

# Past, Present and Future Condition of Bangladesh Forest

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## Introduction

Bangladesh is situated in north eastern part of South Asia between 20° 34' and 26° 38' north latitude and between 88° 01' and 92° 41' east longitude. It lies in the active delta of three major rivers viz Padma, Meghna and Jamuna and their numerous tributaries. The country covers an area of 1,47,570 sq.km and bounded by India from the west, north and most of east. Myanmar lies on the southeastern edge and Bay of Bengal on the south. A small tracts of higher land occur in Sylhet, Mymensingh, Chittagong, Cox's Bazar and Chittagong Hill Tracts (CHT) regions. The southwestern region consists of a large number of dead and cut-off rivers. The coastal part of Bangladesh includes the famous Sundarbans Mangrove Forest. A number of depressed basins are found in the district of greater Mymensingh and Sylhet which are inundated by fresh water during the monsoon that gradually dry out during the dry winter season. These depressed basins are known as 'Haor'. Climate of Bangladesh is sub-tropical and monsoon rainfall varies from 1200-3500mm. Rice is the major cereal crop while jute, sugarcane, and tea are the main cash crops. Other important crops are wheat, tobacco, pulses, vegetable and tree fruits. Garments, raw and manufactured jute goods, tea, fish, and, hides and skins are the chief exports. Bangladesh is noted for its estuarine environment, yet less than 10% of its total water flow originates from its own catchments and rest comes from India, Nepal and Bhutan. Normally, 20% of the country gets flooded during the monsoon period. According to a recent estimate, total forest land in Bangladesh is about 2.5 million hectares or 17% of the land surface of the country (Bangladesh Economic Review, 2002). The forest land of Bangladesh is broadly categorized as state forest land (2.2 million hectares) and private forest land (0.4 million hectares). Of the state forest land 1.3 million hectares of natural forests and plantations are under the jurisdiction of the Forest Department (FD) in the Ministry of Forest and Environment (MOFE).

## Classification of Forest

Under the management of Forest Department the main three types of forests are:

1. Tropical evergreen or semi evergreen forest (640,000 hectares) in the eastern districts of Chittagong, Cox's Bazar, Sylhet, and the Chittagong Hill Tracts region (hill forest)
2. Moist or dry deciduous forest also known as sal (*Shorea robusta*) forest (122,000 hectares) located mainly in central plains and the freshwater areas in the northeast region; and
3. Tidal mangrove forests along the coasts (520,000 hectares) the Sundarbans in the Southwest of the Khulna and other mangroves in the Chittagong and Noakhali coastal belt.

### 1. Hill Forest

The hill forest is divided into three categories:

- Reserved Forests (RFs) cover 796,160 acres
- Protected Forests (PFs) cover 34,688 acres and
- Unclassed State Forests (USF) cover 2,463,000 acres

Commercially most important timber species with gigantic heights and girths are the characteristics of this hill forest. Most of the trees in the under story are of evergreen type, whereas most of the tallest trees are deciduous and semi deciduous. Bamboo of hill forest is very important as the raw material for pulp and paper mills. Though a large number of animal species have gone extinct, still a considerable number of different species of animals are existing in this forest. Human intervention through plantation activities has changed its character. Monoculture of Teak, a commercially valuable timber species is planted in forest which has been proved ecologically unsound. Rubber plantation, which is proved environmentally and economically unsuccessful, has played a role in hastening deforestation and changing the natural characters of the CHT forest.

### 2. Sal Forest

Sal (*Shorea robusta*) is the only species covered 70 - 75% of this forest. Other valuable trees such as Koroï (*Albizia procera*), chambal (*Artocarpus chaplasi*), jogini chakra (*Gmelina arborea*) sonalu (*Cassia fistula*) and etc. are the species of very good economic value. The sal and other products of sal forests is in unlimited demand: sal fire-wood including the stumps is seen in the brick kilns and the industrial areas. Most of the sal forest land has been denuded, degraded and encroached upon by peoples or taken for

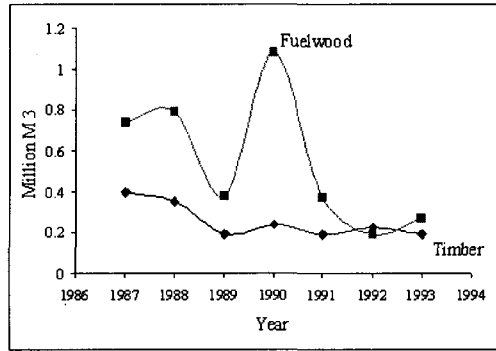
plantation of rubber monoculture or commercial fuel wood of exotic species. Commercial plantations with species drastically change its ecology.

