

ASIA-PACIFIC FORESTRY SECTOR OUTLOOK STUDY II

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BHUTAN FORESTRY OUTLOOK STUDY

by

Dhan B. Dhital



**FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS
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INFORMATION NOTE ON THE ASIA-PACIFIC FORESTRY SECTOR OUTLOOK STUDY

The Asia-Pacific Forestry Sector Outlook Study (APFSOS) is a wide-ranging initiative to gather information on, and examine, the evolution of key forestry issues as well as to review important trends in forests and forestry. The main purpose of the study is to provide a better understanding of the changing relationships between society and forests and thus to facilitate timely policy reviews and reforms in national forest sectors. The specific objectives are to:

1. Identify emerging socio-economic changes impacting on forest and forestry
2. Analyze probable scenarios for forestry developments to 2020
3. Identify priorities and strategies to address emerging opportunities and challenges

The first APFSOS was completed in 1998, with an outlook horizon to 2010. During its twenty-first session, held in Dehradun, India, in April 2006, the Asia-Pacific Forestry Commission (APFC) resolved to update the outlook extending the horizon to 2020. The study commenced in October 2006 and is expected to be completed by September 2009.

The study has been coordinated by the Food and Agriculture Organization of the United Nations (FAO), through its regional office in Bangkok and its headquarters in Rome, and implemented in close partnership with APFC member countries with support from a number of international and regional agencies. The Asian Development Bank (ADB), the International Tropical Timber Organization (ITTO), and the United Kingdom's Department for International Development (DFID) provided substantial financial support to implement the study. Partnerships with the Asia-Pacific Association of Forest Research Institutes (APAFRI) and the Secretariat of the Pacific Community (SPC) supported the organizing and implementing of national focal points' workshops and other activities, which have been crucial to the success of this initiative. The contributions of many other individuals and institutions are gratefully acknowledged in the main APFSOS report.

Working papers have been contributed or commissioned on a wide range of topics. These fall under the following categories: country profiles, sub-regional studies and thematic studies. Working papers have been prepared by individual authors or groups of authors and represent their personal views and perspectives; therefore, opinions expressed do not necessarily reflect the views of their employers, the governments of the APFC member countries or of FAO. Material from these working papers has been extracted and combined with information from a wide range of additional sources to produce the main regional outlook report.

Working papers are moderately edited for style and clarity and are formatted to provide a measure of uniformity, but otherwise remain the work of the authors. Copies of these working papers, as well as more information on the Asia-Pacific Forestry Sector Study, can be obtained from:

Mr. Patrick Durst
Senior Forestry Officer
FAO Regional Office for Asia and the Pacific
39 Phra Atit Road
Bangkok 10200
THAILAND
Ph. (66-2) 697 4000
Fax: (66-2) 697 4445
Email: patrick.durst@fao.org

EXECUTIVE SUMMARY

Key factors impacting forests and forestry in the country

The following are the major drivers of change in the forestry sector:

- (i) Economic change
- (ii) Impacts of globalization
- (iii) Political changes and institutional development
- (iv) Demographic changes and rural-urban migration
- (v) Environment awareness including climate change
- (vi) Societal transition and their impacts
- (vii) Technological changes

Out of the above-mentioned seven key drivers of change, the following three have been identified as the most important and uncertain that are going to impact the forestry sector:

- (i) Economic change
- (ii) Impacts of globalization
- (iii) Political change

An alternative approach to development, as enshrined in the *Gross National Happiness* philosophy, will be strongly pursued under the Parliamentary democracy system of the government. There are both strengths and weaknesses because of the various situations prevailing in the country. The strengths and weaknesses of the country identified are:

Strengths: (i) Low population base and density; (ii) strong spiritual ties and cultural traditions emanating from the concept of *Gross National Happiness*; (iii) relatively high per capita natural resources; (iv) relatively strong social stability; (v) an ongoing effort to establish a strong democratic government; (vi) a strong effort to decentralize and devolve decision making authority at the local level; (vii) a good opportunity for promoting cultural and eco-tourism; (viii) a very high scope for promoting organic agricultural/horticultural products.

Weaknesses: (i) Relatively high level of rural poverty; (ii) low per capita income in rural areas; (iii) high dependence on subsistence agriculture; (iv) very limited skills; (v) inaccessibility of the major part of the country; (vi) relative isolation, which limits opportunities; (vii) development primarily driven by external factors; (viii) high scope for rapid globalization.

The development efforts, until now, have focused on (a) developing hydropower resources for generating revenue for the country by selling the power; (b) improving the education and health system; and (c) construction of road networks for improving accessibility.

Under the situations mentioned above, the private sector has not been able to develop to the required level. The tax base is also very low. Further there is a very high dependency on external assistance for implementing all development activities. This external development assistance may decline in the context of increasing income from the generation and sell of hydropower. The income level is further likely to go up with more new power projects being commissioned.

Another very critical situation is that Bhutan is a landlocked country and as a result it faces serious limitation in market access. Further the country is located between two giant and strongly emerging economies, therefore it faces both challenges and opportunities. Based on this situation the following different scenarios are likely to unfold over the years focusing on

economic performance, income distribution, poverty, trade, policies and institutions. The most likely scenarios are described hereunder:

Scenario 1

Gradual transition of the existing subsistence agrarian economy into a more diversified middle income rural economy maintaining societal cohesion, cultural value, etc. in accordance with the concept of *gross national happiness*

Bhutan, in general, is an agrarian society with about 69 percent of the population depending on subsistence agriculture. The country has been exploring different options for development. The development efforts, up till now, have to a greater extent focused on (i) development of the hydropower sector; (ii) improving education and health care systems; and (iii) improving accessibility through the construction of road networks etc.

Over the years, because of the diversified economy, the GDP has started growing steadily. The growth rate is very progressive and strong. In 2005 it was 6.5 percent and in 2007 it reached 8.5 percent. Further it is predicted that within the next five year period, the growth rate might reach double digits. The indication is very promising and it is quite possible that, within next decade, people's purchasing power will leap. The agrarian economy will be gradually transformed into a strong economy as a result of diversified activities.

Gross National Happiness (GNH), which has been adopted as a development philosophy by the government, was advocated by His Majesty the Fourth King of Bhutan. The GNH philosophy puts happiness of the people over and above gross domestic products. The GNH philosophy of development strongly tries to promote economic growth by maintaining society's cohesion and cultural value.

It is very probable that the GDP growth rate may reach 12 to 13 percent by 2015 but the people living in the rural areas may still be poor. The ripple effects of the growth are likely to be minimal in rural areas. Therefore the net effect would be continuing large numbers of rural people migrating to urban centres in search of employment. On the other hand people living in the rural areas would still exert pressure on the forest. They would continue to depend on the surrounding forest for timber, fuelwood and non-wood forest products (NWFPs).

As indicated above, GDP growth is very progressive and steady which is mainly fuelled by the sale of electricity to India and by the tourism industry. Both of these sectors are urban-based industries and therefore they will not be able to generate enough jobs for the unemployed in rural areas. In this context, jobless people from rural areas will still continue to move to urban centres in search of jobs. The manufacturing and production sectors are quite weak. therefore it is probable that economic growth will not offset the increase in people seeking jobs. This situation has led to an unemployment rate of 3.2 percent which might increase in coming years.

The implications of strong economic growth in urban areas and the gradual transition of a subsistence agrarian rural economy into a middle income economy will mean that the demand for construction timber and firewood will also increase, both in rural as well as in urban areas. This will put extremely heavy pressure on forest resources. Rural people who have been depending on NWFPs will demand more access to NWFP resources in coming years.

Scenario 2

Development primarily driven by external factors leading to the advancement of a dual economy and resulting in rapid globalization

The development programmes are primarily driven by external factors especially because of the demand for resources like hydropower, forest products, and tourism. This will help to develop a dual economy i.e. the revenue generated through the sale of electricity, forest produce and tourism will be concentrated in urban areas while subsistence agriculture, in rural areas, will remain unchanged.

Mass tourism is expected to witness rapid expansion in coming years. People from all over the world are very interested in visiting Bhutan. Tourism, in general, is an urban-based industry which normally helps people living in urban areas but rural people do not receive anticipated benefits.

Globalization is inevitable but there are both opportunities and challenges. Since Bhutan is a landlocked country, accessibility, transportation and communication are limiting factors for efficient market access. The other limiting factor is skilled labour which means products cannot compete in terms of quality and price in the international markets.

On the other hand if proper planning is done then there are major opportunities because the country is situated between two huge emerging economies. The market is very large and wide-ranging.

Scenario 3

The ongoing political changes will pave the way for the establishment of parliamentary democracy that will support institutional and policy reform and devolution of decision making authority at the local level

Under this scenario the political changes that are taking place in the country are central for all policies and programmes. Bhutan has been monarchic for over hundred years. In 2008 an unparalleled political change took place. The country transformed from monarchic rule to a parliamentary democracy. The initiative for this historic political change came right from the Throne. A democratically elected government has been installed in the country. The development philosophy propounded by the government is based on GNH.

Under this political system people in rural areas will be politically more cognizant and it is evident that they will demand more social equity and forest products. People will be more concerned about conserving biodiversity and be stricter in implementing forest management plans so that the forests are managed in a sustainable manner.

The role of various institutions of the central government, local government, private sectors, civil society organizations and the communities will be more organized and clearly defined. The role of central government organizations will be more advisory and provide technical backstopping. Local government offices will take the lead role in implementing the programmes and projects in the Dzongkhags (districts). Civil societies working in the forestry sector will also be more active in their field of specialization.

The people living in rural areas will get an opportunity to participate in the political process. Management responsibility of forest resources will be devolved at the local level. Therefore the democratically elected government will be strong enough to devolve governance responsibility of the forest to the local level.

Further the involvement of the private sector in forestry activities will increase. Distribution and marketing of natural resources, especially construction timber, will be decentralized to local people. The allocation and marketing of commercial timber will be done by a government-owned corporation (Natural Resources Development Corporation Limited, NRDCL).

It is also foreseen that the conservation and management of wildlife will be given higher importance. People will have better understanding of the importance of National Parks and Wildlife Sanctuaries. It is also likely that more tourists will visit these areas. Thus the revenue from the Parks and Sanctuaries will also increase. On the other hand, there are also apprehensions on benefits going to local people (from the higher revenues from Parks and Sanctuaries). Benefits will be channelled only if community-based management of natural resources is promoted and also management of most of the services is outsourced to local people. Community-based eco-tourism is one avenue for alleviating rural poverty.

Urban forestry will be developed in and around urban centres and cities. There will be more facilities for recreation in all urban centres. Another programme that is likely to be strongly promoted is the establishment of rural cottage industries based on horticultural and agricultural products and NWFPs.

With more decision-making power devolved at the local government level, and development of cottage industries in rural areas, the rural–urban migration of people might be reduced to a great extent. Under such situations, the demand for construction timber and firewood will increase in urban areas. The wood energy and industrial wood supply demand balance may become negative.

Management of local natural resources will be handed over to local government institutions. With such reforms taking place both at central and local levels, there will be very proactive management of forest resources. Local institutions should work towards improving the local resource situation with regard to timber as well as NWFPs.

Agriculture–forestry interface issues

Bhutan being a mountainous country, the topography is very rugged and the settlements are mostly concentrated in the valleys. Agriculture and horticulture production and livestock rearing depend on the availability of land which faces serious competition amongst other land uses like infrastructure development, food production and also area for the settlement itself. Therefore there are always potential threats from other quarters to forests.

With 69 percent of the population living in rural areas and engaged in economic activities that are based on natural resources, enhancement of rural livelihood is an important development objective of the Royal Government of Bhutan. Therefore it is pertinent that making rural livelihood more productive and sustainable will form the core development area of the sector.

On the energy front, there is also a strong possibility that demand for energy could be one of the strong drivers which might exert more pressure on forest land. The forestry professionals are likely to face an array of economic, environmental, cultural and technological problems for the use of land based on sustainable principles.

Deriving benefits by practicing sustainable management of forests is often less profitable than large-scale production of food, feed or energy crops. In many cases this situation has propelled forest conversion to other land uses especially in developing countries.

