fuelwood conservation is the second most important option. A considerable amount of energy is wasted during cooking due to design weaknesses in the traditional stoves. Improved stoves reduce this wastage and help to conserve all biomass fuels not just wood. Introducing improved cooking stoves has a significant positive potential to ease the fuelwood scarcity.

Reducing waste is the fourth strategy. Presently it is uneconomic to use wasted Hill Forest timber as fuelwood due to high transportation costs. Conversion of the wastes to charcoal is a more economic method. The recommendation is to manufacture charcoal and wood briquettes from the waste timber left behind during extraction.

There are a number of substitutes for fuelwood. Use of biogas is the dominant option. A viable technology exists for its production in the country. Relatively well off rural households using cowdung as manure are the prospective users of biogas plants. Cowdung produces both fuel for cooking and manure for agriculture. It also improves hygienic conditions around the home. The solar timber kiln is technically and economically viable and is adopted commercially to a limited extent. Existing technology fits with the sawmill modernisation programme, and is also suitable installing in the sawmill and furniture industries. Other technologies, like solar energy need further research before they are available widely. There are a good number of prospects to extending local commercial energy sources as substitute fuels. This analysis excludes these substitute fuels and only considers forestry-related strategies.

INVESTMENT PROGRAMME

Two development options have been proposed under the Master Plan. Scenario 1 represents a modest level of investment and Scenario 2 is based on a high level of investment to achieve optimum targets set under different programme components. The assumption is that the implementation of the Scenario 1 is undertaken by the existing institutional set up of BFD. Substantial strengthening of the Department is proposed in terms of infrastructure, manpower, training, research, monitoring and other support services. On the other hand, for the implementation of Scenario 2 very significant restructuring of BFD and also creation of a new department and autonomous bodies are called for.

Estimated Cost of the Master Plan

The costs of the different Master Plan programmes for each five-year period in the 20-year plan are estimated separately for Scenario 1 and 2. Excepting two cases, all items of expenditure are included in the investment programmes. In the case of forest-based industries, the operating costs required to run the industries are excluded. Scenario 1 estimates exclude the costs of any benefit sharing arrangement required to obtain forecast yields and local involvement. A physical contingency of ten percent on civil works and five percent on other items applies. In consideration of the long planning period, price contingencies are not included.

Since the Master Plan presents a macro level plan, the costs of each programme and programme component is considered as indicative. For specific projects and investment packages a more detailed costing procedure is needed.

The five major programmes, their subprogrammes and main components vary by their nature and costing principle. However, the basic costing method in all programmes is the unit cost approach. Each programme has its own set of quantitative targets, activities, and corresponding implementing schedule as presented in the subteam reports. To the extent possible, appropriate units cost are identified and applied to cost these programmes and components. In most cases, the unit costs are the same or are based on present BFD standards or experienced by specific projects. In other cases, the unit costs are model calculations, sensitive to assumptions made, or are from comparisons with similar other activities. Sometimes the unit costs are deliberately not bound to any detailed model procedure but meant to represent the cost level justified to achieve the proposed targets, thereby offering the planner flexibility to adopt an alternative set of options. All estimates are in early 1993 constant prices. An exchange rate of Tk 38.9 to a US Dollar applies.

1. Scenario 1

On the basis of the above assumptions, the Master Plan investment estimate for Scenario 1, is Tk 54.4 billion (U$ 1.5 billion) including physical contingencies of Tk 2.3 billion (U$ 60.0 million) which is about four percent of the base cost. Foreign exchange costs amount to Tk 16.9 billion (US$ 434.8 million) or about 31 percent of total plan cost. About 76 percent of the cost covers the investment items and their corresponding contingencies while recurrent costs take up the remaining 24 percent. Infrastructure development accounts for about three percent of the total outlay, procurement of furniture, equipment and vehicles will require about 12 percent, human resources development in terms of both overseas and local training use about 12 percent; research and development represents about five percent and consulting services constitute about one percent of the total costs.

Table 41 - Summary of Plan Cost, Scenario 1

Programme	Tk Billion			US$ Million			Percent	
	Foreign	Local	Total	Foreign	Local	Total	Base	FEC
Environment	0.3	1.2	1.5	6.9	31.3	38.2	2.73	1.65
Forest Production	1.2	10.6	11.8	29.6	273.4	303.0	21.71	7.11
Participatory Forestry	2.5	4.2	6.7	65.3	107.3	172.6	12.37	15.67
Wood Energy	0.0	0.6	0.6	0.3	15.5	15.8	1.13	0.07
Non Wood Products	-	-	-	0.0	0.0	0.0	0.00	0.00
Forest Industries	9.9	6.3	16.1	254.1	160.9	415.0	29.73	60.98
Institutional	2.4	15.2	17.6	60.5	391.0	451.4	32.34	14.51
Total								
Base Costs	16.2	38.1	54.3	416.6	979.3	1,396.0	100.00	100.00
Physical Contingencies	0.7	1.7	2.4	18.2	44.7	63.0		
Programme Cost	16.9	39.8	56.8	434.8	1,024.1	1,458.9		

The plantation development accounts for about 28 percent and the commissioning of forest-based industries will require about 24 percent of the total outlay. The incremental staff requirement estimate incorporates the physical target set under plantation development and accounts for about five percent of the plan outlay. A summary of the total plan cost by major programmes under Scenario 1 is given in Table 41 and details are in Appendix 5. Table 42 has details of the costs by category of expenditure.

Table 42 - Plan Cost by Categories of Expenditure, Scenario 1

Programme/Components	Tk Billion			US Million			Percent	
	Foreign	Local	Total	Foreign	Local	Total	Base	FEC
Physical Infrastructure								
Land Acquisition	0.0	0.1	0.1	0.0	2.6	2.6	0.2	0.0
Engineering/Supervision	0.0	0.1	0.1	0.0	1.4	1.4	0.1	0.0
Civil Works	0.1	0.8	0.9	2.3	20.5	22.8	1.6	0.5
Construction of Roads	0.2	0.5	0.7	5.3	13.6	18.9	1.4	1.3
Subtotal	0.3	1.5	1.8	7.6	38.0	45.6	3.3	1.8
Furniture, Equipment and Vehicles								
Furniture	0.0	0.0	0.0	0.0	0.4	0.4	0.0	0.0
Equipment	1.9	0.5	2.4	48.4	12.1	60.5	4.3	11.6
Vehicles	0.3	0.5	0.8	7.2	12.8	20.0	1.4	1.7
Extraction Equipment	1.7	1.5	3.2	43.5	38.6	82.2	5.9	10.5
Subtotal	3.9	2.5	6.3	99.1	64.0	163.1	11.7	23.8
Human Resources Development								
Overseas Training for BFD Staff	0.5	0.1	0.6	14.1	1.6	15.6	1.1	3.4
Local Training to BFD Staff	0.0	0.1	0.1	0.0	3.4	3.4	0.2	0.0
Local Training to Beneficiaries	0.0	0.6	0.6	0.0	15.2	15.2	1.1	0.0
Seminar and Workshops	0.0	0.1	0.1	0.0	1.5	1.5	0.1	0.0
Subtotal	0.5	0.8	1.4	14.1	21.7	35.7	2.6	3.4
Research, Development and Studies								
Research and Development	1.2	1.0	2.2	31.9	25.5	57.3	4.1	7.6
Monitoring and Evaluation	0.0	0.3	0.3	1.0	6.5	7.5	0.5	0.2
Subtotal	1.3	1.2	2.5	32.9	31.9	64.8	4.6	7.9
Consulting Services								
International	0.4	0.0	0.4	10.0	1.1	11.2	0.8	2.4
Local	0.0	0.3	0.3	0.0	7.3	7.3	0.5	0.0
Subtotal	0.4	0.3	0.7	10.0	8.4	18.5	1.3	2.4
Plantation Development, Fabrication of Energy Saving Equipment								
Forest Production	1.2	10.6	11.8	29.6	273.4	303.0	21.7	7.1
Participatory Forestry	0.2	1.9	2.2	6.1	50.0	56.2	4.0	1.5
Non Wood Forest Products	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Wood-based Energy	0.0	0.4	0.4	0.0	9.6	9.6	0.7	0.0
Subtotal	1.4	13.0	14.3	35.8	333.0	368.8	26.4	8.6
Forest-Based Industries								
Sawmills	2.4	0.9	3.3	62.6	23.2	85.8	6.1	15.0
Newsprint/Pulp	3.0	1.8	4.8	76.6	45.9	122.5	8.8	18.4
Printing and Writing Paper	2.6	1.5	4.1	66.0	39.6	105.6	7.6	15.8
Subtotal	8.0	4.2	12.2	205.2	108.7	313.9	22.5	49.3
Recurrent Costs								
Existing Staff Salaries	0.0	9.3	9.3	0.0	237.9	237.9	17.0	0.0
Incremental Staff Salaries	0.0	4.9	4.9	0.0	126.1	126.1	9.0	0.0
Operation and Maintenance								
Facilities	0.0	0.0	0.0	0.2	0.9	1.2	0.1	0.1
Equipment/Vehicles	0.2	0.2	0.5	6.2	6.2	12.5	0.9	1.5
Office Supplies and Consumables	0.2	0.1	0.3	5.5	2.3	7.8	0.6	1.3
Subtotal	0.5	14.5	15.0	12.0	373.6	385.5	27.6	2.9
Base Costs	16.2	38.1	54.3	416.6	979.3	1.396.0	100.0	100.0
Physical Contingencies	0.7	1.7	2.4	18.2	44.7	63.0		
Total Project Cost	16.9	39.8	56.8	434.8	1.024.1	1.458.9		

2. Scenario 2

Estimated total plan costs under Scenario 2 over the 20-year period are Tk 131.0 billion (U$ 3.4 billion) of which physical contingencies represents about four percent of the base cost Tk 5.2 billion (U$ 134.8 million). Foreign exchange component is Tk 42.4 billion (U$ 1.1 billion) representing about 32 percent of the plan cost. Of the total cost about 71 percent covers investments items and the rest, 29 percent, accounts for recurrent costs. These mainly include incremental staff salaries and operation and maintenance of facilities, equipment and vehicles. By categories of expenditure, civil works will require about five percent, procurement of furniture, vehicles and equipment about 12 percent, human resources development about three percent, forest production support about 21 percent and wood-based forest industries about 32 percent investment. Summary of the total plan cost is in Table 43 while details of the programme costs by categories of expenditure is given in Table 44. More detailed cost estimates for each programme by components over the 20-year period are in Appendix 6.

3. Phasing of Programme Costs

The programme cost summaries recognize five-year periods based on the physical targets. The investment requirement will grow, level off, and then start decreasing over the 20-year plan. The trend agrees with the notion that as development takes place triggered by additional investments, less and less further investment is required. On the other hand, recurrent expenditures needed to support maintenance and operations of plantations and facilities, increase as impacts of the investments accumulate.

Under Scenario 1 about 23 percent of the total plan outlay occurs in the first five years. The peak investment is in the second five years, about 37 percent of the total estimated cost. The third period goes down to 18 percent and is 20 percent in the subsequent two five-year periods.

Under Scenario 2 the trend is slightly different. The investment requirements are 17 percent, 31 percent, 24 percent and 27 percent of the total plan outlay respectively for each of the five-year periods. Phasing of the plan costs by programme and development scenario are presented in Tables 45 and 46 for Scenario 1 and 2, respectively.

Table 43 -Summary of Plan Cost, Scenario 2

Programme	Tk Billion			U$ Million			Percent	
	Foreign	Local	Total	Foreign	Local	Total	Base	FEC
Environment	0.8	3.7	4.5	20.9	94.0	114.8	3.57	1.99
Forest Management	1.7	15.8	17.5	44.0	406.5	450.5	13.99	4.19
Participatory Forestry	5.1	11.0	16.1	130.1	283.5	413.5	12.84	12.39
Wood Energy	0.1	1.1	1.2	3.3	28.2	31.5	0.98	0.32
Non Wood Products	0.2	0.8	1.0	4.2	21.6	25.8	0.80	0.40
Forest Industries	28.2	17.2	45.4	725.1	441.9	1,167.0	36.25	69.07
Institutional Strengthening	4.8	34.8	39.5	122.2	894.0	1,016.3	31.57	11.64
Total								
Base Costs	40.8	84.4	125.2	1,049.8	2,169.7	3,219.5	100.0	100.0
Physical Contingencies	1.6	3.6	5.2	41.1	93.0	134.1		
Programme Cost	42.4	88.0	130.5	1,090.8	2,262.7	3,353.6		

Table 44 -Plan Cost by Categories of Expenditure, Scenario 2

Programme/ Components	Tk Billion			US$ Million			Percent	
	Foreign	Local	Total	Foreign	Local	Total	Base	FEC
Physical Infrastructure								
Land Acquisition	0.0	0.7	0.7	0.0	18.9	18.9	0.6	0.0
Engineering/ Supervision	0.0	0.2	0.2	0.0	4.4	4.4	0.1	0.0
Civil Works	0.4	2.5	2.9	10.6	63.3	73.9	2.3	1.0
Construction of Roads	0.6	1.6	2.2	15.9	40.9	56.8	1.8	1.5
Subtotal	1.0	5.0	6.0	26.5	127.5	154.0	4.8	2.5
Furniture, Equipment and Vehicles								
Furniture	0.0	0.9	0.9	0.0	22.6	22.6	0.7	0.0
Equipment	0.7	0.7	1.4	16.9	19.1	36.0	1.1	1.6
Vehicles	3.0	0.3	3.3	77.4	8.6	86.0	2.7	7.4
Extraction Equipment	3.2	1.5	4.6	81.0	37.6	118.6	3.7	7.7
Subtotal	6.8	3.4	10.2	175.3	87.9	263.2	8.2	16.7
New Legislation	0.0	0.3	0.3	0.0	8.7	8.7	0.3	0.0
Subtotal	0.0	0.3	0.3	0.0	8.7	8.7	0.3	0.0
Human Resources Development								
Overseas Training for BFD Staff	0.8	0.1	0.8	19.4	2.2	21.6	0.7	1.9
Local Training to BFD Staff	0.0	0.2	0.2	0.0	4.4	4.4	0.1	0.0
Local Training to Beneficiaries	0.0	2.0	2.1	0.0	52.7	52.7	1.6	0.0
Seminar and Workshops	0.0	0.1	0.1	0.0	2.0	2.0	0.1	0.0
Subtotal	0.8	2.4	3.1	19.4	61.2	80.6	2.5	1.9
Research, Development and Studies								
Research and Development	1.3	1.0	2.3	33.9	25.9	59.8	1.9	3.2
Monitoring and Evaluation	0.1	0.8	0.9	3.2	19.8	23.0	0.7	0.3
Subtotal	1.4	1.8	3.2	37.1	45.8	82.9	2.6	3.5
Consulting Services								
International	0.9	0.1	1.0	24.1	2.7	26.8	0.8	2.3
Local	0.0	0.3	0.3	0.0	8.9	8.9	0.3	0.0
Subtotal	0.9	0.5	1.4	24.1	11.6	35.8	1.1	2.3
Plantation Development, Fabrication of Energy Saving Equipment								
Forest Production	1.7	15.8	17.5	44.0	406.5	450.5	14.0	4.2
Participatory Forestry	0.8	6.9	7.7	21.4	177.4	198.8	6.2	2.0
Non Wood Forest Products	0.0	0.4	0.4	0.0	9.1	9.1	0.3	0.0
Wood-based Energy	0.1	0.6	0.7	2.3	15.1	17.4	0.5	0.2
Subtotal	2.6	23.7	26.3	67.6	608.1	675.8	21.0	6.4
Forest-Based Industries								
Sawmills	6.0	2.2	8.2	153.1	56.6	209.7	6.5	14.6
Newsprint/ Pulp	4.4	2.6	7.0	112.6	67.5	180.1	5.6	10.7
Printing and Writing Paper	4.5	2.7	7.3	116.7	70.0	186.6	5.8	11.1
Wrapping and Packaging Paper	3.6	2.2	5.8	93.0	55.8	148.8	4.6	8.9
Specialities Paper	7.6	4.6	12.2	195.8	117.4	313.2	9.7	18.7
Subtotal	26.1	14.3	40.4	671.2	367.3	1,038.4	32.3	63.9
Recurrent Costs								
Existing Staff Salaries	0.0	1.2	1.2	0.0	29.8	29.8	0.9	0.0
Incremental Staff Salaries	0.0	31.1	31.1	0.0	799.3	799.3	24.8	0.0
Operation/ Maintenance	0.1	0.1	0.2	1.6	3.2	4.7	0.1	0.1
Facilities	0.5	0.5	1.1	13.8	13.8	27.5	0.9	1.3
Equipment/ Vehicles								
Office Supplies and Consumables	0.5	0.2	0.7	13.2	5.7	18.8	0.6	1.3
Subtotal	1.1	33.1	34.2	28.5	851.6	880.1	27.3	2.7
Base Costs	40.8	84.4	125.2	1,049.8	2,169.7	3,219.5	100.0	100.0
Physical Contingencies	1.6	3.6	5.2	41.1	93.0	134.1		
Total Project Cost	42.4	88.0	130.5	1,090.8	2,262.7	3,353.6		

Table 45 - Phasing of Programme Costs, Scenario 1 (Tk Billion)

Programme	Year 1-5 1993/97	Year 6-10 1998/02	Year 11-15 2003/07	Year 16-20 2008/12	Total Costs		
					Local	Foreign	Total
Environment	0.7	0.4	0.2	0.2	1.2	0.3	1.5
Forest Management	2.7	2.7	2.9	3.2	10.6	1.2	11.8
Participatory Forestry	1.4	3.0	1.0	1.5	4.2	2.5	6.7
Wood Energy	0.2	0.2	0.1	0.1	0.6	0.0	0.6
Non Wood Forest Products	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Forest Industries	3.3	9.7	1.3	1.2	6.3	9.9	16.1
Institutional	3.6	3.8	4.7	5.5	15.2	2.4	17.6
Total							
Base Costs	11.8	19.6	10.3	11.8	38.1	16.2	54.3
Physical Contingencies	0.6	0.9	0.5	0.5	1.7	0.7	2.4
Programme Cost	12.4	20.4	10.8	12.3	39.8	16.9	56.8
Percentage	22	36	19	22	70	30	100

Investment Programmes Main Features

From the point of view of total cost the three major programmes are forest production and management, wood-based industries, and participatory forestry under both the scenarios. The plantation forest programme will require on average Tk 589 million under Scenario 1 and Tk 876 under Scenario 2 annually during the 20-year period. In addition some minor plantation components like enrichment plantation, coastal afforestation etc are also included in the programme. Plantation costs are calculated on a full cost basis including not only establishment costs but also maintenance and thinning costs to be required by the silvicultural prescriptions required for each plantation module.

Table 46 - Phasing of Programme Costs, Scenario 2 (Tk Billion)

Programme	Year 1-5 1993/97	Year 6-10 1998/02	Year 11-15 2003/07	Year 16-20 2008/12	Total Costs		
					Local	Foreign	Total
Environment	1.7	1.0	0.7	1.0	3.7	0.8	4.5
Forest Production	4.2	4.3	4.3	4.4	15.8	1.7	17.5
Participatory Forestry	3.3	6.1	2.9	4.4	11.0	5.1	16.1
Wood Energy	0.3	0.3	0.3	0.3	1.1	0.1	1.2
Non Wood Forest Products	0.4	0.2	0.2	0.2	0.8	0.2	1.0
Forest Industries	2.8	17.4	11.8	12.3	17.2	28.2	45.4
Institutional	8.7	9.7	10.0	11.2	34.8	4.8	39.5
Total							
Base Costs	21.4	39.0	30.2	33.7	84.4	40.8	125.2
Physical Contingencies	0.9	1.5	1.3	1.5	3.6	1.6	5.2
Programme Costs	22.3	40.4	31.5	35.2	88.0	42.4	130.5
Percentage	17	31	24	27	67	33	100

The annual quantitative targets set forth under both the scenarios are at about the same level. Differences are mainly on the qualitative side, leading to higher MAI. The difference in MAI targeted under both the scenarios is quite significant and is detailed in Forest Production (FMP 1992g) and Silviculture (FMP 1992h) reports. To support the plantation programme, a substantial amount of money is required in institutional strengthening to achieve these targets. This includes development of physical facilities, equipment, furniture, vehicles, staff training, research studies, monitoring and consultants services.

Intensive plantation development and intensified silvicultural practices provide significant sustained growth possibilities for wood-based industries in the first two five-year periods under Scenario 1 and in the last three five-year periods under Scenario 2. In the near future, however, the raw material supply shift to secondary forests requires large-scale restructuring of the wood-based industry and improvements in logging as represented by the investment needs. The present very low investment (in sawmilling and logging equipment) will grow more than 10 times during the programme years. While quite large, this programme differs from others as the investments required must come from the private sector to be effective.

Participatory forestry as a programme is one of the cornerstone programmes of the Master Plan, and is considered to result in major improvements in forest management. Although it means a significant institutional change, its direct cost requirements are quite modest as seen in programme cost. However, participatory approach of forestry development in the socioeconomic context of Bangladesh relies heavily on the massive participation of the people and therefore, will depend decisively on very intensive and large scale training and extension programmes. In costing the programme due attention goes to education, training, and extension and partly also to NGOs involvement in the forestry development. Attention is drawn to the fact that Scenario 1 requires substantial public involvement to achieve both the forecast growth and physical targets set. The cost of benefit sharing required to obtain the participation and support of the resident population affected by the programme is not reflected in the estimates.

Many other programmes are also directly or indirectly supporting participatory forestry and rely on the management opportunities developed within it. From the costing point of view, community-based forest management represents the extreme case where the vital supporting components are located in other programmes. This is also reflected in GOB's consideration of creating new Department to deal separately with the community-based forestry development.

Financing Plan

It is anticipated that GOB will strive to make a balanced and sustainable allocation of resources among the various development sectors and the programmes and subprogrammes of the plan. To meet the physical targets set forth in the Master Plan, GOB's expenditure for the forestry sector will have to increase substantially. But at the same time it is also expected that the interest of the bilateral and multilateral donors will support the development of the forestry sector of Bangladesh.

1. Allocation Procedure and Principles

The assessment recognizes distribution of costs by main sources - GOB, the external donors, the private sector (including beneficiaries) for each module of subprogramme and programme components and also by development options. Principles adopted for the preparation of the financing plan are described below:

- On equipment and material cost, all imported inputs are generally assumed to be financed by foreign sources. Imported items mainly involve foreign currency. Local currency components are mostly taxes and duties, presumed borne by the Government. A major exception could be wood-based industry investments where imported equipment is high and has been assumed to be undertaken by private sector, but considering hard currency constraints, the entire foreign exchange requirements are open for donor financing. In many of the agriculture and other development sector projects external donors have financed this sort of private sector undertaking as a gesture to support the foreign exchange requirements of the country. All local currency costs are financed through private sector.
- Other principles concerning foreign funding are the nature and type of the programme component. The foreign proportion of the cost has been proposed where:

a. The programme does not have major immediate materialized benefits as in many support programmes) or the benefits are mainly environmental.

b. The programme is basically quite long term in nature (eg forest plantations programmes).

c. The programme has been designed to serve the immediate interest of the international and local community (eg. biodiversity programmes built-in within the environmental programme).

d. The programme is considered to promote social equity (like participatory forestry).

e. Financing of the component is very vital to the overall success of the plan (such as training, research, education, monitoring, consultants services and overall forest plantation development components).

- It is assumed Government funding covers generally the appropriate administrative costs including incremental staff salary and wages of the programme components. The operation and maintenance cost of physical facilities, especially the local currency cost is financed by GOB. Also the programme components which are expected to increase government revenue from the forestry sector are usually assumed to cover those materials and other costs which are considered to be within the reach of Government's funding capacity.

- Participation of the private sector (including forest occupants and NGOs) always assumes private sector or beneficiary investment, expenditure or labour input

The financing plan is indicative at this point and needs considering in more detail when planning and packaging specific projects or investment modules.

2. General Plan

For the whole Master Plan programme costs (total costs during 20 years), the proposed financing plans under both the development scenarios are presented in Tables 47 and 48. More detailed presentations by subprogrammes and components are in Appendix 5 and 6.

Table 47 - Scenario 1 Financing Plan

Source	U$ Million	Percentage
GOB	416.5	30
Donors	885.0	63
Private	96.5	07
Total	1,398.0	100

Proposed GOB Financing

1. Scenario 1

The overall government financing of the total plan cost is estimated to be 35 percent or U$ 492 millions under Scenario 1 (Table 47). At a programme level the range varies between three percent and 62 percent of the total financing. The financing will mainly cover the taxes and duties component, land acquisition, and major portion of the incremental recurrent costs in terms of staff salaries and operation and maintenance of facilities. The lowest in the range concerns wood-based industries which has been assumed to be financed through the private sector and the highest, institutional strengthening. This component is mainly to support the plantation development programme of the plan and will cover development of physical facilities, procurement of vehicles,

equipment, staff training, research and development, consultants services and the associated recurrent costs. At a subprogramme and major component level the variation is much higher (Appendix 6). The largest financial resources from the government are expected to be allocated to the plantation forest programmes followed by the participatory forestry, and wood-based industries. It can be noted that the Master Plan programmes will considerably improve the government's possibilities to finance forestry and forest environment sectors. In the short run this is possible by increasing the stumpage prices of forest products. In the long term it will be a result of increased timber production and other forest-based activities with related industrial development which would generate not only increased stumpage income but other taxable incomes as well.

2. Scenario 2

Under Scenario 2 the GOB financing trend is expected to change drastically because many of the programme components get undertaken by proposed enterprises. This shift in the trend will allow GOB a greater flexibility in allocating its resources more and more to social development sectors. The GOB financing under Scenario 2 is proposed at U$ 92 millions (Table 48) representing about three percent of the total plan costs. This amount will be required to support the BFD activities responsible to oversee the development activities in the sector through regulatory measures.

Table 48 - Scenario 2 Financing Plan

Source	US Million	Percentage
GOB	91.8	03
Donors	2,159.9	64
Private	1,116.6	33
Total	3,368.3	100

Proposed Donor Financing

External donors assistance in the implementation of the Master Plan is vital for is successful adoption. Most, if not all, of the Master Plan programmes are characterized by strong social dimensions and equity concerns, high environmental and conservation contents, and a firm thrust in urgent transition to sustainable development and utilization of the forest land base for economic products. These are among the major factors supporting a prominent foreign assistance in financing the Master Plan programmes.

The other reasons for proposing external financial support is that many of the programme benefits contribute benefits for the enjoyment of the international community at large. This is especially related to the global concern on the protection of the remaining tropical rain forest and maintaining biodiversity options.

The third major reason for proposing foreign financing is simply because of limited local financing capacity. Due to the increasing budgetary constraints of the country and the immediate subsistence needs of the majority of the increasing population (a major cause of unsustainable development), the financing of the programme emphasizing sustainability and medium-to long-term benefits is simply not feasible without large foreign financial support.

1. Scenario 1

Two key programmes, plantation forest and participatory forestry, make up about 44 percent of all foreign financing. The other programme, institutional strengthening accounts for about 12 percent of the proposed external financing. It is noted that forest plantation development,

agroforestry and other participatory-oriented plantations designed to promote smallscale sustainable forestry development actually comprise a large financial share in these programmes. Proportional foreign funding is relatively low for the wood-based industries compared to other programmes, but due to the large investment needs in the latter half of the plan, financial requirements are still considerable. At programme level, high proportional shares of foreign financing is assumed for limited protected areas and biodiversity forest protection, as well as soil conservation and all other environmentally supportive programmes. A detailed financing presentation is found in Appendix 5.

In the financing plan, the anticipation is that about U$ 885.0 million or about 63 percent of the total Plan costs come from different donor agencies to support the development for the entire 20 years.

2. Scenario 2

Forest plantation and participatory forestry account for about 33 percent of all foreign financing. The other programme, wood-based industries makes up about 50 percent. Proportional foreign funding is relatively high for the wood-based industries compared to other programmes under the scenario due to substantial increase in the production of pulpwood which will come from short rotation plantations leading to the large investment needs in the latter half of the plan.

Investments in new machinery in the wood-based industries is imperative both due to the changing volume, size and quality of logs available in the future and to the old and wornout equipment presently used in the industry. At programme level, high proportional shares of foreign financing is assumed for protected areas and biodiversity forest protection, as well as soil conservation and all other environmentally supportive programmes. Institutional restructuring to support the high input-high yield programme will require a substantial support amounting to U$ 106 million, about 12 percent of the total external financing envisaged. A detailed presentation of the proposed financing plan is given in Appendix 6.

Total external financial assistance under Scenario 2 remains almost the same as Scenario 1 if it is considered in terms of percentage. But in absolute terms, the external financial requirement is expected to be substantial to support implementation of this development option. About U$ 2.2 billions is expected to be shared by the external sources which represent about 64 percent of the total cost.

Projected Private Sector Financing

The private sector is assumed to participate actively in Master Plan implementation and funding, although the bulk of private financing occurs in participatory forestry, wood-based energy and wood-based industries. These programmes cover 81% of all private financing and are carried mainly by the participants and industrial companies. Private sector financing also includes small-scale operations in wood and non-wood forest industries as well as NGOs. In people-oriented forestry, individual forest occupants' labour input is included under private financial sources.

In Scenario 1, private sector financing totals $96 million, 7% of total investment. Scenario 2's total increases to $1.1 billion, which represents one third of total investment planned.

Master Plan Budgetary Implications

1. Current Forestry Sector Financing Status

In the government expenditure, forestry related activities are mainly included in the budget of the Forest Department, and are part of agriculture budgets under economic services in the sectoral

classification of the national accounts. During the FY 1992, BFD's budget covered about 15 percent of all expenditures of the agricultural sector and only about one percent of total national expenditure. This is less than forestry's proportional share of three percent in the 1992 gross domestic product. This comparison clearly demonstrates the under financing of the sector, indicating Government considers forestry a revenue generating sector. Attention is drawn to the fact that industrial forestry investment falls under a different budget head.

The assessment of the impact of the GOB's incremental share in the financing of the Master Plan cost on the resource allocations of the government, considers current financing status in the forestry sector by five-year and annual development plans (ADP). The actual allocations made under the First Five Year Plan plus the Two Year Plans totalled Tk 800 millions. The amount increased to Tk 1.8 billion under the Second Five Year Plan, Tk 3.9 billion under the Third Five Year Plan and further increased to Tk 8.5 billion during the current Plan. Although the actual allocations demonstrate an increasing trend they never exceeded two percent of total Plan outlays. This trend is even more clear in the annual development programme allocation.

Since fiscal 1980-81, the share of the forestry sector budget shows an erratic and uneven trend. However, over the same period ADP allocation increased at an annual compound rate of about 23 percent. Despite this nominal increase, the allocation for the sector, as a percentage of total funding, has remained unchanged at about 1.5 percent of the corresponding total plan outlay. The revenue budget for the sector has shown some steady increase over the last five years (Tk 120 million in 1986/87, Tk 128 million in 1987/88, Tk 189 million in 1990/91 and Tk 205 million in 1991/92), still as a percentage of the total outlay, it shows the same trend.

2. Scenario 1

GOB contribution to implement the development option will constitute: (1) cost of land acquisition, (2) taxes and duties on imported items and (3) a part of the incremental recurrent cost. It is anticipated that during the first five years of the Master Plan, GOB would contribute Tk 3.0 billion. This amount represents about 36 percent of the forestry sector allocation and about 7 percent of the total outlay under the Fourth Five Year Plan (1990-95). This means that the during the next five-year plan, allocation to the forestry sector must increase by at least five percent to meet the financial requirements.

3. Scenario 2

As envisaged, many of the programmes under Scenario 2 are undertaken on an enterprises basis, so the implementation of the development option will need much lower levels of Government financing. Based on the tentative financing plan, it is estimated that during the first five year implementation, GOB financial requirements equals Tk 610 million to cover the incremental recurrent cost, land acquisition and taxes and duties. This amount represents about seven percent of the forestry sector allocation and only 1.4 percent of the total outlay under the Fourth Five Year Plan. This low financial requirement to implement the development options will release pressure on government to finance other social development programmes.

ECONOMIC, SOCIAL AND ENVIRONMENTAL IMPACTS

General

Forestry development as envisaged in the Master Plan Programmes in accordance with GOB overall and sector-specific national goals, objectives, policies, and development efforts. Government is strongly committed to overcome the serious problems prevailing in the forestry sector. This commitment is emphasized in the policy pronouncement and the objectives outlined

in the Fourth Five Year Plan. These objectives are: (1) rehabilitation or reforestation of denuded and degraded national forest; (2) bringing all possible vacant public and private lands under tree cover; (3) meeting people's basic needs of all forest products by integrating trees with farming and traditional land use; (4) improving the general environment for supporting agricultural and other biological production; (5) creation of employment opportunities for the landless poor, marginal farmers and women; (6) conservation of the country's ecology and biodiversity and (7) adoption of different wood conservation techniques.

It is expected that these objectives will expand the tree cover of the country, improving the overall environmental condition of the country, while increasing supplies of forest products to meet the deficit and growing demand and also Attaining these sectoral planning goals requires programmes which: (1) upgrade the management and exploitation of existing Hill forests; (2) improve the management and expand the areas of the coastal mangrove forest; (3) increase the production of biomass fuels by supporting homestead plantings and establishing people-oriented plantations on public lands; (4) establishing large scale industrial plantations on degraded state forest lands; and (5) enhancing the capacity of BFD in efficient forest management and protection.

Government's Forest Development Perspective

To respond to these objectives of the Government for the forestry sector, the Master Plan design:

- Promotes the efficient and judicial use of natural resources.
- Ensures the sustainable productive capacity of natural resources.
- Expands the implementation of community-based natural resources management and conservation.
- Achieves a more equitable sharing of the benefits derived from the development and utilization of resources.
- Increases the sector's contribution through the national efforts directed towards poverty alleviation and enhances welfare of small farmers and landless workers.
- Maintains and improves the ecological balance.

The plan defines the following basic goals to support forestry development and resource conservation:

- Forest renewal and rehabilitation is an immediate and foremost concern in the sector, not only for restoring environmental stability, but also for ensuring a stable resource base for the wood industry.
- Conservation of the remaining forest resources to receive more attention.
- Community-based forest management is the basic strategy for promoting a more equitable distribution of benefits from the forests.
- Revitalize and develop the wood and other forest-based industries in view of their potential as a source of revenue, foreign exchange and employment.

An assessment of Master Plan subprogrammes and components clearly shows they support and do not conflict with these basic development goals. There is room for differences in interpretation but the Master Plan programmes support strongly the achievement of the prioritized national goals.

Direct Plan Impact

Two development scenarios were subjected to detailed analyses. Scenario 1 consists of five main programs and Scenario 2 composed of six major programmes; and both have a series of subprogrammes. All programs are planned to efficiently accomplish the goals of social equity and progress, environmental improvement, sustained development, and economic efficiency. Only

those programs which include productive investment components and direct input-output relationship with economically measurable output are tested for financial viability. Financial viability is determined here for two major programmes including their associated subprogrammes and components.

1. Roundwood Production

Present production of different forest products is low. Growth rates for all rotations and forest types are low because of inefficient management, use of low inputs, indigenous variety, lack of protective measures, illegal encroachment and uncontrolled felling. For example, the estimated net MAI for existing long rotation plantations is 2.5 m^3/ha/A, one of the lowest in the region. Net MAI of the medium and short rotation (industrial) plantations is also equally low. A declining trend in the forest production is likely to continue without any major development initiatives.

With the intervention of the Master Plan, production is expected to increase substantially due to increased growth for all rotations and types of forest. This increase results from better management, protection, use of better variety of seedlings, intensive silvicultural practices, and protection from illegal felling. Mean annual increment and yields over the 20-year plan period incorporate a variety of technical plantation models developed by the forest production and management subteam (FMP 1992g). The main forest products from felling and plantation development proposed under the plan would be sawlogs, pulpwood, poles and fuelwood.

Status Quo - Estimated supplies of different forest products come from the present growing stock and BFD's regular plantation programme without Master Plan intervention as summarized in Table 49. Total roundwood production in 2013 reaches 10.8 million m^3.

Table 49 - Status Quo Roundwood Supply (000 m^3/A)

Products	1998	2008	2013
Sawlog	1,364	1,589	1,829
Pulpwood	344	500	518
Poles	153	215	296
Fuelwood	6,494	7,212	8,208
Total	8,355	9,516	10,851

Scenario 1 - Production of different forest products under Scenario 1 by the end of the plan period is 14.3 million m^3, summarized in Table 50 Scenario 1 production comes from continued natural forest extraction, felling old plantations on forest land, public strip plantations, and village and unclassed forests. Details of the felling and plantation program by each five-year period, rotation and type of forest are given in the Forest Production (FMP 1992g) and Participatory Forestry (FMP 1992k) reports.

Table 50 - Scenario 1 Roundwood Supply (000 m^3/A)

Products	1998	2008	2013
Sawlog	1,393	1,739	2,739
Pulpwood	393	648	655
Poles	179	483	830
Fuelwood	6,242	8,554	10,054
Total	8,550	11,424	14,278

Scenario 2 - Considerably higher growth is expected, triggered by high level of investments and more efficient management, intensive silvicultural operations, improved variety of seedlings, and high level of inputs. People living around the plantation area will benefit directly in return for providing protection. Assumed MAIs for long rotation (30 years) plantations is 20 m^3/ha/A, for medium rotation (20 years) and short rotation (10 years) the presumed MAIs are 30 and 45 m^3/ha/a, respectively. These growth estimates are considered attainable with the proposed level of management practices, but require uptodate technology and major institutional change. Based on these rate and plantation programmes the supply of different forest products should reach 25.6 million m^3 in 2013, Table 51 summarizes the estimate.

Table 51 - Scenario 2 Roundwood Supply (000 m^3/A)

Products	1998	2008	2013
Sawlog	1,528	2,018	5,884
Pulpwood	403	1,370	1,640
Poles	175	2,053	3,054
Fuelwood	6,666	10,958	15,072
Total	8,802	16,399	25,650

Production will come from limited clear felling and replanting of hill forest felling and replanting old plantation, new plantation in the degraded and denuded state forest, unclassed forest lands, homestead forestry, agroforestry, strip plantation and cultivated field plantations. Plantation program by type of forest is in the Forest Production (FMP 1992g) and Participatory Forestry (FMP 1992i) reports.

2. Marketing

Bangladesh is deficit in all forest products. This situation will continue in future due to increasing population, therefore, the incremental production forecast is not likely to pose any marketing problem. Sawlog demand indicates that even with a very high level of production, the gap between supply and demand will continue. All the sawmills of the country are operated well below the designed capacity. If the incremental production of sawlogs is not absorbed by existing mills, they are easily replaced by higher capacity ones.

Pulpwood supply is in surplus because of lower capacity utilization of the existing paper and pulpmills. With the establishment of new paper and pulpmills due to increased demands, the incremental production will be absorbed by these mills.

Posts and poles are widely used in house construction and in agriculture. The Rural Electrification and
Railway Boards also provide a sizable market for poles, anchors and sleepers. The present production of poles is insufficient to meet these requirements. However, with the increased production, the supply of poles is estimated to exceed demand. After meeting the basic requirements of these buyers, the surplus projected is available for other purposes such as pulpwood or improved housing. There is a possibility to develop international markets as there is an external demand for pulpwood internationally.

Peeler logs are primarily for matches for tea chests. Although the present production of tea chest is not sufficient to satisfy the requirements of the tea industries, the volume needed is not great. Therefore, a market is needed for high quality peeler logs if there are grown.

Fuelwood is in chronic shortage in rural Bangladesh. This shortage is also one of the reasons for the fast depletion of the forest resources of the country. Attempts made to increase the

production of fuelwood have met with limited success. Markets can readily absorb incremental fuelwood supplies with little difficulty, providing the price is appropriate and the fuels is available close to the consumer.

3. Prices

Forest products from state forests are marketed by BFD in two ways. Sawlogs are sold either at the plantation-gate or at the Divisional Office stockyard through open auction. Market forces play an important role in fixing the prices of sawlog. The Forest Development Corporation also uses a large quantity of timber at a fixed price within their concessions. BFD also makes direct allocations of industrial raw materials to pulpmills on a royalty basis. Most prices of forest products agreed between the public sector and the BFD are well below market prices. Meanwhile, forests products from private lands are marketed through the private traders and small-scale sawmillers, market forces largely determine the prices.

The Master Plan adopts a much higher value for the major forest products than currently charged by the Department. Theses values are judged closer to the true economic value. The stumpage prices of different forest products determined for revenue projections are given in Table 52. In the table long rotation species composition assumed is 25% garjan and chapalish, 15% dakijam and mahogany, 25% teak, 25% jarul and kadam and 10% for other species. Fuelwood price is based on value of mixed species. The price used for poles is the stumpage value of poles. Price of sawlogs represent the average price of Class A and B logs for long rotation plantations.

Table 52 - Prices of Different Forest Products

Product	Tk/ m^3
Sawlogs	
Long Rotation	4,500
Medium Rotation	3,500
Poles	1,240
Fuelwood	400

4. Economic Activities

By the end of the plan period, sawlog production from both the forest production and participatory forestry is expected to increase substantially under both the development options. Estimated incremental production under Scenario 1 is 2.7 million m^3/ A (valued at Tk 12.3 billion or U$ 317 million, annually) in 1993 constant prices at the plantation-gate. Under Scenario 2, the projected production of sawlogs is 5.9 m^3/ A (valued at Tk 26.5 billion or U$ 680 million annually). Based on the plantation program, peak incremental production takes place in year 35 under Scenario 1 and year 30 under Scenario 2. The value of this incremental production is Tk 365.9 billion or U$ 9.4 billion, and Tk 473.2 billion or U$ 12.2 billion under Scenario 1 and 2, respectively. Valuation presumes intensive plantation development mainly on the degraded, denuded and low density forest areas. The value of the incremental production of other products, consisting of pulpwood, poles and fuelwood at the end is Tk 219 billion or U$ 5 billion under Scenario 1 compared to Tk 338 billion or U$ 9 billion under Scenario 2.

5. Employment Generation

The incremental employment opportunities due to the project will come mainly from (a) construction activities; (b) operation and maintenance of the project facilities; and (c) plantation development both under forest production and participatory forestry. These employment opportunities will come mainly due to higher labour requirements for planting, maintenance and more silvicultural operations. It is estimated that on-farm employment opportunities will increase

by about 0.86 million person years under Scenario 1 and 1.3 million person years under Scenario 2 over the 20-year plan period.

Developing and maintaining the physical facilities for the plan will generate about 1.18 person years and about 3.32 million person years of additional employment under Scenario 1 and 2, respectively. The increase in labour absorption will reflect a reduction of the present high level of unemployment and under-employment of family labour, particularly on the smaller farms and landless families. Further employment opportunities are generated by the plan due to increased demand for logging, transportation, processing and marketing services.

6. Poverty Alleviation

About 70 percent of the households in rural Bangladesh are living below the poverty line. The potential effect of the Master Plan on the income of these rural poor is substantial, particularly as the demand for labour would significantly increase for construction of facilities and plantation establishment, maintenance and thinning. The overall increase in the demand for labour for plantation development in state forests is estimated at 0.56 million person years and 0.67 million person years under Scenario 1 and 2 respectively over the 20-year plan. This increase in the additional employment opportunities helps 192,200 families living around the forest areas, especially the landless, and small or marginal farmers. The average increase in wage income for each of these families is estimated at Taka 15,000/A.

The participatory program of the Master Plan will generate an additional employment to the participants in the amount of about 0.28 million person years under Scenario 1 and about 0.65 million under Scenario 2. These opportunities generate wage incomes for the participating families, averaging Tk 15,000/A and supplementing their farm incomes. In addition to the increased wage income the participants are expected to benefit from the fruit and other forest products planted under the programme. Details are in the Participatory Forestry report (FMP 1992i).

Implementing the Master Plan will contribute positively towards the Government's efforts to alleviate poverty in the rural areas. As well as higher incomes, the Master Plan supports a better quality of life for the rural people which will result from increased availability of fuelwood for cooking, more timber for shelter, increased security from natural disaster because of a better soil cover and better amenities from protected areas.

7. Women's Welfare

Women in Bangladesh play a major role in the economy of their households. Some spend a disproportionately large amount of time fetching fuel. GOB planning and policy both recognize that women have an important role in the forest development programme, principally through raising nurseries and homestead plantation development. The Master Plan design involves women actively in the implementation of the participatory programmes. Women are actively targeted for involvement in the agroforestry, woodlot plantation and strip plantation components of the participatory forestry programme, this will contribute their family income in meaningful ways.

Increased production of fuelwood will reduce the time women spend collecting fuel, allowing them to undertake other economic activities to supplement their family income. This additional income will help in improving family living conditions. Bangladesh has large numbers of female-headed households, with their own peculiar social and economic problems. Involvement of women in practical ways consonant with social attitudes will help to minimize the current mutual mistrust between villagers and BFD. This, in turn, will help to minimize the encroachment problems due largely to enormous population pressures, which remains the most serious constraint on forest resource management

Environmental Impact

The forest resources of Bangladesh are rapidly depleting to supply the needs of the increasing population for fuelwood, timber, fodder, and other forest products, as well as land for food production and settlements. The overall strategy of the Master Plan is to improve the management of the forestry resources of the country, helping to bring the population needs, the production systems, and the environment into a sustainable balance. The programs will have a substantial positive impact on the environment. Forest cover will be restored on degraded areas. Exploitation of the natural forests will be controlled, and these forests brought under management. Soil conservation will be promoted. The network of national parks and wildlife reserves will be protected and maintained, plant and animal genetic conservation will be promoted. The people will be made more aware of the necessity of sustaining a balance between their needs for forest products and the ability of the ecosystem to supply these needs.

Due to non availability of data it is not possible to estimate the Environmental-Economic Internal Rate of Return to serve as a quantitative indicator of the environmental impacts of the Master Plan program components. However, it is anticipated that the Plan will have substantial positive impacts on soil productivity. The negative impacts of soil erosion on other productive sectors like irrigated agriculture, fisheries, and power supply may increased. For example, highly mechanized intensive short rotation plantation will increase soil erosion due to heavy equipment and regular removal of vegetation cover, unless protective extractive and forest management practices are adopted and implemented.

Generally, reduction of soil erosion is not an easy task. The bulk of soil erosion comes from sources other than forestry related activities, especially from areas under jhum agriculture, largescale ranching, river erosion, and from poor road construction practices and other infrastructures. There is always a natural erosion rate. It is impossible to levy "total ban" on all economic activities, participatory in a subsistence economy. The issue is how to direct operations, leave fragile areas untouched, protect existing protective vegetation, reduce off-site effects of on-going operations, while including preventive measures and placing sensible restriction on planned activities.

Soil erosion and hydrological deterioration not only have negative off-site impacts to agricultural, industrial, and infrastructure activities, but it also, by definition, reduces the nutrients available for plants, as well as the moisture retention capacity of the soil. This results in a reduction of the productivity of the land where erosion occurs. These economic costs are called the on-site costs. A more visible sign of critical nature of the problem is the vastness of the degraded Unclassified State Forest areas. A large area of the forest lands of the country, lies under low value or degraded vegetation like brushlands and coronal grasses, or has almost no vegetative cover at all. At best, this area supports low productivity agriculture, extensive animal grazing or lies fallow. There are no official estimates on how much this area of "extensive land use" is producing per hectare, and how much it contributes to gross domestic product. The programs of Master Plan can increase the productivity of this presently lightly used land. Integrated social forestry, community-based forest management, range management, assisted natural regeneration, plantation forests, and forest protection will each cover parts of the area of extensive land used and develop them towards intensified uses.

In short, implementation of the Master Plan will have a strongly positive impact on the environment by restoring forest cover on degraded areas. Controlled exploitation of the natural forests will bring them under efficient and more productive management. Soil and water conservation will be promoted. The network of national parks and wildlife reserves protect and maintain existing plant and animal resources and promote genetic conservation. The people will be made more aware of the necessity of sustaining a balance between their needs for forest products and the ability of the ecosystem to supply these needs.

DISTRIBUTIONAL IMPACTS

Resources

Legal access to resources and development for the people living near and relying on the forests is not only a question of social justice but also of economic efficiency. It is well known that secure tenure is fundamental to long term investments and intensification of efforts.

Development as envisaged under the Master Plan will mean fundamental reform in forest land allocation. Community-based forest management, integrated social forestry, and forest land management, when implemented in full, will equalize the present tenure structure to the advantage of people and communities living on forest lands. At the same time, the plan maintains the forest resource base and supports sustainable wood supply for both people and industry, while providing longterm forest products supply security needed for new investment.

Benefits of Wood Production

Increased wood production is one of the major material benefits due to the program. It will improve the sustainability and retailing prospects for the industry dependent on forest-based raw materials. Industrial development in turn provides benefits directly and indirectly to the different sectors and subsectors of society. However, excluding industrial development benefits, the focus of the benefits of the natural forest management, forest plantation, and community-based forest management programs is on the primary sector and primary beneficiaries.

The total value of wood production from natural forests and plantations at millgate prices will increase from the present Tk 18.0 billion to Tk 34.5 billion under Scenario 1 and to Tk 74.1 billion in 2013. How the total incremental "stumpage value" (economic rent) will in practice be allocated among specific forest beneficiaries, like the BFD and local communities, in each case, is a distributional policy. Labour's actual share will depend on the labour intensity of the technology used.

Other material inputs from the forest, especially non wood-based forest products are a source of similarly increased production and value distribution flows. Due to the labour-intensive technology, labour's income from collecting, planting, and processing of these products will have a larger relative share than in the case of wood production.

Environmental Benefits

The biodiversity benefits are multidimensional and the potential direct beneficiaries are, in the first place, future generations, forest gatherers, cultural minorities, traders, and processing firms, either local or foreign. Indirect beneficiaries of maintaining biodiversity option, are society and the citizenry as a whole.

In the case of other major environment benefits, particularly that of reducing the off-site costs of soil erosion and hydrological deterioration, one can be more specific in identifying those who will benefit. In the estimation of the Master Plan, the reduction of off-site costs will be reduced annually by a substantial amount in 2013.

Program Costs as Benefits

The Master Plan is a long-term program and most of the investments will mature beyond 5-10 years after investments are placed, and in many cases much later. However, the most immediate impacts of the program come from the direct implementation of the program components. What

is considered a cost for the program is income to those employed, contracted, or who sell material inputs needed in a program.

It is estimated that about 21 percent of the costs of the Master Plan will benefit small farmers in the plantation development program components which implemented inside the farms and lots. Plan implementation require technical, professional, and administrative skills which account for 24 percent of all costs. Other costs are materials, equipment, machinery costs, human resources development, research, monitoring and consulting services of which about 40 percent is of local origin and 40 percent foreign.

Programme Benefits

1. Forest Management Improvements

Non Wood Forest Products - Expanding and managing non wood forest product resources creates the following benefits:

- Less destructive exploitation methods.
- Maintains biodiversity by preserving a wider variation in plant and animal communities.
- Regular annual income stream which generates more economic benefits - employment in harvesting and downstream manufacture - compared to the two or three harvests from traditional natural or plantation forests.
- Helps to preserve unique cultures and values of tribal peoples.

However, perhaps the most obvious benefit to government is the basis for an excellent focus on poverty alleviation and socioeconomic development programmes, especially directed towards benefiting women participants.

Environmental Programmes - These are incorporated into each development scenario, principally in Scenario 2. They are all designed to assess, plan, and monitor the effects of the required programmes designed to buildup or maintain existing forest-based resources. These programmes and related costs are not included in other plan sections. Scenario environment cost estimates bear the programme costs, but in turn are not credited with any financial or economic returns. These benefits are normally indirect, difficult to quantify and their valuation highly dependent on subjective judgement. Nevertheless, they are real and include:

- Institutional strengthening - creation and empowering of an authority with authority, personnel, new skills and technology to assume environmental responsibilities.
- Fauna and flora surveys and forest inventories to provide a proper information base upon which to plan, develop and monitor resource development effects.
- Watershed management and soil conservation programmes.
- Operation and expansion of an effective protected area system
- Establishment of a resource planning unit to provide systematic planning, implementation and evaluation of forest development.

Other Benefits - Planned road construction standard and network improvements produce a range of benefits which are difficult to quantify directly, but nevertheless are real. These include:

- Reduced soil loss and erosion damage.
- Year around extraction operations providing a stable employment base.
- Establishes conditions permitting the introduction of skilled labour force.
- Reduced logging waste.
- Lower extraction costs.
- Improved log quality.
- Reduced transportation costs.

For example, replacing axes for felling and log cutting by manual or motor drive saws adds approximately 7% to log yields and has a direct effect on increased volume or added value to governmental revenues and sawlog volumes. This factor alone by 2013 would increase Departmental net sawlog volumes by 105,000 m^3/A in Scenario 1 and 247,000 m^3/A in Scenario 2, adding (or preventing an estimated annual value loss of $ 1.5 or 6.2 million, respectively in the sawmilling sector).

Besides the direct effect on wood supplies, intensified forest management offers the base to engage a large segment of the population in productive, profitable economic activity, at the same time as improving the general environment. Large scale opportunities exist for growers, workers and manufacturers based on an expanding forest resource. For GOB, this is the most attractive feature.

2. Utilization Improvements

Waste reduction or wood conservation has great potential and involves a variety of strategies:

- Modify building standards to use less material for conventional products, matching product sizes to modern day strength requirements.
- Introduce wood seasoning and preservation.
- Eliminate unnecessary waste in sawmilling industry.

Conventional building standards use excess materials for wooden door and window frames. Engineer or design changes to size the frames to what strength is needed. This can save up to Tk 200 per wooden frame, minimum, in new construction. Proper seasoning and preservation of all sawntimber has annual savings potential of $49 and $9 million, simply by prolonging wood service length by increasing durability and improving quality. Likewise, a simple preserving technique for bamboo would treat an estimated 470 million bamboo, reducing bamboo demand or adding to annual bamboo supplies. At an average price of Tk 20 each, the potential additional market value in saved bamboo is Tk 77 billion ($1.9 billion) by the year 2013.

Another large promised benefit comes from modernizing the sawmill industry to increase sawing efficiency. This means increasing the mill average conversion factor. At present, mills convert approximately 37.5% of round log volume to rectangular sawntimber. This ratio normally is 50-55%. Today's low figure is due to outmoded sawing methods. Raising the conversion factor to 55% significantly improves financial returns to sawmill owners and economic returns to government. Equally importantly, it lessens the demands on forest resources by reducing the need to produce the equivalent volume of sawntimber. Potential benefits include:

- Up to 45% increase in sawmill employment.
- An additional $360- 990 million increase in manufacturing values over the 20-year period
- Benefits occur in all development scenarios, but are proportionate to sawlog volume processed.
- Environmental benefits by reducing the annual area logged (8,100 to 27,000 ha by 2013), helping to sustain demands on the Bangladesh's forests.

Table 53 evaluates the range of benefits, depending upon the measures used by modernizing the sawmilling industry.

Table 53 - Sawmill Industry Manufacturing Benefits

Item	Units	Status Quo	Scenario 1	Scenario 2
Sawlog Volumes				
20-Year Total[a]	million m^3	3.15	3.83	5.36
Annual Volume, 2013[b]	million m^3	0.44	0.64	1.49
Percent of 1993 demand	%	7	12	27
Equivalent Forest Area[c]	ha/ A	8,100	12,600	27,000
Additional Value Created[d]	$ million	170	227	453
Payback Period	Years	2.1	2.0	2.2

[a] Total volume added (or saved) over 20-year FMP period.
[b] Annual volume added (or saved) in the year 2013.
[c] Annual area of natural Hill Forest logged to obtain this volume.
[d] Based on volume recovered and indicated sawmill restructuring programme.

GOB strategy with BFIDC is to retain entrepreneurial units with technology not found in the Bangladesh private sector - wood seasoning and preservation. These units are profitable now, even with the cutting moratorium. The recommended rationalization programmes produces annual cash savings to government of Tk 23 million ($0.58 million).

Table 54 - Estimated Fuelwood Savings

Project/ Policy	5-Year Fuelwood Savings (Million m^3) 1993-98	1998-03	2003-08	2008-13
Development projects				
Improved cooking stoves	0.123	0.389	0.874	0.852
Charcoal equivalent to fuelwood	0.030	0.045	0.045	0.045
Biogas equivalent to fuelwood	0.101	0.252	0.336	0.336
Subtotal	0.254	0.686	1.165	1.233
Policy implementation				
Brick burning	0.809	1.079	1.349	1.618
Road tarring	0.089	0.114	0.130	0.147
Subtotal	0.907	1.193	1.479	1.765
Total	1.161	1.879	2.644	2.998

3. Fuelwood Conservation

Excluding fuelwood coming from plantations, the suggested programme to support the above strategy indicates significant potential benefits in economic and financial returns. Recommended programme and estimating details are fully covered in a separate report (FMP 1992e). Table 54 summarizes potential benefits in term of fuelwood savings. Benefits derive from the three energy saving programmes and implementing wood energy policies. Table 54 fuelwood savings are equivalent to reducing fuelwood to 74% of estimated 2013, this corresponds to a savings of 25% of annual fuelwood needs at that time.

There are significant savings of fuelwood indicated due to introduction of the energy saving programmes. These savings range from 0.254 million m^3 in 1993 to 1.233 million m^3 in 2013. Compared to the proposed modest investment, these savings are quite substantial. In addition, savings come from the beneficial effects of the policy implementation. Brick burning and road tarring consume the major share of fuelwood in the industrial sector. Eliminating fuelwood industrial applications produces a significant savings, amounting to 0.907 million m^3 in 1993 and 1.765 million m^3 in 2013. The total savings can bring noticeable change in the supply and demand situation of fuelwood especially in the shortfall north and central regions. The west, southeast and northeast regions benefit as well, but to a lesser extent.

Substituting Imports for Hill Forest Products

Both the Status Quo and Scenario 1 continue extraction operations in the natural Hill Forests at about 1,000 ha/A, replacing the 20,000 ha of natural forest by 20,000 ha of plantation. In addition to the different growth standards between the two scenarios. Scenario 1 provides a more diverse species assortment than Status Quo. In comparison, Scenario 2 fully eliminates natural forest extraction during the plan but anticipated extraction is based on extracting up to 500 ha/A and 10,000 ha of plantations. Scenario 1 would also eliminate Hill Forest extraction but at a later date, possibly 5 to 10 years later. Status Quo continues Hill Forest extraction at present cutting rates until today's estimated forest areas are fully exploited.

A second option open to government is to insist on a more effective moratorium in the Hill Forests and replace the foregone forest products by imports. Presently these forests provide the bulk of railroad ties, poles and crossarms for the nation's railways and electric system, in addition to providing most of the raw material used by BFIDC primary manufacturing plants. Some volume is also sold to private timber traders by auction sales as well. FMP Status Quo and Scenario 1 production is 166,000 m^3 of sawlogs and 16,000 m^3 of poles annually during the plan period. In comparison, Scenario 2 uses 50,000 m^3 of sawlogs and 5,000 m^3 of poles. Fuelwood volumes are also involved but are ignored for valuation purposes since fuelwood imports would not occur as local substitute material exists.

Based on current international forest product prices, the annual cost of importing substitute material at the required volumes ranges from $28-50 million for either the Status Quo or Scenario 1 case, compared to $9-12 million for Scenario 2. The inter-scenario range depends on whether sawlogs substitute volume is raw tropical hardwood logs or treated manufactured coniferous materials. This estimate also reflects current conversion rates in the local sawmilling industry. Values are based on an average of $130/$m^3$ for treated sawnwood imports and $1,200//$m^3$ for treated poles. Currently high value Malaysian log exports delivered are valued at $250/$m^3$. There is no need for high quality logs for sleepers and crossarms, so round log imports get valued at $183/$m^3$. During the life of the Master Plan, the discounted value of these imports, at 12%/A interest, is:

Development	Tropical Hardwood Logs	Manufactured Coniferous Products
	($Million)	
Status Quo	225	119
Scenario 1	225	119
Scenario 2	70	37

In all scenarios, importing manufactured products means foregoing job opportunities and economic activities in Bangladesh related to the foregone wood volumes. These costs are not included in the tabular data. Estimated employment loss is 1,350 jobs. The above estimates consider full recovery of standing forest volume, experience shows that extracted volumes range from 50-65% of actual standing volume. Applying similar recovery rates reduces the above cost estimates substantially, but even so, straight replacement by importation is costly. These costs are ignored in the previous estimates of overall programme profitability in both Scenarios 1 and 2.

FINANCIAL AND ECONOMIC RESULTS

Programme Profitability

1. Plantation Models

Profitability analysis considers several plantation development models broadly typical of the range of different rotations, species and growth rates encountered or possible in Bangladesh. The analysis estimates the financial return to the plantation owner - an individual, enterprise or the Department. Appropriate silvicultural prescriptions including spacing, level of physical inputs, maintenance and thinning programs are proposed separately for each of the models. The eleven models form the technical base for any targeted development programme, eg poverty alleviation, watershed management or industrial raw materials.

Based on these technical paradigms, financial analysis undertaken for each assesses their financial attractiveness. In the estimate benefits include all products, fuelwood, poles and sawlogs. Prices of all inputs and outputs are financial prices at plantation-gate, expressed in constant 1992 values. Details of all assumptions and analysis are also given in the Financial Analyst Specialist Report (FMP 1993b) and the Forest Production report (FMP 1992g). Appendix 7 has the analytical details supporting Table 55 data.

Table 55 - Plantation Models Financial Analysis

Rotation/ Species	MAI m^3/ ha/ A	Tk/ ha		FIRR (%)	NPV Tk
		Development	Benefit		
45, Teak stumps	2.5	13,000	38,000	13	2,400
45, Teak seedlings	2.5	16,700	360,600	10	(4,600)
40, Teak	7.5	25,000	788,200	22	30,000
30, Teak	20	33,400	1,065,500	29	81,500
30, Garjan	20	38,200	1,065,500	24	84,800
20, Teak stumps	12.5	23,600	379,80	26	56,100
20, Teak seedlings	30	31,600	731,800	24	81,500
20, Sal	12.5	33,100	278,900	17	10,900
10, Various[a]	15	17,000	51,000	14	3,800
10, Various[a]	20	35,200	74,400	19	8,700
10, Various[a]	45	32,100	198,400	28	27,800

[a] Gamar, melocanna, Pinus caribeae

Financial rates of return, shown in Table 55 indicate that rotations of 20-30 years for sawlogs and poles and average annual growth rates of 7.5 to 30 m^3/ha are financially attractive with financial returns of 17-29%/A. Rotation ages greater than 40 years for teak, the most valuable species, or similar to today's achievements yield less than lower than or about equal to 12%/A. Short rotation pulpwood plantations are also financially pleasing, showing returns of 14-30%/A.

The analyses confirm that all the plantation models are financially viable and attractive. However, the financial profitability of the analyzed models varies over a large range. Strikingly, the short rotation (fuelwood) plantation model shows a lower rate of return. These plantations have been supported in the past because they reduce the pressure on the natural forest.

The low profitability of fuelwood plantations also demonstrates the wide range of financial profitability of plantation forests, a fact that is valid for the whole program as well. Careful selection of locations, project alternatives, market opportunities, and feasible cost levels in each specific project is worthy of extra planning effort. These fuelwood models are adopted in formulating programs and targets for forest production and participatory forestry.

2. Forest Management Programmes

Scenarios 1 and 2 propose various development level planting programmes. The Scenarios incorporate different proportions of the 10 models and different levels of Hill forest extraction rates. Scenario 2 plans to eliminate Hill forest Extraction during the plan period and permits cutting up to 500 ha annually. Excluding the imposition of an effective cutting moratorium, this option offers the maximum extension to the protected area system to support biological diversity of the natural flora and fauna. Scenario 1 plans on harvesting 1,000 ha of Hill Forest annually, twice the Scenario 2 rate.

