



Nishorgo Support Project

Pre-Assessment of Enterprise Development Opportunities Associated with Pilot Protected Areas of the Nishorgo Support Project



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Prepared by

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CREATING OPPORTUNITIES FOR BANGLADESH

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EXECUTIVE SUMMARY

A team has critically examined the potentiality of enterprise development in the protected forest areas in Bangladesh namely: Teknaf Game Reserve, Chunuti Wildlife Sanctuary, Satchari Reserved Forest, Rema-Kalenga Wildlife Sanctuary and Lawachara National Park.

The present situations of the protected forest areas are exacerbated. Heavily illicit felling and encroachment is the common issues that has eroded resource base grossly. Natural regeneration statuses of plant species in the protected areas are very poor due to heavy exploitation. To know the exact natural regeneration status it needs further study with especial tasks.

Small enterprises create more new jobs than do larger business. The new jobs created by small businesses come in small bites. Enterprises based on forest resources may range from natural healing home to hand spoon, hand woven garments and from organic pesticide to bee keeping and ecotourism. When a new bamboo based small scale enterprise opens, it may employ 10-15 persons. When a new herbal medicine processing cottage industry opens it may employ 15-20 persons.

The sector endeavor to develop enterprises at community level small to medium in the chosen geographical locations through a market-led, research and sector development approach. The ultimate goal of the intervention is to assist in growth of these enterprises through partnering arrangements with the stakeholders, while keeping in view to ecological and policy issues.

It is estimated that every one-dollar invested in Non-Wood Forest Products (NWFPs) development projects yields at least seven times that amount in benefits for the Indonesian peoples (FAO, 1995a).

NWFPs are directly connected with the day-to-day life of rural people of Bangladesh due to its cheapness, lightness, easy to work and availability. There are about 3.22 million of cottage industries in Bangladesh and able to produce 160 items of various products and the total number of employment of such industries is approximately 9.18 millions (BSCIC, 1986).

There are about more than 500 different types of Ayurvedic and Unani preparation in the market and 200-3000 medicinal plants of high therapeutic value are used in the preparations (Alam, 2001) which provide employment opportunities for rural poor sector and uplift the socio-economic condition of the poor sector as well as the whole economy. The annual consumptions of crude drugs in Bangladesh used by relevant industries are more than 1000 tons per annum (Alam, 2001). Of which 66% is collected locally and rest are imported from foreign countries (Such as India, Srilanka, China, Malaysia, Indonesia etc.). The total size of the medicinal plant market at wholesale prices was estimated at some\$14 million p.a. corresponding to 17,000 tonnes of product. Local supply accounts for about 70% by volume and 40% by value.

FINDINGS

The following succinctly shows the priority & secondary potential sectors for each Protected Areas (PAs)

| SI # | | Lawachara National Park | Rema Kelanga Wildlife Sanctuary | Satchuri Reserve Forest | Teknaf Game Reserve | Chunuti Wild life Sanctuary |
|------|-------------------------|--|--|--|--|--|
| 1 | Priority Sector | Handicrafts (cane, bamboo and patipata based) | Handicrafts (cane, bamboo and patipata based) | Handicrafts (cane, bamboo and patipata based) | | |
| 2 | | Bee-keeping | Bee-keeping | Bee-keeping | | |
| 3 | | Hand woven and hand spoon natural dyed cloth | Hand woven and hand spoon natural dyed cloth | Hand woven and hand spoon natural dyed cloth | Hand woven and hand spoon natural dyed cloth | Hand woven and hand spoon natural dyed cloth |
| 4 | | Nursery | Nursery | Nursery | Nursery | Nursery |
| 5 | | | Food processing (pickle, jam, jelly) | Food processing (pickle, jam, jelly) | | |
| 6 | | | | | Coconut oil and coir production | |
| 7 | Secondary Sector | Hand made herb tea cultivation and processing (Basak, Camomile, Shefali) | Hand made herb tea cultivation and processing (Basak, Camomile, Shefali) | Hand made herb tea cultivation and processing (Basak, Camomile, Shefali) | Hand made herb tea cultivation and processing (Basak, Camomile, Shefali) | Hand made herb tea cultivation and processing (Basak, Camomile, Shefali) |
| 8 | | Medicinal plant cultivation, collection and processing | Medicinal plant cultivation, collection and processing | Medicinal plant cultivation, collection and processing | Medicinal plant cultivation, collection and processing | Medicinal plant cultivation, collection and processing |

| SI # | | Lawachara National Park | Rema Kelanga Wildlife Sanctuary | Satchuri Reserve Forest | Teknaf Game Reserve | Chunuti Wild life Sanctuary |
|------|--|--|--|--|--|--|
| 9 | | Agar plantation | Agar plantation | Agar plantation | | |
| 10 | | Essential oil cultivation & processing | Essential oil cultivation & processing | Essential oil cultivation & processing | Essential oil cultivation & processing | Essential oil cultivation & processing |
| 11 | | Orchid cultivation and Floriculture | | | | |
| 12 | | Silk culture | Silk culture | Silk culture | | |
| 13 | | Ecotourism | Ecotourism | | Ecotourism | |
| 14 | | | Nature based healing home development | | Nature based healing home development | |

An elaboration of the above is in (Annexure 3, page 53) and the details of the study

Sector identification for rural income generation:

- Plantation in the buffer zone through participatory approaches; this sector can create ample scope for income generation through forest conservation (using organic fertilizer and bio-pesticides for plantation management).
- Medicinal plant cultivation and processing and Agar plantation; have very good prospect and can create solid platform for sustainable income generation for the rural poor in the vicinity of the forest.
- Rural processing industry for handicrafts (lot of products), bamboo & cane products, food processing (pickle, jam, jelly), weaving & natural dyes, essential oils and coconut oils & coir production and bee-keeping for honey production; very much prospective with national and international marketing perspective.
- Ecotourism (cottage, bus service, souvenir shop) and Healing home in the nature; ensure eco-friendly conservation of forest through regular income generation for the local community people.
- Nursery enterprise with emphasis on medicinal plants, aromatic species and spices for hand cash income.
- Herb tea cultivation and processing (Basak, Camomile, shefali); it is another potential field for income generation as because it is labor intensive, processing technology very simple and higher market value in the international market.

- Orchid cultivation and Floriculture; it is becoming very popular in our country with market potentials in the national and international market.

Medicinal plants, handicrafts, natural food colorants raw materials supply chain

- Demand has been increasing and set to accelerate.
- The industries is modernizing, both its own efforts & with the entry of corporate.
- Raw material demand is likely increase by Tk. 300m. over next five years.
- Imports are increasing; local wild harvest is unsustainable & of poor quality.
- Beparies (*middleman*) or pikers (*wholesalers*) are dependent on indigenous knowledge.

Industry sector

- Changes in legislation and new entrants will stimulate innovation, dynamism and competition in the sector
- The operation, layout and information regarding industrial sector are scarce and are of low standard.
- Almost all welcome the opportunity to use international Pharmacopoeia for herbal medicine.

Estimated size of the market Opportunity only for medicinal plants

The sizes of the market growth opportunity for the supply of medicinal plants as raw forms for the sector over next five years are:

| # | Name of plants | US\$M | Measures required |
|----|------------------------------------|-------|--|
| 1 | Kalomegh | 2.00 | Commercialized production |
| 2 | Amloki | 1.35 | Cultivar selection & processing |
| 3 | Hartaki | 1.00 | Cultivar selection & processing |
| 4 | Ashwagandha | 0.74 | Commercialized production |
| 5 | Mutha | 0.60 | Field & distillation trials |
| 6 | Bahera | 0.47 | Cultivar selection & processing |
| 7 | Agar | 0.40 | New production technology |
| 8 | Pipul | 0.34 | Cultivar selection and commercialization |
| 9 | Neem | 0.15 | Commercialized production |
| 10 | Ghrita Kumari (<i>Aloe vera</i>) | 0.10 | Commercialized production |

CONCLUSION

Unless improved cultivation and supply chain, Bangladeshi producers will not be able to benefit from the continued growth in demand for raw materials for handicrafts and raw medicinal plants, and, at worst, it could further lose market from its existing stand points.

RECOMMENDED NEXT STEPS

Field based production

- Development of important short listed crops suitable for medicine and raw materials for handicrafts, food processing and vegetable & essential oils, vegetable dyes, e.g. Amlaki, haritaki, bahera, bamboo, cane, patipata, sinduri, lemongrass, coconut etc.
- Identification, collection, multiplication, and dissemination of elite planting materials.
- Promote primary processing, e.g. essential oils, vegetable oils, natural colorants, handicrafts, packing materials and musabbar.
- Commercialize the production.

POST HARVEST HANDLING

- Improved collection procedures and primary processing e.g. collection of bamboo, cane, patipata, bark of arjun, drying, grading, storage and plant identification.
- Create closer links between collectors, beparies and producers to promote existing crops for quality raw materials supply without post harvest losses.

PROCESSING SECTOR

- Need closer cooperation among the producers of raw materials, researchers, processing and marketing organization.
- Exploring possibilities of bulk buying by locally based processors associations.

In terms of contribution to the national economy, non farm Small Scale Enterprises (SSE's) accounted for between 2.5 % of GDP (Honduras, 1979/81) and 7% (Bangladesh 1981) which was equivalent to 22% and 45% respectively of manufacturing sector GDP.

Forest Based Small Scale Rural Enterprises (hereafter, FBSSREs) in Bangladesh are the second largest cottage industry sector. In 1982 there were 42169 units of FBSSREs in the country (BSCIC, 1983).

As they (forest settlers) have paddy farm land and it is subjected to threats, there is an alternative approach for cotton cultivation by involving the settlers. Cotton will be the raw materials for hand weaving followed by natural dyeing process. Natural dye will be collected from forest origin. It may become potential sector for income generating activities. In the plantation forestry, forest department are planting only timber valued species with exotic concern without inventing medicinal species, spices and aromatic species. Even medicinal herbs and shrubs do not get importance in the field of plantation

forestry. No buffer zone was observed during the field visit and it is crucial need for forest conservation policy.

At the last, it is prospective to launch the project with potential sectoral interventions involving forest settlers and forest neighboring people for creating solid platform for the rural poor people through continual income generation. Now-a-days, forest conservation is unbelievable without active participation of local people and their close cooperation in the protected areas of Bangladesh.

GLOSSARY

| | |
|-----------------|--|
| AP | Ayurvedic Pharmacy |
| BCIC | Bangladesh Cottage Industries Corporation |
| BFRI | Bangladesh Forest Research Institute |
| DFO | Divisional Forest Officer |
| DO | Divisional Officer |
| FAO | Food And Agricultural Organization |
| FBSSE's | Forest Based Small Scale Enterprises |
| FBSSRE's | Forest Based Small Scale Rural Enterprises |
| FD | Forest Department |
| GDP | Gross Domestic Products |
| IRG | International Resource Group |
| JOBS | Job Opportunities & Business Support |
| NTFP's | Non-Timber Forest Products |
| NWFPS | Non-Wood Forest Products |
| PA's | Protected Areas |
| PRAN | Program for Rural Advancement Nationally |
| SSE's | Small Scale Enterprises |
| SSI's | Small Scale Industries |
| TTGB | Training Task Group, Bangladesh |

1. JUSTIFICATION/BACKGROUND

The forest of Bangladesh were subjected to infiltration from East and North-East, large scale clearance for shifting cultivation and over exploitation by the local landlords. No attempt was made anywhere to conserve the forests before the advent of British rule. Even in the early days of British rule there was much wasteful exploitation of forests to meet the requirements of the people (Das 1982). Forest coverage has decreased largely in Bangladesh since 1970s and now, except Sundarban, only tiny patches of natural forest remain. The total area of Bangladesh is 14.12 million hectares of which 1.46 million hectares comprising 10.35% of the total area is under the management of the Forest Department. There is another 0.73 million hectares of denuded state owned forest land which is termed "Unclassed State Forest". These lands are under the control of the civil administration and subjected to various injuries by shifting cultivation done by the local people. The smaller forests (Protected Areas) are part of a mosaic of resources farmland, wet land, fisheries and settlements which provide sustenance and economic opportunity to the country's rural households. Sustainable management of the remaining natural forest especially Protected Forest (PA) network, demands more active local involvement in collaborative process between local stakeholders and the legal owners of forest resources. The alarming rate of population growth has created negative effect on forest resources. The low income/wages and unemployment opportunity inspire the rural neighbors' for illicit felling of trees and illegal collection of non timber forest produces. This leads to exploitation of reserved forest and it is unwanted phenomenon for us. It should be stopped by evolving new approaches of forest conservation policy. A large number of small scale enterprises depend on forest for raw materials through forward and backward linkage. Regular and genuine income sources of the forest vicinity people can ensure to stop illicit felling of trees and illegal extraction of forest produces. It is possible to develop various small scale enterprises depend on forest raw materials. Regulatory felling of trees and collection of other raw materials through permit will help the forest conservation policy. Growth and development of small scale enterprises can ensure regular income sources through engaging the rural poor from forest destructive process and divert them in positive ways. Small scale enterprise is highly depending on family labor involvement and generates continuous family income security. So it can be growth model for alternate and sustainable income generating activities through conserving forest resources or rationale uses of forest resources in the protected areas.

1.1 Objective

To identify the suitable sectors and sub-sectors for generating incomes for the rural poor community through co-management options of the protected forest areas.

1.2 Methodology

Preliminary work on this sector assessment has been carried out in March-May 2004. The field program for the sector assessment will be carried out by a team of three and lasted 35 working days. The team comprises Dr. Iqbal Aminul Kabir, Team leader (Consultant), Md. Shafiqul Islam and Md. Amirul Islam, Research Officer of TTG, B. The teams has carried out field observation and make dialogues with concern Govt. officials, NGOs Officials, local elected bodies, forest settlers, forest neighbors, collectors, researchers and teachers regarding protected forest areas. Open ended questions will be asked to the

concerned persons during the field works. The study aimed to establish commerce potential, sectoral feasibility and trade value of non timber forest products. The overall aim of the work is to:

- Identify major non timber forest products (NTFPs) with potential production technology based on their suitability for production under Bangladesh context coupled with expanding demand, shortage of supply and /or export.
- Establish the value of non timber forest products in Bangladesh
- Realize the supply and production chain and its important role, as to facilitate future possible interventions.
- Generates and intricate project ideas, which could lead, particularly, to divert incomes for small scale producers as well as benefits in terms of forest conservation strategies in the protected areas.
- To make professional linkage and networks among the producers, marketers and traders.

In a true sense the work will be focused on entrepreneurships and small scale enterprises including bamboo based products, cane and murta products, herbal medicine processing sectors, food processing, and natural dye, healing home and ecotourism development in the protected forest areas.

1.2.1 Questionnaire

The following open ended questions have asked during the field works and make dialogue with the concerned (including Government Officials, NGOs Officials, University teacher, researcher, local elected member/Chairman, forest settlers and forest neighboring people)

Question-1:

What about the present situation of protected forest areas?

This output illuminate present status of protected forest areas and generate details information regarding plant species, animal species, natural stock status, process of illicit felling of trees and illegal collection of forest raw materials.

Question-2:

What raw materials, technology and products available in the protected forest areas?

This answer provides list of raw materials & supply status, technology exists in their hands and process products status based on protected areas at the community level and what sorts of technical support they need.

Question-3:

What are the root causes of forest depletion in the protected forest areas?

Answer explores the major causes of forest destruction and help to develop future strategies regarding conservation of protected forest areas.

Question-4:

What are the potential fields (enterprises) in or surround the protected forest areas and how it will run?

The answer explores the potential fields of FBSSes and assist to establish and develop of small scale enterprises depends on feasibility and their common interest.

Question-5:

What products do you see expanding over the next 5-10 years?

This can help in trend analysis of conglomerate products which needs special attention; those are environmentally, socially and economically viable.

Question-6:

How do you want to explore your works and new and future suppliers work with you?

It helps to design marketing channel, channel of distribution and availability of raw materials in relation to new one.

Question-7:

Would you like to be considered to work with the project to link local suppliers to traders like your own?

It explicit the system of marketing, backward & forward linkage with industrial concern and grow special interest regarding the project activities

Question-8:

What are the positive features of forest based small scale enterprises and herbal medicine and other potential fields?

It delineates the effects of FBSSes mentioning special areas of interest including herbal medicine.

This report is organized in ten chapters; in the first chapter preliminary information has given incorporating several aspects. The following chapter is linked with the first chapter.

Chapter2 describes the general information on the protected areas including area, location, physical features, climatic condition of the study area, social and economic status, available resources and scope of potential enterprise development, floristic and faunal composition, and present situation of the protected areas.

Chapter3 explore the sectoral potential with economic development and potential fields for enterprise development with top priority in the present context of the protected areas.

Chapter4 storming on participation, resource assessment, access to the resources, advance resource planning, resource inventory, species selection, sustainable harvest levels, exploring commercial options and characteristics of successful small enterprises.

Chapter5 develops strategy for successful enterprise development, planning, risk management, skills development training for producers, marketing training for concerned persons, credit support for enterprise development, processing options with details processing stages.

Chapter6 explains processing technology of foods, handicrafts made from bamboo, cane and patipata, agar processing, weaving and natural food colorants, vegetable oils, essential oils, medicines and techniques of bee-keeping with marketing linkage system.

Chapter7 provides idea on markets, marketing system of forest products, channel of distribution, market size and production cost & prices of various forest products.

Chapter8 outlines on organizing process of farmers, natural resources and organizing tools for the producer groups.

Chapter9 expedite the problems and threats regarding forest conservation and enterprise development.

Chapter10 drawing inferences in each chapter and make suggestion for further improvement of the sectors.

2. GENERAL INFORMATION OF THE PROTECTED FOREST AREAS

2.1 Teknaf Game Reserve (Elephant)

2.1.1 Area and location

The Teknaf Game Reserve is located in the extreme south-east of the reserved forests of the country. It is about 80 km of the Cox's Bazar city (i.e., 21°00' N and 92°20' E long.) and covers an area of 11,615 hectares.

2.1.2 Physical features

The terrain is irregular and the slopes are mostly precipitous. It faces the river Naff in the east and Bay of Bengal in the west. Soil varies from sandy loam to coarse sands.

2.1.3 Climate

Teknaf, Cox's Bazaar enjoys a moist maritime climate. Temperature variation is very low, humidity is very high and rainfall is very heavy from May to October.

2.1.4 Social and economic status of the areas

The average income around Tk. (1500-2000) per month and the family size 5-6 in this area. The main occupation in this area is fishing, rickshaw pulling and illicit felling of trees from the protected forest.

2.1.5 Available natural resources and scope of potential enterprise development

Scope of plantation in the depleted forest and manufacturing oil from coconut as coconut plants are abundant along the beach. There are also a scope of medicinal plantation, cultivation and setup a processing unit and bee-keeping in that arena.

2.1.6 Flora

The forest falls under the tropical semi-evergreen type. It is a many storied forest with tall trees mostly evergreen species predominating in the lower canopy and deciduous growths predominating in the top canopy. The commonest species are garjan, koroï, chapalish, simul, etc. Under these, a great variety of evergreen species of somewhat shorter heights, such as jam, jarul, and jika are also available. The lowest canopy consists of evergreen species ranging from 8-15 meters high. Bamboo is common undergrowth.

2.1.7 Fauna

The endangered species of Bangladesh like elephant, leopards and pythons are available in this area, although leopards are very rare now-a-days. Other wild animals are barking deer, sloth bears, wild dogs, wild boars, civets, jungle cats, leopard cats, fishing cats, gibbons, capped langurs, rhesus macaques etc are available. There are also many species of birds and snakes in there.

2.2. Chunuti Wildlife Sanctuary

2.2.1 Area and location

The Chunuti Wildlife Sanctuary was established in 1986, and covers an area of 7761 hectares. It is a part of the reserved forest under the Chittagong Forest Division and is about 65 km south of Chittagong port city. It is located on the western side of the Chittagong- Cox's Bazaar highway (21°40' N lat. and 92°07' E long.) and presently it is managed by Wildlife Division.

2.2.2 Physical features

The terrain is of irregular hill ranges intersected by broad alluvial valleys. The hills are composed of very soft and stones and shales. These hills are north-south aligned. The soil varies from clay to clay loam on level ground and from sandy loam to coarse sand on the hills.

2.2.3 Climate

The sanctuary is close to the Bay of Bengal and enjoys a moist tropical climate with a low range of temperature variation and a short cold season. About 80% of the year's total rainfall occurs between June and September.

2.2.4 Social and economic status

The average family member of each family is 5-6 with monthly income ranges from Tk.2000 (US\$ 33) to Tk.2500 (US\$ 42). Agriculture is the main occupation in this area.

2.2.5 Available natural resources and scope of potential enterprise development

Resource creation through the plantation over barren hills and other potential is conversion of natural depression into lake, tourism, set up a healing home and bee-keeping in that arena.

2.2.6 Flora

The upper storey of the sanctuary forests consists of deciduous trees such as garjan, chapalish, simul, bot, koroi, gutgutya etc. like other evergreen forest. The second storey consists of evergreen trees like batna, jam, bhadi, jarul, pitraj, etc. The undergrowth consists mostly of smaller evergreen trees with bamboo and assamlotas.

2.2.7 Fauna

Animal composition and their status are yet to be determined. Although one big herd of elephants have been observed to roam in this sanctuary. Rhesus macaques, capped langurs, wild dogs, wild boar, wild goats, barking deer, small cats etc. are reported to be present in the area. Many reptiles and birds are also seen in that area.

2.3 Lawachara National Park

2.3.1 Area and location

The Lawachara National Park was established through a Gazette notification in 1996. It is located approximately 160 km north-east of Dhaka and 60 km south of the city of Sylhet (24°30'-24°32' N and 91°37'-91°39'E) in the civil administrative units of Kamalgonj Thana, Maulvibazar District under the Forest administration unit of Lawachara, Chautali and Kalchara, Forest Range: Moulvibazar, Sylhet Forest Division. The current notified area of park is 1250 hectares and the proposed area is 281 hectares.