It is therefore very important that sustainable management of forest resources is conducted to achieve the objectives of the Millennium Development Goals; this requires balancing

economic, social and environmental aspects in decision making and achieving synergies between forest, agricultural and energy land uses. Integrated approaches to national land-use and resource planning can help to balance food, feed and biofuel production.

Land-use change

Until now, because of the strong conservation policies pursued by the Government, there is no major land-use change from forestry to other uses. However, in future, with increasing population and infrastructure development and more area required for food production the situation is going to change. Further, dependency on agriculture is decreasing day by day because of the strong growth of non-agricultural sectors, e.g. infrastructure development, industrial development etc.

Construction of various categories of roads is an important development activity which contributes to the conversion of forest land to other uses. The total road network in 2001 was 3,215 kilometers which became 4,000 kilometers in 2004 and in 2005 it was 4,398 kilometers. There is a very strong increasing trend. During five-year period the increase in the length of road networks was 1,184 kilometers indicating an average of about 234 kilometers of various categories of road per year.

With the development of hydropower projects, road networks within the project area have also been increasing. These roads have both positive as well as negative impacts. The roads have contributed to accessibility and connection to various villages in the vicinity of the project area. On the other hand, infrastructure development and road construction have led to forest degradation and fragmentation.

Rural development and impacts on forests

Agricultural development is very important for promoting sustainable rural development. The contribution to the GDP, by this sector, is quite significant. However the contribution from this sector is decreasing. In 2000, the contribution from the agricultural sector was 36 percent (18 percent agriculture, 8 percent livestock and 10 percent forestry). The arable agricultural land constitutes only about 7.7 percent of the total land area and this land is not available in a contiguous stretch. The land is fragmented and scattered in difficult terrain. This situation is making the practice of intensive agriculture difficult (UNDP, 2002).

During the coming tenth five-year plan period, the Government has accorded high priority to developing rural enterprises, in which the focus will be to concentrate more on non-farm rural enterprise development besides conventional agriculture, livestock and horticulture development. Non-farm rural enterprises will be natural resource-based and since the forest occupies more than 72.5 percent of the area the forest is going to be the biggest supporter for developing rural enterprises based on natural resources like: (i) traditional handicrafts using raw materials from the forest; (ii) cane and bamboo products; (iii) incense manufacturing using raw materials from the forest; (iv) traditional paper making etc.

Such development initiatives will also be able to address rural–urban migration and also migration of rural people from higher altitude areas to lower altitude areas. The income-generating activities at the rural level should be able to retain youth from going to urban centres in search of better opportunities.

Future energy demand and its implications on forests

Based on the study conducted by the Department of Energy in 2005, the future demand for energy is going to increase. The study also says that the major portion of the energy consumed (58.96 percent) in the country is biomass energy, which is basically firewood. Electricity is second to firewood (13.81 percent). This trend is going to continue and wood will be the major source of energy in future especially in the rural areas. Since time series data on fuelwood consumption are not available it is not possible project the trend of fuelwood consumption in future.

Therefore it is very much probable that traditional biomass is going to be a very important source of energy in the future. It is also foreseen that most woodfuel is expected to come from the government-managed natural forests. This situation is going to put enormous pressure on the forest. There is apprehension that the forest area, especially in the vicinity of settlements, could be affected or degraded. Therefore, community forests and private forests need to be promoted so that a significant portion of fuelwood demand can be met from these categories of forest; a small percentage could come from government-reserved forest.

Emerging trend in the production of fuel and potential implication on the forestry sector

The cost of fossil fuel is soaring at an alarming rate and very soon it will become unaffordable in many countries. It will hit worst in countries where the entire consumption depends on imports. The countries in the region are spending huge sums of money on research and development and promoting the production of biofuel from plants. The trend is expected to occur in Bhutan as well. However it is foreseen that if biofuel production picks up greatly then there could be heavy pressure on government-reserved forest. Large tracts of forest area could be converted to other land use. The implication would be reduction in forest areas. Further people might also use their agricultural land for raising plantations of those species that can be used for producing biofuel. This might impact the food security of the country severely.

Past trends and current state of forests and forestry

The total forest area as reported by the Ministry of Agriculture in the 1995 Land Cover Figures for Bhutan (National Figures) is 29,045 square kilometers which constitutes about 72.5 percent of the land area. As reported in FRA 2005 Bhutan's forest area increased by about +0.33 percent during 2000–2005 (FAO, 2005). Out of the total forest area about 14 percent is economically accessible forest. The balance forest areas are classified as Protected Areas (26.23 percent) and biological corridors (9 percent). The balance forest areas are either not accessible for harvesting or can be only brought under management after improving technology.

State of forest resources in 2020

People living in rural and urban areas are likely to be in equal proportion by 2020; as such the pressure on forest which is prevalent at present will remain at the same level. Even though the forest area has increased slightly, in coming years encroachment on forest area is likely to increase because of urbanization affecting the cover and density of the forest. The production forest area may be affected but the area under protection forest might remain at the same level. The decision-making authority for planning and resource utilization will be devolved at the local level. Community and private forestry will be boosted and promoted. Prioritized NWFPs will be promoted on a commercial scale which will support establishing cottage industries based on them. In National Parks and Wildlife Sanctuaries, community-based ecotourism based on the community management concept will be developed which will help rural people to earn extra household income. Wood will still continue to be the major source

of energy in rural areas whereas in urban areas people will switch over to electricity, LPG, kerosene etc. as major sources of energy.

The production forest is under tremendous pressure from other activities as a result of urbanization and also for meeting the requirement for other development activities. Therefore in order to augment the area that might be lost, degraded areas will be taken up for plantation by wood-based industries on lease, and also by the Department of Forest. Part of the demand for timber, firewood and NWFPs will be met from planted forests, community forest and also from private forests. Therefore it can be foreseen that the area under plantation will increase greatly in future.

Urban forestry is picking up fast in the cities and in the vicinities of the urban centres. In the next five- to ten-year period many such parks and botanical gardens will be created. In fact with increasing income, people living in urban areas will demand more of these facilities. Further, avenue plantations are also increasing in towns and cities. Therefore the future prospect for urban forestry is very bright.

Protected areas

The Government has a very strong conservation policy therefore in the foreseeable future Protected Areas will not be reduced. With the buying power of the people increasing there will be more strict conservation and management practices put in place in National Parks and Wildlife Sanctuaries. Eco-tourism based on the community management concept will be promoted wherever there are communities living inside the Parks and Sanctuaries. This will help the people living within the Protected Areas in augmenting their household income. On the other hand if there are no communities living inside the Parks, eco-tourism will be implemented through the Parks and Wildlife Sanctuaries Management.

Demand and supply of forest products to the year 2020

The in-country production of construction timber will not be able to meet the growing demand. Since the demand will be many times higher than what can be produced, pressure on forests will also be very high. Therefore it is foreseen that the demand–supply balance for construction timber as well as firewood will be negative. In many cases the demand will have to be met by importing timber from other countries. It is also expected that a major portion of the demand could be met from community and private forests. For this the community and private forestry programme will have to be pursued vigorously.

Future of forest industries in the country

The technologies in wood-based industries have not improved in the past several years. They have remained at the same level that was prevalent eight to ten years back. Since the volume of round timber production is quite small compared to the number of sawmills and wood-based industries available in the country, the industries do not feel comfortable in investing in improving technology. Therefore within the next two decades wood-based industries that require very clean and straight-boled timber are likely to have difficulty in finding raw materials within the country. Further there is also the possibility that industries requiring large logs will face raw material shortage. Therefore wood-based industries will have to survive by importing timber or fade away. Only those industries that use low quality and small-sized wood and produce internationally competitive products are likely to remain in the business.

Non-wood forest products

Bhutan has a major opportunity to develop cottage industries in rural areas based on NWFPs as raw materials. Many of these NWFPs are used by villagers for their use only. However

there are 10 to 12 prioritized NWFPs which have great potential for development and promotion on a commercial scale. Further there are also many NWFPs that have medicinal values and in the foreseeable future it is perceived that there will be many farmers taking up these species for domestication. A strategy needs to be prepared clearly indicating the road map for future NWFP development. Species like *Cordyceps sp.*, *Matsutake* mushroom, and bamboo have great cottage industry potential. In the foreseeable future there will be number of small cottage industries where value addition will be promoted for a few prioritized NWFPs, targeting export markets.

Forests as a source of energy – current situation and anticipated changes

Wood will continue to remain as one of the main sources of energy in rural areas. Rural people will continue to use wood as the principal source of energy whereas people living in urban areas will use other sources of energy like electricity, LPG, kerosene etc. The major portion of this wood is likely to come from government forest. There will be heavy pressure to produce more wood for fuel. However since the Department of Forest is putting much effort into promoting community and private forestry and raising plantations in degraded areas, it is anticipated that part of the fuelwood demand will be met from these forests. Further since the impacts of climate change are also being felt in Bhutan, there will be a strong policy to reduce emissions especially from the use of fossil fuels.

Even though electricity is expected to reach all villages in the country by 2020, energy will not come from grid electricity alone. Such energy available to individual households will be minimal and households will still have to depend on fuelwood to meet their balance energy requirement.

Emerging importance of the environmental functions of forests

One of the most important environmental functions will be to promote forestry initiatives to reduce the impacts of climate change. The effects of climate change, in Bhutan, will also be felt in other areas like (i) water security (ii) food security and (iii) hydropower generation.

Social functions of forests

Forestry-related activities are mostly part-time and off-season. They include (i) logging works in the Forest Management Units; (ii) plantation works; (iii) collection of NWFPs etc. In addition people also work in saw-mills and other wood-based industries. People engaged in wood-based industries have a more permanent role. In the long term, logging will not be able generate much employment because the scale of the activity is very small.

Rural activities based on NWFPs could be one of the most viable alternatives for improving the rural economy. However it needs to be realized that this activity may not be the only definitive solution for uplifting the rural economy radically because most of the NWFPs found in Bhutan are of small volume and are used by rural people at the subsistence level only. However there are a few high value low volume NWFPs which have a great opportunity for promotion at the commercial level. These prioritized commercially potential NWFPs could be promoted at the commercial level in coming decades. There is a need to develop investment plans for adding value to some of the high value low volume NWFPs. Already in the pipeline is the commercialization of many NWFPs that have medicinal value. This Project is expected to address some of the unemployment issues even though the number could be very small. There are other NWFPs that have potential for the export market. Investment plans need to be prepared and implemented on a priority basis.

Role of forests in the provision of global public goods

Bhutan has some major hydropower projects in the pipeline and if these qualify as CDM projects then the country can earn very high revenue from the carbon trade.

On the other hand, Bhutan also has great challenges and opportunities in the contribution to the mitigation of global climate change. Many studies conducted elsewhere have indicated that the countries located in the Himalayas are more vulnerable to the impacts of global warming. The glaciers found in the Himalayas are slowly receding and filling the lakes that are formed as a result of the melting of ice. There is a danger of these lakes overflowing and causing huge losses in lives and properties at lower altitudes. Further since Bhutan has a strong policy in emission reduction from the use of fossil fuels there are good prospects in contributing in this area. The government is strongly pursuing actions on reducing the use of CFC-based refrigeration equipment and systems. Targets have been set to reduce the use of ozone-reducing substances (ODS) in the country.

According to the report produced by the United States Environment and Protection Agency forestry practices can reduce greenhouse gases in the following ways (: (i) avoiding emission by maintaining existing carbon storage in trees and soils; (ii) increasing carbon storage by planting trees; and (iii) substituting bio-based fuels and products for fossil fuels such as coal, and oil. Forestry and agricultural sequestration activities are very important because the forest and soils have a major influence on the atmospheric level of carbon dioxide – the most important global warming gas emitted by human activities. Agriculture and forestry activities can contribute to reducing greenhouse gases in the atmosphere and help prevent climate change by avoiding further emissions and by sequestering additional carbon. Further the carbon sequestered in trees and soils can be released back to the atmosphere¹.