Financial and economic analyses compare the management and production programmes as a whole for Scenarios 1 and 2. The analyses take into account the felling and plantation programmes and the associated growth targets. All values are in 1992 constant prices. For financial analysis, financial price of inputs and outputs are used. The economic analysis uses border prices, with international prices converted at the exchange rate of 1 US $ = Tk 38.9. Because of prevailing unemployment and under employment in Bangladesh, the market value of unskilled labour (Tk 50/day) gets adjusted by a factor of 0.75 to reflect its opportunity cost. Traded goods and services are valued at their CIF imports or FOB export prices as appropriate. Non-traded goods and services get adjusted by a shadow cost factor of 0.80. Other cost items directly related to forest development are incorporated in the cashflow. Further details of the assumptions and analysis are in the Financial Analysis Report (FMP 1993b). Table 56 compares profitability.

Table 56 - Forest Management Programme Profitability

Item	Units	Scenario 1	Scenario 2
Financial Results			
FIRR	%	14	19
NPV	Tk billion	0.04	11.9
Economic Results			
EIRR	%	16	24
NPV	Tk billion	1.54	13.30
Switching Values[a]			
Costs	%	+2	+10
Benefits	%	-25	-50

[a] Percent change to reduce EIRR to 12%/A.

Analysis, summarized in Table 56, reveals that both scenarios are economically viable, but at different profitability levels and financial results. Scenario 2 rate of return is much higher than Scenario 1, while its net present is almost double. Scenario 2 programme shows a financial return of 19%/A, while Scenario 1 yields 14%.

Economic rates of returns are similar in relative values, 24% versus 16%, respectively, for Scenarios 2 and 1. The incremental net benefits from Scenario 2 accrue at a much later stage compared to Scenario 1. Both cases are quite sensitive to programme cost increases but much less so to reduced benefits. Cost increases of 2 and 10% in Scenario 1 and 2, respectively, drop returns to the 12% discount rate, but 25 to 50% reductions in benefits are necessary to achieve the same effect.

Scenario 2 returns are underestimated. This scenario bears the full cost of important environmental development and protection programmes without credit for any income derived from tourism, conservation or non wood forest product developments. Also, attention is drawn to the fact that Scenario 1 yields are over estimated. Scenario 1 costs exclude the cost of benefit sharing programmes necessary to implement the programme size and productivity targets factored into the estimates. The cost of these benefits would likely add a further 20-30% to the existing cost structure, significantly affecting financial and economic yields.

3. Participatory Programmes

These programmes exclusively target poverty alleviation, encroachment of Sal Forests, and farmers. Scenario 1 and 2 offer different development levels, productivity targets and programme support. Analysis show that both scenarios are financially and economically attractive. Basic assumptions underlying the analysis are fully described in the Financial Analysis report (FMP 1993b). Assumptions are similar to those just described for the Forest Management Programme. Financial results below, show yields of 16% and 30%, and economic returns of 17% and 32% for Scenarios 1 and 2, respectively. Scenario 2 has a much higher net present worth, indicating substantial benefits maturing beyond the time horizon of the 20-year plan.

			NPV @ 12%, (Tk Million)	
Scenario	FIRR %	EIRR %	Financial	Economic
Scenario 1	16	17	390	490
Scenario 2	30	32	26,250	28,040

4. Participatory Models

The Plan adopts eight plantation models representative of the range of growing conditions and yields expected or judged possible in Bangladesh. Anticipated yields are conservatively set similar to forest levels. In fact, much higher yields are anticipated from the intensive care and protection possible with the owner living nearby. Estimated models financial profitability are:

	FIRR %
Scenario 1	14-19%
Scenario 2	28-30%

5. Non Wood Forest Products

An analysis of the four products profitably based on estimated yields and inputs indicates favourable financial returns. Prices used in the analysis are farmgate prices and costs used reflect recommended management methods. Financial returns are for producing the primary raw material products and do not include further processing, they generate internal rates of returns

ranging form 30-50% and appear quite robust. Costs have to increase by 140-280%, or resource yields decline 60-70% to drop the return to a 12%/A discount rate. Actual yields estimated are:

- Golpatta thatching 29%
- Lac 33%
- Rattan 36%
- Murta 53%

6. Wood Energy

Financial analysis of viability and profitability shows major returns from the fuelwood savings, vary from 24% to 54% as measured by economic internal rate of return, Table 57. Analysis is considers pricing fuelwood saving based on the energy equivalency price of kerosene. Complete analytical details are separately reported (FMP 1992e).

Table 57 - Fuelwood Strategy Profitability Analysis (Tk millions)

Strategy	Average Annual		IRR %	NPV* Tk
	Investment	Benefit		
Improved Cooking Stoves	37.8	575.5	45	1.72
Charcoal Future	10.1	14.5	20	0.01
Biogas Plants	16.4	48.7	54	0.15

* Discounted at 12%/A.

Master Plan Results

Financial and economic analyses were undertaken for the forest production and participatory forestry components separately and the Master Plan as a whole under both the development options. These analyses have been done by comparing the incremental costs and benefits associated with the program component (Scenario 1 and 2) with the costs and benefits of the "without" (Status Quo) programme situation. The analyses take into account the felling and plantation program and the associated growth targets. All values are in 1993 constant prices. For financial analysis, financial price of inputs and outputs are used. The economic analysis was border prices, with international prices converted at the exchange rate of 1 US$ = Tk 38.9. Because of prevailing unemployment and underemployment in Bangladesh, the daily market value of unskilled labour (Tk 50) has been adjusted by a factor of 0.75 to reflect its opportunity cost.

Economic prices of different forest products under the plan are based on farmgate or plantation-gate prices derived on the basis of prevailing market prices and adjusted by conversion factors. Use of market (financial prices) prices as a basis for subsequent derivation is considered justified in view of the competitive market for poles and timber in Bangladesh. These outputs are not also traded internationally, and therefore, valuing them in terms of imported resources would seem to be inappropriate. Of the output subcategories, only fuelwood is considered to be a close substitute for an import like kerosene. Kerosene, however, is used minimally in rural Bangladesh. Thus, even allowing for a future fall in its real price, the true degree of substitutability among fuels in Bangladesh is yet to be established. Considering this, the market price of fuelwood has been considered as a basis for economic prices of fuelwood in the analysis. Other traded goods and services get valued at their CIF imports or FOB expert prices as appropriate. Non-traded goods and services are adjusted by a shadow cost factor of 0.80. All cost items directly related to forest development have been included in the cashflow. Details of the assumptions and analysis are in Appendix 7, Table 58 summarizes the results.

The analysis reveals that both the scenarios are economically viable. The EIRR under both the development options are higher because many of the forest resources are already in place and benefit of those have been accounted for without taking into consideration the sunk costs associated existing plantations. Under Scenario 1, the EIRR is inflated because the cost of forest protection from benefit sharing is not reflected in the costing of plantation development. Experience shows that without specific protective measures, actual forest production goes down substantially, this severely affects the rate of return.

In contrast, Scenario 2 includes benefit sharing costs, and as well the Scenario excludes potential incomes from environmental development programmes.

Table 58 - Summary of Financial and Economic Analysis, Scenario 2

Item	Rate of Return %		Net Present Value[a] Tk Million	
	Economic	Financail	Financial	Economic
Programme				
Forest Production	19	24	11,896	13,297
Participatory	32	29	28,043	26,897
Master Plan	20	27	12,054	62,936
Switching Value [a]				
Costs	+10	+30	na	na
Benefits	-25	-75	na	na

[a] Discount rate 12%

The EIRR under Scenario 2 is much higher because of the high MAI assumed and this also explains the incremental net benefit that will accrue at a much later years date from long rotation plantations.

1. Sensitivity Analysis

Sensitivity analysis carried out assesses the financial and economic viability of both the development options under various assumptions and adverse changes in key factors affecting costs and benefits using switching values. The results indicate that both the development options remain viable even under a variety of adverse changes in costs and benefits. However, in all the cases, results are more sensitive to cost increases that accrual of benefits. It should be noted here that cost estimates are indicative and, in some cases, are on the higher side to allow flexibility during preparation of more detailed and specific program packages.

2. Risks

For the plantation development protection of forest cover is the major risk anticipated. Theft, illegal grazing, fire and inadequate forest management practices are the major causes of rapid depletion of Bangladesh forest resources. The Plan provides for the establishment of long, medium and short rotation plantations over a period of 20 years. Location of short rotation fuelwood plantations is adjacent to populated areas. However, the Plan envisages large scale peoples participation in the establishment and maintenance of new plantations. The benefit sharing arrangements or monetary incentives to the participants can minimise the risk. In the past, plantations have failed for many reasons. These problems are now better recognized and routine forest management practices are being progressively introduced to counter them. It is therefore expected that these matters should not constitute a major risk, provided that BFD organization and management are enhanced as proposed.

One of the major risk to the success of the participatory forestry is the failure of the local communities to respond as fully as expected. This risk is more related to its social and institutional aspects than to physical, silvicultural or price related variables. In particular, the danger of inadequate participation by local communities in the program is guarded against through attractive benefit-sharing arrangements The emphasis the program places on training and motivational activities through NGOs further reduces the risk.

LONG TERM ECONOMIC POTENTIAL

Natural Resource Accounting

Gross national product is the current measure of economic contribution. Currently, the determination of GNP ignores the productive role of natural resources. Forestry contribution to Bangladesh is significant. The system values manmade assets as productive assets, but assigns no value to natural resource assets. A country can exhaust its mineral resources, cut down its forests, erode its soils, pollute its waterways, and hunt its wildlife and fisheries to extinction: yet accepted economic values assign no cost to these environmental losses.

Since economic valuation confuses the depletion of valuable assets with income generation: it promotes and seems to validate achieving and maintaining rapid economic growth by harmful natural resource exploitation. Continuing such practices results in illusory gains in income and permanent losses in natural resource wealth. Changes in the positions of natural resource assets and other environmental values, such as forests, wildlife and mineral resources, need incorporating in the national income accounts. This is consistent with accounting principles which recognize capital gains as a source of income, and capital losses as income reduction.

From an economic accounting perspective, depleting the natural resources by exploitation, misuse or degradation, represents a real economic cost and reduces national wealth. This economic omission effectively places a zero cost on any sustained resource consumption. The economic dependence of the nation to meet economic targets, finance imports, and support its population is not valued. Since such resources are not accurately valued, government fails to fund their development and maintain a rational balance between conserving and utilizing natural resources. Can Bangladesh continue to place such a meagre value on its diminishing forests and its other forest-dependant resources?

Table 59 -Forecast Major Forest Product Revenues[a] (Tk Million)

Item	Status Quo			2013 Scenarios	
	1993	2013	2013[b]	1	2
Sawlogs					
Natural	125.7	138.9	55.6	138.9	114.8
Plantations	38.1	118.1	47.2	446.5	1,305.9
Pulpwood					
Natural	0.4	0.4	0.2	0.4	0.4
Plantations	32.0	81.6	32.6	110.7	319.5
Poles					
Natural	9.2	9.2	3.7	9.2	7.2
Plantations	5.3	19.4	7.8	56.3	74.6
Fuelwood					
Natural	7.7	8.4	3.4	8.4	5.5
Plantations	0.9	2.7	1.1	35.4	75.0
Bamboo	75.4	66.4	66.4	66.4	102.9
Total	294.7	445.7	218.0	872.2	2,005.4

[a] Assumes cost of replacement and forest land only, not private land.
[b] Assumes a deforestation rate of 3%/A during the Plan

Revenue Potential

Estimated future revenue potential in 2013 varies from Tk 0.3 to 2.0 billion ($7.3 to 50.0 million) for the Status Quo and Scenario 2 development options. Intermediate Scenario 1 has a revenue potential of Tk 0.9 billion ($21.8 million). Table 59 estimates consider only the major forest products, forecast roundwood supplies and present royalty rate structure. Status Quo estimates assume total elimination of deforestation: if deforestation continues at the 3%/A rate forecast, anticipated revenue in 2013 falls to Tk 218 million ($5.4 million). All future estimates exclude revenues from non wood forest products which currently bring about Tk 20-25 million annually. Scenario 2 non wood programme should generate similar revenue increases as those projected for traditional products.

Pricing forest products at replacement cost is a basis of determining revenue potential. Table 60 indicates the incremental revenues generated on this basis, in addition to those shown in Table 59. This estimate incorporates the present worth of Master Plan programmes, current and future costs as appropriate, roundwood yields forecast and a 12%/A discount rate. Attention is drawn to the fact that the estimate ignores any changes from present market conditions. It calculates the basic revenue charges to make forest sector investments competitive with other government investment options. If these rates are not obtained then some means is necessary to subsidize the lower rate charged. Bangladesh right now does not have the option of electing to import its future wood needs. It may not have the ability to purchase then, it may prefer to spend the money in some other way. It definitely would benefit greatly from an expanding forestry sector and all the positive economic benefits associated with that expansion and proportionate to the existing potential.

Table 60 - Indicated Revenue Differential,[a] (Tk Million)

Item	Status Quo			2013 Scenarios	
	1993	2013	2013[b]	1	2
Sawlogs					
Natural	21,972	24,279	9,712	9,754	1,730
Plantations	4,054	12,554	5,022	19,482	12,071
Pulpwood					
Natural	69	69	28	61	28
Plantations	47	118	47	129	-
Poles					
Natural	565	565	226	233	34
Plantations	335	1,235	494	1,466	364
Fuelwood					
Natural	1,131	1,236	495	498	66
Plantations	96	296	119	1,591	675
Bamboo	146	128	128	128	195
Total					
Incremental Rate	28,415	40,480	16,271	33,342	15,163
Present Rate	295	446	218	872	2,005
Total	28,710	40,926	16,489	34,214	17,168

[a] Assumes cost of replacement and forest land only, not private land.
[b] Assumes a deforestation rate of 3%/A during the Plan

Estimated Value Added

As measured by value added, the potential economic contribution of the forestry sector by the Year 2013 ranges from Tk 29 billion to Tk 103 billion ($0.7 to 2.6 billion). Contribution level is very dependent on the development scenario adopted and implemented. Under Status Quo, the

Tk 29 billion potential is contingent on totally eliminating all deforestation right from the plan start. If deforestation continues at the present indicated rate of 3% annually, value added will hold just above the present level of Tk 21 billion. This anomaly holds due to the maturing of the present plantation inventory.

Scenario 1 development generates an intermediate value of Tk 45 billion ($1.1 billion) while Scenario 2 potential is Tk 103 billion. Table 61 presents the estimates, illustrated by Figure 2. Tabular estimates parallel the 1992 ones in Table 3 and are based on the present royalty, price and cost structures. The estimate ignores forest product imports.

Table 61 - Estimated 2013 Value Added (Tk million)

Products	Status Quo[a]	Scenario 1	Scenario 2
Primary			
Sawlogs	13,135	21,608	48,768
Fuelwood	7,324	9,511	14,258
Poles	1,159	3,173	10,321
Pulpwood	278	366	1,001
Bamboo	2,394	2,394	3,872
Total	24,290	37,052	78,220
Non Wood	742	742	2,620
Secondary/ Tertiary			
Sawmilling/ Solidwood	1,743	2,455	9,090
Pulp and Paper	1,838	2,324	5,847
Furniture	505	2,536	7,418
Total	4,086	7,315	22,355
Total			
Value Added	29,118	45,109	103,195
Percent of 1992 Value	135%	210%	480%

[a] Assumes total elimination of deforestation

APPENDIX I
ABBREVIATIONS, TERMS AND CONVERSION FACTORS

PROJECT 372001/31
FORESTRY MASTER PLAN,
BANGLADESH (TA NO.1355-BAN)

ASIAN DEVELOPMENT BANK
MANILA PHILIPPINES
DATE: JANUARY 1993

ECONOMICS AND MARKETING

APPENDIX 1
ABBREVIATIONS, TERMS AND CONVERSION FACTORS

ABBREVIATIONS

ACCF	- Assistant Chief Conservator
ADAB	- Association of Development Agencies Bangladesh
ADB	- Asian Development Bank
ADT	- Airdry Metric Tonne
AF	- Acquired Forest
AWB	- Asian Wetland Bureau
BARC	- Bangladesh Agricultural Research Council
BARI	- Bangladesh Agricultural Research Institute
BASIC	- A Software Program
BBS	- Bangladesh Bureau of Statistics
BCIC	- Bangladesh Chemical Industries Corporation
BCSIR	- Bangladesh Council for Scientific and Industrial Research
BFD	- Bangladesh Forest Department
BFIDC	- Bangladesh Forest Industries Development Corporation
BFRI	- Bangladesh Forest Research Institute
BNBG	- Bangladesh National Botanical Garden
BNH	- Bangladesh National Herbarium
BSCIC	- Bangladesh Small and Cottage Industries Corporation
BSEC	- Bangladesh Steel and Engineering Corporation
CAI	- Current annual increment
CBM	- Chittagong Board Mill
CCB	- Copper sulphate, Sodium dichromate and Boric acid
CCF	- Chief Conservator Forests
CF	- Conservator Forests
cft (H)	- Cubic feet hoppus (.785 x true cubic foot)
cft (T)	- Cubic foot true volume (1.27 x Hoppus cubic foot)
Char	- Land formation on river bank on sea coast
CHT	- Chittagong Hill Tracts
CIF	- Including cartage, insurance and freight
cm	- Centimetre
crore	- Ten million
DAE	- Department of Agricultural Extension
DBH	- Diameter Breast Height
DCCF	- Deputy Chief Conservator Forests
DCF	- Deputy Conservator Forests
DFO	- Divisional Forest Officer
DOA	- Department of Agriculture
EIRR	- Economic Interval Rate of Return
EPB	- Export Promotion Bureau
EPSCIC	- East Pakistan Small Scale Cottage Industries Corporation
ESCAP	- Economic and Social Commission Asia Pacific
FAO	- Food and Agriculture Organization of the United Nations
FDTC	- Forest Development and Training Centre
FEC	- Foreign Exchange Component
FFYP	- Fourth Five Year Plan
FIMU	- Fisheries Investigation Management Unit
FIRR	- Financial Interval Rate of Return
FMP	- Forestry Master Plan
FOB	- Freight on Board
FPMP	- Forestry Master Plan Project
FY	- Financial Year
gm	- Gram
GOB	- Government of Bangladesh
ha	- Hectare
IFCU	- Institute of Forestry, Chittagong University
IRR	- Internal Rate of Return
Jhum	- Shifting Cultivation
kg	- Kilogram
Khas Forest	- Forest Land Owned by Revenue Department of Government
KHBM	- Khulna Hard Board Mill
Khetland	- Low lying private Land
KHM	- Khulna Hardboard Mill
km	- Kilometre
km^2	- Square kilometre

KNM	- Khulna Newsprint Mill
KPM	- Karnafuli Paper Mill
KRC	- Karnafuli Rayon Complex
kw	- Kilowatt
lakh	- One hundred thousand
m	- Metre
m^2	- Square Metre
m^3/ha/A	- Cubic metre per hectare per annum
MAI	- Mean Annual Increment
max	- Maximum
md	- Man day
min	- Minimum
MIS	- Management Information System
mm	- Millimetre
MOEF	- Ministry of Environment and Forest
MUV	- Manufacturing Unit Value
NACOM	- Nature Conservation Movement
NBPM	- North Bengal Paper Mill
NEMAP	- National Environmental Management Action Plan
NGO	- Non Government Organization
No.	- Number
NPV	- Net Present Value
OCC	- Opportunity Cost of Capital
ODA	- Overseas Development Agency
PBVP	- Particle Board and Veneer Plant
PDB	- Power Development Board
PY	- Planning Year
REB	- Rural Electrification Board
RF	- Reserve Forest
SCF	- Standard Conversion Factor
SIDA	- Swedish International Development Agency
SPBM	- Star Particle Board Mills
SPH	- Stems per heactare
SPPM	- Sylhet Pulp and Paper Mill
SVPP	- Sangu Valley Plywood Plant
TEX	- Timber Extraction (Kaptai)
Tk	- Taka
UNCED	- UN Conference on Environment and Development
UNDP	- United Nations Development Program
UNDP	- United Nations Development Programme
USA	- United States of America
USF	- Unclassed State Forest
VAT	- Value Added Tax
VF	- Vested Forest
WAPDA	- Water and Power Development Authority
WHD	- 4 Wheel Drive
WHO	- World Health Organization

CONVERSION FACTORS

US $ 1	- Tk 38.8
Tk	- US 0.0258
1 m^3	- 27.7 cft Hoppus
1 cft(H)	- 1.2732 cubic feet true - cft(t)
1 cft(t)	- one cubic foot true solid volume
maund	- 37.33 kg
1 km	- 0.621 miles
1 ha	- 2.471 acres
1 litre	- 0.220 imperial gallons
ton	- 2,000 lbs
tonne	- 1,000 kilograms
teak	- 1,080 kg/m^3, green weight
gamar	- 650 kg/m^3, green weight
melocanna	- 450 kg/m^3, green weight
1000 culms muli bamboo	- 1.8 ADT
1000 culms other bamboo	- 1.6 ADT
Raw ton	- 0.67 ADT

APPENDIX 2
BACKGROUND INFORMATION

PROJECT 372001/31
FORESTRY MASTER PLAN,
BANGLADESH (TA NO.1355-BAN)

ASIAN DEVELOPMENT BANK
MANILA PHILIPPINES
DATE: JANUARY 1993

ECONOMICS AND MARKETING

APPENDIX 2
BACKGROUND INFORMATION

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1. FORESTRY SECTOR EMPLOYMENT GENERATION, (Manyears)

Item	1993		Scenario 1, 2013		Scenario 2, 2013		
	Employed	Percent	Employed	Percent	Employed	Percent	Increase%
Professional/ Supervisory							
Forest Dept/ Authority	9,600		15,300		48,000		400
Forest Research Institute	800		1,130		1,300		62
BFIDC Head Office	250		270		1,00		300
Total	10,650	1.3	16,700	1.5	50,300	2.3	359
Plantations							
Forest Land	7,300		20,400		31,600		331
Public Programmes	6,100		6,700		9,300		52
Total	13,400	1.7	27,100	2.5	40,900	1.9	205
Primary Processing							
Rubber	2,450	0.3	4,800	0.4	60,000	2.8	2,350
Private Harvesting							
Bamboo	282,100	35.3	282,800	25.6	324,800	15.1	15
Wood	63,100	7.9	106,800	9.7	133,800	6.2	112
Forest Harvesting							
Bamboo	19,000	2,3	7,000	0.6	41,000	1.9	116
Timber	55,400	6.9	107,000	9.7	275,900	12.8	398
Fuelwood	16,100	2.1	16,600	1.5	22,200	1.0	38
Total	438,150	54.8	524,200	47.5	857,700	39.9	95
Secondary Processing							
Forest Industries	50,000	6.2	85,000	7.7	2000,000	9.3	300
Cottage Industries	288,000	36.0	450,000	40.8	1,000,000	46.6	247
Total	338,000	42.2	535,000	48.5	1,200,000	55.9	255
Total	800,200	100.0	1,103,000	100.0	2,148,900	100.0	168
Ratio	1.0		1.4		2.7		
Percent of Labour Force	2.3%		1.9%		3.7%		

[a] Based on 300 working days annually.
[b] Includes plantation activities.
[c] Solidwood products and pulp and paper facilities.
[d] Includes all primary processing and secondary processing for those products which retain their essential physical characteristics, eg. processing of plant-based handicrafts, but excludes secondary processing of industries outsied of forestry, eg. medicinal plants, lali and catechu.

2. BANGLADESH FOREST PRODUCTS EXPORT AND IMPORTS

2a. Exports, 1976-1990

Products	Unit	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
Newsprint	M. Ton	4980	7570	21300	20300	21410	16458	10542	9163	13984	18084	16022	18600	13899	7799	4674
	Mill Tk	17.84	22.48	88.15	84.12	88.59	159.93	104.02	126.44	212.58	278.61	230.03	269.12	241.57	156.67	92.71
Paper & Allied Products	M. Ton															
	Mill Tk	16.38	22.08	41.87	20.32	63.73	28.40	39.45	11.03	39.87	41.65	51.23	125.66	161.62	128.86	33.62
Wood & Article of Wood	M. Ton															
	Mill Tk	-	1.80	1.90	11.20	6.65	4.20	0.93	21.24	1.86	2.82	39.00	55.00	52.00	55.00	60.00
Bamboo/Broom	M. Ton															
	Mill Tk	1.87	3.57	4.13	5.74	5.68	20.20	23.37	20.49	28.47	17.96	11.89	12.29	3.24	8.46	5.00
Total	Mill Tk	36.09	49.93	136.05	121.38	164.65	212.73	167.77	179.20	282.78	241.04	332.15	462.07	458.43	348.99	191.33

Source: Export from Bangladesh, 1972-73 to 1988-89. EPB Foreign Trade Statistics of Bangladesh, 1979-80 to 1989-90. BBS
Statistical Year Book of Bangladesh, 1980, 1986, 1990 and 1991, BBS

2b. Imports, 1977-1990

Commodity/Year	Units	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
1. Paper & Paperboard	M. Ton	14701	18245	18245	12276	14815	15563	8328	12091	7858	9634	10062	9340	23943	34088
	Mill Tk	174.90	211.60	293.70	198.56	279.40	332.80	201.24	282.00	325.20	431.64	672.39	521.38	872.32	1197.56
i) Manufactured Products	M. Ton	-	-	-	8303	14474	14366	7476	11129	5540	5726	5120	5803	20107	31461
	Mill Tk	-	-	-	134.30	272.97	307.20	180.65	259.58	229.27	311.07	513.67	399.12	683.71	1069.81
ii) As primary Products for Consumer Goods	M. Ton	-	-	-	3973	341	1197	825	962	2318	3908	4942	3537	3836	2627
	Mill Tk	-	-	-	64.26	6.43	20.98	16.56	13.28	95.93	119.49	155.39	118.99	188.61	127.75
2. Wood Pulp & Fibrous Materials	M. Ton	6226	6385	4942	7972	7371	7649	3536	25659	41157	26278	33970	17325	17546	21186
	Mill Tk	62.70	64.30	54.30	65.97	77.42	82.35	50.79	314.30	478.13	346.77	541.31	292.21	384.00	472.57
3. Wood in Rough	000 m^3	-	-	-	84.00	129.38	72.06	59.10	259.00	670.00	326.00	449.00	411.00	323.00	3936.00
	Mill Tk	10.10	1.10	13.90	60.20	425.00	18.57	67.50	66.58	210.70	102.24	172.49	102.00	109.00	742.76
Total	Mill Tk	247.70	277.00	361.90	324.73	781.82	433.72	319.53	662.88	1014.03	880.65	1386.19	915.59	1365.32	2412.89

Source: Foreign Trade Statistics of Bangladesh, 1979-80 to 1989-90. BBS
Statistical Year Book of Bangladesh, 1980, 1986, 1990 and 1991, BBS

2c. 1988-89 and 1989-90 Imports

Wood Products	1988-89		1989-90	
	Volume (000 m^3)	Value (Tk Million)	Volume (000 m^3)	Value (Tk Million)
Primary				
Fuelwood	.09	0.356	.09	0.389
Logs	298.8	68.136	7,966.61	573.596
Split Wood	.08	.412	10,21	90.474
Subtotal	298,97	68.904	7,976.91	664.459
Secondary				
Sawn Wood	-	-	3.72	-
Veneer	.03	.339	-	-
Plywood	.01	.343	.06	2.169
Particle	.02	.435	-	-
Densified	.35	8.200	.32	9.482
Subtotal	.41	9.317	4.10	12.320
Total Wood Products	299.38	78.221	7,981.00	676.779
Pulp and Paper	Quantity ADT	Value Tk million	Quantity ADT	Value Tk million
Pulp	27	.950	2,331	9.876
Mechanical	3,196	88.238	10,730	308.911
Dissolving	8,673	184.414	3,047	61.689
Sulphate	4,434	111.630	3,691	77.954
Sulphate	410	2.0160	0.6	0.022
Cotton Linters	807	4.598	2,094	14.055
Waste Paper	17,547	391.846	21,902	472.507
Subtotal				
Paper Products				
Uncoated Paper	4,605	116.737	7,195	155.023
Coated	2,415	53.915	1,883	50.871
Newsprint	2	.033	20	.342
Tissue	2,110	61.439	4,071	113.394
Kraft	554	9.661	1,889	33.81
Writing	1,406	67.173	9,425	299.649
Printing	4,811	177,285	1,048	155.182
Specialities				
Cigarettes	2,947	142.823	2,305	109.792
Parchment	15	1.052	23	0.421
Other	220	10.458	232	12.623
Total Paper	23,943	872.315	34,088	1197.545
Fibreboard	17	1.089	0.8	.205
Total Pulp and Paper	41,507	1,265.25	55,991	1,670.257
Total Forest Product		1,343.471		2,347.036
Unaccounted		21.849		65.854
Total		1,365.320		2,412.890

Source: Foreign Trade Statistics of Bangladesh, 1988, 1990, and 1992, BBS

3. FOREST REVENUES

3a. Pre and Post Moratorium Revenues

Area	Pre-Moratorium [a] U$Million	%	Post-Moratorium [b] U$Million	%
Chittagong/ Cox's Bazaar	3.87	28.6%	0.9	14.4%
Hill Tracts	1.36	10.1%	0.6	9.6%
Sylhet	2.85	21.1%	1.37	22.0%
Total Hill Forests	8.08	59.8%	2.87	46.1%
Sundarbans	5.05	37.4%	2.76	44.3%
Other	0.39	2.9%	0.6	9.6%
Total	13.52	100.0%	6.23	100.0%

[a] 3-Year average [b] 2-year average

3b. 10-Year Revenues, 1981/ 82 - 1990/ 91, (U$ million)

Item	Tk/ US	Leased Land	Public Auction	Abandoned Timber	Seedling Sales	Misc Other	Total
1981 / 82	21.960	0.739	13.477	0.180	0.012	0.263	14.671
1982 / 83	24.537	0.204	10.957	0.195	0.003	0.973	12.332
1983 / 84	25.500	0.824	11.955	0.250	0.000	0.452	13.481
1984 / 85	28.500	2.218	12.100	0.767	0.027	0.876	15.988
1985 / 86	30.900	0.913	16.893	0.795	0.005	1.002	19.608
1986 / 87	31.000	1.658	12.524	1.246	0.004	1.475	16.907
1987 / 88	31.735	1.235	15.387	0.901	0.004	0.659	18.186
1988 / 89	32.270	1.072	15.256	0.960	0.005	1.529	18.780
1989 / 90	34.030	0.715	5.408	0.813	0.020	0.672	7.628
1990 / 91	36.193	1.269	2.718	0.808	0.029	0.526	5.350
Total		5.949	51.293	4.728	0.062	4.861	66.893
Percent %							
Last 5-Years		8.9%	76.7%	7.1%	0.1%	7.3%	100.0%
Pre-Moratorium Last 5-Years		7.9%	80.7%	5.2%	0.0%	6.2%	100.0%
Post-Moratorium Last 2-Years		15.3%	62.6%	12.5%	0.4%	9.2%	100.0%

4. FORESTRY SECTOR EXPENDITURE PATTERNS

4a. Actual Expenditure By Main Budget, 1981/82 to 1991/92, U$ Million

Year	Tk/U$[a]	Normal	Development	Total	Development %
1980/81	18.049	2.6	6.7	9.3	72.0%
1981/82	21.960	2.1	9.5	11.6	81.9%
1982/83	24.537	2.3	8.8	11.1	79.3%
1983/84	25.500	2.5	9.1	11.6	78.4%
1984/85	28.500	2.8	8.8	11.6	75.9%
1985/86	30.900	4.0	7.6	11.6	65.5%
1986/87	31.000	4.1	10.2	14.3	71.3%
1987/88	31.735	4.6	8.4	13.0	64.6%
1988/89	32.270	4.6	8.5	13.1	64.9%
1989/90	34.030	5.3	12.2	17.5	69.7%
1990/91	36.193	5.5	12.1	17.6	68.8%
1991/92	37.758	1.0	na	na	na

[a] International Financial Statistics, July 1992.

4b. Normal Circle Expenditures, 1988/89 - 1991/92

Circle	Tk. Million	Percent
Plantations	137.9	24.1%
Chittagong	105.5	18.4%
Central	94.0	16.4%
Rangamati	91.9	16.0%
Forest Research	70.6	12.3%
Headquarters	17.6	3.1%
Other [a]	55.7	9.7%
Total	573.2	100.0%

[a] Bogra Tk 19.25, Management Planning 13.68, Jessore 9.39, FDTC 7.01 and National Botanical Garden 6.1 million each.

5. DIVISIONAL TIMBER AND FUELWOOD PRODUCTION 1984/85 - 1990/91

(in cft.)

Forest Division	1984-85		1985-86		1986-87		1987-88		1988-89		1989-90		1990-91	
	Timber	Fuelwood	Timber	Fuelwood	Timber	Fuelwood	Timber	Fuelwood	Timber	Fuelwood	Timber	Fuelwood	Timber	Fuelwood
Dhaka Division	13340	18334	2250	6160	5122	27970	6420	17900	42037	26134	12300	11000	-	-
Sylhet Division	536506	1057444	611200	1426740	498690	1160000	1174600	2087960	898340	1425580	265890	938710	905040	452600
Chittagong Division	378326	4330366	456756	2329047	379559	1680760	390417	1580535	444842	808083	65260	2750350	1516150	247890
Cox's Bazar Division	2681903	7509990	2990209	8393286	2254569	5581158	1358214	4289500	1628115	2741956	162000	211000	120660	87000
CHT North Division	352366	927092	1243362	3989050	546074	489640	569934	198890	650339	357667	461440	-	-	165000
CHT South Division	179122	909399	2766691	377068	460860	528747	241900	238900	164780	140517	17700	28000	8000	-
Sundarban Division	11781120	9012180	10032000	5947000	7460397	6364275	8210067	6858536	7501597	7218390	5827480	6223140	8418620	35241170
Castl Affstn Div, Barisal	1836	46380	15524	99840	12326	6951	11734	88378	32659	136297	10000	106000	6000	166000
Castl Affstn Div, Patuakhali	-	-	-	-	-	-	-	-	-	-	-	213000	-	128000
Castl Affstn Div, Noakhali	2133	583884	4666	73075	6830	8858	13497	150839	5381	270273	-	1029900	-	113000
Castl Affstn Div, Chittagong	1220	148555	9000	66700	450	42100	1238	26520	120297	-	-	229040	360	1180
Forest Exten Div, Rangpur	230	-	167	-	973	-	617	165	2122	300	-	-	-	-
Forest Exten Div, Dinajpur	1525	410	1186	325	2940	130	-	-	-	-	-	-	-	-
Forest Exten Div, Comilla	156	-	25	-	-	-	-	-	-	-	2000	4000	2000	1000
Forest Exten Div, Mymensingh	7958	6550	30777	21011	34088	117296	4373	32733	34837	119636	12000	11000	7000	27000
Bandarban Division	165469	409560	164105	367824	192171	498839	-	341000	63080	373007	5800	3800	-	20490
Pulpwood Div, Bandarban	22465	3000	115718	146998	145050	360210	163984	597510	123110	881390	122810	479000	19930	298600
Plupwood Plant. Kaptai	-	-	59900	557800	34800	302850	51060	165850	16500	131000	46740	195270	22000	74940
Unclassified Forest, Rangamati	205163	2247885	121335	1860225	38970	1354889	294164	274506	223191	10565535	-	1740700	35000	526000
Jhoom Control Division	84816	2911000	692890	826800	13403	111500	147580	1122670	89523	536800	177110	278000	-	127000
Lama Forest Division	9880	-	353638	6451928	425054	4518850	906990	1782110	171640	4049980	16940	1474110	196580	805003
Khagrachari Division	136165	892200	127282	2010015	136361	204087	707434	707434	146696	1036847	99150	1654521	-	1796000
Faridpur Division	-	-	-	-	-	-	2166	2235	-	-	430	5250	-	-
Total	17422820	30893475	19798681	34950892	12730511	23359110	14086615	20564171	12961275	20360410	7305050	17585791	8452040	10902134

6. FUELWOOD SUPPLY-DEMAND PROJECTION, STATUS QUO, (000 M^3)

Item	N-West	N-Central	West	South	S-East	N-East	CHT	Total
				1993				
Demand:								
Domestic	1288.61							
Industrial	719.06	1162.78	721.56	567.05	877.13	643.51	48.85	5309.49
Total	2007.67	648.85	441.97	281.13	489.46	359.01	23.02	2962.50
Supply	882.00	1811.63	1163.53	848.18	1366.59	1002.52	71.87	8271.80
Balance	-1125.67	763.00	546.00	860.00	857.00	391.00	1880.00	6179.00
		-1048.63	-617.53	-12.82	-509.59	-611.52	-1808.13	-2092.80
				1998				
a. Domestic	1404.27	1267.14	786.32	617.95	955.85	701.27	53.23	5786.03
b. Industrial	790.96	713.74	486.17	309.24	538.41	394.91	25.32	3258.75
Total	2195.23	1980.88	1272.49	927.19	1494.26	1096.18	78.56	9044.79
Supply	969.00	843.00	597.00	931.00	932.00	434.00	1788.00	6494.00
Balance	-1226.23	-1137.88	-675.49	-4.19	-562.26	-662.18	-1709.44	-2550.79
				2003				
a. Domestic	1519.93	1371.51	851.09	668.85	1034.58	758.95	57.62	6262.52
b. Industrial	870.06	785.11	534.78	340.17	592.25	434.40	27.86	3584.63
Total	2389.99	2156.62	1385.87	1009.01	1626.83	1193.35	85.47	9847.15
Supply	1062.00	927.00	656.00	1001.00	1027.00	478.00	1678.00	6829.00
Balance	-1327.99	-1229.62	-729.87	-8.01	-599.83	-715.35	+1592.53	-3018.15
				2008				
a. Domestic	1635.59	1475.87	915.85	719.74	1113.31	816.78	62.00	6739.14
b. Industrial	957.06	863.62	588.26	374.18	651.48	477.84	30.64	3943.09
Total	2592.65	2339.49	1504.11	1093.93	1764.78	1294.63	92.64	10682.24
Supply	1174.00	1033.00	727.00	1146.00	1334.00	531.00	1577.00	7212.00
Balance	-1418.65	-1306.49	-777.11	+53.07	-430.78	-763.63	+1484.36	-3470.24
				2013				
a. Domestic	1751.25	1580.24	980.61	770.64	1192.03	874.54	66.38	7215.69
b. Industrial	1052.77	949.98	647.09	411.60	716.62	525.63	33.71	4337.40
Total	2804.02	2530.22	1627.70	1182.24	1908.66	1400.17	100.09	11553.10
Supply	1300.00	1155.00	813.00	1346.00	1518.00	590.00	1486.00	8208.00
Balance	-1504.02	-1375.22	-814.70	+164.76	-390.66	-810.17	+1385.91	-3345.10

Source: Forest Products Demand Projection, FMP 1992d

7. SAWLOG SUPPLY-DEMAND, STATUS QUO (000 M^3)

Commodity	N-West	N-Central	West	South	S-East	N-East	CHT	Total
				1993				
Sawlog:								
a. Domestic Urban	196.56	542.18	173.62	96.54	326.25	129.91	14.04	1479.53
b. Domestic Rural	734.05	531.23	388.19	319.41	430.47	355.16	25.46	2783.80
c. Commercial [a]	56.20	155.04	49.65	27.61	93.29	37.15	4.01	423.07
Total	986.81	1228.45	611.46	443.56	850.01	522.22	43.51	4686.40
Supply	178.00	154.00	112.00	330.00	192.00	103.00	216.00	1285.00
Balance	-808.81	-1074.45	-499.46	-113.56	-658.01	-419.22	+171.49	-3401.40
				1998				
a. Domestic Urban	232.98	607.80	199.72	113.47	368.32	150.95	16.01	1689.73
b. Domestic Rural	793.18	572.82	419.25	345.10	464.51	383.95	27.49	3005.84
c. Commercial	62.41	162.80	53.50	30.39	98.66	40.43	4.29	452.60
Total	1088.57	1343.42	672.47	488.96	931.49	575.04	47.79	5148.17
Supply	199.00	175.00	123.00	347.00	205.00	109.00	206.00	1364.00
Balance	-889.57	-1168.42	-549.47	-141.96	-726.49	-466.04	+158.21	-3784.17
				2003				
a. Domestic Urban	269.33	673.35	225.78	130.37	410.33	171.95	17.99	1899.62
b. Domestic Rural	852.34	614.43	450.32	370.81	498.57	412.14	29.51	3227.99
c. Commercial	68.77	171.94	57.65	33.29	104.78	43.91	4.59	485.06
Total	1190.41	1459.72	733.75	534.47	1013.68	628.00	52.09	5612.67
Supply	219.00	194.00	135.00	365.00	237.00	99.00	183.00	1432.00
Balance	-971.41	-1265.72	-598.75	-169.47	-776.68	-529.00	+130.91	-4180.67
				2008				
a. Domestic Urban	305.74	738.94	251.87	147.30	452.39	192.98	19.95	2109.73
b. Domestic Rural	911.48	656.03	481.39	396.51	532.62	440.69	31.55	3450.06
c. Commercial	79.61	192.72	65.59	38.36	117.80	50.25	5.19	549.37
Total	1296.83	1587.39	798.85	582.17	1102.81	683.92	56.69	6109.16
Supply	242.00	217.00	150.00	389.00	284.00	107.00	200.00	1589.00
Balance	-1054.83	-1370.39	-648.85	-193.17	-818.18	-576.92	+143.31	-4520.16
				2013				
a. Domestic Urban	341.97	804.37	277.86	164.14	494.32	213.92	21.91	2319.09
b. Domestic Rural	970.69	697.68	512.49	422.24	566.71	469.23	33.58	3672.40
c. Commercial	95.48	224.58	77.58	45.83	138.01	59.73	6.12	647.49
Total	1408.14	1726.63	867.93	632.21	1199.04	742.88	61.61	6638.98
Supply	2661.00	243.00	165.00	425.00	334.00	132.00	263.00	1828.00
Balance	-1142.14	-1483.63	-702.93	-207.21	-865.04	-610.88	+201.39	-4820.98

Source: Forest Products Demand Projection, FMP 1992d

[a] Includes government, commercial and other industrial use

APPENDIX 3
FOREST PRODUCTS PRICING

PROJECT 372001/31
FORESTRY MASTER PLAN,
BANGLADESH (TA NO.1355-BAN)

ASIAN DEVELOPMENT BANK
MANILA PHILIPPINES
DATE: JANUARY 1993

ECONOMICS AND MARKETING

APPENDIX 3
FOREST PRODUCTS PRICING

TABLE OF CONTENTS

1. CURRENT ROYALTY RATES

1a. Major Products

Item		Units	Sundar bans	Chittagong C. Bazaar	Sylhet	Hill Tracts	Comilla	Dhaka/ Mymen	Dinaj pur
Sawlogs									
Special		Tk/ m3	-	830/ 1660	830/ 1660	830/ 1660	120/ 410	120/ 410	830/ 1660
Class	A	Tk/ m3	-	210	330	210	100/ 210	140/ 330	210/ 410
	B	Tk/ m3	-	170	220	170	40/ 100	80/ 220	140/ 280
	C	Tk/ m3	-	120	170	120	35/ 80	55/ 125	80/ 220
	D	Tk/ m3	-	55	110	55	20/ 55	30/ 80	55/ 170
Poles									
Special		Tk/ m	-	-	6.70	-	16/ 60	-	-
Class	A	Tk/ m	-	16/ 25	6.70	16/ 25	10/ 46	8.50/ 92	10/ 16
	B	Tk/ m	-	5.00	3.30	5.00	6.60/ 3.30	5/ 60	6.60/ 49
	C	Tk/ m	-	to	3.30	to	3.00/ 2.00	3/ 40	5/ 33
	D	Tk/ m	-	6.60	3.30	6.60	3.00/ 2.00	2/ 16	3/ 26
Plywood Logs		Tk/ m3	530	125% d	-	125% d	-	-	-
Fuelwood									
Sundri		Tk/ kg	0.13	-	-	-	-	-	-
Goran		Tk/ kg	0.10/ 0.13	-	-	-	-	-	-
Keora		Tk/ kg	0.08	-	-	-	-	-	-
Gewa		Tk/ kg	0.05	-	-	-	-	-	-
Green									
Stacked		Tk/ m3	-	-	-	-	-	0.53	-
Solid		Tk/ m3	-	-	-	-	-	0.70	-
Dry									
Stacked		Tk/ m3	-	0.10	1.00	0.10	0.15	0.38	0.31
Solid		Tk/ m3	-	0.13	1.30	0.13	0.20	0.50	0.41
Post		Tk each	-	-	-	2.25/ 5.00	-	-	-
Pit Props									
Class A		Tk/ m	-	-	-	4.00	-	-	-
B,C,D		Tk/ m	-	-	-	3.00	-	-	-
Bamboo									
Muli		Tk each	-	.040	0.25	0.04	0.05	0.10	1.00
Thick Walled		Tk each	-	.030	0.60	0.30	0.75	1.00	2.00

a Mid log diameter class 24-44 cm, 44-58 cm and >58 cm.
b Pole top diameter class <10 10/ 15, 15/ 20/ 20/ 25 and >25 cm.
c 100 ft3 stacked = 1866 kg = 75 ft3 solid = 879 kg/ m3 density.
d Compared to sawlog rates

1b. Non Wood Products

Item	Units	Sundar bans	Chittagong C. Bazaar	Sylhet	Hill Tracts	Comilla	Dhaka/ Mymen	Dinaj pur
Sungrass	Tk/ bar	-	0.12	2.00	0.12	0.12	-	-
	Tk/ kg	0.08	-	-	-	-	0.12	0.05
Cane								
- Large Diameter	Tk/ m		-		0.07			
- Small Diameter	Tk/ m		-		0.03			
- Small Diameter	Tk each		-		0.035			
Honey	Tk/ kg	1.07	0.67	1.07	-	-	1.07	1.07
Beeswax	Tk/ kg	1.61	1.34	1.61	-	-	2.14	2.14
Murta	Tk/ 1000	-	-	10.00	-	-	-	-
Hantal	Tk/ kg	0.03	-	-	-	-	-	-
Golpatta	Tk/ kg	0.05	-	-	-	-	-	-
Sal Leaves	Tk/ kg	-	-	-	-	-	0.025	0.025
Fish								
-Hilsa	Tk/ kg	1.34	-	-	-	-	-	-
-Shrimp	Tk/ kg	3.20	-	-	-	-	-	-
-Non Hilsa	Tk/ kg	0.80	-	0.54	-	-	-	2.68
Shells	Tk/ kg	0.01	-	-	-	-	-	-
Fodder Grass	Tk/ kg	-	-	-	-	-	0.05	0.008

1c. Proposed Major Products Rates

Item	Units	Sundar bans	Chittagong C. Bazaar	Sylhet	Hill Tracts	Comilla	Dhaka/ Mymen	Dinaj pur
Fuelwood								
Sundri	Tk/ kg	0.16	-	-	-	-	-	-
Goran	Tk/ kg	0.13/ 0.15	-	-	-	-	-	-
Keora	Tk/ kg	0.10	-	-	-	-	-	-
Gewa	Tk/ kg	0.08	-	-	-	-	-	-
Green								
Stacked	Tk/ m3	-	-	-	-	-	.62/ 1.25	1.00
Solid	Tk/ m3	-	-	-	-	-	.83/ 1.66	1.33
Dry								
Stacked	Tk/ m3	-	1.25	1.00	0.10	0.15	0.38	2.00
Solid	Tk/ m3	-	1.67	1.30	0.13	0.20	0.50	4.18
Charcoal		-	-	-	-	-	1.34	0.11
Post	Tk each		1.25	-	-	2.25/ 5.00	-	2.67
Pit Props								
Class A	Tk/ m	-	-	-	4.00	-	-	-
B,C,D	Tk/ m	-	-	-	3.00	-	-	-
Bamboo								
Muli	Tk each		-	0.40	1.00	0.04	0.05	0.00
Thick Walled	Tk each	-	0.45	3.00/ 4.00	0.30	0.75	0.25	2.00

a Mid log diameter class 24-44 cm, 44-58 cm and >58 cm.
b Pole top diameter class <10, 10/ 15, 15/ 20/ 20/ 25 and >25 cm.
c 100 ft3 stacked = 1866 kg = 75 ft3 solid = 879 kg/ m3 density.
d Compared to sawlog rates
e Proposed Nov 1990

1d. Proposed Non Wood Products

Item	Units	Sundar bans	Chittagong C. Bazaar	Sylhet	Hill Tracts	Comilla	Dhaka/ Mymen	Dinaj pur
Sungrass	Tk/ bar	-	0.12	2.00	0.12	0.12	-	-
	Tk/ kg	0.33	-	-	-	-	0.12	0.05
Cane								
- Large Diameter	Tk/ m		-		0.07			
- Small Diameter	Tk/ m		-		0.07			
- Small Diameter	Tk each		-		0.05			
Honey	Tk/ kg	4.29	5.36	1.07	-	-	2.14	1.07
Beeswax	Tk/ kg	5.36	10.71	1.61	-	-	2.67	2.14
Murta	Tk/ 1000	-	-	10.00	-	-	-	-
Hantal	Tk/ kg	0.05	-	-	-	-	-	-
Golpatta	Tk/ kg	0.10	-	-	-	-	-	-
Sal Leaves	Tk/ kg	-	0.003	-	-	-	0.13	0.025
Fish								
-Hilsa	Tk/ kg	2.00	-	-	-	-	-	-
-Shrimp	Tk/ kg	13.40	-	-	-	-	-	-
-Non Hilsa	Tk/ kg	2.28	-	0.54	-	-	-	2.68
Shells	Tk/ kg	0.05	-	-	-	-	-	-
Fodder Grass	Tk/ kg	-	-	-	-	-	0.05	0.008

a Chittagong/ Cox's Bazaar Nov 1991
b Sylhet Nov 1989
c Dinajpur Oct 1990

2. RESOURCE REPLACEMENT COSTS

2a Average Roundwood Market Price

Item	Tk/ m3
Fuelwood	400
Poles/ Pulpwood	530
Sawlogs	
Forest Species	4,500
Village Species	3,600

2b Basic Plantation Productivity

	Product %				Volume m^3		
Item	Fuel	Poles	Pulp	Sawlog	S Quo	Scenario 1	Scenario 2
Long Rotations							
Thinning							
1st	100	0	0	0	0	0	0
2nd	50	40	0	10	51	62	135
3rd	30	50	0	20	0	73	212
4th	20	40	0	40	0	55	149
Final Felling	15	15	0	70	61	110	254
Total Yield					112	300	750
Medium Rotations							
Thinning							
1st	50	40	0	10	0	0	0
2nd	30	50	0	20	0	70	135
3rd	20	40	0	40	0	54	225
Final Felling	15	15	0	70	60	130	240
Total Yield					60	254	600
Short Rotations							
Polybag Stock	0	0	100	0	100	150	450
Coastal Areas	0	0	100	0	75	150	200
Sal Enrichment					0	150	300
Thinning							
1st	0	40	0	10	0	0	0
2nd	0	50	0	20	0	41	40
3rd	0	40	0	40	0	32	110
Final Felling	15	15	0	70	0	77	150
Total Yield					0	150	300

3. Long Rotation Plantations

3a. Teak Stump

Item	Status Quo	Scenario 1	Scenario 2
Rotation, years	45	40	30
MAI, m3/ha/A	2.5	7.5	25
Thinning Yields, m3			
1st	0	0	0
2nd	50	68	128
3rd	0	80	200
4th	0	60	141
Final Felling,m3			
Fuelwood	9	18	36
Poles/ Pulpwood	9	18	36
Sawlogs	42	84	168
Total	60	120	240
Total Yield	110	328	709

Cost Item	Yr	Tk/ha	Yr	Tk/ha	Yr	Tk/ha
Nursery Seedlings	-1	1,800	-1	2,300	-1	3,000
	1	0	1	0	1	0
Planting	1	4,000	1	5,000	1	6,500
Beating Up	1	200	1	250	1	325
Maintentance						
1st	1	2,250	1	2,850	1	4,940
2nd	2	2,250	2	2,850	2	3,705
3rd	3	750	3	1,900	3	2,470
Climber Cuttting	4	1,500	4	1,875	4	2,440
Fertilizer	3	0	3	730	3	950
1st Thinning	0	0	6	2,225	5	2,892
Compounded Costs, 12%/A						
Year	-1	330,599	-1	239,699	-1	100,665
	1	1,057,720	1	753,713	1	352,478
	2	329,439	2	236,781	2	99,108
	3	98,047	3	195,093	3	81,683
	4	175,085	4	124,185	4	52,033
	0	0	6	104,892	5	49,164
Total Cost		1,990,890		1,654,363		735,131
Cost Distribution, Total						
Fuelwood		35,836		29,779		13,232
Poles		47,781		39,705		17,643
Sawlogs		1,907,273		1,584,879		717,488
Total		1,990,890		1,654,363		735,131
Cost Distribution, Tk/m3						
Fuelwood		3,980		1,650		370
Poles		5,310		2,210		490
Sawlogs		45,410		18,870		4,270
Total		33,180		13,790		3,060

3b. Polybag Nursery Stock, Other Species

Item	Status Quo	Scenario 1	Scenario 2
Rotation, years	45	40	30
MAI, m3/ha/A	2.5	7.5	25
Thinning Yields, m3			
1st	0	0	0
2nd	50	68	128
3rd	0	80	200
4th	0	60	141
Final Felling,m3			
Fuelwood	9	18	36
Poles/ Pulpwood	9	18	36
Sawlogs	42	84	168
Total	60	120	240
Total Yield	110	328	709

Item	Yr	Tk/ha	Yr	Tk/ha	Yr	Tk/ha
Seedlings	-1	0	-1	0	-1	0
	1	4,460	1	5,575	1	7,250
Planting	1	6,225	1	7,800	1	10,140
Beating Up	1	0	1	0	1	0
Maintentance						
1st	1	2,250	1	2,850	1	4,940
2nd	2	2,250	2	2,850	2	3,705
3rd	3	750	3	1,900	3	2,470
Climber Cuttting	4	750	4	1,875	4	2,440
Fertilizer	3	0	3	730	3	950
1st Thinning	0	0	11	2,000	10	2,892
Compounded Costs						
Year	-1	0	-1	0	-1	0
	1	2,121,180	1	1,509,752	1	669,005
	2	329,439	2	236,781	2	99,108
	3	98,047	3	195,093	3	81,683
	4	87,542	4	124,185	4	52,033
	0	0	11	53,500	10	27,897
Total Cost		2,636,208		2,119,311		929,726

Cost Distribution, Total			
Fuelwood	47,452	38,148	16,735
Poles	63,269	50,863	22,313
Sawlogs	2,525,487	2,030,300	907,413
Total	2,636,208	2,119,311	929,726
Cost Distribution, Tk/m3			
Fuelwood	5,270	2,120	460
Poles	7,030	2,830	620
Sawlogs	60,130	24,170	5,400
Total	43,940	17,660	3,870

4. Medium Rotation Plantations

4a. Teak Stumps

Item	Status Quo	Scenario 1	Scenario 2
Rotation, years	na	20	20
MAI, m3/ ha/ A	na	12.5	30
Thinning Yields, m3			
1st	na	0	0
2nd	na	70	135
3rd	na	54	225
4th	na	0	0
Final Felling,m3			
Fuelwood	na	16	36
Poles/ Pulpwood	na	23	36
Sawlogs	na	91	168
Total	na	130	240
Total Yield	na	254	600

Item	Yr	Tk/ ha	Yr	Tk/ ha	Yr	Tk/ ha
Nursery Seedlings	-1	na	-1	2,300	-1	3,000
	1	na	1	0	1	0
Planting	1	na	1	5,000	1	6,500
Beating Up	1	na	1	250	1	325
Maintentance						
1st	1	na	1	2,850	1	4,940
2nd	2	na	2	2,850	2	3,705
3rd	3	na	3	1,900	3	2,470
Climber Cuttting	4	na	4	1,875	4	2,440
Fertilizer	3	na	3	900	3	950
1st Thinning	0	na	6	2,225	5	2,893
Compounded Costs						
Year	-1	0	-1	24,849	-1	32,412
	1	0	1	78,135	1	113,489
	2	0	2	24,546	2	31,910
	3	0	3	21,532	3	26,300
	4	0	4	12,874	4	16,753
	0	0	6	10,874	5	15,835
Total Cost		0		172,810		236,699
Cost Distribution, Total						
Fuelwood		0		3,111		4,261
Poles		0		4,147		5,681
Sawlogs		0		165,552		231,018
Total		0		172,810		236,699
Cost Distribution, Tk/ m3						
Fuelwood		0		190		120
Poles		0		180		160
Sawlogs		0		1,820		1,380
Total		0		1,330		990

4b. Polybag Stock, Other Species

Item	Status Quo	Scenario 1	Scenario 2
Rotation, years	na	20	20
MAI, m3/ha/A	na	12.5	30
Thinning Yields, m3			
1st	na	0	0
2nd	na	70	135
3rd	na	54	225
4th	na	0	0
Final Felling,m3			
Fuelwood	na	16	36
Poles/ Pulpwood	na	23	36
Sawlogs	na	91	168
Total na	130	240	
Total Yield	na	254	600

Item	Yr	Tk/ha	Yr	Tk/ha	Yr	Tk/ha
Nursery Seedlings	-1	na	-1	0	-1	0
	1	na	1	5,575	1	7,248
Planting	1	na	1	7,800	1	10,140
Beating Up	1	na	1	0	1	0
Maintentance						
1st	1	na	1	2,850	1	4,940
2nd	2	na	2	2,850	2	3,705
3rd	3	na	3	1,900	3	2,470
Climber Cuttting	4	na	4	1,875	4	2,440
Fertilizer	3	na	3	900	3	950
1st Thinning	0	na	10	2,225	10	2,892
Compounded Costs						
Year	-1	0	-1	0	-1	0
	1	0	1	156,511	1	215,382
	2	0	2	24,546	2	31,910
	3	0	3	21,532	3	26,300
	4	0	4	12,874	4	16,753
	0	0	10	6,911	10	8,982
Total Cost		0		222,374		299,327
Cost Distribution, Total						
Fuelwood	0			4,003		5,388
Poles	0			5,337		7,184
Sawlogs	0			213,034		292,143
Total	0			222,374		299,327
Cost Distribution, Tk/m3						
Fuelwood		0		250		150
Poles		0		230		200
Sawlogs		0		2,340		1,740
Total		0		1,710		1,250

5. Short Rotation Plantations

5a. Non Coastal Plantations

Item	Status Quo	Scenario 1	Scenario 2
Rotation, years	10	10	10
MAI, m3/ha/A	10	15	45
Thinning Yields, m3			
1st	0	0	0
2nd	0	0	0
3rd	0	0	0
4th	0	0	0
Final Felling,m3			
Fuelwood	0	0	0
Poles/Pulpwood	100	150	450
Sawlogs	0	0	0
Total	100	150	450
Total Yield	100	150	450

Item	Yr	Tk/ha	Yr	Tk/ha	Yr	Tk/ha
Nursery Seedlings	-1	0	-1	0	-1	0
	1	4,875	1	5,575	1	7,248
Planting	1	6,925	1	7,800	1	10,140
Beating Up	1	0	1	0	1	0
Maintentance						
1st	1	2,250	1	2,850	1	4,940
2nd	2	2,250	2	2,850	2	3,705
3rd	3	750	3	1,900	3	2,470
Climber Cuttting	4	0	4	1,875	4	2,438
Fertilizer	3	0	3	900	3	1,170
1st Thinning	0	0	6	0	5	0
Compounded Costs						
Year -1		0	-1	0	-1	0
1		43,637	1	50,392	1	69,347
2		6,239	2	7,903	2	10,274
3		1,857	3	6,933	3	9,013
4		0	4	4,145	4	5,390
0		0	6	0	5	0
Total Cost		51,733		69,373		94,024
Cost Distribution, Total						
Fuelwood		0		0		0
Poles		51,733		69,373		94,024
Sawlogs		0		0		0
Total		51,733		69,373		94,024
Cost Distribution, Tk/m3						
Fuelwood		0		0		0
Poles		520		460		210
Sawlogs		0		0		0
Total		520		460		210

5b. Coastal Plantations

Item	Status Quo	Scenario 1	Scenario 2
Rotation, years	10	10	10
MAI, m3/ha/A	7.5	12.5	20
Thinning Yields, m3			
1st	0	0	0
2nd	0	0	0
3rd	0	0	0
4th	0	0	0
Final Felling,m3			
Fuelwood	0	0	0
Poles/ Pulpwood	75	125	200
Sawlogs	0	0	0
Total	75	125	200
Total Yield	75	125	200

Item	Yr	Tk/ha	Yr	Tk/ha	Yr	Tk/ha
Nursery Seedlings	-1	0	-1	0	-1	0
	1	1,513	1	1,896	1	2,465
Planting	1	2,600	1	3,250	1	4,225
	1	0	1	0	1	0
Beating Up						
1st	1	600	1	750	1	975
2nd	2	600	2	750	2	975
3rd	3	600	3	750	3	975
Climber Cuttting	4	0	4	0	4	0
Fertilizer	3	0	3	0	3	0
1st Thinning	0	0	6	0	5	0
Compounded Costs						
Year -1		0	-1	0	-1	0
1		14,638	1	18,312	1	23,806
2		1,664	2	2,080	2	2,704
3		1,486	3	1,857	3	2,414
4		0	4	0	4	0
0		0	6	0	5	0
Total Cost		17,788		22,249		28,924
Cost Distribution, Total						
Fuelwood		0		0		0
Poles		17,788		22,249		28,924
Sawlogs		0		0		0
Total		17,788		22,249		28,924
Cost Distribution, Tk/m3						
Fuelwood		0		0		0
Poles		240		180		140
Sawlogs		0		0		0
Total		240		180		140

6. Enrichment Sal Plantations

Item	Status Quo	Scenario 1	Scenario 2
Rotation, years	na	20	20
MAI, m3/ ha/ A	na	7.5	15
Thinning Yields, m3			
1st	na	0	0
2nd	na	34	40
3rd	na	40	110
4th	na	0	0
Final Felling,m3			
Fuelwood	na	11	23
Poles/ Pulpwood	na	12	22
Sawlogs	na	53	105
Total	na	76	150
Total Yield	na	150	300

Item	Yr	Tk/ ha	Yr	Tk/ ha	Yr	Tk/ ha
Nursery Seedlings	-1	na	-1	9,000	-1	12,000
	1	na	1	0	1	0
Planting	1	na	1	6,250	1	8,125
Beating Up	1	na	1	0	1	0
Maintentance						
1st	1	na	1	2,850	1	4,940
2nd	2	na	2	2,850	2	3,705
3rd	3	na	3	1,900	3	2,470
Climber Cuttting	4	na	4	0	4	0
Fertilizer	3	na	3	0	3	1,170
1st Thinning	0	na	6	2,225	5	2,893
Compounded Costs						
Year	-1	0	-1	97,235	-1	129,646
	1	0	1	87,781	1	126,029
	2	0	2	24,546	2	31,910
	3	0	3	14,611	3	27,991
	4	0	4	0	4	0
	0	0	6	10,874	5	15,835
Total Cost		0		235,047		331,411
Cost Distribution, Total						
Fuelwood		0		4,231		5,965
Poles		0		5,641		7,954
Sawlogs		0		225,175		323,457
Total		0		235,047		331,411
Cost Distribution, Tk/ m3						
Fuelwood		0		380		260
Poles		0		470		360
Sawlogs		0		4,250		3,080
Total		0		3,090		2,210

7. Muli Bamboo Plantations

Item	Status Quo	Scenario 1	Scenario 2
Life Cycle, years	na	na	30
Harvest Yields, culms/ ha			
Yr 5	na	na	1,333
Yr 6	na	na	1,600
Yr 7	na	na	1,867
Yr 8	na	na	2,133
Yr 9	na	na	2,400
Yr 10	na	na	2,800
Yr 11-30	na	na	2,800
Total Yield	na	na	68,133

Item	Yr	Tk/ ha	Yr	Tk/ ha	Yr	Tk/ ha
Nursery Seedlings	-1	na	-1	na	-1	0
Seedling/ Planting	1	na	1	na	1	4,140
	1	na	1	na	1	0
	1	na	1	na	1	0
Fertilizer/ Culture						
1st	1	na	1	na	1	2,680
2nd	2	na	2	na	2	4,560
3rd	3	na	3	na	3	3,800
4th	4	na	4	na	4	4,560
5th	5	na	0	na	5	7,960
	0	0	na	0	na	0
Compounded Costs						
Year	-1	0	-1	0	-1	0
	1	0	1	0	1	37,330
	2	0	2	0	2	22,285
	3	0	3	0	3	51,315
	4	0	4	0	4	17,766
	0	0	0	0	0	27,689
Total Cost		0		0		156,385
Cost Distribution, Total						
Culms		0		0		156,385
Total		0		0		156,385
Cost Distribution, Tk/ culm						
Culms		0		0		2.30
Total		0		0		2.30
Cost Distribution, Tk/ ADT						
Culms		0		0		1380
Total		0		0		1380