### **3. Mangroves**

Bangladesh is a proud owner of world's largest mangrove forest particularly the Sundarbans, which is a home for the majestic Royal Bengal Tiger (a pride of Bangladesh). Two-thirds of the Sundarban forest that spreads from the southern end of the Ganges Brahmaputra delta and stretches to the Hoogly River are in Bangladesh. The total area inside the Sundarbans Reserved Forest is 6017 km<sup>2</sup> of which total land area is 4143 km<sup>2</sup> and the area covered by forest is 4069 km<sup>2</sup>. The characteristic of this tidal mangrove forest is that the tidal water sweeps the whole forest twice in every day. Both estuarine and swampy, this forest is below the mean high tide level and major part goes under water during the rising tide. Sundarban is an important source of forestry products and fish. This forest is the home of 500 types of birds and 40 species of animal including the globally endangered salt water crocodile. According to ESCAP survey, 500,000 to 600,000 people depend directly on Sundarbans and it supplies Gewa (*Excoecaria agallocharaw*) which is raw materials for the newsprint mill located at Khulna. Sundarban also is a source of Sundri (*Heriteria fomes*) Golpata and sungrass used for making house roofs of the local houses. Some reports suggested that the increasing of salinity in water have an impact of top-dying disease which causes the death of valuable forest species in this forest. Besides this, over harvesting and departmental corruption has reduced the forest stock in the Sundarbans.

### **Forest Resources**

Bangladesh forests are surviving under high level of demographic stress. The production from forest areas is continuously declining and most of it is consumed within the country and a large quantity is imported to satisfy domestic consumption. The continual change in species and age group, and lowering of average age of forests is adversely affecting the sustainability of the current forest ecosystems. The actual production after including private sources is much higher and is estimated at 7.9 million m<sup>3</sup> of round wood of all kinds, and 656 million bamboos (FMP, 1992).

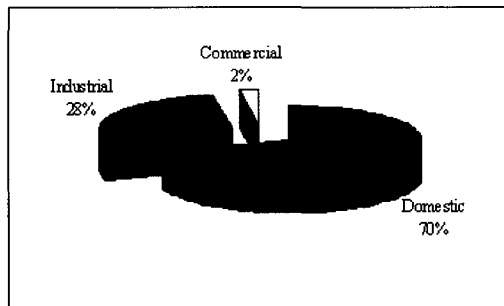


<Fig. 1> Production of timber and fuelwood from forest areas

The wood is primarily used for meeting needs of fuelwood, sawn timber, poles, pulpwood and other products. This chapter uses "round wood" as unit of measurement because the "round wood" is common unit to express production and supply of wood in Bangladesh.

## Fuelwood

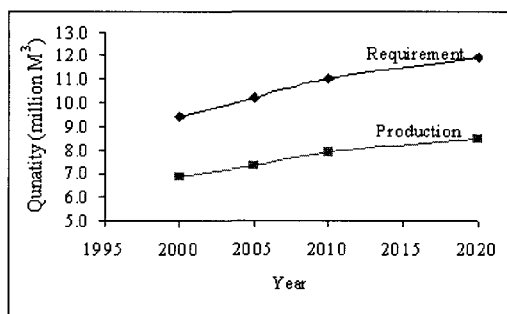
Fuelwood is the main forest product (61% of total round wood) in Bangladesh. The country annually requires about 9.4 million  $M^3$  of fuelwood against supply of about 6.18 million  $M^3$ . Fig. 2 presents the share of domestic (like cooking), industrial (like brick burning), and commercial (like bakeries and restaurants) use of the total fuelwood consumption in the country.



<Fig. 2> Share in use of fuelwood

The consumption is expected to rise (Fig. 3) to 11.9 million  $M^3$  by 2015. The fuelwood consumption in Bangladesh has an income and a regional pattern. The per capita consumption of fuelwood in Bangladesh increases with income, like 0.035  $M^3$  for low income to 0.072  $M^3$  for high income families. Further, the fuelwood energy use varies also with

geographical locations like 1.1 million Kcal per annum in the dry north-west to 1.9 million Kcal per annum in areas near northern Sal forests.



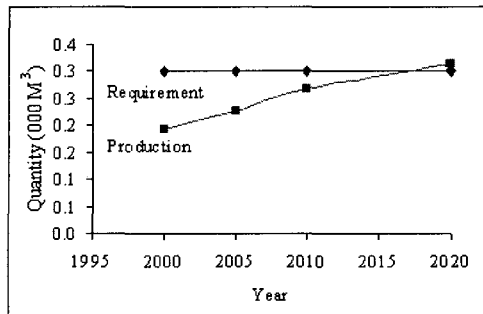
<Fig. 3> Requirement and production of fuelwood