Harvested wood is also a good sink – the wood used for construction or for furniture effectively stores carbon for centuries. Similarly the use of wood fuel instead of coal and oil and natural gas can actually mitigate climate change. Trees and forests therefore help in mitigating global climate change².

Emerging opportunities and threats in a globalized environment

Globalization is inevitable and this has both opportunities and threats. In this context some of the fundamentals that need analysis and discussion are: (i) the country is located between two large and strong economies and is landlocked; (ii) very low skills available in the country; (iii) the small population and middle income rural economy.

Bhutan's location between two large and strongly growing economies means the market base has become much bigger. On the other hand there are constraints in producing sufficient and high quality goods and services to be brought to the market. Further because of the landlocked situation the transportation of goods and services is difficult and also expensive. The competitiveness of the goods is thus reduced tremendously. The potential negative impacts and consequences of neighbouring influences could be tremendous and very difficult to stop.

The implications for society and forestry are diverse. There are opportunities in the trade of wood and NWFPs even though the volume of trade is not very significant. Further there are also opportunities for exporting wood products after value addition. This option will encourage wood-based industries to invest in improving processing technology and making

¹ (<http://www.epa.gov/sequestration/faq.html>).

² (<http://www.fao.org/newsroom/en/focus/2006/1000247/index.html>).

the quality of products very competitive in regional as well as global markets even though the opportunity for investment is limited.

There is also scope for promoting eco-tourism based on the concept of community management. This programme will have scope for improving the socio-economic condition of people living in and in the surrounding areas of National Parks and Wildlife Sanctuaries.

Creating a more appropriate society-forest relationship

The Department of Forest has identified thrust areas as development priorities in the 10th Five Year Plan. Therefore more efforts will be geared towards fulfilling these objectives. It is expected that if they are fulfilled then major changing societal needs will be met. The thrust areas to be addressed in the next five year plan period are: (i) Promotion of community and private forestry; (ii) watershed management based on a collaborative approach; (iii) development of prioritized NWFPs that are economically viable; and (iv) promotion of eco-tourism based on the concept of community management.

Therefore in order to address these thrust areas, the following activities need to be implemented:

- (i) Development of rural cottage enterprises based on prioritized, commercially viable NWFPs including horticultural- and agricultural-related products;
- (ii) Promotion of eco-tourism based on the community management concept;
- (iii) Promotion of community and private forestry;
- (iv) Initiation of actions for collaborative watershed management;
- (v) Measures to halt the conversion of forest land to other land-uses;
- (vi) Measures to reduce rural–urban migration.

1. INTRODUCTION

Background

The objectives of conducting this study have been to collect and interpret the information and see the trend of the important factors affecting the forestry sector in close collaboration with various stakeholders. Based on the information and trend, the outlook for 2020 for the forestry sector is also projected.

Scope and coverage

The main scope and coverage of this outlook study are as follows:

- (i) The present state of forest and forestry is described;
- (ii) Trade in wood and wood products including the level of trade that has taken place during 2004 and 2005 is described. Because of lack of data for other years, a detailed projection could not be carried out;
- (iii) Discussion on the main sources of energy and the possible future impacts of wood energy use;
- (iv) Main NWFPs that are being used at subsistence levels and some prioritized NWFPs that could be developed;
- (v) The service function of the forest including the importance of forest based industries;
- (vi) The policy and institutional framework that has authority for the management of forest;
- (vii) Main drivers of change are identified based on discussion held with various stakeholders in forestry sectors and outside;
- (viii) The outlook for the forestry sector in 2002 is discussed;
- (ix) Possible programmes that would be required to create a better future have also been discussed.

Key questions/issues that will be addressed in the country outlook paper

The key issues are identified as follows:

- (i) Based on the changing economic scenario and political changes, societal needs are also changing therefore the report attempts to address these needs.
- (ii) Technological change is taking place in the region. This is also putting pressure on forestry. The outlook paper attempts to discuss and address this issue.
- (iii) The impacts of globalization are exerting pressure on (a) trade of wood and wood products, (b) climate change, and (c) tourism. An attempt is made to discuss this issue.

The process

Two meetings were organized to discuss various issues and topics pertaining to the outlook study. In these meetings the following officials representing their organizations took part: (i) Forest Management Planners from the Department of Forest, (ii) Divisional Forest Officers, (iii) Officials from NRDCL, (iv) Research Officials, (v) officials from the Forestry Institute, (vi) Project Officials, (vii) private sectors, (viii) NGOs, and (ix) Dzongkhag Forest Officials. Specifically the following topics were discussed in detail:

- (i) Key drivers of change, (ii) forestry issues and trends in the country, (ii) an exercise on scenario analysis, (iii) parameters used in defining the scenarios, (iv) outlook for 2020.

Structure of the report

Broadly the structure of the report is:

1. Introduction
2. Current state of forest and forestry
3. Factors that will influence the future state of forest and forestry
4. Probable scenarios and their implications on forest
5. Outlook for 2020
6. Programmes that need to be implemented for achieving the objectives outlined in the outlook 2020
7. Summary and conclusions

2. CURRENT STATE OF FORESTS AND FORESTRY

General information of the country and major land-use types

Bhutan is a small country located in the eastern part of the Himalayas. The total area of the country is 40,077 square kilometers (RGOB, 1995). The terrain is very rugged and the whole country can be divided into three physiographic zones according to the elevation: (i) the high hills zone, (ii) the middle hill zone, and (iii) the foothill zone. The topography is characterized by steep precipitous slopes which descend rapidly into narrow river valleys. Based on the report produced by the Ministry of Agriculture (MOA, 1995) the major land-use types are (i) forest, (ii) agriculture, (iii) pasture, (iv) horticulture, (v) settlements and (vi) others, which include glaciers, water bodies, wetlands, landslides etc. The details are given in Table 1.

Table 1. Major land-use types of Bhutan

| <i>Land-use categories</i> | <i>Area in sq. km</i> | <i>As % of total land area</i> |
|----------------------------|-----------------------|--------------------------------|
| Forests | 29,045.00 | 72.5 |
| Pasture | 1,564.00 | 3.9 |
| Agriculture | 3,088.00 | 7.7 |
| Horticulture | 58.00 | 0.1 |
| Settlement | 31.00 | 0.1 |
| Others | 6,389.00 | 15.7 |
| Total | 40,077.00 | 100 |

Source: RGOB, 1995.

Trends in the forest resources

Area and forest types

According to the Ministry of Agriculture (1995) forest occupies about 2.9 million hectares which is 72.5 percent of the land area. Table 2 gives the details of the forest types found in Bhutan.

Table 2. Major forest types of Bhutan

| <i>Forest types</i> | <i>Area (ha)</i> | <i>As % of forest area</i> | <i>As % of total land area</i> |
|---------------------|------------------|----------------------------|--------------------------------|
| Fir | 345,300 | 11.9 | 8.6 |
| Mixed conifer | 486,800 | 16.8 | 12.1 |
| Blue pine | 128,600 | 4.4 | 3.2 |
| Chir pine | 100,900 | 3.5 | 2.5 |
| Broadleaf + conifer | 135,800 | 4.7 | 3.4 |
| Broadleaf | 1,374,900 | 47.3 | 34.3 |
| Forest plantation | 6,400 | 0.2 | 0.2 |
| Scrub forest | 325,800 | 11.2 | 8.1 |
| Total | 2,904,500 | 100.0 | 72.5 |

Source: RGOB, 1995.

About 34.3 percent of the area is covered by broadleaf forest and about 26.4 percent is occupied by different conifer species. Broadleaf + conifer occupy 3.4 percent. Another 8 percent is covered by scrub or meadow types of forest. Plantation is very negligible with less than 1 percent of the land area.

Out of the total forest area about 14 percent is economically accessible forest. The balance forest area is classified as Protected Areas (29.96 percent), and biological corridor (9.53

percent). The rest of the forest areas are either not accessible for harvesting or can be only brought under management after improving technology. Arable agricultural land is about 8 percent of the country's area.

Growing stock

The total volume of the growing stock of the country was estimated at 535 million m³ in 1990, it increased to 592 million m³ in 2000 and it became 621 million m³ in 2005 (Table 3). Over these years the growing stock has increased which represents an average annual increase of 0.933 percent.

Table 3. Change in the growing stock

| Growing stock | 1990 | 2000 | 2005 |
|----------------------|--|-------------|-------------|
| | Volume in million m³ over bark | | |
| | 535 | 592 | 621 |

Source: DOF, 2005.

The growing stock per hectare of different forest types (except scrub forest) is given in Table 4.

Table 4. Growing stock per hectare of different forest types

| Forest types | Area in ha. | Volume in '000 m³ | Volume/ha. (in m³) |
|-------------------------------|--------------------|-------------------------------------|--------------------------------------|
| Chir pine | 100,900 | 8,466.00 | 83.90 |
| Blue pine | 128,600 | 5,607.00 | 43.60 |
| Fir including spruce | 345,300 | 92,635.00 | 268.27 |
| Mixed conifers | 486,800 | 40,276.00 | 82.74 |
| Conifers mixed with broadleaf | 135,800 | 71,764.00 | 528.45 |
| Broadleaf forest | 1,374,900 | 310,229.00 | 224.64 |
| Total Forest | 2,572,300 | 528,977.00 | 205.64 |

Source: DOF, 1989a and 1989b.

Similarly the total living biomass³ was estimated at 667 million tonnes (oven dry weight) in 2000 and it was 690 million tonnes in 2005. The average annual increase would be about 0.66 percent from 2000 to 2005. On the other hand the dead biomass was 73 million tonnes oven dry weight in 2000 and it was 76 million tonnes oven dry weight in 2005. This represents an average annual increase of 0.79 percent from 2000 to 2005. The annual allowable harvest, at a sustainable level, is estimated at 722,172 m³ log volume, of which about 72 percent would be firewood and the balance 28 percent logs.

Changes in forest cover

Bhutan is one of the very few countries that has enhanced its forest resources, which are also reflected in the Forest Resources Assessment 2005 (FRA) of FAO. This increase represents an average annual forest area change of +0.41 percent during 1989–1999 (FAO, 2005) which is given in Table 5. A National Forest inventory was not done after 1999 therefore the long-term trend of forest cover change could not be shown in this report.

³ This represents both above ground and below ground biomass.

Table 5. Change in forest areas

| Years | 1989 | 1999 |
|------------------|-----------|-----------|
| Forest area (ha) | 2,572,300 | 2,682,610 |

Source: DOF 2005.

Functional categories of forest

Forest functions are important for planning, design and implementation of forest policy and for assessment of cross-sectoral impacts. The functions refer to the purpose for which the forest is suitable. The identified functions are (i) production function, (ii) protected areas, (iii) protection of soil and water, conservation of biodiversity and social function and (vi) no designation or unknown function.

Reliable national data are not available by functional categories. However the Department of Forest has classified the 'forest' into broad functions performed by the forest. There are also forest areas where no functions have been assigned at the present moment. The National Forest Policy of 1974, Forest and Nature Conservation Act of 1995, and The Forest Management Code of Bhutan have also classified the forest of the country into functional classes. The functional classes and their corresponding areas are given in Table 6.

Table 6. Functional classes of forest

| <i>Functional classes</i> | <i>Area in hectares</i> | <i>Percent</i> |
|---------------------------|-------------------------|----------------|
| Production | 360,122 | 14.0 |
| Protected Areas | 676,514 | 26.3 |
| Protection | 1,215,284 | 47.2 |
| No designation | 320,380 | 12.5 |
| Total Forest | 2,572,300 | 100.0 |

Source: DOF, 2005 and FRA, 2005.

Forest ownership

All lands that are not registered under individual's *thram* are categorized as forestland. These forestlands were nationalized under the purview of the Bhutan Forest Act of 1969. Currently all forestland is owned and managed by the State. However the Forest and Nature Conservation Act of 1995 recognizes the traditional and cultural rights of the local people to forest use and thereby maintains their legitimate access to forest resources.

Under the provision of Forest and Nature Conservation Act of 1995, private forestry is practiced in private registered lands and community forests are established on government forestlands, whereby the concerned communities are granted usufructry rights under the conditions prescribed in approved forest management plans that are drawn up by the communities and subsequently verified and approved by the Department of Forest.