8. PRIVATE PLANTING INCENTIVES

8a. Farmland Areas

Item	Unit	Household Type		
		Farm	Non Farm	Total
Total - Area	million ha	9,181,564	138,227	9,319,791
- Households	no	10,045,299	3,772,347	13,817,646
Area Distribution	ha			
Homestead		329,996	61,091	391,087
Uncultivated		977,768	181,009	1,158,777
Irrigated		1,620,939	-	1,230,939
Cultivated		8,160,957	-	8,106,957
Average Area	ha			
Homestead		0.033	0.016	0.028
Uncultivated		0.097	0.048	0.084
Irrigated		0.161	-	0.117
Cultivated		0.812	-	0.812

Source: BBS 1991

8b. Encroached Sal Forest Land

Alley Cultivation [a]

Item	Basis	Years	Amount	Discount
Free Agricultural Inputs				
Seed		1	1,000	1,000
Implements		1	500	500
Insecticides		1	50	50
Fertilizer	150 kg x 6.50	1	975	975
Cultivation		1	1,000	1,000
Free Forestry Inputs				
Fruit Seedlings	200 x 4	1	800	800
Forest Seedlings	1375 x 2	1	2,750	2,750
Benefits				
Crop Yield	1.0 ha x 1400 kg x 5/kg, every year [c]	20	7,000	58,559
Tree Yield				
Fruit Species	50% x 200 x Tk500/tree from 6-20th Year	20	50,000	216,422
Forest Species				
Inter Yields	1375 sph x 2/3 x Tk 70 x 100%	4	64,167	75,680
Final Yields	(200+1375 sph x 1/3) x Tk 210 x 50%	7	69,125	55,877
Subtotal				413,613
Homesite	.2 ha x Tk 58,559/ha/12% x 8% [d]	1	7,808	65,320
Total Present Worth				478,933

a 1.2 ha/family, 0.2 ha homesite and 1.0 ha field area
b. Discounted @ 12%/A
c. 15 maunds/acre yield
d. Annual rental value

Woodlots [a]

Item	Basis	Years	Amount	Discount [b]
Labour Wages				
1st Yr	-70 days @ Tk 50/ day	1	3,500	3,500
2nd Yr	-35 days @ Tk 50/ day	2	1,750	1,563
3rd Yr	-15 days @ Tk 50/ day	3	750	598
Free Inputs				
Fruit Species		1	0	0
Forest Species	2500 X 2	1	5,000	5,000
Agricultural Crop Yields				
1st Yr	1.0 ha x 1400 kg x Tk5/ kg	1	7,000	7,000
2nd Yr	1.0 ha x 1400 kg x Tk5/ kg x 50%	2	3,500	3,125
Forest Crop Yields				
Intermediate	2500 x 2/ 3 x 70 x 50% x 100%	4	58,333	68,800
Final	2500 x 1/ 3 x 210 x 50% x 40%	7	35,000	28,292
Total Present Worth				117,878

a. Assumes 1.0 ha/ family b. Discounted 12%/ A

8c. Strip Plantations

Main Roads

Item	Basis	Years	Amount	Discount
Labour Wages				
1st Yr	-70 days @ Tk 50/ day	1	3,500	3,500
2nd Yr	-35 days @ Tk 50/ day	2	1,750	1,563
3rd Yr	-15 days @ Tk 50/ day	3	750	598
Free Inputs				
Fruit Species	100 x Tk 4	1	400	400
Forest Species	2500 X Tk 2	1	3,000	3,000
Agricultural Crop Yields				
1st Yr				
2nd Yr		1	0	0
Tree Crop Yields				
Fruit Species	100 x 500/ tree x 50% survival, from Yr 5/ 20	6	25000	108,210
Forest Crop Yields				
Intermediate	1500 x 2/ 3 x Tk 70 x 50% x 100%	4	35,000	41,280
Final	(100+1500 x 2/ 3) x Tk 210 x 50% x 65%	7	40,950	33,102 [a]
Total Present Worth			110,350	191,653

a. Land owner 10% x Tk 50,920 = 5,900
Union Council 5% x Tk 50,920 = 2,950
Forest Department 20% x Tk 50,920 = 11,800

Minor Roads [a]

Item	Basis	Years	Amount	Discount
Labour Wages				
1st Yr	-50 days @ Tk 50/ day	1	2,500	2,500
2nd Yr	-25 days @ Tk 50/ day	2	1,250	1,116
3rd Yr	-15 days @ Tk 50/ day	3	750	598
Free Inputs				
Fruit Species	100 x Tk 4	1	400	400
Forest Species	1000 X Tk 2	1	2,000	2,000

Minor Roads [a] (cont'd)

Item	Basis	Years	Amount	Discount
Agricultural Crop Yields				
1st Yr		1	0	
2nd Yr		2	0	0
Tree Crop Yields				
Fruit Species	100 x 500/tree x 50% survival, from Yr 5/20	6	25000	108,210
Forest Crop Yields				
Intermediate	1000 x Tk 700 x 50% x 100%	4	23,333	27,520
Final	1000 x 1/3 x Tk 210 x 50% x 65%	7	22,750	18,390 [b]
Total Present Worth			77,983 34,125	160,734

a Assumes one participant/km
b Other particpants shares
Land owner 10% x Tk 36,780 = 3,678
Union Council 5% x Tk 36,780 = 1,840
Forest Department 20% x Tk 36,780 = 7,360

Railways [a]

Item	Basis	Years	Amount	Discount (b)
Labour Wages				
1st Yr	-65 days @ Tk 50/day	1	3,250	3,250
2nd Yr	-30 days @ Tk 50/day	2	1,500	1,339
3rd Yr	-15 days @ Tk 50/day	3	750	598
Free Inputs				
Fruit Species	nil	1	0	0
Forest Species	1500 X Tk 2	1	3,000	3,000
Agricultural Crop Yields				
1st Yr	nil	1	0	
2nd Yr	nil	2	0	0
Tree Crop Yields				
Fruit Species	nil	6	0	108,210
Forest Crop Yields				
Intermediate	1500 x 2/3 x Tk 70 x .5 x 1	4	35000	41,280
Final	1500 x 1/3 x Tk 210 x 50% x 65%	7	34125	27,585 [a]
Total Present Worth				185,262

a Assumes one participant/km
b Other particpants shares
Land owner 10% x Tk 42438 = 4,244
Union Council 5% x Tk 42,438 = 2,144
Forest Department 20% x Tk 42,438 = 8,488

Major Embankments [a]

Item	Basis	Years	Amount	Discount
Labour Wages				
1st Yr	-90 days @ Tk 50/day	1	4,500	4,500
2nd Yr	-45 days @ Tk 50/day	2	2,250	2,009
3rd Yr	-20 days @ Tk 50/day	3	1,000	797
Free Inputs				
Fruit Species	100 x Tk 4	1	400	400
Forest Species	2000 X Tk 2	1	4,000	4,000
Agricultural Crop Yields				
1st Yr	nil	1	0	0
2nd Yr	nil	2	0	0

Major Embankments [a] (Cont'd)

Item	Basis	Years	Amount	Discount
Tree Crop Yields				
Fruit Species	100 x 500/ tree x 50% survival, from Yr 5/ 20	6	25000	108,210
Forest Crop Yields				
Intermediate	2000 x 2/ 3 x 70 x 50% x 100%	4	46,667	55,040
Final	2000 x 1/ 3 x 210 x 50% x 65%	7	45,500	36,780 [b]
Total Present Worth				211,736

a Assumes one participant/ km
b Other particpants shares
WAPDA 10% x Tk 56,584 = 5,658
Union Council 5% x Tk 56,584 = 1,800
Forest Department 20% x Tk 56.584 = 7,200

Minor Embankment [a]

Item	Basis	Years	Amount	Discount (b)
Labour Wages				
1st Yr	-45 days @ Tk 50/ day	1	2,250	2,250
2nd Yr	-20 days @ Tk 50/ day	2	1,000	893
3rd Yr	-10 days @ Tk 50/ day	3	500	399
Free Inputs				
Fruit Species	nil	1	0	0
Forest Species	1000 X Tk 2	1	2,000	2,000
Agricultural Crop Yields				
1st Yr	nil	1	0	0
2nd Yr	nil	2	0	0
Tree Crop Yields				
Fruit Species	nil	6	0	0
Forest Crop Yields				
Intermediate	1000 x 2/ 3 x Tk 70 x 50% x 100%	4	23,333	27,520
Final	1000 x 1/ 3 x Tk 210 x 50% x 65%	7	22,750	18,390 [b]
Total Present Worth				51,452

a Assumes one participant/ km
b Other particpants shares
Land owner 10% x Tk 28292 = 2,890
Union Council 5% x Tk 28,290 = 1,450
Forest Department 20% x Tk 28.290 = 5,780

8d. Homesteads

Item	Basis	Years	Amount	Discount
10 fruit trees @ Tk 4.00	1	40	(40)	
Fertilizer 10 @ Tk 2.00	1	20	(20)	
Fertilizer 10 @ Tk 2.00	2	20	(18)	
Fertilizer 10 @ Tk 2.00	3	20	(16)	
Fertilizer 10 @ Tk 2.00	4	20	(14)	
Fertilizer 10 @ Tk 2.00	5	20	(13)	
Fruit, 75% survival Tk 500/ tree, Years 6-20		6-20	42,750	16620
Intermediate Yield, nil	-	-		
Final Yield after 20 years, 7.5 trees x 1.5m3 x Tk 380021		42,750	4,432	
Total Present Worth				20,931

9. COMPARATIVE STUMPAGE ESTIMATE (Tk/ m^3)

9a. Pulpwood

Item/ Basis	Newsprint		Printing/ Writing		
	Gewa	Melocanna	Gamar	Eucalyptus	Melocanna
1. 20% finished product price	3,260	3,280/ 3,330	3,950/ 4,050	4,020/ 4,120	3,010/ 4,030
2. 10% finished product price	1,160	1,430/ 1,500	1,660,1,765	1,736/ 1,830	1,627/ 1,740
3. Replacement cost					
Status Quo	-	-	-	520	-
Scenario 1	-	-	-	460	-
Scenario 2	-	-	-	210	-
4. KNM	530	-	-	-	-
5. SPPM	-	212	-	-	-
6. Forest Division Pulpwood					
Chittagon Hill Tracts,	-	150	262	150	150
Chittagong, C. Bazaar	-				
Sylhet		212	412	212	212
7. Bamboo fibre cost at:					
KPM	56	66	70	91	76
CHT	89	105	110	144	126
SPPM	910	1,080	1,130	1,310	1,296

9b. Sawlogs and Plywoods Log

	Sawmills		Plywood Mills	
	Log Quality			
	Low	Medium	High	High
Cost Items	per m^3			
Sales Price - Ex Millgate	21000	24000	28000	32000
Cost of Production				
A. Variable Costs				
- Labour	2163	2472	2884	3296
- Power, fuel, oil	588	588	588	896
- Spare parts and consumable	630	630	630	960
- Maintenance	525	525	525	700
- Misc.	420	520	520	500
Total :	4326	4735	5147	6352
B. Fixed Cost				
- Administration salaries	840	945	945	1200
- Office expenses	630	630	630	960
- Depreciation	420	480	600	640
- Debt servicing	840	1092	1092	1280
- Misc.	210	315	315	320
Total :	2940	3462	3582	4400
C. Profit Margin for the Miller	2100	2400	2800	3200
D. Wood Paying Capability	11634	13403	16471	18048
E. Recovery Rate	0.375	0.425	0.475	0.48
- Paying capability of log at millgate	4363	5696	7824	8663
F. Logging Costs				
- Layout - tree marking	61	58	58	58
- Felling and bucking	100	95	95	95
- Yarding and skidding	763	726	726	726
- Loading and unloding	122	116	116	116
- Hauling	419	547	751	832
- Log pond	79	75	75	75
- Road construction	602	573	573	573
- Road maintenance	122	116	116	116
Subtotal :	2269	2306	2510	2591
G. Overhaed Cost	681	692	753	777
H. Profit Margin	454	461	502	518
TOTAL LOGGING COST	3403	3459	3765	3886
I. Estimated Economic Rent (Capability to pay for logs)	960	2238	4059	4777
- Average product price	8400	7200	4200	4800
- Average logging cost	1361	1038	565	583
- Average mill price	1745	1709	1174	1299
- Quality Distribution	0.40	0.30	0.15	0.15
- Average stumpage value	384	671	609	717
- Stumpage value as % of mill gate price of log	22	39	52	55

* High forest logs.

APPENDIX 4
MARKETING

ECONOMICS AND MARKETING

APPENDIX 4
MARKETING

TABLE OF CONTENTS

1. IMPORT DUTIES

Trade Code	Item	Advalorem Rate, % Present	Required
Rough Wood			
44 01 10	Fuelwood	15	7.5
21	Chips/ particles, coniferous	60	7.5
22	Chips/ particles, non coniferous	60	7.5
30	Sawdust, waste, scraps	60	7.5
44 03	Wood, rough: barked or unbarked, sawn or squared	7.5	nc[a]
Partially Manufactured Wood			
44 05 00	Wood wool, wood flour	75	nc
44 06 10	Railway sleepers, cross ties	7.5	nc
44 06 90	Railway sleepers, cross ties	7.5	nc
44 07	Manufacture wood > 6mm thickness	7.5	nc
44 08 101	Pencil slats	15	nc
44 08 901	Pencil slats	15	nc
44 08 109	Veneer sheets, peeled or sawn < 6 mm thickness	75	30
44 08 20	Veneer sheets, peeled or sawn < 6 mm thickness	75	30
44 08 909	Veneer sheets, peeled or sawn < 6 mm thickness	75	30
44 10 10	Particleboard, densified board	75	nc
44 10 90	Particleboard, densified board	75	nc
44 11	Fibreboard	75	nc
44 12	Plywood, veneered board, laminated wood	30	50
44 13 001	Wooden ribs, treated wood, seasoned wood for	15	nc
44 13 093	Treated wood	45	20
44 13 093	Seasond wood, including jute/ textile bobbins	45	45
Manufactured Wood Products			
44 15 101	Tea chest	60	75
44 15 109	Packing cases, cable drums	75	nc
44 15 20	Pellets, box pellets	75	nc
44 16 00	Casks, barrels, cooperage	75	nc
44 18	Building products, assembled panels, shingles, shakes	75	nc
44 19 00	Wooden utensils	75	nc
44 20 10	Wooden ornaments	75	nc
44 21 90	Match splints	60	75
Wood Pulp			
47 01 to 47 06	Wood pulp of various kinds, including mechanical, chemical and semi chemical	30	20
Papers			
47 07	Waste paper or paperboard	30	20
48 02	ECG recording paper	7.5	nc
48 23	Ultrasonogram recording paper	7.5	nc
48 11 39	Filter paper	30	nc
48 11 90	Decalcomaini paper	30	nc
48 13	Cigarette paper	125	nc
48 13	Other paper and paperboard (excludes cigarette paper)	60	45
Manufactured Paper Products			
48 17	Stationary	75	nc
48 19	Food cartons	30	60
48 20	Non food cartons, other items	75-100	nc
Non Wood Substitutes			
39 25 20	Non wood doors, windows and their frames and thresholds	75	30

[a] nc = no change

2. SCHEDULE OF RATES

2a. Sundarban Forest

Revised Schedule of Rates of Firewood/ Timber/ Other Forest Products of the Sundarban Forest, 1989

Sl. No.	Fuelwood & other Produces	Existing Rates of Royalties (Tk)	Present Market Rates (Tk)	Proposed Rates of Royalties (Tk)	Remarks
1.	Sundri & Kakra per 100 mds	500	5,000	600	Proposed rate is 12.5% of the market price
2.	Bachhai Goran per 100 mds	500	4,500	560	- do -
3.	Bhadi Goran per 100 mds	400	4,000	500	- do -
4.	Keora, Dhundul and Bain per 100 mds	300	3,000	375	- do -
5.	Amur and Kripa per 100 mds	300	3,500	440	- do -
6.	Gewa per 100 mds	200	2,700	300	- do -
7.	Baula, Jeer, Vaila & others per 100 mds	250	3,000	315	- do -
8.	Jhana per 100 mds	300	3,500	440	- do -
9	Branches and Twings (Sundri, Kakra etc.) per 100 mds	300	3,500	440	- do -
10.	a. Golpata per 100 mds b. Golpata per 80 pc.	200 5	3,000 45	375 6	- do -
11.	Refined was per md.	200	2,700	340	- do -
12.	Unrefined wax per md.	60	1,600	200	- do -
13.	Honey per md.	30	1,300	160	- do -
14.	Shell per 100 md.	50	1,500	185	- do -
15.	Reed and Mahiagrass per 100 md.	20	220	30	- do -
16.	Sungrass and other grasses per 100 md.	30	1,000	125	- do -
17.	a. Hental per 100 md. b. Hental 1 pc. c. Goran 1 pc.	100 10 1	1,500 5 5	185 1/25 1/25	- do -
18.	Fish:				
	a. Any fish other than Hilsha and shrimp per md.	30	700	85	- do -
	b. Hilsha fish per md.	50	600	75	- do -
	c. Dried fish per md.	30	1,200	150	- do -
	d. Shrimps/ prones/ loles ter per md.	120	4,000	500	- do -
	e. Small shrimps	45	480	60	- do -

Rates of Royalty for Forest Products

Ministry of Forestry and Environment
Section - 2

Date: 24.10.1990 AD
08.07.1397B Yr

No. Sha-2/PBM-191/90/681

Subject: Revised Schedule of Rates/Royalty Rates for Produces of the Sundarban Forest.

A joint meeting attended by the officials of this Ministry, the Directorate of Forest and other concerned departments was held on 10-09-1990 in this Ministry to consider the revised schedule of Rates of Royalties for some produces of the Sundarban forest. In that meeting it was decided that the following rates of royalties are refixed for the produces of the Sundarban forest until further order considering and reviewing the proposals for revision placed earlier.

Vide Memo No. NA-1/BAN/(Mise)-69/88/(20/795) dated 07.08.1990

Sl. No.	Produces	Schedule of Rates (Tk)
1.	Any fish other than Hilsha and Shrimps (per mound)	50.00
2.	Hilsha fish (per mound)	75.00
3.	Dried fish (per mound)	65.00
4.	Shrimps/Prones/Lobster (per mound)	300.00
5.	Small shrimps (per mound)	50.00
6.	Golpata (100 mds)	300.00
7.	Refined wax (per mound)	300.00
8.	Unrefined wax (per mound)	150.00
9.	Shells (100 mounds)	100.00
10.	Honey (per mounds)	100.00
11.	Sungrass/other grass (100 mounds)	60.00

By Order of the
President

(M. Azizul Huq)
Additional Secretary In-charge

This schedule is approved considering the proposals made in 1989, in the preceeding page.

2b. Sylhet Scheduled Rates

Government of the People's Republic of Bangladesh
Forest Department (Sylhet Division)

Schedule of conditions and rates for the removal of Forest produce from (i) Reserved Forests and (ii) Unclassed State Forests and similar other Government lands of the Sylhet Collectorate. Approved by Government vide G.O.No.XX/For-41/80/147 dated 11.3.81.

To be Enforced with effect from the date of publication of the Bangladesh Gazette.

DEFINITIONS

Forest produce includes:

a. The following, whether found in or brought from a Forest or not:

Timber, Charcoal, India-rubber, Wood-oil, resin, natural varnish, bark and myrobalans, and

b. The following when found in or brought from a Forests:

(i) Trees and leaves, flowers and fruits and all other parts or produce of trees not herein before mentioned.
(ii) Plants not being trees (including grass, creepers, reeds and moss) and all parts and produce of plants.
(iii) Wild animals and skins, tusks, horns, bones, silk, cocoons, honey and wax and all parts and produce of animals.
(iv) Peat, surface soil, rock and minerals (including limestone, laterite, mineral oils and all products of mines and quarries vide section 2 of the Forests Act).

c. Tree - includes palms, bamboos, stumps, brush-wood and canes.

d. Timber - includes trees when they have fallen or have been felled and all wood, whether cut up, or fashioned or hollowed out for any purpose or not.

Log - A piece of wood in the round 3 feet and over in girth at the larger end and over 4 feet in length.

Poles or House post - A piece of wood in the round, below 3 feet, above 1 foot in girth at the larger end.

Scantling - Sawn timber.

Firewood - Timber or branch wood under 6 feet in length unsuitable owing to hollowness, crookedness or other defect, for conversion into scantling and suitable for use as fuel only.

Dug-out - A boat formed from hollowed out log.

Gail Bakth - Parts of agricultural implements.

Dhaki - Husking paddy.

Kund - Small dug-out for watering paddy field.

Ish, Baitha, Langal - Plough parts.

Jaith - Oil mill (Ghanny) parts.

STATEMENT SHOWING REVISED SCHEDULE OF RATES OF ROYALTIES

TIMBER

Class A - Sal, Cham, Gamari, Jarul, Bhola, Bonsum, Nageswar, Sundri, Rata, Champa, Chapalish & Garjan.

Class B - Dhaki Jam, Silkorai, Gondori, Hotia, Hallock, Pakashaj, Kathal & Chalmugra.

Class C - Other Jam, Karai, Urium, Kurta, Sonalu, Morai, Poma (Cedrela speices) Hollong, Khokan, Haritaki, Augles, Kayangula, Telo (Calapyllus polyanthas), Simul, Kawatuti, Texia (Cinnomomum obtusi folum).

Class D - All other speices.

Special Class - Teak, Mahogany, Pynkado and other high Class hard Wood species.

RATE PER CUBIC FOOT

1. LOGS		REMARKS
Class - A	Tk 12.00	Trees can only be out from Forests with the special permission of the competent authority.
Class - B	Tk 8.00	
Class - C	Tk 6.00	
Class - D	Tk 4.00	

Rate for special Class timber will be fixed by the Conservator of Forests, Central Circle, Dhaka for time to time keeping in conformity with the market price.

N.B. Cubic contents of logs will be determined by quarter-grith measurement in force.

RATE PER CUBIC FOOT

2. SAWN TIMBER		REMARKS
Class - A	Tk 24.00	No sawing is permissible in the Forest without the special permission of the Divisional Forest Officer
Class - B	Tk 16.00	
Class - C	Tk 12.00	
Class - D	Tk 8.00	

3. Poles or House posts

(i) Upto 2 feet in girth at the larger end.

RATE PER RUNNING FOOT

CLASS	
A & B	Tk 2.00
C & D	Tk 1.00

(ii) Below 2 feet in girth at the larger end.

RATE PER RUNNING FOOT

CLASS	
A & B	Tk 1.50
C & D	Tk 0.75

4. Fire wood-dry

(i)	Shoulder load to be removed only once a day for one month.	Tk 10.00	
(ii)	In billets of less than 3 feet in girth	Tk 1.00	per stacked cft.
(iii)	Green firewood from open coupe.	Tk 1.00	per stacked cft.

5. Agriculture Implements

(i)	Bakath, Gail of all species (each)	Tk 0.60
(ii)	Baitha, Gail (each)	Tk 0.50
(iii)	Kunda Gail (each)	Tk 2.50
(iv)	Plough parts Gail (each)	Tk 0.60
(v)	Dekhi (Gail) each	Tk 2.50
(vi)	Jaith Gail each	Tk 0.50

6. Charcoal per mds. Tk 4.00

7. Dug-outs

Pass for extraction of dug-outs will only be issued with the special permission of the Divisional Forest Officer in each case Royalty will be realised at rate per logs under timber on measurement taken before consideration.

8. (a) Schedule of Rates of Bamboos in Number

		Remarks
Bariala	Tk 60.00	Per 100 Nos.
Bhaluka Barua/Jai.	Tk 60.00	" " "
Jari Mirtinga	Tk 40.00	" " "
Mule	Tk 25.00	" " "
Hill Jati Bajali	Tk 20.00	" " "
Make pecha	Tk 20.00	" " "
Dalu	Tk 40.00	" " "
Muli	Tk 40.00	" " "

(b)	Luli not exceeding	25 Nos. per load per day	Tk 6.00
	Jari Mirtinga	10 " " " " "	Tk 3.00
	Make pecha	10 " " " " "	Tk 2.00
	Dalu	10 " " " " "	Tk 3.00
	Bajali	100 " " " " "	Tk 2.00
	Rupai or khang	10 " " " " "	Tk 3.00

(c) For Raghunandan Hills, Satgaon, Dinarpur Hills & Bhattera Baramchal.

Per shoulder load per day Tk 1.00 irrespective of species but not exceeding the following nos. per load per day.

Muli	....	25 Nos.	Tk 3.00
Mirtinga	....	20 Nos.	
Barali	....	100 Nos.	
Rupaiorkhang	....	100 Nos.	

(d) For west Bhanugach, Belashcherra, Longlicherra, Taraf Hill and addition to Taraf Hills:

Muli not exceeding	....	25 Nos.	Tk 5.00
Mirtinga not exceeding	....	10 Nos.	Tk 2.00
Bajali not exceeding	....	75 Nos.	Tk 3.00
Rupaior khang not exceeding	....	10 Nos.	Tk 3.00

(e) For home consumption only in areas other than Raghunandan, Satgaon, Dinajpur & Bhattera & Baramchal. — Tk 0.75 per shoulder load per day irrespective of species but no transit pass will be issued and no other kind of movement except on shoulder & not beyond 5 miles border of the Forest Tk 2.00.

9. (a) Sungrass or thatching grass per 100 bundles

Bundle of 2' - 0 girth	Tk 15.00
Bundle of 4" diameter	Tk 10.00
Bundle of 2'-9" diameter (Binna san)	Tk 3.00

(b) 2 Boundless of 4'-6" girth or per Bhar to be carried on shoulder. — Tk 2.00
5'-0" girth — Tk 1.00

10. Cane 4" diameter rate per 100 rft.

(i)	Sundri, Tita	Tk 2.00
(ii)	Jali, Raidenge Honks, Horma Jalla	Tk 2.00
(iii)	Legarle	Tk 0.50

11. Ekra & other reeds-rate per 100 blds.
Ekra & other reeds-bundles of 18" girth or less — Tk 4.00

12.	Boulder rate per 100 cft.	Tk 40.00
13.	Gravel broken stone or shingle per 100 cft.	Tk 40.00
14.	Gilan stone per 100 cft.	Tk 40.00
15.	Sand per 100 cft.	Tk 12.00
16.	Silica sand 100 cft.	Tk 40.00
17.	Squared stone per 100 cft.	Tk 40.00
18.	While stone	Tk 30.00
19.	Lime stone per 100 mds.	Tk 50.00

20. Fishing

No fishing is allowed in the R.F. without the special permission from the Divisional Forest Officer.

For one day	....	Tk 5.00
For one month	....	Tk 50.00

21. Grazing

No grazing of cattle is allowed in the reserved Forests without the Divisional Forest Officer's written permission except controlled grazing in the grazing reserves:

FEES

(i)	Buffaloes	Tk 5.00
(ii)	Cattle	Tk 1.00
(iii)	Elephants	Tk 100.00
	Elephants calves upto the age of 2 years	half rate.

22. Agar wood

(i)	Agar proper	Tk 250.00
(ii)	Kalagachi Agar	Tk 100.00
(iii)	Dom Agar	Tk 25.00

		Miscellaneous	
Honey - per maund.		Tk 25.00	
Wax (crude)		Tk 50.00	
Murta		Tk 10.00	per thousand Nos.

(While the murtas are in a form of 'Beti' the relationship should be 5000 Nos. of whole murta to one bundle of 'Beti' of 25 paties of 2 bundles or Holai).

		Rate
Pan	per kori (1200 leaves)	Tk 5.00
Creeper	per bundle	Tk 1.00
Haritaki fruit	per md. of basket load	Tk 2.00
Amlaki	per md. of basket load	Tk 2.00
Sutamul	per md. of basket load	Tk 2.00
Bohera leaves	-	
Green	per mds.	Tk 10.00
Dry	per mds.	Tk 35.00
Bohera fruits	per mds.	Tk 2.00
Tejpata	per mds.	Tk 10.00
Patidal	per thousand	Tk 2.00
Fish	per mds.	Tk 20.00
Kumble leaves	Green per mds.	Tk 20.00
Sugar cane	per mds.	Tk 1.00

(one tin of 'Gurh' is equivalent to 16 mds. of sugar cane).

23. Forest import duty is to be realised at 25 percent of the schedules royalty on all the produces coming from outside Bangladesh.

24. The rates of all Forest produces not listed above will be fixed at 12½ percent advalorem by the Divisional Forest Officer in consultation with the Conservator of Forests of the Circle.

3. ROYALTY RATES FOR STATE OWNED CORPORATION RECENT PRICES

Government of the People's Republic of Bangladesh
Department of Forest
Banabhaban, Gulshan Road, Mohakhali, Dhaka-1212

Memo No. Dev-205/ 92/ 771

Date: 12.08.1992 AD
28.04.1399 B. Yr

The Secretary
Bangladesh Secretariat
Dhaka

Sub: Fixation of Royalties for different organization/ corporations.

Ref: PBM-PAKO/ FRMP/ BAN(10)/ 92-93/ part/ 582 dated 20.07.1992 AD/ 05.04.1399 B.Yr.

The Government of Bangladesh decided to fix-up royalties for different forest products required by different corporations as raw materials on the basis of going market rates. The government has decided the following rates of royalties for forest products supplied to the corporations.

Sl. No.	Item of Forest Products	Market Price		Royalties for BCIC Tk	Royalties other organization Tk
		Estimated Tk	Actual Tk		
1.	Gewa (per cft.)	15.00	-	15.00	-
2.	Albezia falcateria (per cft.)	15.00	-	15.00	-
3.	Pulpwood for KPM (per cft.)	15.00	-	15.00	-
4.	Bamboo for SPPM (per 1000 Nos.)	-	3790.00	3790.00	-
5.	Bamboo for KPM (per 1000 Nos.)	-	400.00	400.00	-
6.	Sundri Poles for BFIDC (per cft. of 25-30 long)	-	156.00	-	156.00
7.	Sundri poles for BFIDC (per cft.) above 30 feet long	-	164.00	-	164.00
8.	Timber collected by BFIDC, (per cft.)	45.00	-	-	45.00
	A-Class	56.00	-	-	56.00

As per requirement of the above reference the undersigned is directed to inform you the above rates.

AKM Fazlul Haque, DCF
Development and Planning
Department of Forest
Bangladesh.

(N.B. Translated from Bengali version).

4. DEPOT AUCTION NOTICE

Government of the People's Republic of Bangladesh
Office of the Divisional Forest Officer
Dhaka Forest Division
Banabhaban, Gulshan Road
Mohakhali, Dhaka-1212

Auction Sale Notice Date: 22.11.1992

This sale notice is served to inform members of the public that an open auction is going to be held to sale the confiscated and extracted forest products in 'as and where' condition in accordance with terms of following schedule. The interested persons/parties are requested to inspect the products any day before the auction. Any complain arises due to non-inspection may not be entertained after the auction is over.

SCHEDULE

Sl No.	Range	Place of Auction	Quantity of Forest products to be sold	Date and time of Auction
1.	Dhaka Sadar Range	Auditorium of Banabhaban, 6th floor, Mohakhali, Dhaka-1212	Timber (Misc.)=27375 cft. Gazari Poles (Ballah)=629 unit Fuelwood = 952 cft.	5.12.92 Saturday at 10:00 a.m.
2.	Sreepur Range	Range Office, Sreepur	Timber (Misc.)=1600 cft. Gazari Poles(Ballah)=4382 unit Fuelwood = 5336 cft.	6.12.92 & 7.12.92 Sunday & Monday at 10:00 a.m.
3.	Kaliakoir Range	Range Office, Kaliakoir, Chandra, Dhaka	Timber (Misc.)= 604 cft. Gazari Poles (Ballah)=570 unit Fuelwood = 5313 cft.	6.12.92 Sunday at 10:00 a.m.
4.	Kachighata Range	Range Office, Kachighata	Timber (Misc.)= 50 cft. Gazari Poles (Ballah)=155 unit Fuelwood = 3809 cft.	8.12.92 Tuesday at 10:00 a.m.
5.	Rajendrapur Range	Range Office, Rajendrapur	Timber (Misc.)=3000 cft. Gazari Poles(Ballah)=1000 unit Fuelwood = 3000 cft.	7.12.92 & 8.12.92 Monday & Tuesday at 10:00 a.m.

Terms of Auction

a. Interested persons/ parties wanted to take part in the auction may inspect the saleable forest products by making contact with the respective range officers before the bid is opened. No complain will be entertained after the auction is over.

b. Interested persons are required to pay an earnest money of Tk 1,000.00 (Taka One thousand) only to the DFO through Postal Order/ Bank Draft/ Treasury Chalan in RD head. The original copy of the Bank Draft/ Chalan, etc. to be submitted to the Auction Officers. No person will be allowed to participate in bidding without showing the certificate of money deposit. In unavoidable cases Auction Officers may accept cash for security. However, no cash will be refunded in the spot of auction.

c. Auction Officer reserves the right to accept or reject any bid higher or lower. He is not liable to show cause to any bidder for his decision.

d. The successful bidders have to pay whole amount of bid money in cash on the spot.

e. Successful bidders have to take possession of the auctioned produces immediately after the bid is over and those should be removed within 7 days from the government depot after proper marking. If the buyers fail to remove the sold out products within one month, a delay charge/ demurrage will be realised @ 1 percent of the sale price far each day. All timbers should be marked within 7 days.

f. Liability of the security of goods will lie with the purchases soon after the bid is over. Government will not be liable for any theft and pilferage of the sold timber.

g. The Auction Officer reserves the right to include or exclude any lots from the auction in case of emergency.

h. Sawing, logging or chipping of auctioned timber for convenience of transport will required written permission from the DFO. Otherwise removal of timber will not be allowed. Legal action may proceed against those who violated the provision.

i. The auction beyond the amount of Tk 50,000.00 (Taka Fifty thousand only) will be executed subject to the approval of the higher authority.

j. The Auction Officer reserves the right to accept or reject the offer/ bid of those who have previous dues unsettled with the department or are defaulters for any reasons of illegal extraction of forest products or against whom legal suits are lodged by the department.

k. The DFO or his approved forest officer responsible for conducting auction may change, shift or extend the date of auction or adjourn the sale in case of emergency.

l. No lot will be sold to more than one person/ party but one person/ party can buy more than one lots, if he wishes.

m. Compensation will be realised from the buyers for any damage done to the forest, road or infrastructure during the removal of sold products.

n. The Auction Officer responsible for auction reserves the right to make correction in this schedule for printing or other mistakes.

o. Before removal or the auctioned lots they are got be sold marked by the range officer. If necessary Transit Pass to be collected. Transit pass should be collected from the DFO incase inter-district movements.

p. The buyers have to pay the income tax @ 3 percent fixed on sale proceeds.

Sd/ -
Abdul Mottaleb
DFO, Dhaka Forest Division

(N.B. Translated from Bangla version).

Table I. - Retail Prices Per Cubic Feet (cft.) of Important Timber in Selected Places of Bangladesh (1973-80)

Places/ Species	YEARS															
	1973		1974		1975		1976		1980		1989		1990		1991	
1	Round 2	Sawn 3	Round 4	Sawn 5	Round 6	Sawn 7	Round 8	Sawn 9	Round 10	Sawn 11	Round 12	Sawn 13	Round 14	Sawn 15	Round 16	Sawn 17
Chittagong																
Teak	56.6	n.a	61.8	79.5	42.4	61.8	53.0	70.6	70.6	123.6	400	600	450	700	450	750
Garjan	15.9	21.2	17.7	23.0	17.7	23.0	19.4	24.7	30.0	38.8	230	350	230	350	230	400
Silkoroi	12.4	19.4	17.7	30.0	19.4	23.0	21.2	24.7	30.0	45.9	320	450	320	450	330	460
Gamar	17.7	28.3	26.5	35.3	31.8	38.8	33.5	40.6	35.3	58.3	280	450	280	450	300	460
Chaplish	17.7	26.5	17.7	26.5	21.2	30.0	23.0	31.8	31.8	53.0	240	400	250	400	250	400
Civit	10.6	15.9	8.8	14.1	14.1	19.4	15.9	21.2	10.6	15.9	100	200	100	200	100	200
Jarul	21.2	30.0	24.7	31.8	26.5	35.3	28.3	37.1	35.3	56.5	250	375	270	380	270	385
Jam	15.9	21.2	15.9	23.5	15.9	21.2	17.7	23.0	-	-	150	220	160	230	180	240
Telsur	15.9	22.9	23.0	30.0	26.5	30.0	28.3	31.8	31.8	53.0	240	450	240	450	240	450
Chickrassi	17.6	23.0	19.4	30.0	21.2	30.0	23.0	31.8	24.7	38.8	220	370	220	370	280	380
Banderhola	12.4	24.7	15.9	21.2	14.1	19.4	15.9	21.2	26.5	33.5	135	245	135	245	135	245
Simul	7.0	12.4	6.3	12.3	10.6	14.1	12.4	15.1	10.6	14.1	130	220	130	220	130	220
Am (Mango)											90	180	100	200	120	220
Dhaka																
Teak	n.a	n.a	n.a	n.a	n.a	n.a	n.a	n.a	141.3	158.9	450	650	500	750	500	750
Garjan	n.a	n.a	n.a	n.a	n.a	n.a	n.a	n.a	38.8	44.1	300	380	280	380	300	400
Silkoroi	n.a	n.a	n.a	n.a	n.a	n.a	n.a	n.a	44.1	49.4	280	400	300	400	300	450
Gamar	10.6	21.2	17.7	21.2	17.7	28.3	17.7	28.3	45.8	51.2	300	450	300	500	300	500
Chapalish	n.a	n.a	n.a	n.a	n.a	n.a	n.a	n.a	49.4	53.0	300	450	300	500	300	500
Civit	n.a	n.a	n.a	n.a	n.a	n.a	n.a	n.a	n.a	n.a	150	170	150	185	160	200
Jarul	n.a	n.a	n.a	n.a	n.a	n.a	n.a	n.a	n.a	n.a	300	500	300	500	300	500
Telsur	n.a	n.a	n.a	n.a	n.a	n.a	n.a	n.a	n.a	n.a	350	500	350	500	360	520
Chickrasi	n.a	n.a	n.a	n.a	n.a	n.a	n.a	n.a	n.a	n.a	275	350	275	350	280	360
Bandarhola	n.a	n.a	n.a	n.a	n.a	n.a	n.a	n.a	n.a	n.a	250	300	250	300	280	320
Simul	n.a	n.a	n.a	n.a	n.a	n.a	n.a	n.a	n.a	n.a	150	170	150	170	160	185
Am (Mango)	n.a	n.a	n.a	n.a	n.a	n.a	n.a	n.a	n.a	n.a	130	180	130	180	140	185
Khulna																
Sundri	6.7	12.4	15.9	26.5	17.7	28.3	12.4	21.2	28.2	42.4	310	410	420	530	430	550
Passur	8.8	13.1	21.2	30.0	24.7	31.8	14.1	24.7	-	-	-	-	-	-	-	-
Bean	4.6	6.0	10.6	15.9	8.8	n.a	6.4	8.8	15.9	21.2	135	230	190	290	200	300
Keora	4.2	6.0	12.4	15.9	17.7	14.1	7.1	11.3	17.7	24.7	170	245	210	290	215	310
Kakra	5.7	8.8	21.2	28.3	21.2	30.0	8.8	14.1	21.2	31.8	250	350	290	400	300	400
Garjan Koroi											255	405	290	430	300	430
Rajshahi																
Kanthal	5.3	12.7	n.a	n.a	28.3	38.8	21.3	45.9	38.8	54.7	250	350	300	450	300	450
Am (Mango)	2.5	4.9	n.a	n.a	12.4	21.2	8.8	14.1	13.1	17.0	100	150	110	160	120	200
Sal	n.a	n.a	n.a	n.a	28.2	42.4	20.2	42.4	-	-	-	-	-	-	-	-
Teak	23.0	44.1	n.a	n.a	31.8	45.9	45.9	53.0	-	-	450	650	460	670	470	700
Jam	4.2	7.1	n.a	n.a	17.7	28.3	28.3	31.8	21.1	31.8	200	275	200	275	200	275
Koroi	4.2	7.8	n.a	n.a	21.2	28.3	31.8	35.3	28.3	31.8	400	500	400	550	400	550
Mehogony	8.8	14.8	n.a	n.a	21.2	38.8	n.a	n.a	49.4	63.6	230	350	300	450	300	450
Simul	2.8	4.2	n.a	n.a	8.8	12.4	8.8	14.1	-	-	70	150	100	160	100	160

Source: Utilisation Division, Chittagong, Forest Department for 1989, 1990 and 1991
BFIDC, Forest Industries Report, 1982 for 1973 - 1980.

APPENDIX 5
INVESTMENT PROGRAMME AND COSTS - SCENARIO 1

(Proj. 372001/31, App 5.)

PROJECT 372001/31
FORESTRY MASTER PLAN,
BANGLADESH (TA NO.1355-BAN)

ASIAN DEVELOPMENT BANK
MANILA PHILIPPINES
DATE: JANUARY 1993

ECONOMICS AND MARKETING

APPENDIX 5
INVESTMENT PROGRAMME AND COSTS - SCENARIO 1

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1. SUMMARY OF PROGRAMME COSTS BY CATEGORY OF EXPENDITURE

Table 1 - Summary of Programme Costs by Category of Expenditure

Programme Components	Million Taka			Million U $			% of	% of
	Foreign	Local	Total	Foreign	Local	Total	Base Costs	FEC
A. PHYSICAL INFRASTRUCTURE								
1. Land Acquisition		100.0	100.0		2.6	2.6	0.2	
2. Detail Engineering and Supervision		53.1	53.1		1.4	1.4	0.1	
3. Civil Works	88.5	796.7	885.3	2.3	20.5	22.8	1.6	0.5
4. Construction of Roads	206.1	530.0	736.1	5.3	13.6	18.9	1.4	1.3
Subtotal	**294.6**	**1,479.8**	**1,774.5**	**7.6**	**38.0**	**45.6**	**3.3**	**1.8**
B. FURNITURE, EQUIPMENT AND VEHICLES								
1. Furniture		16.3	16.3		0.4	0.4	0.0	
2. Equipments	1,882.6	470.6	2,353.2	48.4	12.1	60.5	4.3	11.6
3. Vehicles	279.3	498.7	778.1	7.2	12.8	20.0	1.4	1.7
4. Extraction Equipments	1,694.1	1,502.3	3,196.4	43.5	38.6	82.2	5.9	10.5
Subtotal	**3,856.0**	**2,488.0**	**6,344.0**	**99.1**	**64.0**	**163.1**	**11.7**	**23.8**
C. HUMAN RESOURCES DEVELOPMENT								
1. Overseas Training for BFD Staff	546.8	60.8	607.5	14.1	1.6	15.6	1.1	3.4
2. Local Training to BFD Staff		131.8	131.8		3.4	3.4	0.2	
3. Local Training to Beneficiaries		592.4	592.4		15.2	15.2	1.1	
4. Seminar and Workshops		58.0	58.0		1.5	1.5	0.1	
Subtotal	**546.8**	**843.0**	**1,389.7**	**14.1**	**21.7**	**35.7**	**2.6**	**3.4**
D. RESEARCH, DEVELOPMENT AND STUDIES								
1. Research and Development	1,239.6	990.3	2,230.0	31.9	25.5	57.3	4.1	7.6
2. Monitoring and Evaluation	40.0	252.5	292.5	1.0	6.5	7.5	0.5	0.2
Subtotal	**1,279.6**	**1,242.8**	**2,522.5**	**32.9**	**31.9**	**64.8**	**4.6**	**7.9**
E. CONSULTING SERVICES								
1. International	390.7	43.4	434.1	10.0	1.1	11.2	0.8	2.4
2. Local		285.0	285.0		7.3	7.3	0.5	
Subtotal	**390.7**	**328.4**	**719.1**	**10.0**	**8.4**	**18.5**	**1.3**	**2.4**
F. PLANTATION DEVELOPMENT/ FABRICATION OF ENERGY SAVING EQUIPMENTS								
1. Forest Production	1,152.8	10,633.8	11,786.6	29.6	273.4	303.0	21.7	7.1
2. Participatory Forestry	238.0	1,946.3	2,184.3	6.1	50.0	56.2	4.0	1.5
3. Non Wood Forest Products								
4. Wood-Based Energy		375.0	375.0		9.6	9.6	0.7	
Subtotal	**1,390.8**	**12,955.1**	**14,345.9**	**35.8**	**333.0**	**368.8**	**26.4**	**8.6**
G. FOREST-BASED INDUSTRIES								
1. Sawmilling	2,436.5	901.2	3,337.6	62.6	23.2	85.8	6.1	15.0
2. Newsprint	2,979.1	1,786.5	4,765.6	76.6	45.9	122.5	8.8	18.4
3. Printing and Writing Paper	2,567.9	1,540.0	4,107.8	66.0	39.6	105.6	7.6	15.8
Subtotal	**7,983.4**	**4,227.7**	**12,211.1**	**205.2**	**108.7**	**313.9**	**22.5**	**49.3**
H. RECURRENT COSTS								
1. Existing Staff Salaries		9,254.3	9,254.3		237.9	237.9	17.0	
2. Incremental Staff Salaries		4,906.4	4,906.4		126.1	126.1	9.0	
3. Operation and Maintenance of Facilities	9.2	36.8	46.0	0.2	0.9	1.2	0.1	0.1
4. Vehicle/ Equipment Operation/ Maintenance	243.0	243.0	486.0	6.2	6.2	12.5	0.9	1.5
5. Office Supplies and Consumables	212.8	91.2	304.0	5.5	2.3	7.8	0.6	1.3
Subtotal	**465.0**	**14,531.7**	**14,996.7**	**12.0**	**373.6**	**385.5**	**27.6**	**2.9**
BASE COSTS	**16,207.0**	**38,096.5**	**54,303.5**	**416.6**	**979.3**	**1,396.0**	**100.0**	**100.0**
Physical Contingencies*	708.4	1,740.6	2,449.0	18.2	44.7	63.0		
TOTAL PROJECT COST	**16,915.4**	**39,837.1**	**56,752.5**	**434.8**	**1,024.1**	**1,458.9**		

* Ten percent on civil works and five percent on other items.

2. LANDUSE, CONSERVATION AND ENVIRONMENTAL MANAGEMENT

Table 2 - Summary of Programme Costs

Programme Components	Million Taka			Million U $			% of Base Costs	% of FEC
	Foreign	Local	Total	Foreign	Local	Total		
A. PHYSICAL INFRASTRUCTURE								
1. Land Acquisition		5.0	5.0		0.1	0.1	0.3	
2. Detail Engineering and Supervision		18.1	18.1		0.5	0.5	1.2	
3. Civil Works	30.2	271.8	302.0	0.8	7.0	7.8	20.4	11.3
Subtotal	**30.2**	**294.9**	**325.1**	**0.8**	**7.6**	**8.4**	**21.9**	**11.3**
B. FURNITURE, EQUIPMENT AND VEHICLES								
1. Furniture		16.3	16.3		0.4	0.4	1.1	
2. Equipments	12.6	3.2	15.8	0.3	0.1	0.4	1.1	4.7
3. Vehicles	38.4	9.6	48.0	1.0	0.2	1.2	3.2	14.4
Subtotal	**51.0**	**29.1**	**80.1**	**1.3**	**0.7**	**2.1**	**5.4**	**19.1**
C. HUMAN RESOURCES DEVELOPMENT								
1. Overseas Training	16.2	1.8	18.0	0.4	0.0	0.5	1.2	6.1
2. Short Courses (Overseas)	20.3	2.3	22.5	0.5	0.1	0.6	1.5	7.6
3. Training of Trainers		3.0	3.0		0.1	0.1	0.2	
4. Training of Local Government Officials		2.0	2.0		0.1	0.1	0.1	
5. Training of Villagers		80.0	80.0		2.1	2.1	5.4	
6. Workshop and Seminars		6.0	6.0		0.2	0.2	0.4	
Subtotal	**36.5**	**95.1**	**131.5**	**0.9**	**2.4**	**3.4**	**8.9**	**13.6**
D. RESEARCH, DEVELOPMENT AND STUDIES								
1. Inventory and Surveys		8.8	8.8		0.2	0.2		
2. Research and Development Studies		28.0	28.0		0.7	0.7	1.9	
3. Monitoring and Evaluation		32.5	32.5		0.8	0.8	2.2	
Subtotal		**69.3**	**69.3**		**1.8**	**1.8**	**4.7**	
E. CONSULTING SERVICES								
1. International	119.4	13.3	132.6	3.1	0.3	3.4	8.9	44.7
2. Local		225.6	225.6		5.8	5.8	15.2	
Subtotal	**119.4**	**238.9**	**358.3**	**3.1**	**6.1**	**9.2**	**24.1**	**44.7**
F. RECURRENT COSTS								
1. Existing Staff Salaries		137.6	137.6		3.5	3.5	9.3	
2. Incremental Staff Salaries		325.8	325.8		8.4	8.4	22.0	
3. Operation and Maintenance of Facilities	1.2	4.8	6.0	0.0	0.1	0.2	0.4	0.4
4. Vehicle/ Equipment Operation/ Maintenance	15.0	15.0	30.0	0.4	0.4	0.8	2.0	5.6
5. Office Supplies and Consumables	14.0	6.0	20.0	0.4	0.2	0.5	1.3	5.2
Subtotal	**30.2**	**489.2**	**519.4**	**0.8**	**12.6**	**13.4**	**35.0**	**11.3**
BASE COSTS	**267.3**	**1,216.4**	**1,483.7**	**6.9**	**31.3**	**38.1**	**100.0**	**100.0**
Physical Contingencies	14.9	75.6	90.4	0.4	1.9	2.3		
TOTAL PROGRAMME COST	**282.1**	**1,291.9**	**1,574.1**	**7.3**	**33.2**	**40.5**		

Table 3 - Proposed Financing Plan, Million U $

Project Components	Total Programme Cost			GOB Financing			Donors Financing			Beneficiaries Financing		
	Foreign	Local	Total	Foreign	Local	Total	Foreign	Local	Total	Foreign	Local	Total
A. PHYSICAL INFRASTRUCTURE												
1. Land Acquisition		0.1	0.1		0.1	0.1						
2. Detail Engineering and Supervision		0.5	0.5					0.5	0.5			
3. Civil Works	0.8	7.0	7.8		0.8	0.8	0.8	6.2	7.0			
Subtotal	**0.8**	**7.6**	**8.4**		**0.9**	**0.9**	**0.8**	**6.7**	**7.5**			
B. FURNITURE, EQUIPMENT AND VEHICLES												
1. Furniture		0.4	0.4					0.4	0.4			
2. Equipments	0.3	0.1	0.4		0.1	0.1	0.3		0.3			
3. Vehicles	1.0	0.2	1.2		0.2	0.2	1.0		1.0			
Subtotal	**1.3**	**0.7**	**2.1**		**0.3**	**0.3**	**1.3**	**0.4**	**1.7**			
C. HUMAN RESOURCES DEVELOPMENT												
1. Overseas Training	0.4	0.0	0.5				0.4	0.0	0.5			
2. Short Courses (Overseas)	0.5	0.1	0.6				0.5	0.1	0.6			
3. Training of Trainers		0.1	0.1					0.1	0.1			
4. Training of Local Government Officials		0.1	0.1					0.1	0.1			
5. Training of Villagers		2.1	2.1					2.1	2.1			
6. Workshop and Seminars		0.2	0.2					0.2	0.2			
Subtotal	**0.9**	**2.4**	**3.4**				**0.9**	**2.4**	**3.4**			
D. RESEARCH, DEVELOPMENT AND STUDIES												
1. Inventory and Surveys		0.2	0.2					0.2	0.2			
2. Research and Development Studies		0.7	0.7					0.7	0.7			
3. Monitoring and Evaluation		0.8	0.8					0.8	0.8			
Subtotal		**1.8**	**1.8**					**1.8**	**1.8**			
E. CONSULTING SERVICES												
1. International	3.1	0.3	3.4				3.1	0.3	3.4			
2. Local		5.8	5.8					5.8	5.8			
Subtotal	**3.1**	**6.1**	**9.2**				**3.1**	**6.1**	**9.2**			
F. RECURRENT COSTS												
1. Existing Staff Salaries		3.5	3.5		3.5	3.5						
2. Incremental Staff Salaries		8.4	8.4		8.4	8.4						
3. Operation and Maintenance of Facilities	0.0	0.1	0.2		0.1	0.1	0.0		0.0			
4. Vehicle/ Equipment Operation/ Maintenance	0.4	0.4	0.8		0.4	0.4	0.4		0.4			
5. Office Supplies and Consumables	0.4	0.2	0.5		0.2	0.2	0.4		0.4			
Subtotal	**0.8**	**12.6**	**13.4**		**12.6**	**12.6**	**0.8**		**0.8**			
BASE COSTS	**6.9**	**31.3**	**38.1**		**13.8**	**13.8**	**6.9**	**17.5**	**24.3**			
Physical Contingencies	0.4	1.9	2.3		1.0	1.0	0.4	1.0	1.3			
TOTAL PROGRAMME COSTS	**7.3**	**33.2**	**40.5**		**14.8**	**14.8**	**7.3**	**18.4**	**25.7**			
PERCENTAGE	17.9	82.1	100.0		44.6	36.6	100.0	55.4	63.4			

Table 4 - Phasing of Programme Costs, Million Taka

Programme Components	PY FY	Year 1 - 5 1993/97	6 - 10 1998/02	11 - 15 2003/07	16 - 20 2008/12	Total Costs Local	Foreign	Total
A. PHYSICAL INFRASTRUCTURE								
1. Land Acquisition		5.0				5.0		5.0
2. Detail Engineering and Supervision		14.7	3.4			18.1		18.1
3. Civil Works		245.3	56.7			271.8	30.2	302.0
Subtotal		**265.0**	**60.1**			**294.9**	**30.2**	**325.1**
B. FURNITURE, EQUIPMENT AND VEHICLES								
1. Furniture		8.4	5.2	1.2	1.5	16.3		16.3
2. Equipments		10.4			5.4	3.2	12.6	15.8
3. Vehicles		20.1	0.6	12.0	15.3	9.6	38.4	48.0
Subtotal		**38.9**	**5.8**	**13.2**	**22.2**	**29.1**	**51.0**	**80.1**
C. HUMAN RESOURCES DEVELOPMENT								
1. Overseas Training		12.0	6.0			1.8	16.2	18.0
2. Short Courses (Overseas)		13.5	4.5	4.5		2.3	20.3	22.5
3. Training of Trainers		1.0	1.0	1.0		3.0		3.0
4. Training of Local Government Officials		0.5	0.5	0.5	0.5	2.0		2.0
5. Training of Villagers		20.0	20.0	20.0	20.0	80.0		80.0
6. Workshop and Seminars		3.0	1.5	1.5		6.0		6.0
Subtotal		**50.0**	**33.5**	**27.5**	**20.5**	**95.1**	**36.5**	**131.5**
D. RESEARCH, DEVELOPMENT AND STUDIES								
1. Inventory and Surveys		8.8				8.8		8.8
2. Research and Development Studies		12.0	8.0	8.0		28.0		28.0
3. Monitoring and Evaluation		10.0	10.0	7.5	5.0	32.5		32.5
Subtotal		**30.8**	**18.0**	**15.5**	**5.0**	**69.3**		**69.3**
E. CONSULTING SERVICES								
1. International		90.4	42.2			13.3	119.4	132.6
2. Local		155.6	70.0			225.6		225.6
Subtotal		**246.0**	**112.2**			**238.9**	**119.4**	**358.3**
F. RECURRENT COSTS								
1. Existing Staff Salaries		27.6	31.7	36.4	41.9	137.6		137.6
2. Incremental Staff Salaries		39.9	79.9	95.8	110.2	325.8		325.8
3. Operation and Maintenance of Facilities		1.5	1.5	1.5	1.5	4.8	1.2	6.0
4. Vehicle/ Equipment Operation/ Maintenance		7.5	7.5	7.5	7.5	15.0	15.0	30.0
5. Office Supplies and Consumables		5.0	5.0	5.0	5.0	6.0	14.0	20.0
Subtotal		**81.5**	**125.6**	**146.2**	**166.1**	**489.2**	**30.2**	**519.4**
BASE COSTS		**712.2**	**355.2**	**202.4**	**213.8**	**1,216.4**	**267.3**	**1,483.7**
Physical Contingencies		48.9	20.8	10.1	10.7	75.6	14.9	90.4
TOTAL PROGRAMME COST		**761.1**	**376.0**	**212.5**	**224.5**	**1,291.9**	**282.1**	**1,574.1**

Table 5 - Cost Estimates - Civil Works, Furniture, Equipments and Vehicles

Items	Unit	Unit Cost (Taka '000)	Number of Units						Total Costs (Million Taka)							
			Year 1 - 5	6 - 10	11 - 15	16 - 20	21 - 25	Total	Year 1 - 5	6 - 10	11 - 15	16 - 20	21 - 25	Total	FEC	T and D
A. PHYSICAL FACILITIES																
1. Land Acquisition	Ha	5,000.0	1					1	5.0					5.0		
2. Detail Engineering and Supervision 1_/	Percent	6.0							14.7	3.4				18.1		
Subtotal									**19.7**	**3.4**				**23.1**		
3. Civil Works																
- Department	m2	10.1	500					500	5.1					5.1	0.5	0.5
- Regional Offices	m2	8.6	2,500					2,500	21.5					21.5	2.2	2.2
- Existing National Parks(Protected Areas)	m2	5.4	8,000					8,000	43.2					43.2	4.3	4.3
- New Protected Areas	m2	5.4	30,000	10,000				40,000	162.0	54.0				216.0	21.6	21.6
- Field Rest House	m2	5.4	2,000					2,000	10.8					10.8	1.1	1.1
- Herbarium and Botanical Gardens	m2	5.4														
- Regional Nature Conservation Center	m2	5.4	500	500				1,000	2.7	2.7				5.4	0.5	0.5
- National and Regional Zoo	m2	5.4														
- Natural History Museum	m2	8.6														
Subtotal								**54,000**	**245.3**	**56.7**				**302.0**	**30.2**	**30.2**
B. FURNITURE																
- Department of Natural Resource Conservation	Lumpsum	300.0	1		1			2	0.3		0.3			0.6		
- Regional Offices	Lumpsum	150.0	6		6			12	0.9		0.9			1.8		
- Existing National Parks(Protected Areas)	Lumpsum	1,000.0	1					1	1.0					1.0		
- New Protected Areas	Lumpsum	1,000.0	5	5				10	5.0	5.0				10.0		
- Field Rest House	Lumpsum	50.0	10	4		30		44	0.5	0.2		1.5		2.2		
- Herbarium	Lumpsum															
- Regional Nature Conservation Center	Lumpsum	50.0	14					14	0.7					0.7		
- National Zoo	Lumpsum															
- Natural History Museum	Lumpsum															
Subtotal									**8.4**	**5.2**	**1.2**	**1.5**		**16.3**		
C. EQUIPMENTS																
- Division	Lumpsum	3,000.0	1			1		2	3.0			3.0		6.0	4.8	1.2
- Department of Environment	Lumpsum	10,000.0														
- Forest Department	Lumpsum		1			1		2								
- Regional Offices	Lumpsum	200.0	1			1		2	0.2			0.2		0.4	0.3	0.1
- Existing National Parks(Protected Areas)	Lumpsum	1,000.0	1			1		2	1.0			1.0		2.0	1.6	0.4
- New Protected Areas	Lumpsum	1,000.0	1			1		2	1.0			1.0		2.0	1.6	0.4
- Field Rest House	Lumpsum	20.0	10			10		20	0.2			0.2		0.4	0.3	0.1
- Herbarium	Lumpsum															
- Regional Nature Conservation Center	Lumpsum															
- National Zoo	Lumpsum															
- Natural History Museum	Lumpsum	5,000.0	1					1	5.0					5.0	4.0	1.0
Subtotal									**10.4**			**5.4**		**15.8**	**12.6**	**3.2**
D. VEHICLES																
- 4 WHD Jeep	No.	1,500.0	8		8			16	12.0		12.0			24.0	19.2	4.8
- Motor Cycle	No.	60.0	15	10		15		40	0.9	0.6		0.9		2.4	1.9	0.5
- Speed Boat	No.	1,200.0	6			12		18	7.2			14.4		21.6	17.3	4.3
- Coastal Research Vessel	No.															
- River Patrol Boat	No.	1,000.0	3			6		9	3.0			6.0		9.0	7.2	1.8
- Amphibious Aircraft	No.	2,000.0														
Subtotal									**20.1**	**0.6**	**12.0**	**15.3**		**48.0**	**38.4**	**9.6**

Table 6 - Cost Estimates - Human Resource Development, Research, Studies and Operation/ Maintenance

Items	Unit	Unit Cost (Taka '000)	Number of Units						Total Costs (Million Taka)							
			Year 1 - 5	6 - 10	11 - 15	16 - 20	21 - 25	Total	Year 1 - 5	6 - 10	11 - 15	16 - 20	21 - 25	Total	FEC	T and D
A. TRAINING AND SEMINAR																
1. Overseas Training	No	1,200.0	10	5				15	12.0	6.0				18.0	16.2	
2. Short Courses(Overseas)	No	450.0	30	10	10			50	13.5	4.5	4.5			22.5	20.3	
3. Training of Trainers	No	20.0	50	50	50			150	1.0	1.0	1.0			3.0		
4. Training of Local Government Officials	No	10.0	50	50	50	50		200	0.5	0.5	0.5	0.5		2.0		
5. Training of Villagers	No	2.0	10,000	10,000	10,000	10,000		40,000	20.0	20.0	20.0	20.0		80.0		
6. Workshop and Seminars	No	150.0	20	10	10			40	3.0	1.5	1.5			6.0		
Subtotal									**50.0**	**33.5**	**27.5**	**20.5**		**131.5**	**36.5**	
B. RESEARCH, DEVELOPMENT AND STUDIES																
1. Inventory and Surveys	Sum	800.0	11					11	8.8					8.8		
2. Research and Development Studies	Sum	800.0	15	10	10			35	12.0	8.0	8.0			28.0		
3. Monitoring and Evaluation	Sum	500.0	20	20	15	10		65	10.0	10.0	7.5	5.0		32.5		
Subtotal									**30.8**	**18.0**	**15.5**	**5.0**		**69.3**		
C. COMMUNITY BASED RESOURCE MANAGEMENT	Sum	1,167,000.0	0.4	0.2	0.2	0.2		1.0	466.8	233.4	233.4	233.4		1,167.0		
D. CONSULTING SERVICES																
1. International	mm	603.0	150	70				220	90.4	42.2				132.6	119.4	
2. Local	mm	155.6	1,000	450				1,450	155.6	70.0				225.6		
Subtotal									**246.0**	**112.2**				**358.3**	**119.4**	
E. RECURRENT COSTS																
1. Existing Staff Salaries	Sum	27,575.0	1	1.2	1.3	1.5		5	27.6	31.7	36.4	41.9		137.6		
2. Incremental Staff Salaries	Sum	39,928.7	1	2	2.4	2.8		8.2	39.9	79.9	95.8	110.2		325.8		
3. Operation and Maintenance of Facilities	Sum	1,500.0	1	1	1	1		4	1.5	1.5	1.5	1.5		6.0	1.2	0.6
4. Vehicle/ Equipment Operation/ Maintenance	Sum	7,500.0	1	1	1	1		4	7.5	7.5	7.5	7.5		30.0	15.0	3.0
5. Office Supplies and Consumables	Sum	5,000.0	1	1	1	1		4	5.0	5.0	5.0	5.0		20.0	14.0	2.0
Subtotal									**81.5**	**125.6**	**146.2**	**166.1**		**519.4**	**30.2**	**5.6**