The total fuelwood production is estimated as 6.8 million M<sup>3</sup> in 2000 and it is expected to rise (Fig. 3) to 8.5 million M<sup>3</sup> by 2015. This availability has significant regional variations, as major portion of the public forests is located in the eastern region. Other areas, which are densely populated, have to depend, to a great deal, on whatever is locally available like agricultural residues and homestead vegetation. Different studies (FMP, 1992) indicate that due to short supply, the use of fuelwood is declining and that of the agricultural residues is increasing. The majority of the fuelwood supply comes from the village groves. There exists some ambiguity as to the actual contribution of village groves in fuelwood production. Total energy balance in 1990 indicated that the share of commercial energy was 27% (up from 17% in 1981) and that of biomass energy 73% (down from 83% in 1981). The households predominantly use biomass fuel for cooking (100 % in rural households and 70% in urban households) and kerosene for lighting (93% in rural households and 76% in urban households).

## Poles

The annual requirement of different type and sizes of pole expressed in volume is estimated to increase (Fig. 4) from 0.3 million M<sup>3</sup> in 1999 to 0.5million M<sup>3</sup> in 2013. This estimate includes the domestic as well as the industrial requirement of poles like in rural electrification, power development, railway and port authorities and construction industry. The projection of domestic use of pole assumes a constant per capita use and therefore, estimates increases in use with increases in population. The industrial requirements are assumed to

remain flat throughout the period.



<Fig. 4> Requirement and production of poles

FMP, 1992 estimates of pole production indicates a dramatic increase in production of poles from 0.187 million M<sup>3</sup> in 1999 to 0.316 million M<sup>3</sup> in 2015. This prediction is based on the major structural changes that are happening in the forest growing stock like decline in average age, average diameter and percentage of valuable species, and increased supply of plantation material.

## Pulpwood

FMP, 1992 estimates that projected annual requirement of paper products of different categories (Fig. 5) will increase from 0.18 million Air Dry Tonne (mADT) in 2000 to 0.28 mADT in 2020. One half of the increase comes from more people, the other half from greater literacy. The pulp and paper industry ranks second in economic importance (value added) in among wood based industries in Bangladesh. The annual production is about 80 to 90% of the installed capacity (126,000 ADT) of paper and pulp units.

<Table 1> Requirement of paper products

Type of Paper Product	Paper Products in "000" ADT per annum				
	2000	2005	2010	2015	2020
Printing and writing	81.9	89.8	97.8	105.7	113.6
Newsprint	75.7	91.5	107.4	123.3	139.1
Wrapping and packaging	20.8	22.8	24.8	26.8	28.8
Total	178.4	204.1	230	255.8	281.5

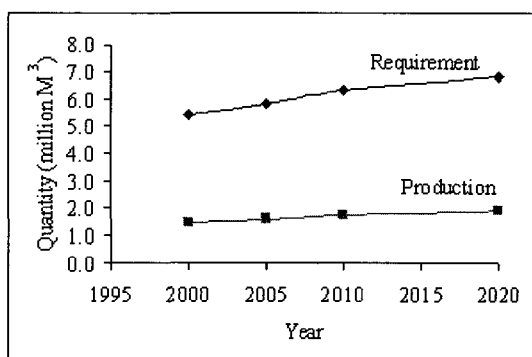
(Note: Based on FMP, 1992)

The requirement of pulpwood to meet the production needs of different categories of paper

products is likely to increase from the level of 0.3 million M<sup>3</sup> in 2000 to 0.5 million M<sup>3</sup> in 2015. The pulpwood production is expected to increase from 0.351 million M<sup>3</sup> in 2000 to 0.550 million M<sup>3</sup> in 2015 to meet the additional requirements. The forest bamboo is expected to contribute roughly 60% of the pulpwood followed by hardwood (30%) and village bamboo (10%). The newsprint mills rely mainly on "Gewa" tree for meeting their demand of pulpwood.

## Timber

The annual requirement of sawn timber is expected to rise (Fig. 5) from 5.4 million M<sup>3</sup> (round) in 2000 to 6.8 million M<sup>3</sup>(round) in 2015. The projection assumes a flat per capita demand and reflects the expected population growth during the period. Sawmills alone consume a large part of the above requirement. Bangladesh has more than 4,500 sawmills, each with a daily capacity of about 2 M<sup>3</sup>. About 4,500 sawmills were annually producing about 2.7 million M<sup>3</sup> of timber and employing 33,000 persons in 1992 (FMP, 1992). In addition to this about 5,500 pit-saw units also use round wood to produce about 10,000 sleepers (400 M<sup>3</sup>timber) every year.