2.3.2 Physical features

The park covers an area of low hills formed primarily from soft sandstone, and originally supporting a generation of a vegetation cover of mixed tropical evergreen forest. The soils of Lawachara are brown, sandy loam to clay loam of Pliocene origin (Hussain et.al.1989). The area is undulating with slopes and hillocks, locally called *tilla*, ranging from 10-50 m and scattered in the forest. Numerous streams flow through the forest. The forest do not fall markedly under one recognized type but is mixed evergreen, where tall trees are deciduous and the under storey evergreen (Ahsan 2000).The forest originally supported a indigenous vegetation cover of mixed tropical evergreen forest (Alam 1988).

2.3.3 Climate

The climate is comparatively humid. The period from November to the end of February is fairly cool and pleasant. In March the temperature begins to rise. The hottest months are April and May. The coldest months are December and January. June to September is the months of heaviest rainfall.

2.3.4 Social and economic status

Most of the forest neighboring people engaged with illicit felling of trees and illegal extraction of fuel and bamboos. Average monthly income of each family is Tk. 3000 (US\$ 50) to Tk. 4000 (US\$ 67) and average family member is 4-5. The tribe Khasis are playing conservation role through betel leaf cultivation as forest villagers within the protected areas.

2.3.5 Available natural resources and scope of potential enterprise development

Medicinal plants, fruits, orchid, bamboo, and cane are available in the forest. Food processing, handicrafts, medicinal plants processing, bee-keeping is possible in the existing consequences. Ecotourism and hand woven and hand spoon natural dyed textile is also possible by creating resources. Integrated plantation is crying need for the conservation of forest in the buffer zone following participatory forestry.

2.3.6 Flora

A floristic survey was carried out by Leech and Ali (1997) and recorded 107 species of plants in there. The forest is semi-evergreen (Craig 1991). The canopy height varies from

10-30m. The top canopy comprises teak (*Teaktona sp*), chapalish (*Artocarpus chaplasha*), telsur (*Hopea odorata*), toon (*Toona ciliate*) etc. The second canopy comprises *Quercus spp.*, *Syzygium sp.*, *Gmelina arborea.*, *Alosphila sp.*, *Geodorum sp.*, *Grewia sp.*, *Ficus sp.*, *Eupatorium odoratum* etc and several ferns and epiphytes are also available (Islam and Feeroz 1992 and Feeroz and Islam 2000)(Annexure-2).

2.3.7 Fauna

Leech and Ali (1997) recorded 4 species of amphibians and 4 species of reptiles. Tecsult Group (FSP 2000b) during their field trip had observed two additional species of reptiles in the forest. Various types of birds and mammals are also exists in the forest.

2.4. Satchari Reserved Forest

2.4.1 Area and location

Satchari Rerved Forest is basically governed by Forest Act 1927 (With the subsequent amendment). It is located on the Dhaka-Sylhet highway between Teliapara and Srimangal in Hobiganj District. The forest is about 130-140 km north-east of Dhaka and is almost easily accessible reserved forests in the country (Chemonics 2002, Feeroz 2003). As per official record the total area of the forest is 1760 hectares. However beat office estimates show that the present area of the forest is about 1520 hectares of which 6 acres under wilderness area (based on range office record).

2.4.2 Physical features

The forest is drained by a number of small sandy bedded streams all of which dry up following the end of the rainy season. The area is very dry and there are a high proportion of deciduous trees. The soil varies from clay loam in the level ground to sandy loam in the hilly ground. The soil consists of yellowish red sandy clay mixed with granules of magnified iron ore.

2.4.3 Climate

The forest enjoys mist environment with the very short seasonal variation of rainfall and temperature. Heavy rainfall occurs during the period of June to November. Intensive commercial harvesting of sand occurs during the dry season.

2.4.4 Social and economic status

The vicinity people are working in the tea estate as a labor and few of them are felling trees illegally in an organized way. The forest villagers (Tipra tribe) are trying to protect the forest with a minimum success. The occupation of the Tipras is agriculture and seasonal hand weaving. The average income range is Tk. 2000 (US\$ 33) to Tk.3000 (50) per month with a family member of 4-5.

2.4.5 Available natural resources and scope of potential enterprise development

Medicinal plants, fruits, bamboo, and cane are available in the forest. Food processing, handicrafts, medicinal plants processing, bee-keeping is possible in the existing

consequences. Ecotourism and hand woven and hand spoon natural dyed textile is also possible by creating resources. Integrated plantation is crying need for the conservation of forest in the buffer zone following participatory forestry.

2.4.6 Flora

Chaplish (*Artocarpus chaplasha*), dcham, balash, pitraj, amloki, bahera, jam dumur, rata, chhatim, rongi, haritaki, awal, gamar, kanaidinga, kadam, kurchi, udal, cane, kakra and bamboos are common in the forests.

2.4.7 Fauna

Very common species wall lizard/tucktoo/gecko (*Gekko gekko*), lineated barbet (*Megalamina lineate*), spotted dove (*Streptolia chinensis*), golden fronted leaf bird (*Chloropsis aurifrons*), Asian fairy bluebird (*Irena puella*), black headed oricle (*Oriolus orolus*), flying fox (*Pteropus giganteus*), rhesus macaque (*Macaca mulata*), barking deer (*Muntiacus muntjack*) etc are the common species in the forest.

2.5 Rema-Kalenga Wildlife Sanctuary

2.5.1 Area and location

Rema-Kalenga wildlife sanctuary was established in 1981 under the Bangladesh Wildlife Preservation (Amendment) Act 1973. It covers an area of 1095 hectares. It is situated in the reserve forests of southern part of Sylhet district, at 24°05' N lat. and 91°37'E long.

2.5.2 Physical features

The Rema-Kalenga Wildlife sanctuary lies in the trap hills. The area is very dry and there are high proportion of deciduous trees are in the forest. The hills run in or within the sanctuary, low with gentle slopes are composed of narrow ridges rising 50 meters above the numerous intercepting valleys. The soil varies from clay loam in the level ground to sandy loam in the hilly ground. The soil consists of yellowish red sandy clay mixed with granules of magnified iron ore.

2.5.3 Climate

The climate is humid. The period from November to the end of February is fairly cool and pleasant. In March the temperature begins to rise. The hottest months are April and May. The coldest months are December and January. June to September is the months of heaviest rainfall.

2.5.4 Social and economic status

This is very much inaccessible remote area, education is scarce and the people are living in the darkness. But illicit felling of trees is regular phenomenon in this area. The average family member of each family is 6-7 with monthly average income of Tk. 2000 (US\$ 33) to Tk. 2500 (US\$ 42) only. The occupation of the people is agriculture, fuel wood collection and daily laborers.

2.5.5 Available natural resources and scope of potential enterprise

development

Medicinal plants, fruits, bamboo, and cane are available in the forest. Food processing, handicrafts, medicinal plants processing, bee-keeping is possible in the existing consequences. Ecotourism and hand woven and hand spoon natural dyed textile is also possible by creating resources. Integrated plantation is crying need for the conservation of forest in the buffer zone following participatory forestry.

2.5.6 Flora

There are various types of plants in this sanctuary like other tropical evergreen/ semi-evergreen forests with a very little difference.

2.5.7 Fauna

Five species of primates exist in this sanctuary: rhesus macaques, pig tailed macques, capped langurs, leaf monkeys and slow lorises are available in the forest. Pythons are also found in this sanctuary.

2.6 Present Situation of the Protected Forest Areas

At present the natural forests are being depleted at the increasing rate due to illegal logging operation for timber extraction as well as for non timber forest products collection from the protected forest of studied areas. Illicit felling of trees is common phenomenon in every site. The ferocious cyclone of 1991 and 1994 has damaged the protected forest-Teknaf Game Reserve severely. After the cyclone, Forest Department issued an order for felling the affected trees from the protected forests. The people (Villagers, neighboring people and traders) also have felled the standing trees illegally. Illegal felling is mostly done by the elites. Forest Department is not well equipped in manpower and organizational strengths and above all lacks commitment.

The present natural regeneration status of the species in every protected area is also threatened. Very poor regeneration status is found scattered through coppice or seeds. Proper protection, enrichment planting and improved coppice management can ensure the natural stocks availability.

The present status of Teknaf Game Reserve and Chunuti Wildlife Sanctuary is the worst in conditions. Without new plantation no intervention is possible in Teknaf Game Reserve and Chunuti Wild life Sanctuary as because there are not any alternative sources of raw materials for enterprise development. The protected areas in Chittagong zone (Teknaf Game Reserve and Chunuti Wildlife Sanctuary) are almost tree less barren hill compared to Sylhet zone (Satchari Reserve Forest, Rema-Kalenga Wildlife sanctuary and Lawachara National Park). The natural resource base is eroded including cane, bamboo and other non timber forest products and wildlife.

The plants and animals are decreasing in numbers and species with alarming threats for the natural environment. The stock of bamboo species is not available due to continuous extraction and destruction of bamboos disturbing natural regeneration process. A group of people are engaging with illicit felling of trees in association with local elite people.

Moreover political influences are also heavily involved in such kind of intrusion. Any how local administration helps them positively with the conditional agreement. The forest neighbors are very poor and mostly jobless; they have no regular income sources to lead their lives.

In Sylhet zone tea sector engage the forest vicinity people with a minimum daily wages. Only one/two can employ from a family as laborers, that is why they have organized for illicit felling of trees and this happened in Lawachara National Parks and Satchari Reserved Forests. It was observed that Wildlife also scarce and it happens due to destruction of natural forest and continuous destruction of natural habitats. Lack of availability of foods, home range, and natural regeneration status affect the wildlife in the protected forest areas. Local people are collecting forest produces (bamboo, fuel wood, raw materials for herbal medicine) illegally. Some times they also provide bribe to the forest officials and collect forest produce randomly. Such types of operation exacerbate the system and responsible for destroying the reserved forest.

Land encroachment is also a major and crucial problem in all of the protected areas. The forest villagers are using more than the allocated land and other non-registered households residing inside or outside the forest are also enjoying the forest land. Approximately 200 or more households of forest villagers currently are residing in the reserve forest instead of 181. As per Forest Department records show that 206 hectares of inside forest and another 674 hectares of outside forest still remain under cultivation, of which substantial areas have been encroached in Rema-Kalenga Wildlife sanctuary; and this common for all of the sites.

It is earmarked through prior discussion with forest villagers, local elected bodies, forest officials, tea officials, NGOs representatives and forest vicinity peoples; there are sectoral potentialities with varieties of ranges. There is various possibility of small scale enterprise development in the protected forest areas in relation to availability of raw materials.

3. SECTOR ASSESSMENT

The non-wood forest products comprises all forest products other than timber and fuel wood and include medicinal plants, essential oils, edible wild plants, spices, gums resins and oleo resins, fatty oils, tannin materials, natural colouring materials, khata and cutch, oxalic acid, fibres and flosses, beverage and narcotics, beads, rubber, basket and wicker work including canes, miscellaneous materials including thatching and broom materials. Besides these products animal products such as lac, honey, are included amongst non-wood forest products. It is also possible to provide services through ecotourism, recreational facilities through ameliorating the environment and nature conservation. These products are important when their utility, money value and importance in local economy are taken into consideration.

It is possible to generate income and employment from the collection, trade, or processing and manufacturing of Non-wood forest products (Falconer, 1988; FAO 1995). It is estimated that every one-dollar invested in NWFPs development projects yields at least seven times that amount in benefits for the Indonesian peoples (FAO, 1995a).

NWFPs are directly connected with the day-to-day life of rural people of Bangladesh as those are cheap, light, and easily available. Bangladesh is at present the most populace country in the world and the country facing acute unemployment problems. It is necessary to increase the employment opportunities in a country, as it plays a dual role in development. NWFPs may generate employment for the rural poor. The employment provided by NWFPs include- direct employment (Management execution of NWFPs), self-employment and secondary employment. It is now increasingly felt that the management of forest resources for NWFPs may be more sustainable from the ecological and social perspectives. Further, managing forests for NWFPs also implies a greater biodiversity of both plant and animal species (Tewari; 1995; 1998).

There is an urgent need to find alternative of sustainable systems of extracting of NWFPs without affecting renewable resources stock; which will be able to provide employment and income to rural poor and prevent the destruction of forest based resources.

A good number of NWFPs are available in Bangladesh, but all of them are not equal commercially importance. A few of them namely Bamboo, Rattan(cane), Patipata, Medicinal plants, insects products (honey, silk and lac) and others (essential oils from seeds, gums, resins, tans, fibers and flosses, rubber and latex) may play a vital role in pivoting the rural economy of Bangladesh.

In Bangladesh there are more than 5000 species of flora (Miah 1999). Of them 546 species are found to have medicinal values (Yousuf, et.al 1994). Medicinal plants can play a vital role in employment opportunities in Bangladesh through collection of medicinal plants for crude drugs, processing and manufacturing, trading, both marketing in the local and international market. There are about more than 500 different types of Ayurvedic and Unani preparation in the market and 200-3000 medicinal plants of high therapeutic value are used in the preparations (Alam, 2001) which provide employment opportunities for rural poor sector and uplift the socio-economic condition of the poor sector as well as the whole economy. Since plants are the basis of modern drugs, there are many pharmaceutical industries based on crude drugs in the country. The annual consumptions of crude drugs in Bangladesh used by relevant industries is more than 1000

tons per annum (Alam, 2001). Of which 66% is collected locally and rest are imported from foreign countries (Such as India, Srilanka, China, Malaysia, Indonesia etc.)

By way of background, it is useful to give orders of magnitude on sector size and on nature of small scale enterprises generally. In terms of employment, total small scale enterprises provide principal employment for between 20 and 30 percent of the total rural labor force in many countries for which recent information was collected. For Jamaica and Sierra Leone FAO has estimated employment in rural and urban forest based small scale enterprises to be two and nine times higher than in larger industries (FAO, 1985). The reported proportion of total rural cash income derived from SSEs ranged from 22 to 70%. The poor and landless seem to depend on non farm SSE's more than normal, with some of them earning two-thirds or more of their income from non farm sources (FAO, 1984). In terms of contribution to the national economy, non farm SSE's accounted for between 2.5% of GDP (Honduras, 1979/81) and 7% (Bangladesh 1981) which was equivalent to 22% and 45% respectively of manufacturing sector GDP.

Forest Based Small Scale Rural Enterprises (hereafter, FBSSREs) in Bangladesh are the second largest cottage industry sector. In 1982 there were 42169 units of FBSSREs in the country (BSCIC, 1983).

3.1 Potential Sectors and Sub-Sectors for Intervention/Enterprises Development in or Adjacent to Protected Areas

Potential enterprise depends on several factors likely: availability of raw materials, technology, investment capital, labor intensity and proven product market. The followings are the potential enterprises for sector development:

Potential enterprises and project areas

| SI # | | Lawachara National Park | Rema Kelanga Wildlife Sanctuary | Satchuri Reserve Forest | Teknaf Game Reserve | Chunuti Wild life Sanctuary |
|------|------------------------|---|---|---|--|--|
| 1 | Priority Sector | Handicrafts (cane, bamboo and patipata based) | Handicrafts (cane, bamboo and patipata based) | Handicrafts (cane, bamboo and patipata based) | | |
| 2 | | Bee-keeping | Bee-keeping | Bee-keeping | | |
| 3 | | Hand woven and hand spoon natural dyed cloth | Hand woven and hand spoon natural dyed cloth | Hand woven and hand spoon natural dyed cloth | Hand woven and hand spoon natural dyed cloth | Hand woven and hand spoon natural dyed cloth |
| 4 | | Nursery | Nursery | Nursery | Nursery | Nursery |

| SI # | | Lawachara National Park | Rema Kelanga Wildlife Sanctuary | Satchuri Reserve Forest | Teknaf Game Reserve | Chunuti Wild life Sanctuary |
|------|-------------------------|--|--|--|--|--|
| 5 | | | Food processing (pickle, jam, jelly) | Food processing (pickle, jam, jelly) | | |
| 6 | | | | | Coconut oil and coir production | |
| 7 | Secondary Sector | Hand made herb tea cultivation and processing (Basak, Camomile, Shefali) | Hand made herb tea cultivation and processing (Basak, Camomile, Shefali) | Hand made herb tea cultivation and processing (Basak, Camomile, Shefali) | Hand made herb tea cultivation and processing (Basak, Camomile, Shefali) | Hand made herb tea cultivation and processing (Basak, Camomile, Shefali) |
| 8 | | Medicinal plant cultivation, collection and processing | Medicinal plant cultivation, collection and processing | Medicinal plant cultivation, collection and processing | Medicinal plant cultivation, collection and processing | Medicinal plant cultivation, collection and processing |
| 9 | | Agar plantation | Agar plantation | Agar plantation | | |
| 10 | | Essential oil cultivation & processing | Essential oil cultivation & processing | Essential oil cultivation & processing | Essential oil cultivation & processing | Essential oil cultivation & processing |
| 11 | | Orchid cultivation and Floriculture | | | | |
| 12 | | Silk culture | Silk culture | Silk culture | | |
| 13 | | Ecotourism | Ecotourism | | Ecotourism | |
| 14 | | | Nature based healing home development | | Nature based healing home development | |

4. PARTICIPATION

Local participation should be encouraged for sustainable management of NWFPs in the protected forest areas in following several reasons:

- To recognize the full extent of local demands on the forest resources
- To fully consider the local knowledge of the resource that has developed over time
- To engage nearby communities as stakeholders in managing resources, ensuring their commitment to long-term management goals
- To engage their energies of local people in their own economic change, which can include decisions on social and cultural priorities that outsiders do not realize

4.1 Resource Assessment & Development

A first step in developing any viable forest enterprise understands the capacity of the forest resource. It is impossible to manage the resource wisely or profitably without knowing about its natural growth and production, and the human environment that affects it. The existing resources of our protected forest areas are almost exhausted. So resource should be created through rationale extraction, cultivation and manipulation. Many people assume that harvests of NWFPs have less impact on a forest than logging. Without a sound knowledge of the resources and regular monitoring, harvests of certain non-wood resources can have a disastrous impact that is not noticed though already it is late for the remedy.

For example, over harvesting of fruits or seeds of a tree species can drastically reduce regeneration to the point of local extinction.

4.2 Access to the Resources

Our reserve forests are accessible to all, have no recognized users and are not well controlled. State or public property often requires users to negotiate rights or obtain authorization for secure rights or access.

4.3 Advance Resource Planning

Planning helps to make inventories, which are expensive and labor-intensive. The following questions should be considered for resource planning.

- Where does the desired species occur in greatest abundance? Its distribution should be mapped as precisely as possible;
- Is the species limited to a certain forest type, or is it fairly evenly distributed throughout the area?
- Is the desired material produced by only one species or by several species? What is the exact identity of these plants?
- Has a product already been harvested from the area? How long and by whom?

Heavily exploited areas and areas of selective planting or other management by local people should be noted on the map;

- Has the area ever been inventoried, perhaps for another resource (timber, minerals, wildlife)? If so for what kind of resource? Try to obtain copies of any information available.

4.4 Resource Inventory

Both physical and human resources should be inventoried in this stage, a professional inventory specialist or team should conduct the inventory. The inventory should provide:

- A reliable estimate of the resource density, number of adult trees, latex production
- The current size –class distribution of adults and heights
- A preliminary assessment of species regeneration & other considerations
- Socio-economic information on the nearby communities and the costs and benefits of managing resources
- Existing and future demand for preferred species, site conditions affecting harvesting costs, size and types of cottage industries location of processing units and transport facilities and scale and potential uses.
- Operational information or factors that will affect the specific operations such as protection, harvesting nursery establishment and other logistics;
- Institutional information training and research support to communities

4.5 Species Selection

With a good knowledge of the forest environment and the socio-economic environment, a community or enterprise must rationally decide on which species to harvest and utilize. This decision should explore social and cultural preferences and economic and ecological factors.

Ecological criteria should reflect the species' biological potential for being managed on a sustained-yield basis. For tree species selection the following factors should be taken into consideration:

- Life cycle characteristics
- Type of non-wood resource harvested
- Density in different forest types
- Size class distribution

4.6 Sustainable Harvest Levels

Sustainability of resources the entrepreneur should determine what harvest level a resource can sustain without destruction, it is important to know the quantity of non-wood material that the species produce naturally.

4.7 Exploring Commercial Options

Option is the matter of choice. We should outline an approach for planning an enterprise, reducing the risks involved and improving entrepreneurial skills. Finally it looks at credit needs and options for adding value locally, often through local processing, for greater rural income.

4.8 Characteristics of Successful Small Enterprises

To develop successful forest based small scale enterprises we should share the following characteristics:

- Able entrepreneur-a resourceful and capable manager can overcome many obstacle
- Marketable product-the entrepreneur must continually assess the future of the products market: will price trends for the product (and its substitutes) cause its market to grow or decline? What new products threaten to replace it?
- Reliable supply of materials- processors and traders need a predictable and stable supply for maintaining markets. Forest degradation can threaten an enterprises supply of materials and its credibility with traders and consumers
- Favorable infrastructures and access to credit-access to transportation, utilities and credit for capital investment heavily influence enterprises chances for success. Small enterprises can overcome the conditions that favor larger operations by grouping together.