3. FOREST PRODUCTION AND MANAGEMENT

Table 7 - Summary of Plantation Costs

Programme Components	Million Taka			Million U $			% of Base Costs	% of FEC
	Foreign	Local	Total	Foreign	Local	Total		
A. LONG ROTATION								
1. Nursery	28.8	259.2	288.0	0.7	6.7	7.4		
2. Plantation Establishment	50.5	454.3	504.8	1.3	11.7	13.0	4.3	4.4
3. Plantation Maintenance	129.0	1,161.4	1,290.4	3.3	29.9	33.2	10.9	11.2
Subtotal	**208.3**	**1,874.9**	**2,083.2**	**5.4**	**48.2**	**53.6**	**17.7**	**18.1**
B. MEDIUM ROTATION								
1. Nursery	70.6	635.1	705.6	1.8	16.3	18.1	6.0	6.1
2. Plantation Establishment	127.3	1,145.3	1,272.5	3.3	29.4	32.7	10.8	11.0
3. Plantation Maintenance	299.8	2,698.3	2,998.1	7.7	69.4	77.1		
Subtotal	**497.6**	**4,478.6**	**4,976.3**	**12.8**	**115.1**	**127.9**	**42.2**	**43.2**
C. SHORT ROTATION								
1. Nursery	27.9	250.9	278.8	0.7	6.4	7.2	2.4	2.4
2. Plantation Establishment	39.0	351.0	390.0	1.0	9.0	10.0	3.3	3.4
3. Plantation Maintenance	51.9	466.9	518.8	1.3	12.0	13.3	4.4	4.5
Subtotal	**118.8**	**1,068.8**	**1,187.5**	**3.1**	**27.5**	**30.5**	**10.1**	**10.3**
D. ENRICHMENT PLANTATION								
1. Nursery	77.6	698.0	775.5	2.0	17.9	19.9	6.6	6.7
2. Plantation Establishment	51.7	723.8	775.5	1.3	18.6	19.9	6.6	4.5
3. Plantation Maintenance	116.2	1,046.0	1,162.2	3.0	26.9	29.9	9.9	10.1
Subtotal	**245.5**	**2,467.7**	**2,713.2**	**6.3**	**63.4**	**69.7**	**23.0**	**21.3**
E. COASTAL AFFORESTATION								
1. Nursery	9.5	85.5	95.0	0.2	2.2	2.4	0.8	0.8
2. Plantation Establishment	25.8	231.8	257.5	0.7	6.0	6.6	2.2	2.2
3. Plantation Maintenance	11.3	101.3	112.5	0.3	2.6	2.9	1.0	1.0
Subtotal	**46.5**	**418.5**	**465.0**	**1.2**	**10.8**	**12.0**	**3.9**	**4.0**
F. PARKS AND GAME SANCTUARIES								
1. Nursery	9.8	87.8	97.5	0.3	2.3	2.5	0.8	0.8
2. Plantation Establishment	8.1	73.1	81.3	0.2	1.9	2.1	0.7	0.7
3. Plantation Maintenance	18.3	164.4	182.7	0.5	4.2	4.7	1.5	1.6
Subtotal	**36.1**	**325.3**	**361.4**	**0.9**	**8.4**	**9.3**	**3.1**	**3.1**
BASE COSTS	**1,152.8**	**10,633.8**	**11,786.6**	**29.6**	**273.4**	**303.0**	**100.0**	**100.0**
Physical Contingencies	39.7	357.1	396.8	1.0	9.2	10.2		
TOTAL PROJECT COST	**1,192.5**	**10,990.9**	**12,183.4**	**30.7**	**282.5**	**313.2**		

Table 8 - Proposed Financing Plan, Million U $

Project Components	Total Programme Cost			GOB Financing			Donors Financing			Beneficiaries Financing		
	Foreign	Local	Total	Foreign	Local	Total	Foreign	Local	Total	Foreign	Local	Total
A. LONG ROTATION												
1. Nursery	0.7	6.7	7.4		1.3	1.3	0.7	5.3	6.1			
2. Plantation Establishment	1.3	11.7	13.0		2.3	2.3	1.3	9.3	10.6			
3. Plantation Maintenance	3.3	29.9	33.2		6.0	6.0	3.3	23.9	27.2			
Subtotal	**5.4**	**48.2**	**53.6**		**9.6**	**9.6**	**5.4**	**38.6**	**43.9**			
B. MEDIUM ROTATION												
1. Nursery	1.8	16.3	18.1		3.3	3.3	1.8	13.1	14.9			
2. Plantation Establishment	3.3	29.4	32.7		5.9	5.9	3.3	23.6	26.8			
3. Plantation Maintenance	7.7	69.4	77.1		13.9	13.9	7.7	55.5	63.2			
Subtotal	**12.8**	**115.1**	**127.9**		**23.0**	**23.0**	**12.8**	**92.1**	**104.9**			
C. SHORT ROTATION												
1. Nursery	0.7	6.4	7.2		1.3	1.3	0.7	5.2	5.9			
2. Plantation Establishment	1.0	9.0	10.0		1.8	1.8	1.0	7.2	8.2			
3. Plantation Maintenance	1.3	12.0	13.3		2.4	2.4	1.3	9.6	10.9			
Subtotal	**3.1**	**27.5**	**30.5**		**5.5**	**5.5**	**3.1**	**22.0**	**25.0**			
D. ENRICHMENT PLANTATION												
1. Nursery	2.0	17.9	19.9		3.6	3.6	2.0	14.4	16.3			
2. Plantation Establishment	1.3	18.6	19.9		3.7	3.7	1.3	14.9	16.2			
3. Plantation Maintenance	3.0	26.9	29.9		5.4	5.4	3.0	21.5	24.5			
Subtotal	**6.3**	**63.4**	**69.7**		**12.7**	**12.7**	**6.3**	**50.8**	**57.1**			
E. COASTAL AFFORESTATION												
1. Nursery	0.2	2.2	2.4		0.4	0.4	0.2	1.8	2.0			
2. Plantation Establishment	0.7	6.0	6.6		1.2	1.2	0.7	4.8	5.4			
3. Plantation Maintenance	0.3	2.6	2.9		0.5	0.5	0.3	2.1	2.4			
Subtotal	**1.2**	**10.8**	**12.0**		**2.2**	**2.2**	**1.2**	**8.6**	**9.8**			
F. PARKS AND GAME SANCTUARIES												
1. Nursery	0.3	2.3	2.5		0.5	0.5	0.3	1.8	2.1			
2. Plantation Establishment	0.2	1.9	2.1		0.4	0.4	0.2	1.5	1.7			
3. Plantation Maintenance	0.5	4.2	4.7		0.8	0.8	0.5	3.4	3.9			
Subtotal	**0.9**	**8.4**	**9.3**		**1.7**	**1.7**	**0.9**	**6.7**	**7.6**			
BASE COSTS	**29.6**	**273.4**	**303.0**		**54.7**	**54.7**	**29.6**	**218.7**	**248.3**			
Physical Contingencies	1.0	9.2	10.2		1.8	1.8	1.0	7.3	8.4			
TOTAL PROJECT COST	**30.7**	**282.5**	**313.2**		**56.5**	**56.5**	**30.7**	**226.0**	**256.7**			
Percentage	9.8	90.2	100.0		20.0	18.0	100.0	80.0	82.0			

Table 9 - Phasing of Programme Costs, Million Taka

Programme Components	PY / FY Year 1 - 5 1993/97	6 - 10 1998/02	11 - 15 2003/07	16 - 20 2008/12	Total Costs Local	Foreign	Total
A. LONG ROTATION							
1. Nursery	63.5	58.0	66.4	100.2	259.2	28.8	288.0
2. Plantation Establishment	111.4	100.4	115.2	177.9	454.3	50.5	504.8
3. Plantation Maintenance	285.0	254.1	291.8	459.5	1,161.4	129.0	1,290.4
Subtotal	**459.8**	**412.4**	**473.3**	**737.7**	**1,874.9**	**208.3**	**2,083.2**
B. MEDIUM ROTATION							
1. Nursery	176.4	176.4	176.4	176.4	635.1	70.6	705.6
2. Plantation Establishment	318.1	318.1	318.1	318.1	1,145.3	127.3	1,272.5
3. Plantation Maintenance	749.5	749.5	749.5	749.5	2,698.3	299.8	2,998.1
Subtotal	**1,244.1**	**1,244.1**	**1,244.1**	**1,244.1**	**4,478.6**	**497.6**	**4,976.3**
C. SHORT ROTATION							
1. Nursery	37.6	48.8	94.8	97.6	250.9	27.9	278.8
2. Plantation Establishment	52.7	68.3	132.6	136.5	351.0	39.0	390.0
3. Plantation Maintenance	70.0	90.8	176.4	181.6	466.9	51.9	518.8
Subtotal	**160.3**	**207.8**	**403.8**	**415.6**	**1,068.8**	**118.8**	**1,187.5**
D. ENRICHMENT PLANTATION							
1. Nursery	193.9	193.9	193.9	193.9	698.0	77.6	775.5
2. Plantation Establishment	129.3	129.3	129.3	129.3	723.8	51.7	775.5
3. Plantation Maintenance	290.6	290.6	290.6	290.6	1,046.0	116.2	1,162.2
Subtotal	**613.7**	**613.7**	**613.7**	**613.7**	**2,467.7**	**245.5**	**2,713.2**
E. COASTAL AFFORESTATION							
1. Nursery	23.8	23.8	23.8	23.8	85.5	9.5	95.0
2. Plantation Establishment	64.4	64.4	64.4	64.4	231.8	25.8	257.5
3. Plantation Maintenance	28.1	28.1	28.1	28.1	101.3	11.3	112.5
Subtotal	**116.3**	**116.3**	**116.3**	**116.3**	**418.5**	**46.5**	**465.0**
F. PARKS AND GAME SANCTUARIES							
1. Nursery	24.4	24.4	24.4	24.4	87.8	9.8	97.5
2. Plantation Establishment	20.3	20.3	20.3	20.3	73.1	8.1	81.3
3. Plantation Maintenance	45.7	45.7	45.7	45.7	164.4	18.3	182.7
Subtotal	**90.4**	**90.4**	**90.4**	**90.4**	**325.3**	**36.1**	**361.4**
BASE COSTS	**2,684.5**	**2,684.6**	**2,941.4**	**3,217.6**	**10,633.8**	**1,152.8**	**11,786.6**
Physical Contingencies	98.5	97.9	98.6	101.8	357.1	39.7	396.8
TOTAL PROJECT COST	**2,782.9**	**2,782.5**	**3,040.1**	**3,319.4**	**10,990.9**	**1,192.5**	**12,183.4**

Table 10 - Cost Estimate - Forest Plantation Development

Items	Unit	Unit Cost (Taka '000)	Number of Units						Total Costs (Million Taka)							
			Year 1 - 5	6 - 10	11 - 15	16 - 20	21 - 25	Total	Year 1 - 5	6 - 10	11 - 15	16 - 20	21 - 25	Total	FEC	T and D
A. LONG ROTATION																
1. Nursery																
- Stump	Ha	2.3	9,896	8,461	9,755	16,506		44,618	22.8	19.5	22.4	38.0		102.6	10.3	
- Polybags	Ha	5.6	7,299	6,904	7,885	11,169		33,257	40.7	38.5	44.0	62.3		185.4	18.5	
Subtotal			**17,195**	**15,365**	**17,640**	**27,675**		**77,875**	**63.5**	**58.0**	**66.4**	**100.2**		**288.0**	**28.8**	
2. Plantation Establishment																
- Stump	Ha	5.5	9,896	8,461	9,755	16,506		44,618	54.4	46.5	53.7	90.8		245.4	24.5	
- Polybags	Ha	7.8	7,299	6,904	7,885	11,169		33,257	56.9	53.9	61.5	87.1		259.4	25.9	
Subtotal									**111.4**	**100.4**	**115.2**	**177.9**		**504.8**	**50.5**	
3. Plantation Maintenance																
- Stump	Ha	17.2	9,896	8,461	9,755	16,506		44,618	170.2	145.5	167.8	283.9		767.4	76.7	
- Polybags	Ha	15.7	7,299	6,904	7,885	11,169		33,257	114.8	108.6	124.0	175.6		523.0	52.3	
Subtotal									**285.0**	**254.1**	**291.8**	**459.5**		**1,290.4**	**129.0**	
Total									**459.8**	**412.4**	**473.3**	**737.7**		**2,083.2**	**208.3**	
B. MEDIUM ROTATION																
1. Nursery																
- Stump	Ha	2.3	31,250	31,250	31,250	31,250		125,000	71.9	71.9	71.9	71.9		287.5	28.8	
- Polybags	Ha	5.6	18,750	18,750	18,750	18,750		75,000	104.5	104.5	104.5	104.5		418.1	41.8	
Subtotal			**50,000**	**50,000**	**50,000**	**50,000**		**200,000**	**176.4**	**176.4**	**176.4**	**176.4**		**705.6**	**70.6**	
2. Plantation Establishment																
- Stump	Ha	5.5	31,250	31,250	31,250	31,250		125,000	171.9	171.9	171.9	171.9		687.5	68.8	
- Polybags	Ha	7.8	18,750	18,750	18,750	18,750		75,000	146.3	146.3	146.3	146.3		585.0	58.5	
Subtotal									**318.1**	**318.1**	**318.1**	**318.1**		**1,272.5**	**127.3**	
3. Plantation Maintenance																
- Stump	Ha	15.8	31,250	31,250	31,250	31,250		125,000	494.5	494.5	494.5	494.5		1,978.1	197.8	
- Polybags	Ha	13.6	18,750	18,750	18,750	18,750		75,000	255.0	255.0	255.0	255.0		1,020.0	102.0	
Subtotal									**749.5**	**749.5**	**749.5**	**749.5**		**2,998.1**	**299.8**	
Total									**1,244.1**	**1,244.1**	**1,244.1**	**1,244.1**		**4,976.3**	**497.6**	
C. SHORT ROTATION																
1. Nursery																
- Stump	Ha															
- Polybags	Ha	5.6	6,750	8,750	17,000	17,500		50,000	37.6	48.8	94.8	97.6		278.8	27.9	
Subtotal			**6,750**	**8,750**	**17,000**	**17,500**		**50,000**	**37.6**	**48.8**	**94.8**	**97.6**		**278.8**	**27.9**	
2. Plantation Establishment																
- Stump	Ha															
- Polybags	Ha	7.8	6,750	8,750	17,000	17,500		50,000	52.7	68.3	132.6	136.5		390.0	39.0	
Subtotal									**52.7**	**68.3**	**132.6**	**136.5**		**390.0**	**39.0**	
3. Plantation Maintenance																
- Stump	Ha															
- Polybags	Ha	10.4	6,750	8,750	17,000	17,500		50,000	70.0	90.8	176.4	181.6		518.8	51.9	
Subtotal									**70.0**	**90.8**	**176.4**	**181.6**		**518.8**	**51.9**	
Total									**160.3**	**207.8**	**403.8**	**415.6**		**1,187.5**	**118.8**	

Table 10 - Cost Estimate - Forest Plantation Development (Cont'd.)

Items	Unit	Unit Cost (Taka '000)	Number of Units						Total Costs (Million Taka)							
			Year 1 - 5	6 - 10	11 - 15	16 - 20	21 - 25	Total	Year 1 - 5	6 - 10	11 - 15	16 - 20	21 - 25	Total	FEC	T and D
D. ENRICHMENT PLANTATION																
1. Nursery																
- Sal	Ha	11.3	10,340	10,340	10,340	10,340		41,360	116.3	116.3	116.3	116.3		465.3	46.5	
- Others	Ha	7.5	10,340	10,340	10,340	10,340		41,360	77.6	77.6	77.6	77.6		310.2	31.0	
Subtotal			**20,680**	**20,680**	**20,680**	**20,680**		**82,720**	**193.9**	**193.9**	**193.9**	**193.9**		**775.5**	**77.6**	
2. Plantation Establishment																
- Sal	Ha	6.3	10,340	10,340	10,340	10,340		41,360	64.6	64.6	64.6	64.6		258.5	25.9	
- Others	Ha	6.3	10,340	10,340	10,340	10,340		41,360	64.6	64.6	64.6	64.6		258.5	25.9	
Subtotal									**129.3**	**129.3**	**129.3**	**129.3**		**517.0**	**51.7**	
3. Plantation Maintenance																
- Sal	Ha	14.1	10,340	10,340	10,340	10,340		41,360	145.3	145.3	145.3	145.3		581.1	58.1	
- Others	Ha	14.1	10,340	10,340	10,340	10,340		41,360	145.3	145.3	145.3	145.3		581.1	58.1	
Subtotal									**290.6**	**290.6**	**290.6**	**290.6**		**1,162.2**	**116.2**	
Total									**613.7**	**613.7**	**613.7**	**613.7**		**2,454.7**	**245.5**	
E. COASTAL AFFORESTATION																
1. Nursery																
- Bed	Ha	1.9	12,500	12,500	12,500	12,500		50,000	23.8	23.8	23.8	23.8		95.0	9.5	
- Polybags	Ha															
Subtotal			**12,500**	**12,500**	**12,500**	**12,500**		**50,000**	**23.8**	**23.8**	**23.8**	**23.8**		**95.0**	**9.5**	
2. Plantation Establishment																
- Stump	Ha	5.2	12,500	12,500	12,500	12,500		50,000	64.4	64.4	64.4	64.4		257.5	25.8	
- Polybags	Ha															
Subtotal									**64.4**	**64.4**	**64.4**	**64.4**		**257.5**	**25.8**	
3. Plantation Maintenance																
- Stump	Ha	2.3	12,500	12,500	12,500	12,500		50,000	28.1	28.1	28.1	28.1		112.5	11.3	
- Polybags	Ha															
Subtotal									**28.1**	**28.1**	**28.1**	**28.1**		**112.5**	**11.3**	
Total									**116.3**	**116.3**	**116.3**	**116.3**		**465.0**	**46.5**	
F. PARKS AND GAME SANCTUARIES																
1. Nursery																
- Sal	Ha	11.3														
- Others	Ha	7.5	3,250	3,250	3,250	3,250		13,000	24.4	24.4	24.4	24.4		97.5	9.8	
Subtotal			**3,250**	**3,250**	**3,250**	**3,250**		**13,000**	**24.4**	**24.4**	**24.4**	**24.4**		**97.5**	**9.8**	
2. Plantation Establishment																
- Sal	Ha	6.3														
- Others	Ha	6.3	3,250	3,250	3,250	3,250		13,000	20.3	20.3	20.3	20.3		81.3	8.1	
Subtotal									**20.3**	**20.3**	**20.3**	**20.3**		**81.3**	**8.1**	
3. Plantation Maintenance																
- Sal	Ha	14.1														
- Others	Ha	14.1	3,250	3,250	3,250	3,250		13,000	45.7	45.7	45.7	45.7		182.7	18.3	
Subtotal									**45.7**	**45.7**	**45.7**	**45.7**		**182.7**	**18.3**	
Total									**90.4**	**90.4**	**90.4**	**90.4**		**361.4**	**36.1**	

4. PARTICIPATORY FORESTRY DEVELOPMENT

Table 11 - Summary of Programme Costs

Programme Components	Million Taka			Million U $			% of	% of
	Foreign	Local	Total	Foreign	Local	Total	Base Costs	FEC
A. PHYSICAL INFRASTRUCTURE								
1. Land Acquisition		45.0	45.0		1.2	1.2	1.0	
2. Detail Engineering and Supervision		19.0	19.0		0.5	0.5	0.4	
3. Civil Works	31.6	284.6	316.2	0.8	7.3	8.1	7.0	1.4
Subtotal	**31.6**	**348.5**	**380.2**	**0.8**	**9.0**	**9.8**	**8.4**	**1.4**
B. FURNITURE, EQUIPMENT AND VEHICLES								
1. Furniture		225.3	225.3		5.8	5.8	5.0	
2. Equipments	1,808.0	452.0	2,260.0	46.5	11.6	58.1	49.9	78.5
3. Vehicles	84.3	21.1	105.4	2.2	0.5	2.7	2.3	3.7
Subtotal	**1,892.3**	**698.4**	**2,590.7**	**48.6**	**18.0**	**66.6**	**57.2**	**82.2**
C. HUMAN RESOURCES DEVELOPMENT								
1. Overseas Training for BFD Staff	145.8	16.2	162.0	3.7	0.4	4.2	3.6	6.3
2. Local Training to BFD Staff		20.0	20.0		0.5	0.5	0.4	
3. Local Training to Beneficiaries		210.0	210.0		5.4	5.4	4.6	
Subtotal	**145.8**	**246.2**	**392.0**	**3.7**	**6.3**	**10.1**	**8.7**	**6.3**
D. MONITORING AND STUDIES								
1. On-going Monitoring		40.0	40.0		1.0	1.0	0.9	
2. Evaluation Studies		60.0	60.0		1.5	1.5	1.3	
Subtotal		**100.0**	**100.0**		**2.6**	**2.6**	**2.2**	
E. CONSULTING SERVICES								
1. International	108.5	12.1	120.6	2.8	0.3	3.1	2.7	4.7
2. Local		22.5	22.5		0.6	0.6	0.5	
Subtotal	**108.5**	**34.6**	**143.1**	**2.8**	**0.9**	**3.7**	**3.2**	**4.7**
F. RECURRENT COSTS								
1. Existing Staff Salaries		384.2	384.2		9.9	9.9	8.5	
2. Incremental Staff Salaries		285.6	285.6		7.3	7.3	6.3	
3. Operation and Maintenance of Facilities	8.0	32.0	40.0	0.2	0.8	1.0	0.9	0.3
4. Vehicle/ Equipment Operation/ Maintenance	88.0	88.0	176.0	2.3	2.3	4.5	3.9	3.8
5. Office Supplies and Consumables	28.0	12.0	40.0	0.7	0.3	1.0	0.9	1.2
Subtotal	**124.0**	**801.8**	**925.8**	**3.2**	**20.6**	**23.8**	**20.4**	**5.4**
BASE COSTS	**2,302.3**	**2,229.5**	**4,531.8**	**59.2**	**57.3**	**116.5**	**100.0**	**100.0**
Physical Contingencies	20.3	57.7	78.0	0.5	1.5	2.0		
TOTAL PROGRAMME COST	**2,322.6**	**2,287.2**	**4,609.8**	**59.7**	**58.8**	**118.5**		

Table 12 - Proposed Financing Plan, Million U $

Project Components	Total Programme Cost			GOB Financing			Donors Financing			Beneficiaries Financing		
	Foreign	Local	Total	Foreign	Local	Total	Foreign	Local	Total	Foreign	Local	Total
A. PHYSICAL INFRASTRUCTURE												
1. Land Acquisition		1.2	1.2		1.2	1.2						
2. Detail Engineering and Supervision		0.5	0.5					0.5	0.5			
3. Civil Works	0.8	7.3	8.1				0.8	7.3	8.1			
Subtotal	**0.8**	**9.0**	**9.8**		**1.2**	**1.2**	**0.8**	**7.8**	**8.6**			
B. FURNITURE, EQUIPMENT AND VEHICLES												
1. Furniture		5.8	5.8					5.8	5.8			
2. Equipments	46.5	11.6	58.1		11.6	11.6	46.5		46.5			
3. Vehicles	2.2	0.5	2.7		0.5	0.5	2.2		2.2			
Subtotal	**48.6**	**18.0**	**66.6**		**12.2**	**12.2**	**48.6**	**5.8**	**54.4**			
C. HUMAN RESOURCES DEVELOPMENT												
1. Overseas Training for BFD Staff	3.7	0.4	4.2				3.7	0.4	4.2			
2. Local Training to BFD Staff		0.5	0.5					0.5	0.5			
3. Local Training to Beneficiaries		5.4	5.4					5.4	5.4			
Subtotal	**3.7**	**6.3**	**10.1**				**3.7**	**6.3**	**10.1**			
D. MONITORING AND STUDIES												
1. On-going Monitoring		1.0	1.0					1.0	1.0			
2. Evaluation Studies		1.5	1.5					1.5	1.5			
Subtotal		**2.6**	**2.6**					**2.6**	**2.6**			
E. CONSULTING SERVICES												
1. International	2.8	0.3	3.1				2.8	0.3	3.1			
2. Local		0.6	0.6					0.6	0.6			
Subtotal	**2.8**	**0.9**	**3.7**				**2.8**	**0.9**	**3.7**			
F. RECURRENT COSTS												
1. Existing Staff Salaries		9.9	9.9		9.9	9.9						
2. Incremental Staff Salaries		7.3	7.3		7.3	7.3						
3. Operation and Maintenance of Facilities	0.2	0.8	1.0		0.8	0.8	0.2		0.2			
4. Vehicle/ Equipment Operation/ Maintenance	2.3	2.3	4.5		2.3	2.3	2.3		2.3			
5. Office Supplies and Consumables	0.7	0.3	1.0		0.3	0.3	0.7		0.7			
Subtotal	**3.2**	**20.6**	**23.8**		**20.6**	**20.6**	**3.2**		**3.2**			
BASE COSTS	**59.2**	**57.3**	**116.5**		**33.9**	**33.9**	**59.2**	**23.4**	**82.6**			
Physical Contingencies	0.5	1.5	2.0		0.9	0.9	0.5	0.6	1.1			
TOTAL PROGRAMME COST	**59.7**	**58.8**	**118.5**		**34.8**	**34.8**	**59.7**	**24.0**	**83.7**			
PERCENTAGE	37.0	63.0	100.0		59.2	29.4	100.0	40.8	70.6			

Table 13 - Phasing of Programme Costs, Million Taka

Programme Components	PY / FY	Year 1 - 5 1993/97	6 - 10 1998/02	11 - 15 2003/07	16 - 20 2008/12	Total Costs Local	Foreign	Total
A. PHYSICAL INFRASTRUCTURE								
1. Land Acquisition		15.0	30.0			45.0		45.0
2. Detail Engineering and Supervision		5.5	13.5			19.0		19.0
3. Civil Works		91.7	224.5			284.6	31.6	316.2
Subtotal		**112.2**	**267.9**			**348.5**	**31.6**	**380.2**
B. FURNITURE, EQUIPMENT AND VEHICLES								
1. Furniture		55.0	170.0		0.3	225.3		225.3
2. Equipments		370.0	1,520.0		370.0	452.0	1,808.0	2,260.0
3. Vehicles		33.2	56.0		16.2	21.1	84.3	105.4
Subtotal		**458.2**	**1,746.0**		**386.5**	**698.4**	**1,892.3**	**2,590.7**
C. HUMAN RESOURCES DEVELOPMENT								
1. Overseas Training for BFD Staff		81.0	81.0			16.2	145.8	162.0
2. Local Training to BFD Staff		5.0	5.0	5.0	5.0	20.0		20.0
3. Local Training to Beneficiaries		30.0	60.0	60.0	60.0	210.0		210.0
Subtotal		**116.0**	**146.0**	**65.0**	**65.0**	**246.2**	**145.8**	**392.0**
D. MONITORING AND STUDIES								
1. On-going Monitoring		10.0	10.0	10.0	10.0	40.0		40.0
2. Evaluation Studies		15.0	15.0	15.0	15.0	60.0		60.0
Subtotal		**25.0**	**25.0**	**25.0**	**25.0**	**100.0**		**100.0**
E. CONSULTING SERVICES								
1. International		30.1	30.1	30.1	30.1	12.1	108.5	120.6
2. Local		5.0	5.0	6.3	6.3	22.5		22.5
Subtotal		**35.1**	**35.1**	**36.4**	**36.4**	**34.6**	**108.5**	**143.1**
F. RECURRENT COSTS								
1. Existing Staff Salaries		77.0	88.6	101.6	117.0	384.2		384.2
2. Incremental Staff Salaries		35.0	70.0	84.0	96.6	285.6		285.6
3. Operation and Maintenance of Facilities		10.0	10.0	10.0	10.0	32.0	8.0	40.0
4. Vehicle/ Equipment Operation/ Maintenance		44.0	44.0	44.0	44.0	88.0	88.0	176.0
5. Office Supplies and Consumables		10.0	10.0	10.0	10.0	12.0	28.0	40.0
Subtotal		**176.0**	**222.6**	**249.6**	**277.6**	**801.8**	**124.0**	**925.8**
BASE COSTS		**922.6**	**2,442.6**	**376.0**	**790.5**	**2,229.5**	**2,302.3**	**4,531.8**
Physical Contingencies		17.6	21.4	18.8	20.2	57.7	20.3	78.0
TOTAL PROJECT COST		**940.2**	**2,464.1**	**394.8**	**810.7**	**2,287.2**	**2,322.6**	**4,609.8**

Table 14 - Cost Estimates - Civil Works, Furniture, Equipments and Vehicles

Items	Unit	Unit Cost (Taka '000)	Number of Units						Total Costs (Million Taka)							
			Year 1 - 5	6 - 10	11 - 15	16 - 20	21 - 25	Total	Year 1 - 5	6 - 10	11 - 15	16 - 20	21 - 25	Total	FEC	T and D
A. PHYSICAL FACILITIES																
1. Land Acquisition	Ha	5,000.0	3	6				9	15.0	30.0				45.0		
2. Detail Engineering and Supervision 1_/	Percent	6.0							5.5	13.5				19.0		
Subtotal									**20.5**	**43.5**				**64.0**		
3. Civil Works																
- Functional Building	m2	8.5	1,050	2,500				3,550	8.9	21.3				30.2	3.0	3.0
- Residential	m2	5.4	7,000	29,300				36,300	37.8	158.2				196.0	19.6	19.6
- Nursery	m2	4.5	10,000	10,000				20,000	45.0	45.0				90.0	9.0	9.0
Subtotal									**91.7**	**224.5**				**316.2**	**31.6**	**31.6**
B. FURNITURE																
- Functional Building	Lumpsum	500.0	70	300		0.5		370.5	35.0	150.0		0.3		185.3		
- Nursery	Lumpsum	100.0	200	200		0.5		400.5	20.0	20.0		0.1		40.1		
Subtotal									**55.0**	**170.0**		**0.3**		**225.3**		
C. EQUIPMENTS																
- Functional Building	Lumpsum	5,000.0	70	300		70		440	350.0	1,500.0		350.0		2,200.0	1,760.0	440.0
- Nursery	Lumpsum	100.0	200	200		200		600	20.0	20.0		20.0		60.0	48.0	12.0
Subtotal									**370.0**	**1,520.0**		**370.0**		**2,260.0**	**1,808.0**	**452.0**
D. VEHICLES																
- Station Wagon	No.	1,000.0	5	10				15	5.0	10.0				15.0	12.0	3.0
- 4 WHD Jeep	No.	1,000.0	10	20				30	10.0	20.0				30.0	24.0	6.0
- Staff Bus	No.	1,500.0	2	2		2		6	3.0	3.0		3.0		9.0	7.2	1.8
- Truck	No.	1,200.0	6	10		6		22	7.2	12.0		7.2		26.4	21.1	5.3
- Motor Cycle	No.	60.0	100	150		100		350	6.0	9.0		6.0		21.0	16.8	4.2
- Bi-Cycle	No.	4.0	500	500				1,000	2.0	2.0				4.0	3.2	0.8
Subtotal									**33.2**	**56.0**		**16.2**		**105.4**	**84.3**	**21.1**

Table 15 - Cost Estimates - Human Resources Development, Research, Studies and Operation/ Maintenance

Items	Unit	Unit Cost (Taka '000)	Number of Units						Total Costs (Million Taka)							
			Year 1 - 5	6 - 10	11 - 15	16 - 20	21 - 25	Total	Year 1 - 5	6 - 10	11 - 15	16 - 20	21 - 25	Total	FEC	T and D
A. TRAINING																
1. Overseas Training for BFD Staff	No	450.0	180	180				360	81.0	81.0				162.0	145.8	
2. Local Training to BFD Staff	No	10.0	500	500	500	500		2,000	5.0	5.0	5.0	5.0		20.0	.	
3. Local Training to Beneficiaries	No	0.6	50,000	100,000	100,000	100,000		350,000	30.0	60.0	60.0	60.0		210.0		
Subtotal									**116.0**	**146.0**	**65.0**	**65.0**		**392.0**	**145.8**	
C. MONITORING AND EVALUATION																
1. Ongoing monitoring		10,000.0	1	1	1	1		4	10.0	10.0	10.0	10.0		40.0		
1. Evaluation and Studies		5,000.0	1	1	1	1		4	5.0	5.0	5.0	5.0		20.0		
Subtotal									**15.0**	**15.0**	**15.0**	**15.0**		**60.0**		
D. CONSULTING SERVICES																
1. International		603.0	50	50	50	50		200	30.1	30.1	30.1	30.1		120.6	108.5	
2. Local		50.0	100	100	125	125		450	5.0	5.0	6.3	6.3		22.5		
Subtotal									**35.1**	**35.1**	**36.4**	**36.4**		**143.1**	**108.5**	
E. RECURRENT COSTS																
1. Existing Staff Salaries		77,000.0	1	1.2	1.3	1.5		5	77.0	88.6	101.6	117.0		384.2		
2. Incremental Staff Salaries		35,000.0	1	2	2.4	2.8		8.2	35.0	70.0	84.0	96.6		285.6		
3. Operation and Maintenance of Facilities		10,000.0	1	1	1	1		4	10.0	10.0	10.0	10.0		40.0	8.0	4.0
4. Vehicle/ Equipment Operation/ Maintenance		44,000.0	1	1	1	1		4	44.0	44.0	44.0	44.0		176.0	88.0	17.6
5. Office Supplies and Consumables		10,000.0	1	1	1	1		4	10.0	10.0	10.0	10.0		40.0	28.0	4.0
Subtotal									**176.0**	**222.6**	**249.6**	**277.6**		**925.8**	**124.0**	**25.6**

5. PARTICIPATORY FOREST PLANTATION DEVELOPMENT

Table 16 - Summary of Programme Costs

Programme Components	Million Taka			Million U $			% of	% of
	Foreign	Local	Total	Foreign	Local	Total	Base Costs	FEC
A. AGROFORESTRY								
1. Nursery	4.7	42.7	47.5	0.1	1.1	1.2	2.2	2.0
2. Plantation Establishment	6.6	59.8	66.5	0.2	1.5	1.7	3.0	2.8
3. Plantation Maintenance								
Subtotal	**11.4**	**102.6**	**114.0**	**0.3**	**2.6**	**2.9**	**5.2**	**4.8**
B. WOODLOT								
1. Nursery	27.9	250.9	278.8	0.7	6.4	7.2	12.8	11.7
2. Plantation Establishment	39.0	351.0	390.0	1.0	9.0	10.0	17.9	16.4
3. Plantation Maintenance							3.2	14.4
Subtotal	**66.9**	**601.9**	**668.8**	**1.7**	**15.5**	**17.2**	**30.6**	**28.1**
C. STRIP PLANTATION								
1. Nursery	9.9	88.8	98.7	0.3	2.3	2.5	4.5	4.1
2. Plantation Establishment	13.8	124.3	138.1	0.4	3.2	3.5	6.3	5.8
3. Plantation Maintenance	18.4	165.3	183.6	0.5	4.2	4.7	8.4	7.7
Subtotal	**42.0**	**378.3**	**420.4**	**1.1**	**9.7**	**10.8**	**19.2**	**17.7**
D. HOMESTEAD PLANTATION								
1. Nursery	49.1	441.5	490.6	1.3	11.4	12.6	22.5	20.6
2. Plantation Establishment	68.6	422.0	490.6	1.8	10.8	12.6	22.5	28.8
3. Plantation Maintenance								
Subtotal	**117.7**	**863.5**	**981.2**	**3.0**	**22.2**	**25.2**	**44.9**	**49.5**
E. KHETLAND PLANTATION								
1. Nursery								
2. Plantation Establishment								
3. Plantation Maintenance								
Subtotal								
BASE COSTS	**238.0**	**1,946.3**	**2,184.3**	**6.1**	**50.0**	**56.2**	**100.0**	**100.0**
Physical Contingencies	9.6	86.0	95.6	0.2	2.2	2.5		
TOTAL PROGRAMME COST	**247.6**	**2,032.3**	**2,279.9**	**6.4**	**52.2**	**58.6**		

Table 17 - Proposed Financing Plan, Million U $

Project Components	Total Programme Cost			GOB Financing			Donors Financing			Beneficiaries Financing		
	Foreign	Local	Total	Foreign	Local	Total	Foreign	Local	Total	Foreign	Local	Total
A. AGROFORESTRY												
1. Nursery	0.1	1.1	1.2				0.1	0.9	1.0		0.2	0.2
2. Plantation Establishment	0.2	1.5	1.7				0.2	1.2	1.4		0,3	0.3
3. Plantation Maintenance												
Subtotal	**0.3**	**2.6**	**2.9**				**0.3**	**2.1**	**2.4**		**0.5**	**0.5**
B. WOODLOT												
1. Nursery	0.7	6.4	7.2				0.7	5.2	5.9		1.3	1.3
2. Plantation Establishment	1.0	9.0	10.0				1.0	7.2	8.2		1.8	1.8
3. Plantation Maintenance												
Subtotal	**1.7**	**15.5**	**17.2**				**1.7**	**12.4**	**14.1**		**3.1**	**3.1**
C. STRIP PLANTATION												
1. Nursery	0.3	2.3	2.5				0.3	1.8	2.1		0.5	0.5
2. Plantation Establishment	0.4	3.2	3.5				0.4	2.6	2.9		0.6	0.6
3. Plantation Maintenance	0.5	4.2	4.7				0.5	3.4	3.9		0.8	0.8
Subtotal	**1.1**	**9.7**	**10.8**				**1.1**	**7.8**	**8.9**		**1.9**	**1.9**
D. HOMESTEAD PLANTATION												
1. Nursery	1.3	11.4	12.6				1.3	9.1	10.3		2.3	2.3
2. Plantation Establishment	1.8	10.8	12.6				1.8	8.7	10.4		2.2	2.2
3. Plantation Maintenance												
Subtotal	**3.0**	**22.2**	**25.2**				**3.0**	**17.8**	**20.8**		**4.4**	**4.4**
E. KHETLAND PLANTATION												
1. Nursery												
2. Plantation Establishment												
3. Plantation Maintenance												
Subtotal												
BASE COSTS	**6.1**	**50.0**	**56.2**				**6.1**	**40.0**	**46.1**		**10.0**	**10.0**
Physical Contingencies	0.2	2.2	2.5				0.2	1.8	2.0		0.4	0.4
TOTAL PROGRAMME COST	**6.4**	**52.2**	**58.6**				**6.4**	**41.8**	**48.2**		**10.4**	**10.4**
Percentage	10.9	89.1	100.0				100.0	80.0	82.2		20.0	17.8

Table 18 - Phasing of Programme Costs, Million Taka

Programme Components	PY / FY	Year 1 - 5 1993/97	6 - 10 1998/02	11 - 15 2003/07	16 - 20 2008/12	Total Costs Local	Foreign	Total
A. AGROFORESTRY								
1. Nursery		7.9	7.9	15.8	15.8	42.7	4.7	47.5
2. Plantation Establishment		11.1	11.1	22.2	22.2	59.8	6.6	66.5
3. Plantation Maintenance								
Subtotal		**19.0**	**19.0**	**38.0**	**38.0**	**102.6**	**11.4**	**114.0**
B. WOODLOT								
1. Nursery		27.9	55.8	83.6	111.5	250.9	27.9	278.8
2. Plantation Establishment		39.0	78.0	117.0	156.0	351.0	39.0	390.0
3. Plantation Maintenance								
Subtotal		**66.9**	**133.8**	**200.6**	**267.5**	**601.9**	**66.9**	**668.8**
C. STRIP PLANTATION								
1. Nursery		16.4	16.4	32.9	32.9	88.8	9.9	98.7
2. Plantation Establishment		23.0	23.0	46.0	46.0	124.3	13.8	138.1
3. Plantation Maintenance		30.6	30.6	61.2	61.2	165.3	18.4	183.6
Subtotal		**70.1**	**70.1**	**140.1**	**140.1**	**378.3**	**42.0**	**420.4**
D. HOMESTEAD PLANTATION								
1. Nursery		122.7	122.7	122.7	122.7	441.5	49.1	490.6
2. Plantation Establishment		171.6	171.6	171.6	171.6	422.0	68.6	490.6
3. Plantation Maintenance								
Subtotal		**294.3**	**294.3**	**294.3**	**294.3**	**863.5**	**117.7**	**981.2**
E. KHETLAND PLANTATION								
1. Nursery								
2. Plantation Establishment								
3. Plantation Maintenance								
Subtotal								
BASE COSTS		**450.2**	**517.1**	**673.0**	**739.9**	**1,946.3**	**238.0**	**2,184.3**
Physical Contingencies		18.6	22.0	25.9	29.2	86.0	9.6	95.6
TOTAL PROGRAMME COST		**468.8**	**539.0**	**698.8**	**769.1**	**2,032.3**	**247.6**	**2,279.9**

Table 19 - Cost Estimates - Forest Plantation Development

Items	Unit	Unit Cost (Taka '000)	Number of Units						Total Costs (Million Taka)							
			Year 1 - 5	6 - 10	11 - 15	16 - 20	21 - 25	Total	Year 1 - 5	6 - 10	11 - 15	16 - 20	21 - 25	Total	FEC	T and D
A. AGROFORESTRY																
1. Nursery																
- Stump	Ha															
- Polybags	Ha	5.6	1,420	1,420	2,840	2,840		8,520	7.9	7.9	15.8	15.8		47.5	4.7	
Subtotal			**1,420**	**1,420**	**2,840**	**2,840**		**8,520**	**7.9**	**7.9**	**15.8**	**15.8**		**47.5**	**4.7**	
2. Plantation Establishment																
- Stump	Ha															
- Polybags	Ha	7.8	1,420	1,420	2,840	2,840		8,520	11.1	11.1	22.2	22.2		66.5	6.6	
Subtotal									**11.1**	**11.1**	**22.2**	**22.2**		**66.5**	**6.6**	
3. Plantation Maintenance																
- Stump	Ha															
- Polybags	Ha		1,420	1,420	2,840	2,840		8,520								
Subtotal																
Total									**19.0**	**19.0**	**38.0**	**38.0**		**114.0**	**11.4**	
B. WOODLOT PLANTATION																
1. Nursery																
- Stump	Ha															
- Polybags	Ha	5.6	5,000	10,000	15,000	20,000		50,000	27.9	55.8	83.6	111.5		278.8	27.9	
Subtotal			**5,000**	**10,000**	**15,000**	**20,000**		**50,000**	**27.9**	**55.8**	**83.6**	**111.5**		**278.8**	**27.9**	
2. Plantation Establishment																
- Stump	Ha															
- Polybags	Ha	7.8	5,000	10,000	15,000	20,000		50,000	39.0	78.0	117.0	156.0		390.0	39.0	
Subtotal									**39.0**	**78.0**	**117.0**	**156.0**		**390.0**	**39.0**	
3. Plantation Maintenance																
- Stump	Ha															
- Polybags	Ha		5,000	10,000	15,000	20,000		50,000								
Subtotal																
Total									**66.9**	**133.8**	**200.6**	**267.5**		**668.8**	**66.9**	
C. STRIP PLANTATION																
1. Nursery																
- Stump	Ha															
- Polybags	Ha	5.6	2,950	2,950	5,900	5,900		17,700	16.4	16.4	32.9	32.9		98.7	9.9	
Subtotal			**2,950**	**2,950**	**5,900**	**5,900**		**17,700**	**16.4**	**16.4**	**32.9**	**32.9**		**98.7**	**9.9**	
2. Plantation Establishment																
- Stump	Ha															
- Polybags	Ha	7.8	2,950	2,950	5,900	5,900		17,700	23.0	23.0	46.0	46.0		138.1	13.8	
Subtotal									**23.0**	**23.0**	**46.0**	**46.0**		**138.1**	**13.8**	
3. Plantation Maintenance																
- Stump	Ha															
- Polybags	Ha	10.4	2,950	2,950	5,900	5,900		17,700	30.6	30.6	61.2	61.2		183.6	18.4	
Subtotal									**30.6**	**30.6**	**61.2**	**61.2**		**183.6**	**18.4**	
Total									**70.1**	**70.1**	**140.1**	**140.1**		**420.4**	**42.0**	

Table 19 - Cost Estimates - Forest Plantation Development (Cont'd.)

Items	Unit	Unit Cost (Taka '000)	Number of Units						Total Costs (Million Taka)							
			Year 1 - 5	6 - 10	11 - 15	16 - 20	21 - 25	Total	Year 1 - 5	6 - 10	11 - 15	16 - 20	21 - 25	Total	FEC	T and D
D. HOMESTEAD PLANTATION																
1. Nursery																
- Stump	Ha															
- Polybags	Ha	5.6	22,000	22,000	22,000	22,000		88,000	122.7	122.7	122.7	122.7		490.6	49.1	
Subtotal			**22,000**	**22,000**	**22,000**	**22,000**		**88,000**	**122.7**	**122.7**	**122.7**	**122.7**		**490.6**	**49.1**	
2. Plantation Establishment																
- Stump	Ha															
- Polybags	Ha	7.8	22,000	22,000	22,000	22,000		88,000	171.6	171.6	171.6	171.6		686.4	68.6	
Subtotal									**171.6**	**171.6**	**171.6**	**171.6**		**686.4**	**68.6**	
3. Plantation Maintenance																
- Stump	Ha															
- Polybags	Ha		22,000	22,000	22,000	22,000		88,000								
Subtotal																
Total									**294.3**	**294.3**	**294.3**	**294.3**		**1,177.0**	**117.7**	
E. KHETLAND PLANTATION																
1. Nursery																
- Bed	Ha															
- Polybags	Ha															
Subtotal																
2. Plantation Establishment																
- Stump	Ha															
- Polybags	Ha															
Subtotal																
3. Plantation Maintenance																
- Stump	Ha															
- Polybags	Ha															
Subtotal																
Total																

6. WOOD-BASED ENERGY DEVELOPMENT

Table 20 - Summary of Programme Costs

Programme Components	Million Taka			Million U $			% of	% of
	Foreign	Local	Total	Foreign	Local	Total	Base Costs	FEC
A. FABRICATION OF IMPROVED STOVE								
1. Fabrication and Installation		375.0	375.0		9.6	9.6	61.2	
Subtotal		**375.0**	**375.0**		**9.6**	**9.6**	**61.2**	
B. EQUIPMENT AND VEHICLES								
1. Equipments	2.4	0.6	3.0	0.1	0.0	0.1	0.5	21.6
2. Vehicles	2.9	0.7	3.6	0.1	0.0	0.1	0.6	26.2
Subtotal	**5.3**	**1.3**	**6.6**	**0.1**	**0.0**	**0.2**	**1.1**	**47.8**
C. HUMAN RESOURCES DEVELOPMENT								
1. Training of Trainers		6.8	6.8		0.2	0.2	1.1	
2. Training to Users		2.4	2.4		0.1	0.1	0.4	
Subtotal		**9.2**	**9.2**		**0.2**	**0.2**	**1.5**	
D. RESEARCH AND DEVELOPMENT		8.0	8.0		0.2	0.2	1.3	
Subtotal		**8.0**	**8.0**		**0.2**	**0.2**	**1.3**	
E. PROMOTIONAL ACTIVITIES								
1. Exhibitions and Workshop		32.0	32.0		0.8	0.8	5.2	
2. Extension and Dissemination		20.0	20.0		0.5	0.5	3.3	
Subtotal		**52.0**	**52.0**		**1.3**	**1.3**	**8.5**	
F. MONITORING AND EVALUATION								
1. On-going Monitoring		8.0	8.0		0.2	0.2	1.3	
2. Evaluation Studies		12.0	12.0		0.3	0.3	2.0	
Subtotal		**20.0**	**20.0**		**0.5**	**0.5**	**3.3**	
G. RECURRENT COSTS								
1. Staff Salaries		132.2	132.2		3.4	3.4	21.6	
2. Vehicle/ Equipment Operation/ Maintenance	3.0	3.0	6.0	0.1	0.1	0.2	1.0	27.0
3. Office Supplies and Consumables	2.8	1.2	4.0	0.1	0.0	0.1	0.7	25.2
Subtotal	**5.8**	**136.4**	**142.2**	**0.1**	**3.5**	**3.7**	**23.2**	**52.2**
BASE COSTS	**11.1**	**602.0**	**613.1**	**0.3**	**15.5**	**15.8**	**100.0**	**100.0**
Physical Contingencies	0.6	48.9	49.4	0.0	1.3	1.3		
TOTAL PROGRAMME COST	**11.7**	**650.9**	**662.5**	**0.3**	**16.7**	**17.0**		

Table 21 - Proposed Financing Plan, Million U $

Project Components	Total Programme Cost			GOB Financing			Donors Financing			Beneficiaries Financing		
	Foreign	Local	Total	Foreign	Local	Total	Foreign	Local	Total	Foreign	Local	Total
A. FABRICATION OF IMPROVED STOVE												
1. Fabrication and Installation		9.6	9.6					1.9			7.7	9.6
Subtotal		**9.6**	**9.6**					**1.9**			**7.7**	**9.6**
B. EQUIPMENT AND VEHICLES												
1. Equipments	0.1	0.0	0.1		0.0	0.0	0.1		0.1			
2. Vehicles	0.1	0.0	0.1		0.0	0.0	0.1		0.1			
Subtotal	**0.1**	**0.0**	**0.2**		**0.0**	**0.0**	**0.1**		**0.1**			
C. HUMAN RESOURCES DEVELOPMENT												
1. Training of Trainers		0.2	0.2					0.2	0.2			
2. Training to Users		0.1	0.1					0.1	0.1			
Subtotal		**0.2**	**0.2**					**0.2**	**0.2**			
D. RESEARCH AND DEVELOPMENT		0.2	0.2					0.2	0.2			
Subtotal		**0.2**	**0.2**					**0.2**	**0.2**			
E. PROMOTIONAL ACTIVITIES												
1. Exhibitions and Workshop		0.8	0.8					0.8	0.8			
2. Extension and Dissemination		0.5	0.5					0.5	0.5			
Subtotal		**1.3**	**1.3**					**1.3**	**1.3**			
F. MONITORING AND EVALUATION												
1. On-going Monitoring		0.2	0.2					0.2	0.2			
2. Evaluation Studies		0.3	0.3					0.3	0.3			
Subtotal		**0.5**	**0.5**					**0.5**	**0.5**			
G. RECURRENT COSTS												
1. Staff Salaries		3.4	3.4		3.4	3.4						
2. Vehicle/ Equipment Operation/ Maintenance	0.1	0.1	0.2		0.1	0.1	0.1		0.1			
3. Office Supplies and Consumables	0.1	0.0	0.1		0.0	0.0	0.1		0.1			
Subtotal	**0.1**	**3.5**	**3.7**		**3.5**	**3.5**	**0.1**		**0.1**			
BASE COSTS	**0.3**	**15.5**	**15.8**		**3.5**	**3.5**	**0.3**	**4.2**	**2.6**		**7.7**	**9.6**
Physical Contingencies	0.0	1.3	1.3		0.3	0.3	0.0	0.3	0.4		0.6	0.6
TOTAL PROGRAMME COST	**0.3**	**16.7**	**17.0**		**3.8**	**3.8**	**0.3**	**4.6**	**2.9**		**8.3**	**10.3**
Percentage	0.0	100.0	100.0		20.0	20.0	100.0	30.0	20.0		50.0	60.0

Table 22 - Phasing of Programme Costs, Million Taka

Programme Components	PY Year 1 - 5 FY 1993/97	6 - 10 1998/02	11 - 15 2003/07	16 - 20 2008/12	Total Costs Local	Foreign	Total
A. CONSTRUCTION OF IMPROVED STOVE							
1. Fabrication and Installation	125.0	125.0	62.5	62.5	375.0		375.0
Subtotal	**125.0**	**125.0**	**62.5**	**62.5**	**375.0**		**375.0**
B. EQUIPMENT AND VEHICLES							
1. Equipments	1.5		1.5		0.6	2.4	3.0
2. Vehicles	1.7	0.2	1.5	0.2	0.7	2.9	3.6
Subtotal	**3.2**	**0.2**	**3.0**	**0.2**	**1.3**	**5.3**	**6.6**
C. HUMAN RESOURCES DEVELOPMENT							
1. Training of Trainers	3.4	3.4			6.8		6.8
2. Training to Users	0.6	0.6	0.6	0.6	2.4		2.4
Subtotal	**4.0**	**4.0**	**0.6**	**0.6**	**9.2**		**9.2**
D. RESEARCH AND DEVELOPMENT	5.0	3.0			8.0		8.0
Subtotal	**5.0**	**3.0**			**8.0**		**8.0**
E. PROMOTIONAL ACTIVITIES							
1. Exhibitions and Workshop	8.0	8.0	8.0	8.0	32.0		32.0
2. Extension and Dissemination	5.0	5.0	5.0	5.0	20.0		20.0
Subtotal	**13.0**	**13.0**	**13.0**	**13.0**	**52.0**		**52.0**
F. MONITORING AND EVALUATION							
1. On-going Monitoring	2.0	2.0	2.0	2.0	8.0		8.0
2. Evaluation Studies	3.0	3.0	3.0	3.0	12.0		12.0
Subtotal	**5.0**	**5.0**	**5.0**	**5.0**	**20.0**		**20.0**
G. RECURRENT COSTS							
1. Staff Salaries	26.5	30.5	35.0	40.3	132.2		132.2
2. Vehicle/ Equipment Operation/ Maintenance	1.5	1.5	1.5	1.5	3.0	3.0	6.0
3. Office Supplies and Consumables	1.0	1.0	1.0	1.0	1.2	2.8	4.0
Subtotal	**29.0**	**33.0**	**37.5**	**42.8**	**136.4**	**5.8**	**142.2**
BASE COSTS	**184.2**	**183.2**	**121.6**	**124.1**	**602.0**	**11.1**	**613.1**
Physical Contingencies	15.5	15.4	9.2	9.3	48.9	0.6	49.4
TOTAL PROGRAMME COST	**199.7**	**198.6**	**130.8**	**133.4**	**650.9**	**11.7**	**662.5**

Table 23 - Cost Estimates - Civil Works, Equipments and Vehicles

Items	Unit	Unit Cost (Taka '000)	Number of Units						Total Costs (Million Taka)							
			Year 1 - 5	6 - 10	11 - 15	16 - 20	21 - 25	Total	Year 1 - 5	6 - 10	11 - 15	16 - 20	21 - 25	Total	FEC	T and D
A. CONSTRUCTION AND SETTING OF IMPROVED STOVES	No	0.1	1,000,000	1,000,000	500,000	500,000		3,000,000	125.0	125.0	62.5	62.5		375.0		
B. EQUIPMENTS																
- Mobile Audio-visual Unit	No	1,500.0	1		1			2	1.5		1.5			3.0	2.4	0.6
C. VEHICLES																
- 4 WHD Jeep	No.	1,500.0	1		1			2	1.5		1.5			3.0	2.4	0.6
- Bi-Cycle	No.	4.0	54	54		54		162	0.2	0.2		0.2		0.6	0.5	0.1
Subtotal									**1.7**	**0.2**	**1.5**	**0.2**		**3.6**	**2.9**	**0.7**
D. TRAINING																
1. Training of Trainers	No	15.0	228	228				456	3.4	3.4				6.8		
2. Local Training to Users	No	0.6	1,000	1,000	1,000	1,000		4,000	0.6	0.6	0.6	0.6		2.4		
Subtotal									**4.0**	**4.0**	**0.6**	**0.6**		**9.2**		
E. RESEARCH AND DEVELOPMENT	NO	1,000.0	5	3				8	5.0	3.0				8.0		

Table 24 - Cost Estimates - Human Resources Development, Studies and Operation/Maintenance

Items	Unit	Unit Cost (Taka '000)	Number of Units						Total Costs (Million Taka)							
			Year 1 - 5	6 - 10	11 - 15	16 - 20	21 - 25	Total	Year 1 - 5	6 - 10	11 - 15	16 - 20	21 - 25	Total	FEC	T and D
F. PROMOTIONAL ACTIVITIES																
1. Exhibitions and Workshop	No	100.0	80	80	80	80		320	8.0	8.0	8.0	8.0		32.0		
2. Extension and Dissemination	No	50.0	100	100	100	100		400	5.0	5.0	5.0	5.0		20.0		
Subtotal									**13.0**	**13.0**	**13.0**	**13.0**		**52.0**		
G. MONITORING AND EVALUATION																
1. Ongoing monitoring		1,000.0	2	2	2	2		8	2.0	2.0	2.0	2.0		8.0		
1. Evaluation and Studies		500.0	6	6	6	6		24	3.0	3.0	3.0	3.0		12.0		
Subtotal									**5.0**	**5.0**	**5.0**	**5.0**		**20.0**		
H. RECURRENT COSTS																
1. Staff Salaries and Allowances		26,500.0	1	1.2	1.3	1.5		5	26.5	30.5	35.0	40.3		132.2		
2. Vehicle/ Equipment Operation/ Maintenance		1,500.0	1	1	1	1		4	1.5	1.5	1.5	1.5		6.0	3.0	0.6
3. Office Supplies and Consumables		1,000.0	1	1	1	1		4	1.0	1.0	1.0	1.0		4.0	2.8	0.4
Subtotal									**29.0**	**33.0**	**37.5**	**42.8**		**142.2**	**5.8**	**1.0**

7. FOREST-BASED INDUSTRIES DEVELOPMENT

Table 25 - Summary of Programme Costs

Programme Components	Million Taka			Million U $			% of	% of
	Foreign	Local	Total	Foreign	Local	Total	Base Costs	FEC
A. PHYSICAL INFRASTRUCTURE								
1. Roads								
- Access Road	3.0	7.7	10.7	0.1	0.2	0.3	0.1	0.0
- Main Road	183.7	472.4	656.1	4.7	12.1	16.9	4.1	1.9
- Secondary Road	19.4	49.9	69.3	0.5	1.3	1.8	0.4	0.2
Subtotal	**206.1**	**530.0**	**736.1**	**5.3**	**13.6**	**18.9**	**4.6**	**2.1**
B. EXTRACTION EQUIPMENTS								
1. Equipment Procurement	349.0	309.4	658.4	9.0	8.0	16.9	4.1	3.5
2. Replacement of existing Equipments	1,345.1	1,192.9	2,538.0	34.6	30.7	65.2	15.7	13.6
Subtotal	**1,694.1**	**1,502.3**	**3,196.4**	**43.5**	**38.6**	**82.2**	**19.8**	**17.1**
C. FOREST-BASED INDUSTRIES								
1. Sawmilling	2,436.5	901.2	3,337.6	62.6	23.2	85.8	20.7	24.7
2. Newsprint	2,979.1	1,786.5	4,765.6	76.6	45.9	122.5	29.5	30.1
3. Printing and Writing Paper	2,567.9	1,540.0	4,107.8	66.0	39.6	105.6	25.4	26.0
Subtotal	**7,983.4**	**4,227.7**	**12,211.1**	**205.2**	**108.7**	**313.9**	**75.6**	**80.8**
BASE COSTS	**9,883.6**	**6,259.9**	**16,143.6**	**254.1**	**160.9**	**415.0**	**100.0**	**100.0**
Physical Contingencies	504.5	339.5	844.0	13.0	8.7	21.7		
TOTAL PROGRAMME COST	**10,388.1**	**6,599.4**	**16,987.6**	**267.0**	**169.7**	**436.7**		

Table 26 - Proposed Financing Plan, Million U $

Project Components	Total Programme Cost			GOB Financing			Donors Financing			Beneficiaries Financing		
	Foreign	Local	Total	Foreign	Local	Total	Foreign	Local	Total	Foreign	Local	Total
A. PHYSICAL INFRASTRUCTURE												
1. Roads												
- Access Road	0.1	0.2	0.3		0.1	0.1	0.1	0.1	0.2			
- Main Road	4.7	12.1	16.9		3.4	3.4	4.7	8.8	13.5			
- Secondary Road	0.5	1.3	1.8		0.4	0.4	0.5	0.9	1.4			
Subtotal	**5.3**	**13.6**	**18.9**		**3.8**	**3.8**	**5.3**	**9.8**	**15.1**			
B. EXTRACTION EQUIPMENTS												
1. Equipment Procurement	9.0	8.0	16.9		4.2	4.2	9.0	3.7	12.7			
2. Replacement of existing Equipments	34.6	30.7	65.2		16.3	16.3	34.6	14.4	48.9			
Subtotal	**43.5**	**38.6**	**82.2**		**20.5**	**20.5**	**43.5**	**18.1**	**61.6**			
C. FOREST-BASED INDUSTRIES												
1. Sawmilling	62.6	23.2	85.8		8.6	8.6	62.6	14.6	77.2			
2. Newsprint	76.6	45.9	122.5		21.0	21.0	76.6	25.0	101.5			
3. Printing and Writing Paper	66.0	39.6	105.6		18.1	18.1	66.0	21.5	87.5			
Subtotal	**205.2**	**108.7**	**313.9**		**47.6**	**47.6**	**205.2**	**61.1**	**266.3**			
BASE COSTS	**254.1**	**160.9**	**415.0**		**71.9**	**71.9**	**254.1**	**89.0**	**343.1**			
Physical Contingencies	13.0	8.7	21.7		3.8	3.8	13.0	4.9	17.9			
TOTAL PROGRAMME COST	**267.0**	**169.7**	**436.7**		**75.8**	**75.8**	**267.0**	**93.9**	**360.9**			
Percentage	60.0	40.0	100.0		40.0	20.0	100.0	60.0	80.0			

Table 27 - Phasing of Programme Costs, Million Taka

Programme Components	PY	Year 1 - 5	6 - 10	11 - 15	16 - 20	Total Costs		
	FY	1993/97	1998/02	2003/07	2008/12	Local	Foreign	Total
A. PHYSICAL INFRASTRUCTURE								
1. Roads								
- Access Road		1.8	2.8	2.9	3.3	7.7	3.0	10.7
- Main Road		103.3	160.7	181.0	211.0	472.4	183.7	656.1
- Secondary Road		12.4	19.0	18.8	19.1	49.9	19.4	69.3
Subtotal		**117.4**	**182.5**	**202.7**	**233.4**	**530.0**	**206.1**	**736.1**
B. EXTRACTION EQUIPMENTS								
1. Equipment Procurement		410.8	1.4	13.8	33.4	309.4	349.0	658.4
2. Replacement of existing Equipments			848.1	615.2	516.6	1,192.9	1,345.1	2,538.0
Subtotal		**410.8**	**849.5**	**629.0**	**550.0**	**1,502.3**	**1,694.1**	**3,196.4**
C. FOREST-BASED INDUSTRIES								
1. Sawmilling		2,730.8	606.8			901.2	2,436.5	3,337.6
2. Newsprint			4,376.6		389.0	1,786.5	2,979.1	4,765.6
3. Printing and Writing Paper			3,641.0	466.8		1,540.0	2,567.9	4,107.8
Subtotal		**2,730.8**	**8,624.5**	**466.8**	**389.0**	**4,227.7**	**7,983.4**	**12,211.1**
BASE COSTS		**3,259.0**	**9,656.5**	**1,298.5**	**1,172.4**	**6,259.9**	**9,883.6**	**16,143.6**
Physical Contingencies		168.8	492.0	75.1	70.3	339.5	504.5	844.0
TOTAL PROJECT COST		**3,427.8**	**10,148.5**	**1,373.6**	**1,242.7**	**6,599.4**	**10,388.1**	**16,987.6**