Extent of production forests and the change in area over time

An effort is being made to bring more area under production forest i.e. under Forest Management Units (FMUs). There is very heavy biotic pressure and in future the area under FMUs might be reduced because of the land-use change that is expected to take place in the FMUs. However with more areas estimated to be brought under community forestry, the overall production of timber and firewood should remain unchanged.

State of forest management

The forest that is classified as Government Reserved Forest (GRF) is managed by the State. The Department of Forest is entrusted with the responsibility of management and resource allocation. The forests are managed under many types of silvicultural systems: (i) selection system for both broadleaved and conifer forests, (ii) seed tree system for chir pine and blue pine, (iii) group selection system for mixed conifer, hemlock, spruce and fir forests. The forest conditions and types vary significantly among FMUs and other areas, leading to variations in the contents and depth of forest management plans.

Firewood extraction, improved pastures, and water harvesting are some of the current issues of sustainability. The current forest classification into operable and non-operable forests provided by Master Plan for Forestry Development (MPFD) does not have the capacity to deal with these issues. Therefore, forest zoning by function and by agency of control (local or State) have become necessary in this context (Schindele & Dhital 1997). The Department of Forest is conducting in-depth studies to understand these issues and then to search out alternatives to deal with them.

Forestry and the five year plans

Successive five year plans (FYP) consider forest resources as a source for catering to the need of local people in terms of the timber and firewood requirement and as a reservoir of social benefits such as environment, water and climate. The plans treat forest-based industries as additional or indirect sources of employment for Bhutanese people.

All the FYPs have consistently maintained the objective of increasing the *per capita* income of rural communities through forestry activities. For example, the World Bank-Swiss Development Co-operation Project, which was implemented in the eastern part of the country, encouraged households to establish private forest nurseries to increase household or community income and the local supply of good quality forestry seedlings for plantations.

It is a known fact that State control can only ensure equity at macro level and efficiency and utility at the local level is not ensured because of poor micro-level information and a lower stake of the people in forest resource management. The local social institutions possess better (past and current) information and have a higher stake in forest resources than the State. Therefore, they have the capacity to enhance efficiency and utility. The changed perception of the State is clearly reflected in the FYPs of the Forest Department, which recognizes the concept of involvement of local communities in the management of forest resources. The Forest and Nature Conservation Act of 1995 and Forest and Nature Conservation Rules 2006 have legitimized the strategy of involving local institutions through the establishment of community forests.

The current forestry plan further develops this strategy by providing increased sharing of forest goods and services between the government and communities for sustainable forest resource management including Protected Areas. The main components of the Programme include: (i) development of self-reliance by rural communities and (ii) support to rural households to develop strategies for sustained utilization of forest resources by promoting participation of communities in planning and managing their forests for economic development.

The Government, even with its limited financial resources, maintains roughly the same annual share of financial resources for the forestry sector. This demonstrates the Government's commitment for sustaining natural resources and the environment. The forestry share in the 10th five-year plan has, however, been increased.

Economic viability of forest management for wood production

Wood from FMUs is harvested and brought to depots by the NRDCL. The NRDCL sells the round timber and logs in open auctions. The timber is purchased by various saw millers and wood-based industries from the auctions conducted by the NRDCL. Each FMU is managed and operated by the NRDCL on the sustainable principle. The Department of Forest has the technical backstopping and monitoring role. The earnings from the sale of timber and other forest resources are able to meet the expenditure required for implementing various activities in the FMUs.

The industries comprise around 56 sawmills; 60 furniture workshops; one large particle board factory, some producers of broom handles, fruit boxes, veneer, plywood and block board and some wooden handicrafts producers. Most of the industries are located in the western and southern parts of Bhutan (RGOB, 2001).

Wood-based industries are growing in Bhutan although they are in the initial stage of development. The wood-based industries consist mainly of small sawmills, furniture units, joinery and wood craft units and few block board, particle board and plywood factories; many of them operate on a temporary basis. There are 324 wood-based industries including large scale, medium scale, small scale and cottage scale industries (RGOB, 2001).

As a result the demands for timber supply to these units have also increased. However the sustainable management system has a symbiotic relation with the wood-based industries. In this context, forest resource managers require a vibrant and enterprising network of wood-based industries for utilization of harvested resources to minimize resource waste and optimize economic and service benefits. The allotment of timber from the FMUs contributes to augmenting the demand of private industries for construction purposes. Therefore broadly it can be said that the country's economy is basically driven by renewable natural resource management, hydropower production, tourism and industrial development.

Sustainable supply of timber in the market

Bhutan's Ninth Five-Year Development Plan emphasizes the importance of the sustainable management of forests for the dual purposes of conserving environmental resources and supplying wood resources to the domestic markets. Sustainable management of forests through the establishment of FMUs in the Government Reserve Forest and also by encouraging community and private forestry can ensure the sustainable supply of timber in the market.

Domestic wood-processing industries

As stated in the earlier sections, there are in total 324 wood-based industries of different sizes in the Kingdom. The demand of timber for feeding these industries is increasing every year. Sustainable supplies of raw materials to these domestic industries have to be met through FMUs. Therefore in the long run the Department of Forest will have to make an effort to supplement the demand of raw materials from community and private forestry as well.

Export potential, niche markets

Although, at present, market awareness and marketing skills are insufficient, there is huge market potential in neighbouring countries for wood products. Firms specializing in the construction sector should also understand that the Indian Construction Industries are 60-70 percent dependent on imported timber and are increasingly being penetrated by imported products as a result of the opening up of Indian markets. It is evident that potential markets

exist in India for various wood and wood products, viz: particleboard, plywood, face veneers, blockboard, panel doors, furniture, handicrafts, etc.

Self-reliant in wood resources

All the wood-based industries depend on wood resources as their main raw material. At present getting the raw material (wood) is not a major problem. However in future getting wood resource, as raw material, could pose a great problem if efforts are not made to produce wood even from community, private forests and plantations; also through leasing degraded forest areas to the wood-based industries for producing wood for their own requirements. In future wood may have to be imported from outside the country to meet the growing demand.

Wood and wood products

Production and consumption of wood

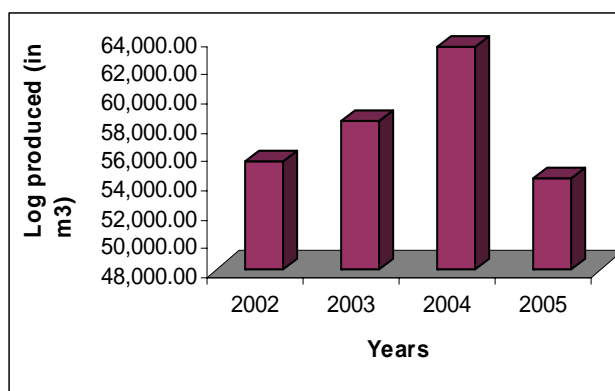
In general, the production and consumption of wood, for various purposes, varies from year to year. On average, it ranges from about 200,000 m³ to 240,000 m³. However in 2004, the demand for construction timber went up considerably; as a result the consumption of timber crossed 486,000 m³. It was mainly because of many construction works being undertaken by both the Government as well as private organizations in that year. On the other hand, the production of commercial logs has remained fairly constant ranging from about 55,000 m³ to 66,000 m³ per annum except in 2005 when production went up slightly. The annual average consumption of wood is given in Table 7.

Table 7. Annual production of wood for various purposes

| Years | Commercial logs (m ³) | Construction timber for rural use (m ³) | Small timber for rural use (m ³) | Total per year (m ³) |
|-------|-----------------------------------|---|--|----------------------------------|
| 2002 | 55,428 | n/a | n/a | 55,428 |
| 2003 | 58,262 | 141,530 | 4,964 | 204,756 |
| 2004 | 63,467 | 417,215 | 5,630 | 486,311 |
| 2005 | 66,122 | 169,266 | 6,323 | 241,711 |

Source: NRDCL and DOF, 2005.

The commercial round wood and logs are produced by the NRDCL from the Forest Management Units (FMUs) and are sold through public auctions to various saw millers and wood-based industries. The buyers bid in the auctions according to their requirements. Generally the auctions are held on a monthly basis. The NRDCL makes auction lots of different sizes (in terms of volume) which enable even the small buyers to take part in the auctions and buy according to their requirements.



Besides the production and supply made by the NRDCL, the Department of Forest, through its Divisional Forest Officers, also supplies timber for various types of construction in rural areas. These supplies come in various forms: (i) standing trees, (ii) logs, (iii) sawn wood, (iv) poles and post and small timber for making purlins and rafters etc. The average annual supply of construction timber varied from 146,494 m³ in 2003 to 422,845 m³ in 2004 (Table 8). It

dropped significantly in 2005. Because of the lack of time series data, trend analysis is not possible.

Table 8. Allotment of constructional timber for rural uses

| Construction timber | Years | | |
|---------------------|--------------------------|----------------|----------------|
| | 2003 | 2004 | 2005 |
| | Volume in m ³ | | |
| Trees | 45,203 | 36,632 | 53,910 |
| Shinglap | 5,473 | 5,130 | 4,520 |
| Cham | 73,594 | 50,482 | 71,613 |
| Logs | 16,531 | 323,488 | 38,139 |
| Sawn timber | 729 | 1,483 | 1,114 |
| Poles and posts | 4,964 | 5,630 | 6293 |
| Total | 146,494 | 422,845 | 175,589 |

Source: DoF, 2005

Distribution of forest area is not uniform throughout all the *Dzongkhags*, therefore the wood cannot be produced uniformly. There is regional imbalance in the production of logs for commercial utilization. Some *Dzongkhags* are forest-resource rich while others are deficient. Correction of this regional imbalance in wood production will be one of the challenges for the Department of Forest. Initiatives such as plantations in the degraded and barren hills, through Government or private initiatives could be one of the alternatives in the future.

State of forest industries, including the state of technology

The wood-processing industries comprise sawmills, furniture workshops, broom handle making firms, wooden box manufacturers, small veneer and plywood mills, wooden handicraft workshops and less than a dozen paper factories producing traditional hand-made paper. In addition there is one important particle board factory, i.e. Bhutan Board Products Limited. Most of these industries are located in the western and southern parts of the country.

The wood-processing industries are generally not developed and have remained in roughly the same state for the last decade. The typical saw mills are small labour-intensive units, equipped with Indian manufactured horizontal band saws. These saw mills produce rough-cut sawn timber without any grading and with average recovery rates being around 60-70 percent depending on species and class of timber. There are, however, some saw mills with vertically integrated production units producing planed and seasoned sawn timber as well as furniture.

Trade of forest products

With the introduction of the Timber Marketing and Pricing Policy in 1999 export of logs and firewood, in the primary form, was banned. The rationale behind the promulgation of the policy was to (i) make available sufficient timber for internal consumption, (ii) make the price of logs and sawn timber more affordable by supplying enough timber in the market, and (iii) to conserve the environment by practicing sustainable management of the forest. Exports of wooden products are, however, allowed after adding value to the wood, e.g. making semi-finished or fully finished products. The major trading partner for wooden products is India. Small volumes of business are also carried out with other countries.

Details of items imported from India

The total value of import⁴ of wooden items/products from India in 2004 was slightly more than Nu.127 million whereas the value exceeded Nu.131 million in 2005. Business increased slightly in 2005. The details are given in Table 9. The value of imports differs from year to year; as such there is no consistency or stability in the business. The share of the import of wood and wooden products from India compared to the total import is very small. In 2004 it was 0.68 percent of the total import value from India and in 2005 it rose to 0.77 percent.

Table 9. Values of wood products imported from India

| Particulars | Value of import (in Nu) | |
|--|--------------------------------|----------------|
| | 2004 | 2005 |
| Value of total imports from India (Nu.) | 18,639,490,000 | 16,996,690,000 |
| Value of import of wood & wood products (Nu) | 127,027,139 | 131,366,840 |
| % share of wood and wood product imports | 0.68 | 0.77 |

Source: Bhutan Trade Statistics for 2004 and 2005.