5. STRATEGY FOR SUCCESSFUL ENTERPRISE

We are to:

- Start with products for which a local market already exists. Entering an existing market allows producers to start repaying costs immediately, but creating markets for new products takes time;
- Improve harvesting techniques and reduce post-harvest losses
- Increase the producers' competitiveness by (1) reducing costs of production, (2) creating a niche market, or (3) improving management of the resource by enrichment planting for better yields and easier harvesting.
- Adopt a simple strategy. Complex production/marketing strategies permit more unforeseen difficulties.
- Start with one product and gradually diversify
- Diversify the markets for each products
- Add value locally, usually through processing
- Continually study the available technology for potential improvements:
- Know the quality standards required by buyers, and the standard of the enterprises product.
- Organize with other producers for collective strength
- Demonstrate the ecological viability of the enterprise

5.1 Planning for Enterprise Development

Planning is a major part of modern approaches to management. Planning builds on the assumption that anticipating a range of possible events enables the manager to respond to events as they occur. People starting NWFPs enterprise (particularly a group enterprise) should clearly identify their short and long-term goals for the enterprise, and then review what experience and resources (cash, credit, equipment, land) each person brings to the enterprise.

The followings considerations are to be considered during planning:

- Raw material supply
- Legal control/access to the natural resources
- Markets for the forest products
- Appropriate processing technology
- Good management
- Financial managements

5.2 Risk Management

An enterprise can minimize risk by starting with small, pilot-scale commercialization, based on known markets and their preferences for the specific product. Pilot scale production and sale allow the enterprise to get a more accurate picture of the market, make adjustments while costs are relatively low, and refine its marketing plan. The level of risk varies with the nature of the enterprise and the type of markets. In general distant markets involve greater risks to the producer than nearby markets. To reduce the risk of producing an export item, an enterprise could select a product that the source country currently imports. This strategy can divide the risk between two markets assuming that the export and national markets have comparable preferences and standard. Considering these factors we may give priority to herbal medicine, herb tea and natural dye processing.

5.3 Skills Development

Both good management and entrepreneurial skills are as important as good planning in a commercial venture. Plans are useful as reference points for clarifying goals. Plan should be made to response to changing conditions and opportunities.

5.4 Entrepreneurial Training for Producers

It needs special training to be an entrepreneur. Some development agencies and NGOs offer training in deal-making and other entrepreneurial skills for NWFP enterprises. In Bangladesh BSCIC can play important role for entrepreneurial skills development. The international NGO Conservation International has a group experienced business professionals who help local enterprises get established and make market linkages for forest-based products.

5.5 Marketing Training for Producers, Extension Workers and Policy-Makers

Among enterprise skills, marketing is often a serious blind spot. This is because (1) more than other activities, marketing requires information from outside the producer's domain,(2) in extension, marketing has received less emphasis than production, and (3) many rural producers have little experience in market economy. To address this, producers and extension workers should receive training in marketing skills.

5.6 Credit Support

Credit for rural enterprises can be made more flexible and development agencies supplying credit for new enterprises should share the financial risk as partners. Credit institutions should also offer greater support to women's groups which frequently lack access to credit.

5.7 Processing Options

We have full range of processing options, from little or no processing (fresh foods, spices), to relatively simple technologies (preserved foods and handicrafts), to

intermediate processing (traditional medicines, vegetables oil, dyes, waxes and tannins) to more complex, expensive process (such as for essential oils, gums) that usually requires centralized facilities (De Silva and Atal, 1995). To choose the right processing technology, an entrepreneur should acquired information on (1) the characteristics of the resource and raw material, (2) potential markets and (3) enterprises capacity and technology.

5.8 Steps in Processing

The steps involved in developing a processing operation are:

- Select non-wood products for processing based on available resources, facilities and marketability.
- Start small scale pilot production to test the feasibility of the process, product quality and market preferences.
- Determine the cultivation, harvesting and/or post-harvest treatments best suited for the enterprise and to ensure sustainable supply.
- Make or purchase equipment and arrange for the space, utilities and human resources for production.
- Arrange for training staff in processing methods and quality control.
- Start processing operations with technical assistance as needed.

6. PROCESSING TECHNOLOGY AND FIELD OF INTERVENTIONS

The range of processes by which enterprises can convert non-wood forest resources into market items, proceeding from less complex technologies to more sophisticated, capital-intensive process. Evaluating options for processing requires up to date information on the natural resources, markets, processing technologies, and trade practices and regulations. For example, neem (*Azadirachta indica*) can be managed for leaves and seeds to produce many marketable products from soap to bio-insecticide; cultural preferences and the biological resource might dictate an optimal product combination.

For creating alternative income generating activities plantation is the manifold programs in the protected areas. Forest Land should be allocated to the groups by raising plantation through an agreement for benefit sharing process. Plantation is the crucial need at this moment as there are no trees left in the protected forest areas. Plantation should be raised with advent seedling rising in the nursery. Plantation should be established through multistoried cropping systems. Medicinal plants and horticultural plants will be incorporated in this planting mixing pattern for quick return. Generally four strata will be creating in this planting mixing pattern. For cultural management, organic fertilizer and bio-pesticides will use for plantation management.

Top strata: large trees (timber, medicinal and fruit trees)

Second strata: comparatively smaller trees (timber, fruits and medicinal plants)

Third strata: Small trees and herbs

Fourth strata: Creeper and agricultural crops and shrubs

Suitable species: Garjan, jam, chapalish, gamar, Kanthal, peyara, litchi, lemon, bahera, haritaki, Arjun, Amloki, bel, neem, shimul, ulatkombal, tokma, shotomuli, pipul, sharpagandha, pudina, ekangi, ghretokumari, bashok, aswhagandha, ginger, turmeric, lemon grass, agar, tulsi and bhuikumra, papaya, cconut, golmorich, daruchini, tejpata, champa, pineapple, cane, bamboo and patipata.

The priority and secondary sectors of potential for the protected areas are: *(Summary information of the selected sector at a glance see annexure 3, page ..)*

6.1 Handicrafts

The cane handicrafts; local processing can improve producers return from these products. Rural households work in rattan and rattan handicrafts because these enterprises use relatively simple technology, rely on raw materials that have traditionally been abundant, require little capital and provide jobs for skilled and unskilled labor (Hadi, 1991). Rattan collectors pull the rattan from the forest or homesteads, then use machetes to cut it and remove the thorny sheath. Next they fold it in bundles of 4-6 m lengths, pack the bundles in unit of kg and air dries them, sometimes removing the stems outer coating. Each generation of forest dwellers has passed on the knowledge of how to collect and cultivate rattan. The collector sells his/her produce or products to middle men or traders, who take it a first stage processing centre. The processors wash and sand the rattan and then air dry in the sun for 1-2 weeks. It is then graded by size and treated (either by smoking or

boiling) to improve its color and protect against pest damage. Wholesalers and retailers then buy the stored rattan. At a further processing stage, cottage industries work the rattan into handicrafts and furniture.

6.1.1 Cane based enterprises

Canes find a variety of uses due to their remarkable pliability, strength and the long lengths in which they are usually obtained. They are extensively used in industry –thick canes for making furniture frames, walking sticks, polo-sticks and umbrella handles, and thinner ones for making baskets. Canes are also split and the strips from the outside with the smooth outer surface are largely used for making seats and backs of chairs and sofas, while the lusterless strips from inside of the canes serve for making various articles such as furniture, baskets, sieves, mats etc.

6.1.2 Market potential, competitors and threats

Market Potential: Very common house hold item for almost all Bangladeshi families. High market potential to overseas because it is used 100% natural raw material. Simple technology, rely on raw materials that have traditionally been abundant, require little capital and create jobs for skilled and unskilled labor.

Threat: there is not any threat for the local market except for the emerging trend of the plastic product industries.

Competitor: Existing local micro entrepreneurs. Some private companies i.e. Conexpo, Dhaka Handicrafts, Tauras etc. and plastic product industries.

6.1.3 Linkage

- Group formation to work in a cluster or association approach.
- Capacity build up and technology transfer to establish a handicraft (cane based) - unit.
- Train people to prepare skilled manpower for operating and managing the business.
- Forward linkage with the existing handicrafts exporters i.e. Conexpo, Dhaka Handicrafts, Tauras etc.
- Market linkage with the wholesalers and all the established retail shops i.e. Arong, Agora, Nandan, Meena Bazar etc.
- Facilitate participation in different fair for promotion.

6.1.4 Employment potential:

- Cane plantation
- Collection of cane and processing.
- Producing different handicrafts - as tying of bamboo products, umbrella handles, walking stick, furniture frame, baskets, seats and backs of chair and sofa, mats, wicker work, sporting goods, packing, rough cordage, matting and variety of other articles, etc.

- Wholesale and retail marketing.

6.1.5 Bamboo based small-scale enterprise

The strength of culms, their straightness, smoothness and lightness, combined with hardness, their hollowness, the facility with which they can be split and the range in size makes bamboos suitable for variety of purposes, for which other materials would require much labor and preparation. Bamboo is used extensively in place of timber and frequently houses are made entirely of bamboo and its products. Numerous articles of every day use are made of it: e.g. tools, beds, sticks, tent-poles, brushes, pipes, fans, umbrellas handles, toys, musical instruments, wastage basket, paper tray, bookshelf, pen stand etc. Bamboo is the chief raw material for making baskets and wicker-work, which is a cottage industry throughout Bangladesh. Selected sticks of thin varieties of bamboos are converted into umbrella handles. Containers, drinking vessels, and fishing rods and fishing traps are also made from bamboos.

Similarly bamboo is the proven raw materials for handicrafts, furniture and other household use. Various species of bamboo can be used in cottage industries sources from village or forests.

6.1.6 Market potential, competitors and threats

Market Potential: Common house hold item for almost all Bangladeshi families. As it is a nature friendly product, high market potential to local and international market. Simple technology, rely on raw materials that have traditionally been abundant, require little capital and create jobs for skilled and unskilled labor.

Threat: there is not any threat for the local market except for the emerging trend of the plastic product industries.

Competitor: Existing local micro entrepreneurs. Some private companies i.e. Conexpo, Dhaka Handicrafts, Tauras etc. and plastic product industries.

6.1.7 Linkage

- Group formation to work in a cluster or association approach.
- Capacity build up and technology transfer to establish a handicraft (bamboo based) - unit.
- Train people to prepare skilled manpower for operating and managing the business.
- Forward linkage with the existing handicrafts exporters i.e. Conexpo, Dhaka Handicrafts, Tauras etc.
- Market linkage with the wholesalers and all the established retail shops i.e. Arong, Agora, Nandan, Meena Bazar etc.
- Facilitate participation in different fair for promotion.

The long-term vision is to create an effective supply chain which can deliver raw materials, working through an upgrade version of the existing supply chain, whereby a

network will be developed and linked to the processors through a more professional bepari network.

6.1.8 Employment potential:

- Bamboo plantation, nursery practices and their management.
- Collection of bamboos and processing.
- Producing different bamboo product and use it to make houses, bridges, walking stick, basket making, mats, water and milk vessels (chungu), furniture, agricultural implements, fencing, pipes, fishing rods, tent poles, trays for silk worms, chicks for door and windows, pipes, musical instruments, containers for storing grain, stakes for plantation, pan trays, floats fans, boat roofs etc.
- Wholesale and retail marketing.

6.1.9 Patipata

Patipata or mortapati (*Olinogynae dichotoma*) grows in any low-lying and submerged area both in forest and village groves. It is cultivated on commercial basis in large Sylhet, Noakhali, Mymensingh, Patuakhali and Tangail but widely cultivated in Feni and Tangail. Its demand and scope are more both in home and abroad. It is widely used as raw materials for making sital pati and mats in Bangladesh. There are different types of sital pati (mat), namely khalgor, asmantara, jamintara, backpar and tajmahal etc. as the name of their designs. But designs are not always seen in sital pati. In commercial production unit, sewing is done on the basis of the purchaser's choice; elite peoples favor sital pati of mihipati without any design. It can be one of the potential sectors in Rema-Kalenga Wildlife Sanctuary.

6.1.10 Market potential, competitors and threats

Market Potential: Common house hold item for almost all Bangladeshi families. As it is a nature friendly product, high market potential to local and international market. Simple technology, rely on raw materials that have traditionally been abundant, require little capital and create jobs for skilled and unskilled labor.

Threat: There is hardly any threat for the local market.

Competitor: Existing local micro entrepreneurs.

6.1.11 Linkage

- Group formation to work in a cluster or association approach.
- Capacities build up to establish a handicraft (patipata based) - sector.
- Train people to prepare skilled manpower for operating and managing the business.
- Forward linkage with the existing handicrafts exporters i.e. Conexpo, Dhaka Handicrafts, Tauras etc.
- Market linkage with the wholesalers and the entire established retail shops i.e. Arong, Agura, Nandan, Meena Bazar etc.

- Facilitate participation in different fair for promotion.

6.1.12 Employment potential

- Patipata plantation, collection and processing.
- Producing sital pati, table mats, jaynamaz (prayer mat), wall cover, hand bag, hanging bag, money bag, cap etc. including voluntary organization, advertising inventory and research etc.
- Wholesale and retail marketing.

6.2 Bee Keeping and Honey Processing

Bee-keeping is a steady income generating industry and is ideally suited to the rural population of the country. It can be full-time occupation or a part-time pursuit, allowing the people to continue with their traditional activities. Like sericulture, the whole family can get involved and earn a handsome additional income. The villagers need not have their own extensive land to engage in bee-keeping. Fifty colonies occupy just one-fifth of an acre. Bee-keeping is possible in the protected forest areas. There are three type of bees found in Bangladesh. *Apis cerena*, *Apis mellifera* and *Apis dorsata* are common in Bangladesh.

6.2.1 Bee flora

Honey bees collect nectar and pollen from the flowers of the plants. Some plant species are known to constitute bee flora in Bangladesh. The better known bee flora can be as under: *Syzygium cumini*; *Zizyphus mauritiana*, *Citrus sp*; *Psidium guajava*; *vitex negundo*; *Albizia sp*; *Leucaena leucocephala*; *Bombax ceiba*; *Azadirachta indica*; *Terminalia arjuna*; *Bauhinia variegata*; *Swietenia macrophylla*; and many others with agricultural crops.

6.2.2 Production of honey

Trees play an important role in providing nectar and pollen honeybees. “Planting of a suitable nectar yielding tree may be effective as a hundred or thousand smaller nectar plants”. Besides being a source of nectar and pollen, trees provide shade and shelter for bee colonies in addition to the wood production for which they are primarily grown.

6.2.3 Market potential, competitors and threats

Market Potential: Demand is very high and increasing. Honey is an import substitute. It does have local as well as international market. At present large volume of honey is being imported from India, Australia & USA for domestic use and for medicinal industry. Supply demand shows that the product is potential; at present 400 MT honey is being produced whereas country demand is 1000 MT. Sonalu, jarul, hargaza, chatim, jam, ronjon these species and flowering variation is highly prospective for bee-keeping is available in the protected areas.

Threat – Deforestation, shortage of favorable species and indiscriminate use of chemical pesticides are the threat for bee-keeping and honey collection.

Competitor – Various types of imported consumer pack honey like Dabur honey (India) marketed by ACI, Australian honey etc. and insignificant local production.

6.2.4 Linkage

- Group formation to work in a cluster or association approach.
- Technology transfer to establish a honey - processing unit.
- Train people to prepare skilled manpower for operating and managing the business.
- Forward linkages with the herbal medicine processing industries and food processing industries likely AP, Hamdard, Sadhona etc.
- Forward linkage with the food processing industries like PRAN, Ahmed Foods, also with different agency like Hortex Foundation, ATDP etc.
- Market linkage with the wholesalers and all the established retail shops i.e. Agora, Nandan, Meena Bazar etc.

6.2.5 Employment potential

- Bee rearing and bee flora plantations;
- Honey collecting, honey and wax processing;
- Packaging and storage; and
- Wholesale and retail marketing.

6.3 Hand Woven and Hand Spoon Natural Dyed Cloth

As with many processed NWFPs, synthetic substitute have restricted the use of natural dyes and colorants. Still, markets for certain natural food colorants have increased (De Silva and Atal op. cit.). The sinduri plant (*Bixa orellana*) produces seeds from which a reddish-orange food colorant, bixin is derived. The international market for sinduri has fluctuated widely in recent years but consumption in Japan, for example, has increased steadily. The sinduri plant is possible to cultivate in the protected forest areas as because it is found in homestead areas of nearby Chunuti Wildlife Sanctuary. In addition *Terminalia chebula*, *T. belerica* and *Eemblica officinalis* is used for the preparing of natural dyes. Cotton is the main raw materials for hand spoon hand woven cloth. It could be grown in plain crop fields in the forest. Especially in Rema Kelanga where monkeys are regularly destroy paddy and other vegetable crops.

6.3.1 Market potential, competitors and threats

Market Potential: This is a high value product. Demand is very high among rich nation. Increase with raising consciousness about health and nature.

Threat: None

Competition: Chemically dyed industrial products. Intra sector competition – insignificant.

6.3.2 Linkage

- Group formation to work in a cluster or association approach.
- Capacity build up and technology transfer to establish a hand woven and hand spoon natural dye production unit.
- Train people to prepare skilled manpower for operating and managing the business.
- Forward linkage with the existing natural dyes cloth exporters e.g. Banaj Barnali, Aronya Crafts Ltd. Folk Bangladesh etc.
- Market linkage with the wholesalers and the entire established retail shops at Dhaka.

This project will be popularizing through creating awareness among the mass people in the national market as well as in the international market.

6.3.3 Employment potential

- Cotton plantation and nursery practices and management.
- Collections, processing and conversion into thread.
- Hand weaving.
- Producing clothe by the cultivated cotton and natural dyeing.
- Wholesale and retail marketing.

6.4 Nursery

It is assumed that the community based nursery will be one of the enterprises that can help forest conservation program through income generating activities by involving the forest neighboring poor people. In this scheme, medicinal plants, ornamental plants, aromatic plants and spices will be getting more emphasis.

Nursery may be one of the potential enterprises in the study areas as people are very much interested to buy seedlings of medicinal plants and fruits, but which are not available in the locality. Nursery business enabling in create strong economic platform within a very short time. Group nursery should be raised through the participation of local stakeholders. Selection of species should be done carefully. Considering demand, market size, economic return and sustainability; medicinal plants of important species have got importance followed by fruits, spices, aromatic and then timber tree species. Local market and forest department may be the consumer of the seedlings. Within a very short time it will back the investments in terms of return.

6.4.1 Market potential, competitors and threats

Market Potential: Very high particularly for high value medicinal plants. Plants like neem have got export market. Easily managed and requires small capital to establish. Government is promoting to huge plantation but the existing supply of sapling is not sufficient to meet the growing demand. Nursery would be the source (sub sector) of the

integrated plantation through participatory approach and it will assist as both backward and forward linkages.

Threat: None

Competition: Local nursery house.

6.4.2 Linkage

- Group formation to work in a cluster or association approach.
- Capacities build up to establish a nursery house.
- Train people to prepare skilled manpower for operating and managing the business.
- Market linkage with the wholesalers and the entire established retail nursery at Dhaka.

6.4.3 Employment potential

- Soil collection, seed collection to organize a nursery.
- Scope of opportunity to women employment.
- Family labor involvement to the nursery management.
- Wholesale and retail marketing.

6.5 Food Processing

Forest fruits, nuts, tubers, tender shoots and insects provide many foods which are required little or no processing for local sale. But relatively simple techniques for drying, preserving, shelling, storing etc., producers can increase the value of these items reduce seasonal fluctuations in supply. The community should decide to produce needed cash from the forest rather than convert it to agriculture. The community can select wild forest fruits to develop three products: pickle, jam and jelly made from amloki, jalpai, amra, pineapple and ginger. The processing operation requires much planning, capital, storage space and care full attention to quality control and product standardization. Recipe development varied from year to year as variable weather conditions cause difference in acid, sugar and pectin contents of the fruits. The enterprise has enhanced the forests local value, encouraged enrichment planting and provided local employment for skilled labor (Rice, 1994).

6.5.1 Market potential, competitors and threats

Market Potential: Market is increasing very high and expanding with health consciousness in national and overseas market. Raw materials are locally available, easy access of the technology, easily managed and cost effective.

Threat: Quality product.

Competition: Both local and imported items from Bhutan, Malaysia and Indonesia etc. are available. Among local brands PRAN is the market leader.

6.5.2 Linkage

- Group formation to work in a cluster or association approach.
- Capacity build up and technology transfer to establish a handmade food-processing unit.
- Train people to prepare skilled manpower for operating and manage the business.
- Forward linkage with the food processing companies like PRAN, Ahmed Foods, also with different agency like Hortex Foundation, BISIC showroom, ATDP etc.
- Market linkage with the wholesalers and all the established retail shops i.e. Agora, Nandan, Meena Bazar etc.

This would aim to create demand of wild forest fruits and horticultural crops where an ongoing dialogue between the industry and rural producer/suppliers can continue so that processors changing requirements for fruits plants are matched by Bangladeshi supply. As for example, PRAN and PARTEX beverage group can play an important role in this sector.

6.5.3 Employment Potential

- Fruits collection and storage.
- Primary processing and packing.
- Produce variety of pickles, jam, jelly and other processed food stuffs.
- Wholesale and retail marketing.

6.6 Coconut Oil and Coir Production

Coconut tree is the most extensively grown nut in the world, the most important palm. It provides people's basic needs such as food, drink, shelter, fuel, furniture, medicine, decorative materials and much more. It is also known as the "heavenly tree", "tree of life", "tree of abundance" and "nature's supermarket." Coconut is one of the most familiar fruit in Bangladesh. It is not only used as an edible fruit but it has other uses. The Fruit has a unique scale that is used for making a coarse kind of fabric. The cord derived from coconut is called Coir. The naming the fabric is according to the place of origin where it is called 'kayur' (rope) and 'kayaru' (twisted).