Table 28 - Cost Estimates - Roads and Logging Equipments

Items	Unit	Unit Cost (Taka '000)	Number of Units						Total Costs (Million Taka)							
			Year 1 - 5	6 - 10	11 - 15	16 - 20	21 - 25	Total	Year 1 - 5	6 - 10	11 - 15	16 - 20	21 - 25	Total	FEC	T and D
A. Physical Facilities																
1. Roads																
- Access Road	Km	345.0	5	8	8	10		31	1.8	2.8	2.9	3.3		10.7	3.0	2.1
- Main Road	Km	345.0	299	466	525	612		1,902	103.3	160.7	181.0	211.0		656.1	183.7	131.2
- Secondary Road	Km	57.5	216	331	326	332		1,205	12.4	19.0	18.8	19.1		69.3	19.4	13.9
Subtotal			520	805	859	954		3,138	117.4	182.5	202.7	233.4		736.1	206.1	147.2
B. EXTRACTION EQUIPMENTS																
1. Equipment Procurement																
- High Forest Logging	m^3	3.2	117,000					117,000	374.4					374.4	198.4	93.6
- Plantation Forest Logging	m^3	0.8	45,500	1,750	17,250	41,750	248,750	355,000	36.4	1.4	13.8	33.4	199.0	284.0	150.5	71.0
Subtotal									410.8	1.4	13.8	33.4	199.0	658.4	349.0	164.6
2. Replacement																
- High Forest Logging	m^3	3.2		255,938	182,813	146,250	146,250	731,251		819.0	585.0	468.0	468.0	2,340.0	1,240.2	585.0
- Plantation Forest Logging	m^3	0.8		36,375	37,750	60,750	112,625	247,500		29.1	30.2	48.6	90.1	198.0	104.9	49.5
Subtotal										848.1	615.2	516.6	558.1	2,538.0	1,345.1	634.5
C. FABRICATION OF SAWMILLS																
- Large Scale	No	385,110.0		1				1		385.1				385.1	281.1	38.5
- Medium Scale	No	221,730.0	2	1				3	443.5	221.7				665.2	485.6	66.5
- Teak	No	190,610.0	12					12	2,287.3					2,287.3	1,669.7	228.7
- Small Scale	No	30,808.8	3	9	27	61	47	147	92.4	277.3	831.8	1,879.3	1,448.0	4,528.9	3,306.1	452.9
- Push Bench	No	6,224.0	18	59	175	144	1	397	112.0	367.2	1,089.2	896.3	6.2	2,470.9	1,803.8	247.1
Subtotal									2,730.8	606.8				3,337.6	2,436.5	333.8

Table 29 - Cost Estimates - Forest-Based Industries

Items	Unit	Unit Cost (Taka '000)	Number of Units						Total Costs (Million Taka)							
			Year 1 - 5	6 - 10	11 - 15	16 - 20	21 - 25	Total	Year 1 - 5	6 - 10	11 - 15	16 - 20	21 - 25	Total	FEC	T and D
D. NEWSPRINT																
1. Machinery/ Equipments	Sum	2,800,800.0		1				1		2,800.8				2,800.8	2,240.6	560.2
2. Structures	Sum	866,692.0		1				1		866.7				866.7	173.3	173.3
3. Operating Supplies	Sum	87,914.0		1				1		87.9				87.9		
4. Equipment Rent	Sum	52,515.0		1				1		52.5				52.5	42.0	
5. Startup Cost	Sum	153,266.0		1				1		153.3				153.3	30.7	15.3
6. Studies/ Design	Sum	415,452.0		1				1		415.5				415.5	249.3	
Subtotal										4,376.6				4,376.6	2,735.9	748.8
.1. Machinery/ Equipments	Sum	248,960.0				1		1				249.0		249.0	199.2	49.8
2. Structures	Sum	77,022.0				1		1				77.0		77.0	15.4	15.4
3. Operating Supplies	Sum	7,780.0				1		1				7.8		7.8		
4. Equipment Rent	Sum	4,668.0				1		1				4.7		4.7	3.7	
5. Startup Cost	Sum	13,615.0				1		1				13.6		13.6	2.7	1.4
6. Studies/ Design	Sum	36,955.0				1		1				37.0		37.0	22.2	
Subtotal												389.0		389.0	243.2	66.6
Total										4,376.6		389.0		4,765.6	2,979.1	815.4
E. PRINTING AND WRITING PAPER																
1. Machinery/ Equipments	Sum	2,330,110.0		1				1		2,330.1				2,330.1	1,864.1	466.0
2. Structures	Sum	720,817.0		1				1		720.8				720.8	144.2	144.2
3. Operating Supplies	Sum	73,132.0		1				1		73.1				73.1		
4. Equipment Rent	Sum	43,568.0		1				1		43.6				43.6	34.9	
5. Startup Cost	Sum	127,592.0		1				1		127.6				127.6	25.5	12.8
6. Studies/ Design	Sum	345,821.0		1				1		345.8				345.8	207.5	
Subtotal										3,641.0				3,641.0	2,276.1	622.9
1. Machinery/ Equipments	Sum	298,752.0			1			1			298.8			298.8	239.0	59.8
2. Structures	Sum	92,582.0			1			1			92.6			92.6	18.5	18.5
3. Operating Supplies	Sum	9,336.0			1			1			9.3			9.3		
4. Equipment Rent	Sum	5,446.0			1			1			5.4			5.4	4.4	
5. Startup Cost	Sum	16,338.0			1			1			16.3			16.3	3.3	1.6
6. Studies/ Design	Sum	44,346.0			1			1			44.3			44.3	26.6	
Subtotal											466.8			466.8	291.8	79.9
Total										3,641.0	466.8			4,107.8	2,567.9	702.8

8. INSTITUTIONAL STRENGTHENING

Table 30 - Summary of Programme Costs

Programme Components	Million Taka			Million U $			% of	% of
	Foreign	Local	Total	Foreign	Local	Total	Base Costs	FEC
A. PHYSICAL INFRASTRUCTURE								
1. Land Acquisition		50.0	50.0		1.3	1.3	0.3	
2. Detail Engineering and Supervision		16.0	16.0		0.4	0.4	0.1	
3. Civil Works	26.7	240.4	267.1	0.7	6.2	6.9	1.5	1.1
Subtotal	**26.7**	**306.4**	**333.1**	**0.7**	**7.9**	**8.6**	**1.9**	**1.1**
B. FURNITURE, EQUIPMENT AND VEHICLES								
1. Furniture		17.6	17.6		0.5	0.5	0.1	
2. Equipments	59.5	14.9	74.4	1.5	0.4	1.9	0.4	2.5
3. Vehicles	137.0	34.2	171.2	3.5	0.9	4.4	1.0	5.8
Subtotal	**196.5**	**66.7**	**263.2**	**5.1**	**1.7**	**6.8**	**1.5**	**8.4**
C. HUMAN RESOURCES DEVELOPMENT								
1. Overseas Training for BFD Staff	364.5	40.5	405.0	9.4	1.0	10.4	2.3	15.5
2. Local Training to BFD Staff		100.0	100.0		2.6	2.6	0.6	
3. Local Training to Beneficiaries		300.0	300.0		7.7	7.7	1.7	
Subtotal	**364.5**	**440.5**	**805.0**	**9.4**	**11.3**	**20.7**	**4.6**	**15.5**
D. RESEARCH, DEVELOPMENT AND STUDIES								
1. Research and Development	1,239.6	945.5	2,185.2	31.9	24.3	56.2	12.4	52.7
2. Monitoring and Evaluation	40.0	100.0	140.0	1.0	2.6	3.6	0.8	1.7
Subtotal	**1,279.6**	**1,045.5**	**2,325.2**	**32.9**	**26.9**	**59.8**	**13.2**	**54.4**
E. CONSULTING SERVICES								
1. International	162.8	18.1	180.9	4.2	0.5	4.7	1.0	6.9
2. Local		36.9	36.9		0.9	0.9	0.2	
Subtotal	**162.8**	**55.0**	**217.8**	**4.2**	**1.4**	**5.6**	**1.2**	**6.9**
F. RECURRENT COSTS								
1. Existing Staff Salaries		8,732.5	8,732.5		224.5	224.5	49.7	
2. Incremental Staff Salaries		4,295.0	4,295.0		110.4	110.4	24.5	
3. Operation and Maintenance of Facilities	13.7	54.9	68.7	0.4	1.4	1.8	0.4	0.6
4. Vehicle/ Equipment Operation/ Maintenance	140.0	140.0	280.0	3.6	3.6	7.2	1.6	6.0
5. Office Supplies and Consumables	168.0	72.0	240.0	4.3	1.9	6.2	1.4	7.1
Subtotal	**321.7**	**13,294.4**	**13,616.2**	**8.3**	**341.8**	**350.0**	**77.5**	**13.7**
BASE COSTS	**2,351.9**	**15,208.6**	**17,560.5**	**60.5**	**391.0**	**451.4**	**100.0**	**100.0**
Physical Contingencies	118.9	775.8	894.7	3.1	19.9	23.0		
TOTAL PROGRAMME COST	**2,470.8**	**15,984.4**	**18,455.2**	**63.5**	**410.9**	**474.4**		

Table 31 - Proposed Financing Plan, Million U $

Project Components	Total Programme Cost			GOB Financing			Donors Financing			Beneficiaries Financing		
	Foreign	Local	Total	Foreign	Local	Total	Foreign	Local	Total	Foreign	Local	Total
A. PHYSICAL INFRASTRUCTURE												
1. Land Acquisition		1.3	1.3		1.3	1.3						
2. Detail Engineering and Supervision		0.4	0.4						0.4	0.4		
3. Civil Works	0.7	6.2	6.9		0.2	0.2	0.7	6.0	6.6			
Subtotal	**0.7**	**7.9**	**8.6**		**1.5**	**1.5**	**0.7**	**6.4**	**7.1**			
B. FURNITURE, EQUIPMENT AND VEHICLES												
1. Furniture		0.5	0.5						0.5	0.5		
2. Equipments	1.5	0.4	1.9		0.4	0.4	1.5		1.5			
3. Vehicles	3.5	0.9	4.4		0.9	0.9	3.5		3.5			
Subtotal	**5.1**	**1.7**	**6.8**		**1.3**	**1.3**	**5.1**	**0.5**	**5.5**			
C. HUMAN RESOURCES DEVELOPMENT												
1. Overseas Training for BFD Staff	9.4	1.0	10.4				9.4	1.0	10.4			
2. Local Training to BFD Staff		2.6	2.6					2.6	2.6			
3. Local Training to Beneficiaries		7.7	7.7					7.7	7.7			
Subtotal	**9.4**	**11.3**	**20.7**				**9.4**	**11.3**	**20.7**			
D. RESEARCH, DEVELOPMENT AND STUDIES												
1. Research and Development	31.9	24.3	56.2		4.8	4.8	31.9	19.5	51.3			
2. Monitoring and Evaluation	1.0	2.6	3.6		0.2	0.2	1.0	2.4	3.4			
Subtotal	**32.9**	**26.9**	**59.8**		**5.0**	**5.0**	**32.9**	**21.8**	**54.7**			
E. CONSULTING SERVICES												
1. International	4.2	0.5	4.7				4.2	0.5	4.7			
2. Local		0.9	0.9					0.9	0.9			
Subtotal	**4.2**	**1.4**	**5.6**				**4.2**	**1.4**	**5.6**			
F. RECURRENT COSTS												
1. Existing Staff Salaries		224.5	224.5		224.5	224.5						
2. Incremental Staff Salaries		110.4	110.4		110.4	110.4						
3. Operation and Maintenance of Facilities	0.4	1.4	1.8		1.4	1.4	0.4		0.4			
4. Vehicle/ Equipment Operation/ Maintenance	3.6	3.6	7.2		3.6	3.6	3.6		3.6			
5. Office Supplies and Consumables	4.3	1.9	6.2		1.9	1.9	4.3		4.3			
Subtotal	**8.3**	**341.8**	**350.0**		**341.8**	**341.8**	**8.3**		**8.3**			
Physical Contingencies	3.1	19.9	23.0		17.5	17.5	3.1	2.4	5.5			
TOTAL PROGRAMME COSTS	**63.5**	**410.9**	**474.4**		**367.1**	**367.1**	**63.5**	**43.8**	**107.3**			
PERCENTAGE	13.4	86.6	100.0		89.3	77.4	100.0	10.7	22.6			

Table 32 - Phasing of Programme Costs, Million Taka

Programme Components	PY Year 1 - 5 FY 1993/97	6 - 10 1998/02	11 - 15 2003/07	16 - 20 2008/12	Total Costs Local	Foreign	Total
A. PHYSICAL INFRASTRUCTURE							
1. Land Acquisition	50.0				50.0		50.0
2. Detail Engineering and Supervision	15.5	0.5			16.0		16.0
3. Civil Works	259.1	8.0			240.4	26.7	267.1
Subtotal	**324.7**	**8.5**			**306.4**	**26.7**	**333.1**
B. FURNITURE, EQUIPMENT AND VEHICLES							
1. Furniture	14.8			2.8	17.6		17.6
2. Equipments	37.2			37.2	14.9	59.5	74.4
3. Vehicles	85.6			85.6	34.2	137.0	171.2
Subtotal	**137.6**			**125.6**	**66.7**	**196.5**	**263.2**
C. HUMAN RESOURCES DEVELOPMENT							
1. Overseas Training for BFD Staff	202.5	202.5			40.5	364.5	405.0
2. Local Training to BFD Staff	25.0	25.0	25.0	25.0	100.0		100.0
3. Local Training to Beneficiaries	75.0	75.0	75.0	75.0	300.0		300.0
Subtotal	**302.5**	**302.5**	**100.0**	**100.0**	**440.5**	**364.5**	**805.0**
D. RESEARCH, DEVELOPMENT AND STUDIES							
1. Research and Development	576.7	572.1	500.7	535.7	945.5	1,239.6	2,185.2
2. Monitoring and Evaluation	35.0	35.0	35.0	35.0	100.0	40.0	140.0
Subtotal	**611.7**	**607.1**	**535.7**	**570.7**	**1,045.5**	**1,279.6**	**2,325.2**
E. CONSULTING SERVICES							
1. International	60.3	60.3	30.1	30.1	18.1	162.8	180.9
2. Local	11.9	12.5	6.3	6.3	36.9		36.9
Subtotal	**72.2**	**72.8**	**36.4**	**36.4**	**55.0**	**162.8**	**217.8**
F. RECURRENT COSTS							
1. Existing Staff Salaries	1,750.0	2,012.5	2,310.0	2,660.0	8,732.5		8,732.5
2. Incremental Staff Salaries	250.0	600.0	1,550.0	1,895.0	4,295.0		4,295.0
3. Operation and Maintenance of Facilities	17.2	17.2	17.2	17.2	54.9	13.7	68.7
4. Vehicle/ Equipment Operation/ Maintenance	70.0	70.0	70.0	70.0	140.0	140.0	280.0
5. Office Supplies and Consumables	60.0	60.0	60.0	60.0	72.0	168.0	240.0
Subtotal	**2,147.2**	**2,759.7**	**4,007.2**	**4,702.2**	**13,294.4**	**321.7**	**13,616.2**
BASE COSTS	**3,595.9**	**3,750.6**	**4,679.2**	**5,534.8**	**15,208.6**	**2,351.9**	**17,560.5**
Physical Contingencies	196.0	188.0	234.0	276.7	775.8	118.9	894.7
TOTAL PROJECT COST	**3,791.9**	**3,938.5**	**4,913.2**	**5,811.5**	**15,984.4**	**2,470.8**	**18,455.2**

Table 33 - Cost Estimates - Civil Works, Furniture, Equipments and Vehicles

Items	Unit	Unit Cost (Taka '000)	Number of Units						Total Costs (Million Taka)							
			Year 1 - 5	6 - 10	11 - 15	16 - 20	21 - 25	Total	Year 1 - 5	6 - 10	11 - 15	16 - 20	21 - 25	Total	FEC	T and D
A. Physical Facilities																
1. Land Acquisition	Ha	5,000.0	10					10	50.0					50.0		
2. Detail Engineering and Supervision 1_/	Percent	6.0							15.5	0.5				16.0		
Subtotal									**65.5**	**0.5**				**66.0**		
3. Civil Works																
- IFCU	m^2	10.1	8,500					8,500	85.9					85.9	8.6	8.6
- Forest Academy	m^2	8.6	4,000					4,000	34.4					34.4	3.4	3.4
- Sylhet Forest School	m^2	8.6	3,575					3,575	30.7					30.7	3.1	3.1
- Chittagong Forest School	m^2	8.6	1,650					1,650	14.2					14.2	1.4	1.4
- DFOs Office	m^2	8.6	1,850					1,850	15.9					15.9	1.6	1.6
- Office for other Officers	m^2	5.4	1,550	1,481				3,031	8.4	8.0				16.4	1.6	1.6
- Office for Other Staffs	m^2	5.4	2,200					2,200	11.9					11.9	1.2	1.2
- Forest Extension Nursery	m^2	5.4	10,700					10,700	57.8					57.8	5.8	5.8
Subtotal									**259.1**	**8.0**				**267.1**	**26.7**	**26.7**
B. Furniture																
- IFCU	Lumpsum	2,100.0	1			0.5		1.5	2.1			1.1		3.2		
- Forest College	Lumpsum	1,000.0	1			0.5		1.5	1.0			0.5		1.5		
- Sylhet Forest School	Lumpsum	1,000.0	1			0.5		1.5	1.0			0.5		1.5		
- Chittagong Forest School	Lumpsum	1,200.0	1			0.5		1.5	1.2			0.6		1.8		
- DFOs Office	Lumpsum	100.0	19			0.5		19.5	1.9			0.1		2.0		
- Office for other Officers	Lumpsum	50.0	24			0.5		24.5	1.2			0.0		1.2		
- Office for Other Staffs	Lumpsum	40.0	89			0.5		89.5	3.6			0.0		3.6		
- Forest Extension Nursery	Lumpsum	40.0	72			0.5		72.5	2.9			0.0		2.9		
Subtotal									**14.8**			**2.8**		**17.6**		
C. Equipments																
- IFCU	Lumpsum	10,000.0	1			1		2	10.0			10.0		20.0	16.0	4.0
- Forest College	Lumpsum	10,000.0	1			1		2	10.0			10.0		20.0	16.0	4.0
- Sylhet Forest School	Lumpsum	1,000.0	1			1		2	1.0			1.0		2.0	1.6	0.4
- Chittagong Forest School	Lumpsum	1,000.0	1			1		2	1.0			1.0		2.0	1.6	0.4
- DFOs Office	Lumpsum	250.0	19			19		38	4.8			4.8		9.5	7.6	1.9
- Office for other Officers	Lumpsum	100.0	24			24		48	2.4			2.4		4.8	3.8	1.0
- Office for Other Staffs	Lumpsum	50.0	89			89		178	4.5			4.5		8.9	7.1	1.8
- Forest Extension Nursery	Lumpsum	50.0	72			72		144	3.6			3.6		7.2	5.8	1.4
Subtotal									**37.2**			**37.2**		**74.4**	**59.5**	**14.9**
D. Vehicles																
- Motor Launch	No.	20,000.0	2			2		4	40.0			40.0		80.0	64.0	16.0
- Cabin Trawler	No.	1,500.0	5			5		10	7.5			7.5		15.0	12.0	3.0
- 4 WHD Jeep	No.	1,500.0	24			24		48	36.0			36.0		72.0	57.6	14.4
- Motor Cycle	No.	60.0	35			35		70	2.1			2.1		4.2	3.4	0.8
Subtotal									**85.6**			**85.6**		**171.2**	**137.0**	**34.2**

Table 34 - Cost Estimates - Human Resource Development, Research Studies and Operation/Maintenance

Items	Unit	Unit Cost (Taka '000)	Number of Units						Total Costs (Million Taka)							
			Year 1 - 5	6 - 10	11 - 15	16 - 20	21 - 25	Total	Year 1 - 5	6 - 10	11 - 15	16 - 20	21 - 25	Total	FEC	T and D
A. TRAINING																
1. Overseas Training for BFD Staff	No	450.0	450	450				900	202.5	202.5				405.0	364.5	
2. Local Training to BFD Staff	No	10.0	2,500	2,500	2,500	2,500		10,000	25.0	25.0	25.0	25.0		100.0		
3. Local Training to Beneficiaries	No	0.6	125,000	125,000	125,000	125,000		500,000	75.0	75.0	75.0	75.0		300.0		
Subtotal									**302.5**	**302.5**	**100.0**	**100.0**		**805.0**	**364.5**	
B. RESEARCH AND DEVELOPMENT																
1. Overseas Training		1,167.0	100	80	22	22		224	116.7	93.4	25.7	25.7		261.4	235.3	
2. Local Training		50.0	200	200	200	200		800	10.0	10.0	10.0	10.0		40.0		
3. Improvement of Field Research Station		75,000.0	1	1	0.8	0.8		3.5	75.0	75.0	56.3	56.3		262.5	105.0	26.3
4. Improvement of Laboratory Facilities		75,000.0	1	1	0.8	0.8		3.5	75.0	75.0	56.3	56.3		262.5	210.0	26.3
5. Improvement of Library Facilities		25,000.0	1	0.5	0.3	0.3		2	25.0	12.5	6.3	6.3		50.0	35.0	5.0
6. Improvement of Seed Production Area		50,000.0	1	1.5	1.8	2		6.3	50.0	75.0	90.0	100.0		315.0	157.5	31.5
7. Improvement of Seed Storage Facilities		75,000.0	1	0.8	0.8	0.8		3.3	75.0	56.3	56.3	56.3		243.8	121.9	24.4
8. Technology Transfer		25,000.0	1	1	1	1		4	25.0	25.0	25.0	25.0		100.0	50.0	10.0
9. Operation of Research Programmes		125,000.0	1	1.2	1.4	1.6		5.2	125.0	150.0	175.0	200.0		650.0	325.0	65.0
Subtotal									**576.7**	**572.1**	**500.7**	**535.7**		**2,185.2**	**1,239.6**	**188.4**
C. MONITORING AND EVALUATION																
1. Ongoing monitoring		20,000.0	1	1	1	1		4	20.0	20.0	20.0	20.0		80.0	40.0	8.0
1. Evaluation and Studies		15,000.0	1	1	1	1		4	15.0	15.0	15.0	15.0		60.0		
Subtotal									**35.0**	**35.0**	**35.0**	**35.0**		**140.0**	**40.0**	**8.0**
D. CONSULTING SERVICES																
1. International		603.0	100	100	50	50		300	60.3	60.3	30.1	30.1		180.9	162.8	
2. Local		50.0	238	250	125	125		738	11.9	12.5	6.3	6.3		36.9		
Subtotal									**72.2**	**72.8**	**36.4**	**36.4**		**217.8**	**162.8**	
E. RECURRENT COSTS																
1. Existing Staff Salaries		1,750,000.0	1	1.2	1.3	1.5		5	1,750.0	2,012.5	2,310.0	2,660.0		8,732.5		
2. Incremental Staff Salaries		250,000.0	1	2.4	6.2	7.6		17.2	250.0	600.0	1,550.0	1,895.0		4,295.0	-	
3. Operation and Maintenance of Facilities		17,170.0	1	1	1	1		4	17.2	17.2	17.2	17.2		68.7	13.7	6.9
4. Vehicle/ Equipment Operation/ Maintenance		70,000.0	1	1	1	1		4	70.0	70.0	70.0	70.0		280.0	140.0	28.0
5. Office Supplies and Consumables		60,000.0	1	1	1	1		4	60.0	60.0	60.0	60.0		240.0	168.0	24.0
Subtotal									**2,147.2**	**2,759.7**	**4,007.2**	**4,702.2**		**13,616.2**	**321.7**	**58.9**

APPENDIX 6
INVESTMENT PROGRAMME AND COSTS - SCENARIO 2

PROJECT 372001/31
FORESTRY MASTER PLAN,
BANGLADESH (TA NO.1355-BAN)

ASIAN DEVELOPMENT BANK
MANILA PHILIPPINES
DATE: JANUARY 1993

ECONOMICS AND MARKETING

APPENDIX 6
INVESTMENT PROGRAMME AND COSTS - SCENARIO 2

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1. SUMMARY OF PROGRAMME COSTS BY CATEGORIES OF EXPENDITURE

Table 1 - Summary of Programme Costs by Categories of Expenditure

Programme Components	Million Taka			Million U $			% of	% of
	Foreign	Local	Total	Foreign	Local	Total	Base Costs	FEC
A. PHYSICAL INFRASTRUCTURE								
1. Land Acquisition		735.0	735.0		18.9	18.9	0.6	
2. Detail Engineering and Supervision		172.5	172.5		4.4	4.4	0.1	
3. Civil Works	411.4	2,463.2	2,874.5	10.6	63.3	73.9	2.3	1.0
4. Construction of Roads	618.6	1,590.6	2,209.2	15.9	40.9	56.8	1.8	1.5
Subtotal	**1,029.9**	**4,961.3**	**5,991.3**	**26.5**	**127.5**	**154.0**	**4.8**	**2.5**
B. FURNITURE, EQUIPMENT AND VEHICLES								
1. Furniture		879.3	879.3		22.6	22.6	0.7	
2. Equipments	656.4	744.1	1,400.4	16.9	19.1	36.0	1.1	1.6
3. Vehicles	3,012.2	335.0	3,347.2	77.4	8.6	86.0	2.7	7.4
4. Extraction Equipments	3,152.3	1,460.8	4,613.1	81.0	37.6	118.6	3.7	7.7
Subtotal	**6,820.9**	**3,419.1**	**10,240.0**	**175.3**	**87.9**	**263.2**	**8.2**	**16.7**
C. NEW LEGISLATION		337.3	337.3		8.7	8.7	0.3	
Subtotal		**337.3**	**337.3**		**8.7**	**8.7**	**0.3**	
D. HUMAN RESOURCES DEVELOPMENT								
1. Overseas Training for BFD Staff	755.8	84.0	839.7	19.4	2.2	21.6	0.7	1.9
2. Local Training to BFD Staff		171.4	171.4		4.4	4.4	0.1	
3. Local Training to Beneficiaries		2,049.0	2,049.0		52.7	52.7	1.6	
3. Seminar and Workshops		76.5	76.5		2.0	2.0	0.1	
Subtotal	**755.8**	**2,380.9**	**3,136.6**	**19.4**	**61.2**	**80.6**	**2.5**	**1.9**
E. RESEARCH, DEVELOPMENT AND STUDIES								
1. Research and Development	1,318.4	1,009.1	2,327.5	33.9	25.9	59.8	1.9	3.2
2. Monitoring and Evaluation	125.0	771.0	896.0	3.2	19.8	23.0	0.7	0.3
Subtotal	**1,443.4**	**1,780.1**	**3,223.5**	**37.1**	**45.8**	**82.9**	**2.6**	**3.5**
F. CONSULTING SERVICES								
1. International	938.8	104.3	1,043.1	24.1	2.7	26.8	0.8	2.3
2. Local		347.8	347.8		8.9	8.9	0.3	
Subtotal	**938.8**	**452.1**	**1,390.9**	**24.1**	**11.6**	**35.8**	**1.1**	**2.3**
G. PLANTATION DEVELOPMENT/ FABRICATION OF ENERGY SAVING EQUIPMENTS								
1. Forest Production	1,710.2	15,813.7	17,523.8	44.0	406.5	450.5	14.0	4.2
2. Participatory Forestry	831.0	6,900.7	7,731.8	21.4	177.4	198.8	6.2	2.0
3. Non Wood Forest Products		353.5	353.5		9.1	9.1	0.3	
4. Wood-Based Energy	90.0	588.3	678.3	2.3	15.1	17.4	0.5	0.2
Subtotal	**2,631.2**	**23,656.2**	**26,287.4**	**67.6**	**608.1**	**675.8**	**21.0**	**6.4**
H. FOREST-BASED INDUSTRIES								
1. Sawmilling	5,954.9	2,202.5	8,157.3	153.1	56.6	209.7	6.5	14.6
2. Newsprint	4,378.6	2,626.5	7,005.1	112.6	67.5	180.1	5.6	10.7
3. Printing and Writing Paper	4,538.2	2,721.7	7,259.9	116.7	70.0	186.6	5.8	11.1
4. Wrapping/ Packaging Papers	3,618.9	2,169.8	5,788.7	93.0	55.8	148.8	4.6	8.9
5. Speciality Papers	7,617.2	4,566.6	12,183.9	195.8	117.4	313.2	9.7	18.7
Subtotal	**26,107.9**	**14,287.1**	**40,394.9**	**671.2**	**367.3**	**1,038.4**	**32.3**	**63.9**
I. RECURRENT COSTS								
1. Existing Staff Salaries		1,158.1	1,158.1		29.8	29.8	0.9	
2. Incremental Staff Salaries		31,091.0	31,091.0		799.3	799.3	24.8	
3. Operation and Maintenance of Facilities	60.8	123.2	184.0	1.6	3.2	4.7	0.1	0.1
4. Vehicle/ Equipment Operation/ Maintenance	535.0	535.0	1,070.0	13.8	13.8	27.5	0.9	1.3
5. Office Supplies and Consumables	513.1	219.9	733.0	13.2	5.7	18.8	0.6	1.3
Subtotal	**1,108.9**	**33,127.1**	**34,236.0**	**28.5**	**851.6**	**880.1**	**27.3**	**2.7**
BASE COSTS	**40,836.7**	**84,401.2**	**125,237.9**	**1,049.8**	**2,169.7**	**3,219.5**	**100.0**	**100.0**
Physical Contingencies	1,597.0	3,619.2	5,216.2	41.1	93.0	134.1		
TOTAL PROJECT COST	**42,433.7**	**88,020.4**	**130,454.1**	**1,090.8**	**2,262.7**	**3,353.6**		

2. LANDUSE, CONSERVATION AND ENVIRONMENTAL MANAGEMENT

Table 2 - Summary of Programme Costs

Programme Components	Million Taka			Million U $			% of	% of
	Foreign	Local	Total	Foreign	Local	Total	Base Costs	FEC
A. PHYSICAL INFRASTRUCTURE								
1. Land Acquisition		165.0	165.0		4.2	4.2	3.7	
2. Detail Engineering and Supervision		61.8	61.8		1.6	1.6	1.4	
3. Civil Works	103.0	926.7	1,029.7	2.6	23.8	26.5	23.1	12.7
Subtotal	**103.0**	**1,153.5**	**1,256.5**	**2.6**	**29.7**	**32.3**	**28.1**	**12.7**
B. FURNITURE, EQUIPMENT AND VEHICLES								
1. Furniture		36.3	36.3		0.9	0.9	0.8	
2. Equipments	203.6	50.9	254.4	5.2	1.3	6.5	5.7	25.1
3. Vehicles	94.1	23.5	117.6	2.4	0.6	3.0	2.6	11.6
Subtotal	**297.6**	**110.7**	**408.3**	**7.7**	**2.8**	**10.5**	**9.1**	**36.7**
C. HUMAN RESOURCES DEVELOPMENT								
1. Overseas Training	16.2	1.8	18.0	0.4	0.0	0.5	0.4	2.0
2. Short Courses (Overseas)	64.8	7.2	72.0	1.7	0.2	1.9	1.6	8.0
3. Training of Trainers		3.0	3.0		0.1	0.1	0.1	
4. Training of Local Government Officials		2.0	2.0		0.1	0.1	0.0	
5. Training of Villagers		720.0	720.0		18.5	18.5	16.1	
6. Workshop and Seminars		16.5	16.5		0.4	0.4	0.4	
Subtotal	**81.0**	**750.5**	**831.5**	**2.1**	**19.3**	**21.4**	**18.6**	
D. RESEARCH, DEVELOPMENT AND STUDIES								
1. Inventory		2.4	2.4		0.1	0.1		
2. Surveys		90.0	90.0		2.3	2.3	2.0	
3. Research and Development Studies		48.0	48.0		1.2	1.2	1.1	
4. Monitoring and Evaluation		100.0	100.0		2.6	2.6	2.2	
Subtotal		**240.4**	**240.4**		**6.2**	**6.2**	**5.4**	
E. CONSULTING SERVICES								
1. International	244.2	27.1	271.3	6.3	0.7	7.0	6.1	
2. Local		225.6	225.6		5.8	5.8	5.1	
Subtotal	**244.2**	**252.8**	**496.9**	**6.3**	**6.5**	**12.8**	**11.1**	**30.1**
F. RECURRENT COSTS								
1. Existing Staff Salaries		274.8	274.8		7.1	7.1	6.2	
2. Incremental Staff Salaries		798.3	798.3		20.5	20.5	17.9	
3. Operation and Maintenance of Facilities	4.0	16.0	20.0	0.1	0.4	0.5	0.4	0.5
4. Vehicle/ Equipment Operation/ Maintenance	40.0	40.0	80.0	1.0	1.0	2.1	1.8	4.9
5. Office Supplies and Consumables	42.0	18.0	60.0	1.1	0.5	1.5	1.3	5.2
Subtotal	**86.0**	**1,147.1**	**1,233.1**	**2.2**	**29.5**	**31.7**	**27.6**	**10.6**
BASE COSTS	**811.8**	**3,654.9**	**4,466.7**	**20.9**	**94.0**	**114.8**	**100.0**	**100.0**
Physical Contingencies	45.7	240.4	286.2	1.2	6.2	7.4		
TOTAL PROJECT COST	**857.5**	**3,895.3**	**4,752.9**	**22.0**	**100.1**	**122.2**		

Table 3 - Proposed Financing Plan, Million U $

Project Components	Total Programme Cost			GOB Financing			Donors Financing			Beneficiaries Financing		
	Foreign	Local	Total	Foreign	Local	Total	Foreign	Local	Total	Foreign	Local	Total
A. PHYSICAL INFRASTRUCTURE												
1. Land Acquisition		4.2	4.2		4.2	4.2						
2. Detail Engineering and Supervision		1.6	1.6					1.6	1.6			
3. Civil Works	2.6	23.8	26.5		2.6	2.6	2.6	21.2	23.8			
Subtotal	**2.6**	**29.7**	**32.3**		**6.9**	**6.9**	**2.6**	**22.8**	**25.4**			
B. FURNITURE, EQUIPMENT AND VEHICLES												
1. Furniture		0.9	0.9					0.9	0.9			
2. Equipments	5.2	1.3	6.5		1.3	1.3	5.2		5.2			
3. Vehicles	2.4	0.6	3.0		0.6	0.6	2.4		2.4			
Subtotal	**7.7**	**2.8**	**10.5**		**1.9**	**1.9**	**7.7**	**0.9**	**8.6**			
C. HUMAN RESOURCES DEVELOPMENT												
1. Overseas Training	0.4	0.0	0.5				0.4	0.0	0.5			
2. Short Courses (Overseas)	1.7	0.2	1.9				1.7	0.2	1.9			
3. Training of Trainers		0.1	0.1					0.1	0.1			
4. Training of Local Government Officials		0.1	0.1					0.1	0.1			
5. Training of Villagers		18.5	18.5					18.5	18.5			
6. Workshop and Seminars		0.4	0.4					0.4	0.4			
Subtotal	**2.1**	**19.3**	**21.4**				**2.1**	**19.3**	**21.4**			
D. RESEARCH, DEVELOPMENT AND STUDIES												
1. Inventory		0.1	0.1					0.1	0.1			
2. Surveys		2.3	2.3					2.3	2.3			
3. Research and Development Studies		1.2	1.2					1.2	1.2			
4. Monitoring and Evaluation		2.6	2.6					2.6	2.6			
Subtotal		**6.2**	**6.2**					**6.2**	**6.2**			
E. CONSULTING SERVICES												
1. International	6.3	0.7	7.0				6.3	0.7	7.0			
2. Local		5.8	5.8					5.8	5.8			
Subtotal	**6.3**	**6.5**	**12.8**				**6.3**	**6.5**	**12.8**			
F. RECURRENT COSTS												
1. Existing Staff Salaries		7.1	7.1		7.1	7.1						
2. Incremental Staff Salaries		20.5	20.5								20.5	20.5
3. Operation and Maintenance of Facilities	0.1	0.4	0.5		0.1	0.1	0.1		0.1		0.3	0.3
4. Vehicle/ Equipment Operation/ Maintenance	1.0	1.0	2.1		0.2	0.2	1.0		1.0		0.8	0.8
5. Office Supplies and Consumables	1.1	0.5	1.5		0.1	0.1	1.1		1.1		0.4	0.4
Subtotal	**2.2**	**29.5**	**31.7**		**7.4**	**7.4**	**2.2**		**2.2**		**22.0**	**22.0**
BASE COSTS	**20.9**	**94.0**	**114.8**		**16.2**	**16.2**	**20.9**	**55.7**	**76.5**		**22.0**	**22.0**
Physical Contingencies	1.2	6.2	7.4		1.1	1.2	1.2	3.7	1.2		1.4	4.9
TOTAL PROJECT COST	**22.0**	**100.1**	**122.2**		**17.3**	**17.5**	**22.0**	**59.4**	**77.7**		**23.5**	**27.0**
PERCENTAGE	18.0	82.0	100.0		17.3	14.3	100.0	59.3	63.6		23.4	22.1

Table 4 - Phasing of Programme Costs, Million Taka

Programme Components	PY Year 1 - 5	6 - 10	11 - 15	16 - 20	Total Costs		
	FY 1993/97	1998/02	2003/07	2008/12	Local	Foreign	Total
A. PHYSICAL INFRASTRUCTURE							
1. Land Acquisition	15.0	50.0	50.0	50.0	165.0		165.0
2. Detail Engineering and Supervision	36.0	11.8	3.9	10.1	61.8		61.8
3. Civil Works	599.8	197.1	64.8	168.0	926.7	103.0	1,029.7
Subtotal	**650.8**	**258.9**	**118.7**	**228.1**	**1,153.5**	**103.0**	**1,256.5**
B. FURNITURE, EQUIPMENT AND VEHICLES							
1. Furniture	19.7	9.7	4.0	3.0	36.3		36.3
2. Equipments	195.3	12.0	7.0	40.1	50.9	203.6	254.4
3. Vehicles	58.2	16.2		43.2	23.5	94.1	117.6
Subtotal	**273.2**	**37.9**	**11.0**	**86.3**	**110.7**	**297.6**	**408.3**
C. HUMAN RESOURCES DEVELOPMENT							
1. Overseas Training	12.0	6.0			1.8	16.2	18.0
2. Short Courses (Overseas)	18.0	18.0	18.0	18.0	7.2	64.8	72.0
3. Training of Trainers	1.0	1.0	1.0		3.0		3.0
4. Training of Local Government Officials	0.5	0.5	0.5	0.5	2.0		2.0
5. Training of Villagers	120.0	160.0	200.0	240.0	720.0		720.0
6. Workshop and Seminars	7.5	4.5	3.0	1.5	16.5		16.5
Subtotal	**159.0**	**190.0**	**222.5**	**260.0**	**750.5**	**81.0**	**831.5**
D. RESEARCH, DEVELOPMENT AND STUDIES							
1. Inventory	2.4				2.4		2.4
2. Surveys	90.0				90.0		90.0
3. Research and Development Studies	16.0	16.0	8.0	8.0	48.0		48.0
4. Monitoring and Evaluation	25.0	25.0	25.0	25.0	100.0		100.0
Subtotal	**133.4**	**41.0**	**33.0**	**33.0**	**240.4**		**240.4**
E. CONSULTING SERVICES							
1. International	180.9	90.4			27.1	244.2	271.3
2. Local	155.6	70.0			225.6		225.6
Subtotal	**336.5**	**160.5**			**252.8**	**244.2**	**496.9**
F. RECURRENT COSTS							
1. Existing Staff Salaries	55.1	63.3	72.7	83.7	274.8		274.8
2. Incremental Staff Salaries	97.8	195.7	234.8	270.0	798.3		798.3
3. Operation and Maintenance of Facilities	5.0	5.0	5.0	5.0	16.0	4.0	20.0
4. Vehicle/ Equipment Operation/ Maintenance	20.0	20.0	20.0	20.0	40.0	40.0	80.0
5. Office Supplies and Consumables	15.0	15.0	15.0	15.0	18.0	42.0	60.0
Subtotal	**192.9**	**299.0**	**347.5**	**393.7**	**1,147.1**	**86.0**	**1,233.1**
BASE COSTS	**1,745.7**	**987.3**	**732.6**	**1,001.1**	**3,654.9**	**811.8**	**4,466.7**
Physical Contingencies	119.8	62.3	42.6	61.5	240.4	45.7	286.2
TOTAL PROJECT COST	**1,865.5**	**1,049.6**	**775.2**	**1,062.6**	**3,895.3**	**857.5**	**4,752.9**

Table 5 - Cost Estimates - Civil Works, Furniture, Equipments and Vehicles

Items	Unit	Unit Cost (Taka '000)	Number of Units						Total Costs (Million Taka)							
			Year 1 - 5	6 - 10	11 - 15	16 - 20	21 - 25	Total	Year 1 - 5	6 - 10	11 - 15	16 - 20	21 - 25	Total	FEC	T and D
A. PHYSICAL FACILITIES																
1. Land Acquisition	Ha	5,000.0	3	10	10	10		33	15	50	50	50		165		
2. Detail Engineering and Supervision 1_/	Percent	6.0							36	11.8	3.9	10.1		61.8		
Subtotal									**51.0**	**61.8**	**53.9**	**60.1**		**226.8**		
3. Civil Works																
- Department	m^2	10.1	1,000					1,000	10.1					10.1	1.0	1.0
- Regional Offices	m^2	8.6	3,000					3,000	25.8					25.8	2.6	2.6
- Existing National Parks(Protected Areas)	m^2	5.4	10,000					10,000	54.0					54.0	5.4	5.4
- New Protected Areas	m^2	5.4	60,000	20,000				80,000	324.0	108.0				432.0	43.2	43.2
- Field Rest House	m^2	5.4	4,700					4,700	25.4					25.4	2.5	2.5
- Herbarium and Botanical Gardens	m^2	5.4	1,600					1,600	8.6					8.6	0.9	0.9
- Regional Nature Conservation Center	m^2	5.4	1,500	4,500				6,000	8.1	24.3				32.4	3.2	3.2
- National and Regional Zoo	m^2	5.4	10,700	12,000	12,000	12,000		46,700	57.8	64.8	64.8	64.8		252.2	25.2	25.2
- Natural History Museum	m^2	8.6	10,000			12,000		22,000	86.0			103.2		189.2	18.9	18.9
Subtotal								**175,000.0**	**599.8**	**197.1**	**64.8**	**168.0**		**1,029.7**	**103.0**	**103.0**
B. FURNITURE																
- Department of Natural Resource Conservation	Lumpsum	500.0	1		1			2	0.5		0.5			1.0		
- Regional Offices	Lumpsum	200.0	6		6			12	1.2		1.2			2.4		
- Existing National Parks(Protected Areas)	Lumpsum	5,000.0	1					1	5.0					5.0		
- New Protected Areas	Lumpsum	1,000.0	5	5				10	5.0	5.0				10.0		
- Field Rest House	Lumpsum	50.0	30	12		30		72	1.5	0.6		1.5		3.6		
- Herbarium	Lumpsum	300.0	10					10	3.0					3.0		
- Regional Nature Conservation Center	Lumpsum	150.0	13	17	5			35	2.0	2.6	0.8			5.3		
- National Zoo	Lumpsum	1,500.0	1	1	1	1		4	1.5	1.5	1.5	1.5		6.0		
- Natural History Museum	Lumpsum	1,500.0	1					1	1.5					1.5		
Subtotal									**19.7**	**9.7**	**4.0**	**3.0**		**36.3**		
C. EQUIPMENTS																
- Department of Natural Resource Conservation	Lumpsum	10,000.0	1			1		2	10.0			10.0		20.0	16.0	4.0
- Department of Environment	Lumpsum	10,000.0	1			1		2	10.0			10.0		20.0	16.0	4.0
- Forest Department	Lumpsum	2,000.0	1			1		2	2.0			2.0		4.0	3.2	0.8
- Regional Offices	Lumpsum	500.0	1			1		2	0.5			0.5		1.0	0.8	0.2
- Existing National Parks(Protected Areas)	Lumpsum	5,000.0	1			1		2	5.0			5.0		10.0	8.0	2.0
- New Protected Areas	Lumpsum	7,000.0	1			1		2	7.0			7.0		14.0	11.2	2.8
- Field Rest House	Lumpsum	20.0	30	12		30		72	0.6	0.2		0.6		1.4	1.2	0.3
- Herbarium	Lumpsum	14,500.0	10					10	145.0					145.0	116.0	29.0
- Regional Nature Conservation Center	Lumpsum	400.0	13	17	5			35	5.2	6.8	2.0			14.0	11.2	2.8
- National Zoo	Lumpsum	5,000.0	1	1	1	1		4	5.0	5.0	5.0	5.0		20.0	16.0	4.0
- Natural History Museum	Lumpsum	5,000.0	1					1	5.0					5.0	4.0	1.0
Subtotal									**195.3**	**12.0**	**7.0**	**40.1**		**254.4**	**203.6**	**50.9**
D. VEHICLES																
- 4 WHD Jeep	No.	1,500.0	18	10		18		46	27.0	15.0		27.0		69.0	55.2	13.8
- Motor Cycle	No.	60.0	30	20		30		80	1.8	1.2		1.8		4.8	3.8	1.0
- Speed Boat	No.	1,200.0	12			12		24	14.4			14.4		28.8	23.0	5.8
- Coastal Research Vessel	No.	15,000.0	1					1	15.0					15.0	12.0	3.0
- River Patrol Boat	No.	1,000.0	6			6		12	6.0			6.0		12.0	9.6	2.4
- Amphibious Aircraft	No.	2,000.0	2					2	4.0					4.0	3.2	0.8
Subtotal									**58.2**	**16.2**		**43.2**		**117.6**	**94.1**	**23.5**

Table 6 - Cost Estimates - Human Resource Development, Research Studies, Monitoring and Operation/Maintenance

Items	Unit	Unit Cost (Taka '000)	Number of Units						Total Costs (Million Taka)							
			Year 1 - 5	6 - 10	11 - 15	16 - 20	21 - 25	Total	Year 1 - 5	6 - 10	11 - 15	16 - 20	21 - 25	Total	FEC	T and D
A. TRAINING AND SEMINAR																
1. Overseas Training	No	1,200.0	10	5				15	12.0	6.0				18.0	16.2	
2. Short Courses (Overseas)	No	450.0	40	40	40	40		160	18.0	18.0	18.0	18.0		72.0	64.8	
3. Training of Trainers	No	20.0	50	50	50			150	1.0	1.0	1.0			3.0		
4. Training of Local Government Officials	No	10.0	50	50	50	50		200	0.5	0.5	0.5	0.5		2.0		
5. Training of Villagers	No	2.0	60,000	80,000	100,000	120,000		360,000	120.0	160.0	200.0	240.0		720.0		
6. Workshop and Seminars	No	150.0	50	30	20	10		110	7.5	4.5	3.0	1.5		16.5		
Subtotal									**159.0**	**190.0**	**222.5**	**260.0**		**831.5**	**81.0**	
B. RESEARCH, DEVELOPMENT AND STUDIES																
1. Inventory	Sum	400.0	6					6	2.4					2.4		
2. Surveys	Sum	30,000.0	3					3	90.0					90.0		
3. Research and Development Studies	Sum	800.0	20	20	10	10		60	16.0	16.0	8.0	8.0		48.0		
4. Monitoring and Evaluation	Sum	500.0	50	50	50	50		200	25.0	25.0	25.0	25.0		100.0		
Subtotal									**133.4**	**41.0**	**33.0**	**33.0**		**240.4**		
C. COMMUNITY BASED RESOURCE MANAGEMENT	Sum	1,167,000.0	0.4	0.2	0.2	0.2		1	466.8	233.4	233.4	233.4		1,167.0		
D. CONSULTING SERVICES																
1. International	mm	603.0	300	150				450	180.9	90.4				271.3	244.2	
2. Local	mm	155.6	1,000	450				1,450	155.6	70.0				225.6		
Subtotal									**336.5**	**160.5**				**496.9**	**244.2**	
E. RECURRENT COSTS																
1. Existing Staff Salaries	Sum	55,075.0	1	1.2	1.3	1.5		5	55.1	63.3	72.7	83.7		274.8		
2. Incremental Staff Salaries	Sum	97,825.2	1	2	2.4	2.8		8.2	97.8	195.7	234.8	270.0		798.3		
3. Operation and Maintenance of Facilities	Sum	5,000.0	1	1	1	1		4	5.0	5.0	5.0	5.0		20.0	4.0	2.0
4. Vehicle/ Equipment Operation/ Maintenance	Sum	20,000.0	1	1	1	1		4	20.0	20.0	20.0	20.0		80.0	40.0	8.0
5. Office Supplies and Consumables	Sum	15,000.0	1	1	1	1		4	15.0	15.0	15.0	15.0		60.0	42.0	6.0
Subtotal									**192.9**	**299.0**	**347.5**	**393.7**		**1,233.1**	**86.0**	**16.0**

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3. FOREST PLANTATION DEVELOPMENT

Table 7 - Summary of Programme Costs

Programme Components	Million Taka			Million U $			% of	% of
	Foreign	Local	Total	Foreign	Local	Total	Base Costs	FEC
A. LONG ROTATION								
1. Nursery	42.5	382.4	424.9	1.1	9.8	10.9		
2. Plantation Establishment	74.5	670.1	744.6	1.9	17.2	19.1	4.2	4.4
3. Plantation Maintenance	186.0	1,674.2	1,860.3	4.8	43.0	47.8	10.6	10.9
Subtotal	**303.0**	**2,726.8**	**3,029.8**	**7.8**	**70.1**	**77.9**	**17.3**	**17.7**
B. MEDIUM ROTATION								
1. Nursery	91.9	826.7	918.6	2.4	21.3	23.6	5.2	5.4
2. Plantation Establishment	163.6	1,472.0	1,635.5	4.2	37.8	42.0	9.3	9.6
3. Plantation Maintenance	410.2	3,691.8	4,102.0	10.5	94.9	105.4		
Subtotal	**665.6**	**5,990.5**	**6,656.1**	**17.1**	**154.0**	**171.1**	**38.0**	**38.9**
C. SHORT ROTATION								
1. Nursery	42.2	380.0	422.2	1.1	9.8	10.9	2.4	2.5
2. Plantation Establishment	59.1	531.6	590.7	1.5	13.7	15.2	3.4	3.5
3. Plantation Maintenance	85.8	772.0	857.7	2.2	19.8	22.0	4.9	5.0
Subtotal	**187.1**	**1,683.5**	**1,870.6**	**4.8**	**43.3**	**48.1**	**10.7**	**10.9**
D. ENRICHMENT PLANTATION								
1. Nursery	126.5	1,138.4	1,264.9	3.3	29.3	32.5	7.2	7.4
2. Plantation Establishment	84.3	1,180.6	1,264.9	2.2	30.3	32.5	7.2	4.9
3. Plantation Maintenance	214.4	1,929.6	2,144.0	5.5	49.6	55.1	12.2	12.5
Subtotal	**425.2**	**4,248.6**	**4,673.7**	**10.9**	**109.2**	**120.1**	**26.7**	**24.9**
E. COASTAL AFFORESTATION								
1. Nursery	15.0	135.0	150.0	0.4	3.5	3.9	0.9	0.9
2. Plantation Establishment	42.9	386.1	429.0	1.1	9.9	11.0	2.4	2.5
3. Plantation Maintenance	15.0	135.0	150.0	0.4	3.5	3.9	0.9	0.9
Subtotal	**72.9**	**656.1**	**729.0**	**1.9**	**16.9**	**18.7**	**4.2**	**4.3**
F. PARKS AND GAME SANCTUARIES								
1. Nursery	14.6	131.6	146.3	0.4	3.4	3.8	0.8	0.9
2. Plantation Establishment	16.3	146.3	162.5	0.4	3.8	4.2	0.9	1.0
3. Plantation Maintenance	25.6	230.3	255.9	0.7	5.9	6.6	1.5	1.5
Subtotal	**56.5**	**508.2**	**564.7**	**1.5**	**13.1**	**14.5**	**3.2**	**3.3**
BASE COSTS	**1,710.2**	**15,813.7**	**17,523.8**	**44.0**	**406.5**	**450.5**	**100.0**	**100.0**
Physical Contingencies	58.3	524.4	582.6	1.5	13.5	15.0		
TOTAL PROJECT COST	**1,768.4**	**16,338.0**	**18,106.5**	**45.5**	**420.0**	**465.5**		

Table 8 - Proposed Financing Plan, Million U $

Project Components	Total Programme Cost			GOB Financing			Donors Financing			Beneficiaries Financing		
	Foreign	Local	Total	Foreign	Local	Total	Foreign	Local	Total	Foreign	Local	Total
A. LONG ROTATION												
1. Nursery	1.1	9.8	10.9				1.1	7.9	9.0		2.0	2.0
2. Plantation Establishment	1.9	17.2	19.1				1.9	13.8	15.7		3.4	3.4
3. Plantation Maintenance	4.8	43.0	47.8				4.8	34.4	39.2		8.6	8.6
Subtotal	**7.8**	**70.1**	**77.9**				**7.8**	**56.1**	**63.9**		**14.0**	**14.0**
B. MEDIUM ROTATION												
1. Nursery	2.4	21.3	23.6				2.4	17.0	19.4		4.3	4.3
2. Plantation Establishment	4.2	37.8	42.0				4.2	30.3	34.5		7.6	7.6
3. Plantation Maintenance	10.5	94.9	105.4				10.5	75.9	86.5		19.0	19.0
Subtotal	**17.1**	**154.0**	**171.1**				**17.1**	**123.2**	**140.3**		**30.8**	**30.8**
C. SHORT ROTATION												
1. Nursery	1.1	9.8	10.9				1.1	7.8	8.9		2.0	2.0
2. Plantation Establishment	1.5	13.7	15.2				1.5	10.9	12.5		2.7	2.7
3. Plantation Maintenance	2.2	19.8	22.0				2.2	15.9	18.1		4.0	4.0
Subtotal	**4.8**	**43.3**	**48.1**				**4.8**	**34.6**	**39.4**		**8.7**	**8.7**
D. ENRICHMENT PLANTATION												
1. Nursery	3.3	29.3	32.5				3.3	23.4	26.7		5.9	5.9
2. Plantation Establishment	2.2	30.3	32.5				2.2	24.3	26.4		6.1	6.1
3. Plantation Maintenance	5.5	49.6	55.1				5.5	39.7	45.2		9.9	9.9
Subtotal	**10.9**	**109.2**	**120.1**				**10.9**	**87.4**	**98.3**		**21.8**	**21.8**
E. COASTAL AFFORESTATION												
1. Nursery	0.4	3.5	3.9				0.4	2.8	3.2		0.7	0.7
2. Plantation Establishment	1.1	9.9	11.0				1.1	7.9	9.0		2.0	2.0
3. Plantation Maintenance	0.4	3.5	3.9				0.4	2.8	3.2		0.7	0.7
Subtotal	**1.9**	**16.9**	**18.7**				**1.9**	**13.5**	**15.4**		**3.4**	**3.4**
F. PARKS AND GAME SANCTUARIES												
1. Nursery	0.4	3.4	3.8				0.4	2.7	3.1		0.7	0.7
2. Plantation Establishment	0.4	3.8	4.2				0.4	3.0	3.4		0.8	0.8
3. Plantation Maintenance	0.7	5.9	6.6				0.7	4.7	5.4		1.2	1.2
Subtotal	**1.5**	**13.1**	**14.5**				**1.5**	**10.5**	**11.9**		**2.6**	**2.6**
BASE COSTS	**44.0**	**406.5**	**450.5**				**44.0**	**325.2**	**369.2**		**81.3**	**81.3**
Physical Contingencies	1.5	13.5	15.0				1.5	8.0	9.5		5.5	5.5
TOTAL PROGRAMME COST	**45.5**	**420.0**	**465.5**				**45.5**	**333.2**	**378.6**		**86.8**	**86.8**
Percentage	9.8	90.2	100.0				100.0	79.3	81.3		20.7	18.7

Table 9 - Phasing of Programme Costs, Million Taka

Programme Components	PY Year 1 - 5	6 - 10	11 - 15	16 - 20	Total Costs		
	FY 1993/97	1998/02	2003/07	2008/12	Local	Foreign	Total
A. LONG ROTATION							
1. Nursery	111.2	109.1	96.3	108.3	382.4	42.5	424.9
2. Plantation Establishment	188.9	189.6	175.6	190.5	670.1	74.5	744.6
3. Plantation Maintenance	451.8	468.5	461.8	478.2	1,674.2	186.0	1,860.3
Subtotal	**751.9**	**767.2**	**733.7**	**777.0**	**2,726.8**	**303.0**	**3,029.8**
B. MEDIUM ROTATION							
1. Nursery	229.7	229.7	229.7	229.7	826.7	91.9	918.6
2. Plantation Establishment	408.9	408.9	408.9	408.9	1,472.0	163.6	1,635.5
3. Plantation Maintenance	1,025.5	1,025.5	1,025.5	1,025.5	3,691.8	410.2	4,102.0
Subtotal	**1,664.0**	**1,664.0**	**1,664.0**	**1,664.0**	**5,990.5**	**665.6**	**6,656.1**
C. SHORT ROTATION							
1. Nursery	79.7	99.7	121.4	121.4	380.0	42.2	422.2
2. Plantation Establishment	111.5	139.4	169.8	169.8	531.6	59.1	590.7
3. Plantation Maintenance	162.0	202.5	246.6	246.6	772.0	85.8	857.7
Subtotal	**353.2**	**441.6**	**537.9**	**537.9**	**1,683.5**	**187.1**	**1,870.6**
D. ENRICHMENT PLANTATION							
1. Nursery	316.2	316.2	316.2	316.2	1,138.4	126.5	1,264.9
2. Plantation Establishment	210.7	210.7	210.7	210.7	1,180.6	84.3	1,264.9
3. Plantation Maintenance	536.0	536.0	536.0	536.0	1,929.6	214.4	2,144.0
Subtotal	**1,062.9**	**1,062.9**	**1,062.9**	**1,062.9**	**4,248.6**	**425.2**	**4,673.7**
E. COASTAL AFFORESTATION							
1. Nursery	37.5	37.5	37.5	37.5	135.0	15.0	150.0
2. Plantation Establishment	107.3	107.3	107.3	107.3	386.1	42.9	429.0
3. Plantation Maintenance	37.5	37.5	37.5	37.5	135.0	15.0	150.0
Subtotal	**182.3**	**182.3**	**182.3**	**182.3**	**656.1**	**72.9**	**729.0**
F. PARKS AND GAME SANCTUARIES							
1. Nursery	36.6	36.6	36.6	36.6	131.6	14.6	146.3
2. Plantation Establishment	40.6	40.6	40.6	40.6	146.3	16.3	162.5
3. Plantation Maintenance	64.0	64.0	64.0	64.0	230.3	25.6	255.9
Subtotal	**141.2**	**141.2**	**141.2**	**141.2**	**508.2**	**56.5**	**564.7**
BASE COSTS	**4,155.5**	**4,259.1**	**4,321.9**	**4,365.2**	**15,813.7**	**1,710.2**	**17,523.8**
Physical Contingencies	145.8	145.8	145.1	145.9	524.4	58.3	582.6
TOTAL PROJECT COST	**4,301.2**	**4,404.9**	**4,467.0**	**4,511.1**	**16,338.0**	**1,768.4**	**18,106.5**

Table 10 - Cost Estimates - Forest Plantation Development

Items	Unit	Unit Cost (Taka '000)	Number of Units						Total Costs (Million Taka)							
			Year 1 - 5	6 - 10	11 - 15	16 - 20	21 - 25	Total	Year 1 - 5	6 - 10	11 - 15	16 - 20	21 - 25	Total	FEC	T and D
A. LONG ROTATION																
1. Nursery																
- Stump	Ha	3.0	11,904	13,205	14,575	13,902		53,586	35.7	39.6	43.7	41.7		160.8	16.1	
- Polybags	Ha	7.3	10,411	9,585	7,255	9,188		36,439	75.5	69.5	52.6	66.6		264.2	26.4	
Subtotal			22,315	22,790	21,830	23,090		90,025	111.2	109.1	96.3	108.3		424.9	42.5	
2. Plantation Establishment																
- Stump	Ha	7.0	11,904	13,205	14,575	13,902		53,586	83.3	92.4	102.0	97.3		375.1	37.5	
- Polybags	Ha	10.1	10,411	9,585	7,255	9,188		36,439	105.6	97.2	73.6	93.2		369.5	36.9	
Subtotal									188.9	189.6	175.6	190.5		744.6	74.5	
3. Plantation Maintenance																
- Stump	Ha	23.4	11,904	13,205	14,575	13,902		53,586	278.6	309.0	341.1	325.3		1,253.9	125.4	
- Polybags	Ha	16.6	10,411	9,585	7,255	9,188		36,439	173.2	159.5	120.7	152.9		606.3	60.6	
Subtotal									451.8	468.5	461.8	478.2		1,860.3	186.0	
Total									751.9	767.2	733.7	777.0		3,029.8	303.0	
B. MEDIUM ROTATION																
1. Nursery																
- Stump	Ha	3.0	31,250	31,250	31,250	31,250		125,000	93.8	93.8	93.8	93.8		375.0	37.5	
- Polybags	Ha	7.2	18,750	18,750	18,750	18,750		75,000	135.9	135.9	135.9	135.9		543.6	54.4	
Subtotal			50,000	50,000	50,000	50,000		200,000	229.7	229.7	229.7	229.7		918.6	91.9	
2. Plantation Establishment																
- Stump	Ha	7.0	31,250	31,250	31,250	31,250		125,000	218.8	218.8	218.8	218.8		875.0	87.5	
- Polybags	Ha	10.1	18,750	18,750	18,750	18,750		75,000	190.1	190.1	190.1	190.1		760.5	76.1	
Subtotal									408.9	408.9	408.9	408.9		1,635.5	163.6	
3. Plantation Maintenance																
- Stump	Ha	21.6	31,250	31,250	31,250	31,250		125,000	675.0	675.0	675.0	675.0		2,700.0	270.0	
- Polybags	Ha	18.7	18,750	18,750	18,750	18,750		75,000	350.5	350.5	350.5	350.5		1,402.0	140.2	
Subtotal									1,025.5	1,025.5	1,025.5	1,025.5		4,102.0	410.2	
Total									1,664.0	1,664.0	1,664.0	1,664.0		6,656.1	665.6	
C. SHORT ROTATION																
1. Nursery																
- Stump	Ha															
- Polybags	Ha	7.2	11,000	13,750	16,750	16,750		58,250	79.7	99.7	121.4	121.4		422.2	42.2	
Subtotal			11,000	13,750	16,750	16,750		58,250	79.7	99.7	121.4	121.4		422.2	42.2	
2. Plantation Establishment																
- Stump	Ha															
- Polybags	Ha	10.1	11,000	13,750	16,750	16,750		58,250	111.5	139.4	169.8	169.8		590.7	59.1	
Subtotal									111.5	139.4	169.8	169.8		590.7	59.1	
3. Plantation Maintenance																
- Stump	Ha															
- Polybags	Ha	14.7	11,000	13,750	16,750	16,750		58,250	162.0	202.5	246.6	246.6		857.7	85.8	
Subtotal									162.0	202.5	246.6	246.6		857.7	85.8	
Total									353.2	441.6	537.9	537.9		1,870.6	187.1	

4. PARTICIPATORY FORESTRY INSTITUTIONAL DEVELOPMENT

Table 11 - Summary of Programme Costs

Programme Components	Million Taka			Million U $			% of	% of
	Foreign	Local	Total	Foreign	Local	Total	Base Costs	FEC
A. PHYSICAL INFRASTRUCTURE								
1. Land Acquisition		120.0	120.0		3.1	3.1	1.4	
2. Detail Engineering and Supervision		35.2	35.2		0.9	0.9	0.4	
3. Civil Works	58.6	527.3	585.9	1.5	13.6	15.1	7.0	1.4
Subtotal	**58.6**	**682.4**	**741.0**	**1.5**	**17.5**	**19.0**	**8.9**	**1.4**
B. FURNITURE, EQUIPMENT AND VEHICLES								
1. Furniture		580.0	580.0		14.9	14.9	6.9	
2. Equipments	3,344.0	836.0	4,180.0	86.0	21.5	107.5	50.0	79.1
3. Vehicles	182.1	45.5	227.6	4.7	1.2	5.9	2.7	4.3
Subtotal	**3,526.1**	**1,461.5**	**4,987.6**	**90.6**	**37.6**	**128.2**	**59.7**	**83.4**
C. HUMAN RESOURCES DEVELOPMENT								
1. Overseas Training for BFD Staff	243.0	27.0	270.0	6.2	0.7	6.9	3.2	5.7
2. Local Training to BFD Staff		55.0	55.0		1.4	1.4	0.7	
3. Local Training to Beneficiaries		390.0	390.0		10.0	10.0	4.7	
Subtotal	**243.0**	**472.0**	**715.0**	**6.2**	**12.1**	**18.4**	**8.6**	**5.7**
D. MONITORING AND STUDIES								
1. On-going Monitoring		60.0	60.0		1.5	1.5	0.7	
2. Evaluation Studies		100.0	100.0		2.6	2.6	1.2	
Subtotal		**160.0**	**160.0**		**4.1**	**4.1**	**1.9**	
E. CONSULTING SERVICES								
1. International	162.8	18.1	180.9	4.2	0.5	4.7	2.2	3.9
2. Local		32.5	32.5		0.8	0.8	0.4	
Subtotal	**162.8**	**50.6**	**213.4**	**4.2**	**1.3**	**5.5**	**2.6**	**3.9**
F. RECURRENT COSTS								
1. Existing Staff Salaries		384.2	384.2		9.9	9.9	4.6	
2. Incremental Staff Salaries		652.8	652.8		16.8	16.8	7.8	
3. Operation and Maintenance of Facilities	16.0	64.0	80.0	0.4	1.6	2.1	1.0	0.4
4. Vehicle/ Equipment Operation/ Maintenance	180.0	180.0	360.0	4.6	4.6	9.3	4.3	4.3
5. Office Supplies and Consumables	42.0	18.0	60.0	1.1	0.5	1.5	0.7	1.0
Subtotal	**238.0**	**1,299.0**	**1,537.0**	**6.1**	**33.4**	**39.5**	**18.4**	**5.6**
BASE COSTS	**4,228.5**	**4,125.6**	**8,354.0**	**108.7**	**106.1**	**214.8**	**100.0**	**100.0**
Physical Contingencies	34.3	97.0	131.3	0.9	2.5	3.4		
TOTAL PROJECT COST	**4,262.8**	**4,222.5**	**8,485.3**	**109.6**	**108.5**	**218.1**		