(Fig. 5) Requirement and production of sawlogs (timber)

The sawn wood production is expected to increase from current estimated level of 1.45 million M<sup>3</sup> (round) in 2000 to the estimated level of 1.9 million M<sup>3</sup> (round) in 2015. The garjan, jam, chapalish, telsur and champa, gewa and sundri are main forest tree species that will supply the sawlogs. Teak is the dominant plantation species, followed by jarul, gamar, melocanna, eucalyptus, keora and mangium that will contribute sawlogs. The jackfruit, mango, shil koroï and raintree are main species in the villages that will augment the supply of sawlogs. Private wood supplies are very significant, but are spatially skewed like public

wood supplies. The southern and south-eastern regions have the best stock of private trees. Khulna, Barisal, Patuakhali, southern Comilla, Noakhali, Chittagong and Cox's Bazar districts have medium stock of private trees. The north-western region and Sylhet, western Mymensingh and northern Comilla have significantly lower stock of private tree resources.

### **Other Solid Wood Products**

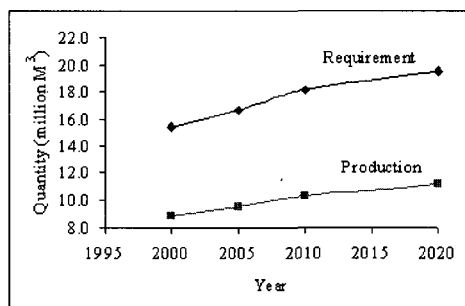
Other solid wood products include veneer, plywood, matches and composite panel boards. At present the total round wood requirement is slightly over 200,000 M<sup>3</sup> for these products. This requirement is included in the projected requirement of sawlog, pole and pulpwood. Although the projected requirements maintain a slightly increasing consumption rate, these products are not expected to become major demand items (FMP, 1992). Most of the plywood units are old with total annual capacity of about 4.0 million sq. meters. Local production capacity appears far greater than the local demand for commercial plywood. Bangladesh has about 18 matchwood units. Five of them are major producers (95%) of matchwood while the rest share the remaining five percent. The annual match production is about approximately 12.8 million gross boxes. Demand is declining during the period a result of the increased use of substitutes like electronic and gas lighters. The main supply used in the production of match splints currently comes from privately grown light-weight softwood species because of felling ban on "Gewa" from Sunderbans. Bangladesh has about 42 units producing composite panel products (wet process hardboard and particleboard). Most of these units use fuelwood, forest residues and wood industry residues as raw material. There are about 34,000 furniture making units, mostly at the cottage level, employing about 115,000 persons every year. These units mostly utilize the cheaper white woods rather than the more expensive decorative species like Teak. In addition to the above, there are large but unsurveyed and unorganized numbers of other wood using enterprises producing a wide variety of products like rickshaw bodies, toys, sporting goods, agricultural implements, bobbins, shuttles, cart wheels, musical instruments, and domestic utensils etc.

### **All Wood Products**

<Fig. 8> presents the consolidated picture of round wood requirements (FMP, 1992) for fuelwood, sawn timber, poles, and paper. It increases from 15.4 million M<sup>3</sup> in 2000 to 19.5 million M<sup>3</sup> in 2015. The share of fuelwood in total requirement of round wood is maximum



at about 61%, which is followed by sawn timber with share of about 35%.



<Fig. 6> Total requirement and production of wood

The annual total round wood production is expected to increase from the current level of about 8.8 million M<sup>3</sup> to 11.2 million M<sup>3</sup> in 2015 (FMP, 1992). This trend has two major implications (a) future supplies will become increasingly small and (b) the species proportions will change dramatically in favor of the plantation species. FMP (1992) predicts that by the year 2015, the share of plantation sawlogs and pulpwood in total wood production may go up to 30%. Another expected significant change is the large increase of pole material. This change may ask for new technologies, and provide different basket of final products.

## Bamboo

Single stemmed "muli" bamboo dominates the forest bamboo resources, while the main bamboo species from villages are "barua", "bariala", "barak", "jali" and "makhal" bamboo. Bamboo resource distribution is apposite of the private tree resource pattern. Northwest, northeast and western region farmers hold 70% of the private bamboo resource, more than 13 culms per capita. However, in the north central and southeastern regions, and more particularly in the southern region, per capita bamboo falls below 11 culms, the average for the country. The total supply potential of Bamboo in Bangladesh is about 722 million culms. The contribution of public forests is estimated at about 194 million culms and that of village forests at about 528 million culms (FMP, 1992). The present system of annual auctions and permits does not encourage investment in infrastructure such as roads and cable ways. As a result, part of the bamboo area remains inaccessible and the prescribed cutting rules are not consistently followed, resulting in high waste and unnecessary damage.

## Non forestry use of forest land

A large extent (51.86%) of the forest land is either blank, encroached, and under agriculture including shifting cultivation. These forest land under non-forestry uses have no or negligible forest cover.