The articles made of coir are very hard, strong and durable. It was used as the raw material for the ropes made by the people. But in course of time, man became much intelligent and made some sophisticated structures and designing out of the refuse of the fruit. When the case of coconut is removed from the fruit structure a kind of fiber can be derived from it, which is used for weaving many useful and decorative items as well. The ornaments made of coir are no wonder now. It is used for making many things like thick and stern rope, carpets, cushions, mattress, wall hangings and other decorative items like dolls and images. There is a procedure to obtain the quality husk or coir to be employed in domestic use. The hard coat of coconut is kept submerged in water for some weeks to make soft and to be rubberized. Then the immersed residue is retrieved and dehydrated till it basks properly. Then the material is beaten by wooden hammer or the kind to seclude the smooth fiber from the rough husk. After which it is woven in to many

different outputs. Coir products are very cheap and reliable hence it is popular and taken its own place in the world market. Some products like doormats, floor mats, drudgeries, durries, bags, and idols are most wanted things by the people.

Coir husk of the coconut fruit contains 20% to 30% fiber of varying length. After grinding the husk, the long fibers are removed and used for various industrial purposes, such as rope and mat making. The remaining material, composed of short and medium-length fibers as well as pith tissue, is commonly referred to as waste-grade coir. The waste grade coir may be screened to remove part or all of the fiber, and the remaining product is referred to as coir pith.

6.6.1 Market potential, competitors and threats

Market Potential: It is very high used as common product. High potential household items used in all Bangladeshi families and also have demand in the export market. As it is a nature friendly product, high market potential to local and international market. Simple technology cost effective and labor intensive. There are huge coconut productions in the southern part of the country. So raw materials are easily available.

Threat: None.

Competition: For the coconut oil competitors are the local companies like Lalbag Chemical and Perfumery Works, Kohinoor Chemicals Works and imported oil from India and other countries. For coir product there is no significant competitor.

6.6.2 Linkage

- Group formation to work in a cluster or association approach.
- Capacity build up and technology transfer to establish a handmade coconut oil and coir-processing unit.
- Train people to prepare skilled manpower for operating and manage the business.
- Forward linkage with the coconut oil producing companies as a supplier of the raw materials.
- Forward linkage with the existing coir product exporters.
- Market linkage with the wholesalers and all the established retail shops i.e. Arong, Karupannaya, Probortona etc.

The processing sector will take a more proactive approach to stimulating local supply rather than being dependent on imported raw materials.

6.6.3 Employment potential

- Coconut collection and processing.
- Formation of coir, fiber extraction
- Formation of yarn and wet processing.
- Produce coir mat, coir geo textile, non-woven items, rubberized coir sheets for cushioning, coir ropes, coir garden products etc.

- Wholesale and retail marketing.

6.7 Handmade Herb Tea

Herb tea is made from varieties of plants take Bashak, Sheuli, Camomile, Chandramollika etc. It is becoming popular day by day due to its synergic effects (including medicinal properties). Herb tea is creating global market with prospective features. Considering scope of cultivation, processing and marketing opportunity, there is an ample scope of this project in the study areas. The technology is very simple including nursery raising, plantation, establishment, managing and processing. No complex technology requirement, regarding manufacturing or processing is required. Simple crusher, drier is required to process the products. The projected area is suitable for herb cultivation for herb tea processing and the plants will become in production stage after one year of plantation. The plantation will become labor intensive and field of forest villagers' income generation.

6.7.1 Market potential, competitors and threats

Market Potential: Very high and expanding with health consciousness in western world. It can be leading sector for global market development. Herb tea is taking market of coffee and regular tea due to its medicinal prospective.

Threat: none

Competition: No local competition.

6.7.2 Linkage

- Herb tea plantation through community participatory approach
- Capacity build up and technology transfer to establish a handmade herb tea processing unit
- Train people to prepare skilled manpower for operating and managing the business
- Forward linkages to the existing tea manufacturers
- It is the food supplement of medicine, so it can be marketed through creating network with the producer's, markets and consumers at national level to global market.
- Facilitate participation in different fair for promotion

6.7.3 Employment potential

- Nursery raising and plantation
- Plucking, processing, and packaging,
- Marketing to local and international market.

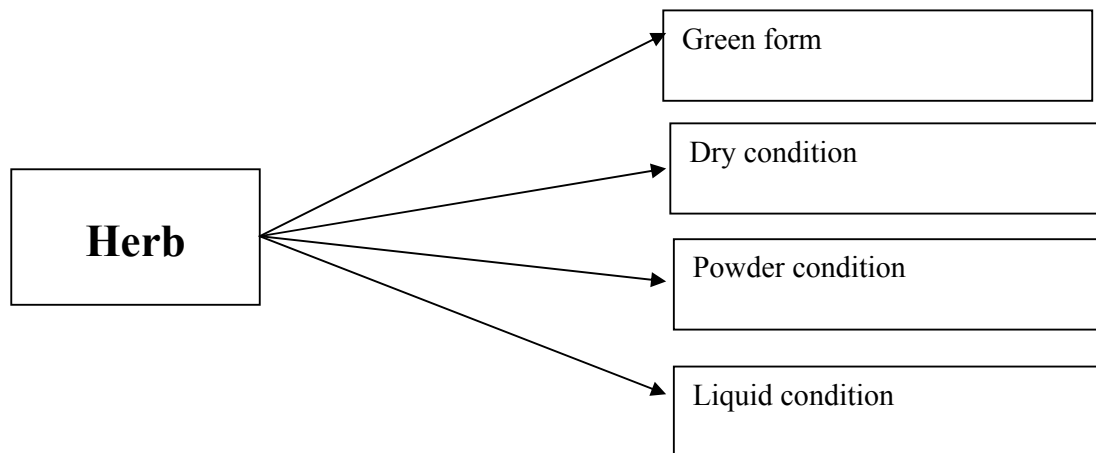
6.8 Medicinal Plant Cultivation, Collection and Processing

More than 80% of the world's people depend on traditional medicinal plants for their health care. Furthermore, about 20% of the drugs in modern allopathic medicine are derived from plant sources. Most plants used in traditional medicinal systems are still collected from wild sources. In some cases, this industry has caused local extinction of species. Where communities take steps to improve and control harvesting practices, however, medicinal plants can provide sustainable employment and improved community health traditional medicines for ingestion are usually prepared using the simple methods of (De Silva and Atal, op.cit.):

- Extraction in hot or cold water process.
- Crushing an item to express the juice.
- Powdering dried materials.
- Formulating powders into pastes using water, oil or honey.
- Fermenting.

In preparing dosage forms, it is important to control quality and document traditional healers' standards. Plants with medicinal properties can also provide raw materials for downstream processing operations in the pharmaceutical industry. *Rawolfia serpentine*, *aloevera indica* are of examples.

The four major forms of herb transformation into medicine are:



6.8.1 Market potential, competitors and threats

Market Potential: Multi billion US\$ global market. Market growth rate is more than 15%.

Threat: Illicit cutting, Limited local market with poor quality & standard.

Competitor: Hamdard & other traditional products in local market. India, China & Korea in the international markets.

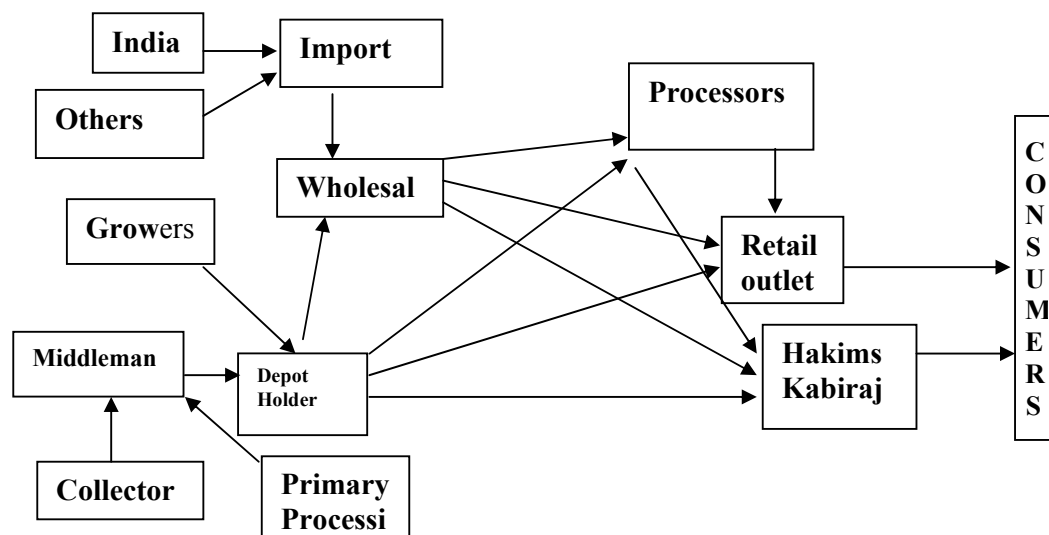
6.8.2 Linkage

- Plantation through community participatory approach.
- Awareness build up to the local community on the medicinal plant and herb plantation.
- Capacities build up and technology transfer to establish handmade and simple equipment based medicinal plant processing unit.
- Train people to prepare skilled manpower for operating and managing the business.
- Forward and market linkage with the existing herbal medicinal companies i.e. AP, Sadhona, Shakti, Humdard, Jayson, ACME etc.
- The program would aim to create a forum where an ongoing dialogue between the industry and rural producer/suppliers can continue so that processors changing requirements for medicinal plants are matched by Bangladeshi supply. The preparatory steps and techniques will have been tested under the linkage and the bepari (middleman) training components discussed under the short term interventions.
- The long-term vision is to create an effective supply chain which can deliver raw materials, working through an upgrade version of the existing supply chain, whereby a network of specialist medicinal plant producers will be developed and linked to the processors through a more professional and modern inter-district bepari network. The processing sector will take a more proactive approach to stimulating local supply rather than being dependent on imported raw materials.
- Facilitate participation in different fair for promotion

Medicinal plant supply chain

Figure 1 set out a diagram of the distribution chain showing how imported and local raw medicinal herbs are channeled through the various sectors of the herbal medicine industry.

Figure 1: Herbal Medicines Supply Chain



6.8.3 Employment potential

- Nursery practices, plantation,
- Collection of raw herbs, drying, preservation
- Processing and conversion into crude drugs, medicines etc.
- Wholesale and retail marketing.
- International market linkage.

6.9 Agar Plantation

Agar perfume or agar oil is obtained from resinous portion of the wood of *Aquilaria agallocha*. The resinous infiltration is due to fungus attack. Only mature trees of about 50-60 years old are infested with fungus. These trees are exploited. The average yield of resin is 3-4kgs from single tree (Indian forest utilization, 1972). Approximately more than 6000 agar trees in Sylhet and many others found in Dhaka, Mymensing and homestead forests. Villagers collect it from villages or forests by permit systems or auction. Agar oil is manufactured in the cottage industries in Patharia, Kanaighat, Sylhet. Attar and Agarbati are available in the market as artificial scent producing from this oil and providing employment to the unemployed rural people.

6.9.1 Market potential, competitors and threats

Market Potential: Export market

Threat: Illicit cutting, extraction and processing technology.

Competitor: None

6.9.2 Linkage

- In first phase Agar plantation through community participatory approach.
- After maturity of the plant - in second phase establish a processing unit.

6.9.3 Employment potential

- Nursery practices and plantation.

6.10 Essential Oil Cultivation and Processing

Essential oil is volatile aromatic compounds located in many plant parts. They are used in many industries for adhesives, pharmaceuticals, cosmetics and toiletries, paints, paper and printing, insecticides, textile making, polishes, solvents, rubber and plastic products, and food and beverages. The common method for extracting essential oil is steam distillation, although some like citrus oil is processed by cold expression. Steam distillation involves generating steam with a separate boiler and passing it through the plant material in order to carry off the volatile constituents. Extraction with solvents or essential oils from flowers or oleoresins from spices (for example, ginger, pepper and cardamom) requires an additional step to separation.

Essential oils, Balsams, gums and waxes are all produced with more complex, capital and technology intensive process. Extraction processes for these products are favored centralized, large-scale operations that use products from intermediate processing operations, as inputs. Because they remove operations further away from the household level and require full-time employment and specialized skills, such processing operations tend to disfavor women compared to the process mentioned above.

A plant's yield of essential oil depends on harvesting and post-harvest operations, including:

- Stage of harvesting (maturation, flowering stage).
- Time of day when harvested.
- Rate of drying.
- Temperature of drying.
- Moisture content after drying.
- Storage conditions.
- Storage time before processing.

Cultivation of citronella, lemon grass and sandal wood is very much prospective in the protected areas considering its cultivation and processing technology and demand in the market.

6.10.1 Market potential, competitors and threats

Market Potential: Expanding market globally. Used as an essential ingredients in non chemical toiletries and cosmetics.

Threat: None.

Competitor: No local producer.

6.10.2 Linkage

- Plantation through community participatory approach.
- Capacity build up and technology transfer to establish a essential oil processing unit.
- Train people to prepare skilled manpower for operating and managing the business.
- Forward linkages to the existing Toiletries and Cosmetics production companies.
- Forward linkage to the existing adhesives, pharmaceuticals, paints, paper and printing, insecticides, textile making, polishes, solvents, rubber and plastic products, and food and beverages companies.
- Facilitate participation in different fair for promotion.

6.10.3 Employment potential

- Nursery practices, plantation.
- Collection, drying, preservation and processing.
- Steam distillation and processed by cold expression.
- Extraction with solvents or essential oils from flowers or oleoresins from spices (for example, ginger, pepper and cardamom) requires an additional step to separation.
- Wholesale and retail marketing.
- International market linkage.

6.11 Orchid Cultivation & Floriculture

Few of the species are growing naturally in Lawachara National Park, Rema-Kalenga Wildlife sanctuary and Satchari Reserve forest areas. It can be managed by engaging forest settlers through commercial cultivation. Orchid is very attractive in color and for its flower. Market demand is very high and not easily accessible. It is used for decoration and ornamental outlooks. Flower is also another commercial crop for cultivation. It has lucrative market demand in national market even in the international market. Few groups can be involved with orchid cultivation and floriculture selecting important species of flower and orchids that have commercial market value. Regarding orchid cultivation technological support should provided them. This can be a potential enterprise for alternate income generating.

6.11.1 Market potential, competitors and threats

Market Potential: Opportunity to export in the international market as the overseas market demand is very high. At present it is imported in limited scale.

Threat: New area. No previous experience. Lack of propagation materials/propagates, diversity of varieties.

Competitor: No local Competitor.

6.11.2 Linkage

- Plantation through community participation.
- Awareness build up to the local community on the orchid cultivation and floriculture.
- Market linkage with the wholesalers and all the established flower retail shops.
- International market linkage.

6.11.3 Employment potential

- Nursery practices, plantation.
- Collection of seedling.

- Retail and wholesale marketing.
- International market linkage.

6.12 Silk Culture

Silk making from silkworms raised on leaves from mulberry (*Morus alba*) and other trees is a widespread cottage industry (Iqbal, op.cit). Raw materials are tree-leaf fodder and worm themselves (for mulberry silk, *bombyx mori*). Silk production also opens a wide range of other products: mulberry produces edible fruits, a fine wood and branches useful for basketry. Silk and silk products make up a significant international trade, with China being the largest exporting country. Some Asian silk industries are seeking new sources of raw silk in developing countries.

6.12.1 Market potential, competitors and threats

Market Potential: This is a high used product especially for the rich family. Easy process, simple technology, labor intensive and increasing demand in the local and export market.

Threat: Lack of design, management tactics and imported silk.

Competitor: Imported silk from China, Thailand, Vietnam, Korea etc.

6.12.2 Linkage

- Group formation to work in a cluster approach or association.
- Capacity build up and technology transfer to establish a silk culture unit.
- Provide skill development training to the cluster members.
- Forward linkage with the BRAC, Proshika and sericulture board etc.
- Market linkage with the wholesalers and the retail shops.

6.12.3 Employment potential

- Nursery practices, plantation.
- Rearing of silkworm, collection of cocoon, processing of guti as threads.
- Produce silk cloth and different items.
- Wholesale and retail marketing.

6.13 Ecotourism

Eco-tourism focuses on local cultures, wilderness adventures, volunteering, personal growth and learning new ways to live on our vulnerable planet. It is typically defined as travel to destinations where the flora, fauna, and cultural heritage are the primary attractions. Responsible ecotourism includes programs that minimize the adverse effects of traditional tourism on the natural environment, and enhance the cultural integrity of local people. Therefore, in addition to evaluating environmental and cultural factors, initiatives by hospitality providers to promote recycling, energy efficiency, water re-use,

and the creation of economic opportunities for local communities are an integral part of ecotourism.

Sustainable tourism in its purest sense is an industry which attempts to make a low impact on the environment and local culture, while helping to generate income, employment, and the conservation of local ecosystems. It is responsible tourism which is both ecologically and culturally sensitive. Ecotourism is considered the fastest growing market in the tourism industry, according to the World Tourism Organization with an annual growth rate of 5% worldwide and representing 6% of the world gross domestic product, 11.4% of all consumer spending - not a market to be taken lightly.

The goal of the ecotourism is to enable people to enjoy and learn about the natural, historical and cultural characteristics of unique environments while preserving the integrity of those sites and stimulating the economic development opportunities in local communities.

Specifically, the successful ecotourism projects must:

- Effectively promote the preservation of entire local ecosystems, not just individual species, vistas or sites.
- Be economically viable in order to attract financing and be sustainable.
- Be well planned, financed, managed and marketed in order to meet the stringent environmental and recreational demands of a true ecotourism development.

Bangladesh has a tropical climate. The mean temperature in the coldest month is above 18°C and mean rainfall in driest month is less than 60 cm. there is distinct dry season in the winter or low sunshine period (December-February). Bangladesh is in the greatest physiographic condition for ecotourism. Hilly areas lakes, sea, rivers, plain land, island, all these things make Bangladesh a most suitable place for ecotourism. Firstly sea-beach of Cox's bazaar, Inani-beach, Teknaf Game Reserve, Naff river, Chunuti Wild life Sanctuary are impressive spots for ecotourism centering Teknaf Game Reserve and Chunuti Wildlife Sanctuary. Tea estate of Sylhet, Lawachara National Park, Rema-Kalenga wildlife sanctuary, Satchari Reserved Forest, all these places can be golden spots for ecotourism centering Lawachara National Park.

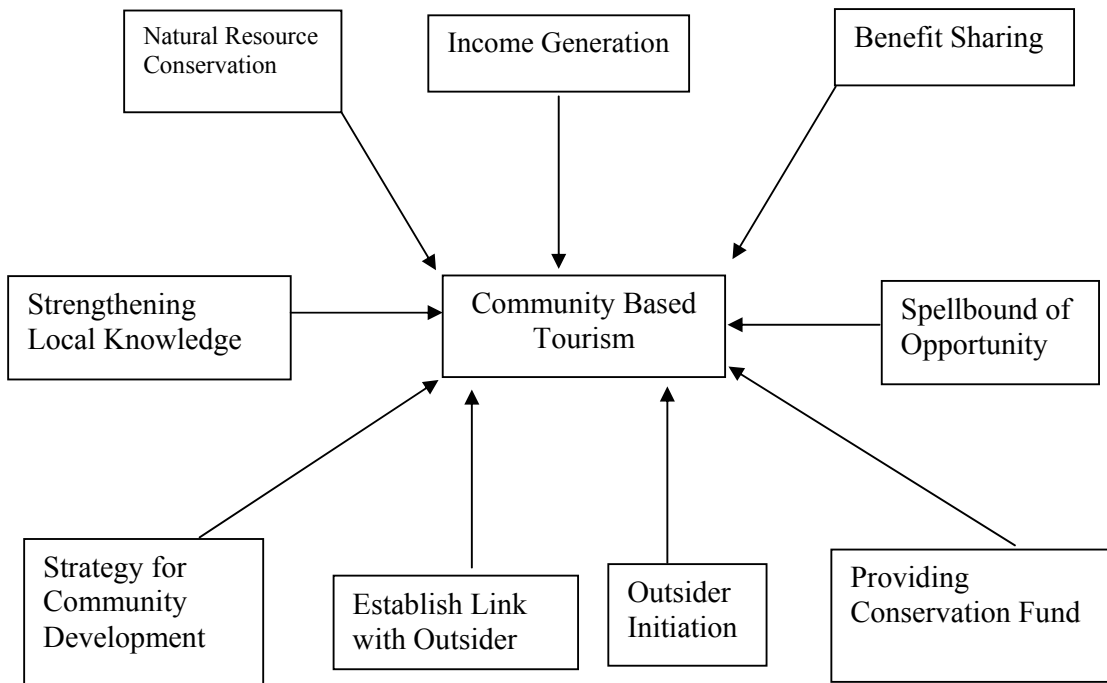
6.13.1 Who are involved in ecotourism?

- Different motives and aims of stakeholders in tourism include tourists. Visiting places of natural beauty and authentic culture for leisure adventure and study.
- New marketing strategies to offer new products to environmentally oriented travelers and quality tourists.
- Integration of developing countries into global economy, make them internationally complaint efforts towards sustainable development to ensure economic growth in the future.
- Maintenance of base of livelihood, expectations for additional job opportunities and income, experiences meeting with people from different places and cultures.
- Conservation groups: This includes groups such as Conservation international and

The Ecotourism Society. Giving natural value to the tourist, protected areas can generate income from tourism through conservation management. Other Public Interest Groups: This includes social and environmental actions groups. The search for small scale and locally control visitor industries are to create long-term structural changes in tourism and development policy in general.

Consultants and Researcher: dependent on their background and contractual period and partner.

Different perceptions in community based tourism lead to different strategies



6.13.2 What does sustainable tourism fit in?

Sustainable Tourism embraces all segments of the industry with guidelines and criteria that seek to reduce environmental impacts, particularly the use of non-renewable resources, using measurable benchmarks, and to improve tourism’s contribution to sustainable development and environmental conservation.