Table 12 - Proposed Financing Plan, Million U $

Project Components	Total Programme Cost			GOB Financing			Donors Financing			Beneficiaries Financing		
	Foreign	Local	Total	Foreign	Local	Total	Foreign	Local	Total	Foreign	Local	Total
A. PHYSICAL INFRASTRUCTURE												
1. Land Acquisition		3.1	3.1								3.1	3.1
2. Detail Engineering and Supervision		0.9	0.9					0.9	0.9			
3. Civil Works	1.5	13.6	15.1		1.5	1.5	1.5	12.0	13.6			
Subtotal	**1.5**	**17.5**	**19.0**		**1.5**	**1.5**	**1.5**	**13.0**	**14.5**		**3.1**	**3.1**
B. FURNITURE, EQUIPMENT AND VEHICLES												
1. Furniture		14.9	14.9					14.9	14.9			
2. Equipments	86.0	21.5	107.5		21.5	21.5	86.0		86.0			
3. Vehicles	4.7	1.2	5.9		1.2	1.2	4.7		4.7			
Subtotal	**90.6**	**37.6**	**128.2**		**22.7**	**22.7**	**90.6**	**14.9**	**105.6**			
C. HUMAN RESOURCES DEVELOPMENT												
1. Overseas Training for BFD Staff	6.2	0.7	6.9				6.2	0.7	6.9			
2. Local Training to BFD Staff		1.4	1.4					1.4	1.4			
3. Local Training to Beneficiaries		10.0	10.0					10.0	10.0			
Subtotal	**6.2**	**12.1**	**18.4**				**6.2**	**12.1**	**18.4**			
D. MONITORING AND STUDIES												
1. On-going Monitoring		1.5	1.5					1.5	1.5			
2. Evaluation Studies		2.6	2.6					2.6	2.6			
Subtotal		**4.1**	**4.1**					**4.1**	**4.1**			
E. CONSULTING SERVICES												
1. International	4.2	0.5	4.7				4.2	0.5	4.7			
2. Local		0.8	0.8					0.8	0.8			
Subtotal	**4.2**	**1.3**	**5.5**				**4.2**	**1.3**	**5.5**			
F. RECURRENT COSTS												
1. Existing Staff Salaries		9.9	9.9		9.9	9.9						
2. Incremental Staff Salaries		16.8	16.8								16.8	16.8
3. Operation and Maintenance of Facilities	0.4	1.6	2.1				0.4		0.4		1.6	1.6
4. Vehicle/ Equipment Operation/ Maintenance	4.6	4.6	9.3				4.6		4.6		4.6	4.6
5. Office Supplies and Consumables	1.1	0.5	1.5				1.1		1.1		0.5	0.5
Subtotal	**6.1**	**33.4**	**39.5**		**9.9**	**9.9**	**6.1**		**6.1**		**23.5**	**23.5**
BASE COSTS	**108.7**	**106.1**	**214.8**		**34.0**	**34.0**	**108.7**	**45.4**	**154.1**		**26.6**	**26.6**
Physical Contingencies	0.9	2.5	3.4		0.8	0.8	0.9	1.1	2.0		0.6	0.6
TOTAL PROGRAMME COST	**109.6**	**108.5**	**218.1**		**34.8**	**34.8**	**109.6**	**46.5**	**156.1**		**27.2**	**27.2**
Percentage	50.2	49.8	100.0		32.1	16.0	100.0	42.8	71.5		25.1	12.5

Table 13 - Phasing of Programme Costs, Million Taka

Programme Components	PY Year 1 - 5 FY 1993/97	6 - 10 1998/02	11 - 15 2003/07	16 - 20 2008/12	Total Costs Local	Foreign	Total
A. PHYSICAL INFRASTRUCTURE							
1. Land Acquisition	45.0	75.0			120.0		120.0
2. Detail Engineering and Supervision	13.0	22.2			35.2		35.2
3. Civil Works	216.1	369.8			527.3	58.6	585.9
Subtotal	**274.1**	**466.9**			**682.4**	**58.6**	**741.0**
B. FURNITURE, EQUIPMENT AND VEHICLES							
1. Furniture	135.0	310.0		135.0	580.0		580.0
2. Equipments	810.0	2,560.0		810.0	836.0	3,344.0	4,180.0
3. Vehicles	59.9	117.0		50.7	45.5	182.1	227.6
Subtotal	**1,004.9**	**2,987.0**		**995.7**	**1,461.5**	**3,526.1**	**4,987.6**
C. HUMAN RESOURCES DEVELOPMENT							
1. Overseas Training for BFD Staff	135.0	135.0			27.0	243.0	270.0
2. Local Training to BFD Staff	10.0	15.0	15.0	15.0	55.0		55.0
3. Local Training to Beneficiaries	60.0	90.0	120.0	120.0	390.0		390.0
Subtotal	**205.0**	**240.0**	**135.0**	**135.0**	**472.0**	**243.0**	**715.0**
D. MONITORING AND STUDIES							
1. On-going Monitoring	15.0	15.0	15.0	15.0	60.0		60.0
2. Evaluation Studies	25.0	25.0	25.0	25.0	100.0		100.0
Subtotal	**40.0**	**40.0**	**40.0**	**40.0**	**160.0**		**160.0**
E. CONSULTING SERVICES							
1. International	60.3	60.3	30.1	30.1	18.1	162.8	180.9
2. Local	10.0	10.0	6.3	6.3	32.5		32.5
Subtotal	**70.3**	**70.3**	**36.4**	**36.4**	**50.6**	**162.8**	**213.4**
F. RECURRENT COSTS							
1. Existing Staff Salaries	77.0	88.6	101.6	117.0	384.2		384.2
2. Incremental Staff Salaries	80.0	160.0	192.0	220.8	652.8		652.8
3. Operation and Maintenance of Facilities	20.0	20.0	20.0	20.0	64.0	16.0	80.0
4. Vehicle/ Equipment Operation/ Maintenance	90.0	90.0	90.0	90.0	180.0	180.0	360.0
5. Office Supplies and Consumables	15.0	15.0	15.0	15.0	18.0	42.0	60.0
Subtotal	**282.0**	**373.6**	**418.6**	**462.8**	**1,299.0**	**238.0**	**1,537.0**
BASE COSTS	**1,876.3**	**4,177.8**	**630.0**	**1,669.9**	**4,125.6**	**4,228.5**	**8,354.0**
Physical Contingencies	29.9	36.2	31.5	33.7	97.0	34.3	131.3
TOTAL PROJECT COST	**1,906.1**	**4,214.0**	**661.5**	**1,703.6**	**4,222.5**	**4,262.8**	**8,485.3**

Table 14 - Cost Estimates - Civil Works, Furniture, Equipments and Vehicles

Items	Unit	Unit Cost (Taka '000)	Number of Units						Total Costs (Million Taka)							
			Year 1 - 5	6 - 10	11 - 15	16 - 20	21 - 25	Total	Year 1 - 5	6 - 10	11 - 15	16 - 20	21 - 25	Total	FEC	T and D
A. PHYSICAL FACILITIES																
1. Land Acquisition	Ha	5,000.0	9	15				24	45.0	75.0				120.0		
2. Detail Engineering and Supervision 1_/	Percent	6.0							13.0	22.2				35.2		
Subtotal									**58.0**	**97.2**				**155.2**		
3. Civil Works																
- Functional Building	m^2	8.5	3,400	7,500				10,900	28.9	63.8				92.7	9.3	9.3
- Residential	m^2	5.4	18,000	40,000				58,000	97.2	216.0				313.2	31.3	31.3
- Nursery	m^2	4.5	20,000	20,000				40,000	90.0	90.0				180.0	18.0	18.0
Subtotal									**216.1**	**369.8**				**585.9**	**58.6**	**58.6**
B. FURNITURE																
- Functional Building	Lumpsum	500.0	150	500		150		800	75.0	250.0		75.0		400.0		
- Nursery	Lumpsum	100.0	600	600		600		1,800	60.0	60.0		60.0		180.0		
Subtotal									**135.0**	**310.0**		**135.0**		**580.0**		
C. EQUIPMENTS																
- Functional Building	Lumpsum	5,000.0	150	500		150		800	750.0	2,500.0		750.0		4,000.0	3,200.0	800.0
- Nursery	Lumpsum	100.0	600	600		600		1,800	60.0	60.0		60.0		180.0	144.0	36.0
Subtotal									**810.0**	**2,560.0**		**810.0**		**4,180.0**	**3,344.0**	**836.0**
D. VEHICLES																
- Station Wagon	No.	1,000.0	10	20		10		40	10.0	20.0		10.0		40.0	32.0	8.0
- 4 WHD Jeep	No.	1,000.0	20	40		20		80	20.0	40.0		20.0		80.0	64.0	16.0
- Staff Bus	No.	1,500.0	5	10		5		20	7.5	15.0		7.5		30.0	24.0	6.0
- Truck	No.	1,200.0	6	10		6		22	7.2	12.0		7.2		26.4	21.1	5.3
- Motor Cycle	No.	60.0	200	400		100		700	12.0	24.0		6.0		42.0	33.6	8.4
- Bi-Cycle	No.	4.0	800	1,500				2,300	3.2	6.0				9.2	7.4	1.8
Subtotal									**59.9**	**117.0**		**50.7**		**227.6**	**182.1**	**45.5**

Table 15 - Cost Estimates - Human Resource Development, Studies and Operation/ Maintenance

Items	Unit	Unit Cost (Taka '000)	Number of Units						Total Costs (Million Taka)							
			Year 1 - 5	6 - 10	11 - 15	16 - 20	21 - 25	Total	Year 1 - 5	6 - 10	11 - 15	16 - 20	21 - 25	Total	FEC	T and D
A. TRAINING																
1. Overseas Training for BFD Staff	No	450.0	300	300				600	135.0	135.0				270.0	243.0	
2. Local Training to BFD Staff	No	10.0	1,000	1,500	1,500	1,500		5,500	10.0	15.0	15.0	15.0		55.0		
3. Local Training to Beneficiaries	No	0.6	100,000	150,000	200,000	200,000		650,000	60.0	90.0	120.0	120.0		390.0		
Subtotal									**205.0**	**240.0**	**135.0**	**135.0**		**715.0**	**243.0**	
B. MONITORING AND EVALUATION																
1. Ongoing monitoring		15,000.0	1	1	1	1		4	15.0	15.0	15.0	15.0		60.0		
1. Evaluation and Studies		10,000.0	1	1	1	1		4	10.0	10.0	10.0	10.0		40.0		
Subtotal									**25.0**	**25.0**	**25.0**	**25.0**		**100.0**		
C. CONSULTING SERVICES																
1. International		603.0	100	100	50	50		300	60.3	60.3	30.1	30.1		180.9	162.8	
2. Local		50.0	200	200	125	125		650	10.0	10.0	6.3	6.3		32.5		
Subtotal									**70.3**	**70.3**	**36.4**	**36.4**		**213.4**	**162.8**	
D. RECURRENT COSTS																
1. Existing Staff Salaries		77,000.0	1	1.2	1.3	1.5		5	77.0	88.6	101.6	117.0		384.2		
2. Incremental Staff Salaries		80,000.0	1	2	2.4	2.8		8.2	80.0	160.0	192.0	220.8		652.8		
3. Operation and Maintenance of Facilities		20,000.0	1	1	1	1		4	20.0	20.0	20.0	20.0		80.0	16.0	8.0
4. Vehicle/ Equipment Operation/ Maintenance		90,000.0	1	1	1	1		4	90.0	90.0	90.0	90.0		360.0	180.0	36.0
5. Office Supplies and Consumables		15,000.0	1	1	1	1		4	15.0	15.0	15.0	15.0		60.0	42.0	6.0
Subtotal									**282.0**	**373.6**	**418.6**	**462.8**		**1,537.0**	**238.0**	**50.0**

5. PARTICIPATORY FORESTRY PLANTATION DEVELOPMENT

Table 16 - Summary of Programme Costs

Programme Components	Million Taka			Million U $			% of	% of
	Foreign	Local	Total	Foreign	Local	Total	Base Costs	FEC
A. AGROFORESTRY								
1. Nursery	28.0	252.4	280.5	0.7	6.5	7.2	3.6	3.4
2. Plantation Establishment	39.2	353.2	392.4	1.0	9.1	10.1	5.1	4.7
3. Plantation Maintenance								
Subtotal	**67.3**	**605.6**	**672.9**	**1.7**	**15.6**	**17.3**	**8.7**	**8.1**
B. WOODLOT								
1. Nursery	36.2	326.2	362.4	0.9	8.4	9.3	4.7	4.4
2. Plantation Establishment	50.7	456.3	507.0	1.3	11.7	13.0	6.6	6.1
3. Plantation Maintenance								
Subtotal	**86.9**	**782.5**	**869.4**	**2.2**	**20.1**	**22.3**	**11.2**	**10.5**
C. STRIP PLANTATION								
1. Nursery	86.7	780.5	867.2	2.2	20.1	22.3	11.2	10.4
2. Plantation Establishment	121.3	1,091.9	1.213.3	3.1	28.1	31.2	15.7	14.6
3. Plantation Maintenance	34.0	306.3	340.4	0.9	7.9	8.7	4.4	4.1
Subtotal	**242.1**	**2,178.8**	**2,420.8**	**6.2**	**56.0**	**62.2**	**31.3**	**29.1**
D. HOMESTEAD PLANTATION								
1. Nursery	145.0	1,304.6	1,449.6	3.7	33.5	37.3	18.7	17.4
2. Plantation Establishment	202.8	1,246.8	1,449.6	5.2	32.1	37.3	18.7	24.4
3. Plantation Maintenance								
Subtotal	**347.8**	**2,551.4**	**2,899.2**	**8.9**	**65.6**	**74.5**	**37.5**	**41.8**
E. KHETLAND PLANTATION								
1. Nursery	36.2	326.2	362.4	0.9	8.4	9.3	4.7	4.4
2. Plantation Establishment	50.7	456.3	507.0	1.3	11.7	13.0	6.6	6.1
3. Plantation Maintenance								
Subtotal	**86.9**	**782.5**	**869.4**	**2.2**	**20.1**	**22.3**	**11.2**	**10.5**
BASE COSTS	**831.0**	**6,900.7**	**7,731.8**	**21.4**	**177.4**	**198.8**	**100.0**	**100.0**
Physical Contingencies	23.7	213.3	237.0	0.6	5.5	6.1		
TOTAL PROJECT COST	**854.7**	**7,114.0**	**7,968.7**	**22.0**	**182.9**	**204.9**		

Table 17 - Proposed Financing Plan, Million U $

Project Components	Total Programme Cost			GOB Financing			Donors Financing			Beneficiaries Financing		
	Foreign	Local	Total	Foreign	Local	Total	Foreign	Local	Total	Foreign	Local	Total
A. AGROFORESTRY												
1. Nursery	0.7	6.5	7.2				0.7	5.2	5.9		1.3	1.3
2. Plantation Establishment	1.0	9.1	10.1				1.0	7.3	8.3		1.8	1.8
3. Plantation Maintenance												
Subtotal	**1.7**	**15.6**	**17.3**				**1.7**	**12.5**	**14.2**		**3.1**	**3.1**
B. WOODLOT												
1. Nursery	0.9	8.4	9.3				0.9	6.7	7.6		1.7	1.7
2. Plantation Establishment	1.3	11.7	13.0				1.3	9.4	10.7		2.3	2.3
3. Plantation Maintenance												
Subtotal	**2.2**	**20.1**	**22.3**				**2.2**	**16.1**	**18.3**		**4.0**	**4.0**
C. STRIP PLANTATION												
1. Nursery	2.2	20.1	22.3				2.2	16.1	18.3		4.0	4.0
2. Plantation Establishment	3.1	28.1	31.2				3.1	22.5	25.6		5.6	5.6
3. Plantation Maintenance	0.9	7.9	8.7				0.9	6.3	7.2		1.6	1.6
Subtotal	**6.2**	**56.0**	**62.2**				**6.2**	**44.8**	**51.0**		**11.2**	**11.2**
D. HOMESTEAD PLANTATION												
1. Nursery	3.7	33.5	37.3				3.7	26.8	30.6		6.7	6.7
2. Plantation Establishment	5.2	32.1	37.3				5.2	25.6	30.9		6.4	6.4
3. Plantation Maintenance												
Subtotal	**8.9**	**65.6**	**74.5**				**8.9**	**52.5**	**61.4**		**13.1**	**13.1**
E. KHETLAND PLANTATION												
1. Nursery	0.9	8.4	9.3				0.9	6.7	7.6		1.7	1.7
2. Plantation Establishment	1.3	11.7	13.0				1.3	9.4	10.7		2.3	2.3
3. Plantation Maintenance												
Subtotal	**2.2**	**20.1**	**22.3**				**2.2**	**16.1**	**18.3**		**4.0**	**4.0**
BASE COSTS	**21.4**	**177.4**	**198.8**				**21.4**	**141.9**	**163.3**		**35.5**	**35.5**
Physical Contingencies	0.6	5.5	6.1				0.6	4.4	5.0		1.1	1.1
TOTAL PROGRAMME COST	**22.0**	**182.9**	**204.9**				**22.0**	**146.3**	**168.3**		**36.6**	**36.6**
Percentage	10.7	89.3	100.0				100.0	80.0	82.1		20.0	17.9

Table 18 - Phasing of Programme Costs, Million Taka

Programme Components	PY FY	Year 1 - 5 1993/97	6 - 10 1998/02	11 - 15 2003/07	16 - 20 2008/12	Total Costs Local	Foreign	Total
A. AGROFORESTRY								
1. Nursery		15.6	62.3	77.9	124.7	252.4	28.0	280.5
2. Plantation Establishment		21.8	87.2	109.0	174.4	353.2	39.2	392.4
3. Plantation Maintenance								
Subtotal		**37.4**	**149.5**	**186.9**	**299.1**	**605.6**	**67.3**	**672.9**
B. WOODLOT								
1. Nursery		36.2	72.5	108.7	145.0	326.2	36.2	362.4
2. Plantation Establishment		50.7	101.4	152.1	202.8	456.3	50.7	507.0
3. Plantation Maintenance								
Subtotal		**86.9**	**173.9**	**260.8**	**347.8**	**782.5**	**86.9**	**869.4**
C. STRIP PLANTATION								
1. Nursery		59.9	163.2	267.4	376.7	780.5	86.7	867.2
2. Plantation Establishment		83.9	228.4	374.1	527.0	1,091.9	121.3	1,213.3
3. Plantation Maintenance		29.2	79.4	108.1	123.7	306.3	34.0	340.4
Subtotal		**173.0**	**471.0**	**749.6**	**1,027.3**	**2,178.8**	**242.1**	**2,420.8**
D. HOMESTEAD PLANTATION								
1. Nursery		362.4	362.4	362.4	362.4	1,304.6	145.0	1,449.6
2. Plantation Establishment		507.0	507.0	507.0	507.0	1,246.8	202.8	1,449.6
3. Plantation Maintenance								
Subtotal		**869.4**	**869.4**	**869.4**	**869.4**	**2,551.4**	**347.8**	**2,899.2**
E. KHETLAND PLANTATION						2.551.4		
1. Nursery		90.6	90.6	90.6	90.6	326.2	36.2	362.4
2. Plantation Establishment		126.8	126.8	126.8	126.8	456.3	50.7	507.0
3. Plantation Maintenance								
Subtotal		**217.4**	**217.4**	**217.4**	**217.4**	**782.5**	**86.9**	**869.4**
BASE COSTS		**1,384.1**	**1,881.1**	**2,284.1**	**2,760.9**	**6,900.7**	**831.0**	**7,731.8**
Physical Contingencies		48.9	56.5	62.0	69.6	213.3	23.7	237.0
TOTAL PROJECT COST		**1,433.0**	**1,937.7**	**2,346.0**	**2,830.5**	**7,114.0**	**854.7**	**7,968.7**

Table 19 - Cost Estimates - Forest Plantation Development

Items	Unit	Unit Cost (Taka '000)	Number of Units						Total Costs (Million Taka)							
			Year 1 - 5	6 - 10	11 - 15	16 - 20	21 - 25	Total	Year 1 - 5	6 - 10	11 - 15	16 - 20	21 - 25	Total	FEC	T and D
A. AGROFORESTRY																
1. Nursery																
- Stump	Ha															
- Polybags	Ha	7.2	2,150	8,600	10,750	17,200		38,700	15.6	62.3	77.9	124.7		280.5	28.0	
Subtotal			**2,150**	**8,600**	**10,750**	**17,200**		**38,700**	**15.6**	**62.3**	**77.9**	**124.7**		**280.5**	**28.0**	
2. Plantation Establishment																
- Stump	Ha															
- Polybags	Ha	10.1	2,150	8,600	10,750	17,200		38,700	21.8	87.2	109.0	174.4		392.4	39.2	
Subtotal									**21.8**	**87.2**	**109.0**	**174.4**		**392.4**	**39.2**	
3. Plantation Maintenance																
- Stump	Ha															
- Polybags	Ha		2,150	8,600	10,750	17,200		38,700								
Subtotal																
Total									**37.4**	**149.5**	**186.9**	**299.1**		**672.9**	**67.3**	
B. WOODLOT PLANTATION																
1. Nursery																
- Stump	Ha															
- Polybags	Ha	7.2	5,000	10,000	15,000	20,000		50,000	36.2	72.5	108.7	145.0		362.4	36.2	
Subtotal			**5,000**	**10,000**	**15,000**	**20,000**		**50,000**	**36.2**	**72.5**	**108.7**	**145.0**		**362.4**	**36.2**	
2. Plantation Establishment																
- Stump	Ha															
- Polybags	Ha	10.1	5,000	10,000	15,000	20,000		50,000	50.7	101.4	152.1	202.8		507.0	50.7	
Subtotal									**50.7**	**101.4**	**152.1**	**202.8**		**507.0**	**50.7**	
3. Plantation Maintenance																
- Stump	Ha															
- Polybags	Ha		5,000	10,000	15,000	20,000		50,000								
Subtotal																
Total									**86.9**	**173.9**	**260.8**	**347.8**		**869.4**	**86.9**	
C. STRIP PLANTATION																
1. Nursery																
- Medium Rotation	Ha	7.2	2,070	5,630	7,670	8,770		24,140	15.0	40.8	55.6	63.6		175.0	17.5	
- Short Rotation	Ha	7.2	6,200	16,890	29,220	43,200		95,510	44.9	122.4	211.8	313.1		692.3	69.2	
Subtotal			**8,270**	**22,520**	**36,890**	**51,970**		**119,650**	**59.9**	**163.2**	**267.4**	**376.7**		**867.2**	**86.7**	
2. Plantation Establishment																
- Medium Rotation	Ha	10.1	2,070	5,630	7,670	8,770		24,140	21.0	57.1	77.8	88.9		244.8	24.5	
- Short Rotation	Ha	10.1	6,200	16,890	29,220	43,200		95,510	62.9	171.3	296.3	438.0		968.5	96.8	
Subtotal									**83.9**	**228.4**	**374.1**	**527.0**		**1,213.3**	**121.3**	
3. Plantation Maintenance																
- Medium Rotation	Ha	14.1	2,070	5,630	7,670	8,770		24,140	29.2	79.4	108.1	123.7		340.4	34.0	
- Short Rotation	Ha		6,200	16,890	29,220	43,200		95,510								
Subtotal									**29.2**	**79.4**	**108.1**	**123.7**		**340.4**	**34.0**	
Total									**173.0**	**471.0**	**749.6**	**1,027.3**		**2,420.8**	**242.1**	

Table 19 - Cost Estimates - Forest Plantation Development (Cont'd)

Items	Unit	Unit Cost (Taka '000)	Number of Units						Total Costs (Million Taka)							
			Year 1 - 5	6 - 10	11 - 15	16 - 20	21 - 25	Total	Year 1 - 5	6 - 10	11 - 15	16 - 20	21 - 25	Total	FEC	T and D
D. HOMESTEAD PLANTATION																
1. Nursery																
- Stump	Ha															
- Polybags	Ha	7.2	50,000	50,000	50,000	50,000		200,000	362.4	362.4	362.4	362.4		1,449.6	145.0	
Subtotal			**50,000**	**50,000**	**50,000**	**50,000**		**200,000**	**362.4**	**362.4**	**362.4**	**362.4**		**1,449.6**	**145.0**	
2. Plantation Establishment																
- Stump	Ha															
- Polybags	Ha	10.1	50,000	50,000	50,000	50,000		200,000	507.0	507.0	507.0	507.0		2,028.0	202.8	
Subtotal									**507.0**	**507.0**	**507.0**	**507.0**		**2,028.0**	**202.8**	
3. Plantation Maintenance																
- Stump	Ha															
- Polybags	Ha		50,000	50,000	50,000	50,000		200,000								
Subtotal																
Total									**869.4**	**869.4**	**869.4**	**869.4**		**3,477.6**	**347.8**	
E. KHETLAND PLANTATION																
1. Nursery																
- Bed	Ha															
- Polybags	Ha	7.2	12,500	12,500	12,500	12,500		50,000	90.6	90.6	90.6	90.6		362.4	36.2	
Subtotal			**12,500**	**12,500**	**12,500**	**12,500**		**50,000**	**90.6**	**90.6**	**90.6**	**90.6**		**362.4**	**36.2**	
2. Plantation Establishment																
- Stump	Ha															
- Polybags	Ha	10.1	12,500	12,500	12,500	12,500		50,000	126.8	126.8	126.8	126.8		507.0	50.7	
Subtotal									**126.8**	**126.8**	**126.8**	**126.8**		**507.0**	**50.7**	
3. Plantation Maintenance																
- Stump	Ha															
- Polybags	Ha		12,500	12,500	12,500	12,500		50,000								
Subtotal																
Total									**217.4**	**217.4**	**217.4**	**217.4**		**869.4**	**86.9**	

6. WOOD-BASED ENERGY DEVELOPMENT

Table 20 - Summary of Programme Costs

Programme Components	Million Taka			Million U $			% of	% of
	Foreign	Local	Total	Foreign	Local	Total	Base Costs	FEC
A. DEVELOPMENT SUPPORT								
1.Improved Stoves		375.0	375.0		9.6	9.6	30.6	
2. Charcoal Kilns (mud and brick)		1.1	1.1		0.0	0.0	0.1	
3. Charcoal Kilns (Portable Drum)		2.2	2.2		0.1	0.1	0.2	
4. Bio-gas Plants	90.0	210.0	300.0	2.3	5.4	7.7	24.5	69.4
Subtotal	**90.0**	**588.3**	**678.3**	**2.3**	**15.1**	**17.4**	**55.3**	**69.4**
B. EQUIPMENT AND VEHICLES								
1. Equipments	2.4	0.6	3.0	0.1	0.0	0.1	0.2	1.9
2. Vehicles	22.7	5.7	28.4	0.6	0.1	0.7	2.3	17.5
Subtotal	**25.1**	**6.3**	**31.4**	**0.6**	**0.2**	**0.8**	**2.6**	**19.3**
C. HUMAN RESOURCES DEVELOPMENT								
1. Training of Trainers		7.5	7.5		0.2	0.2	0.6	
2. Training to Users		231.0	231.0		5.9	5.9	18.8	
Subtotal		**238.5**	**238.5**		**6.1**	**6.1**	**19.4**	
D. RESEARCH AND DEVELOPMENT		21.0	21.0		0.5	0.5	1.7	
Subtotal		**21.0**	**21.0**		**0.5**	**0.5**	**1.7**	
E. PROMOTIONAL ACTIVITIES								
1. Exhibitions and Workshop		36.0	36.0		0.9	0.9	2.9	
2. Extension and Dissemination		24.0	24.0		0.6	0.6	2.0	
Subtotal		**60.0**	**60.0**		**1.5**	**1.5**	**4.9**	
F. MONITORING AND EVALUATION								
1. On-going Monitoring		8.0	8.0		0.2	0.2	0.7	
2. Evaluation Studies		14.0	14.0		0.4	0.4	1.1	
Subtotal		**22.0**	**22.0**		**0.6**	**0.6**	**1.8**	
G. RECURRENT COSTS								
1. Staff Salaries		149.7	149.7		3.8	3.8	12.2	
2. Vehicle/ Equipment Operation/ Maintenance	9.0	9.0	18.0	0.2	0.2	0.5	1.5	6.9
3. Office Supplies and Consumables	5.6	2.4	8.0	0.1	0.1	0.2	0.7	4.3
Subtotal	**14.6**	**161.1**	**175.7**	**0.4**	**4.1**	**4.5**	**14.3**	**11.3**
BASE COSTS	**129.7**	**1,097.2**	**1,226.8**	**3.3**	**28.2**	**31.5**	**100.0**	**100.0**
Physical Contingencies	11.4	84.4	95.7	0.3	2.2	2.5		
TOTAL PROGRAMME COST	**141.1**	**1,181.5**	**1,322.6**	**3.6**	**30.4**	**34.0**		

Table 21 - Proposed Financing Plan, Million U $

Project Components	Total Programme Cost			GOB Financing			Donors Financing			Beneficiaries Financing		
	Foreign	Local	Total	Foreign	Local	Total	Foreign	Local	Total	Foreign	Local	Total
A. DEVELOPMENT SUPPORT												
1.Improved Stoves		9.6	9.6					1.9	1.9		7.7	7.7
2. Charcoal Kilns (mud and brick)		0.0	0.0					0.0	0.0		0.0	0.0
3. Charcoal Kilns (Portable Drum)		0.1	0.1					0.0	0.0		0.0	0.0
4. Bio-gas Plants	2.3	5.4	7.7				2.3	1.1	3.4		4.3	4.3
Subtotal	**2.3**	**15.1**	**17.4**				**2.3**	**3.0**	**5.3**		**12.1**	**12.1**
B. EQUIPMENT AND VEHICLES												
1. Equipments	0.1	0.0	0.1		0.0	0.0	0.1		0.1			
2. Vehicles	0.6	0.1	0.7		0.1	0.1	0.6		0.6			
Subtotal	**0.6**	**0.2**	**0.8**		**0.2**	**0.2**	**0.6**		**0.6**			
C. HUMAN RESOURCES DEVELOPMENT												
1. Training of Trainers		0.2	0.2					0.2	0.2			
2. Training to Users		5.9	5.9					5.9	5.9			
Subtotal		**6.1**	**6.1**					**6.1**	**6.1**			
D. RESEARCH AND DEVELOPMENT		0.5	0.5					0.5	0.5			
Subtotal		**0.5**	**0.5**					**0.5**	**0.5**			
E. PROMOTIONAL ACTIVITIES												
1. Exhibitions and Workshop		0.9	0.9					0.9	0.9			
2. Extension and Dissemination		0.6	0.6					0.6	0.6			
Subtotal		**1.5**	**1.5**					**1.5**	**1.5**			
F. MONITORING AND EVALUATION												
1. On-going Monitoring		0.2	0.2					0.2	0.2			
2. Evaluation Studies		0.4	0.4					0.4	0.4			
Subtotal		**0.6**	**0.6**					**0.6**	**0.6**			
G. RECURRENT COSTS												
1. Staff Salaries		3.8	3.8		3.8	3.8						
2. Vehicle/ Equipment Operation/ Maintenance	0.2	0.2	0.5		0.2	0.2	0.2		0.2			
3. Office Supplies and Consumables	0.1	0.1	0.2		0.1	0.1	0.1		0.1			
Subtotal	**0.4**	**4.1**	**4.5**		**4.1**	**4.1**	**0.4**		**0.4**			
BASE COSTS	**3.3**	**28.2**	**31.5**		**4.3**	**4.3**	**3.3**	**11.8**	**15.1**		**12.1**	**12.1**
Physical Contingencies	0.3	2.2	2.5		0.3	0.3	0.3	0.9	1.2		0.9	0.9
TOTAL PROGRAMME COST	**3.6**	**30.4**	**34.0**		**4.6**	**4.6**	**3.6**	**12.7**	**16.3**		**13.0**	**13.0**
Percentage	10.0	90.0	100.0		20.0	10.0	10.0	40.0	50.0		40.0	40.0

Table 22 - Phasing of Programme Costs, Million Taka

Programme Components	PY FY	Year 1 - 5 1993/97	6 - 10 1998/02	11 - 15 2003/07	16 - 20 2008/12	Total Costs Local	Foreign	Total
A. DEVELOPMENT SUPPORT								
1.Improved Stoves		125.0	125.0	62.5	62.5	375.0		375.0
2. Charcoal Kilns (mud and brick)		0.6	0.2	0.2	0.2	1.1		1.1
3. Charcoal Kilns (Portable Drum)		2.0	0.1	0.1	0.1	2.2		2.2
4. Bio-gas Plants		75.0	75.0	75.0	75.0	210.0	90.0	300.0
Subtotal		**202.6**	**200.2**	**137.7**	**137.8**	**588.3**	**90.0**	**678.3**
B. EQUIPMENT AND VEHICLES								
1. Equipments		1.5		1.5		0.6	2.4	3.0
2. Vehicles		14.1	0.2	13.9	0.2	5.7	22.7	28.4
Subtotal		**15.6**	**0.2**	**15.4**	**0.2**	**6.3**	**25.1**	**31.4**
C. HUMAN RESOURCES DEVELOPMENT								
1. Training of Trainers		3.8	3.8			7.5		7.5
2. Training to Users		33.0	66.0	66.0	66.0	231.0		231.0
Subtotal		**36.8**	**69.8**	**66.0**	**66.0**	**238.5**		**238.5**
D. RESEARCH AND DEVELOPMENT		13.0	7.0	1.0		21.0		21.0
Subtotal		**13.0**	**7.0**	**1.0**		**21.0**		**21.0**
E. PROMOTIONAL ACTIVITIES								
1. Exhibitions and Workshop		9.0	9.0	9.0	9.0	36.0		36.0
2. Extension and Dissemination		6.0	6.0	6.0	6.0	24.0		24.0
Subtotal		**15.0**	**15.0**	**15.0**	**15.0**	**60.0**		**60.0**
F. MONITORING AND EVALUATION								
1. On-going Monitoring		2.0	2.0	2.0	2.0	8.0		8.0
2. Evaluation Studies		3.5	3.5	3.5	3.5	14.0		14.0
Subtotal		**5.5**	**5.5**	**5.5**	**5.5**	**22.0**		**22.0**
G. RECURRENT COSTS								
1. Staff Salaries		30.0	34.5	39.6	45.6	149.7		149.7
2. Vehicle/ Equipment Operation/ Maintenance		4.5	4.5	4.5	4.5	9.0	9.0	18.0
3. Office Supplies and Consumables		2.0	2.0	2.0	2.0	2.4	5.6	8.0
Subtotal		**36.5**	**41.0**	**46.1**	**52.1**	**161.1**	**14.6**	**175.7**
BASE COSTS		**324.9**	**338.7**	**286.7**	**276.6**	**1,097.2**	**129.7**	**1,226.8**
Physical Contingencies		26.6	27.1	21.2	20.7	84.4	11.4	95.7
TOTAL PROGRAMME COST		**351.6**	**365.8**	**307.9**	**297.3**	**1,181.5**	**141.1**	**1,322.6**

Table 23 - Cost Estimates - Civil Works, Furniture, Equipments and Vehicles

Items	Unit	Unit Cost (Taka '000)	Number of Units						Total Costs (Million Taka)							
			Year 1 - 5	6 - 10	11 - 15	16 - 20	21 - 25	Total	Year 1 - 5	6 - 10	11 - 15	16 - 20	21 - 25	Total	FEC	T and D
A. PRODUCTION SUPPORT																
- Improved Stoves	No	0.1	1,000,000	1,000,000	500,000	500,000		3,000,000	125.0	125.0	62.5	62.5		375.0		
- Charcoal Kilns (mud and brick)	No	40.0	15	4	4	4		27	0.6	0.2	0.2	0.2		1.1		
- Charcoal Kilns (Portable Drum)	No	2.0	1,000	25	25	50		1,100	2.0	0.1	0.1	0.1		2.2		
- Bio-gas Plants	No	7.5	10,000	10,000	10,000	10,000		40,000	75.0	75.0	75.0	75.0		300.0	90.0	30.0
Subtotal									**202.6**	**200.2**	**137.7**	**137.8**		**678.3**	**90.0**	**30.0**
B. EQUIPMENTS																
- Mobile Audio-visual Unit	No	1,500.0	1		1			2	1.5		1.5			3.0	2.4	0.6
- Briquetting equipment	No	150.0	2	2	2	2		8	0.3	0.3	0.3	0.3		1.2	1.0	0.2
- Weighing Balance	No	50.0	5		5			10	0.3		0.3			0.5	0.4	0.1
- Crosscut Saw	No	100.0	2					2	0.2					0.2	0.2	0.0
- Laboratory Equipment	No	1,500.0	3	2				5	4.5	3.0				7.5	6.0	1.5
Subtotal									**6.8**	**3.3**	**2.1**	**0.3**		**12.4**	**9.9**	**2.5**
C. VEHICLES																
- 4 WHD Jeep	No.	1,500.0	3		3			6	4.5		4.5			9.0	7.2	1.8
- Truck	No.	1,500.0	6		6			12	9.0		9.0			18.0	14.4	3.6
- Motor Cycle	No.	60.0	6		6			12	0.4		0.4			0.7	0.6	0.1
- Bi-Cycle	No.	4.0	54	54		54		162	0.2	0.2		0.2		0.6	0.5	0.1
Subtotal									**14.1**	**0.2**	**13.9**	**0.2**		**28.4**	**22.7**	**5.7**
D. TRAINING																
1. Training of Trainers	No	15.0	250	250				500	3.8	3.8				7.5		
2. Local Training to Users	No	0.6	55,000	110,000	110,000	110,000		385,000	33.0	66.0	66.0	66.0		231.0		
2. Overseas Training	No	1,244.8	3	2	1			6	3.7	2.5	1.2			7.5	6.7	
Subtotal									**36.8**	**69.8**	**66.0**	**66.0**		**238.5**		
E. RESEARCH AND DEVELOPMENT	No	1,000.0	13	7	1			21	13.0	7.0	1.0			21.0		

Table 24 - Cost Estimates - Human Resource Development, Studies and Operation/ Maintenance

Items	Unit	Unit Cost (Taka '000)	Number of Units						Total Costs (Million Taka)							
			Year 1 - 5	6 - 10	11 - 15	16 - 20	21 - 25	Total	Year 1 - 5	6 - 10	11 - 15	16 - 20	21 - 25	Total	FEC	T and D
F. PROMOTIONAL ACTIVITIES																
1. Exhibitions and Workshop	No	100.0	90	90	90	90		360	9.0	9.0	9.0	9.0		36.0		
2. Extension and Dissemination	No	50.0	120	120	120	120		480	6.0	6.0	6.0	6.0		24.0		
Subtotal									**15.0**	**15.0**	**15.0**	**15.0**		**60.0**		
G. MONITORING AND EVALUATION																
1. Ongoing monitoring		1,000.0	2	2	2	2		8	2.0	2.0	2.0	2.0		8.0		
1. Evaluation and Studies		500.0	7	7	7	7		28	3.5	3.5	3.5	3.5		14.0		
Subtotal									**5.5**	**5.5**	**5.5**	**5.5**		**22.0**		
H. RECURRENT COSTS																
1. Staff Salaries and Allowances		30,000.0	1	1.2	1.3	1.5		5	30.0	34.5	39.6	45.6		149.7		
2. Vehicle/ Equipment Operation/ Maintenance		4,500.0	1	1	1	1		4	4.5	4.5	4.5	4.5		18.0	9.0	1.8
3. Office Supplies and Consumables		2,000.0	1	1	1	1		4	2.0	2.0	2.0	2.0		8.0	5.6	0.8
Subtotal									**36.5**	**41.0**	**46.1**	**52.1**		**175.7**	**14.6**	**2.6**

7. NON WOOD-BASED FOREST PRODUCTS DEVELOPMENT

Table 25 - Summary of Programme Costs

Programme Components	Million Taka			Million U $			% of Base Costs	% of FEC
	Foreign	Local	Total	Foreign	Local	Total		
A. PHYSICAL INFRASTRUCTURE								
1. Land Acquisition		50.0	50.0		1.3	1.3	5.0	
2. Detail Engineering and Supervision		1.2	1.2		0.0	0.0	0.1	
3. Civil Works	2.0	18.0	20.0	0.1	0.5	0.5	2.0	1.2
Subtotal	**2.0**	**69.2**	**71.1**	**0.1**	**1.8**	**1.8**	**7.1**	**1.2**
B. FURNITURE, EQUIPMENT AND VEHICLES								
1. Furniture		3.0	3.0		0.1	0.1	0.3	
2. Equipments	2.4	0.6	3.0	0.1	0.0	0.1	0.3	1.5
3. Vehicles	33.3	8.3	41.7	0.9	0.2	1.1	4.1	20.4
Subtotal	**35.7**	**11.9**	**47.7**	**0.9**	**0.3**	**1.2**	**4.7**	**21.8**
C. HUMAN RESOURCES DEVELOPMENT								
1. Overseas Training	43.0	4.8	47.7	1.1	0.1	1.2	4.7	26.2
2. Short Foreign Training	24.3	2.7	27.0	0.6	0.1	0.7	2.7	14.8
3. Local Training		3.9	3.9		0.1	0.1	0.4	
4. Local Training to Beneficiaries		108.0	108.0					
Subtotal	**67.3**	**11.4**	**78.6**	**1.7**	**0.3**	**2.0**	**7.8**	**41.1**
D. PLANTATION DEVELOPMENT								
1. Medicinal Plants		45.0	45.0		1.2	1.2	4.5	
2. Rattan Plantation		266.0	266.0		6.8	6.8	26.5	
3. Murta Plantation		6.0	6.0		0.2	0.2	0.6	
4. Lali/ Catechu Plantation		36.5	36.5		0.9	0.9	3.6	
Subtotal		**353.5**	**353.5**		**9.1**	**9.1**	**35.2**	
E. MONITORING AND STUDIES								
1. Research and Development		353.5	353.5		9.1	9.1	35.2	
2. Surveys and Evaluation	5.0	15.5	20.5	0.1	0.4	0.5	2.0	3.1
Subtotal	**5.0**	**369.0**	**374.0**	**0.1**	**9.5**	**9.6**	**37.2**	**3.1**
F. CONSULTING SERVICES								
1. International	43.4	4.8	48.2	1.1	0.1	1.2	4.8	26.5
2. Local		4.7	4.7		0.1	0.1	0.5	
Subtotal	**43.4**	**9.5**	**52.9**	**1.1**	**0.2**	**1.4**	**5.3**	**26.5**
G. RECURRENT COSTS								
1. Staff Salaries		6.2	6.2		0.2	0.2	0.6	
2. Operation and Maintenance of Facilities	0.8	3.2	4.0	0.0	0.1	0.1	0.4	0.5
3. Vehicle/ Equipment Operation/ Maintenance	6.0	6.0	12.0	0.2	0.2	0.3	1.2	3.7
4. Office Supplies and Consumables	3.5	1.5	5.0	0.1	0.0	0.1	0.5	2.1
Subtotal	**10.3**	**16.9**	**27.2**	**0.3**	**0.4**	**0.7**	**2.7**	**6.3**
BASE COSTS	**163.7**	**841.4**	**1,005.0**	**4.2**	**21.6**	**25.8**	**100.0**	**100.0**
Physical Contingencies	2.0	6.4	8.4	0.1	0.2	0.2		
TOTAL PROJECT COST	**165.7**	**847.8**	**1,013.5**	**4.3**	**21.8**	**26.1**		

Table 26 - Proposed Financing Plan, Million U $

Project Components	Total Programme Cost			GOB Financing			Donors Financing			Beneficiaries Financing		
	Foreign	Local	Total	Foreign	Local	Total	Foreign	Local	Total	Foreign	Local	Total
A. PHYSICAL INFRASTRUCTURE												
1. Land Acquisition		1.3	1.3		1.3	1.3						
2. Detail Engineering and Supervision		0.0	0.0					0.0	0.0			
3. Civil Works	0.1	0.5	0.5		0.0	0.0	0.1	0.5	0.5			
Subtotal	**0.1**	**1.8**	**1.8**		**1.3**	**1.3**	**0.1**	**0.5**	**0.5**			
B. FURNITURE, EQUIPMENT AND VEHICLES												
1. Furniture		0.1	0.1					0.1	0.1			
2. Equipments	0.1	0.0	0.1		0.0	0.0	0.1		0.1			
3. Vehicles	0.9	0.2	1.1		0.2	0.2	0.9		0.9			
Subtotal	**0.9**	**0.3**	**1.2**		**0.2**	**0.2**	**0.9**	**0.1**	**1.0**			
C. HUMAN RESOURCES DEVELOPMENT												
1. Overseas Training	1.1	0.1	1.2				1.1	0.1	1.2			
2. Short Foreign Training	0.6	0.1	0.7				0.6	0.1	0.7			
3. Local Training		0.1	0.1					0.1	0.1			
4. Local Training to Beneficiaries												
Subtotal	**1.7**	**0.3**	**2.0**				**1.7**	**0.3**	**2.0**			
D. PLANTATION DEVELOPMENT												
1. Medicinal Plants		1.2	1.2					0.9	0.9		0.2	0.2
2. Rattan Plantation		6.8	6.8					5.5	5.5		1.4	1.4
3. Murta Plantation		0.2	0.2					0.1	0.1		0.0	0.0
4. Lali/ Catechu Plantation		0.9	0.9					0.7	0.7		0.2	0.2
Subtotal		**9.1**	**9.1**					**7.3**	**7.3**		**1.8**	**1.8**
E. MONITORING AND STUDIES												
1. Research and Development		9.1	9.1					9.1	9.1			
2. Surveys and Evaluation	0.1	0.4	0.5				0.1	0.4	0.5			
Subtotal	**0.1**	**9.5**	**9.6**				**0.1**	**9.5**	**9.6**			
F. CONSULTING SERVICES												
1. International	1.1	0.1	1.2				1.1	0.1	1.2			
2. Local		0.1	0.1					0.1	0.1			
Subtotal	**1.1**	**0.2**	**1.4**				**1.1**	**0.2**	**1.4**			
G. RECURRENT COSTS												
1. Staff Salaries		0.2	0.2					0.2	0.2			
2. Operation and Maintenance of Facilities	0.0	0.1	0.1				0.0	0.0	0.0		0.1	0.1
3. Vehicle/ Equipment Operation/ Maintenance	0.2	0.2	0.3				0.2	0.0	0.2		0.1	0.1
4. Office Supplies and Consumables	0.1	0.0	0.1				0.1	0.0	0.1		0.0	0.0
Subtotal	**0.3**	**0.4**	**0.7**				**0.3**	**0.2**	**0.5**		**0.2**	**0.2**
BASE COSTS	**4.2**	**21.6**	**25.8**		**1.5**	**1.5**	**4.2**	**18.1**	**22.3**		**2.0**	**2.0**
Physical Contingencies	0.1	0.2	0.2		0.0	0.0	0.1	0.1	0.2		0.0	0.0
TOTAL PROGRAMME COST	**4.3**	**21.8**	**26.1**		**1.5**	**1.5**	**4.3**	**18.2**	**22.5**		**2.1**	**2.1**
PERCENTAGE	16.3	83.7	100.0		7.0	5.9	100.0	83.5	86.2		9.4	7.9

Table 27 - Phasing of Programme Costs, Million Taka

Programme Components	PY Year 1 - 5 FY 1993/97	6 - 10 1998/02	11 - 15 2003/07	16 - 20 2008/12	Total Costs Local	Foreign	Total
A. PHYSICAL INFRASTRUCTURE							
1. Land Acquisition	50.0				50.0		50.0
2. Detail Engineering and Supervision	1.2				1.2		1.2
3. Civil Works	20.0				18.0	2.0	20.0
Subtotal	**71.1**				**69.2**	**2.0**	**71.1**
B. FURNITURE, EQUIPMENT AND VEHICLES							
1. Furniture	1.0	1.0		1.0	3.0		3.0
2. Equipments	1.0	1.0		1.0	0.6	2.4	3.0
3. Vehicles	18.6	7.5		15.6	8.3	33.3	41.7
Subtotal	**20.6**	**9.5**		**17.6**	**11.9**	**35.7**	**47.7**
C. HUMAN RESOURCES DEVELOPMENT							
1. Overseas Training	28.1	19.7			4.8	43.0	47.7
2. Short Foreign Training	22.5	4.5			2.7	24.3	27.0
3. Local Training	2.4	1.5			3.9		3.9
4. Local Training to Beneficiaries	40.0	40.0	28.0		108.0		108.0
Subtotal	**53.0**	**25.7**			**11.4**	**67.3**	**78.6**
D. PLANTATION DEVELOPMENT							
1. Medicinal Plants	11.3	11.3	11.3	11.3	45.0		45.0
2. Rattan Plantation	66.5	66.5	66.5	66.5	266.0		266.0
3. Murta Plantation	1.5	1.5	1.5	1.5	6.0		6.0
4. Lali/ Catechu Plantation	9.1	9.1	9.1	9.1	36.5		36.5
Subtotal	**88.4**	**88.4**	**88.4**	**88.4**	**353.5**		**353.5**
E. MONITORING AND STUDIES							
1. Research and Development	88.4	88.4	88.4	88.4	353.5		353.5
2. Monitoring and Evaluation	5.5	5.5	5.5	4.0	15.5	5.0	20.5
Subtotal	**93.9**	**93.9**	**93.9**	**92.4**	**369.0**	**5.0**	**374.0**
F. CONSULTING SERVICES							
1. International	36.2	12.1			4.8	43.4	48.2
2. Local	3.0	1.7			4.7		4.7
Subtotal	**39.2**	**13.8**			**9.5**	**43.4**	**52.9**
G. RECURRENT COSTS							
1. Staff Salaries	1.3	1.4	1.7	1.9	6.2		6.2
2. Operation and Maintenance of Facilities	1.0	1.0	1.0	1.0	3.2	0.8	4.0
3. Vehicle/ Equipment Operation/ Maintenance	3.0	3.0	3.0	3.0	6.0	6.0	12.0
4. Office Supplies and Consumables	1.3	1.3	1.3	1.3	1.5	3.5	5.0
Subtotal	**6.5**	**6.7**	**6.9**	**7.2**	**16.9**	**10.3**	**27.2**
BASE COSTS	**372.6**	**237.8**	**189.1**	**205.5**	**841.4**	**163.7**	**1,005.0**
Physical Contingencies	15.8	0.7	0.2	1.1	6.4	2.0	8.4
TOTAL PROJECT COST	**388.5**	**238.6**	**189.3**	**206.5**	**847.8**	**165.7**	**1,013.5**

Table 28 - Cost Estimates - Civil Works, Furniture, Equipments and Vehicles

Items	Unit	Unit Cost (Taka '000)	Number of Units						Total Costs (Million Taka)							
			Year 1 - 5	6 - 10	11 - 15	16 - 20	21 - 25	Total	Year 1 - 5	6 - 10	11 - 15	16 - 20	21 - 25	Total	FEC	T and D
A. PHYSICAL FACILITIES																
1. Land Acquisition	Ha	5,000.0	10					10	50.0					50.0		
2. Detail Engineering and Supervision 1_/	Percent	6.0							1.2					1.2		
Subtotal									51.2					51.2		
3. Civil Works																
- Medicinal Plants Development	m^2	8.6	350					350	3.0					3.0	0.3	0.3
- Murta Plantation Development	m^2	8.6	370					370	3.2					3.2	0.3	0.3
- Sylhet Forest School	m^2	8.6	1,600					1,600	13.8					13.8	1.4	1.4
Subtotal									20.0					20.0	2.0	2.0
B. FURNITURE																
- Medicinal Plants Development	Lumpsum	200.0	1	1		1		3	0.2	0.2		0.2		0.6		
- Murta Plantation Development	Lumpsum	300.0	1	1		1		3	0.3	0.3		0.3		0.9		
- Sylhet Forest School	Lumpsum	500.0	1	1		1		3	0.5	0.5		0.5		1.5		
Subtotal									1.0	1.0		1.0		3.0		
C. EQUIPMENTS																
- Medicinal Plants Development	Lumpsum	200.0	1	1		1		3	0.2	0.2		0.2		0.6	0.5	0.1
- Murta Plantation Development	Lumpsum	300.0	1	1		1		3	0.3	0.3		0.3		0.9	0.7	0.2
- Sylhet Forest School	Lumpsum	500.0	1	1		1		3	0.5	0.5		0.5		1.5	1.2	0.3
Subtotal									1.0	1.0		1.0		3.0	2.4	0.6
D. VEHICLES																
- 4 WHD Jeep	No.	1,500.0	10	5		10		25	15.0	7.5		15.0		37.5	30.0	7.5
- Motor Cycle	No.	60.0	9			9		18	0.5			0.5		1.1	0.9	0.2
- Motorized Boat	No.	1,500.0	2					2	3.0					3.0	2.4	0.6
- Bi-Cycle	No.	4.0	10			10		20	0.0			0.0		0.1	0.1	0.0
Subtotal									18.6	7.5		15.6		41.7	33.3	8.3

Table 29 - Cost Estimates - Human Resource Development, Research, Studies and Operation/ Maintenance

Items	Unit	Unit Cost (Taka '000)	Number of Units						Total Costs (Million Taka)							
			Year 1 - 5	6 - 10	11 - 15	16 - 20	21 - 25	Total	Year 1 - 5	6 - 10	11 - 15	16 - 20	21 - 25	Total	FEC	T and D
A. TRAINING																
1. Overseas Training	No	1,404.0	20	14				34	28.1	19.7				47.7	43.0	
2. Short Foreign Training	No	450.0	50	10				60	22.5	4.5				27.0	24.3	
3. Local Training	No	15.0	160	100				260	2.4	1.5				3.9		
4. Local Training to Beneficiaries	No	2.0	20,000	20,000	14,000			54,000	40.0	40.0	28.0			108.0		
Subtotal									**53.0**	**25.7**				**78.6**	**67.3**	
B. PLANTATION DEVELOPMENT																
1. Medicinal Plants	Ha	12.5	900	900	900	900		3,600	11.3	11.3	11.3	11.3		45.0		
2. Rattan Plantation	Ha	13.3	5,000	5,000	5,000	5,000		20,000	66.5	66.5	66.5	66.5		266.0		
3. Murta Plantation	Ha	7.5	200	200	200	200		800	1.5	1.5	1.5	1.5		6.0		
4. Lali/ Catechu Plantation	Ha	12.8	715	715	715	715		2,860	9.1	9.1	9.1	9.1		36.5		
Subtotal									**88.4**	**88.4**	**88.4**	**88.4**		**353.5**		
C. MONITORING AND STUDIES																
1. Ongoing monitoring		2,500.0	1	1	1	1		4	2.5	2.5	2.5	2.5		10.0	5.0	1.0
1. Survey and Studies		150.0	20	20	20	10		70	3.0	3.0	3.0	1.5		10.5		
Subtotal									**5.5**	**5.5**	**5.5**	**4.0**		**20.5**	**5.0**	**1.0**
D. CONSULTING SERVICES																
1. International		603.0	60	20				80	36.2	12.1				48.2	43.4	
2. Local		50.0	60	34				94	3.0	1.7				4.7		
Subtotal									**39.2**	**13.8**				**52.9**	**43.4**	
E. RECURRENT COSTS																
1. Staff Salaries		1,250.0	1	1.2	1.3	1.5		5	1.3	1.4	1.7	1.9		6.2		
3. Operation and Maintenance of Facilities		1,000.0	1	1	1	1		4	1.0	1.0	1.0	1.0		4.0	0.8	0.4
4. Vehicle/ Equipment Operation/ Maintenance		3,000.0	1	1	1	1		4	3.0	3.0	3.0	3.0		12.0	6.0	1.2
5. Office Supplies and Consumables		1,250.0	1	1	1	1		4	1.3	1.3	1.3	1.3		5.0	3.5	0.5
Subtotal									**6.5**	**6.7**	**6.9**	**7.2**		**27.2**	**10.3**	**2.1**

8. FOREST-BASED INDUSTRIES DEVELOPMENT

Table 30 - Summary of Programme Costs

Programme Components	Million Taka			Million U $			% of	% of
	Foreign	Local	Total	Foreign	Local	Total	Base Costs	FEC
A. PHYSICAL INFRASTRUCTURE								
1. Roads								
- Access Road	14.8	38.1	52.9	0.4	1.0	1.4	0.1	0.1
- Main Road	325.2	836.3	1,161.5	8.4	21.5	29.9	2.6	1.2
- Secondary Road	278.6	716.3	994.9	7.2	18.4	25.6	2.2	1.0
Subtotal	**618.6**	**1,590.6**	**2,209.2**	**15.9**	**40.9**	**56.8**	**4.9**	**2.2**
B. EXTRACTION EQUIPMENTS								
1. Equipment Procurement	509.5	451.9	961.4	13.1	11.6	24.7	2.1	1.8
2. Replacement of existing Equipments	970.8	860.9	1,831.7	25.0	22.1	47.1	4.0	3.4
Subtotal	**1,480.3**	**1,312.8**	**2,793.1**	**38.1**	**33.7**	**71.8**	**6.2**	**5.2**
C. FOREST-BASED INDUSTRIES								
1. Sawmilling	5,954.9	2,202.5	8,157.3	153.1	56.6	209.7	18.0	21.1
2. Newsprint	4,378.6	2,626.5	7,005.1	112.6	67.5	180.1	15.4	15.5
3. Printing and Writing Paper	4,538.2	2,721.7	7,259.9	116.7	70.0	186.6	16.0	16.1
4. Wrapping/ Packaging Papers	3,618.9	2,169.8	5,788.7	93.0	55.8	148.8	12.8	12.8
5. Speciality Papers	7,617.2	4,566.6	12,183.9	195.8	117.4	313.2	26.8	27.0
Subtotal	**26,107.9**	**14,287.1**	**40,394.9**	**671.2**	**367.3**	**1,038.4**	**89.0**	**92.6**
BASE COSTS	**28,206.8**	**17,190.5**	**45,397.3**	**725.1**	**441.9**	**1,167.0**	**100.0**	**100.0**
Physical Contingencies	1,269.1	835.8	2,104.9	32.6	21.5	54.1		
TOTAL PROGRAMME COST	**29,475.9**	**18,026.3**	**47,502.2**	**757.7**	**463.4**	**1,221.1**		

Table 31 - Proposed Financing Plan, Million U $

Project Components	Total Programme Cost			GOB Financing			Donors Financing			Beneficiaries Financing		
	Foreign	Local	Total	Foreign	Local	Total	Foreign	Local	Total	Foreign	Local	Total
A. PHYSICAL INFRASTRUCTURE												
1. Roads												
- Access Road	0.4	1.0	1.4				0.4	0.8	1.2	0.2	0.2	
- Main Road	8.4	21.5	29.9				8.4	17.2	25.6	4.3	4.3	
- Secondary Road	7.2	18.4	25.6				7.2	14.7	21.9	3.7	3.7	
Subtotal	**15.9**	**40.9**	**56.8**				**15.9**	**32.7**	**48.6**	**8.2**	**8.2**	
B. EXTRACTION EQUIPMENTS												
1. Equipment Procurement	13.1	11.6	24.7				13.1	9.3	22.4	2.3	2.3	
2. Replacement of existing Equipments	25.0	22.1	47.1				25.0	17.7	42.7	4.4	4.4	
Subtotal	**38.1**	**33.7**	**71.8**				**38.1**	**27.0**	**65.1**	**6.7**	**6.7**	
C. FOREST-BASED INDUSTRIES												
1. Sawmilling	153.1	56.6	209.7				153.1	45.3	198.4	11.3	11.3	
2. Newsprint	112.6	67.5	180.1				112.6	54.0	166.6	13.5	13.5	
3. Printing and Writing Paper	116.7	70.0	186.6				116.7	56.0	172.6	14.0	14.0	
4. Wrapping/ Packaging Papers	93.0	55.8	148.8				93.0	44.6	137.7	11.2	11.2	
5. Specinlity Papers	195.8	117.4	313.2				195.8	93.9	289.7	23.5	23.5	
Subtotal	671.2	367.3	1,038.4				671.2	293.8	965.0	73.5	73.5	
BASE COSTS	**725.1**	**441.9**	**1,167.0**				**725.1**	**353.5**	**1,078.6**	**88.4**	**88.4**	
Physical Contingencies	32.6	21.5	54.1				32.6	17.2	49.8	4.3	4.3	
TOTAL PROGRAMME COST	**757.7**	**463.4**	**1,221.1**				**757.7**	**370.7**	**1,128.5**	**92.7**	**92.7**	
Percentage	60.0	40.0	100.0				100.0	80.0	92.4	20.0	8.0	

Table 32 - Phasing of Programme Costs, Million Taka

Programme Components	PY	Year 1 - 5	6 - 10	11 - 15	16 - 20	Total Costs		
	FY	1993/97	1998/02	2003/07	2008/12	Local	Foreign	Total
A. PHYSICAL INFRASTRUCTURE								
1. Roads								
- Access Road		9.5	14.0	14.5	14.8	38.1	14.8	52.9
- Main Road		210.5	310.3	317.1	323.6	836.3	325.2	1,161.5
- Secondary Road		180.3	265.8	271.6	277.2	716.3	278.6	994.9
Subtotal		**400.3**	**590.1**	**603.2**	**615.6**	**1,590.6**	**618.6**	**2,209.2**
B. EXTRACTION EQUIPMENTS								
1. Equipment Procurement		313.2	6.6	10.2	56.8	451.9	509.5	961.4
2. Replacement of existing Equipments			521.6	412.8	394.6	860.9	970.8	1,831.7
Subtotal		**313.2**	**528.2**	**423.0**	**451.4**	**1,312.8**	**1,480.3**	**2,793.1**
C. FOREST-BASED INDUSTRIES								
1. Sawmilling		2,127.8	2,571.3	2,349.6	1,108.7	2,202.5	5,954.9	8,157.3
2. Newsprint			4,475.1	1,265.0	1,265.0	2,626.5	4,378.6	7,005.1
3. Printing and Writing Paper			3,641.0	1,867.2	1,751.7	2,721.7	4,538.2	7,259.9
4. Wrapping/ Packaging Papers			840.2	2,147.7	2,800.8	2,169.8	3,618.9	5,788.7
5. Speciality Papers			4,726.7	3,151.3	4,305.8	4,566.6	7,617.2	12,183.9
Subtotal		**2,127.8**	**16,254.4**	**10,780.7**	**11,232.0**	**14,287.1**	**26,107.9**	**40,394.9**
BASE COSTS		**2,841.3**	**17,372.7**	**11,806.9**	**12,299.0**	**17,190.5**	**28,206.8**	**45,397.3**
Physical Contingencies		162.1	716.1	527.1	645.7	835.8	1,269.1	2,104.9
TOTAL PROJECT COST		**3,003.4**	**18,088.7**	**12,334.1**	**12,944.8**	**18,026.3**	**29,475.9**	**47,502.2**

Table 33 - Cost Estimates - Roads and Logging Equipments

Items	Unit	Unit Cost (Taka '000)	Number of Units						Total Costs (Million Taka)							
			Year 1 - 5	6 - 10	11 - 15	16 - 20	21 - 25	Total	Year 1 - 5	6 - 10	11 - 15	16 - 20	21 - 25	Total	FEC	T and D
A. PHYSICAL FACILITIES																
1. Roads																
- Access Road	Km	460.0	21	31	31	32		115	9.5	14.0	14.5	14.8		52.9	14.8	10.6
- Main Road	Km	333.5	631	930	951	970		3,482	210.5	310.3	317.1	323.6		1,161.5	325.2	232.3
- Secondary Road	Km	124.2	1,452	2,140	2,187	2,232		8,011	180.3	265.8	271.6	277.2		994.9	278.6	199.0
Subtotal			**2,104**	**3,101**	**3,169**	**3,234**		**11,608**	**400.3**	**590.1**	**603.2**	**615.6**		**2,209.2**	**618.6**	**441.8**
B. EXTRACTION EQUIPMENTS																
1. Equipment Procurement																
- High Forest Logging	m^3	3.2	50,000					50,000	160.0					160.0	84.8	40.0
- Plantation Forest Logging	m^3	0.8	191,500	8,250	12,750	71,000	718,250	1,001,750	153.2	6.6	10.2	56.8	574.6	801.4	424.7	200.4
Subtotal									**313.2**	**6.6**	**10.2**	**56.8**	**574.6**	**961.4**	**509.5**	**240.4**
2. Replacement																
- High Forest Logging	m^3	3.2		124,688	89,063	71,250	71,250	356,251		399.0	285.0	228.0	228.0	1,140.0	604.2	285.0
- Plantation Forest Logging	m^3	0.8		153,250	159,750	208,250	343,375	864,625		122.6	127.8	166.6	274.7	691.7	366.6	172.9
Subtotal										**521.6**	**412.8**	**394.6**	**502.7**	**1,831.7**	**970.8**	**457.9**
C. FABRICATION OF SAWMILLS																
- Large Scale	No	385,110.0														
- Medium Scale	No	221,730.0	1	3	2	5		11	221.7	665.2	443.5	1,108.7		2,439.0	1,780.5	243.9
- Teak	No	190,610.0	10	10	10			30	1,906.1	1,906.1	1,906.1			5,718.3	4,174.4	571.8
- Small Scale	No	30,808.8	3	2	98	200		303	92.4	61.6	3,019.3	6,161.8		9,335.1	6,814.6	933.5
- Push Bench	No	6,224.0	31	62	186	290		569	192.9	385.9	1,157.7	1,805.0		3,541.5	2,585.3	354.1
Subtotal									**2,127.8**	**2,571.3**	**2,349.6**	**1,108.7**		**8,157.3**	**5,954.9**	**815.7**

Table 33 - Cost Estimates - Forest-Based Industries Development (Cont'd.)