〈Table 2〉 Forest land use in Bangladesh

Type of Forest Landuse	Area	Percentage	Percentage
	"000" ha	(with legal forest area)	(with Country area)
(i) Forest land under Forestry Use			
Under Forests, Plantations including Protected Areas	1065.6	48.14	7.18
Blanks/Encroachment/Water/Other	106.9	4.83	0.72
(ii) Forest land not under forestry use			
Other Blanks and Encroachments	1041.1	47.03	7.02
Total of Public Forests (legal area)	2213.6	100	14.92
Total Private Forest land	270.0		1.82
Total Other uses including Agriculture	12356.0		83.26
Total Area of the Country	14839.6		100

(Source: SYB, 1997 and Forest Dept., 1999)

Most of the economically backward tribal population practices shifting cultivation on forest areas. Four identifiable tribes with a population of 0.5 million people reside mainly in the Chittagong Hill Tracts. Some tribal population is present in the northern parts of Mymensingh District. None of the past attempts to rehabilitate these tribal and shifting cultivation areas have succeeded. While the earlier efforts to address this issue focused on agriculture, the later ones had emphasized horticulture and afforestation.

## Import

Bangladesh is now heavily dependent on imports of forest and forest-based products for meeting its basic consumption. A huge trade deficit exists for the forest products. Primary imports of logs and sawn timbers are from countries like United States, Canada, Australia, Myanmar, Singapore and Malaysia. The GOB tries to contain import of forest products through imposition of duty and restriction on imports.

## Forest Planning and Management

Forest planning and management is a planned interference in forest systems to achieve or maintain desired forest patterns. The forest planning designs the capacity of forest systems

to satisfy social, political and economic needs of the landscape. The forest management builds and maintains that capacity. This chapter presents information on the forest planning and management in Bangladesh. The forests of Bangladesh have been under planned management for over a hundred years. The forest department prepared new working plans to meet the new challenges and opportunities after independence of Bangladesh in 1971. The most of the forest areas of Bangladesh face immense demographic pressure and have crossed resiliency limits. The rigidity in the public management systems and lack of financial resources continue to limit the ability of the forest organization to develop and sustain existing forest resources.

### **Main Problems for Sustenance**

Exponentially increasing use and dependence on forest goods and services by the fast growing population, and poor enforceability of forest regulations are the main problems faced by the forest resources of Bangladesh. The crux of the problem, therefore, lies outside the forestry sector. All other problems including those within the forestry sector like declining productivity and sustainability of forest resources are manifestations of the "main problem".

Many of the problems within the forestry sector are ubiquitous. Inability of the forest resource to satisfy demands both at local and national levels is increasing all over Bangladesh. Forest are fragmenting, shrinking, and getting deforested. Most of the forest areas are drifting towards lower limits of resiliency.

### **Forest Policies**

The first outline of the policy for forest conservancy was laid down in 1858 as Charter of Indian Forests during the reign of Lord Dalhousie. Subsequently, the Forest Policy, 1894 acknowledged the role of forests in the conservation of soil, climate, watershed and prevention of erosion, siltation, flood, cyclone, torrent, etc. However, preference for agricultural land use over forestry practice remained unchanged. Hence, clearing of forest for agricultural use continued unabated and unchanged even after enactment of the policy. The Forest Policy 1955 dealt primarily with the issues related to West Pakistan forests and thus it grossly neglected the issues that relate to Bangladesh forests. On the contrary, it was assumed under its provision that Bangladesh has vast forest coverage hence emphasis in farming. The policy led to increased exploitation of natural forest and the need for

conservation, development and management were undermined and ignored. Consequently, a Forest Product Laboratory was set up in Chittagong and a Paper Mill at Chandroghona during the mid-fifties for increased extraction and utilization of forest products at commercial scales. The Forest Policy, 1955 was revised in 1962, but the practice of discrimination regarding Bangladesh forest continued even after adoption of this policy. However the need for strengthening of Forest Department and initiation of research on Forest Management Research in Bangladesh were felt necessary under the revised Forest Policy, 1962. This policy also failed to support all round growth perspectives of forest and failed to recognize the necessity of need oriented forestry research, development and utilization. Hence, degradation of forest in Bangladesh continued.