Sustainable Ecotourism -

- Minimizes environmental impacts using benchmarks.
- Improves contribution to local sustainable development.
- Requires lowest possible consumption of non-renewable resources
- Sustains the well-being of local people.
- Stresses local ownership.

- Supports efforts to conserve the environment.
- Contributes to bio-diversity.

6.13.3 Why it is important?

Ecotourism is economically important as because, tourism is one of the largest industry in the world. The travel and tourism industry employs 127 million workers. Increasing human populations and their demand on natural resources make it almost impossible for developing countries to leave large areas undeveloped. It is this necessity for development of natural areas to produce economic benefits that makes ecotourism so attractive. Ecotourism is an attractive use of these reserves as it aims to protect natural resources not destroying them. Ecotourism also brings in foreign exchange that helps to support the maintenance of these reserves. Local communities must be involved from the very beginning in planning a reserve, and be able to give their opinions and to be heard.

6.13.4 Market potential, competitors and threats

Market Potential: As this is a new area but there is demand in national and international arena.

Threat: Journey into unknown. Decline Law and order situation. Lack of market promotion and dynamic administration will be a threat.

Competitor: None.

6.13.5 Linkage

- New marketing strategies to offer new products to environmentally oriented travelers and quality tourists.
- Maintenance of base of livelihood, expectations for additional job opportunities and income, experiences meeting with people from different places and cultures.
- Conservation groups: This includes groups such as Conservation International and The Ecotourism Society. Giving natural value to the tourist, protected areas can generate income from tourism through conservation management. Other Public Interest Groups: This includes social and environmental actions groups. The search for small scale and locally control visitor industries are to create long-term structural changes in tourism and development policy in general.

6.13.6 Employment potential

- Forest department or third party investor or implementing agencies can administer this project through logistic support with the help of the service of the forest villagers.
- Many local people would be employed in this program for providing support services directly and indirectly.
- Awareness creation of the ecotourism through promotional activities.
- Tourism would be initiated with the help of broad-based community-inputs and the community would maintain and control the tourism development.

- Tourism would provide quality employment to its community residents and a linkage between the local businesses and tourism should be established.
- A code of practice should be established for tourism at all levels - national, regional, and local - based on internationally accepted standards. Guidelines for tourism operations, impact assessment, monitoring of cumulative impacts, and limits to acceptable change should be established.
- Education and training programs to improve and manage heritage and natural resources should be established.
- Organize tourism guide, service providers, handicraft selling, Cultural and traditional cloth and product selling, boat riding, driving, snacks, hotel & restaurant etc.

6.14 Nature Based Healing Home Development

The Vedic village wellness centre is a unique, state of the art health and wellness facility, combining Nature cure, General practice, Ortho-molecular Medicine, Yoga, Meditation and exercise programs. The Vedic village offers the visitor or resident the chance to heal or rejuvenate themselves on many levels. The healing centre contains all the traditional healing arts combined with modern medical science into unique program of education and healing aimed at rejuvenating and educating the individual towards a balanced, healthy, prosperous life. Guests can also expect all the traditional spa treatments combined with the wellness center programs, providing a therapeutic effect as well as a comprehensive education and on long support program. Guests will be educated in the basis of disease development, diet and food preparation, relaxation and meditation techniques, exercise activities and lifestyle advice. Patients can expect to receive comprehensive healing programs in a supportive environment designed to take the mysticism out of health.

All these aspects make Vedic village a true healing and wellness centre.

6.14.1 Naturopathy

Naturopathic medicine is a comprehensive approach to health and healing that emphasizes the importance of treating the whole person. Modern naturopathic medicine concerns itself with treatment of disease through the stimulation, enhancement and support of the inherent healing capacity of the person. With the philosophy that the human body has the ability to heal itself if given the correct environment and stimulation, Naturopathy treats the cause of the condition as opposed to simply treating the symptoms. The treatments modalities of Herbal Medicine, Homoeopathy, Clinical Nutrition and physical therapies are all critically examined through modern day science and prescribed according to strict manufacture and prescription guidelines. Modern day naturopathy places a great emphasis on the importance of a healthy world of excesses. The Vedic village medical teams have been trained under the guidance from Dr. Jeff Butterworth who has been a senior naturopathic lecturer at the prestigious, academy of natural therapies in Australia.

6.14.2 Ayurveda

Ayurveda is considered by many scholars to be the oldest healing science. Ayurveda is a Sanskrit word which means “The Science of Life”. Ayurvedic knowledge originated in India more than 5000 years ago and is often called the “Mother of All Healing”.

Ayurveda places great emphasis on prevention and encourages maintaining health by paying close attention to balance in life through the correct diet, lifestyle, mental thoughts and herbs. Knowledge of Ayurveda allows the individual to understand how to create balance of body, mind and consciousness according to their own individual constitution and how to make lifestyle changes to bring about and maintain this balance.

Just as everyone has an individual thumb print, according to Ayurveda, each person has a particular pattern of energy an individual combination of physical, mental and emotional characteristics. These Characteristics are classified into a combination of the three doshas, Vata, Pitta and Kapa. Ayurveda attempts to balance these forces through specific treatments and lifestyle adjustments to create deep, functional healing. The Vedic Village Ayurvedic Medical teams have been trained through the prestigious Ayurvedic Trust of Kerala.

6.14.3 Wellness health spa

The health spa at Vedic Village is distinctive from conventional spa centers in those treatments which are designed to be therapeutic, whilst at the same time relaxing and pampering. The treatments are either delivered singularly, part of spa programs or in conjunction with the Wellness center medical programs. The spa treatments are a unique combination of traditional spa therapies drawn from Asia’s finest spa centers with traditional Indian spa techniques and Nature Cure Hydrotherapy principles.

Spa treatments are delivered in a range of soothing settings. The Wellness centre is equipped with its signature hydrotherapy rooms offering a soothing panoramic view of the lake at Vedic village. Treatment are also delivered in the privacy and exclusivity of the guests very own spa villa or treatments can be received in the Vedic village health club with access to the hydrotherapy whirlpools, saunas and steam rooms. Spa therapists are trained extensively in the spa treatments and at all times remain consummately professional.

6.14.4 Yoga and meditation

An extensive program of yoga and mediation techniques has been specifically designed for the Vedic village. Incorporating yoga classes for all levels the wellness programs have specific asanas for individual programs and treatments. Specific mantras are used in conjunction to release blocked energies and enhance the wellness healings programs.

Meditation also plays a large role in the wellness center programs and an extensive program of meditation is available for beginners to experts. Meditation is used to relax and de-stress as well as specific meditations have been developed to assist healing programs. Innovative meditations developed have been recorded to CD which stimulates healing processes for individual health conditions. Classes are conducted in Vastu principle designed rooms which feature pyramid shaped roof and large glass paneling to

bring the natural surrounds into the room. The rooms have an amazing presence and healing energy. Tatami mat floors make for a totally unique experience.

A yoga consultation/assessment makes up part of many of the wellness programs to tailor yoga and mediation treatments to the individual needs and requirements. For those completing executive level programs individual yoga and mediation sessions are offered.

6.14.5 Anti-aging

Anti-aging medicine is a revolution sweeping the world. At Vedic Village the anti-aging program is not so much about increasing the natural lifespan; it is more about remaining healthy and active in the later years. By creating health and vitality, the body naturally age's slower and general appearance is more youthful and vibrant. Many of the international anti-aging programs are more concerned about looking good rather than feeling good. The anti-aging program gets you a feeling great which in turn gets you looking great. At Vedic village beauty is considered a lot more than skin deep. Natural beauty is about being vibrant, radiant, fit, toned with a natural energy for life rather than the typical 'glossed look' created through cosmetic medical anti-aging programs. The wellness anti-aging program is to determine the individuals' health weakness to prevent health degeneration. Predetermined health parameters are used to gauge progress and further fine tune treatments as time progresses. Patients can expect to look and feel younger with an aura of 'natural radiance' rather than 'synthetic gloss' which people will admire and be attracted to.

6.14.6 Nervous system rejuvenation

In today's high paced world stress is an inevitable consequence. Persistence stress unfortunately can have devastating effects upon a person work, family and relationships not to mention health. The nervous system rejuvenation program not only educates guests how to manage and release stress; it systematically rejuvenates damaged nerve fibers. All imbalanced nervous systems are the root cause of many other conditions as a healthy nervous system is fundamental to the rest of the body.

6.14.7 Infertility

Infertility is becoming an ever increasing problem in today's program. Couples are currently faced with two options. One is to use the medicinal route where IVF and GIFT treatments are both costly and have low success rates with greater chances of birth defects or they can adopt. The wellness Fertility program is a combination of dietary and lifestyle advice, hormone level monitoring, natural medicines, detoxification and general health improvement, which the body has not conceived for a reason. By removing these reasons, a healthy pregnancy and child will be ensured. Patients can expect personalized treatment with informative step by step information to optimize the chances of conception.

6.14.8 Preconception

The wellness preconception program is focused at couples that have embraced the philosophy of wellness and want to give their child the best start to life. Most parents conceive and then begin to look at always of maximizing the development of the child. The single most important time in the development of a child is at the point of conception

when all the genetic material is combined to produce the foetus. This is the seed and the quality of seed is all important. From this point it is then important that the soil (mother) is the correct environment to produce the correct growth. It takes at least 3 to 6 months to improve the basic elements necessary to optimize the process of pregnancy. Neonatal status needs to be improved, toxins need to be eliminated, hormones need to be balanced and lifestyle habits need to be corrected. The wellness program is not for everyone, however for those parents that want to give their child the best chance in life, and then the program is essential parenting. The program is also vehicle for older couples to minimize any age related birth complications. Couples can expect to receive individualized treatment and improve their own health and vitality as a side effect of the program.

6.14.9 Digestive system rejuvenation

A healthy digestive system is fundamental to good health. Health and vitality can not exist if the digestive system is not functioning to full capacity. The wellness plan recognizes this fact and attempts to cleanse and improve the digestive tract to ensure optimum health. The digestive wellness plan utilizes many of the wellness centers healing modalities. From specific yoga asanas to proven Naturopathic medicines the whole digestive tracts is repaired to either establish a strong base for health improvement or specifically heal digestive diseases which are a common side effect of modern living habits. Patients can look forward to a symptom free digestive system which performs as nature intended. Common improvements are greater elimination, no bloating and feeling unwell after meals and increased energy levels. The skin also improves dramatically as no longer eliminating toxins reabsorbed from digestive tract.

6.14.10 Detoxification wellness

The Detoxification system is an integral part in the matrix of health. The impact of an imbalanced detoxification system on health is enormous. When the Detoxification system begins to fail an amazing array of symptoms and poor health will manifest. When the accumulating toxins out-weigh the body's ability to excrete them, disease will eventuate as these toxins damage the cellular processes. Toxins affect individuals in different ways. Toxins place an additional stress on the system and appropriately the weakest point breaks under the stress. Dependent upon any acquired or genetic weaknesses, toxins stress the weakness and damage occurs. The result is symptoms, which are often obscure and diffuse. Conditions that are often difficult to diagnose or unresponsive to conventional treatments respond well to a well-planned detoxification. The wellness Detoxification plan can cure all types of diseases as you are removing the core factors in the development of the disease. The wellness Detoxification plan is distinctive from the many types of detoxification programs and fasts because it utilizes modern techniques to monitor the release of toxins from the system. By doing this the level of detoxification side effects are minimized to make the experience a vitalizing one rather than draining. This method also reduces any damage created from toxins being released from the system too quickly which is often the case with other methods. Patients will find that all current disease processes will be improved after the wellness Detoxification plan with the most common result being improve vitality and clarity of mind. The skin begins to make on a youthful luster and people will notice on how well you are looking.

6.14.11 Endocrine system rejuvenation

Our endocrine system is an important system in the body, which is often unrecognized as a major cause of physical and mental disease. The endocrine system is made up of the gland and the hormones. When the endocrine system becomes imbalanced many physiological problems occur. Common problems are blood sugar imbalances that create fatigue, hormonal imbalances, which create menstrual pain and menopausal symptoms, mood swings, anxiety and depression, as well as thyroid disorders, which contribute to weight gain. The endocrine system is very sensitive to diet and lifestyle so the ideal way to improve function is to follow the endocrine wellness plan.

6.14.12 Cellular rejuvenation

The cellular rejuvenation plan is designed to treat chronic and degenerative diseases. The cellular rejuvenation plan focuses on the end stage of disease, which is affected, namely cellular energetic. The wellness plan is about recognizing the degeneration and making positive steps toward health instead of relying upon synthetic drugs to mask symptoms. The patients can expect to be able to reduce current medications and shift their health focus from degeneration to rejuvenation.

6.14.13 Weight loss program

Excessive weight is a symptom of the modern lifestyle. The program consists of eight weeks precluded by an initial stay at the Vedic village. All recommendations have taken into consideration that life was meant to be fun and changes to diet and lifestyle are enjoyable.

6.14.14 Women's wellness

The women's wellness program at Vedic village is like no other in the world. Women's wellness in Australia has innovative treatments and products to bring balance back to women's health. Combined with the wellness philosophy healing can occur on many levels. Patients can expect to feel more in control of their health and feel they are in control of their hormones and not their hormones are in control of them.

6.14.15 Male wellness

The male wellness at the Vedic village is specifically related to men's age related conditions. Conditions such as prostate enlargement, nighttime frequency, reduced and hard to start flow, reduced sex drives and impotency are all treated with success on the male wellness program. Natural medicines and treatments in conjunction with the wellness philosophy rejuvenate the male reproductive area restoring functions lost long ago. Healthy systems will not only develop these conditions and reproductive health but also can be enjoyed for the rest of the life. Men can expect a supportive, discrete environment where they can take the time to relax and regenerate.

6.14.16 Wellness fitness program

The wellness fitness program combines the basic principles of the wellness plan with specific fitness regimes designed by our sports scientists. The Vedic village provides the

ideal natural environment for conscious fitness minded individual through to professional sporting organizations to immerse themselves in health and fitness.

6.14.17 Wellness Respiratory program

The wellness respiratory program was specifically designed in response to demand for a program that dealt with respiratory associated with pollution. Specific respiratory conditions that the program was designed to effectively treat are asthma and chronic bronchitis. Patients can expect comprehensive medical evaluation with educational classes aimed at teaching the individual how to best manage and prevent recurrence of the condition.

6.14.18 Employment potential

- Forest department or third party investor or implementing agencies can administer this project through logistic support with the help of the service of the forest villagers.
- Many local people would be employed in this program for providing support services directly and indirectly.
- Medicinal support will be coming in from the in-house herb plantation.
- Awareness creation of the natural healing method through promotional activities.

7. MARKETS AND MARKETING

The markets for most forest based products are characterized by their rural location and nature. These markets are predominantly for low cost products, demands for which changes seasonally with the fluctuations in rural incomes and activities. Individual markets are likely to be small and localized and to comprise mainly job-orders for single or a few items. Forest products are sold in various markets: local, urban, regional and international. Good marketing involves knowing which values a particular market seeks and making ones product more desirable than competing products based on that information. Each market place also involves different influencing factors relating to the product, promotion, and price. For example, selling herbal medicine in a local market may involve no packaging, broad quality categories, and few transport costs. However marketing the same product in a city can require precise identification of quality standards, sophisticated packaging, advertising and incorporating transport costs into the products price. The simplest marketing practices for non-wood forest products can be found on local and national markets. The marketing of non-wood forest products which are used in industries is normally carried out in two main stages: the marketing of raw material, i.e. gathering stage until it reaches the industrial user as raw product; and the marketing of the semi-finished or finished industrial or finished consumer products either or other processing industries or to final consumers.

7.1 Channel of Distribution

Producer → Organized marketing → Retailer & wholesaler → Consumer
Or
Producer → Retailer & wholesaler → Consumer

7.2 Market Size

Field observation reveals that smallness of markets due to the generally low purchasing power of rural people is a major problem for forest based small scale enterprises. The problem is worsened by seasonal fluctuation of demand in line with change in agricultural incomes. Products with a significant tourist market (handicrafts) also have seasonality problems. Enterprises closer to major roads or larger settlements have access are sold to more widespread markets than others.

7.3 Production Cost & Price of Various Products

According to market price the different products produced varies seasonally on the basis of locality of the enterprises. The followings are the marketing information on different items:

| Product's name | Production cost/unit (Tk.) | Selling cost/unit (Tk.) | Net profit/unit (Tk.) |
|----------------|----------------------------|-------------------------|-----------------------|
| Pati | 110 | 160 | 50 |
| Chatai | 90 | 120 | 30 |
| Sital pati | 180 | 320 | 140 |
| Mat | 15 | 25 | 10 |
| Seed earring | 7 | 10 | 3 |

| Product's name | Production cost/unit (Tk.) | Selling cost/unit (Tk.) | Net profit/unit (Tk.) |
|-----------------------|-----------------------------------|--------------------------------|------------------------------|
| Hair band | 5 | 10 | 5 |
| Ornamental set | 35 | 65 | 30 |

Source: field data through personal communication

8. ORGANIZING FARMERS/PRODUCER GROUPS

Successful community organizations for natural resource management often share similar characteristics related to the local user group and the natural resource. User group here means the community with local access rights to the forest resource. Group should be formed taking forest villagers or forest neighboring peoples according to each intervention requirements. Project will train them in accordance to the needs of the sub sector priority.

The user group

The characteristics of user groups that generally promote good community organization, which are often found in indigenous systems for common property management, include (ATI, 1995):

- Identification as a group: The group recognizes its members, and outsiders see the group as distinct. Not all the group's members may actively use the groups' access rights; in this sense there may be "user sub-groups".
- Group size: The group should be large enough to support harvesting and processing at the threshold of economic sustainability.
- Control over resources: The group must have access to the non-wood resources that is recognized by legal rights or customary law of forest.
- Mitigating income effects: Poorer community members should be represented in any change in resource use.
- Recurrent interaction: Frequent meetings with the group members to promote cooperative behavior and adherence to the groups' rules.
- Reciprocity: Group members should realize that they will receive benefits only if they fulfill their responsibilities to the group.
- Disciplinary mechanisms: The group can impose sanctions or penalties that have a real deterrent effect.
- Leadership: Change the leadership by rotation.

8.1 The Natural Resources

In general, the forest resource managed by the group should be:

- Clearly defined, so that it becomes easier to manage & result in sustainability;
- Recognized by the community as valuable. Often user groups will agree to the added effort of sustainable management only if they see that destructive over-use threatens the resource.

8.2 Organizing Tools

The followings are tool for organizing the group

- Community meetings
- Land use mapping
- Community education

9. PROBLEM OR THREATS

Protected forest areas and Forest based small scale enterprises face wide array of problems. The range of problems that can be encountered by Forest based small scale enterprises can be summarized as follows:

- The alarming increase of population create extreme pressure on forest, in addition the political influence and unfairness of forest officials mostly destroy the forest resources.
- Incase of plantation forestry, forest department is very slow in resource creation and generation and species mixing pattern is so far. They never pay attention for indigenous species supporting wild life or for raw materials for the processing enterprises.
- Raw material shortages, often compounded by wasteful processing, restrictive regulations, poor distribution, small scale producers often have little land area and poor growing stock;
- Small and insecure markets: producers often lack information on: (1) the price of their products, both in local markets and as inputs to downstream processing,(2)product volume required by the market and how much competitors provide and (3) quality standard. Insecure market due to low rural income, seasonality, poor access to the larger market and severe competition.
- Non availability of appropriate technology in the form of suitable tools and equipment.
- Shortage of finance, in particular working capital, worsened by problems of access to what is available and by its cost. Lacking collateral or flexible lending terms, many producers can not get credit for working capital from formal financial institutions. They then rely on informal channels such as local merchants who usually command high interest rates.
- Unfavorable policies: The existing policies regarding imports, exports are creating high economic barriers for producers.
- Post harvest losses: Poor transportation and storage facilities caused the producers to lose 25-50% of a harvest, losses compounded by wasteful processing.
- Lack of processing: Many producers do not process their items further, either they are lack of information or equipment processing or they are in doubt that processing will significantly improve their earnings
- Transportation and infrastructure: In remote areas, high transport costs and poor infrastructure reduce many producers ability to compete the price in the existing markets.

10. CONCLUSION AND RECOMMENDATION

Enterprise development mostly depends on investor's decision, market demand and availability of the raw materials. Forest is the natural growing stock of raw materials; a container of a storehouse. We must protect the forest for our existence and sustenance. Non-wood forest products play an important role in terms of products, employment, and income generation. Development of enterprise requires immediate and long-term attention and clarity of vision and bold decision. Because of a heterogeneous assortment of groups in rural population, there are diverse demands on the forest. So the development of enterprise of the forest is therefore a challenge to researchers, planners and management experts.

Based on field observation and findings following recommendations are made:

- Plantation is the main concern for all sites; especially for resource creation and generation of economic solid platform for the rural poor forest villagers and neighboring people. Mixtures of species should be followed encouraging native species with multiple uses.
- Among the enterprises, medicinal plants cultivation, extraction and processing can be given top priority of all sites. Bee-keeping, medicinal plants collection and food processing is possible in Sylhet zone (Lawachara National Park, Satchari Reserve Forest and Rema-Kalenga Wildlife Sanctuary) at present.
- Participatory approach should be developed, involving the settlers in plantation at the buffer zone, management of resources for sustainable production, harvesting and processing for marketing of the forest products.
- Proper collection system of non-wood forest products should be introduced to reduce the wastage of produces.
- Proper utilization of non-wood forest products should be ensured a forest utilization scheme to maximize state revenue addressing the people within the forest.
- Non-wood forest products such as bamboo, cane, medicinal plants, and patipata plants should be developed in plantation within forest or outside the forest, where intensive cultivation is required without any delay.
- All protected areas should have buffer zone management plan that addresses resource management, community development and ecotourism in a collaboration effort with government and non-government agencies. The buffer zone provides an additional layer of protection around the protected areas. Buffer zone provides not only an additional layer of protection to existing protected areas but also gives an opportunity of sustainable resource use of local people.
- Joint forest management and eco-development are concepts that involve communities in the protection and management of forests, along with the government. NGOs with experience in mobilizing people at the grassroots level can successfully launch and implement nature sensitization programs in the communities.
- Close collaboration and network should be made with the specialist of silviculture,

non-wood forest products, and especially with the products specialist and herbal specialist.