Items	Unit	Unit Cost (Taka '000)	Number of Units						Total Costs (Million Taka)							
			Year 1 - 5	6 - 10	11 - 15	16 - 20	21 - 25	Total	Year 1 - 5	6 - 10	11 - 15	16 - 20	21 - 25	Total	FEC	T and D
D. NEWSPRINT																
1. Machinery/ Equipments	Sum	2,053,920.0		1				1		2,053.9				2,053.9	1,643.1	410.8
2. Structures	Sum	635,626.0		1				1		635.6				635.6	127.1	127.1
3. Operating Supplies	Sum	64,574.0		1				1		64.6				64.6		
4. Equipment Rent	Sum	38,900.0		1				1		38.9				38.9	31.1	
5. Startup Cost	Sum	112,032.0		1				1		112.0				112.0	22.4	11.2
6. Studies/ Design	Sum	304,976.0		1				1		305.0				305.0	183.0	
Subtotal										**3,210.0**				**3,210.0**	**2,006.8**	**549.1**
1. Machinery/ Equipments	Sum	809,120.0			1	1		2			809.1	809.1		1,618.2	1,294.6	323.6
2. Structures	Sum	250,516.0			1	1		2			250.5	250.5		501.0	100.2	100.2
3. Operating Supplies	Sum	25,674.0			1	1		2			25.7	25.7		51.3		
4. Equipment Rent	Sum	15,560.0			1	1		2			15.6	15.6		31.1	24.9	
5. Startup Cost	Sum	44,346.0			1	1		2			44.3	44.3		88.7	17.7	8.9
6. Studies/ Design	Sum	119,812.0			1	1		2			119.8	119.8		239.6	143.8	
Subtotal											**1,265.0**	**1,265.0**		**2,530.1**	**1,581.2**	**432.7**
1. Machinery/ Equipments	Sum	809,120.0		1				1		809.1				809.1	647.3	161.8
2. Structures	Sum	250,516.0		1				1		250.5				250.5	50.1	50.1
3. Operating Supplies	Sum	25,674.0		1				1		25.7				25.7		
4. Equipment Rent	Sum	15,560.0		1				1		15.6				15.6	12.4	
5. Startup Cost	Sum	44,346.0		1				1		44.3				44.3	8.9	4.4
6. Studies/ Design	Sum	119,812.0		1				1		119.8				119.8	71.9	
Subtotal										**1,265.0**				**1,265.0**	**790.6**	**216.4**
Total										**4,475.1**	**1,265.0**	**1,265.0**		**7,005.1**	**4,378.6**	**1,198.2**
E. PRINTING AND WRITING PAPER																
1. Machinery/ Equipments	Sum	2,330,110.0		1				1		2,330.1				2,330.1	1,864.1	466.0
2. Structures	Sum	720,817.0		1				1		720.8				720.8	144.2	144.2
3. Operating Supplies	Sum	73,132.0		1				1		73.1				73.1		
4. Equipment Rent	Sum	43,568.0		1				1		43.6				43.6	34.9	
5. Startup Cost	Sum	127,592.0		1				1		127.6				127.6	25.5	12.8
6. Studies/ Design	Sum	345,821.0		1				1		345.8				345.8	207.5	
Subtotal										**3,641.0**				**3,641.0**	**2,276.1**	**622.9**
1. Machinery/ Equipments	Sum	1,195,008.0			1			1			1,195.0			1,195.0	956.0	239.0
2. Structures	Sum	369,550.0			1			1			369.6			369.6	73.9	73.9
3. Operating Supplies	Sum	37,344.0			1			1			37.3			37.3		
4. Equipment Rent	Sum	22,562.0			1			1			22.6			22.6	18.0	
5. Startup Cost	Sum	65,352.0			1			1			65.4			65.4	13.1	6.5
6. Studies/ Design	Sum	177,384.0			1			1			177.4			177.4	106.4	
Subtotal											**1,867.2**			**1,867.2**	**1,167.5**	**319.4**
1. Machinery/ Equipments	Sum	1,120,320.0				1		1				1,120.3		1,120.3	896.3	224.1
2. Structures	Sum	346,988.0				1		1				347.0		347.0	69.4	69.4
3. Operating Supplies	Sum	35,399.0				1		1				35.4		35.4		
4. Equipment Rent	Sum	21,006.0				1		1				21.0		21.0	16.8	
5. Startup Cost	Sum	61,462.0				1		1				61.5		61.5	12.3	6.1
6. Studies/ Design	Sum	166,492.0				1		1				166.5		166.5	99.9	
Subtotal												**1,751.7**		**1,751.7**	**1,094.6**	**299.6**
Total										**3,641.0**	**1,867.2**	**1,751.7**		**7,259.9**	**4,538.2**	**1,242.0**

Table 34 - Cost Estimates, Forest-Based Industries Development

Items	Unit	Unit Cost (Taka '000)	Number of Units						Total Costs (Million Taka)							
			Year 1 - 5	6 - 10	11 - 15	16 - 20	21 - 25	Total	Year 1 - 5	6 - 10	11 - 15	16 - 20	21 - 25	Total	FEC	T and D
F. WRAPPING AND PACKAGING																
1. Machinery/ Equipments	Sum	537,598.0		1				1		537.6				537.6	430.1	107.5
2. Structures	Sum	166,492.0		1				1		166.5				166.5	33.3	33.3
3. Operating Supplies	Sum	16,727.0		1				1		16.7				16.7		
4. Equipment Rent	Sum	10,114.0		1				1		10.1				10.1	8.1	
5. Startup Cost	Sum	29,175.0		1				1		29.2				29.2	5.8	2.9
6. Studies/ Design	Sum	80,134.0		1				1		80.1				80.1	48.1	
Subtotal										**840.2**				**840.2**	**525.4**	**143.7**
1. Machinery/ Equipments	Sum	1,374,337.0			1			1			1,374.3			1,374.3	1,099.5	274.9
2. Structures	Sum	424,788.0			1			1			424.8			424.8	85.0	85.0
3. Operating Supplies	Sum	43,179.0			1			1			43.2			43.2		
4. Equipment Rent	Sum	25,674.0			1			1			25.7			25.7	20.5	
5. Startup Cost	Sum	75,466.0			1			1			75.5			75.5	15.1	7.5
6. Studies/ Design	Sum	204,225.0			1			1			204.2			204.2	122.5	
Subtotal											**2,147.7**			**2,147.7**	**1,342.6**	**367.4**
1. Machinery/ Equipments	Sum	1,792,512.0				1		1				1,792.5		1,792.5	1,434.0	358.5
2. Structures	Sum	554,714.0				1		1				554.7		554.7	110.9	110.9
3. Operating Supplies	Sum	56,016.0				1		1				56.0		56.0		
4. Equipment Rent	Sum	33,454.0				1		1				33.5		33.5	26.8	
5. Startup Cost	Sum	98,028.0				1		1				98.0		98.0	19.6	9.8
6. Studies/ Design	Sum	266,076.0				1		1				266.1		266.1	159.6	
Subtotal												**2,800.8**		**2,800.8**	**1,751.0**	**479.2**
Total										**840.2**	**2,147.7**	**2,800.8**		**5,788.7**	**3,618.9**	**990.4**
G. SPECIALITY PAPERS																
1. Machinery/ Equipments	Sum	3,024,864.0		1				1		3,024.9				3,024.9	2,419.9	605.0
2. Structures	Sum	935,934.0		1				1		935.9				935.9	187.2	187.2
3. Operating Supplies	Sum	94,527.0		1				1		94.5				94.5		
4. Equipment Rent	Sum	56,794.0		1				1		56.8				56.8	45.4	
5. Startup Cost	Sum	165,714.0		1				1		165.7				165.7	33.1	16.6
6. Studies/ Design	Sum	448,906.0		1				1		448.9				448.9	269.3	
Subtotal										**4,726.7**				**4,726.7**	**2,955.0**	**808.7**
1. Machinery/ Equipments	Sum	2,016,576.0			1			1			2,016.6			2,016.6	1,613.3	403.3
2. Structures	Sum	623,956.0			1			1			624.0			624.0	124.8	124.8
3. Operating Supplies	Sum	63,018.0			1			1			63.0			63.0		
4. Equipment Rent	Sum	38,122.0			1			1			38.1			38.1	30.5	
5. Startup Cost	Sum	110,476.0			1			1			110.5			110.5	22.1	11.0
6. Studies/ Design	Sum	299,141.0			1			1			299.1			299.1	179.5	
Subtotal											**3,151.3**			**3,151.3**	**1,970.1**	**539.2**
1. Machinery/ Equipments	Sum	2,756,065.0				1		1				2,756.1		2,756.1	2,204.9	551.2
2. Structures	Sum	852,299.0				1		1				852.3		852.3	170.5	170.5
3. Operating Supplies	Sum	85,969.0				1		1				86.0		86.0		
4. Equipment Rent	Sum	51,348.0				1		1				51.3		51.3	41.1	
5. Startup Cost	Sum	150,932.0				1		1				150.9		150.9	30.2	15.1
6. Studies/ Design	Sum	409,228.0				1		1				409.2		409.2	245.5	
Subtotal												**4,305.8**		**4,305.8**	**2,692.1**	**736.8**
Total										**4,726.7**	**3,151.3**	**4,305.8**		**12,183.9**	**7,617.2**	**2,084.7**

9. INSTITUTIONAL DEVELOPMENT

Table 35 - Summary of Programme Costs

Programme Components	Million Taka			Million U $			% of	% of
	Foreign	Local	Total	Foreign	Local	Total	Base Costs	FEC
A. PHYSICAL INFRASTRUCTURE								
1. Land Acquisition		400.0	400.0		10.3	10.3	1.0	
2. Detail Engineering and Supervision		74.3	74.3		1.9	1.9	0.2	
3. Civil Works	247.8	991.2	1,239.0	6.4	25.5	31.9	3.1	5.2
Subtotal	**247.8**	**1,465.6**	**1,713.4**	**6.4**	**37.7**	**44.0**	**4.3**	**5.2**
B. FURNITURE, EQUIPMENT AND VEHICLES								
1. Furniture		260.0	260.0		6.7	6.7	0.7	
2. Equipments	448.0	112.0	560.0	11.5	2.9	14.4	1.4	9.4
3. Vehicles	1,008.0	252.0	1,260.0	25.9	6.5	32.4	3.2	21.2
Subtotal	**1,456.0**	**624.0**	**2,080.0**	**37.4**	**16.0**	**53.5**	**5.3**	**30.6**
C. NEW LEGISLATION		337.3	337.3		8.7	8.7	0.9	
Subtotal		**337.3**	**337.3**		**8.7**	**8.7**	**0.9**	
D. HUMAN RESOURCES DEVELOPMENT								
1. Overseas Training for BFD Staff	364.5	40.5	405.0	9.4	1.0	10.4	1.0	7.7
2. Local Training to BFD Staff		100.0	100.0		2.6	2.6	0.3	
3. Local Training to Beneficiaries		600.0	600.0		15.4	15.4	1.5	
Subtotal	**364.5**	**740.5**	**1,105.0**	**9.4**	**19.0**	**28.4**	**2.8**	**7.7**
E. RESEARCH, DEVELOPMENT AND STUDIES								
1. Research and Development	1,318.4	847.7	2,166.1	33.9	21.8	55.7	5.5	27.7
2. Monitoring and Evaluation	120.0	120.0	240.0	3.1	3.1	6.2	0.6	2.5
Subtotal	**1,438.4**	**967.7**	**2,406.1**	**37.0**	**24.9**	**61.9**	**6.1**	**30.2**
F. CONSULTING SERVICES								
1. International	488.4	54.3	542.7	12.6	1.4	14.0	1.4	10.3
2. Local		85.0	85.0		2.2	2.2	0.2	
Subtotal	**488.4**	**139.3**	**627.7**	**12.6**	**3.6**	**16.1**	**1.6**	**10.3**
G. RECURRENT COSTS								
1. Existing Staff Salaries		499.0	499.0		12.8	12.8	1.3	
2. Incremental Staff Salaries		29,484.0	29,484.0		757.9	757.9	74.6	
3. Operation and Maintenance of Facilities	40.0	40.0	80.0	1.0	1.0	2.1	0.2	0.8
4. Vehicle/ Equipment Operation/ Maintenance	300.0	300.0	600.0	7.7	7.7	15.4	1.5	6.3
5. Office Supplies and Consumables	420.0	180.0	600.0	10.8	4.6	15.4	1.5	8.8
Subtotal	**760.0**	**30,503.0**	**31,263.0**	**19.5**	**784.1**	**803.7**	**79.1**	**16.0**
BASE COSTS	**4,755.1**	**34,777.4**	**39,532.4**	**122.2**	**894.0**	**1,016.3**	**100.0**	**100.0**
Physical Contingencies	152.6	1,617.5	1,770.1	3.9	41.6	45.5		
TOTAL PROJECT COST	**4,907.6**	**36,394.9**	**41,302.5**	**126.2**	**935.6**	**1,061.8**		

Table 36 - Proposed Financing Plan, Million U $

Project Components	Total Programme Cost			GOB Financing			Donors Financing			Beneficiaries Financing		
	Foreign	Local	Total	Foreign	Local	Total	Foreign	Local	Total	Foreign	Local	Total
A. PHYSICAL INFRASTRUCTURE												
1. Land Acquisition		10.3	10.3								10.3	10.3
2. Detail Engineering and Supervision		1.9	1.9					1.9	1.9			
3. Civil Works	6.4	25.5	31.9		3.2	3.2	6.4	22.3	28.7			
Subtotal	**6.4**	**37.7**	**44.0**		**3.2**	**3.2**	**6.4**	**24.2**	**30.6**		**10.3**	**10.3**
B. FURNITURE, EQUIPMENT AND VEHICLES												
1. Furniture		6.7	6.7					6.7	6.7			
2. Equipments	11.5	2.9	14.4		2.9	2.9	11.5		11.5			
3. Vehicles	25.9	6.5	32.4		6.5	6.5	25.9		25.9			
Subtotal	**37.4**	**16.0**	**53.5**		**9.4**	**9.4**	**37.4**	**6.7**	**44.1**			
C. NEW LEGISLATION		8.7	8.7					8.7	8.7			
Subtotal		**8.7**	**8.7**					**8.7**	**8.7**			
D. HUMAN RESOURCES DEVELOPMENT												
1. Overseas Training for BFD Staff	9.4	1.0	10.4				9.4	1.0	10.4			
2. Local Training to BFD Staff		2.6	2.6					2.6	2.6			
3. Local Training to Beneficiaries		15.4	15.4					15.4	15.4			
Subtotal	**9.4**	**19.0**	**28.4**				**9.4**	**19.0**	**28.4**			
E. RESEARCH, DEVELOPMENT AND STUDIES												
1. Research and Development	33.9	21.8	55.7		5.1	5.1	33.9	16.7	50.6			
2. Monitoring and Evaluation	3.1	3.1	6.2				3.1	3.1	6.2			
Subtotal	**37.0**	**24.9**	**61.9**		**5.1**	**5.1**	**37.0**	**19.8**	**56.8**			
F. CONSULTING SERVICES												
1. International	12.6	1.4	14.0				12.6	1.4	14.0			
2. Local		2.2	2.2					2.2	2.2			
Subtotal	**12.6**	**3.6**	**16.1**				**12.6**	**3.6**	**16.1**			
G. RECURRENT COSTS												
1. Existing Staff Salaries		12.8	12.8		12.8	12.8						
2. Incremental Staff Salaries		757.9	757.9								757.9	757.9
3. Operation and Maintenance of Facilities	1.0	1.0	2.1		0.1	0.1	1.0		1.0		0.9	0.9
4. Vehicle/ Equipment Operation/ Maintenance	7.7	7.7	15.4		0.8	0.8	7.7		7.7		6.9	6.9
5. Office Supplies and Consumables	10.8	4.6	15.4		0.5	0.5	10.8		10.8		4.2	4.2
Subtotal	**19.5**	**784.1**	**803.7**		**14.2**	**14.2**	**19.5**		**19.5**		**770.0**	**770.0**
BASE COSTS	**122.2**	**894.0**	**1,016.3**		**31.8**	**31.8**	**122.2**	**82.0**	**204.2**		**780.3**	**780.3**
Physical Contingencies	3.9	41.6	45.5		1.7	1.7	3.9	3.7	7.7		36.2	36.2
TOTAL PROGRAMME COST	**126.2**	**935.6**	**1,061.8**		**33.5**	**33.5**	**126.2**	**85.7**	**211.9**		**816.4**	**816.4**
Percentage	11.9	88.1	100.0		3.6	3.2	100.0	9.2	20.0		87.3	76.9

Table 37 - Phasing of Programme Costs, Million Taka

Programme Components	PY Year 1 - 5 FY 1993/97	6 - 10 1998/02	11 - 15 2003/07	16 - 20 2008/12	Total Costs Local	Foreign	Total
A. PHYSICAL INFRASTRUCTURE							
1. Land Acquisition	150.0	150.0	100.0		400.0		400.0
2. Detail Engineering and Supervision	18.8	22.7	13.4	19.4	74.3		74.3
3. Civil Works	313.8	378.4	222.9	323.9	991.2	247.8	1,239.0
Subtotal	**482.6**	**551.1**	**336.3**	**343.4**	**1,465.6**	**247.8**	**1,713.4**
B. FURNITURE, EQUIPMENT AND VEHICLES							
1. Furniture	80.0	130.0	30.0	20.0	260.0		260.0
2. Equipments	145.0	145.0	125.0	145.0	112.0	448.0	560.0
3. Vehicles	430.0	430.0	185.0	215.0	252.0	1,008.0	1,260.0
Subtotal	**655.0**	**705.0**	**340.0**	**380.0**	**624.0**	**1,456.0**	**2,080.0**
C. NEW LEGISLATION	272.0	21.8	21.8	21.8	337.3		337.3
Subtotal	**272.0**	**21.8**	**21.8**	**21.8**	**337.3**		**337.3**
D. HUMAN RESOURCES DEVELOPMENT							
1. Oversea Training for BFD Staff	202.5	202.5			40.5	364.5	405.0
2. Local Training to BFD Staff	25.0	25.0	25.0	25.0	100.0		100.0
3. Local Training to Beneficiaries	150.0	150.0	150.0	150.0	600.0		600.0
Subtotal	**377.5**	**377.5**	**175.0**	**175.0**	**740.5**	**364.5**	**1,105.0**
E. RESEARCH, DEVELOPMENT AND STUDIES							
1. Research and Development	543.4	539.3	522.8	560.7	847.7	1,318.4	2,166.1
2. Monitoring and Evaluation	60.0	60.0	60.0	60.0	120.0	120.0	240.0
Subtotal	**603.4**	**599.3**	**582.8**	**620.7**	**967.7**	**1,438.4**	**2,406.1**
F. CONSULTING SERVICES					24.9	37.0	61.9
1. International	180.9	180.9	120.6	60.3	54.3	488.4	542.7
2. Local	30.0	30.0	20.0	5.0	85.0		85.0
Subtotal	**210.9**	**210.9**	**140.6**	**65.3**	**139.3**	**488.4**	**627.7**
G. RECURRENT COSTS							
1. Existing Staff Salaries	100.0	115.0	132.0	152.0	499.0		499.0
2. Incremental Staff Salaries	5,670.0	6,804.0	7,938.0	9,072.0	29,484.0		29,484.0
3. Operation and Maintenance of Facilities	20.0	20.0	20.0	20.0	40.0	40.0	80.0
4. Vehicle/ Equipment Operation/ Maintenance	150.0	150.0	150.0	150.0	300.0	300.0	600.0
5. Office Supplies and Consumables	150.0	150.0	150.0	150.0	180.0	420.0	600.0
Subtotal	**6,090.0**	**7,239.0**	**8,390.0**	**9,544.0**	**30,503.0**	**760.0**	**31,263.0**
BASE COSTS	**8,691.4**	**9,704.5**	**9,986.5**	**11,150.1**	**34,777.4**	**4,755.1**	**39,532.4**
Physical Contingencies	364.1	421.3	464.4	520.2	1,617.5	152.6	1,770.1
TOTAL PROJECT COST	**9,055.4**	**10,125.8**	**10,450.9**	**11,670.3**	**36,394.9**	**4,907.6**	**41,302.5**

Table 38 - Cost Estimates - Civil Works, Furniture, Equipments and Vehicles

Items	Unit	Unit Cost (Taka '000)	Number of Units						Total Costs (Million Taka)							
			Year 1 - 5	6 - 10	11 - 15	16 - 20	21 - 25	Total	Year 1 - 5	6 - 10	11 - 15	16 - 20	21 - 25	Total	FEC	T and D
A. PHYSICAL FACILITIES																
1. Land Acquisition	Ha	5,000.0	30	30	20			80	150.0	150.0	100.0			400.0		
2. Detail Engineering and Supervision 1_/	Percent	6.0							18.8	22.7	13.4	19.4		74.3		
Subtotal									**168.8**	**172.7**	**113.4**	**19.4**		**474.3**		
3. Civil Works																
- Enterprise Building	m^2	10.1	13,950	13,950	9,300	9,300		46,500	140.9	140.9	93.9	93.9		469.7	93.9	47.0
- Production Unit	m^2	8.6	8,360	10,000	15,000	15,000		48,360	71.9	86.0	129.0	129.0		415.9	83.2	41.6
- Forestry Board	m^2	10.1	10,000	15,000		10,000		35,000	101.0	151.5		101.0		353.5	70.7	35.4
Subtotal									**313.8**	**378.4**	**222.9**	**323.9**		**1,239.0**	**247.8**	**123.9**
B. FURNITURE																
- Enterprise Building	Lumpsum	10,000.0	2	2	1			5	20.0	20.0	10.0			50.0		
- Production Unit	Lumpsum	10,000.0	5	10	2	2		19	50.0	100.0	20.0	20.0		190.0		
- Forestry Board	Lumpsum	10,000.0	1	1				2	10.0	10.0				20.0		
Subtotal									**80.0**	**130.0**	**30.0**	**20.0**		**260.0**		
C. EQUIPMENTS																
- Enterprise Office	Lumpsum	50,000.0	1	1	1	1		4	50.0	50.0	50.0	50.0		200.0	160.0	40.0
- Production Unit	Lumpsum	75,000.0	1	1	1	1		4	75.0	75.0	75.0	75.0		300.0	240.0	60.0
- Forestry Board	Lumpsum	20,000.0	1	1		1		3	20.0	20.0		20.0		60.0	48.0	12.0
Subtotal									**145.0**	**145.0**	**125.0**	**145.0**		**560.0**	**448.0**	**112.0**
D. VEHICLES																
- Motor Launch	No.	20,000.0	10	10	5	5		30	200.0	200.0	100.0	100.0		600.0	480.0	120.0
- Cabin Trawler	No.	1,000.0	50	50	10	10		120	50.0	50.0	10.0	10.0		120.0	96.0	24.0
- 4 WHD Jeep	No.	1,500.0	100	100	50	50		300	150.0	150.0	75.0	75.0		450.0	360.0	90.0
- Motor Cycle	No.	60.0	500	500		500		1,500	30.0	30.0		30.0		90.0	72.0	18.0
Subtotal									**430.0**	**430.0**	**185.0**	**215.0**		**1,260.0**	**1,008.0**	**252.0**
E. NEW LEGISLATION/IMPLEMENTATION		272,000.0	1	0.1	0.1	0.1		1.2	272.0	21.8	21.8	21.8		337.3		

Table 29 - Cost Estimates - Research Studies and Operation/ Maintenance

Items	Unit	Unit Cost (Taka '000)	Number of Units						Total Costs (Million Taka)							
			Year 1 - 5	6 - 10	11 - 15	16 - 20	21 - 25	Total	Year 1 - 5	6 - 10	11 - 15	16 - 20	21 - 25	Total	FEC	T and D
A. TRAINING																
1. Overseas Training	No	450.0	450	450				900	202.5	202.5				405.0	364.5	
2. Local Training	No	10.0	2,500	2,500	2,500	2,500		10,000	25.0	25.0	25.0	25.0		100.0		
3. Local Training to Beneficiaries	No	0.6	250,000	250,000	250,000	250,000		1,000,000	150.0	150.0	150.0	150.0		600.0		
Subtotal									**377.5**	**377.5**	**175.0**	**175.0**		**1,105.0**	**364.5**	
B. RESEARCH AND DEVELOPMENT																
1. Overseas Training		1,167.0	50	30	20	22		122	58.4	35.0	23.3	25.7		142.4	128.1	
2. Local Training		50.0	200	200	200	200		800	10.0	10.0	10.0	10.0		40.0		
3. Improvement of Field Research Station		75,000.0	1	1	0.8	0.8		3.5	75.0	75.0	56.3	56.3		262.5	157.5	26.3
4. Improvement of Laboratory Facilities		75,000.0	1	1	0.8	0.8		3.5	75.0	75.0	56.3	56.3		262.5	157.5	26.3
5. Improvement of Library Facilities		25,000.0	1	0.5	0.3	0.3		2	25.0	12.5	6.3	6.3		50.0	30.0	5.0
6. Improvement of Seed Production Area		50,000.0	1	1.5	1.8	2		6.3	50.0	75.0	90.0	100.0		315.0	189.0	31.5
7. Improvement of Seed Storage Facilities		75,000.0	1	0.8	0.8	0.8		3.3	75.0	56.3	56.3	56.3		243.8	146.3	24.4
8. Technology Transfer		25,000.0	1	1	1	1		4	25.0	25.0	25.0	25.0		100.0	60.0	10.0
9. Operation of Research Programmes		150,000.0	1	1.2	1.3	1.5		5	150.0	175.5	199.5	225.0		750.0	450.0	75.0
Subtotal									**543.4**	**539.3**	**522.8**	**560.7**		**2,166.1**	**1,318.4**	**198.4**
C. MONITORING AND EVALUATION																
1. Ongoing monitoring		40,000.0	1	1	1	1		4	40.0	40.0	40.0	40.0		160.0	80.0	16.0
1. Evaluation and Studies		20,000.0	1	1	1	1		4	20.0	20.0	20.0	20.0		80.0	40.0	
Subtotal									**60.0**	**60.0**	**60.0**	**60.0**		**240.0**	**120.0**	**16.0**
D. CONSULTING SERVICES																
1. International		603.0	300	300	200	100		900	180.9	180.9	120.6	60.3		542.7	488.4	
2. Local		50.0	600	600	400	100		1,700	30.0	30.0	20.0	5.0		85.0		
Subtotal									**210.9**	**210.9**	**140.6**	**65.3**		**627.7**	**488.4**	
D. RECURRENT COSTS																
1. Existing Staff Salaries		100,000.0	1	1.2	1.3	1.5		5	100.0	115.0	132.0	152.0		499.0		
2. Incremental Staff Salaries for Enterprises		5,520,000.0	1	1.2	1.4	1.6		5.2	5,520.0	6,624.0	7,728.0	8,832.0		28,704.0		
3. Incremental Staff Salaries Research/ Development		150,000.0	1	1.2	1.4	1.6		5.2	150.0	180.0	210.0	240.0		780.0		
4. Operation and Maintenance of Facilities		20,000.0	1	1	1	1		4	20.0	20.0	20.0	20.0		80.0	40.0	8.0
5. Vehicle/ Equipment Operation/ Maintenance		150,000.0	1	1	1	1		4	150.0	150.0	150.0	150.0		600.0	300.0	60.0
6. Office Supplies and Consumables		150,000.0	1	1	1	1		4	150.0	150.0	150.0	150.0		600.0	420.0	60.0
Subtotal									**6,090.0**	**7,239.0**	**8,390.0**	**9,544.0**		**31,263.0**	**760.0**	**128.0**

APPENDIX 7
ECONOMIC AND FINANCIAL ANALYSIS

ECONOMICS AND MARKETING

APPENDIX 7
ECONOMIC AND FINANCIAL ANALYSIS

TABLE OF CONTENTS

1. FINANCIAL AND ECONOMIC ANALYSES ASSUMPTIONS

TABLE OF CONTENTS

Economic and financial analyses have been carried out for two major programmes separately and the Master Plan as a whole. Major assumptions underlying financial and economic analysis are outlined below:

Period of Analysis

The Plan will be implemented over a period of 20 years. The life of the Plan has been estimated to be 60 years for Scenario 1 and 50 years for Scenario 2. No residual values have been included in the Master Plan benefits because they are insignificant when discounted after year 20. Full development in terms of different forest products is estimated to be attained in year 30 for Scenario 1 and in year 35 for Scenario 2 based on the projected plantation programmes, rotations and growth rates used.

Life of Infrastructure and Facilities

All building and civil works are assumed to have an economic life of 50 years, equipments, furniture and vehicles 10 years. The cost of replacing these items has been taken into account as and when applicable.

Prices

All Financial and economic prices of different forest products to be produced have been expressed in 1993 constant values. These prices are based on farmgate or plantation-gate prices derived on the basis of prevailing market prices and adjusted by relevant conversion factors. Use of market (financial) prices as a basis for subsequent derivation was considered justified in view of the competitive nature of the market for fuelwood, poles and timber in Bangladesh. The outputs in question are not traded internationally, and therefore, valuing them in terms of imported resources would be inappropriate. Of the output sub-categories, only fuelwood is considered to be close substitute for an import (kerosene). Kerosene, however, is used minimally in rural Bangladesh. Thus, even allowing for a possible future fall in its real price, the true degree of substitutability among fuels in Bangladesh is yet to be established. Given the (IBRD) projected increase in the real price of kerosene between 1988 and 1995 ($22.5/barrel in 1995 compared with $16.6/barrel in 1988, both at 1988 constant prices) the possibility of significant fall in the price of an internationally traded substitute for Bangladesh-produce fuelwood (i.e. kerosene) appears unlikely. In any case, a "kerosene priority" price turns out to be substantially above the price used here.

Almost independently of the ups and downs of the world market for crude and its derivatives, real prices of fuelwood have been steadily rising in Bangladesh as have those of timber and poles (by about 1 and 2 per cent per annum respectively). This trend is expected to continue given the acute shortage and expected increasing demand of different forest products. The economic prices for internationally traded commodities (like fertliser) are based on projected 1995-2000 prices taken from the World Bank Commodity price projections of August, 1992. These have been rebased to 1993 constant prices using the World Bank's Manufacturing Unit Value (MUV) Index.

Foreign Exchange Rate

The Bangladeshi Taka is linked to weighted basket of currencies with US dollar as the intervention currency. It has progressively devalued over the last few years. The prevailing exchange rate of Taka 38.9 = US $1.00 has been used in the analysis.

Standard Conversion Factor (SCF)

For the purpose of economic analysis, the costs and benefits of the Plan have to be evaluated at world market prices to reflect the real opportunity costs of the country's resources and to measure the country's net economic benefits properly. This requires certain adjustments since most items are not traded in the world market and others are affected by tariffs, subsidies and trade restrictions. To make them comparable i.e. to convert their domestic market prices to border prices, a standard conversion factor (SCF) is applied to the non-traded goods and services in the absence of specific information on the cost composition of these goods and services and specific conversion factors for their components. For valid comparison with other donor assisted project in Bangladesh, a SCF of 0.80 has been applied to all local costs excluding unskilled labour.

Value of Unskilled Labour

The average market wage rate for unskilled labour is estimated at Taka 50 per day in rural Bangladesh. It varies significantly depending on the month and the location. Since there is a wide unemployment and under-employment and seasonality in the demand of unskilled labour, a conversion factor of 0.75 has been applied to reflect the real opportunity cost.

Investment and Recurrent Cost

The costs included in the economic analysis are all initial investment costs, investment cost for replacement, plantation development costs, recurrent expenditures and incremental costs to support directly the forest production and participatory programmes of the Master Plan under both the development options. Taxes and associated with these costs are excluded but physical contingencies are included. Local costs are expressed in border prices after applying SCF of 0.80.

"Without" and "With Plan" Conditions

It has been assumed that no significant changes in the production of different forest products will take place without the Plan intervention which has been considered as Status Quo (without plan) situation. Projections for "without" and "with plan" conditions are based on published reports and Consultant's estimates.

Master Plan Benefits

The major quantified benefits resulting from the implementation of the Master Plan are the primary products - sawlogs, pulpwood, poles and fuelwood - under both the development scenario. The value of incremental net benefits is taken as the Plan's benefit in the analysis. In each case, value of different forest products under the Status Quo situation has been subtracted from the value of production of different forest products estimated under development Scenarios 1 and 2 to obtain the incremental benefit streams. These are expected from better management, use of higher inputs, high yielding species, peoples active participation in the plantation development and maintenance as well as protection of the forest areas. Plan benefits accruing from other programmes are not quantified because of difficulty and also due to the conjectural nature of the benefits.

Plantation Programme and Growth Rates

1. Forest Production

Plantation development for forest production has been proposed mainly in the hill areas which includes existing natural forest, denuded area covering entire Chittagong hilltracts, Chittagong, Cox's Bazar, and Shylhet. For Sal Forest, under both the Scenarios, plantation development will take place on participatory basis on encroached, denuded land and enrichment plantation on low density existing sal forest. Coastal plantation has also been proposed under both the development options. The plantation programme, rotation and the corresponding growth projected by five-year plan period under Scenario 1 and 2 is given in Tables 1 and 2.

Table 1 - Annual Plantation Programme under Scenario 1 (ha)

Rotation Year	MAI m3/ha	Type of Forest	Area to be planted annually by 5-year period 1993-1998	1998-2003	2003-2008	2008-2013
40	7.5	Hill forest	3,439	3,073	3,528	5,535
20	12.5	- Do-	10,000	10,000	10,000	10,000
10	15	- Do -	1,350	1,750	3,400	3,500
6-8	15	Sal forest	2,986	2,980	2,986	2,986
20	12.5	- Do -	1,150	1,150	1,150	1,150
20	30	- Do -	1,050	1,050	1,050	1,050
25	7	- Do -	3,000	3,000	3,000	3,000

Table 2 - Annual Plantation Programme under Scenario 2 (ha)

Rotation Year	MAI m3/ha	Type of Forest	Area to be planted annually by 5-year period 1993-1998	1998-2003	2003-2008	2008-2013
30	20	Hill forest	4,463	4,558	4,566	4,818
20	30	- Do-	10,000	10,000	10,000	10,000
10	45	- Do -	2,200	2,750	3,350	3,350
6-8	15	Sal forest	2,986	2,980	2,986	2,986
20	12.5	- Do -	1,150	1,150	1,150	1,150
20	30	- Do -	1,050	1,050	1,050	1,050
25	7	- Do -	3,000	3,000	3,000	3,000

2. Participatory Forestry

Strip Plantations - The land along roads, flood embankments and canals to be used for strip plantations cannot be cultivated to agricultural crops because of its physical features as well as the damage systematic cultivation of agricultural crops would pose to the adjoining structures. Planting embankments is largely free of these disadvantages, although it is likely to lead to a loss of grass output mainly due to shading. At the same time, the planted trees will provide certain quantities of foliage, (not counted separately among Project benefits) which will largely substitute for grass for grazing purposes. In addition, shading provided by trees must be considered a real benefit (to both humans, and cattle) under the conditions prevailing in Bangladesh. On balance, therefore, an assumption made here of zero opportunity cost of land to be planted to strips is, if anything, conservative.

Agroforestry - Virtually the entire agroforestry component of the Project will be implemented on land which is currently encroached upon and cultivated (albeit often inefficiently) to agricultural crops. Under the component, part of each encroachment holding will revert to forestry, and trees will therefore replace existing agricultural output in a proportion which depends on the agroforestry model applied and the percentage of total area planted to trees (varying from 20 per cent to 66 per cent of each holding if fruit trees are counted).

For the average holding, trees are most likely to be planted where existing or potential agricultural output is least. The assumption of declining opportunity cost of land is justified even without envisaging future loss of agricultural output on the least fertile portion of land planted to trees, provided it is accepted that the same trees will help productive segments of each holding.

Ground Crops - In many of the plantation components under the project, intercropping will be possible in the early years. A large variety of ground crops will be introduced into the agroforestry component. Based on the experience of the Community Forestry Development Project, the most popular crops will be lentils, mustard, ground nuts and sugar cane (in addition to the pigeon peas). The Plan by no means restricts these crops, but to simplify the analysis, these four crops were considered to be representative examples. It has been assumed that annual crops occupy about 80 per cent of the productive area and that the proportion of land given to each of the four crops is about equal. Yields gradually diminish as shade from trees contains the growth of these crops.

2b. Forest Management and Production Financial Analysis (Tk million)

	Year 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25-60
A. Inflow																									
Incremental Benefit																									
- from Fuelwood	1.3	1.3	1.3	1.3	1.3	24.5	24.5	24.5	24.5	24.5	41.0	41.0	41.0	41.0	41.0	108.5	108.5	108.5	108.5	237.6	237.6	237.6	237.6	237.6	238.9
- from Poles	40.2	40.2	40.2	40.2	40.2	160.7	151.5	151.5	151.5	167.7	447.4	447.4	447.4	447.4	440.7	648.5	648.5	648.5	648.5	757.4	921.6	921.6	921.6	921.6	961.2
- from Sawlogs	140.4	140.4	140.4	140.4	140.4	112.1	112.1	112.1	112.1	1,552.1	1,702.9	1,656.0	1,656.0	1,656.0	1,656.0	4,093.1	4,093.1	4,093.1	4,093.1	4,093.1	4,492.8	4,492.8	4,492.8	10,252.8	10,252.8
Total	**180.5**	**180.5**	**180.5**	**180.5**	**180.5**	**272.9**	**263.7**	**263.7**	**263.7**	**1719.9**	**2150.3**	**2103.4**	**2103.4**	**2103.4**	**2096.7**	**4741.7**	**4741.7**	**4741.7**	**4741.7**	**4850.5**	**5414.4**	**5414.4**	**5414.4**	**11174.4**	**11214.0**
B. Outflow																									
Project Investment Costs	328.9	328.9	328.9	328.9	328.9	234.8	234.8	234.8	234.8	234.8	234.8	10.0	10.0	10.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0
Incremental Operating Cost	458.8	458.8	458.8	458.8	458.8	583.2	583.2	583.2	583.2	583.2	830.8	830.8	830.8	830.8	830.8	969.8	969.8	969.8	969.8	969.8	969.8	969.8	969.8	969.8	969.8
Incremental Production Costs	248.1	303.9	359.8	435.6	474.7	476.1	476.9	475.1	475.6	513.9	542.3	548.3	554.3	563.7	582.2	611.5	617.5	623.5	631.5	643.9	337.8	269.9	185.6	108.2	68.2
Total	**1035.9**	**1091.7**	**1147.6**	**1223.3**	**1262.4**	**1294.1**	**1294.9**	**1293.1**	**1293.6**	**1331.9**	**1607.9**	**1389.1**	**1395.1**	**1404.6**	**1428.0**	**1596.3**	**1602.3**	**1608.3**	**1616.3**	**1628.7**	**1322.7**	**1254.8**	**1170.5**	**1093.1**	**1053.0**
Incremental Net Benefit	-855.4	-911.2	-967.0	1042.8	1081.9	1021.2	1031.2	1029.5	1030.0	388.0	542.4	714.3	708.3	698.8	668.6	3145.4	3139.4	3133.4	3125.3	3221.8	4091.7	4159.6	4243.9	10081.3	10161.0

Base Case EIRR 14% NPV @ 12% 37.6 Million

SENSITIVITY ANALYSIS		EIRR	SENSITIVITY INDICATOR
(i) Decrease in Benefits	20%	13%	0.83
(ii) Increase in Costs	20%	13%	0.83
(iii) Combination of (i) & (ii)		12%	

Switching Values (at 12 %)% Change	
Incremental Crop Benefit	-15.9
Incremental Production Costs	64.6
Investment Costs	1.3
Project Recurrent Costs	41.6

Benefits Lag	EIRR
Lagged 1 year	16.2
2 years	13.8
3 years	12.1

2c. Forest Management and Production Economic Analysis (Tk Million)

	Year 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25-60
A. Inflow																									
Incremental Benefit																									
- from Fuelwood	1.3	1.3	1.3	1.3	1.3	24.5	24.5	24.5	24.5	24.5	41.0	41.0	41.0	41.0	41.0	108.5	108.5	108.5	108.5	237.6	237.6	237.6	237.6	237.6	238.9
- from Poles	57.8	57.8	57.8	57.8	57.8	115.2	108.5	108.5	108.5	120.3	295.5	295.5	295.5	295.5	290.6	430.1	430.1	430.1	430.1	535.6	705.4	705.4	705.4	705.4	739.4
- from Sawlogs	131.6	131.6	131.6	131.6	131.6	415.1	415.1	415.1	415.1	2,102.6	1,934.0	1,890.0	1,890.0	1,890.0	1,890.0	4,174.8	4,174.8	4,174.8	4,174.8	4,174.8	4,549.5	4,549.5	4,549.5	9,949.5	9,949.5
Total	**189.4**	**189.4**	**189.4**	**189.4**	**189.4**	**530.3**	**523.6**	**523.6**	**523.6**	**2223.0**	**2229.5**	**2185.5**	**2185.5**	**2185.5**	**2180.6**	**4604.9**	**4604.9**	**4604.9**	**4604.9**	**4710.4**	**5254.9**	**5254.9**	**5254.9**	**10654.9**	**10688.8**
B. Outflow																									
Project Investment Costs	284.2	284.2	284.2	284.2	284.2	198.0	198.0	198.0	198.0	198.0	198.0	10.0	10.0	10.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0
Incremental Operating Cost	454.8	454.8	454.8	454.8	454.8	577.4	577.4	577.4	577.4	577.4	826.8	826.8	826.8	826.8	826.8	965.8	965.8	965.8	965.8	965.8	965.8	965.8	965.8	965.8	965.8
Incremental Production Costs	198.5	243.2	287.8	348.4	379.7	380.9	381.5	380.1	380.5	411.1	433.8	438.6	443.4	451.0	465.8	489.2	494.0	498.8	505.2	515.1	270.3	215.9	148.5	86.6	54.6
Total	**937.5**	**982.1**	**1026.8**	**1087.4**	**1118.7**	**1156.3**	**1157.0**	**1155.6**	**1156.0**	**1186.6**	**1458.7**	**1275.5**	**1280.3**	**1287.8**	**1307.6**	**1470.0**	**1474.8**	**1479.6**	**1486.0**	**1495.9**	**1251.1**	**1196.8**	**1129.3**	**1067.4**	**1035.4**
Incremental Net Benefit	-748.1	-792.7	-837.4	-898.0	-929.3	-626.0	-633.4	-631.9	-632.3	1036.4	770.8	910.0	905.2	897.7	873.0	3135.0	3130.2	3125.4	3118.9	3214.5	4003.8	4058.1	4125.6	9587.5	9653.5

Base Case EIRR 16% NPV @ 12% 1,537.6 Million

SENSITIVITY ANALYSIS		EIRR	SENSITIVITY INDICATOR
(i) Decrease in Benefits	20%	14%	0.83
(ii) Increase in Costs	20%	15%	0.83
(iii) Combination of (i) & (ii)		14%	

Switching Values (at 12 %)% Change	
Incremental Production Benefit	-25.2
Incremental Production Costs	131.8
Investment Costs	2.4
Project Recurrent Costs	68.5

Benefits Lag	EIRR
Lagged 1 year	16.1
2 years	13.7
3 years	11.8

2d. Participatory Forestry Economic Analysis (Tk Million)

	Year 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25-40
A. Inflow																									
Incremental Benefit																									
- from Fuelwood	0.0	0.0	0.0	0.0	149.2	23.0	23.0	23.0	23.0	23.0	220.7	220.7	220.7	220.7	220.7	386.4	386.4	386.4	386.4	386.4	689.2	689.2	689.2	689.2	689.2
- from Poles	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	65.5	65.5	65.5	65.5	65.5	114.9	114.9	114.9	114.9	114.9	514.6	514.6	514.6	514.6	514.6
- from Sawlogs	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	277.2	277.2	277.2	277.2	277.2	501.0	501.0	501.0	501.0	501.0	864.1	864.1	864.1	864.1	864.1
Total	**0.0**	**0.0**	**0.0**	**0.0**	**149.2**	**23.0**	**23.0**	**23.0**	**23.0**	**23.0**	**563.4**	**563.4**	**563.4**	**563.4**	**563.4**	**1,002.2**	**1,002.2**	**1,002.2**	**1,002.2**	**1,002.2**	**2,068.0**	**2,068.0**	**2,068.0**	**2,068.0**	**2,068.0**
B. Outflow																									
Project Investment Costs	122.9	122.9	122.9	122.9	122.9	354.1	354.1	354.1	354.1	354.1	25.3	25.3	25.3	25.3	25.3	85.8	85.8	85.8	85.8	85.8	0.0	0.0	0.0	0.0	0.0
Incremental Operating Cost	28.4	28.4	28.4	28.4	28.4	36.6	36.6	36.6	36.6	36.6	40.9	40.9	40.9	40.9	40.9	45.7	45.7	45.7	45.7	45.7	45.7	45.7	45.7	45.7	45.7
Incremental Production Costs	22.2	22.2	22.2	22.2	22.2	23.5	23.5	23.5	23.5	23.5	47.9	47.9	47.9	47.9	47.9	30.9	30.9	30.9	30.9	30.9	0.0	0.0	0.0	0.0	0.0
Total	**173.6**	**173.6**	**173.6**	**173.6**	**173.6**	**414.3**	**414.3**	**414.3**	**414.3**	**414.3**	**114.2**	**114.2**	**114.2**	**114.2**	**114.2**	**162.5**	**162.5**	**162.5**	**162.5**	**162.5**	**45.7**	**45.7**	**45.7**	**45.7**	**45.7**
Incremental Net Benefit	-173.6	-173.6	-173.6	-173.6	-24.4	-391.3	-391.3	-391.3	-391.3	-391.3	449.2	449.2	449.2	449.2	449.2	839.7	839.7	839.7	839.7	839.7	2,022.2	2,022.2	2,022.2	2,022.2	2,022.2

Base Case EIRR 17% NPV @ 12% 488.8 Million

SENSITIVITY ANALYSIS		EIRR	SENSITIVITY INDICATOR
(i) Decrease in Benefits	10%	15%	1.17
(ii) Increase in Capital Cost	10%	15%	1.17
(iii) Combination of (i) & (ii)		14%	

Switching Values (at 12 %)% Change	
Incremental Benefit	-34.5
Incremental Plantation Costs	73.2
Project Investments	19.1
Project Recurrent Costs	449.5

Benefits Lag	EIRR
Lagged 1 year	6.7
2 years	6.0
3 years	4.4

3. SCENARIO 2 ECONOMIC AND FINANCIAL ANALYSIS

3a. Master Plan, Economic Analysis (Tk Million)

	Year 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17-50
A. Inflow																	
Incremental Benefit from Fuelwood	54.7	54.7	54.7	54.7	203.9	154.8	154.8	154.8	154.8	154.8	774.7	774.7	774.7	774.7	774.7	1,931.2	1,931.2
Incremental Benefit from Poles and Pulp	57.3	57.3	57.3	57.3	57.3	1,235.2	1,235.2	1,235.2	1,235.2	1,251.8	1,485.3	1,485.3	1,485.3	1,485.3	1,495.5	2,888.0	2,888.0
Incremental Benefit from Sawlogs	615.5	615.5	615.5	615.5	615.5	870.8	870.8	870.8	870.8	4,110.8	4,765.9	4,713.1	4,713.1	4,713.1	4,713.1	10,330.8	10,330.8
Total	**727.5**	**727.5**	**727.5**	**727.5**	**876.7**	**2,260.9**	**2,260.9**	**2,260.9**	**2,260.9**	**5,517.4**	**7,025.9**	**6,973.0**	**6,973.0**	**6,973.0**	**6,983.3**	**15,150.1**	**15,150.1**
B. Outflow																	
Project Investment Costs	699.1	699.1	699.1	699.1	699.1	1,026.0	1,026.0	1,026.0	1,026.0	1,026.0	310.2	310.2	310.2	310.2	310.2	308.4	308.4
Incremental Operating Cost	920.7	920.7	920.7	920.7	920.7	1,099.4	1,099.4	1,099.4	1,099.4	1,307.2	1,314.9	1,314.9	1,314.9	1,314.9	1,314.9	1,322.3	1,713.9
Incremental Production Costs	498.9	573.1	626.8	714.4	754.8	845.7	848.9	846.9	849.2	892.9	958.9	958.9	959.3	960.4	988.9	1,051.2	1,048.9
Total	**2,118.7**	**2,192.9**	**2,246.6**	**2,334.2**	**2,374.6**	**2,971.1**	**2,974.2**	**2,972.3**	**2,974.6**	**3,226.1**	**2,583.9**	**2,584.0**	**2,584.3**	**2,585.5**	**2,614.0**	**2,682.0**	**3,071.3**
Incremental Net Benefit	-1,391.1	-1,465.4	-1,519.1	-1,606.6	-1,497.9	-710.3	-713.4	-711.4	-713.7	2,291.3	4,441.9	4,389.1	4,388.7	4,387.5	4,369.3	12,468.1	12,078.8

Base Case EIRR 27% NPV @ 12% 62,953.5 Million

Net Benefit-Investment Ratio (at 12% OCC) 23.69

SENSITIVITY ANALYSIS	EIRR	SENSITIVITY INDICATOR
(i) Decrease in Benefits	20%	1.0
(ii) Increase in Costs	24%	0.8
(iii) Combination of (i) & (ii)	24%	
	23%	

Switching Values (at 12 %)	% Change
Incremental Production Benefit	-75.2
Incremental Production Costs	1,214.9
Investments Costs	29.6
Project Recurrent Costs	1,070.9

Benefits Lag	EIRR
Lagged 1 year	26.4
2 years	24.0
3 years	21.8

3b. Forest Management and Production Financial Analysis (Tk Million)

	Year 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25-50
A. Inflow																									
Incremental Benefit																									
- from Fuelwood	68.4	68.4	68.4	68.4	68.4	181.1	181.1	181.1	181.1	181.1	256.4	256.4	256.4	256.4	256.4	489.6	489.6	489.6	489.6	482.9	482.9	482.9	482.9	482.9	484.6
- from Poles and Pulp	36.0	36.0	36.0	36.0	36.0	414.2	414.2	414.2	414.2	442.5	874.6	874.6	874.6	874.6	892.1	1,318.6	1,318.6	1,318.6	1,318.6	1,457.6	1,272.8	1,451.3	1,451.3	1,451.3	1,400.6
- from Sawlogs	683.9	683.9	683.9	683.9	683.9	967.6	967.6	967.6	967.6	4,567.6	4,757.1	4,698.4	4,698.4	4,698.4	4,698.4	7,919.0	7,919.0	7,919.0	7,919.0	7,919.0	7,086.5	7,086.5	7,086.5	14,286.5	14,286.5
Total	**788.3**	**788.3**	**788.3**	**788.3**	**788.3**	**1,562.9**	**1,562.9**	**1,562.9**	**1,562.9**	**5,191.2**	**5,888.1**	**5,829.4**	**5,829.4**	**5,829.4**	**5,846.9**	**9,727.2**	**9,727.2**	**9,727.2**	**9,727.2**	**9,859.5**	**8,842.2**	**9,020.7**	**9,020.7**	**16,220.7**	**16,171.7**
B. Outflow																									
Project Investment Costs	520.3	520.3	520.3	520.3	520.3	495.9	495.9	495.9	495.9	495.9	323.1	323.1	323.1	323.1	323.1	322.4	322.4	322.4	322.4	322.4	0.0	0.0	0.0	0.0	0.0
Incremental Operating Cost	1290.8	1290.8	1290.8	1290.8	1290.8	1532.0	1532.0	1532.0	1532.0	1532.0	1532.0	1532.0	1532.0	1532.0	1532.0	1532.0	2012.8	2012.8	2012.8	2012.8	2012.8	2012.8	2012.8	2012.8	2012.8
Incremental Production Costs	336.8	425.5	492.6	588.6	634.1	644.8	648.4	647.6	650.8	696.5	701.9	703.5	704.7	706.7	737.0	740.8	741.8	742.6	743.8	745.9	390.8	296.9	209.6	123.6	78.0
Total	**2147.9**	**2236.6**	**2303.7**	**2399.7**	**2445.2**	**2672.7**	**2676.3**	**2675.5**	**2678.6**	**2724.3**	**2557.0**	**2558.6**	**2559.8**	**2561.8**	**2592.1**	**2595.2**	**3077.0**	**3077.8**	**3078.9**	**3081.1**	**2403.6**	**2309.7**	**2222.4**	**2136.4**	**2090.8**
Incremental Net Benefit	-1359.6	1448.3	1515.4	1611.4	1656.8	1109.8	1113.4	1112.6	1115.8	2466.9	3331.1	3270.8	3269.6	3267.5	3254.8	7131.9	6650.2	6649.4	6648.2	6778.4	6438.7	6711.0	6798.3	14084.3	14080.9

Base Case EIRR 19% NPV @ 12% 11,896.7 Million

SENSITIVITY ANALYSIS		EIRR	SENSITIVITY INDICATOR
(i) Decrease in Benefits	20%	15%	1.08
(ii) Increase in Costs	20%	16%	0.97
(iii) Combination of (i) & (ii)		15%	

Switching Values (at 12 %)% Change

Incremental Production Benefit	-36.7
Incremental Production Costs	342.2
Investments Costs	7.5
Project Recurrent Costs	265.3

Benefits Lag	EIRR
Lagged 1 year	18.3
2 years	16.4
3 years	14.6

3c. Forest Management and Production Economic Analysis (Tk Million)

	Year 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24-50
A. Inflow																								
Incremental Benefit																								
- from Fuelwood	54.7	54.7	54.7	54.7	54.7	144.9	144.9	144.9	144.9	144.9	205.1	205.1	205.1	205.1	205.1	391.7	391.7	391.7	391.7	386.4	386.4	386.4	386.4	386.4
- from Poles and Pulp	57.3	57.3	57.3	57.3	57.3	311.9	311.9	311.9	311.9	328.5	562.0	562.0	562.0	562.0	572.2	836.5	836.5	836.5	836.5	914.8	763.6	867.8	867.8	867.8
- from Sawlogs	615.5	615.5	615.5	615.5	615.5	870.8	870.8	870.8	870.8	4,110.8	4,281.4	4,228.5	4,228.5	4,228.5	4,228.5	7,127.1	7,127.1	7,127.1	7,127.1	7,127.1	6,377.8	6,377.8	6,377.8	12,857.8
Total	727.5	727.5	727.5	727.5	727.5	1327.6	1327.6	1327.6	1327.6	4584.2	5048.5	4995.6	4995.6	4995.6	5005.9	8355.3	8355.3	8355.3	8355.3	8428.2	7527.8	7632.0	7632.0	14112.0
B. Outflow																								
Project Investment Costs	438.9	438.9	438.9	438.9	438.9	419.1	419.1	419.1	419.1	419.1	268.2	268.2	268.2	268.2	268.2	266.1	266.1	266.1	266.1	266.1	0.0	0.0	0.0	0.0
Incremental Operating Cost	774.4	774.4	774.4	774.4	774.4	774.4	774.4	774.4	774.4	774.4	774.4	774.4	774.4	774.4	774.4	774.4	774.4	774.4	774.4	774.4	774.4	774.4	774.4	774.4
Incremental Production Costs	278.3	352.5	406.2	493.8	534.2	536.6	539.7	537.8	540.0	583.8	583.6	583.6	584.0	585.2	613.6	600.4	598.1	595.3	595.4	595.7	327.5	255.0	191.2	113.0
Total	1491.5	1565.8	1619.5	1707.0	1747.5	1730.1	1733.2	1731.2	1733.5	1777.2	1626.1	1626.2	1626.5	1627.7	1656.2	1640.9	1638.6	1635.8	1635.8	1636.2	1101.9	1029.4	965.6	887.4
Incremental Net Benefit	-764.0	-838.3	-891.9	-979.5	1020.0	-402.4	-405.6	-403.6	-405.9	2806.9	3422.3	3369.5	3369.1	3367.9	3349.7	6714.4	6716.7	6719.5	6719.4	6792.0	6425.9	6602.6	6666.4	13224.5

Base Case EIRR 24% NPV @ 12% 13,296.8 Million

SENSITIVITY ANALYSIS		EIRR	SENSITIVITY INDICATOR
(i) Decrease in Benefits	20%	19%	1.0
(ii) Increase in Costs	20%	20%	0.8
(iii) Combination of (i) & (ii)		18%	

Switching Values (at 12 %)	% Change
Incremental Production Benefit	-50.4
Incremental Production Costs	454.5
Investments Costs	10.0
Project Recurrent Costs	357.6

Benefits Lag	EIRR
Lagged 1 year	23.1
2 years	20.0
3 years	17.8

3d. Participatory Forestry Economic Analysis (Tk Million)

	Year 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25-40
A. Inflow																									
Incremental Benefit from Fuelwood	0.0	0.0	0.0	0.0	149.2	9.9	9.9	9.9	9.9	9.9	569.5	569.5	569.5	569.5	569.5	1,539.5	1,539.5	1,539.5	1,539.5	1,539.5	3,134.2	3,134.2	3,134.2	3,134.2	3,134.2
Incremental Benefit from Poles	0.0	0.0	0.0	0.0	0.0	923.3	923.3	923.3	923.3	923.3	923.3	923.3	923.3	923.3	923.3	2,051.6	2,051.6	2,051.6	2,051.6	2,051.6	3,106.9	3,106.9	3,106.9	3,106.9	3,106.9
Incremental Benefit from Sawlogs	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	484.6	484.6	484.6	484.6	484.6	3,203.8	3,203.8	3,203.8	3,203.8	3,203.8	58,357.1	58,357.1	58,357.1	58,357.1	58,357.1
Total	**0.0**	**0.0**	**0.0**	**0.0**	**149.2**	**933.2**	**933.2**	**933.2**	**933.2**	**933.2**	**1,977.4**	**1,977.4**	**1,977.4**	**1,977.4**	**1,977.4**	**6,794.8**	**6,794.8**	**6,794.8**	**6,794.8**	**6,794.8**	**64,598.2**	**64,598.2**	**64,598.2**	**64,598.2**	**64,598.2**
B. Outflow																									
Project Investment Costs	260.2	260.2	260.2	260.2	260.2	606.9	606.9	606.9	606.9	606.9	42.0	42.0	42.0	42.0	42.0	42.3	42.3	42.3	42.3	42.3	0.0	0.0	0.0	0.0	0.0
Incremental Operating Cost	45.5	45.5	45.5	45.5	45.5	60.5	60.5	60.5	60.5	60.5	68.2	68.2	68.2	68.2	68.2	75.7	75.7	75.7	75.7	75.7	75.7	75.7	75.7	75.7	75.7
Incremental Production Costs	220.6	220.6	220.6	220.6	220.6	309.1	309.1	309.1	309.1	309.1	375.3	375.3	375.3	375.3	375.3	450.8	450.8	450.8	450.8	450.8	0.0	0.0	0.0	0.0	0.0
Total	**526.4**	**526.4**	**526.4**	**526.4**	**526.4**	**976.5**	**976.5**	**976.5**	**976.5**	**976.5**	**485.5**	**485.5**	**485.5**	**485.5**	**485.5**	**568.8**	**568.8**	**568.8**	**568.8**	**568.8**	**75.7**	**75.7**	**75.7**	**75.7**	**75.7**
Incremental Net Benefit	-526.4	-526.4	-526.4	-526.4	-377.2	-43.3	-43.3	-43.3	-43.3	-43.3	1,491.9	1,491.9	1,491.9	1,491.9	1,491.9	6,226.0	6,226.0	6,226.0	6,226.0	6,226.0	64,522.5	64,522.5	64,522.5	64,522.5	64,522.5

Base Case EIRR 32% NPV@ 12% 28,042.3 Million

SENSITIVITY ANALYSIS		EIRR	SENSITIVITY INDICATOR
(i) Decrease in Benefits	10%	30%	2.35
(ii) Increase in Capital Cost	10%	31%	1.18
(iii) Combination of (i) & (ii)		30%	

Switching Values (at 12 %)	% Change
Incremental Crop Benefit	-89.5
Incremental Crop Costs	1,849.5
Project Investments	542.1
Project Recurrent Costs	1,931.7

Benefits Lag	EIRR
Lagged 1 year	28.6
2 years	27.0
3 years	24.1

4. PLANTATION MODELS, FINANCIAL ANALYSIS

4a. Financial Analysis of 1 ha Long Rotation Teak Plantation Model (Rotation = 45 Years, MAI = 2.5 m^3/ha/A)

	Unit	Year 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
INFLOW																									
A. Yield 1_/																									
1. Thinning 2_/																									
- Fuelwood	m^3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	13.8	0	0	0	0
- Pole	m^3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	34.5	0	0	0	0
- Log	m^3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20.7	0	0	0	0
2. Final felling 3_/																									
- Fuelwood	m^3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
- Pole	m^3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
- Log	m^3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
B. Total Volume of Production																									
- Fuelwood	m^3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	13.8	0	0	0	0
- Pole	m^3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	34.5	0	0	0	0
- Log	m^3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20.7	0	0	0	0
C. Price 4_/																									
- Fuelwood	Tk/m^3	0	0	0	0	405	0	0	0	0	405	0	0	0	0	0	0	0	0	0	400	0	0	0	0
- Pole	Tk/m^3	0	0	0	0	0	0	0	0	0	1765	0	0	0	0	0	0	0	0	0	1240	0	0	0	0
- Log	Tk/m^3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4500	0	0	0	0
TOTAL INCOME	**Tk**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**141450**	**0**	**0**	**0**	**0**
OUTFLOW		**416526**																							
D. Physical Inputs																									
Seedlings 5_/	No	3500																							
In-fill Seedlings	No	0																							
Fertilizer	Kg	60																							
Labour - Establishment 6_/	md	75																							
Labour - Maintenance 7_/	md	45	49	45	15	30																			
Labour - Thinning	md					0					0										40				
TOTAL LABOUR REQUIREMENT	**md**	**120**	**49**	**45**	**15**	**30**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**40**	**0**	**0**	**0**	**0**
E. FINANCIAL INPUTS																									
Seedlings	Tk	3500																							
In-fill Seedlings	Tk	0																							
Fertilizer	Tk	360																							
Tools and Equipments	Tk					0					0														
Non Labour Costs	Tk	3860	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Labour Cost @ Tk 50/day	Tk	6000	2450	2250	750	1500	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2000	0	0	0	0
TOTAL COSTS	**Tk**	**9860**	**2450**	**2250**	**750**	**1500**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**2000**	**0**	**0**	**0**	**0**
NET BENEFIT BEFORE FINANCING	**Tk**	**-9860**	**-2450**	**-2250**	**-750**	**-1500**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**139450**	**0**	**0**	**0**	**0**

4a. Financial Analysis of 1 ha Long Rotation Teak Plantation Model (Rotation = 45 Years MAI = 2.5 m^3/ha/A) (Cont'd)

	Unit	Year 25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
INFLOW																						
A. Yield 1_/																						
1. Thinning 2_/																						
- Fuelwood	m^3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
- Pole	m^3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
- Log	m^3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2. Final felling 3_/																						
- Fuelwood	m^3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12.15
- Pole	m^3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12.15
- Log	m^3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	56.7
B. Total Volume of Production																						
- Fuelwood	m^3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12.15
- Pole	m^3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12.15
- Log	m^3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	56.7
C. Price 4_/																						
- Fuelwood	Tk/m^3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	400
- Pole	Tk/m^3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1240
- Log	Tk/m^3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4500
TOTAL INCOME	**Tk**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**275076**
D. PHYSICAL INPUTS																						
Seedlings 5_/	No																					
In-fill Seedlings	No																					
Fertilizer	Kg																					
Labour - Establishment 6_/	md																					
Labour - Maintenance 7_/	md																					
Labour - Thinning	md	0																				
TOTAL LABOUR REQUIREMENT	**md**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
E. FINANCIAL INPUTS																						
Seedlings	Tk																					
In-fill Seedlings	Tk																					
Fertilizer	Tk																					
Tools and Equipments	Tk	100																				
Non Labour Costs	**Tk**	**100**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Labour Cost @ Tk 50/day	**Tk**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
TOTAL COSTS	**Tk**	**100**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
NET BENEFIT BEFORE FINANCING	**Tk**	**-100**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**275076**

		SWITCHING VALUES TO BRING FIRR TO 12%			
FIRR	13%	(a) Benefit	-5%	(b) Cost	6%
NPV @ 12%	2,441.9				

1_/ Average MAI of 2.5 m^3 per ha per year has been assumed.
2_/ Thinning is done at year 20.
3_/ At final felling 450 trees will be available.
4_/ Based on the existing stumpage value calculated at 12.5 percent of market value.
5_/ Spacing of 1.82 m x 1.82 m and a sapling mortality rate of 17% has been assumed.
6_/ Operation includes survey, layout, site preparation, planting, fire breaks etc.
7_/ Operation includes weeding and cleaning.
8_/ Based on the pulpwood plantation in Kaptai and Teak plantation in Bandarban area.