Products/commodities/items imported from India are vegetative products like live trees for planting, other plants materials like bulbs, roots, cut flowers and ornamental foliage. Other products include gums, lac, resin and other vegetative sap and extracts, wood and wood and charcoal articles, cork and cork articles, basketware and wickerwork, wood pulp and other fibrous cellulosic materials etc (Table 10).

⁴ The value of the USD in 2004 was Nu.43.93 and in 2005 it was 44.35.

Table 10. Details of items imported from India

| <i>Particulars</i> | 2004 | 2005 |
|--|-------------------------------|--------------------|
| | Value of import in Nu. | |
| Vegetative products, other plants, bulbs, roots; cut flowers and ornamental foliage | 25,874 | 275,892 |
| Lac, gum, resin and other vegetative sap and extracts | 359,922 | 443,428 |
| Vegetative planting materials, vegetative products etc. | 5,357,774 | 5,144,209 |
| Wood and wood charcoal articles | 116,939,880 | 120,867,354 |
| Cork and cork articles | 411,701 | 740,158 |
| Straw, esparto and other plaiting materials, basketware and wickerwork | 2,644,948 | 1,944,117 |
| Wood pulp or other fibrous cellulosic materials; recovered (waste and scrap) paper or paperboard | 1,287,040 | 1,951,682 |
| Total | 127,027,139 | 131,366,840 |

Source: Bhutan Trade Statistics for 2004 and 2005.

Details of imports from countries other than India

The total value of imports from countries other than India amounted to Nu.8,445 million in 2004 and Nu.4,239 million in 2005. The corresponding value of import of wood and wood products was Nu.7.7 million in 2004 and in 2005 it increased by 100 percent and exceeded Nu.13.4 million. Diverse types of products, made out of wood, were imported from various countries in the region as well as from Europe and America. The details are given in Table 11.

Table 11. Value of wood products imported from countries other than India

| <i>Particulars</i> | <i>Value of import (in Nu)</i> | |
|--|--------------------------------|---------------|
| | 2004 | 2005 |
| Value of total import from other countries (Nu.) | 8,445,590,000 | 4,239,990,000 |
| Value of import of wood & wood products (Nu) | 7,679,448 | 13,396,879 |
| % share of wood and wood products import | 0.09 | 0.32 |

Source: Bhutan Trade Statistics for 2004 and 2005.

Most important products/items imported include bamboo articles, wooden frames for paintings and photographs, wooden furniture both for general and specific uses, packing cases, wooden boxes, crates, densified wood, fibrous board, particle board etc. Wooden tool handles and joinery were also imported from India. The values of imports, item-wise, for 2004 and 2005 are given in Table 12.

Table 12. Details of items imported from countries other than India

| <i>Particulars</i> | <i>2004</i> | <i>2005</i> |
|---|--------------------------------|-------------------|
| | <i>Value of imports in Nu.</i> | |
| Bamboo articles, and wooden frames for painting & photographs | 199,553 | 77,734 |
| Wooden furniture and cane articles | 502,406 | 55,473 |
| Wooden furniture for general use | 6,977,489 | 0 |
| Wooden furniture for office and kitchen use | 0 | 9,792,377 |
| Packing cases, boxes, crates etc. | 0 | 116,607 |
| Densified wood, fibrous board, particle covered decorative lamination | 0 | 2,908,295 |
| Tool handles, joinery and carved wood articles | 0 | 125,473 |
| Wood parquetry and inlaid caskets and cases and other wood articles | 0 | 320,920 |
| Total | 7,679,448 | 13,396,879 |

Source: Bhutan Trade Statistics for 2004 and 2005.

Details of the items exported to India

The total value of exports to India was Nu.7,761 million in 2004 and Nu.9,969 million in 2005. During these years the corresponding value of exported wood and wood products to India was Nu.284 million and Nu.312 million respectively. The details of export values in 2004 and 2005 are given in Table 13.

Table 13. Values of wood products exported to India

| <i>Particulars</i> | <i>Value of export (in Nu)</i> | |
|--|--------------------------------|---------------|
| | <i>2004</i> | <i>2005</i> |
| Value of total exports to India (Nu.) | 7,761,560,000 | 9,969,830,000 |
| Value of export of wood & wood products (Nu) | 284,656,478 | 312,371,584 |
| % share of wood and wood products exported | 3.67 | 3.13 |

Source: Bhutan Trade Statistics for 2004 and 2005.

Various products exported to India ranged from vegetative products to other plant materials like bulbs, cut flowers and ornamental plants etc. Other items exported included products like gum, lac, vegetable sap and extracts. Wood and wood and charcoal articles are also exported to India as well as fuelwood, offcuts, sawdust, hopwood, split poles, sawn materials, sheets for veneering, plywood, tea chest battens, particle boards, waferboards, wooden frames for painting and photographs, wooden cases, casks, barrels, vats, tubs, doors and window frames and bamboo articles. The types of product exported vary greatly from year to year. Statistics show that business is increasing. However because time series data on exports are lacking the long-term trend cannot be shown clearly. The products exported and the corresponding values are given in Table 14.

Table 14. Details of items exported to India

| <i>Particulars</i> | 2004 | 2005 |
|--|--------------------|--------------------|
| | Value in Nu. | |
| Vegetative products, other plants, bulbs, roots; cut flowers and ornamental foliage | -- | 56,350 |
| Lac, gum, resin and other vegetative sap and extracts | 3,949,300 | 520,000 |
| Vegetative planting materials, vegetative products etc. | 471,000 | 126,000 |
| Wood and wood and wood charcoal articles | 279,881,630 | 310,441,617 |
| Straw, esparto and of other plaiting materials, basketware and wickerwork | 137,460 | 18,000 |
| Wood pulp or other fibrous cellulosic materials; recovered (waste and scrap) paper or paperboard | 217,088 | 1,209,617 |
| Total | 284,656,478 | 312,371,584 |

Source: Bhutan Trade Statistics for 2004 and 2005.

Export of wooden products to countries other than India

The total value of exports to countries other than India in 2004 was Nu.509 million and it rose to Nu.1,416 million in 2005. The corresponding value of the export of wood and wood products in 2004 was Nu.2.43 million and in 2005 it shot up to Nu.6.80 million. The details of trade are given in Table 15.

Table 15. Total value of wood and wood products exported to other countries

| <i>Particulars</i> | Value of export (in Nu) | |
|--|-------------------------|---------------|
| | 2004 | 2005 |
| Value of total exports (Nu.) | 509,590,000 | 1,416,340,000 |
| Value of export of wood & wood products (Nu) | 2,429,608 | 6,803,781 |
| % share of wood and wood products exported | 0.48 | 0.48 |

Source: Bhutan Trade Statistics for 2004 and 2005.

The main products or items exported and the value of exports is given in Table 16.

Table 16. Details of items exported to countries other than India

| <i>Particulars</i> | 2004 | 2005 |
|---|------------------|------------------|
| | Value in Nu. | |
| Wooden tool handles, canework, and wooden furniture | 2,429,608 | 927,360 |
| Mushrooms | 0 | 5,321,326 |
| Wooden frames for paintings and photographs including furniture | 0 | 553,895 |
| Builders' joinery, carved wood, and other articles of wood | 0 | 1,200 |
| Total | 2,429,608 | 6,803,781 |

Source: Bhutan Trade Statistics for 2004 and 2005.

Future prospects in trade of wood and wood products

The in-country demand for construction timber is increasing every year therefore the prospect of trade of wood and wood products is not very promising in the future. The volume of timber produced within the country is also not enough for in-country consumption. Bhutan may have to import quite large quantities of timber to meet the demand for construction timber.

However on the other hand there is scope for capturing the niche market and exporting wood products manufactured with very high value-addition.

Present scenario of energy consumption

The total energy consumed in 2005 was 393,288 toe⁵, out of which the residential sector consumed the highest quantity accounting for 48.5 percent. The industrial sector's consumption accounted for 26.4 percent followed by the transport sector at 14.3 percent. The consumption share of the agriculture sector was 1.2 percent. The commercial and institutional sector's share was 8.9 percent and auxiliary consumption was 0.8 percent. The details of sector-wise consumption of energy in 2005 are given in Table 17.

Table 17. Sector-wise consumption of energy in 2005

| Sectors | Sector-wise consumption (in toe¹) | % |
|------------------------------|---|--------------|
| Agriculture | 4,554 | 1.2 |
| Residential | 190,815 | 48.5 |
| Commercial and Institutional | 34,965 | 8.9 |
| Transport | 56,052 | 14.3 |
| Industrial | 103,942 | 26.4 |
| Auxiliary consumption | 2,961 | 0.8 |
| Total | 393,288 | 100.0 |

Source: DOE, 2006.

Energy consumption mix

Detailed analysis of energy consumption during 2005 shows that 58.96 percent of the total energy consumed was firewood followed by electricity which constituted 13.81 percent and diesel constituting 11.76 percent. Firewood is still the main source of energy in Bhutan, and is obtained from the natural forest. In the foreseeable future of about 12 to 15 years, the main source of energy will still be fuelwood obtained from natural forest. The details of the energy mix are given in Table 18.

Table 18. Percentage mix of energy consumed during 2005

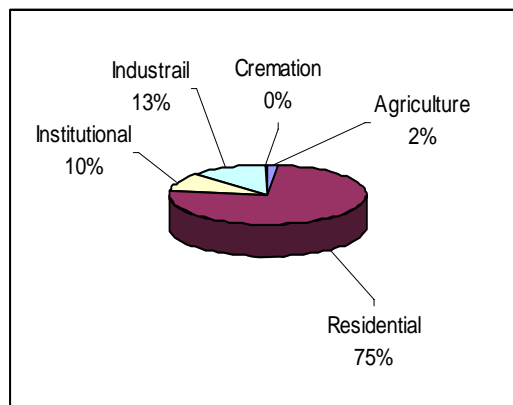
| Energy consumption mix | Consumption (in toe) | % |
|-------------------------------|-----------------------------|---------------|
| Aviation turbine fuel | 957 | 0.24 |
| Briquettes | 65 | 0.02 |
| Coal | 33,460 | 8.51 |
| Diesel | 46,263 | 11.76 |
| Electricity | 54,298 | 13.81 |
| Furnace oil | 1,638 | 0.42 |
| Fuelwood | 231,871 | 58.96 |
| Kerosene | 5,924 | 1.51 |
| Light diesel oil | 2,448 | 0.62 |
| LPG | 5,053 | 1.28 |
| Petrol | 11,311 | 2.88 |
| Total | 393,288 | 100.00 |

Source: DOE, 2006.

⁵ Tonnes of oil equivalent (1 toe = 41.86 GJ).

Wood as a source of energy

Bhutan consumed 724,597 tonnes of firewood during 2005 which accounted for 58.96 percent of the total primary energy supply. In addition to firewood, electricity and kerosene are also used as important sources of energy. Fuelwood is being used by many sectors in the country. The most prominent are (i) Agriculture, (ii) Residential (both rural and urban areas), (iii) Institutional (including hotels and restaurants), (iv) industrial and finally a small quantity is consumed for cremation. The detailed break-up of the consumption, sector-wise, is given in the adjoining figure. It is likely that firewood is going to be the main source of primary energy in the country for some time to come. This situation is definitely going to impact forests and their management strategy in the coming decades.



Extent of wood energy use

Fuelwood consumed in agriculture and residential sectors

People in the rural areas depend on wood as a source of energy for cooking, space heating and also for cooking fodder for their animals. People living in the colder region use more wood per capita as an energy source than people living in the warmer climate. In 2005 about 724,595 tonnes⁶ of firewood was consumed by various sectors. The residential sector topped the list by consuming more than 74.8 percent. Out of the total of 542,247 tonnes of firewood consumed in the residential sector, 96.2 percent was consumed in the rural areas. The urban sector consumed 3.7 percent of the total consumption of the residential sector. Therefore it is very apparent that the rural sector will continue to use fuelwood as a source of energy in coming years. Table 19 gives the details of consumption sector-wise.