- For the better performance of the project, sector specialist should be employed or contracted in the field of forestry, agriculture and marketing profession.
- Regarding enterprise development all of the resources should be assessed and developed for continuous supply of raw materials in the relevant sector.
- Limit access to the resources, and make provision for strict regulatory collection system through legal permission.
- To start an enterprise, advance resource planning and inventory should be carried out for its smooth operation.
- Species selection is an important factor for forest based enterprise development; species characteristics and availability is a vital consideration in sector development.
- Careful harvest of raw materials avoiding post harvest losses and natural regeneration disturbance will ensure sustainability of harvest levels.
- Well planned strategy is required for sector development; before starting a processing unit a blue print approach should be made for risk management supporting by the other potential sub sectors.
- Skill development and marketing training is the prime concern for the entrepreneur; in advent of sector development proper training should be provided to the entrepreneurs by experts.
- List of product, product design should be evaluated in advent of starting processing and product quality standard should be maintained for creating competitive market.
- Lack or limited access in credit is the major hindrance in sector development. Commercial Bank or NGOs can provide credit support with a minimum rate of interest and following easy installment systems.
- Sectors should be piloted before the coverage.
- To know the exact natural regeneration status it needs further study with specific tasks.

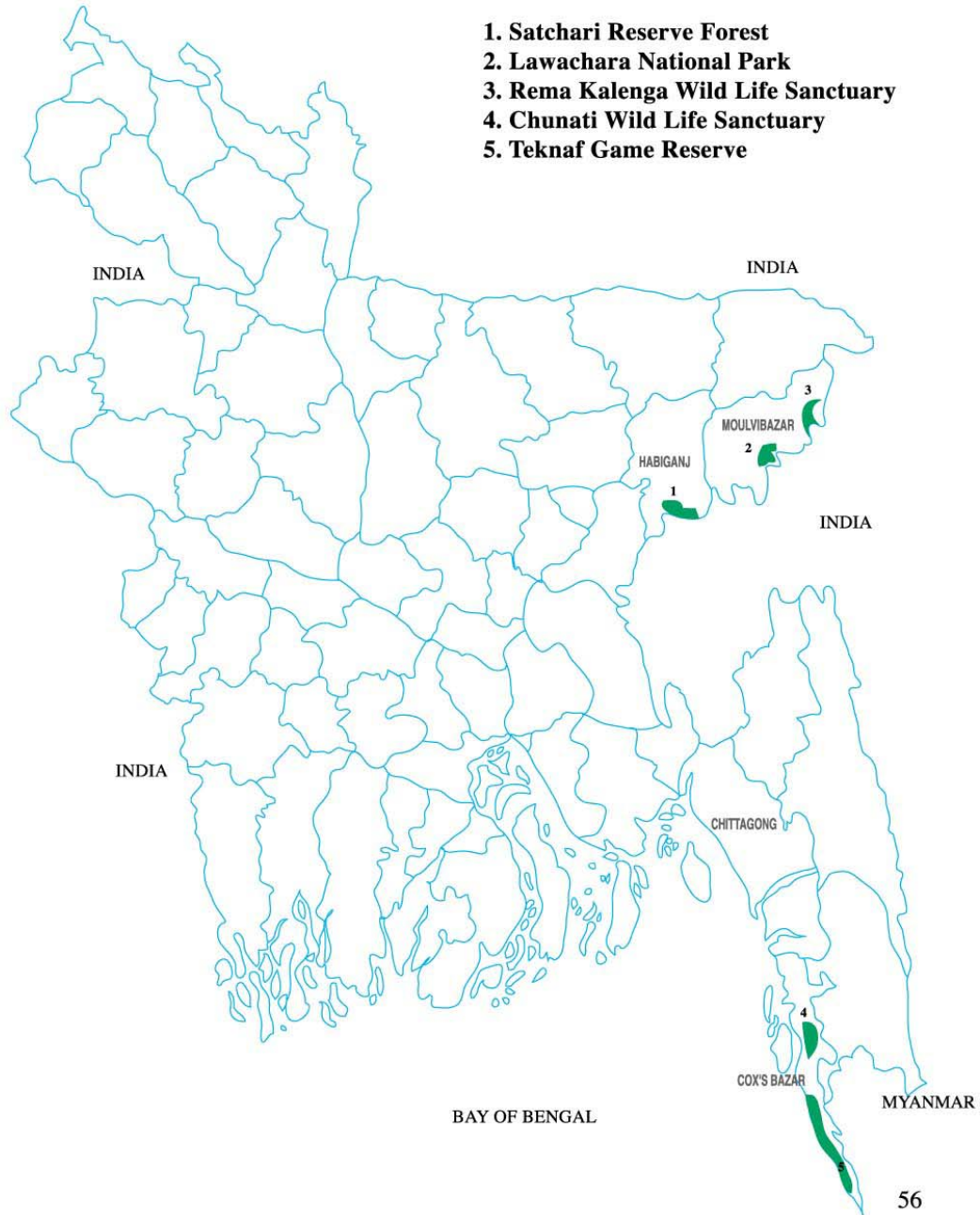
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ANNEXURE-1 (Geographic Location of the 5 selected PAs)

Geographic Location of Five Protected Forest Areas
(Locations are approximate & not to scale)

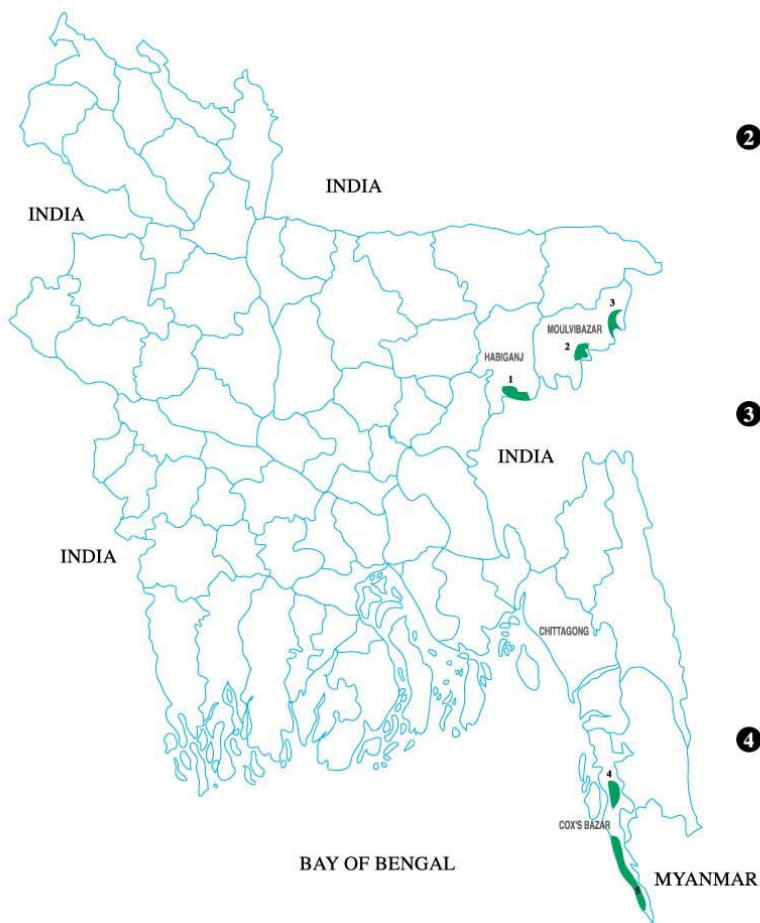


ANNEXURE-2 (Geographic Location of the selected sectors in the PAs)

Selected Sector in the Protected Forest Areas

(Locations are approximate & not to scale)

1. Satchari Reserve Forest
2. Lawachara National Park
3. Rema Kalenga Wild Life Sanctuary
4. Chunati Wild Life Sanctuary
5. Teknaf Game Reserve



1. Plantation in the buffer zone
2. Nursery
3. Medicinal Plant Cultivation
4. Weaving and Natural Dye
5. Food Processing
6. Handicrafts
7. Bee Keeping
8. Herb Tea Cultivation
9. Essential Oil Production

2. Plantation in the buffer zone
2. Nursery
3. Medicinal Plant Cultivation
4. Weaving and Natural Dye
5. Handicrafts
6. Bee Keeping
7. Herb Tea Cultivation
8. Essential Oil Production
9. Orchid Cultivation

3. Plantation in the buffer zone
2. Nursery
3. Medicinal Plant Cultivation
4. Weaving and Natural Dye
5. Food Processing
6. Natural Healing Home
7. Handicrafts
8. Bee Keeping
9. Herb Tea Cultivation
10. Essential Oil Production
11. Eco-Tourism

4. Plantation in the buffer zone
2. Nursery
3. Medicinal Plant Cultivation
4. Weaving and Natural Dye
5. Herb Tea Cultivation
6. Essential Oil Production

5. Plantation in the buffer zone
2. Nursery
3. Medicinal Plant Cultivation
4. Weaving and Natural Dye
5. Natural Healing Home
6. Herb Tea Cultivation
7. Coconut Oil and Coir
8. Essential Oil Production
9. Eco-Tourism

ANNEXURE-3: (Selected sector at a glance)

| SL # | Sector | Type of Plantation | Raw materials | Technology | Project unit cost | Employment generation | Structural arrangement | Value addition | Market, market demand, marketing and channel of distribution |
|------|---|---|--|---|------------------------|--|---|-------------------|---|
| 1 | Handicrafts (cane, bamboo and patipata based) | Cane, Bamboo, Patipata | Locally available | Available in locally | Tk.3 lac | Directly 12 person in each unit | Work shed 1500 square feet and open space 1 acre | Tk.250/day/person | Local and international market. Demand is high. Forward linkage with Conexpo, Dhaka handicrafts Inbar, Taurus etc. |
| 2 | Bee-keeping | Floriculture | Box and bee collect out side from forest | Very simple and easily accessible | Tk.80,000 (for 10 box) | 10 person can be engaged in every unit | work shed 1500 square feet, and open space 1 acre | Tk.150/day/person | Demand is very high and increasing. Local and national market, food processing industries, Ayurvedic pharmaceuticals companies |
| 3 | Hand oven and hand spoon natural dyed cloth | Cotton cultivation, Horitoki, Betel nut, Guava, Onion, Sinduri etc. | Locally available | Simple technology and locally available and labor intensive, no foreign technical expert is required. | Tk.1.25 lac | 12 person can be employed | Working space 1500 square feet, and open space 1 acre | Tk.300/day/person | Demand is very high in the overseas market. Forward linkage with the existing natural dyes cloth exporters Banaj Barnali, Aronya Crafts Ltd. Folk Bangladesh etc. Market linkage with the wholesalers and the entire established retail shops at Dhaka. |

| SL # | Sector | Type of Plantation | Raw materials | Technology | Project unit cost | Employment generation | Structural arrangement | Value addition | Market, market demand, marketing and channel of distribution |
|------|--------------------------------------|---------------------------------|--|---|-------------------|---------------------------|--|-----------------------------------|--|
| 4 | Nursery | Tree nursery and herbal nursery | Seeds, vegetable propagates, soil, cow dung, pot, bamboo etc | No special technology is required, local technology will be used for seedling raising | Tk.3 lac | 15 person | Work shed 1500 square feet and nursery space 3 acres | 20 times higher than bank deposit | Very much in demand in the local market especially for medicinal plants. Market linkage with the wholesalers and the entire established retail nurseries at Dhaka. |
| 5 | Food processing (pickle, jam, jelly) | Olive, Amra, Amloki | Amloki, Olive, Amra, and Pineapple. | Simple and locally available | Tk.40,000 | 12 person can be employed | Work shed 1500 square feet and open space 0.5 acre | Tk.200/day/person | Local and national market. Forward linkage with the food processing companies like PRAN, Ahmed Foods, also with different agencies like Hortex Foundation, BISIC showroom, ATDP etc. Market linkage with the wholesalers and all the established retail shops i.e. Agora, Nandan, Meena Bazar etc. |
| 6 | Coconut oil and coir production | Coconut | Coconut and homesteads | Simple technology and locally available | Tk.1 lac | 10 person | Work shed 1500 square feet and open space 1 acre | Tk.300/day/person | Local and international market. Forward linkage with the coconut oil producing companies as a supplier of the raw materials. Forward linkage with the existing coir product exporters. Market linkage with the wholesalers and all the established retail shops i.e. Arong, Karupannaya, |

| SL # | Sector | Type of Plantation | Raw materials | Technology | Project unit cost | Employment generation | Structural arrangement | Value addition | Market, market demand, marketing and channel of distribution |
|------|--|---------------------------|--|---------------------------------|------------------------|--|---|---------------------|--|
| | | | | | | | | | Probortona etc. |
| 7 | Herb tea cultivation and processing (Basak, Camomile, Shefali) | Basak, Camomile, Shefali | Resource generation through plantation | Hand made | Tk.3 lac | 100 person | Work shed-1 acre and open space-2 acre | Tk.500/day/person | Mostly international market and it is exportable items likely in Europe. Forward linkages to the existing tea manufacturers. It is the food supplement of medicine, so it can be made network with the producer's, markets and consumers at national level to global market. |
| 8 | Medicinal plant cultivation, collection and processing | Detailed – See Annexure 5 | Locally available and resource generation through plantation | Very simple and hand processing | Tk.3 lac for each unit | Employment will be generated in many sub sectors through plantation, collection, processing, marketing etc. Average 12 people will involve in each unit. | Work space - 1500 square feet and open space 1 acre | Tk.500/day / person | Great demand in local, regional, national (Hamdard, sadhona, and many others Ayurvedi and Unani pharmaceuticals company) and international market. |
| 9 | Agar plantation | Agar | Agar plant, locally available | Foreign expert required | Tk.20,000 /per Acre | Employment will generate in many sub sector through plantation, collection, processing, | Work space - 1500 square feet and open space 1 acre | Tk.1000/per day | Great demand in local, regional, national and international market. |

| SL # | Sector | Type of Plantation | Raw materials | Technology | Project unit cost | Employment generation | Structural arrangement | Value addition | Market, market demand, marketing and channel of distribution |
|------|--|--|--|--|--|---|--|------------------------------------|--|
| | | | | | | marketing etc | | | |
| 10 | Essential oil cultivation & processing | Jota-mangshi, Lemon grass, Citronella, and Clove | Lemon grass, Citronella, Clove and locally available | Easily accessible technology | Tk.3 lac | At least 12 person will be employed directly | Work shed 1500 square feet, and open space 0.5 acres | 50 times higher than bank interest | As it is an imported item so, local demand is high and it can be marketed locally and internationally. |
| 11 | Orchid cultivation and Floriculture | Orchid | Local and imported | Very simple cultivation technology and locally available | Tk.3 lac | 12 person | Work shed 1500 square feet and open space 5 acres | Tk.300/day/person | National and international market |
| 12 | Silk culture | Sericulture | Tuth plant, Cocoon rearing | Very simple and easily accessible technology | Depend on production scale | Employment will generate in many sub sector through plantation, collection, processing, marketing etc | Depend on production scale | Depend on production scale | National and international market |
| 13 | Ecotourism | N/A | Forest and nature based | Foreign expert | Depend on items and level of development | Directly and indirectly thousand of people | Depend on investment | 30 times than bank interest | National and international market |

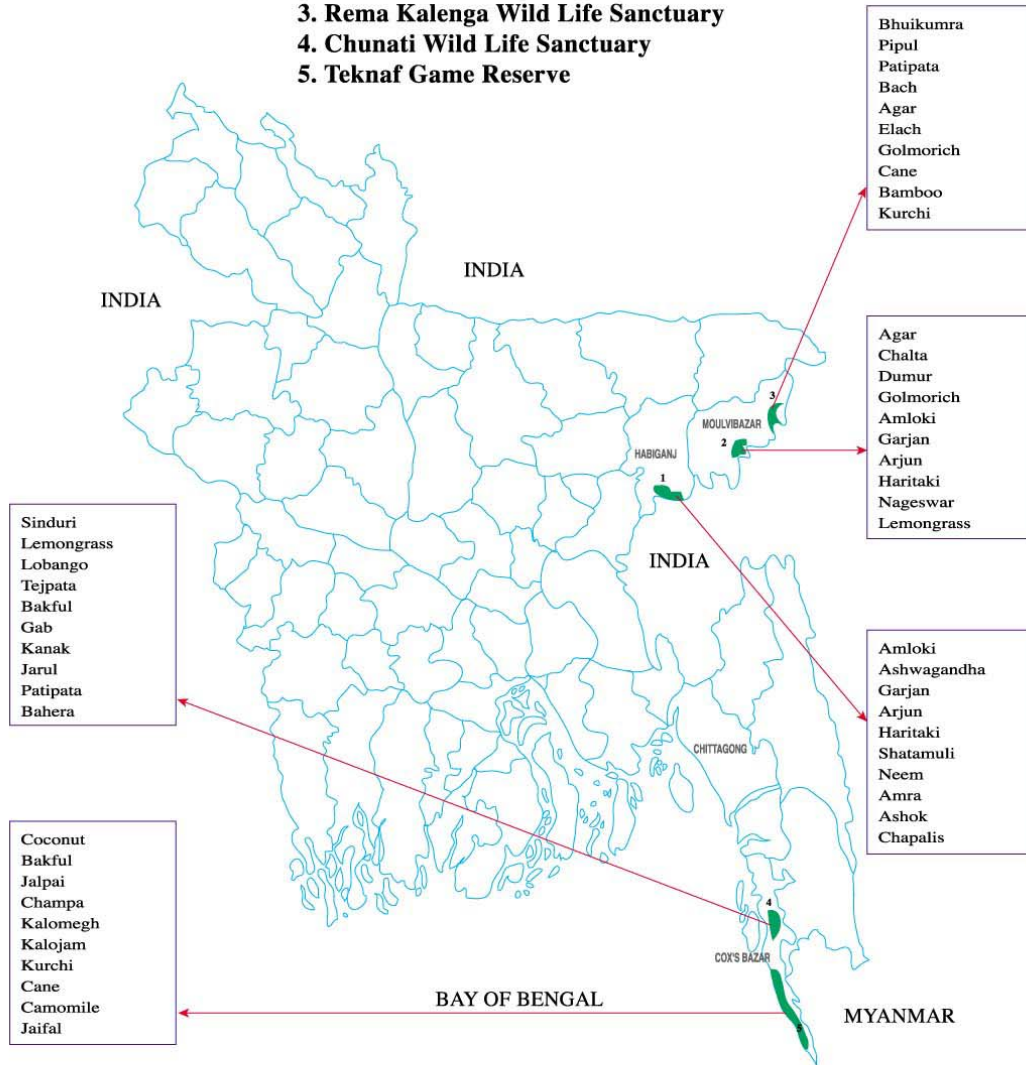
| SL # | Sector | Type of Plantation | Raw materials | Technology | Project unit cost | Employment generation | Structural arrangement | Value addition | Market, market demand, marketing and channel of distribution |
|-------------|---------------------------------------|---------------------------|----------------------|--|-------------------------------|--|-------------------------------|-----------------------------|---|
| 14 | Nature based healing home development | N/A | Locally available | Simple technology, no foreign expert is required | Depend on establishment size. | Directly 30 person and 100 person indirectly as service provider | Shed 1 acre | 30 times than bank interest | Equally demand in national and international market |

ANNEXURE-4 (Geographic Location of the selected herbal and medicinal plantation)

**Selected Herb and Medicinial Plantation
in the Protected Forest Areas**

(Locations are approximate & not to scale)

1. Satchari Reserve Forest
2. Lawachara National Park
3. Rema Kalenga Wild Life Sanctuary
4. Chunati Wild Life Sanctuary
5. Teknaf Game Reserve