The Forest Policy for the independent Bangladesh framed in 1979 remained dormant for a long time as an office document without any effective implementation effort due to lack of sincere intention of GoB, and capability of Forest Department. The changed socio-economic conditions and declining law and order situation that followed after 1972, caused rapid exhaustion of the forest resources in Bangladesh. In addition, the price-hike of fossil fuels in the international market, closure of the Suez Canal and economic isolation of Bangladesh from the world community accelerated the rapid exhaustion of resources (including forests) in Bangladesh. The Forest Policy, 1962 was found inadequate in view of UNCED (Rio Earth Summit 1992) that viewed forest as multi functional, multi dimensional and renewable biological resource production units with multiple use potentials. The policy makers being inspired by the Rio Earth Summit did ultimately realize the need for a sectoral study for farming, and a 20-year Forestry Master Plan to combat the environmental and ecological degradation that was currently occurring. MoEF published the Forestry Master Plan accordingly in 1993. The National Forest Policy 1994 was subsequently enacted in light of the recommendations of Forestry Master Plan. The salient features of the National Forest Policy, 1994 are (i) raising forested areas to 20% of land area by 2015, (ii) ensuring coordinated participated of FD, NGOs and private individuals in forestry related activities, (iii) strengthening capability of FD, Bangladesh Forest Research Institute (BFRI), Forest Industries Development Corporation (BFIDC), (iv) Forestry Training Academy University, (v) reorganization of FD, BFRI, BFIDC and other forestry sector organizations. The estimated resources requirement for the proposed activities was Tk. 8,000 million, ADB came forward to organize collection of funds from various donor agencies. The Forestry Sector Project (FSP) was launched in 1997 with ADB support of Tk. 4,000 million as the first project for

implementing the FMP recommendations. ADB evaluation of the FSP has found that though it was launched in mid 1997, it is a sick project and has failed to reach the physical and financial targets.

Forest offences in British-India were dealt under the Indian Penal Codes until the forest in several states was declared as State Forest for management, exploration and conservation purpose. The customary rights of people as well as the public interest in forestry sector recognized by the government are in conflict with conservation and management of state forests. Hence it was soon realized that to deal with the vivid nature of forest offences that take place within the state forests special laws were required. The Forest Act, 1865 was, therefore, enacted in India to prevent crimes, protect resources e.g, trees, wildlife, ecology, watershed, landscape, etc and to expand and manage the state forests. Hence, the Act was subsequently revised in 1878. Finally, the Forest Act, 1927 was enacted to provide full-scale legal coverage for protection and development of Reserve Forest and other type of state managed forests. This Act was valid in Bangladesh to deal with Forest-offences until enactment of the Forest Act, 1994 with the subsequent Amendment in 2000. Seventeen sections Article xvi of the Forest Act, 1927 were amended and the linguistic errors were corrected by the enactment of Forest (Amendment) Act, 2000. Other laws, ordinances and rules of general nature that have a strong bearing in relation to forest administration, management and conservation include (i) Bangladesh Wildlife (Preservation) Act 1973, (Amendment) 1974 and 1998 (ii) Bangladesh Environment Conservation Act 1995, (iii) Environmental Conservation Rule, 1997(iv) Hill Cutting Ordinance 1986, (v) Brick Burning Act 1989, (vi) Cattle Trespass Act, 1881,etc. From the above discussion it becomes apparent that there had been defined policies for forestry practice in Bangladesh since 1865. But only a few of these are satisfactory to the needs of the time and the legislation enacted for pursuing the policies are rather punitive in encouraging private sector involvement in forestry activities. Moreover, the prevailing laws and orders in Bangladesh makes FD unable to implement the existing legislation to provide protection to the national forests. For example, several of FD field staff and timber merchants of Cox's Bazar, Rangamati and Khagrachari who preferred to remain anonymous reported that it costs nearly Tk. 70,000 in the form of extortion to move a seven ton truck from these stations to Dhaka. The parties involved in extorting the money are getting 27% where FD's share is less than 20 percent. It therefore, becomes clear that none of the single agencies including FD can totally stop pilferage of forest resources in Bangladesh.

## Forest Planning

Modern forestry involves interrelated activities that go far beyond the limits of forest land, and affect the welfare of all living beings. The fundamental issue is how to plan forests to sustain their essential ecological functional roles, and to provide maximum societal and individual satisfaction. Bangladesh follows two (National and District) level planning system for its forest resources. At national level, it has a long-term macro forest planning model (Forestry Master Plan, 1992) and at district level it has working or management plans and schemes. The basic objective of forest planning in Bangladesh is to optimize the contribution of forest resources for environmental stability, economic improvement and social development. At the national level, the 1992 Forestry Master Plan (FMP) serves the purpose of macro forest plan. It deals with various policy issues, institutional reforms, and environmental concerns. The resource management framework aims at balanced and sustainable land use and focuses on the basic needs of the rural people. The FMP, 1992 identifies following five pre-conditions for sustainable development in the forestry sector,

- (a) Satisfaction of basic human needs through increases in vital commodities and services such as firewood, housing and shelter materials, animal forage, medicinal plants, soil conservation and biodiversity.
- (b) Continued socio-economic growth with enhanced equitable distribution of benefits to rural areas and prospects of a better future for those who depend on trees and forest land.
- (c) Participation in decision-making and benefit sharing by tree growers, forest users and others whose livelihoods depend on trees and forest.
- (d) Sustained commitment of the government to systematic long-term approaches to issues such as tenure.
- (e) Sustainable utilization of forest resources within carrying resiliency limits accompanied by conservation of eco-systems and biodiversity.