⁶ The average density of firewood is assumed to be 725 kg/m³ and further it is assumed that 1 truckload of firewood is equal to 8 m³ which is equal to 5.8 tonnes. Therefore 1 m³ of firewood would weigh 0.73 tonnes. Total annual consumption is 724,595 tonnes of firewood which is equal to 992,596 m³ or 35.06 million cft/annum. [1 tonne of firewood = 0.32 toe].

Table 19. Total fuelwood consumed in the agriculture and residential sectors in 2005

| Sectors | Quantity (tonnes) | Quantity (toe) | Sectoral share in % of the total consumption |
|--------------------|------------------------------|---------------------------|---|
| Agriculture Sector | 12,489 | 3,997 | 1.7 |
| Cardamom drying | 12,489 | 3,997 | |
| Residential Sector | 542,247 | 173,519 | 74.8 |
| (a) Rural areas | 521,828 | 166,985 | |
| Cooking | 343,469 | 109,910 | |
| space heating | 22,600 | 7,232 | |
| fodder cooking | 155,760 | 49,843 | |
| (b) Urban areas | 20,419 | 6,534 | |
| cooking | 5,947 | 1,903 | |
| space heating | 14,472 | 4,631 | |

Source: DOE, 2006.

People living in urban areas consume less quantities of firewood because they have access to other sources of energy for cooking as well as space heating.

Fuelwood consumed in institutional, industrial and other sectors

The industrial sector emerged as the second highest fuelwood-consuming sector. Fuelwood, in this sector, is consumed in various types of cottage and small industries. The institutional and commercial sector consumed 10.2 percent of the total fuelwood consumed in the country. The Armed Forces consumed large quantities of fuelwood for cooking and space heating purposes. Schools, colleges, hospitals, hotels and restaurants are also important consumers of fuelwood. The details are given in Table 20.

Table 20. Fuelwood consumed in institutional, industrial and other sectors

| Sectors | Quantity (tonnes) | Quantity (toe) | Sectoral share in % of the total consumption |
|-----------------------------------|------------------------------|---------------------------|---|
| Institutional | 73,861 | 23,636 | 10.2 |
| Armed Forces | 26,180 | 8,378 | |
| Institutions | 39,252 | 12,561 | |
| Hotels & Restaurants | 8,429 | 2,697 | |
| Industrial | 94,743 | 30,317 | 13.1 |
| Lemon grass | 817 | 261 | |
| BBPL (Bhutan Board) | 10,000 | 3,200 | |
| BCCL/BFAL | 46,500 | 14,880 | |
| Hand-made paper | 8,000 | 2,560 | |
| Rosin and Turpentine | 335 | 107 | |
| Yarn dyeing | 91 | 29 | |
| Carbon manufacturing ⁷ | 29,000 | 9,280 | |
| Cremation | 1,255 | 402 | 0.17 |

Source: DOE, 2006.

⁷ Carbon refers to charcoal.

Policies and regulations impacting use of wood as a source of energy

Supply of huge volumes of wood as firewood is impacting negatively on the forest resources of the country. Therefore every effort is being made by the Department of Forest to encourage people to switch over to alternative sources of energy like electricity, solar energy, LPG etc. In urban areas, more and more people have started switching over to electricity, LPG, and kerosene etc. However people in rural areas still depend on fuelwood. This trend is likely to continue for another eight to ten years. In future quite sizeable volumes of fuelwood for rural consumption should come from community forests, private forests and plantations. The community forestry programme is being pursued strongly so that the above-mentioned objective can be fulfilled easily. At the moment community forests are managed by Community Groups and technical support like operational plan preparation, support in thinning etc. is extended by the Dzongkhag Forest Offices. If this strategy is implemented then the pressure on the government forest will be reduced.

Economics of wood energy use

Wood is easily available in most parts of the country. The people living in rural areas use wood as a source of energy more than those living in urban areas. The other sources of energy like LPG, kerosene are more expensive because of the heavy cost of transportation. On the other hand electricity has not reached all rural areas, therefore wood is the cheapest source of energy. Firewood is supplied free of cost for people living in rural areas. However people pay for firewood when it is for commercial purpose.

Non-wood forest products

Introduction

Communities that exhibit significant dependence on NWFPs for their livelihoods are often the poorest households. With very small landholdings, these communities derive much needed resources from the State forests. National studies, in the past, have shown that there is a very high percentage of rural population that depends on forest food to supplement their daily nutritional intake, particularly during the lean season. Rural and other poorer communities also derive monetary income from forestry operations during the lean agricultural season. Recognizing the role of NWFPs in alleviating poverty and improving the livelihoods of many communities, the Department of Forest continues to address such needs through a system of maintaining subsidies for the rural population in obtaining forestry resources for household consumption. The traditional rights of the people, including grazing and other access rights, are still upheld in the current legal frameworks. With the promotion of social, community and private forestry programmes, the Department of Forest has increased the avenues for rural communities to institutionalize participatory forest management and thereby increase the availability of NWFPs and other forest produce and foster equity in forestry resource allocation.

Main non-wood forest products and their significance to economies

Bhutan has thousands of economically important NWFPs. The most important are described in this section. Detailed trade data on NWFPs are lacking, however in 1999 and 2000 substantial revenue was earned by exporting NWFPs. Even though the share of revenue from NWFPs (compared to wood products) is relatively low, in absolute terms, the revenue earned at the national level is substantial. Equal volumes of NWFPs are being used, within the country, by local people for their own use. Revenue earned through NWFP export in 1999 and 2000 is given in Table 21.

Table 21. Revenue earned through NWFP export

| <i>Particulars</i> | <i>Years</i> | |
|-------------------------------|--------------|-------------|
| | 1999 | 2000 |
| Total export (in million Nu) | 1.231 | 1.190 |

Source: DOF, 1999 quoted in FAO 2005.

The main NWFPs that have great relevance to the lives of local people in Bhutan are (i) bamboo, (ii) rattan, (iii) lemon grass, (iv) *Illicium grifithii*, (v) *Cordyceps sinensis*, (vi) wild mushrooms, (vii) *Emblica officinalis*, (viii) medicinal plants, (ix) *Daphne* sp., (x) natural vegetable dyes, (xi) *Swertia chirayita*, and (xii) species suitable for making incense. Brief descriptions of these NWFPs and their importance in the lives of rural communities of Bhutan are given below:

Bamboo

About 15 genera and 31 species of bamboo have been recorded in Bhutan. The main genera are *Arundinaria*, *Bambusa*, *Cephalostachyum*, *Chimonobambusa*, *Dendrocalamus*, *Drepanostachyum*, *Himalayacalamus*, *Neomicrocalamus*, *Teinostachyum*, and *Thamnocalamus*. They are the most versatile and used group of plants in Bhutan.

Bamboos are used as constructional materials in rural areas. The Department of Forest is responsible for scientifically managing the bamboo in the country. Rural people use bamboo for various purposes like construction and for making baskets, mats etc. The Department of Forest issues permits to villagers if they want to use bamboo for household purposes. Table 22 gives broad information on the numbers allotted to villagers at subsidized rates.

Table 22. Allotment of bamboo for local uses

| <i>Year</i> | <i>Qty supplied (nos)</i> | <i>Royalty collected (Nu)</i> |
|-------------|---------------------------|-------------------------------|
| 2002 | 315,631 | 30,779.00 |
| 2003 | 291,538 | 103,315.59 |
| 2004 | 342,372 | 87,940.94 |
| 2005 | 464,883 | 40,742.14 |

Source: DOF, 2005

Exploitation of bamboo for commercial purposes has not been started in Bhutan except for small numbers of bamboos sold by villagers from their home gardens. The NRDC has started diversifying its activities by taking up bamboo plantations on a commercial scale.

Current and potential uses of bamboo

Amongst the many species of bamboo available in Bhutan, the following have great potential for commercial management by communities. Bamboo products have great scope for earning substantial household income. The following species have good commercial and income-generating potential, (i) *Borinda grossa* (ii) *Neomicrocalamus andropogonifolius*.

The *Neomicrocalamus* is the most important bamboo in Bhutan. It is used for making (i) high quality *bangchung* and (ii) handicraft items like dyed bamboo woven hats and arrow quivers etc. A case study conducted by one of the research centres showed that *Neomicrocalamus* is used for weaving beautiful *bangchung* (baskets) by one community in central Bhutan. Usually they make two varieties. The best one is sold at Nu.70 per pair and the other variety is sold at

Nu.60 per pair. The variety depends upon the pattern and mosaics given on the *bangchungs*. Table 23 gives a cost benefit analysis of weaving *bangchungs* at the household level.

Table 23. Cost-benefit analysis of *bangchung* weaving at the household level

| Particulars | Price per unit | Amount (Nu.) |
|--|---|---|
| I. Cost of production | | |
| Collection and transportation of <i>Yula</i> and cane from forest to home (requires about 1 day for <i>Yula</i> and 2 days for cane) | | |
| Cutting of bamboo into pieces and splitting into fine strips- done usually at night | 5 litres of kerosene at the rate of Nu.14 per litre | Nu.70 |
| Purchase of red, yellow and green colours per packet and colouring of strips requires about 2 days | Yellow (Nu.150) Red (Nu.120) Green (Nu.120) | Nu.390 |
| Weaving, tying and finishing of products require about 2 weeks (<i>to complete the steps 1-4, altogether about 27 days are required</i>) | | |
| Royalty levied by the Dzongkhag of the DoF | Nu.2 per pair of <i>bangchung</i> . The royalty levied for 20 pairs of <i>bangchung</i> | Nu.40 |
| Transportation (most households sell to middlemen at door steps and they bear the costs) | | |
| Total costs | | Nu.500 |
| II. Selling price | | |
| About 20 pairs of <i>bangchung</i> of type <i>Nyekayama</i> (13 pairs) and <i>Tangkama</i> (7 pairs) are woven in a month | <i>Tangkama</i> costs Nu.60 per pair and <i>Nyekama</i> cost Nu.70 per pair | Nu.420.00 <u>Nu.910.00</u> Nu.1330.00 |
| Net benefit in a month (Total costs minus benefit) | | Nu.830 |
| Total earnings received at household door steps in a season (6 months) | | Nu. 4,980.00 |

Source: Bamboo and Cane: Potential of poor man's timber for Poverty Alleviation and Forest Conservation. A Case study from Bjoka, Zhemgang-2004 by RNR-RC (Yusipang).

The average total amount earned in a season (6 months) amounts to Nu.4,980 per household. Besides *bangchungs*, the households also weave many other bamboo products. From this case study it can broadly be concluded that *bangchung* weaving is economically profitable even if the opportunity cost of collection and transportation is taken into account (Moktan et al. 2004).

Rattan

Rattans are very important NWFPs which are used extensively for making furniture, mats, baskets and many different types of handicraft items. In Bhutan, rattans are found mostly in the sub-tropical belt of the country. The species of rattan found in Bhutan are *Calamus acanthospathus*, *Calamus tenuis*, *Calamus erectus*, *Calamus enemis*, *Calamus leptospadly* and *Plectocomia himalayana*. Among these the most commonly used are *Calamus acanthospathus*, and *Calamus tenuis*.

People of some Dzongkhags are skilled in weaving cane into products such as fancy baskets, saddle bags, mats, hats, wicker chests, winnowers, sieves and *bangchungs*. Sale of such products has helped people to earn extra household income in these Dzongkhags.

Lemon grass

Lemon grass (*Cymbopogon flexuosus*) grows naturally in the chirpine forest (*Pinus roxburghii*) between 600 to 1,700 meters above mean sea level and covers more than 50,000 hectares in the eastern part of the country. Villagers collect the lemon grass from the forest and sell to the distillation units. The year-wise collection of lemon grass and revenue earned is given in Table 24.