ANNEXURE-5 (List of plant species with specific site)

| # | Local name | Latine name | Trade name | Suitable cultivation area |
|----|-------------|---------------------------------|------------|---------------------------|
| 1 | Garjan | <i>Dipterocarpus turbinatus</i> | Garjan | C, L, R,S, T |
| 2 | Am | <i>Mangifera indica</i> | Am | C, L, R,S, T |
| 3 | Amloki | <i>Emblika officinalis</i> | | C, L, R,S, T |
| 4 | Ada | <i>Zingiber officinalis</i> | | C, L, R,S, T |
| 5 | Ashwagandha | <i>Withania somnifera</i> | | C, L, R,S, T |
| 6 | Join | <i>Trychospermum ammi</i> | | |
| 7 | Bel | <i>Aegel mermelos</i> | | C, T |
| 8 | Pipul | <i>Piper longum</i> | | L, R,S |
| 9 | Mutha | <i>Cyperus rotundus</i> | | C, L, R,S, T |
| 10 | Basak | <i>Adhatoda vasica</i> | | C, L, R,S, T |
| 11 | Arjun | <i>Terminalia arjuna</i> | | C, L, R,S, T |
| 12 | Methi | <i>Trigonella foenum</i> | | C |
| 13 | Haritaki | <i>Terminalia chebula</i> | | C, L, R,S, T |
| 14 | Tokma | <i>Hyptis suaveolens</i> | | C,R,L |
| 15 | Tulsi | <i>Ocimum sanctum</i> | | C,R |
| 16 | Gritokumari | <i>Aloe vera</i> | | C, L, R,S, |
| 17 | Ulatkambal | <i>Abroma auguta</i> | | C, L, R,S, T |
| 18 | Dhaiful | <i>Woodfordia fruticosa</i> | | L, R,S |
| 19 | Kalojira | <i>Nigella sativa</i> | | |
| 20 | Kalomegh | <i>Andrographis paniculata</i> | | C, L, R,S, T |
| 21 | Mouri | <i>Foeniculum vulgare</i> | | C |
| 22 | Ekangi | <i>Zingiber zerumbet</i> | | C, L, R,S, T |
| 23 | Shimul | <i>Salmalia malabarica</i> | | C, L, R,S, T |
| 24 | Shatamuli | <i>Asparagus racemosus</i> | | L, R,S |
| 25 | Pudina | <i>Mentha arvensis</i> | | C |
| 26 | Neem | <i>Azar\dirachta indica</i> | | C, L, R,S, T |
| 27 | Bhuikumra | <i>Ipomea digiata</i> | | C,R |
| 28 | Sarpagandha | <i>Rawolfia serpentina</i> | | R, S,L |
| 29 | Cherota | <i>Swertia chirata</i> | | Need trial |
| 30 | Isubgul | <i>Plantago ovata</i> | | Need trial |
| 31 | Amra | <i>Spondias pinnata</i> | Amra | C, L, R,S, T |
| 32 | Ashok | <i>Saraca indica</i> | Ashok | C, L, R,S, T |
| 33 | Bahera | <i>Terminalia belerica</i> | Bahera | C, L, R,S, T |
| 34 | Champa | <i>Michelia champac</i> | Champa | C, T |

| # | Local name | Latine name | Trade name | Suitable cultivation area |
|----|--------------|-----------------------------------|------------|---------------------------|
| 35 | Chapalis | <i>Artocarpus chaplasha</i> | Chapalish | C, L, R,S, T |
| 36 | Dhakijam | <i>Syzizium grande</i> | Dhakijam | C, L, R,S, T |
| 37 | Gab | <i>Diospyras embroyopteris</i> | Bag | C, R,S, T |
| 38 | Sinduri | <i>Bixa orellana</i> | | C |
| 39 | Jalpai | <i>Elaeocarpus spp</i> | Olive | C, L, R,S, T |
| 40 | Jarul | <i>Lagerstroemia speciosa</i> | | C, L, R,S, T |
| 41 | Kalojam | <i>Syzigium spp</i> | Jam | C, L, R,S, T |
| 42 | Kanak | <i>Schima wallichii</i> | Kanak | C,S, T |
| 43 | Kurchi | <i>Holarrhena antidysenterica</i> | Kurus | C, R,S, T |
| 44 | Patipata | <i>Clinagyne dichotoma</i> | Murta | C, R |
| 45 | Chattim | <i>Alstonia scholaris</i> | Chatim | C, L, R,S, T |
| 46 | Sonalu | <i>Cassia fistula</i> | Sonalu | C, L, R,S, T |
| 47 | Bamboo | <i>Bambusa spp</i> | Bansh | C, L, R,S, T |
| 48 | Cane | <i>All species</i> | | C, L, R,S, T |
| 49 | Udal | <i>Sterculia vilosa</i> | Udal | C, L, R,S, |
| 50 | Telsur | <i>Hopea odorata</i> | Telsur | C, L, R,S, T |
| 51 | Camomile | | | C, L, R,S, T |
| 52 | Shefli | | | C, L, R,S, T |
| 53 | Lemon grass | | | C, L, R,S, T |
| 54 | Lobongo | | | C, L, R,S, T |
| 55 | Daruchini | <i>Cinnamomum zeylanicum</i> | | C, L, R,S, T |
| 56 | Elach | | | L, R,S |
| 57 | Tejpata | <i>Cinnamomum tamala</i> | | C, L, R,S, T |
| 58 | Agar | <i>Aquilari agallocha</i> | | L, R,S |
| 59 | Coconut | <i>Cocos nucifera</i> | | T |
| 60 | Raktachandan | <i>Santalum album</i> | Chandan | C, L, R,S, T |
| 61 | Alkushi | <i>Mcuna pruriens</i> | | C, L, R,S, T |
| 62 | Bach | <i>Acorus calamus</i> | | R |
| 63 | Bakful | <i>Sesbania grandiflora</i> | | C,T |
| 64 | Bakul | <i>Mimosop elengi</i> | | C, L, R,S, T |
| 65 | Chalta | <i>Dillenia indica</i> | | C, L, R,S, T |
| 66 | Daruharidra | <i>Berberis aristata</i> | | C, L, R,S, T |
| 67 | Dumur | <i>Ficus glomerata</i> | | C, L, R,S, T |
| 68 | Golmorich | <i>Piper nigrum</i> | | L, R,S |
| 69 | Jaifal | <i>Myristica fragrans</i> | | C, L, R,S, T |
| 70 | Kuchila | <i>Strychnos nuxvomica</i> | | C, L, R,S, T |

| # | Local name | Latine name | Trade name | Suitable cultivation area |
|----|------------|---------------------------------|------------|---------------------------|
| 71 | Nageswar | <i>Mesua ferrea</i> | | C, L, R,S, T |
| 72 | Raina | <i>Aphanamixis polystrachya</i> | | C, L, R,S, T |
| 73 | Papya | <i>Carica papaya</i> | | C, L, R,S, T |
| 74 | Tentul | <i>Tamarindus indica</i> | | C, L, R,S, T |
| 75 | | | | |
| | | | | |

Legend: C=Chunuti Wildlife Sanctuary, L=Lawachara National Park, R=Rema-Kalenga Wildlife Sanctuary, S=Satchari Reserve Forest and T=Teknaf Game Reserve

ANNEXURE-6 (Medicinal Plant Marketing in Bangladesh)

Introduction

Herbal medicine has been used in Bangladesh for centuries. The most important market for herbal medicines is rural consumers. Each year, huge amounts of raw plant ingredients are imported into Bangladesh by companies producing traditional herbal medicines. The cultivation of medicinal plants in Bangladesh is thus both profitable and environment friendly. The development of the industry has been encouraged by the Government of Bangladesh since Prime Minister inaugurated the “plantation fortnight” last year with a call to plant medicinal plants and trees.

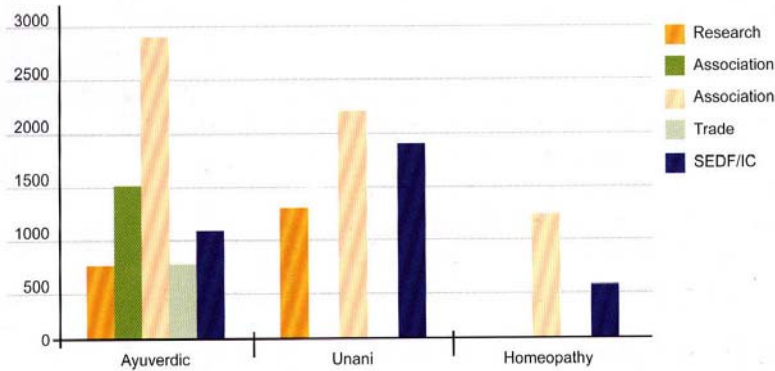
In total, it is estimated that some 12,500 tones of dried medicinal plant are sold from the Bangladeshi rural areas. These products will be worth around Tk. 255 million (\$4.5 million) to the rural economy. At the wholesale/factory gate, these products will be worth around Tk. 340 million (\$6 million). The 5,000 tones of imported medicinal plants will cost around Tk. 480 million (\$8 million). At present the total size of the medicinal plant market at wholesale prices is around \$14 million, amounting to 17,000 tones of product. Local supply accounts for about 70% by volume and 40% by value.

It is believed that there are around 350 inter-district beparis (middleman) who are serviced by 6,000 to 10,000 local collectors, pikers (wholesalers) and growers. In total there are said to be around 200 Unani and 200 Ayuverdic registered factories, plus some 70 homeopathic factories. Collectively they employ 2,000 to 4,000 people. In addition, there are said to be 5,000 qualified and 80,000 unqualified herbal practitioners in Bangladesh.

1.0 The Existing Market Situation

The SEDF/IC study estimated the turnover figures at trade for the Ayurvedic sector at around Tk.1,000 million and Unani at around Tk 1800 million, with homeopathy standing at around Tk. 500 million. Graph 1 below sets out the estimated size of the herbal medicine market for the Ayuverdic, Unani and homeopathic sectors in terms of trade prices. Estimates were provided by private sector companies, as well as by the leaders of various Processors’ Associations.

Graph 1 Estimated Size of the Market for Processed Herbal Medicines



Graph 2 places the herbal medicine sector in the context of the allopathic sector. In total, the formally processed herbal medicine sector is worth approximately 13% of the allopathic market. The Bangladeshi herbal medicine market is valued at Tk 3,300 million (approximately \$60 million) at trade prices and has been growing at over 10% per annum, exceeding the allopathic sector. The fast growth in the Unani sector is believed to be fuelled by the larger number of trained Hakims, its simpler and faster production process and the easier treatment courses than Ayurvedic medicine. Homeopathy is the smallest sector, but is reported to be growing rapidly because of the low treatment costs. However, because of the specialist nature of the herbs used and the existing low volumes of raw material required, the homeopathic sector is not considered further in this study.

Graph 2 Market Size and Annual Growth Rates of the Herbal Medicine Sectors in Comparison with the Allopathic Sector at Trade Prices



1.1 Medicinal Plants Raw Material Chain

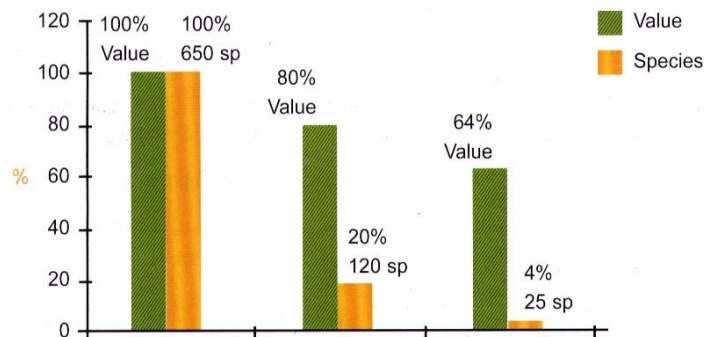
The following points summaries the important findings about medicinal plant raw material supply chain in Bangladesh

- Demand has been increasing, and is set to accelerate.
- The industry is modernizing, both by its own efforts & with the entry of corporate.
- Raw material demand is likely to increase by Tk. 300 m. over the next 5 years.
- Most of this growth (+50%) is expected to occur with the major processing companies.
- Imports are increasing; local wild harvest is unsustainable & the quality is poor.
- Companies are considering using imported herbal extracts & /or developing their own production of their raw material supply.
- Beparis (middleman) and pikers (wholesalers) are reliant on traditional techniques & knowledge.

1.2 Important Medicinal Plant Species

Collectively, some 650 different species are used by the herbal medicine sector. As graph 3 shows, even by applying the 80:20 ratio, whereby 80% of the value is represented by 20% of the species, this would still represent an unmanageable 120 medicinal plant species on which to focus. Our analysis has shown that the top 4% of species, i.e., 25 species, represent over 60% of the raw material costs. (i.e.80:20 effect). This is set out graphically in graph 3 below. This ratio has been verified through detailed analysis of processors medicinal plant buying and by applying formula to the work carried out by Kamrul Ahsan et al in their work on the “Conservation and Utilizations of Medicinal and Aromatic Plants in Bangladesh 1997”

Graph 3 80:20² Effect: Species Focus



This study has identified Bangladeshi demand for over 25 species of significant medicinal plants in terms of the Unani, Ayurvedic, and herbal practitioner and self-treatment markets. The important features are that there are only 3 products worth over \$ 1 million; two (Cheerota and Isubgul) are imported and used almost exclusively for self-treatment.

The third product is Amloki, which is used by all sectors. The second important feature is the relatively low volumes of all the products involved with only Amloki and fresh Aloe vera exceeding 1,000 tones per year. The small size of demand for the individual species highlights the importance of precisely targeting the promotion of species with growing demand and of some scale. This finding also emphasizes that herbal plant production is a very much minor industrial crops with niche markets and can be easily over-supplied.

1.3 Herbal Medicine Industry

The following points summaries the key findings on the herbal medicine industry in Bangladesh:

- Changes in legislation and new entrants will stimulate innovation, dynamism and competition in the medicinal plant sector.
- Almost all welcome the opportunity to use international Pharmacopoeia.
- The industry would like to see herbal medicine as an important and examined part of the training of MBBs Doctors as well as new Unani and Ayurvedic colleges.
- The industry is confident of the efficacy of its products especially for stomach ailments, male and female sexual health and as a tonic.
- The operation, layout & hygiene of many factories are of a low standard.
- The trade has complained that not all products actually contain the specified amounts of medicinal plants.

So, unless improvements are made in the supply chain:

At best, Bangladesh producers will not be able to benefit from the continued growth in demand for raw medicinal plants. At worst, it could further lose market share from its existing 40%, by value. To overcome these problems the key changes that need to be made are:

Improved quality

Commercialization of production

Market oriented production

Close linkages between producers and processors.

2.0 Future Influences

2.1 The Future Influence of Government Policy

2.1.1 Promotion

The government of Bangladesh has taken an active policy decision to promote the use of herbal medicines. It is achieving this through media campaigns, including advertising, and is setting about purposefully to create interest, awareness and emphasis on herbal medicines as an effective substitute for allopathic treatments.

2.1.2 Legal

Following discussions between the government and the herbal medicine sector, a number of modifications are being made to the Drug Acts and Rules and particularly under the sub-section referring to the manufacture of herbal and Ayurvedic medicines.

Effectively, the new legislation allows processors of Unani and Ayurvedic products to escape from having to adhere exclusively to the Bangladesh Pharmacopoeia and enable them to develop products based on the Pharmacopoeia from other countries. In addition, it is likely that a number of clauses under the 1982 National Drug Policy will be amended. These amendments will include the liberalization of advertising of registered Ayurvedic drugs. Ayurvedic drug manufacturing companies are likely to be entrusted exclusively with the responsibility of manufacturing agro and local component based drugs frequently used for the relief and treatment of common ailments and suffering. This clause opens the way for companies to package and market single herb treatments, which already have a market in Bangladesh (e.g. Cheerota, Isubgul)

2.2.1 The Future Influences of Commercial Factors

2.2.1 Modernization

A significant proportion of herbal medicine processing companies and, particularly, the larger and more successful operations, are in the process of undergoing modernization, e.g. Hamdard, Kundeshwari, AP, Pharmagen, Puratan Mourasha.

2.2.2 Corporates

A number of major allopathic companies have entered, or are entering, into the herbal medicine sector. These include Square, ACME, Jayson, Mystic etc. These corporations have been responsible for promoting the liberalizing of the Drug Act and particularly keen to apply science, modern marketing techniques and to open the avenues of marketing herbal products through MBBS doctors.

2.2.3 Consumers

Typically the consumer of herbal medicines is, at the moment, mainly found in the rural areas. The herbal industry considers that the urban consumer prefers the allopathic treatments, which are quick and focus on symptoms rather than the longer term and holistic herbal approach. In view of the new marketing policies being promoted by both the modernizing herbal medicine companies and the new Corporates, it is expected that the urban market will be developed and sales will accelerate.

2.3 Future Influences on the Supply Chain

2.3.1 Quality

Processors are concerned about the raw materials and, particularly, Bangladeshi medicinal plants.

2.3.2 Wild Harvest

About 90% of Bangladesh's supply is estimated to come from wild harvest, i.e. over 11,000 tones. This is a declining and unsustainable resource due to reduction in wild forest areas and increasing pressure on commercialized use of land area.

2.3.3 Imports

Imports have been increasing. This is partly due to the long term inability of Bangladesh's wild harvest to supply the demand. It is also due to the need for specific species, which cannot be grown under Bangladeshi agro-climatic conditions.

2.3.4 Extracts

Throughout the herbal medicine sector in the Indian sub-continent, a debate is under way as to whether raw material herbs can be substituted by herbal extracts of a known active ingredient. In particular, a number of the more science based companies, including those that are modernizing and the allopathic corporations are considering substituting raw plants for imported herbal extracts.

2.3.5 Cultivation

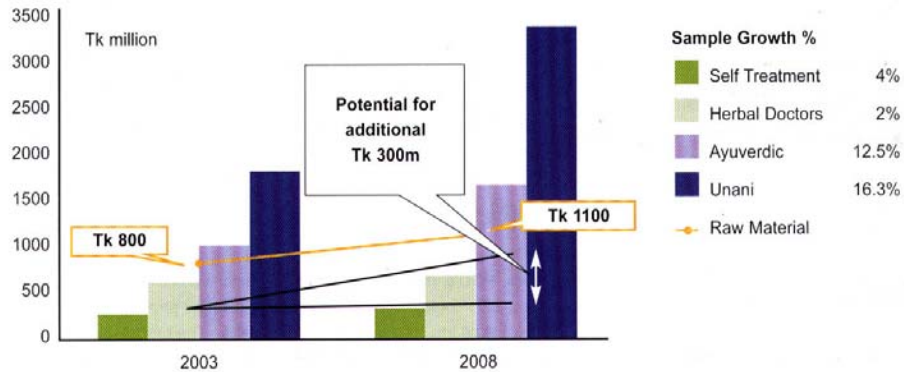
Within Bangladesh there is increased interest in commercializing the production of suitable medicinal plants. Examples of successes include Aloe Vera production near Natore and Chai (Piper Chaba) in Pirgacha. These developments have mainly been the result of private initiative by individual farmers. These efforts are piecemeal and largely unsystematic.

3.0 The future demand for Medicinal Plant Materials

3.1 Future Demand for Medicinal Plant Materials

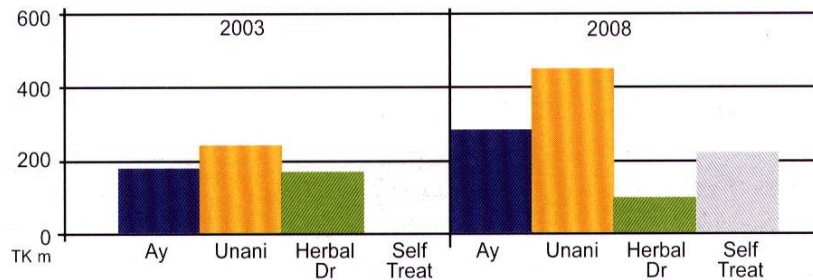
Graph 4 below projects forward the future size of the herbal market in 5 years time based on the assumption that the existing simple growth rate for self-treatment, herbal practitioners and the Ayurvedic and Unani sectors will continue. The total value of the herbal medicinal market, at trade price, is expected to increase from around Tk 3,700 million in 2003 to Tk. 5,850 million in 2008. These growth rate assumptions are conservative. As a result of the effects of the government's active promotion, market liberalization and the dynamism of the corporates, these growth rates should be exceeded. Graph 4 also demonstrated that the demand for medicinal raw materials per year is expected to increase from around Tk. 800 million to Tk. 1,100 million –an increase of Tk 300 million.

Graph 4 Market Sizes and Total Medicinal Plant requirements 2003–2008



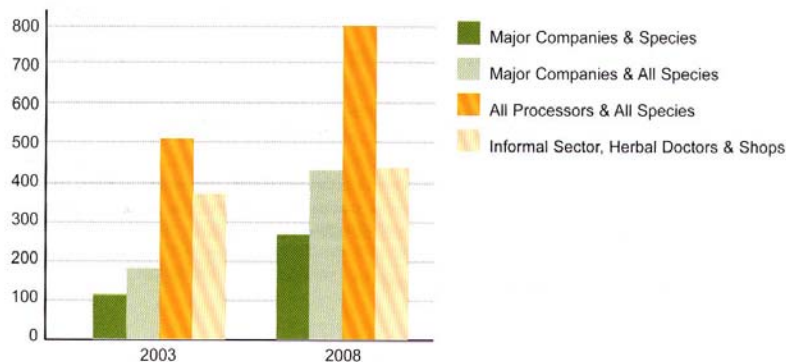
Graph 5 demonstrates that the bulk of this increased demand for raw material is likely to take place in the formal Ayurvedic and Unani sectors. Currently, Bangladesh holds around 40% by value of the medicinal herb market, worth Tk 340 million. Given Bangladesh’s reliance on an unsustainable wild harvest and its lack of a specific integrated program to develop commercialized medicinal plant production, in 5 years time it may only continue to supply Tk 340 million of raw material. In this scenario its market would drop from 40% to 30%. Conversely, with an active program to commercialize the production, improve quality and to take back market share from products that are currently being imported, Bangladesh could expect to take 60% of the market and supply Tk 660 million of product per year – an increase of Tk 320 million (over \$5 million) of increased rural income per year.

Graph 5 Demand for Raw Medicinal Plants by Sector, 2003 & 2008



Graph 6 serves to focus more precisely on where the bulk of this growth in demand is likely to take place. Given the continued and expected accelerated growth in demand for branded Unani and Ayurvedic products, and the increasing power and effectiveness of the larger companies, it is expected that the fastest growth in the demand for raw medicinal plants will occur amongst the larger companies. In particular, about half the total increase in demand for raw materials will occur amongst the larger processing companies (both Unani and Ayurvedic) and specifically for the top 25 medicinal plant species. Within this particular sector, annual growth rates are expected of around 28%.

Graph 6 Raw Medicinal Plant Requirements in terms of Major Companies, Major Species, All Processors and the Informal Sector



4.0 Possible Interventions

4.1 Creation of a Medicinal Plant Forum

Although there are a number of different association, agencies, NGO's, universities and international aid institutions, interested or operating in the medicinal plant sector, there appears to be very little communication between the different strata of the medicinal plant sector. For example, university institutions are often unaware of what the commercial sector requires. The processing sector is often relatively disconnected from the production potential and resources in the field. Until this Study was undertaken there was only anecdotal information of the size of the market and the demand by the different sectors.