The FMP, 1992 has developed four main themes to achieve its objectives; (a) environment management, (ii) people oriented forestry, and (iii) production directed programs, and (iv) institutional restructuring and development. The environment management provides for conservation of forests of natural origin, protected area development and community resource management. The people oriented forestry includes forestry on privately owned land, social forestry, participatory management of government controlled forest land, tree plantations on

non-forest public ("Khas") lands and unclassed state forest (USF) in the hill tracts. The production directed programs provide for industrial plantations, wood harvesting, and promotion of industry and technology. Finally, the institutional restructuring and development will focus on entrepreneur-based infrastructure and maintenance, industrial support, training and transfer of technology, institutional change, research and development. Forest planning at divisional and district level in Bangladesh is simply a technical resource planning in isolation of other sectors. The plans weakly address new concerns of forestry development - soil conservation, watershed protection, environmental and conservation values, local participation, gender issues, and non wood forest products. The name of the planning document has changed from Working Plan to Management Plan. The plan period varies from 10 to 20 years. Very few forest divisions have current working / management plans and provisions of these plans are not strictly followed. The moratorium on extraction from natural forests issued in October 1989 has further complicated the picture. A computer based Resource Information Management System (RIMS) supports Bangladesh forest department in its forest planning and management activities. It needs major up-gradation (hardware and software) to meet challenges of the next century.

### **Forest Management Plans**

The forests of Bangladesh have been under planned management for over a hundred years. The forests of Sitapahar and in Sundarbans were the first to be notified as reserved forests in 1875 under the Forest Act, Act VII of 1855. The first working plan came into force in the Sundarbans during 1893. The Forest Department started plantation activity by planting Teak at Sitapahar in 1871. The greater part of the Hill Forests was initially on a care and maintenance basis. In plains, the Sal forests came under management and planning of the forest department during 1950's.

The forest department prepared new working plans after independence of Bangladesh in 1971 to meet the new challenges and opportunities. The forest department adopted clear felling followed by artificial regeneration as main system of forest management. The Teak was identified as the main species for plantation with an agroforestry system "taungya". The aim was to convert large parts of the high forest to plantations within the rotation period. The forest management planning model of Bangladesh is traditional that considers only technical aspects and plans forest resources that vary over space in type and area. The felling moratorium of 1989 covers most of the forest area but its implementation is not effective

(FMP, 1992). The productivity of forests is low due to inadequate financial resources for forest development, rigidity in the management system, exponential population growth, and poor enforceability of forest regulations. A large proportion of the hill forests has been planted. The remaining forest area needs conservation and development. The commercial timber extraction levels in Hill Forests are unsustainable. The Sal plains forests have been heavily encroached and the present growing stock has almost lost its capacity to regenerate by itself. The coastal fringe plantations and tree cover on embankments are supplementing the declining natural capacity of coastal forest lands to deal with the cyclones.

### **Management of Hill Forests**

The Hill Forests consist of tropical evergreen and tropical moist-evergreen forests. These forests are the most important watershed areas in the country. Scientific forest management of these forests began in the 1870s under a system of selection felling and natural regeneration. In the 1930s, the system of management was modified to clear felling supported by artificial regeneration or plantation, while the system of selection-cum-improvement felling also continued. The prescriptions for plantations include establishment of natural regeneration plots of six to ten meters width around every 40-hectare plantation.

Hill forests were heavily exploited during the Second World War. Subsequent management emphasized on raising long and short rotation plantations on a large scale, and abandoned the natural regeneration plots. Delays in revision/reformulation of management plans (working plans) including plantations, and the need for ensuring timber requirements led to development of "ad hoc" treatment. Yield regulation by area was changed to one of predetermined volume. This led to larger felling areas and consequently a larger plantation program. Better and higher yields motivated for the large scale conversion of Hill forests into plantations. The sustained principles of forest management were not applied in practice and adequate information to establish annual allowable cuts does not exist (FMP, 1992). As regards Bamboo, the contribution of public forests is estimated at about 194 million culms against 528 million culms from village forests (FMP, 1992). The present system of annual auctions and permits does not encourage investment in infrastructure such as roads and cable ways. As a result, part of the bamboo areas remains inaccessible and the prescribed cutting rules are not consistently followed, resulting in high waste and unnecessary damage.



## **Management of Sal Plains Forests**

Most of the Sal forests originally belonged to feudal landlords and were not under scientific management for a very long period. The forest department gradually assumed their responsibility for management after nationalization in 1950s. The silvicultural prescriptions included clear felling with regeneration mostly from coppice; simple coppice and coppice with standards on a rotation of about 20 years. Thinning was prescribed on a 10-year cycle to improve the Sal crop. The plan provided for taungya system to afforest the blanks. Due to immense pressure from growing population, none of these practices could sustain the sustainable development of these forests, which has continued to deplete in size and stocking. Sal forests areas have maximum encroachment and most of the root stock of remnant Sal forests has lost coppicing power suggesting use of plantation for re-afforesting such areas. FMP, 1992 observes that in most cases, the land in the remnant Sal Forests are not suitable for permanent agriculture without irrigation, However, if such Sal stands are provided adequate protection and tending then they can still respond and grow.