4b. Financial Analysis of 1 ha Long Rotation Teak Plantation Model (Polybags) (Rotation = 45 Years, MAI = 2.5 m^3/ha/A)

	Unit	Year 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
INFLOW																									
A. Yield 1_/																									
1. Thinning 2_/	m^3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	13.8	0	0	0	0
- Fuelwood	m^3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	34.5	0	0	0	0
- Pole	m^3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20.7	0	0	0	0
- Log																									
2. Final felling 3_/																									
- Fuelwood	m^3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
- Pole	m^3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
- Log	m^3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
B. Total Volume of Production																									
- Fuelwood	m^3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	13.8	0	0	0	0
- Pole	m^3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	34.5	0	0	0	0
- Log	m^3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20.7	0	0	0	0
C. Price 4_/																									
- Fuelwood	Tk/m^3	0	0	0	0	405	0	0	0	0	400	0	0	0	0	0	0	0	0	0	400	0	0	0	0
- Pole	Tk/m^3	0	0	0	0	0	0	0	0	0	1240	0	0	0	0	0	0	0	0	0	1240	0	0	0	0
- Log	Tk/m^3	0	0	0	0	0	0	0	0	0	4500	0	0	0	0	0	0	0	0	0	3500	0	0	0	0
TOTAL INCOME	**Tk**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**120750**	**0**	**0**	**0**	**0**
OUTFLOW		**339126**																							
D. PHYSICAL INPUTS																									
Seedlings 5_/	No	1370																							
In-fill Seedlings	No	0																							
Fertilizer	Kg	116		0																					
Labour - Establishment 6_/	md	111																							
Labour - Maintenance 7_/	md	0	45	45	165																				
Labour - Thinning	md					0					0										39				
TOTAL LABOUR REQUIREMENT	**md**	**111**	**45**	**45**	**165**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**39**	**0**	**0**	**0**	**0**
E. FINANCIAL INPUTS																									
Seedlings	Tk	4452.5																							
In-fill Seedlings	Tk	0																							
Fertilizer	Tk	696																							
Tools and Equipments	Tk					0					0										100				
Non Labour Costs	**Tk**	**5148.5**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**100**	**0**	**0**	**0**	**0**
Labour Cost @ Tk 50/day	**Tk**	**5550**	**2250**	**2250**	**8250**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1950**	**0**	**0**	**0**	**0**
TOTAL COSTS	**Tk**	**10698.5**	**2250**	**2250**	**8250**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**2050**	**0**	**0**	**0**	**0**
NET BENEFIT BEFORE FINANCING	**Tk**	**-10698.5**	**-2250**	**-2250**	**-8250**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**118700**	**0**	**0**	**0**	**0**

4b. Financial Analysis of 1 ha Long Rotation Teak Plantation Model (Polybags) (Rotation = 45 Years, MAI = 2.5 m3/ha/A) (Cont'd)

	Unit	Year 25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
INFLOW																						
A. Yield 1_/																						
1. Thinning 2_/	m^3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
- Fuelwood	m^3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
- Pole	m^3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
- Log																						
2. Final felling 3_/																						
- Fuelwood	m^3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12.15
- Pole	m^3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12.15
- Log	m^3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	56.7
B. Total Volume of Production																						
- Fuelwood	m^3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12.15
- Pole	m^3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12.15
- Log	m^3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	56.7
C. Price 4_/																						
- Fuelwood	Tk/m^3	0	0	0	0	0	400	0	0	0	0	0	0	0	0	0	400	0	0	0	0	400
- Pole	Tk/m^3	0	0	0	0	0	1240	0	0	0	0	0	0	0	0	0	1240	0	0	0	0	1240
- Log	Tk/m^3	0	0	0	0	0	3500	0	0	0	0	0	0	0	0	0	3500	0	0	0	0	3500
TOTAL INCOME	**Tk**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**218376**
OUTFLOW																						
D. PHYSICAL INPUTS																						
Seedlings 5_/	No																					
In-fill Seedlings	No																					
Fertilizer	Kg																					
Labour - Establishment 6_/	md																					
Labour - Maintenance 7_/	md																					
Labour - Thinning	md	0					10															
TOTAL LABOUR REQUIREMENT	**md**	**0**	**0**	**0**	**0**	**0**	**10**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
E. FINANCIAL INPUTS																						
Seedlings	Tk																					
In-fill Seedlings	Tk																					
Fertilizer	Tk																					
Tools and Equipments	Tk	100					100															
Non Labour Costs	**Tk**	**100**	**0**	**0**	**0**	**0**	**100**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Labour Cost @ Tk 50/day	**Tk**	**0**	**0**	**0**	**0**	**0**	**500**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
TOTAL COSTS	**Tk**	**100**	**0**	**0**	**0**	**0**	**600**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
NET BENEFIT BEFORE FINANCING	**Tk**	**-100**	**0**	**0**	**0**	**0**	**-600**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**218376**

FIRR 10%
NPV @ 12% -4579.45

SWITCHING VALUES TO BRING FIRR TO 12%

(a) Benefit 47% (b) Cost -32%

1_/ Average MAI of 2.5 m^3 per ha per year has been assumed.
2_/ Thinning is done at year 20.
3_/ At final felling 450 trees will be available.
4_/ Based on the existing stumpage value calculated at 12.5 percent of market value.
5_/ Spacing of 1.82 m x 1.82 m and a sapling mortality rate of 17% has been assumed.
6_/ Operation includes survey, layout, site preparation, planting, fire breaks etc.
7_/ Operation includes weeding and cleaning.
8_/ Based on the pulpwood plantation in Kaptai and Teak plantation in Bandarban area.

4c. Financial Analysis of 1 ha Long Rotation Teak Plantation Model (Rotation = 40 Years, MAI = 7.5 m^3/ha/A)

	Unit	Year 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
INFLOW																									
A. Yield 1_/																									
1. Thinning 2_/																									
- Fuelwood	m^3	0	0	0	0	0	0	0	0	0	34	0	0	0	0	0	0	0	0	0	16	0	0	0	0
- Pole	m^3	0	0	0	0	0	0	0	0	0	27.2	0	0	0	0	0	0	0	0	0	40	0	0	0	0
- Log	m^3	0	0	0	0	0	0	0	0	0	6.8	0	0	0	0	0	0	0	0	0	24	0	0	0	0
2. Final felling 3_/																									
- Fuelwood	m^3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
- Pole	m^3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
- Log	m^3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
B. Total Volume of Production																									
- Fuelwood	m^3	0	0	0	0	0	0	0	0	0	34	0	0	0	0	0	0	0	0	0	13.8	0	0	0	0
- Pole	m^3	0	0	0	0	0	0	0	0	0	27.2	0	0	0	0	0	0	0	0	0	34.5	0	0	0	0
- Log	m^3	0	0	0	0	0	0	0	0	0	6.8	0	0	0	0	0	0	0	0	0	20.7	0	0	0	0
C. Price 4_/																									
- Fuelwood	Tk/m^3	0	0	0	0	405	0	0	0	0	405	0	0	0	0	0	0	0	0	0	400	0	0	0	0
- Pole	Tk/m^3	0	0	0	0	0	0	0	0	0	1240	0	0	0	0	0	0	0	0	0	1240	0	0	0	0
- Log	Tk/m^3	0	0	0	0	0	0	0	0	0	4500	0	0	0	0	0	0	0	0	0	4500	0	0	0	0
TOTAL INCOME	**Tk**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**78098**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**141450**	**0**	**0**	**0**	**0**
OUTFLOW		**693620**																							
D. PHYSICAL INPUTS																									
Seedlings 5_/	No	3500																							
In-fill Seedlings	No	0																							
Fertilizer	Kg	94		66																					
Labour - Establishment 6_/	md	89																							
Labour - Maintenance 7_/	md	5	57	64	76																				
Labour - Thinning	md					44					44										40				
TOTAL LABOUR REQUIREMENT	**md**	**94**	**57**	**64**	**76**	**44**	**0**	**0**	**0**	**0**	**44**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**40**	**0**	**0**	**0**	**0**
E. FINANCIAL INPUTS																									
Seedlings	Tk	3500																							
In-fill Seedlings	Tk	0																							
Fertilizer	Tk	564		396																					
Tools and Equipments	Tk					100					100										100				
Non Labour Costs	**Tk**	**4064**	**0**	**396**	**0**	**100**	**0**	**0**	**0**	**0**	**100**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**100**	**0**	**0**	**0**	**0**
Labour Cost @ Tk 50/day	**Tk**	**4700**	**2850**	**3200**	**3800**	**2200**	**0**	**0**	**0**	**0**	**2200**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**2000**	**0**	**0**	**0**	**0**
TOTAL COSTS	**Tk**	**8764**	**2850**	**3596**	**3800**	**2300**	**0**	**0**	**0**	**0**	**2300**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**2100**	**0**	**0**	**0**	**0**
NET BENEFIT BEFORE FINANCING	**Tk**	**-8764**	**-2850**	**-3596**	**-3800**	**-2300**	**0**	**0**	**0**	**0**	**75798**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**139350**	**0**	**0**	**0**	**0**

4c. Financial Analysis of 1 ha Long Rotation Teak Plantation Model (Rotation = 40 Years, MAI = 7.5 m^3/ha/A) (Cont'd)

	Unit	Year 25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
INFLOW																	
A. Yield 1_/																	
1. Thinning 2_/																	
- Fuelwood	m^3	0	0	0	0	0	12	0	0	0	0	0	0	0	0	0	0
- Pole	m^3	0	0	0	0	0	24	0	0	0	0	0	0	0	0	0	0
- Log	m^3	0	0	0	0	0	17	0	0	0	0	0	0	0	0	0	0
2. Final felling 3_/																	
- Fuelwood	m^3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	18.3
- Pole	m^3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	18.3
- Log	m^3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	74
B. Total Volume of Production																	
- Fuelwood	m^3	0	0	0	0	0	12	0	0	0	0	0	0	0	0	0	18.3
- Pole	m^3	0	0	0	0	0	24	0	0	0	0	0	0	0	0	0	18.3
- Log	m^3	0	0	0	0	0	17	0	0	0	0	0	0	0	0	0	74
C. Price 4_/																	
- Fuelwood	Tk/m^3	0	0	0	0	0	400	0	0	0	0	0	0	0	0	0	400
- Pole	Tk/m^3	0	0	0	0	0	1240	0	0	0	0	0	0	0	0	0	1240
- Log	Tk/m^3	0	0	0	0	0	4500	0	0	0	0	0	0	0	0	0	4500
TOTAL INCOME	**Tk**	**0**	**0**	**0**	**0**	**0**	**111060**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**363012**
OUTFLOW																	
D. PHYSICAL INPUTS																	
Seedlings 5_/	No																
In-fill Seedlings	No																
Fertilizer	Kg																
Labour - Establishment 6_/	md																
Labour - Maintenance 7_/	md																
Labour - Thinning	md						10										
TOTAL LABOUR REQUIREMENT	**md**	**0**	**0**	**0**	**0**	**0**	**10**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
E. FINANCIAL INPUTS																	
Seedlings	Tk																
In-fill Seedlings	Tk																
Fertilizer	Tk																
Tools and Equipments	Tk	100					100										
Non Labour Costs	**Tk**	**100**	**0**	**0**	**0**	**0**	**100**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Labour Cost @ Tk 50/day	**Tk**	**0**	**0**	**0**	**0**	**0**	**500**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
TOTAL COSTS	**Tk**	**100**	**0**	**0**	**0**	**0**	**600**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
NET BENEFIT BEFORE FINANCING	**Tk**	**-100**	**0**	**0**	**0**	**0**	**110460**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**363012**

FIRR	22%	SWITCHING VALUES TO BRING FIRR TO 12%		
NPV @ 12%	30,056.54	(a) Benefit	-63%	(b) Cost 173%

1_/ Average MAI of 7.5 m^3 per ha per year has been assumed.
2_/ At 1st thinning 1,500trees will be taken out and no intermediate Production is assumed
At 2nd thinning about 750 trees will be taken out.
At 3rd thinning about 350 trees will be taken out and at 4th thinning about 150 trees will be taken out..
3_/ At final felling 200 trees will be available.
4_/ Based on the existing stumpage value calculated at 12.5percent of the market price of the respective products..
5_/ Spacing of 1.82m x 1.82m and a sapling mortality rate of 17% has been assumed.
6_/ Operation includes survey, layout, site preparation, planting, fire breaks etc.
7_/ Operation includes weeding and clenning.
8_/ Based on the pulpwood plantation in Kaptai and Teak plantation in Bandarban area.

4d. Financial Analysis of 1 ha Long Rotation Teak Plantation Model (Rotation = 30 Years, MAI = 20 m^3/ha/A)

	Unit	Year 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
INFLOW																
A. Yield 1_/																
1. Thinning 2_/																
- Fuelwood	m^3	0	0	0	0	0	0	0	0	0	64	0	0	0	0	40
- Pole	m^3	0	0	0	0	0	0	0	0	0	51	0	0	0	0	52
- Log	m^3	0	0	0	0	0	0	0	0	0	12.8	0	0	0	0	60
2. Final felling 3_/																
- Fuelwood	m^3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
- Pole	m^3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
- Log	m^3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
B. Total Volume of Production																
- Fuelwood	m^3	0	0	0	0	0	0	0	0	0	64	0	0	0	0	40
- Pole	m^3	0	0	0	0	0	0	0	0	0	51	0	0	0	0	52
- Log	m^3	0	0	0	0	0	0	0	0	0	12.8	0	0	0	0	60
C. Price 4_/																
- Fuelwood	Tk/m^3	0	0	0	0	400	0	0	0	0	405	0	0	0	0	0
- Pole	Tk/m^3	0	0	0	0	0	0	0	0	0	1240	0	0	0	0	0
- Log	Tk/m^3	0	0	0	0	0	0	0	0	0	4500	0	0	0	0	0
TOTAL INCOME	Tk	0	0	0	0	0	0	0	0	0	146760	0	0	0	0	0
OUTFLOW		1137260														
D. PHYSICAL INPUTS																
Seedlings 5_/	No	3500														
In-fill Seedlings	No	0														
Fertilizer	Kg	150		67												
Labour - Establishment 6_/	md	138														
Labour - Maintenance 7_/	md	0	57	64	76											
Labour - Thinning	md										40					
TOTAL LABOUR REQUIREMENT	md	138	57	64	76	0	0	0	0	0	40	0	0	0	0	0
E. FINANCIAL INPUTS																
Seedlings	Tk	3500														
In-fill Seedlings	Tk	0														
Fertilizer	Tk	250		100												
Tools and Equipments	Tk					100					100					
Non Labour Costs	Tk	3750	0	100	0	100	0	0	0	0	100	0	0	0	0	0
Labour Cost @ Tk 50/day	Tk	6900	2850	3200	3800	0	0	0	0	0	2000	0	0	0	0	0
TOTAL COSTS	Tk	10650	2850	3300	3800	100	0	0	0	0	2100	0	0	0	0	0
NET BENEFIT BEFORE FINANCING	Tk	-10650	-2850	-3300	-3800	-100	0	0	0	0	144660	0	0	0	0	0

4d. Financial Analysis of 1 ha Long Rotation Teak Plantation Model (Rotation = 30 Years, MAI = 20 m^3/ha/A) (Cont'd)

	Unit	Year 16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
INFLOW																
A. Yield 1_/																
1. Thinning 2_/																
- Fuelwood	m^3	0	0	0	0	20	0	0	0	0	0	0	0	0	0	0
- Pole	m^3	0	0	0	0	45	0	0	0	0	0	0	0	0	0	0
- Log	m^3	0	0	0	0	45	0	0	0	0	0	0	0	0	0	0
2. Final felling 3_/																
- Fuelwood	m^3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	30
- Pole	m^3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	30
- Log	m^3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	150
B. Total Volume of Production																
- Fuelwood	m^3	0	0	0	0	20	0	0	0	0	0	0	0	0	0	30
- Pole	m^3	0	0	0	0	45	0	0	0	0	0	0	0	0	0	30
- Log	m^3	0	0	0	0	45	0	0	0	0	0	0	0	0	0	150
C. Price 4_/																
- Fuelwood	Tk/m^3	0	0	0	0	400	0	0	0	0	0	0	0	0	0	400
- Pole	Tk/m^3	0	0	0	0	1240	0	0	0	0	0	0	0	0	0	1240
- Log	Tk/m^3	0	0	0	0	4500	0	0	0	0	0	0	0	0	0	4500
TOTAL INCOME	Tk	0	0	0	0	266300	0	0	0	0	0	0	0	0	0	724200
OUTFLOW																
D. PHYSICAL INPUTS																
Seedlings 5_/	No															
In-fill Seedlings	No															
Fertilizer	Kg															
Labour - Establishment 6_/	md															
Labour - Maintenance 7_/	md															
Labour - Thinning	md					40										10
TOTAL LABOUR REQUIREMENT	md	0	0	0	0	40	0	0	0	0	0	0	0	0	0	10
E. FINANCIAL INPUTS																
Seedlings	Tk															
In-fill Seedlings	Tk															
Fertilizer	Tk															
Tools and Equipments	Tk					100					100					100
Non Labour Costs	Tk	0	0	0	0	100	0	0	0	0	100	0	0	0	0	100
Labour Cost @ Tk 50/day	Tk	0	0	0	0	2000	0	0	0	0	0	0	0	0	0	500
TOTAL COSTS	Tk	0	0	0	0	2100	0	0	0	0	100	0	0	0	0	600
NET BENEFIT BEFORE FINANCING	Tk	0	0	0	0	264200	0	0	0	0	-100	0	0	0	0	723600

FIRR	29%	SWITCHING VALUES TO BRING FIRR TO 12%	
NPV @ 12%	81,510	(a) Benefit -82%	(b) Cost 465%

1_/ Average MAI of 20 m^3 per ha per year has been assumed.
2_/ At 1st thinning 1,500 trees will be taken out and no intermediate Production is assumed
At 2nd thinning about 750 trees will be taken out.
At 3rd thinning about 350 trees will be taken out and at 4th thinning about 150 trees will be taken out..
3_/ At final felling 200 trees will be available.
4_/ Based on the existing stumpage value calculated at 12.5 percent of the market price of the respective products..
5_/ Spacing of 1.82 m x 1.82 m and a sapling mortality rate of 17% has been assumed.
6_/ Operation includes survey, layout, site preparation, planting, fire breaks etc.
7_/ Operation includes weeding and cleaning.

4e. Financial Analysis of 1 ha Long Rotation Garjan Plantation Model (Rotation = 30 Years, MAI = 25 m^3/ha/A)

	Unit	Year 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
INFLOW																
A. Yield 1_/																
1. Thinning 2_/																
- Fuelwood	m^3	0	0	0	0	0	0	0	0	0	64	0	0	0	0	40
- Pole	m^3	0	0	0	0	0	0	0	0	0	51	0	0	0	0	100
- Log	m^3	0	0	0	0	0	0	0	0	0	13	0	0	0	0	60
2. Final felling 3_/																
- Fuelwood	m^3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
- Pole	m^3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
- Log	m^3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
B. Total Volume of Production																
- Fuelwood	m^3	0	0	0	0	0	0	0	0	0	64	0	0	0	0	40
- Pole	m^3	0	0	0	0	0	0	0	0	0	51	0	0	0	0	100
- Log	m^3	0	0	0	0	0	0	0	0	0	12.8	0	0	0	0	60
C. Price 4_/											127.8					200
- Fuelwood	Tk/m^3	0	0	0	0	400	0	0	0	0	405	0	0	0	0	0
- Pole	Tk/m^3	0	0	0	0	0	0	0	0	0	1240	0	0	0	0	0
- Log	Tk/m^3	0	0	0	0	0	0	0	0	0	4500	0	0	0	0	0
TOTAL INCOME	**TAKA**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**146760**	**0**	**0**	**0**	**0**	**0**
OUTFLOW		**1344440**														
D. PHYSICAL INPUTS																
Seedlings 5_/	No	1370														
In-fill Seedlings	No	0														
Fertilizer	Kg	195		86												
Labour - Establishment 6_/	md	180														
Labour - Maintenance 7_/	md	0	98	74	50	85										
Labour - Thinning	md										40					
TOTAL LABOUR REQUIREMENT	**md**	**180**	**98**	**74**	**50**	**85**	**0**	**0**	**0**	**0**	**40**	**0**	**0**	**0**	**0**	**0**
E. FINANCIAL INPUTS																
Seedlings	Tk	7247.3														
In-fill Seedlings	Tk	0														
Fertilizer	Tk	1170		516												
Tools and Equipments	Tk					100					100					
Non Labour Costs	**Tk**	**8417.3**	**0**	**516**	**0**	**100**	**0**	**0**	**0**	**0**	**100**	**0**	**0**	**0**	**0**	**0**
Labour Cost @ Tk 50/day	**Tk**	**9000**	**4900**	**3700**	**2500**	**4250**	**0**	**0**	**0**	**0**	**2000**	**0**	**0**	**0**	**0**	**0**
TOTAL COSTS	**Tk**	**17417.3**	**4900**	**4216**	**2500**	**4350**	**0**	**0**	**0**	**0**	**2100**	**0**	**0**	**0**	**0**	**0**
NET BENEFIT BEFORE FINANCING	**Tk**	**-17417.3**	**-4900**	**-4216**	**-2500**	**-4350**	**0**	**0**	**0**	**0**	**144660**	**0**	**0**	**0**	**0**	**0**

4e. Financial Analysis of 1 ha Long Rotation Garjan Plantation Model (Rotation = 30 Years, MAI = 25 m^3/ha/A) (Cont'd)

	Unit	Year 16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
INFLOW																
A. Yield 1_/																
1. Thinning 2_/																
- Fuelwood	m^3	0	0	0	0	28	0	0	0	0	0	0	0	0	0	0
- Pole	m^3	0	0	0	0	56	0	0	0	0	0	0	0	0	0	0
- Log	m^3	0	0	0	0	56	0	0	0	0	0	0	0	0	0	0
2. Final felling 3_/																
- Fuelwood	m^3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	36
- Pole	m^3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	36
- Log	m^3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	168
B. Total Volume of Production																
- Fuelwood	m^3	0	0	0	0	30	0	0	0	0	0	0	0	0	0	52
- Pole	m^3	0	0	0	0	60	0	0	0	0	0	0	0	0	0	52
- Log	m^3	0	0	0	0	60	0	0	0	0	0	0	0	0	0	168
C. Price 4_/						150										272
- Fuelwood	Tk/m^3	0	0	0	0	400	0	0	0	0	0	0	0	0	0	400
- Pole	Tk/m^3	0	0	0	0	1240	0	0	0	0	0	0	0	0	0	1240
- Log	Tk/m^3	0	0	0	0	4500	0	0	0	0	0	0	0	0	0	4500
TOTAL INCOME	**TAKA**	**0**	**0**	**0**	**0**	**356400**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**841280**
OUTFLOW																
D. PHYSICAL INPUTS																
Seedlings 5_/	No															
In-fill Seedlings	No															
Fertilizer	Kg															
Labour - Establishment 6_/	md															
Labour - Maintenance 7_/	md															
Labour - Thinning	md					40										10
TOTAL LABOUR REQUIREMENT	**md**	**0**	**0**	**0**	**0**	**40**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**10**
E. FINANCIAL INPUTS																
Seedlings	Tk															
In-fill Seedlings	Tk															
Fertilizer	Tk															
Tools and Equipments	Tk					100					100					100
Non Labour Costs	**Tk**	**0**	**0**	**0**	**0**	**100**	**0**	**0**	**0**	**0**	**100**	**0**	**0**	**0**	**0**	**100**
Labour Cost @ Tk 50/day	**Tk**	**0**	**0**	**0**	**0**	**2000**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**500**
TOTAL COSTS	**Tk**	**0**	**0**	**0**	**0**	**2100**	**0**	**0**	**0**	**0**	**100**	**0**	**0**	**0**	**0**	**600**
NET BENEFIT BEFORE FINANCING	**Tk**	**0**	**0**	**0**	**0**	**354300**	**0**	**0**	**0**	**0**	**-100**	**0**	**0**	**0**	**0**	**840680**

FIRR	24%	SWITCHING VALUES TO BRING FIRR TO 12%			
NPV @ 12%	84,845				
		(a) Benefit	-76%	(b) Cost	309%

1_/ Average MAI of 25 m3 per ha per year has been assumed.
2_/ At 1st thinning 470 trees will be taken out and no intermediate production is assumed
At 2nd thinning about 300 trees will be taken out.
At 3rd thinning about 350 trees will be taken out and at 4th thinning about 300 trees will be taken out..
3_/ At final felling 300 trees will be available.
4_/ Based on the existing stumpage value calculated at 12.5 percent of the market price of the respective products..
5_/ Spacing of 2.78 m x 2.78 m has been assumed.
6_/ Operation includes survey, layout, site preparation, planting, fire breaks etc.
7_/ Operation includes weeding and cleaning.

4f. Financial Analysis of 1 ha Medium Rotation Teak Plantation Model (Rotation = 20 Years, MAI = 12.5 m^3/ha/A)

	Unit	Year 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
INFLOW																					
A. Yield 1_/																					
1. Thinning 2_/																					
- Fuelwood	m^3	0	0	0	0	0	0	0	0	0	35	0	0	0	0	12	0	0	0	0	0
- Pole	m^3	0	0	0	0	0	0	0	0	0	28	0	0	0	0	27	0	0	0	0	0
- Log	m^3	0	0	0	0	0	0	0	0	0	7	0	0	0	0	16	0	0	0	0	0
2. Final felling 3_/																					
- Fuelwood	m^3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20
- Pole	m^3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20
- Log	m^3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	91
B. Total Volume of Production																					
- Fuelwood	m^3	0	0	0	0	0	0	0	0	0	35	0	0	0	0	11.8	0	0	0	0	19.5
- Pole	m^3	0	0	0	0	0	0	0	0	0	28	0	0	0	0	27	0	0	0	0	19.5
- Log	m^3	0	0	0	0	0	0	0	0	0	7	0	0	0	0	16.2	0	0	0	0	91
C. Price 4_/											70					55					130
- Fuelwood	Tk/m^3	0	0	0	0	400	0	0	0	0	400	0	0	0	0	400	0	0	0	0	400
- Pole	Tk/m^3	0	0	0	0	0	0	0	0	0	1240	0	0	0	0	1240	0	0	0	0	1240
- Log	Tk/m^3	0	0	0	0	0	0	0	0	0	4500	0	0	0	0	4500	0	0	0	0	4500
TOTAL INCOME	**Tk**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**169400**	**0**	**0**	**0**	**0**	**136132**	**0**	**0**	**0**	**0**	**111930**
OUTFLOW		**417462**																			
D. PHYSICAL INPUTS																					
Seedlings 5_/	No	3500																			
In-fill Seedlings	No	0																			
Fertilizer	Kg	67																			
Labour - Establishment 6_/	md	89		83																	
Labour - Maintenance 7_/	md	4	57	65	76																
Labour - Thinning	md					45					45					20					
TOTAL LABOUR REQUIREMENT	**md**	**93**	**57**	**148**	**76**	**45**	**0**	**0**	**0**	**0**	**45**	**0**	**0**	**0**	**0**	**20**	**0**	**0**	**0**	**0**	**0**
E. FINANCIAL INPUTS																					
Seedlings	Tk	3500																			
In-fill Seedlings	Tk	0																			
Fertilizer	Tk	402		0																	
Tools and Equipments	Tk					100					500										
Overhead 8_/	Tk	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
Non Labour Costs	**Tk**	**5902**	**2000**	**2000**	**2000**	**2100**	**2000**	**2000**	**2000**	**2000**	**2500**	**2000**	**2000**	**2000**	**2000**	**2000**	**2000**	**2000**	**2000**	**2000**	**2000**
Labour Cost @ Tk 50/day	**Tk**	**4650**	**2850**	**7400**	**3800**	**2250**	**0**	**0**	**0**	**0**	**2250**	**0**	**0**	**0**	**0**	**1000**	**0**	**0**	**0**	**0**	**0**
TOTAL COSTS	**Tk**	**10552**	**4850**	**9400**	**5800**	**4350**	**2000**	**2000**	**2000**	**2000**	**4750**	**2000**	**2000**	**2000**	**2000**	**3000**	**2000**	**2000**	**2000**	**2000**	**2000**
NET BENEFIT	**Tk**	**-10552**	**-4850**	**-9400**	**-5800**	**-4350**	**-2000**	**-2000**	**-2000**	**-2000**	**164650**	**-2000**	**-2000**	**-2000**	**-2000**	**133132**	**-2000**	**-2000**	**-2000**	**-2000**	**109930**

FIRR	26%	SWITCHING VALUES TO BRING FIRR TO 12%	
NPV @ 12%	56,086	(a) Benefit -62%	(b) Cost 161%

1_/ Average MAI of 12.5 m^3 per ha per year has been assumed.
2_/ At 1st thinning 1,500 trees will be removed, at 2nd thinning 750 trees will be taken out, at 3rd thinning about 300 trees will be removed and at 4th thinning 150 trees will be felled.
3_/ At final felling 200 trees will be available.
4_/ Based on the existing stumpage value estimated at 12.5 percent of market price.
5_/ Spacing of 1.82m x 1.82m and a sapling mortality rate of 17% has been assumed.
6_/ Operation includes survey, layout, site preparation, planting, fire breaks etc.
7_/ Operation includes weeding and cleaning.
8_/ Based on the pulpwood plantation in Kaptai and Teak plantation in Bandarban area.

4g. Financial Analysis of 1 ha Medium Rotation Teak Plantation Model (Rotation = 20 Years, MAI = 30 m^3/ha/A)

	Unit	Year 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
INFLOW																					
A. Yield 1_/																					
1. Thinning 2_/																					
- Fuelwood	m^3	0	0	0	0	0	0	0	0	0	68	0	0	0	0	45	0	0	0	0	0
- Pole	m^3	0	0	0	0	0	0	0	0	0	54	0	0	0	0	113	0	0	0	0	0
- Log	m^3	0	0	0	0	0	0	0	0	0	14	0	0	0	0	68	0	0	0	0	0
2. Final felling 3_/																					
- Fuelwood	m^3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	36
- Pole	m^3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	36
- Log	m^3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	168
B. Total Volume of Production																					
- Fuelwood	m^3	0	0	0	0	0	0	0	0	0	68	0	0	0	0	45	0	0	0	0	13.8
- Pole	m^3	0	0	0	0	0	0	0	0	0	54	0	0	0	0	113	0	0	0	0	34.5
- Log	m^3	0	0	0	0	0	0	0	0	0	14	0	0	0	0	68	0	0	0	0	20.7
C. Price 4_/																					
- Fuelwood	Tk/m^3	0	0	0	0	400	0	0	0	0	400	0	0	0	0	400	0	0	0	0	400
- Pole	Tk/m^3	0	0	0	0	0	0	0	0	0	1240	0	0	0	0	1240	0	0	0	0	1240
- Log	Tk/m^3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3500	0	0	0	0	3500
TOTAL INCOME	**Tk**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**84320**	**0**	**0**	**0**	**0**	**451300**	**0**	**0**	**0**	**0**	**137862**
OUTFLOW		673482																			
D. PHYSICAL INPUTS																					
Seedlings 5_/	No	1370																			
In-fill Seedlings	No	0																			
Fertilizer	Kg	195		86																	
Labour - Establishment 6_/	md	180																			
Labour - Maintenance 7_/	md	0	100	74	50	70															
Labour - Thinning	md					0					57					26					
TOTAL LABOUR REQUIREMENT	**md**	**180**	**100**	**74**	**50**	**70**	**0**	**0**	**0**	**0**	**57**	**0**	**0**	**0**	**0**	**26**	**0**	**0**	**0**	**0**	**0**
E. FINANCIAL INPUTS																					
Seedlings	Tk	7247.3																			
In-fill Seedlings	Tk	0																			
Fertilizer	Tk	1170		516																	
Tools and Equipments	Tk					100					500										
Overhead 8_/	Tk	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
Non Labour Costs	**Tk**	**10417.3**	**2000**	**2516**	**2000**	**2100**	**2000**	**2000**	**2000**	**2000**	**2500**	**2000**	**2000**	**2000**	**2000**	**2000**	**2000**	**2000**	**2000**	**2000**	**2000**
Labour Cost @ Tk 50/day	**Tk**	**9000**	**5000**	**3700**	**2500**	**3500**	**0**	**0**	**0**	**0**	**2850**	**0**	**0**	**0**	**0**	**1300**	**0**	**0**	**0**	**0**	**0**
TOTAL COSTS	**Tk**	**19417.3**	**7000**	**6216**	**4500**	**5600**	**2000**	**2000**	**2000**	**2000**	**5350**	**2000**	**2000**	**2000**	**2000**	**3300**	**2000**	**2000**	**2000**	**2000**	**2000**
NET BENEFIT	**Tk**	**-19417.3**	**-7000**	**-6216**	**-4500**	**-5600**	**-2000**	**-2000**	**-2000**	**-2000**	**78970**	**-2000**	**-2000**	**-2000**	**-2000**	**448000**	**-2000**	**-2000**	**-2000**	**-2000**	**135862**

FIRR	24%	SWITCHING VALUES TO BRING FIRR TO 12%	
NPV @ 12%	81,467	(a) Benefit -66%	(b) Cost 192%

1_/ Average MAI of 30 m^3 per ha per year has been assumed.
2_/ At 1st thinning 1,500 trees will be taken out.
At 2nd thinning about 1,000 trees will be taken out.
3_/ At final felling 500 trees will be available.
4_/ Based on the existing stumpage value.
5_/ Spacing of 15 cm x 15 cm and a sapling mortality rate of 17% has been assumed.
6_/ Operation includes survey, layout, site preparation, planting, fire breaks etc.
7_/ Operation includes weeding and cleaning.
8_/ Based on the pulpwood plantation in Kaptai and Teak plantation in Bandarban area.

4h. Financial Analysis of 1 ha Medium Rotation Enrichment (Sal) Plantation Model (Rotation = 20 Years, MAI = 12.5 m^3/ha/A)

	Unit	Year 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
INFLOW																					
A. Yield 1_/																					
1. Thinning 2_/																					
- Fuelwood	m^3	0	0	0	0	60	0	0	0	0	28	0	0	0	0	8	0	0	0	0	0
- Pole	m^3	0	0	0	0	0	0	0	0	0	22	0	0	0	0	21	0	0	0	0	0
- Log	m^3	0	0	0	0	0	0	0	0	0	6	0	0	0	0	13	0	0	0	0	0
2. Final Felling 3_/																					
- Fuelwood	m^3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	18
- Pole	m^3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	18
- Log	m^3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	83
B. Total Volume of Production																					
- Fuelwood	m^3	0	0	0	0	60	0	0	0	0	28	0	0	0	0	8	0	0	0	0	13.8
- Pole	m^3	0	0	0	0	0	0	0	0	0	22	0	0	0	0	21	0	0	0	0	34.5
- Log	m^3	0	0	0	0	0	0	0	0	0	6	0	0	0	0	13	0	0	0	0	20.7
C. Price 4_/																					
- Fuelwood	Tk/m^3	0	0	0	0	400	0	0	0	0	400	0	0	0	0	400	0	0	0	0	400
- Pole	Tk/m^3	0	0	0	0	0	0	0	0	0	1700	0	0	0	0	1700	0	0	0	0	1700
- Log	Tk/m^3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3500	0	0	0	0	3500
TOTAL INCOME	**TAKA**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**47600**	**0**	**0**	**0**	**0**	**87100**	**0**	**0**	**0**	**0**	**144210**
OUTFLOW		**278910**																			
D. PHYSICAL INPUTS																					
Seedlings 5_/	No	3000																			
In-fill Seedlings	No	0																			
Fertilizer	Kg	150		108																	
Labour - Establishment 6_/	md	144																			
Labour - Maintenance 7_/	md	0	100	74	50	24															
Labour - Thinning	md					58					58					52					
TOTAL LBOUR REQUIREMENT	**md**	**144**	**100**	**74**	**50**	**82**	**0**	**0**	**0**	**0**	**58**	**0**	**0**	**0**	**0**	**52**	**0**	**0**	**0**	**0**	**0**
E. FINANCIAL INPUTS																					
Seedlings	Tk	3000																			
In-fill Seedlings	Tk	0																			
Fertilizer	Tk	900		648																	
Tools and Equipments	Tk					100					500										
Overhead 8_/	Tk	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
Non Labour Costs	**Tk**	**5900**	**2000**	**2648**	**2000**	**2100**	**2000**	**2000**	**2000**	**2000**	**2500**	**2000**	**2000**	**2000**	**2000**	**2000**	**2000**	**2000**	**2000**	**2000**	**2000**
Labour Cost @ Tk 50/day	**Tk**	**7200**	**5000**	**3700**	**2500**	**4100**	**0**	**0**	**0**	**0**	**2900**	**0**	**0**	**0**	**0**	**2600**	**0**	**0**	**0**	**0**	**0**
TOTAL COSTS	**Tk**	**13100**	**7000**	**6348**	**4500**	**6200**	**2000**	**2000**	**2000**	**2000**	**5400**	**2000**	**2000**	**2000**	**2000**	**4600**	**2000**	**2000**	**2000**	**2000**	**2000**
NET BENEFIT	**Tk**	**-13100**	**-7000**	**-6348**	**-4500**	**-6200**	**-2000**	**-2000**	**-2000**	**-2000**	**42200**	**-2000**	**-2000**	**-2000**	**-2000**	**82500**	**-2000**	**-2000**	**-2000**	**-2000**	**142210**

FIRR 14%
NPV @ 12% 8,716

SWITCHING VALUES TO BRING FIRR TO 12%

(a) Benefit -19% (b) Cost 23%

1_/ Average MAI of 12.5m3 per ha per yea has been assumed.
2_/ At 1st thinning 1,500trees will be taken out.
At 2nd thinning about 1,000trees will be taken out.
3_/ At final felling 500 trees will be available.
4_/ Based on the existing stumpage value.
5_/ Spacing of 15 cm x 15 cm and a saplinmg mortality rate of 17% has been assumed.
6_/ Operation includes survey, layout, site preparation, planting, fire breaks etc.
7_/ Operation includes weeding and cleaning.
8_/ Based on the pulpwood plantation in Kaptai and Teak plantation in Banderban area.

4i. Financial Analysis of 1 ha Short Rotation Pulpwood Plantation (Rotation = 10 Years, MAI = 15 m^3/ha/A)

	Unit	Year 1	2	3	4	5	6	7	8	9	10
INFLOW											
A. Yield											
- Fuelwood	m^3	0	0	0	0	0	0	0	0	0	60
- Pulp	m^3	0	0	0	0	0	0	0	0	0	90
B. Total Volume of Production											
- Fuelwood	m^3	0	0	0	0	0	0	0	0	0	60
- Pole	m^3	0	0	0	0	0	0	0	0	0	90
C. Price											
- Fuelwood	Tk/m^3	0	0	0	0	400	0	0	0	0	400
- Pole	Tk/m^3	0	0	0	0	0	0	0	0	0	1240
TOTAL INCOME	**TAKA**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**74400**
OUTFLOW											
D. PHYSICAL INPUTS											
Seedlings	No	1370									
In-fill Seedlings	No	0									
Fertilizer	Kg	90		0							
Labour - Establishment	md	100		0							
Labour - Maintenance 8 /	md	0	40	40	20	20					
Labour - Thinning	md										45
TOTAL LABOUR REQUIREMENT	**md**	**100**	**40**	**40**	**20**	**20**	**0**	**0**	**0**	**0**	**45**
E. FINANCIAL INPUTS											
Seedlings	Tk	5137.5									
In-fill Seedlings	Tk	0									
Fertilizer	Tk	540		0							
Tools and Equipments	Tk					100					500
Overhead	Tk	0	0	0	0	0	0	0	0	0	0
Non Labour Costs	**Tk**	**5677.5**	**0**	**0**	**0**	**100**	**0**	**0**	**0**	**0**	**500**
Labour Cost @ Tk 50/day	**Tk**	**5000**	**2000**	**2000**	**1000**	**1000**	**0**	**0**	**0**	**0**	**2250**
TOTAL COSTS 19527.5	**Tk**	**10677.5**	**2000**	**2000**	**1000**	**1100**	**0**	**0**	**0**	**0**	**2750**
NET BENEFIT	**Tk**	**-10677.5**	**-2000**	**-2000**	**-1000**	**-1100**	**0**	**0**	**0**	**0**	**71650**

FIRR 17%
NPV @ 12% 7,258

SWITCHING VALUES TO BRING FIRR TO 12%

(a) Benefit -39% (b) Cost 63%

4j. Financial Analysis of 1 ha Short Rotation Pulpwood Plantation (Rotation = 10 Years, MAI = 20 m^3/ha/A)

	Unit	Year 1	2	3	4	5	6	7	8	9	10
INFLOW											
A. Yield											
- Fuelwood	m^3	0	0	0	0	0	0	0	0	0	60
- Pulp	m^3	0	0	0	0	0	0	0	0	0	140
B. Total Volume of Production											
- Fuelwood	m^3	0	0	0	0	0	0	0	0	0	60
- Pole	m^3	0	0	0	0	0	0	0	0	0	140
C. Price											
- Fuelwood	Tk/m^3	0	0	0	0	400	0	0	0	0	400
- Pole	Tk/m^3	0	0	0	0	0	0	0	0	0	1240
TOTAL INCOME	**TAKA**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**74400**
OUTFLOW											
D. PHYSICAL INPUTS											
Seedlings	No	1370									
In-fill Seedlings	No	0									
Fertilizer	Kg	90		50							
Labour - Establishment	md	100		0							
Labour - Maintenance	md	0	40	50	20	20					
Labour - Thinning	md										45
TOTAL LABOUR REQUIREMENT	**md**	**100**	**40**	**50**	**20**	**20**	**0**	**0**	**0**	**0**	**45**
E. FINANCIAL INPUTS											
Seedlings	Tk	5137.5									
In-fill Seedlings	Tk	0									
Fertilizer	Tk	540		300							
Tools and Equipments	Tk					100					500
Overhead	Tk	0	0	0	0	0	0	0	0	0	0
Non Labour Costs	**Tk**	**5677.5**	**0**	**300**	**0**	**100**	**0**	**0**	**0**	**0**	**500**
Labour Cost @ Tk 50/day	**Tk**	**5000**	**2000**	**2500**	**1000**	**1000**	**0**	**0**	**0**	**0**	**2250**
TOTAL COSTS	**Tk**	**10677.5**	**2000**	**2800**	**1000**	**1100**	**0**	**0**	**0**	**0**	**2750**
NET BENEFIT	**Tk**	**-10677.5**	**-2000**	**-2800**	**-1000**	**-1100**	**0**	**0**	**0**	**0**	**71650**

FIRR 19%
NPV @ 12% 8,689

SWITCHING VALUES TO BRING FIRR TO 12%

(a) Benefit -36% (b) Cost 57%

4k. Financial Analysis of 1 ha Short Rotation Pulpwood Plantation (Rotation = 10 Years, MAI = 45 m^3/ha/A)

	Unit	Year 1	2	3	4	5	6	7	8	9	10
INFLOW											
A. Yield											
- Fuelwood	m^3	0	0	0	0	0	0	0	0	0	160
- Pulp	m^3	0	0	0	0	0	0	0	0	0	240
B. Total Volume of Production											
- Fuelwood	m^3	0	0	0	0	0	0	0	0	0	160
- Pole	m^3	0	0	0	0	0	0	0	0	0	240
C. Price											
- Fuelwood	Tk/m^3	0	0	0	0	400	0	0	0	0	400
- Pole	Tk/m^3	0	0	0	0	0	0	0	0	0	1240
TOTAL INCOME	**TAKA**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**198400**
OUTFLOW											
D. PHYSICAL INPUTS											
Seedlings	No	1370									
In-fill Seedlings	No	0									
Fertilizer	Kg	90		50							
Labour - Establishment	md	200		0							
Labour - Maintenance	md	0	40	60	20	60					
Labour - Thinning	md										45
TOTAL LABOUR REQUIREMENT	**md**	**200**	**40**	**60**	**20**	**60**	**0**	**0**	**0**	**0**	**45**
E. FINANCIAL INPUTS											
Seedlings	Tk	5137.5									
In-fill Seedlings	Tk	0									
Fertilizer	Tk	540		300							
Tools and Equipments	Tk					100					500
Overhead	Tk	0	0	0	0	0	0	0	0	0	0
Non Labour Costs	**Tk**	**5677.5**	**0**	**300**	**0**	**100**	**0**	**0**	**0**	**0**	**500**
Labour Cost @ Tk 50/day	**Tk**	**10000**	**2000**	**3000**	**1000**	**3000**	**0**	**0**	**0**	**0**	**2250**
TOTAL COSTS 27827.5	**Tk**	**15677.5**	**2000**	**3300**	**1000**	**3100**	**0**	**0**	**0**	**0**	**2750**
NET BENEFIT	**Tk**	**-15677.5**	**-2000**	**-3300**	**-1000**	**-3100**	**0**	**0**	**0**	**0**	**195650**

FIRR	28%	SWITCHING VALUES TO BRING FIRR TO 12%			
NPV @ 12%	42,658	(a) Benefit	-67%	(b) Cost	201%

4. ECONOMIC AND FINANCIAL INPUT PRICES

4a. Fertilizers

	Unit	1992	1993	1994	1995	2000	2005
AT EXPORT PARITY							
UREA 46% N							
FOB Source Price in 1985 Constant 1_/	U $/Ton	101.00	105.00	108.00	108.00	120.00	112.00
MUV Multiplier	U $/Ton	1.48	1.48	1.48	1.48	1.48	1.48
FOB Price in 1992 Constant	U $/Ton	149.48	155.40	159.84	159.84	177.60	165.76
Exchange Rate (U $ = Tk)		38.90	38.90	38.90	38.90	38.90	38.90
FOB at Port of Exit	Tk/ton	5814.77	6045.06	6217.78	6217.78	6908.64	6448.06
Port Dues/Handling etc. 2_/	Tk/ton	1400.00	1400.00	1400.00	1400.00	1400.00	1400.00
Handling/Transport/Storage	Tk/ton	400	400	400	400	400	400
Value Ex-store/Market	Tk/ton	4014.772	4245.06	4417.776	4417.776	5108.64	4648.064
Transport Market-Farmgate	Tk/ton	250.00	250.00	250.00	250.00	250.00	250.00
Distributors Margin	Tk/ton	500.00	500.00	500.00	500.00	500.00	500.00
FARMGATEPRICE							
Financial	Tk/kg	3.26	3.50	3.67	3.67	4.36	3.90
Economic 3_/	Tk/kg	3.77	4.01	4.18	4.18	4.87	4.41
TSP 46% P AT IMPORT PARITY							
FOB Source Price in 1985 Constant 1_/	U $/Ton	79.00	90.00	93.00	96.00	98.00	98.00
MUV Multiplier	U $/Ton	1.48	1.48	1.48	1.48	1.48	1.48
Price in 1992 Constant	U $/Ton	116.92	133.20	137.64	142.08	145.04	145.04
Freight and Insuarence	U $/Ton	70.00	70.00	70.00	70.00	70.00	70.00
CIF Chittagong at Entry Port	U $/Ton	186.92	203.20	207.64	212.08	215.04	215.04
Exchange Rate (U $ = Tk)		38.90	38.90	38.90	38.90	38.90	38.90
CIF Chittagong at Entry Port	Tk/ton	7271.19	7904.48	8077.20	8249.91	8365.06	8365.06
Port Dues/Handling etc. 2_/	Tk/ton	1400	1400	1400	1400	1400	1400
Handling/Transport/Storage	Tk/ton	400	400	400	400	400	400
Value Ex-store/Market	Tk/ton	9071.188	9704.48	9877.196	10049.91	10165.06	10165.06
Transport Market-Farmgate	Tk/ton	800.00	800.00	800.00	800.00	800.00	800.00
Distributors Margin	Tk/ton	500.00	500.00	500.00	500.00	500.00	500.00
FARMGATEPRICE							
Financial	Tk/kg	7.77	8.40	8.58	8.75	8.87	8.87
Economic 3_/	Tk/kg	7.59	8.23	8.40	8.57	8.69	8.69
MURATE OF POTASH 60% K20 AT IMPORT PARITY							
FOB Source Price in 1985 Constant 1_/	U $/Ton	73.00	72.00	72.00	72.00	71.00	71.00
MUV Multiplier	U $/Ton	1.48	1.48	1.48	1.48	1.48	1.48
Price in 1992 Constant	U $/Ton	108.04	106.56	106.56	106.56	105.08	105.08
Freight and Insuarence	U $/Ton	70.00	70.00	70.00	70.00	70.00	70.00
CIF Chittagong at Entry Port	U $/Ton	178.04	176.56	176.56	176.56	175.08	175.08
Exchange Rate (U $ = Tk)		38.90	38.90	38.90	38.90	38.90	38.90
CIF Chittagong at Entry Port	Tk/ton	6925.76	6868.18	6868.18	6868.18	6810.61	6810.61
Port Dues/Handling etc. 2_/	Tk/ton	1400.00	1400.00	1400.00	1400.00	1400.00	1400.00
Handling/Transport/Storage	Tk/ton	400.00	400.00	400.00	400.00	400.00	400.00
Value Ex-store/Market	Tk/ton	8725.76	8668.18	8668.18	8668.18	8610.61	8610.61
Transport Market-Farmgate	Tk/ton	800.00	800.00	800.00	800.00	800.00	800.00
Distributors Margin	Tk/ton	500.00	500.00	500.00	500.00	500.00	500.00
FARMGATEPRICE							
Financial	Tk/kg	7.43	7.37	7.37	7.37	7.31	7.31
Economic 3_/	Tk/kg	7.33	7.27	7.27	7.27	7.21	7.21

1_/ Based on IBRD, Commodity Price Forecast, February 1992
2_/ Include wharfage dues, storage, arrestre, stevedoring charges and handling.
3_/ All local costs adjusted by SCF of 0.80 for derivation of economic prices

Price Base:
Urea : FOB Chittagong/Chalna
TSP : FOB US Gulf
MP : FOB US Gulf

4b. Paddy/Wheat

	Unit	1992	1993	1994	1995	2000	2005
AT IMPORT PARITY							
RICE/PADDY							
FOB Source Price in 1985 Constant 1_/	U $/Ton	196.00	176.00	175.00	178.00	197.00	176.00
MUV MUltiplier	U $/Ton	1.48	1.48	1.48	1.48	1.48	1.48
FOB Price in 1992 Constant	U $/Ton	290.08	260.48	259.00	263.44	291.56	260.48
Quality Adjustment 2_/	U $/Ton	217.56	195.36	194.25	197.58	218.67	195.36
Freight and Insuarence	U $/Ton	40.00	40.00	40.00	40.00	40.00	40.00
CIF Chittagong at Entry Port	U $/Ton	257.56	235.36	234.25	237.58	258.67	235.36
Exchange Rate (U $ = Tk)		38.90	38.90	38.90	38.90	38.90	38.90
CIF Chittagong at Entry Port	Tk/ton	10019.08	9155.50	9112.33	9241.86	10062.26	9155.50
Port Dues/Handling etc. 3_/	Tk/ton	1400.00	1400.00	1400.00	1400.00	1400.00	1400.00
Handling/Transport/Storage	Tk/ton	400.00	400.00	400.00	400.00	400.00	400.00
Value Ex-store/Market	Tk/ton	11819.08	10955.50	10912.33	11041.86	11862.26	10955.50
Processing Cost	Tk/ton	320.00	320.00	320.00	320.00	320.00	320.00
Distributors Margin	Tk/ton	800.00	800.00	800.00	800.00	800.00	800.00
Transport/Handling Mill-Farmgate	Tk/ton	250.00	250.00	250.00	250.00	250.00	250.00
Processing Ratio		0.67	0.67	0.67	0.67	0.67	0.67
FARMGATEPRICE							
Financial	Tk/kg	7.00	6.42	6.39	6.48	7.03	6.42
Economic 4_/	Tk/kg	6.94	6.36	6.34	6.42	6.97	6.36
WHEAT							
FOB Source Price in 1985 Constant 1_/	U $/Ton	97.00	101.00	106.00	108.00	109.00	114.00
MUV MUltiplier	U $/Ton	1.48	1.48	1.48	1.48	1.48	1.48
Price in 1992 Constant	U $/Ton	143.56	149.48	156.88	159.84	161.32	168.72
Freight and Insuarence	U $/Ton	70.00	70.00	70.00	70.00	70.00	70.00
CIF Chittagong at Entry Port	U $/Ton	213.56	219.48	226.88	229.84	231.32	238.72
Exchange Rate (U $ = Tk)		38.90	38.90	38.90	38.90	38.90	38.90
CIF Chittagong at Entry Port	Tk/ton	8307.48	8537.77	8825.63	8940.78	8998.35	9286.21
Port Dues/Handling etc. 3_/	Tk/ton	1400.00	1400.00	1400.00	1400.00	1400.00	1400.00
Handling/Transport/Storage	Tk/ton	400.00	400.00	400.00	400.00	400.00	400.00
Value Ex-store/Market	Tk/ton	10107.48	10337.77	10625.63	10740.78	10798.35	11086.21
Processing Cost	Tk/ton	120.00	120.00	120.00	120.00	120.00	120.00
Distributors Margin	Tk/ton	800.00	800.00	800.00	800.00	800.00	800.00
Transport/Handling Mill-Farmgate	Tk/ton	250.00	250.00	250.00	250.00	250.00	250.00
Processing Ratio		0.90	0.90	0.90	0.90	0.90	0.90
FARMGATEPRICE							
Financial	Tk/kg	8.04	8.25	8.51	8.61	8.67	8.92
Economic 4_/	Tk/kg	7.93	8.14	8.40	8.50	8.55	8.81

1_/ Based on IBRD, Commodity Price Forecast, February 1992
2_/ Quality differential @25% for Rice/Paddy
3_/ Include wharefage dues, storage, arrestre, stevedoring charges and handling.
4_/ All local costs adjusted by SCF of 0.80 for derivation of economic prices

Price base : - Rice (Thai), White, milled, 5% broken, government standard, export price, FOB Bangkok.

4c. Sawlogs

	Unit	1992	1993	1994	1995	2000	2005
AT IMPORT PARITY							
ROUND LOGS							
FOB Source Price in 1985 Constant	U $/m^3	157.00	161.00	162.00	163.00	174.00	189.00
MUV Multiplier	U $/m^3	1.48	1.48	1.48	1.48	1.48	1.48
FOB Price in 1992 Constant	U $/m^3	232.36	238.28	239.76	241.24	257.52	279.72
Quality Adjustment 2_/	U $/m^3	153.3576	157.2648	158.2416	159.2184	169.9632	184.6152
Freight and Insuarence	U $/m^3	21.00	21.00	21.00	21.00	21.00	21.00
CIF Chittagong at Entry Port	U $/m^3	174.36	178.26	179.24	180.22	190.96	205.62
Exchange Rate (U $ = Tk)		38.90	38.90	38.90	38.90	38.90	38.90
CIF Chittagong at Entry Port	Tk/m^3	6782.51	6934.50	6972.50	7010.50	7428.47	7998.43
Port Dues/Handling etc. 3_/	Tk/m^3	200.00	200.00	200.00	200.00	200.00	200.00
Handling/Transport/Storage	Tk/m^3	150.00	150.00	150.00	150.00	150.00	150.00
Value Ex-store/Market	Tk/m^3	7132.51	7284.50	7322.50	7360.50	7778.47	8348.43
Cost of Extraction	Tk/m^3	320.00	320.00	320.00	320.00	320.00	320.00
Wholesellers Margin	Tk/m^3	900.00	900.00	900.00	900.00	900.00	900.00
Transport/Handling Market-Farmgate	Tk/m^3	100.00	100.00	100.00	100.00	100.00	100.00
Economic Stumpage Value	Tk/m^3	6006.51	6158.50	6196.50	6234.50	6652.47	7222.43
Stumpage Value at Market Price							
Wholesale Market Price of Average Quality Log	Tk/m^3	14000	14000	14000	14000	14000	14000
Cost of Extraction	Tk/m^3	3000	3000	3000	3000	3000	3000
Transport to Market	Tk/m^3	500	500	500	500	500	500
Stumpage Value at Market Price	Tk/m^3	10500	10500	10500	10500	10500	10500
Log Price Conversion Factor 4_/		0.57	0.59	0.59	0.59	0.63	0.69
Economic Stumpage Value of Other Wood Products							
A. Peelers							
- Stumpage Value at Market Prices		4200.00	4200.00	4200.00	4200.00	4200.00	4200.00
- Economic Stumpage Value		2402.60	2463.40	2478.60	2493.80	2660.99	2888.97
B. Poles							
- Stumpage Value at Market Prices		2590.00	2590.00	2590.00	2590.00	2590.00	2590.00
- Economic Stumpage Value		1481.61	1519.10	1528.47	1537.84	1640.94	1781.53
C. Short Rotation Sawlogs							
- Stumpage Value at Market Prices		5500.00	5500.00	5500.00	5500.00	5500.00	5500.00
- Economic Stumpage Value		3146.27	3225.88	3245.78	3265.69	3484.63	3783.18

1_/ Based on IBRD, Commodity Price Forecast, February 1992
2_/ Quality differential @ 33%
3_/ All local costs adjusted by SCF of 0.86 for derivation of economic prices
4_/ Economical: Financial ratios
Source:
- Logs (Malaysian), Meranti, Sabah best quality, sale price charged by importers, Japan

4d. Fuelwood

	Unit	1992	1993	1994	1995	2000	2005
AT IMPORT PARITY							
KEROSENE							
FOB Source Price in 1985 Constant	U $/BBL	10.50	10.80	11.30	11.70	14.80	14.10
MUV MUltiplier	U $/BBL	1.48	1.48	1.48	1.48	1.48	1.48
FOB Price in 1992 Constant	U $/BBL	15.54	15.98	16.72	17.32	21.90	20.87
Freight and Insuarence	U $/BBL	21.00	21.00	21.00	21.00	21.00	21.00
CIF Chittagong at Entry Port	U $/BBL	36.54	36.98	37.72	38.32	42.90	41.87
Exchange Rate (U $ = Tk)		38.90	38.90	38.90	38.90	38.90	38.90
CIF Chittagong at Entry Port	Tk/BBL	1421.41	1438.68	1467.46	1490.49	1668.97	1628.67
Port Dues/Handling etc. 3_/	Tk/BBL	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00
Handling/Transport/Storage	Tk/BBL	800.00	800.00	800.00	800.00	800.00	800.00
Value Ex-store/Market	Tk/BBL	3221.41	3238.68	3267.46	3290.49	3468.97	3428.67
Wholesellers Margin	Tk/BBL	900.00	900.00	900.00	900.00	900.00	900.00
Transport/Handling Market-Farmgate	Tk/BBL	100.00	100.00	100.00	100.00	100.00	100.00
Economic Value of Kerosene	Tk/Gallon	46.85	47.24	47.90	48.42	52.48	51.56
Market Value of Kerosene	Tk/Gallon	58.50	58.50	58.50	58.50	58.50	58.50
Conversion Factor for Kerosene		0.80	0.81	0.82	0.83	0.90	0.88
Weighted Fuelwood Conversion Factor (80%*CF+20%*SCF)		0.80	0.81	0.82	0.82	0.88	0.87
Mangrove Fuelwood							
Retail Market Price		1050.00	1050.00	1050.00	1050.00	1050.00	1050.00
Cost of Extraction		500.00	500.00	500.00	500.00	500.00	500.00
Transport		70.00	70.00	70.00	70.00	70.00	70.00
Margin		350.00	350.00	350.00	350.00	350.00	350.00
Stumpage Value at Market Prices		130.00	130.00	130.00	130.00	130.00	130.00
Economic Stumpage Value		104.09	104.79	105.95	106.88	114.09	112.46
Industrial Plantation Fuelwood							
Retail Market Price		1400.00	1400.00	1400.00	1400.00	1400.00	1400.00
Cost of Extraction		500.00	500.00	500.00	500.00	500.00	500.00
Transport		70.00	70.00	70.00	70.00	70.00	70.00
Margin		350.00	350.00	350.00	350.00	350.00	350.00
Stumpage Value at Market Prices		480.00	480.00	480.00	480.00	480.00	480.00
Economic Stumpage Value		384.33	386.91	391.20	394.64	421.26	415.25

1_/ Based on IBRD, Commodity Price Forecast, February 1992
2_/ All local costs adjusted by SCF of 0.80 for derivation of economic prices

Source:
- Average OPEC price (OPEC government sales weighted by OPEC exports).

APPENDIX 8
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