From the discussions, it emerged that in order to overcome these weaknesses in communication between sectors that a Medicinal Plant Forum needed to be established. The purpose of the forum would be to enable players to exchange ideas, understand each other's roles, reduce duplication of activities and, above all, be able to chart out priorities and develop an action plan for the development of the medicinal plant sector.

As pointed out by Dr. Kamaluddin Siddiqi, Principal Secretary to the Prime Minister, the emergence of such a Medicinal Plant Forum would be extremely timely because of the government strategy for promotion of herbal medicines and the need for the disparate elements of the sector to understand each other's roles and to respond to the true of the industry.

Creating the information base for commercialized medicinal plant production

The study has indicated that there are a number of products, for which long term market opportunities have been identified. These products need to be divided into two those which have the possibility of being profitable crops to be grown on arable land. Second groups are those plants which are likely to be suitable for improved production in homesteads, field edges and small portions of land. The key elements in the short term are the identification of suitable agro-climatic locations, the selection of improved planting material and the development of agronomic practices, based largely on existing experience in the Indian subcontinent. Potential products include Arshwagandha, Dhaiful,

Peepul, Kalomegh, Tokma, Mehtha arvensis (Japanese Mint Oil), Sarpargandha, and Cheerota and Isubgul. For homesteading planting the species would include Amloki, Haritaki, Bahera and Shoto-muli. The initial work would mainly involve identifying sources of elite plant material, gathering best production practices from the Indian sub-continent and establishing suitable production locations in Bangladesh, based on combination of where the product is currently being sourced from and agro-climatic conditions.

Establishment of commercial herbal plantation is a demand of time

Private sector should come forward to establish such plantation for ensuring supply to the industry. Forest Department may lease-out degraded forest land for herbal and medicinal plantation development to the private sector. Private sector may also establish plantations with the help and expertise of Forest Department on a cost and benefit sharing basis. Establishment of herbal plantation with Government/private sector and NGO partnership on a cost/income sharing basis would improve the supply chain.

5.0 Conclusion

The study indicated that there is a huge scope for the development of the medicinal plant industry in Bangladesh. The medicinal plant sector is an important part of the rural economy; demand has been increasing and is set to accelerate. In light of this the private sector and the Government should work hand in hand to establish an appropriate environment for the production of herbal plants and the processing of the products for commercial use. Joint venture programs should also be promoted with neighboring countries (such a China or India) whose technological bases are more advanced than the local industries.

ANNEXURE- 7 (Report on a sustainable Ecotourism)

Defining Eco-Tourism

Eco-tourism focuses on local cultures, wilderness adventures, volunteering, personal growth and learning new ways to live on our vulnerable planet. It is typically defined as travel to destinations where the flora, fauna, and cultural heritage are the primary attractions. Responsible ecotourism includes programs that minimize the adverse effects of traditional tourism on the natural environment, and enhance the cultural integrity of local people. Therefore, in addition to evaluating environmental and cultural factors, initiatives by hospitality providers to promote recycling, energy efficiency, water re-use, and the creation of economic opportunities for local communities are an integral part of ecotourism.

Historical, biological and cultural conservation, preservation, sustainable development etc. are some of the fields closely related to Eco-Tourism. Many professionals have been involved in formulating and developing eco-tourism policies. They come from the fields of Geographic Information Systems, Wildlife Management, Wildlife Photography, Marine Biology and Oceanography, National and State Park Management, Environmental Sciences, Women in Development, Historians and Archaeologists, etc.

Ecotourism is considered the fastest growing market in the tourism industry, according to the World Tourism Organization with an annual growth rate of 5% worldwide and representing 6% of the world gross domestic product, 11.4% of all consumer spending - not a market to be taken lightly

Some definitions, views, statements and objectives -

Tourism is changing rapidly as nature, heritage, and recreational destinations become more important, and as conventional tourism is forced to meet tougher environmental requirements. This presents a challenge to government and private enterprise to develop new approaches to the tourism market. Successful tourism must benefit local populations economically and culturally to give them incentives to protect the natural resources which create the attraction. Strategies must be economically feasible if private investors are to support the projects.

Our goal is to enable people to enjoy and learn about the natural, historical and cultural characteristics of unique environments while preserving the integrity of those sites and stimulating the economic development opportunities in local communities.

Specifically, we believe that successful ecotourism projects must:

- effectively promote the preservation of entire local ecosystems, not just individual species, vistas or sites;
- be economically viable in order to attract financing and be sustainable;
- be well planned, financed, managed and marketed in order to meet the stringent environmental and recreational demands of a true ecotourism development.

Eco-Tourism International

Ecotourism is cultural tourism (a cross-cultural experience), nature tourism (assisting with conservation programs), a travel-learn experience (discover how we are coping with modernity), a little bit of soft adventure (just being here is an adventure), and benefiting the well-being of indigenous peoples.

Western Samoa, National Ecotourism Program

Around the globe, ecotourism is quickly becoming one of the most popular forms of vacationing.

In an era of heightened environmental consciousness and accessibility to exotic locales, countries are busily promoting their natural resources as lures for tourists. The trick with ecotourism is to preserve the natural resources while also promoting them and accommodating volumes of tourists.

Businesses are creating camps and eco-lodges, and natural resource managers are designing trails and tours. Most of the popular eco-travel destinations have fragile eco-systems, however, so it is important to maintain a careful balance between preservation and promotion -- "sustainable development" -- in order to ensure the long-term health of both the eco-systems and the tourism economies.

Science and the Environment

Tourism Concern advocates

1. Tourism that is just, yielding benefits that are fairly distributed.
2. Tourism that is participatory, recognizing the rights of residents.
3. Tourism that is sustainable.

Tourism Concern

The term ecotourism was coined by Héctor Ceballos-Lascuràin in 1983, and was initially used to describe nature-based travel to relatively undisturbed areas with an emphasis on education. The concept has, however, developed to a scientifically based approach to the planning, management and development of sustainable tourism products and activities.

It is an enlightening, participatory travel experience to environments, both natural and cultural, that ensures the sustainable use, at an appropriate level, of environmental resources and, whilst producing viable economic opportunities for the tourism industry and host communities, makes the use of these resources through conservation beneficial to all tourism role players.

It is not a marketing ploy, nor is it scenic or nature-based travel.

It is an approach that creates a variety of quality tourism products that are:

- environmentally/ ecologically sustainable
- economically viable
- socially and psychologically acceptable

The result of which reflects:

- an integrated and holistic approach to product development
- capacity building in host communities
- a sense and uniqueness of place
- commitment to the greening of the tourism industry

Centre for Ecotourism

What is Sustainable Tourism?

Its informative. Travelers not only learn about the destination, they learn how to help sustain its character while deepening their own travel experiences. Residents learn that the ordinary and familiar may be of interest and value to outsiders.

It supports integrity of place. Destination-savvy travelers seek out businesses that emphasize the character of the locale in terms of architecture, cuisine, heritage, aesthetics, and ecology. Tourism revenues in turn raise local perceived value of those assets.

It benefits residents. Travel businesses do their best to employ and train local people, buy local supplies, and use local services.

It conserves resources. Environmentally aware travelers favor businesses that minimize pollution, waste, energy consumption, water usage, landscaping chemicals, and unnecessary nighttime lighting.

It respects local culture and tradition. Foreign visitors learn about and observe local etiquette, including using at least a few courtesy words in the local language. Residents learn how to deal with foreign expectations that may differ from their own.

It does not abuse its product. Stakeholders anticipate development pressures and apply limits and management techniques to prevent the "loved to death" syndrome. Businesses cooperate to sustain natural habitats, heritage sites, scenic appeal, and local culture.

It strives for quality, not quantity. Communities measure tourism success not by sheer numbers of visitors, but by length of stay, money spent, and quality of experience.

It means great trips. Satisfied, excited visitors bring new knowledge home and send friends off to experience the same thing - which provides continuing business for the destination.

What is the difference between ecotourism and nature-based travel?

While nature-based tourism is just travel to natural places, ecotourism provides local benefits - environmentally, culturally and economically. A nature-based tourist may just go bird watching; an eco-tourist goes bird watching with a local guide, stays in a locally operated eco-lodge and contributes to the local economy.

Where does Sustainable Tourism fit in?

Sustainable Tourism embraces all segments of the industry with guidelines and criteria

that seek to reduce environmental impacts, particularly the use of non-renewable resources, using measurable benchmarks, and to improve tourism's contribution to sustainable development and environmental conservation.

Sustainable Ecotourism -

- Minimizes environmental impacts using benchmarks
- Improves contribution to local sustainable development
- Requires lowest possible consumption of non-renewable resources
- Sustains the well-being of local people
- Stresses local ownership
- Supports efforts to conserve the environment
- Contributes to biodiversity.

Canopy walkway

A constructed bridge walkway through the tree tops of a forest.

Conservation enterprises

Income generating activities that focuses on conserving natural resources and ecosystems.

Ecosystem

A dynamic complex of plant, animal, fungal and micro-organism communities and theirs' associated non-living environment interacting as an ecological unit.

Ecotourism

A responsible travel to natural areas which, conserves the environment and sustains the livelihood of local people.

Ecotourism activities

Activities included in a tour that are designed to entertain clients and are coordinated by a professional guide or interpreter. Over 80 activities have been listed for ecotourism, such as bird watching, hiking, diving, kayaking, participating in cultural events, photography, and mountaineering.

Ecotourism product

A combination of resources, activities, and services, which are sold and managed through professional tour operators.

Ecotourism resources

Natural and cultural features that attract visitors, such as landscapes, endemic or rare flora and fauna, cultural festivals, and historical monuments.

Ecotourism services

Tourism services such as transportation, food, lodging, guiding and interpretation services which cause minimal damage to the biological and cultural environments and promote a better understanding of the natural and cultural history of an area.

Endemism

The level of species that occur naturally only in a specific region or site.

Stakeholders

Individuals who have a vested interest in development, including community members; environmental, social, and community NGOs; natural resource, planning, and government officials; hotel owners, tour operators, guides, transportation providers, and representatives from other related services in the private sector.

Sustainable development

Development that meets the needs and aspirations of the current generation without compromising the ability to meet those of future generations.

Source: The Ecotravel Center

Principles of Sustainable Tourism

Increasing evidence shows that an integrated approach to tourism planning and management is now required to achieve sustainable tourism. It is only recently that there has been a growing recognition of the importance of combining the needs of traditional urban management (transportation, land use planning, marketing, economic development, fire and safety etc.) with the need to plan for tourism.

Some of the most important principles of sustainable tourism development include:

- Tourism should be initiated with the help of broad-based community-inputs and the community should maintain control of tourism development.
- Tourism should provide quality employment to its community residents and a linkage between the local businesses and tourism should be established.
- A code of practice should be established for tourism at all levels - national, regional, and local - based on internationally accepted standards. Guidelines for tourism operations, impact assessment, monitoring of cumulative impacts, and limits to acceptable change should be established.
- Education and training programs to improve and manage heritage and natural resources should be established.

ANNEXURE-8 (Types of end products, raw materials used and their sources)

Bamboo, patipata and rattans are the raw materials used to make different types of products such as basket, mat, hand fan, sieve etc. All type of bamboo are collected from the nearby protected forest areas and homesteads. Patipata and rattan are collected from homesteads. Shortage of quality raw materials is a positive threat for further development of FBSSREs in the study area as mentioned by the concerned. Consequently, prices of the raw materials are increasing day by day. The natural stocks in the protected areas are also depleting at the increasing rate.

Name of products derived from specific species:

| Name of products | Specific species |
|-----------------------------------|---|
| Basket | Bambusa tulda, B. vulgaris, B. polymorpha, B. nutans, Melocana baccifera, Dendrocalamus gigantens, Cephalostachyum pargracile, Oxytenanthera nigrociliata, Pseudostachyum polymorphum |
| Walking stick | Oxytenanthera niaraciliata |
| Loading vessels | Teinostachyum dulloa |
| Cooking utensils | Teinostachyum dulloa, Bambusa arundinacea, Cephalostachyum pargracile, dendrocalamus hamiltonii and melocann baccifera |
| Bows and arrows | Cephalostachyum pargracile |
| Mats | Bambusa arundinacea, Cephalostachyum pargracile, dendrocalamus hamiltonii and melocann baccifera Cephalostachyum pargracile, Bambusa tulda |
| Water/salt/milk vessels Chunga | Bambusa tulda, Dendrocalamus giganteus, Melocannana baccifera |
| Furniture | Bambusa tulda, Melocanna baccifera |
| Agricultural implements | Bambusa vulgaris, Bambusa balcooa, all thinner varieties of bamboo |
| Hooka pipes | Teinoastachyum grifithii |
| Tool handle | Bambusa polymorpha, All solid varieties of bamboo |
| Fishing rods | Dendrocalamus strictus, thyrostachys oliveri, bambusa species |
| Trays for silk worms | Bambusa aurindacea and all other available bamboos |
| Tent poles | All solid varieties of bamboo |
| Sticks for doors& window | Bambusa aurindacea, Bambusa vulgaris, Bambusa polymorpha, Dendrocalamus longispathus, Melocanna baccifera |
| Pipes | Bambusa aurindacea, Neohozenus dullooa |
| Scaffolding | Bambusa aurindacea |
| Cradles | Bambusa aurandicea |
| Cart yokes | All long sized, hard and solid bamboos |
| Ladders | Bambusa aurindacea, Bambusa vulgaris |
| Musical instruments | Dendrocalamus longispathus |
| Container for storing grain | All available bamboos |
| Cart sheet roofs | All available bamboos |
| Country tiles | Bambusa aurindacea |
| Pen stand | Neohozeaua dullooa Teirostachyum grifithii |
| Seed drills | Dendrocalamus strictus |

Name of products with raw materials used:

| Raw materials used | Products |
|--|--|
| Ora bansh, lata bansh, Jali bet, Golla bet | Kai, |
| Patipata | Pati, packing materials, shital pati, Jaynamaz |
| Ora bansh, Jali bet | Mora |
| Ora bansh | Hand fan |
| Ora bansh, Jali bet | Chaluni |
| Wood based | Ashtray, wooden box, wall mat, fruit basket, table lamp stand, pen holder, candle stand, clock box, baby toy set, powder box, cotton bud case, chess board, hard board |
| Bamboo based | Flower vas, fruit basket, paper tray, wastage basket, door screen, mora, hand fan, photo frame, pen holder, bookshelf, chatai, tukri |
| Cane based | Candle, sofa, walking stick, stick, mirror frame, hand fan, bookshelf, decorative mora |
| Grass/ hogla based | Jhuri, Different mats |
| Seed based | Earning, Ornamental set |
| Leaf based | Palm leaf fan (tal pata fan) |
| | |

ANNEXURE-9 (The priority species, by value and sector)

Ten priority species, by value and sector

| Ayurvedic | Unani | Self treatment |
|---------------|---------------|----------------|
| Amloki ◇ | Ada ◇ | Cherota △ |
| Ashwagandha △ | Amloki ◇ | Isubgul △ |
| Ada ◇ | Join □ | Amloki ◇ |
| Arjun □ | Bel shoot □ | Methi ◇ |
| Pipul △ | Ashwagandha △ | Haritaki ◇ |
| Mutha □ | Basak □ | Tokma □ |
| Bahera ◇ | Pipul △ | Aloe vera □ |
| Haritaki ◇ | Tulsi □ | Kalomegh □ |
| Dhaiful △ | Mutha □ | Ekangi □ |
| Join □ | Haritaki ◇ | Ulatkambol □ |

Legend: □ Local production ◇ Partly imported △ Mainly imported

Annexure-10 (Medicinal plant demand by major product and Market sector in Tk. And tones)

| Medicinal plants | | Ayurvedic | | Unani | | Herbal Doctor | | Self treatment | | Total | |
|------------------|--------------------------------|-----------|-----|--------|-----|---------------|-----|----------------|------|--------|-------|
| Local name | Latin name | Tk'000 | MT | Tk'000 | MT | Tk'000 | MT | Tk'000 | MT | Tk'000 | MT |
| Cherota | <i>Swertia chirata</i> | 381 | 7 | | | 95 | | 100 | 200 | 100476 | 201 |
| Isubgul | <i>Plantago ovata</i> | | | | | | | 100000 | 800 | 100000 | 800 |
| Amloki | <i>Emblika officinalis</i> | 17103 | 342 | 17332 | 347 | 8609 | 172 | 25000 | 500 | 68045 | 1361 |
| Ada | <i>Zingiber officinalis</i> | 6951 | 126 | 17830 | 324 | 6195 | 113 | | | 30976 | 563 |
| Ashwagandha | <i>Withania somnifera</i> | 14867 | 124 | 8566 | 71 | 5858 | 49 | | | 29291 | 244 |
| Join | <i>Trychospermum ammi</i> | 3205 | 92 | 14904 | 426 | 4527 | 129 | | | 22636 | 647 |
| Bel shoot | <i>Aegel mermelos</i> | 12 | | 10587 | 331 | 2650 | 83 | 3309 | 20 | 16558 | 434 |
| Pipul | <i>Piper longum</i> | 5154 | 52 | 5871 | 49 | 2756 | 25 | | | 13782 | 126 |
| Mutha | <i>Cyperus rotundus</i> | 4952 | 165 | 5022 | 167 | 2493 | 83 | | | 12466 | 416 |
| Basak | <i>Adhatoda vasica</i> | 1867 | 41 | 7528 | 167 | 2349 | 52 | | | 11744 | 261 |
| Arjun | <i>Terminalia arjuna</i> | 5749 | 192 | 2178 | 73 | 1982 | 66 | | | 9909 | 330 |
| Methi | <i>Trigonella foenum</i> | 16 | | 960 | | 244 | | 12150 | 270 | 13369 | 270 |
| Haritaki | <i>Terminalia chebula</i> | 3882 | 243 | 3600 | 225 | 1870 | 117 | | 250 | 8458 | 814 |
| Tokma | <i>Hyptis suaveolens</i> | | | | | | | 12000 | 300 | 1200 | 300 |
| Tulsi | <i>Ocimum sanctum</i> | 8 | | 5503 | 183 | 1378 | 46 | | | 6889 | 230 |
| Gritokumari | <i>Aloe vera</i> | 8 | | | | 2 | | 10000 | 1000 | 10010 | 10000 |
| Ulatkambal | <i>Abroma auguta</i> | 4 | | 3466 | | 868 | | 2000 | 100 | 6338 | 100 |
| Dhaiful | <i>Woodfordia fruticosa</i> | 3676 | 167 | 766 | 34 | 1108 | 50 | | | 5540 | 252 |
| Kalajira | <i>Nigella sativa</i> | | | 215 | 30 | 54 | 7 | 7000 | 200 | 7269 | 237 |
| Kalomegh | <i>Andrographis paniculata</i> | 148 | 5 | 1845 | 61 | 498 | 17 | 3000 | 200 | 5491 | 283 |
| Mouri | <i>Foeniculum vulgare</i> | | | 3369 | 61 | 842 | 15 | | | 4211 | 77 |
| Ekangi | <i>Zingiber zerumbet</i> | 4 | | 764 | 25 | 192 | 6 | 4500 | 150 | 5460 | 182 |

| Medicinal plants | | Ayurvedic | | Unani | | Herbal Doctor | | Self treatment | | Total | |
|---|----------------------------|-----------|------|--------|------|---------------|------|----------------|------|--------|-------|
| Local name | Latin name | Tk'000 | MT | Tk'000 | MT | Tk'000 | MT | Tk'000 | MT | Tk'000 | MT |
| Shimul | <i>Salmalia malabarica</i> | 2466 | 35 | 623 | | 772 | 9 | | | 3861 | 44 |
| Shatamuli | <i>Asparagus racemosus</i> | 2559 | 73 | 286 | | 711 | 18 | 249 | 50 | 3806 | 141 |
| Pudina | <i>Mentha arvensis</i> | 1276 | 27 | 756 | 16 | 508 | 11 | | | 2540 | 53 |
| Neem | <i>Azadirachta indica</i> | 338 | 17 | 1206 | 60 | 386 | 19 | | | 1931 | 97 |
| Bhuikumra | <i>Ipomea digiata</i> | 1634 | 136 | | | 408 | 34 | | | 2042 | 170 |
| Sarpagandha | <i>Rawolfia serpentina</i> | 1556 | 35 | | | 389 | 9 | | | 1945 | 43 |
| Sub total main species | | 82580 | 2191 | 115170 | 2786 | 49437 | 1244 | 279209 | 4290 | 526396 | 10510 |
| Average values | | 38 | | 41 | | 39 | | 65 | | 50 | |
| Estimated total size including crops & imported items | | 206450 | 5477 | 174499 | 4220 | 98874 | 2488 | 279209 | 4290 | 759033 | 16476 |
| Major companies | | 82580 | 2191 | 104700 | 2532 | | | | | 24605 | 4723 |
| Major companies and major items | | 49548 | 1315 | 62820 | 1519 | 35594 | | | | 147963 | 2834 |

Annexure-11 (Photo album of the field observation)



1 Present position of the Chunity Wild Life Sanctuary



2 Present position of the Chunity Wild Life Sanctuary



3 Illicit felling of the trees in Lawachara National Park



*4 Illicit
felling of
the trees in
Lawachara
National
Park*



*5 Scope of
the
plantation
in the
Teknaf
Game
Reserve*



*6 Scope of
the
plantation
in the
Teknaf
Game
Reserve*



7 Discussion meeting with the forest villagers in Chunity



8 Discussion meeting with the forest villagers



9 One villager is processing a Chatai in Satchari



10 A girl is processing cane in Lawachara



11 A girl is processing bamboo in Rema-Kalenga



12 A girl is processing cane in Lawachara