## **Management of Mangrove Forests**

The Sundarban forests were declared as a Reserved Forest in 1879, and are managed under a selection system. Early management consisted of a selection system with fixed exploitable girth limit for the main species and a felling cycle of 40 years. Subsequent working plans reduced the felling cycle to 20 years. The forest management intensity was increased after construction Khulna Newsprint Mills Ltd (KNM) in 1959, and other Khulna-based forest industries. All age gradations of trees are not available due to improper marking and inadequate regeneration (FMP, 1992). Ecological changes taking place in the Sundarbans are evident, apparently from extensive changes in river flow and increased salt content. Besides Golpatta palm leaves exploitation takes place on the basis of collection permits. Scarcity of *information and inability to enforce regulations are the two main problems in sustainable management of Sunderbans.*

## **Management of Unclassed State Forests (USF)**

The USF do not have any forest management plans. The district administration controls the large amount of the 700,000 ha of hill land called Unclassed State Forests (USF). Most of this land is bare, lacks forest cover, and losing topsoil. Its capacity to sustain shifting

cultivation, the past major land use, is declining. Social, political, tenurial, and institutional constraints limit the development of such USF lands. Chittagong Hill Tracts contains one of the largest and most concentrated blocks of these unproductive lands in the country that have remained undeveloped for decades. Most of these lands are now only suited for raising forests species. Marketing problem restricts use of some of these lands for horticulture. Ambiguity about land tenure checks new investment in these lands.

### **Management of Protected Areas (PAs)**

Management plans for the PAs have been developed for the first time in 1997 (Rosario, 1997 a, 1997b). Five National Parks, seven Wildlife Sanctuaries and one Game Reserve are within public forests in Bangladesh and the Bangladesh Wildlife Preservation (Amendment) Act of 1974 provides legal protection to these areas. These 13 PAs occupy an area of 164,660 ha, or about 1.11 percent of the land area of Bangladesh. This is well below the target of 5 percent established by the Wildlife Task force in 1986 and the target of 12 percent recommended by the World Commission on Environment and Development.

### **Management of Private or Village Forest**

There is no forest management planning for the village forest, which are mostly homestead forests and extend over 270,000 ha in about 10 million households covering over 85,650 villages. The private forests annually supply about 5 million M<sup>3</sup> of wood (about one million m<sup>3</sup> of logs and about four million m<sup>3</sup> of fuelwood) and 0.53 million Air Dry MT of bamboo. The homestead forests are the most important source of wood, bamboo and other non wood forest products in the villages. A national survey (FMP 1992) shows that the average growing stock has remained almost unchanged since 1980-81 but has much higher proportion of smaller diameter trees. There are no formal plan or management guidelines for these forests.

### **Conclusion**

The forests of Bangladesh have been under planned management for more than hundred years. During last few decades, the socio-economic conditions have minimized the utility and use of forest planning and management. The unplanned biotic pressures have far exceeded the planned conservation efforts and have shrunk, degraded and fragmented the forest

resources. However, the national development plans have developed a better perception about forestry as an important sector impacting social, economic and environmental conditions and ask for a more socially oriented forestry institution. Accordingly, Bangladesh has adopted a new National Forest Policy in 1994 and the issue of institutional reform in its forestry sector is under active consideration of the government. The new policy lays emphasis on people oriented programs to conserve natural resources, preserve existing values and to maximize benefits to local people. High density and rate of growth of population coupled with high incidence of poverty is exerting very high pressure on forest land. The huge illegal collection of fuelwood and unauthorized use of forest land for non-forestry purposes is very common and extensive. More than half of the forest land in Bangladesh is either blank or under illegal non-forestry use. Excessive use of remaining forest resources is pushing them towards their limits of resiliency. Public forests are mostly meeting large commercial and industrial needs.

Privately owned trees and bamboo resources are being harnessed at higher levels and are supplying more forest products than the public forests. Harvesting on private land by individual owners, timber traders and contractors accounts for the bulk of wood production. Privately owned trees are not under any scientific management and therefore it is difficult to ensure their sustainability. Bangladesh faces increasing shortage of forest raw material supply for meeting its domestic and industrial needs. Future wood supplies will rely heavily on plantations and consist of increasingly small dimensions. Excepting supply of poles all other supplies will be much below the requirement. This will result in regular decrease in manufactured products available for export and domestic consumption, and increase in import of forest raw material as well as manufactured products.

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