Table 24. Quantity of lemon grass collected from the forest and revenue earned

| Year | Qty of lemon grass collected from the forests (kg) | Royalty (Nu) |
|------|--|--------------|
| 1995 | 4,172.50 | 16,690.00 |
| 1996 | 7,890.00 | 31,560.00 |
| 1997 | 4,050.08 | 16,200.32 |
| 1998 | 17,483.73 | 69,934.92 |
| 1999 | 17,626.00 | 70,504.00 |
| 2000 | 12,240.00 | 48,960.00 |
| 2001 | 12,420.00 | 49,680.00 |
| 2002 | 10,980.00 | 43,920.00 |
| 2003 | 8,820.00 | 35,280.00 |
| 2004 | 9,900.00 | 39,600.00 |
| 2005 | 10,529.00 | 42,116.00 |

Source: DOF, 2005.

The forest area where lemon grass grows belongs to the State. The farmers in the vicinity are allowed to harvest and distill lemon grass oil and to sell it. Lemon grass oil extraction is one of the important activities in the eastern part of the country. The average annual royalty earned by the Department of Forest, through the sale of grass, is about Nu.42,000. On the other hand the communities are also earning substantial amounts through the sale of oil. About 78 percent of the rural households living close to the lemon grass-growing area derive their household income from this activity. The household income from harvest and transportation of the grass to distillation plants can be as high as USD200 equivalent per year. (Prommegger et al. 2005).

Illicium grifithii

Illicium grifithii (star anis) is found in sub-tropical and wet temperate broadleaved forests of Bhutan. The species is more commonly found in the eastern part of the country. The fruits of the plant are collected by villagers and sold in the market. This plant has not yet been cultivated or domesticated in Bhutan. Villagers earn substantial amounts through the sale of this commodity.

Cordyceps sinensis

Cordyceps sinensis is a rare and highly priced ingredient in traditional medicine that has good demand all over the world. Locally it is known as *Yartsa Goenbub* literally meaning “summer grass, winter worm”. *Cordyceps* is a fungus related to the edible mushrooms which are commonly marketed. It is an entomogenous fungus. The spores of which, in millions, are widely dispersed by wind and water in autumn. Some of the spores fall, germinate and penetrate into the caterpillar larva of *Hepialis* sp. of the Lepidoptera order of insects (moths and butterflies).

The species is extraordinary as it exhibits both plant and insect form. *Cordyceps* was a highly protected species and people were not allowed to collect and sell it. In 2005 the Government

liberalized the policy and the people living within the *Cordyceps*-growing habitat were allowed to collect the material and sell it. The year-wise collection, sale and price of *Cordyceps* are given in Table 25.

Table 25. Quantity of *Cordyceps* collected and average market price in Bhutan

| Year | Qty collected from the forests (Kg) | Royalty (Nu) | Total revenue (Bhutan) | Average price per kg. (Bhutan) |
|-------------|--|---------------------|-------------------------------|---------------------------------------|
| 2004 | 171.51 | 636654.4 | 12,662,957.20 | 73,832.18 |
| 2005 | 57.13 | 165,487.00 | 3,001,592.30 | 52,539.69 |
| 2006 | 433.42 | 1,721,680.00 | 14,987,647.00 | 34,579.96 |
| 2007 | 140.37 | n/a | 41,150,033.00 | 293,154.04 |

Source: DOF, 2005.

Collection of *Cordyceps* was restricted because it was included in Schedule⁸ I of the Forest and Nature Conservation Act, 1995. Only the Institute of Traditional Medical Service (ITMS) was allowed to collect *Cordyceps* to be used as an ingredient in traditional medicine. Now the collection and sale of *Cordyceps* is allowed for those people living in the surrounding areas of *Cordyceps*-growing habitat. These are normally people living in the high altitude areas who are basically yak herders. The Department of Forest has introduced simple regulations with a view to prevent overharvesting. Further the Department of Forest has also arranged to have the stock auctioned, once in a year, where exporters and international buyers can participate. The quantity sold in the auctions is known to vary, on average from 140–433 kilograms annually. However there are indications that large quantities of *Cordyceps* are collected and traded illegally across the border. The lowest price per kilogram is Nu.34,579.96 and the highest per kilogram is Nu.293,154.04.

Wild mushrooms

Wild edible mushrooms have been collected and consumed from time immemorial. Some of the popular wild edible mushrooms include sangey sham (*Tricholoma matsutake*), Sisi sham (*Cantherellus cibarius*), Shiitake mushroom (*Lentinus edodes*), Oyster mushroom (*Pleorutus ostretus*), Ngala sham (Bjili namcho (*Auricularia auricula*), which grows on rocks and rotten logs. Other mushrooms include bjichu kangroo (*Calvaria* spp.), ga sham (*Clitocybe odora*), and taa sham (*Polyporus* spp.).

Amongst the wild mushrooms found in Bhutan, Matsutake mushroom (*Tricholoma matsutake*) is the most valuable and expensive. This mushroom is popularly known as *Sangay sham* meaning Buddha mushroom. It is a symbiotic fungus belonging to the ectomychorrhizal group, obtaining its nutrients from the roots of the living trees which basically serve as hosts. The host trees are *Pinus* sp., *Picea* sp., *Tsuga* sp. and *Quercus* sp. Year-wise collection and price obtained in Bhutan are given in Table 26.

⁸ All plants and animal species listed in Schedule I of the Forest and Nature Conservation Act 1995 are totally protected. Harvesting and trade are not restricted.

Table 26. Quantity of mushrooms collected and market value

| Year | Quantity collected from the forest (kg) | Royalty (Nu) | Market value in Bhutan (Nu) | Total Amount (Nu) |
|-------------|--|---------------------|------------------------------------|--------------------------|
| 2000 - 2001 | 34.00 | 680.00 | 13,600.00 | 14,280.00 |
| 2001 - 2002 | 1468.12 | 29,362.40 | 587,248.00 | 616,610.40 |
| 2002 - 2003 | 1462.37 | 29,247.50 | 584,950.00 | 614,197.50 |
| 2003 - 2004 | 3719.20 | 74,384.00 | 1,487,680.00 | 1,562,064.00 |
| 2004 - 2005 | 2655.00 | 53,113.20 | 1,062,264.00 | 1,115,377.20 |

Source: DOF, 2005.

Matsutake is a high value mushroom exported to Japan. It is an important source of income for rural communities. The trade is localized and has developed only in a few Dzongkhags where this mushroom grows. The local communities in the *Matsutake* mushroom-growing areas have formed a community organization for sustainable harvesting of the mushroom.

Emblica officinalis syn. Phyllanthus emblica

Emblica officinalis is a moderate-sized tree with feathery light foliage. The leaves are very narrow and linear in shape. This species is commonly found in moist deciduous forest throughout the major part of Bhutan ascending up to about 1,400 metres. It grows in a wide range of climatic conditions like semi-arid to moist localities with other trees. *Emblica officinalis* is a multi-purpose tree and its fruits have a very wide range of use especially in medicinal application. It is also used in a number of ayurvedic formulations. Local people are allowed to collect the fruits of *Emblica* and sell them in the market.

Medicinal plants

A large number of medicinal plant species, growing naturally in Bhutan, have international market value. Among these are agar wood (*Aquilaria agallocha*), *Rauvolfia serpentina*, (*Ephedra gerardina*), Himalayan yew (*Taxus baccata*), chutsa (*Rheum nobile*), chumtsa (*Rheum accuminita*), kutki/putishing (*Picorrhiza kurroa*), pangpoi (*Nardostachys jatamansi*), tsenduk rig (*Aconitum* spp.), and yartsa-geonbup (*Cordyceps sinensis*). All the species mentioned above have very high demand for pharmaceutical purposes. People in one of the Dzongkhags (Bumthang) have started cultivating two of the medicinal plant species namely, manu (*Innula helenium*) and ruta (*Saussurea lappa*). Both these plants are used for producing medicine and incense.

Daphne spp.

Bhutan uses the bark of two tree species in the manufacture of traditional paper. Bhutan has five species of *Daphne* spp. and one of *Edgeworthia* sp. All six are found throughout the country, but their distribution and frequency vary which has become a constraint in providing continuous supply of raw materials to local cottage industries.

Natural vegetable dyes

There are many dye-yielding plants in Bhutan. They are mostly found and used in eastern parts of the country where the traditional weaving industry has its roots and where weaving is one of the off-farm activities and source of livelihood for women. Most dye-yielding plants are forest-based and can be accessed free in community and government forests. The dye-yielding plants in the forms of leaves, bark, fruits and roots are generally suitable for collection from early September to the end of the year. Plants such as *Choenomeles lagenaria*, *Curcuma longa*, *Strobilanthus flaccidifolous*, and *Indigofera* spp. are cultured and propagated

on a small scale. Some dyes are sourced from fruit trees also. Local people obtain dyes from plants and minerals by simple traditional extraction methods. These dyes can be grouped into five categories: leaf dyes, bark dyes, flower and fruit dyes, stem and root dyes, and mineral dyes.

Swertia chirayita

Twelve different species of *Swertia* are reported to be growing in Bhutan. The most important and commercially exploited is *Swertia chirayita*. It is found in abundance in the eastern part of the country. *Swertia chirayita* is collected for household medicinal use, production of traditional medicines by the National Institute of Traditional Medicine (NITM), and for export. During 1992-1993, farmers in eastern Bhutan (Shingkar Lauri) collected about 18 tonnes of *Swertia chirayita*. The collection increased to 20 tonnes worth Nu.1,000,000 or (US\$35,714⁹) in 1993-94 (Dorji, 1995).

A comprehensive study on its impact on the rural economy was done by one of the research centres in 1998. The study showed that about 42 percent of the household income of some households of Louri geog (eastern Bhutan) comes from its sale (Pradhan et al. 1998). The same study indicated that other sources of livelihoods and income generation were limited as shown in Table 27.

Table 27. Percentage of income from the sale of *Swertia* compared to other sources

| <i>Income sources</i> | <i>Income earned (Nu)</i> | <i>Percentage</i> |
|-----------------------|---------------------------|-------------------|
| Swertia | 2,738.6 | 42.1 |
| Daily wages | 1,612.3 | 24.8 |
| Livestock | 1,293.3 | 19.8 |
| Star anis | 293.3 | 4.5 |
| Chilli | 519.4 | 8.0 |
| Others | 55.5 | 0.8 |
| Total | 6,509.5 | 100 |

Source: Pradhan et al. 1998.

Incense

Incense sticks are manufactured from many plant species which yield a pleasant aroma. Most people use the leaves, bark or the whole plant directly as incense. In Bhutan, the demand for incense sticks for religious use is very high.

There are 17 licensed incense units in the country. They procure most of the ingredients from outside the country for making the incense. Therefore there is great opportunity for local people to supply the raw materials to these units. Some of the commonly used species for making incense are given in Table 28.

⁹ 1US\$ = Nu.28 (official exchange rate in 1993-94).

Table 28. List of NWFPs used for incense

| Local names | Scientific names |
|--------------------------|--------------------------------|
| <i>Aru</i> | Myrobolan/Terminalia Chebula |
| <i>Baru</i> | Myrabloen/Terminalia Bellirica |
| <i>Agarwood</i> | Aquillaria agallocha |
| <i>Chugang</i> | Bambusta Textilelles |
| <i>Churu</i> | Goose berry |
| <i>Dezang</i> | Saffron |
| <i>Gurgum</i> | Carthamus tinctorius |
| <i>Pangpoi</i> | Nardostachys grandiflora |
| <i>Shingar</i> | Ligourice |
| <i>Sugmyel</i> | Ellettaria cardamom |
| <i>Poikar</i> | Shorea robusta |
| <i>Shintsha</i> | Cinnamomum tamala |
| <i>Manu</i> | Inula helenium |
| <i>Kakola</i> | Elanchi/Cardamom |
| <i>Tonggue</i> | Selenium Vaginatam |
| <i>Sang(Balu, sulu)</i> | Rhododendron sp. |
| <i>Sangzey Kachu</i> | --- |
| <i>Red sandal wood</i> | Sandalum |
| <i>White Sandal Wood</i> | Sandalum |
| <i>Tshe</i> | Ephedra heradiana |
| <i>Ruta</i> | Saussarea lappa |
| <i>Gugul</i> | Comiphora mukul |
| <i>Lishi</i> | Clove |
| <i>Shugpo shing</i> | Juniperus squamata |
| <i>Zati</i> | Myristica fragans |

Source: Nado poizokhang.

The Bhutanese incense market has been picking up over the last five years since incense-making industries began in Bhutan over a decade ago. Bhutanese incense is made strictly according to Buddhist prescriptions by blending over one hundred precious medicinal and aromatic substances and hence it has a sacred aroma. But the incense which comes from India still holds a substantial share of the Bhutanese incense market, although this share is falling by the year.

State of management of NWFP resources

The importance of NWFPs in the lives of rural people is gaining importance. In the past, the Department of Forest's efforts were geared towards management of timber resources only but now there is a shift in paradigm in the management of forest resources. At that time most of the NWFPs were being used by rural people on a subsistence level only. Now there are many NWFPs that have been identified for export.

Recognizing the importance of NWFPs in the socio-economic development of rural people, the Department of Forest has developed a strategy for the future development and management of NWFPs in Bhutan. Guidelines for resource assessment, based on local situations and conditions, are being developed. After developing the guidelines and the future road map, the future management of NWFPs will be handed over to communities. Some NWFPs will be identified as priority species which will be promoted for commercial use. The other NWFPs will still be utilized by rural people on a subsistence level.

Organizations involved in NWFP development and management

A wide range of institutions and organizations (including Government institutions, NGOs, donors, foundations, and the private sector) are involved directly or indirectly in NWFP development in the country.

Government agencies

Government agencies that are involved in NWFP development include:

The Department of Forest: The role of the Forest Department in NWFP development and management is as follows:

- (i) Coordinate all field offices in the Dzongkhags on behalf of the Forest Directorate on matters pertaining to NWFP management.
- (ii) The Forest Department has a national mandate for NWFP development and coordination among organizations for strengthening NWFP development¹⁰.
- (iii) Develop NWFP resource assessment and management guidelines of priority NWFPs for sustainable and meaningful utilization.
- (iv) Review and improve forest management codes/guidelines including NWFPs.
- (v) Provide technical support and implementation of (i) private forestry and (ii) community forestry programmes.
- (vi) Promote NWFP development activities in Community Forests (CF) in collaboration with the Dzongkhag Forestry Officers (DzFO), Divisional Forest Officers (DFO), and Park Managers.
- (vii) Provide training on NWFP development activities for CF user groups.
- (viii) Develop management guidelines on prioritized NWFPs for CFs.
- (ix) Species conservation and research monitoring.
- (x) Biodiversity inventory and management.
- (xi) Management of national parks and wildlife sanctuaries.

The Council for Renewable Natural Resources (RNR) Research in Bhutan (CORRB) oversees research programming and technology generation at the RNR Research Centres and packages technological options for implementation by the RNR sector programmes. Among the most important activities the following need to be mentioned:

- (i) National mandate for forestry research, including NWFP development.
- (ii) Coordinate and monitor NWFP-related research nationwide.
- (iii) Implement NWFP research activities including other high altitude medicinal and aromatic plants.
- (iv) Undertake research for improving scientific methods of sustainable utilization of NWFPs to enhance rural income.
- (v) Develop appropriate research methodologies and strategies for conservation and meaningful utilization of NWFPs in the country.
- (vi) Research on low altitude medicinal and aromatic plants.
- (vii) Product development on herbal home remedies.
- (viii) Conduct research to generate information on availability of NWFPs.
- (ix) Develop related technology for sustainable harvesting and management practices of selected NWFPs.
- (x) Promote NWFP plantations with economic significance (including bamboos, cane and medicinal plants).

National Biodiversity Centre

- (i) Provide a framework for organizing Bhutan's biodiversity-related activities.
- (ii) Offer mechanisms for national decision making on biodiversity concerns, cutting across sectors, divisions and institutions.
- (iii) Provide mechanisms to guarantee a better national balance between conservation and utilization of biological resources in general, and between in-situ and ex-situ conservation in particular.
- (iv) Present institutional and policy mechanisms to assure continuity of biodiversity-related activities over time.

National Mushroom Centre

- (i) Sustainable use of natural resources and management of mushrooms.
- (ii) Increase of income, living standards and nutritional status especially of the rural population through mushroom cultivation.
- (iii) Provide training in mushroom cultivation and in harvesting techniques of wild mushrooms in order to sustain wild mushroom resources.

Agriculture Marketing Services

- (i) Develop and disseminate market information.
- (ii) Develop marketing infrastructure and a communication network.
- (iii) Explore, develop and promote intra-regional and niche export markets for RNR products (fresh and processed).
- (iv) Promote value addition and agribusiness enterprises.
- (v) Develop market institutions and linkages between buyers and suppliers.

Natural Resources Development Corporation Limited (NRDCL)

- (i) Identification of commercial bamboo species.
- (ii) Plantation of bamboo estates.
- (iii) Identification of local bamboo products for marketing.
- (iv) Non-wood value addition through local and improved craftsmanship.

Institute of Traditional Medicine and Services

- (i) Promote the traditional system of medicine in the country.
- (ii) Preserve the unique culture and tradition related to medical practice.
- (iii) Provide alternative medicine to complement the allopathic system.
- (iv) Produce medicines required by the traditional medical system.
- (v) Conduct research and quality control of medicines.
- (vi) Provide traditional medical services in Bhutan.

Ministry of Economic Affairs (formerly Ministry of Trade and Industry)

- (i) Training on developing knowledge and craftsmanship employing natural resources like bamboo and cane, orchids, mushroom cultivation.
- (ii) Essential Oils Development Program (EODP) and formation of related farmer groups and cooperatives.
- (iii) Presents trade policy guidelines and promotes bilateral and regional trade through bilateral and multilateral trade agreements (Department of Trade).

Entrepreneurship Promotion Centre

- (i) Serves as a focal point for all entrepreneurship and small business promotion activities in the small and medium enterprise (SME) sector.
- (ii) Designs and conducts short courses to assist potential entrepreneurs to start small businesses.

Intellectual Property Division

- (i) Facilitates registration of intellectual property rights including company trademarks, brand names and labels.

Bhutan Agriculture Food and Regulatory Authority (BAFRA)

- (i) Quality control and ensuring safety standards in order to safeguard the image of products originating from Bhutan.

College of Natural Resources (CNR)

- (i) Training of RNR extension agents (including forestry).
- (ii) National mandate for in-service training.

The private sector

Besides the above-mentioned government institutions, there are also some established private sector institutions involved in NWFP marketing, including 17 licensed incense entrepreneurs; e.g. Bio-Bhutan is a pioneering enterprise that produces and markets natural and organic certified products from Bhutan for Bhutanese and international markets.

Other private players include recent government initiatives towards formation of farmers' groups like the Lemon Grass Association in the east and bamboo and cane growers in central Bhutan operating through the community forestry initiatives.

There are forthcoming plans to privatize feasible enterprises within NRDC and ITMS to be taken up by the private sector. ITMS has also developed a number of commercial products like *Tsheringma* tea and *Cordyceps*.

NGOs, donors and foundations

There are a number of NGOs, donors and foundations supporting Bhutan in NWFP development. Bilateral and multilateral development partners continue to provide both financial and technical support through projects and technical assistance.

For example, the Netherlands Development Organization (SNV) provides Technical Assistance in NWFP development along the entire value chain.

The Food and Agriculture Organization (FAO) supported the commodity chain analysis of high value mushrooms.

Helvetas/SDC provides technical and financial assistance through the participatory forest management project.

The International Development Research Centre (IDRC) in collaboration with SNV is supporting community-based natural resource management (CBNRM) activities, including action research on community-based management of a number of priority NWFPs.

The Rural Enterprise Development Project (REDP) of the United Nations Development Programme (UNDP) has amongst others supported the establishment of the Lemon Grass Association, and bamboo and cane product development.

The European Union has supported the Medicinal and Aromatic Plant project (MAP).

The Tarayana Foundation recently started utilizing nettle plants (*Girardinia diversifolia*) for the production of authentic hand-woven fabric fetching attractive prices for the local producers. Candle making is another activity using local materials like natural dyes to colour the candles.

Otherwise, there are other donors and NGOs such as: the Worldwide Fund for Nature (WWF), the Global Environment Facility (GEF's small grants programme) and the International Fund for Agriculture Development (IFAD), which are involved in promoting and developing NWFPs in Bhutan through programmes and projects.

In the region, the Asian Network for Sustainable Agriculture and Bio resources (ANSAB) and the International Centre for Integrated Mountain Development (ICIMOD) both based in Nepal, and the Regional Community Forestry Training Center for Asia and Pacific (RECOFTC) based in Thailand are other regional NGOs which have expertise in NWFP development in the region and could provide support in further NWFP development through short-term training programmes, workshops and study tours.

Challenges faced in the organizational and institutional set-up

One of the major institutional and organizational challenges is the lack of effective cooperation and coordination among and between different organizations in terms of duties and mandates. As there are many organizations involved in NWFP management and utilization the mandates and roles of these organizations need to be clearly defined. Coordination between collectors, traders, governmental and non-governmental organizations, exporters and institutional buyers continues to be weak and requires efficient institutions supported by adequate policy and legal instruments. Cross-departmental and cross-ministerial coordination is crucial in order to share information, to avoid the duplication of efforts and to witness a well-developed NWFP sub-sector in the country.

At the moment most of the NWFPs are exported as raw materials. In future there is a need to develop strategies to add value to the commodities and exports.

The service functions of forests

Significance of forest-based recreation and urban forestry

Forests provide recreational facilities. At the moment not much has been done in most of the cities and towns. However in bigger towns the concept of urban forestry is picking up strongly. The biological parks and botanical gardens have a great opportunity to provide recreational facilities. In future forest-based recreation and urban forestry will be important components and urban forestry will emerge strongly.

Forests and water

Water and watershed management are important programmes in the coming 10th five year plan and focus on the conservation of the cleanliness of ground- and surface water bodies and the maintenance of a continuous supply of water. Watershed conservation by forests contributes to the largest income-generating body of the country, i.e. the hydropower projects.

Therefore, conservation, development, utilization and management of water have been guided by the national policy. Effective watershed management is imperative for water resource conservation and sustainable utilization. Due to the rapid pace of socio-economic development, there is increased pressure on watersheds. Although harvesting of forest produce is based on sustainable management plans, increasing demand for timber, firewood and NWFPs is starting to have negative impacts on watersheds. Further, forestland encroachment and forest fires have become challenges for watershed management and conservation. Therefore, watershed management is a challenge that must be addressed collectively in the interest of all resource users.

Presently, watershed management has been taken for granted on the premise that the country already has rich forest and water resources. However, in the longer term, if certain policy interventions are not put in place, the implications of economic development on our natural resources will be irreversible and will jeopardize the very objective of sustainable development that the Government is pursuing. Therefore, if economic development is to be pursued in the manner that is proposed, the Department of Forest must accord very high priority to conservation and preservation of our natural resources.

There are many mega hydro-projects planned during the coming tenth five year plan period and almost all of these are based on run-of-the-river schemes. Therefore it is assumed that there will not be much environmental risk likely to occur in future. Further the law also requires that thorough environmental assessment is conducted and clearance obtained. There is a strong accepted wisdom amongst foresters and environmentalists that there should be a cost tag calculated and levied for conserving and managing watersheds for ensuring steady flow of water. The modality of calculating the cost has not been worked out but different opinions have been put forward for discussion and evaluation.

In principle the Management Teams of the mega hydro projects have already agreed to fund the raising of plantations in up-stream areas as part of payment for environmental services. The plantations will be raised by involving the local communities so that communities will have a sense of ownership. In the coming tenth five year plan period watershed management, through a collaborative approach, will be given high priority and activities will be implemented for river basin management.

Conservation of biodiversity

About 26.2 percent of the land area has been declared as Protected Areas. These Protected Areas are distributed in different ecological zones; as a result they represent diverse ecosystems. Further these Protected Areas are managed under various systems, i.e. under National Parks, Wildlife Sanctuaries and Strict Nature Reserves.

The forest types, in Bhutan, are interspersed by mountains and many rivers, lakes and marshlands. Species diversity is huge. Bhutan recorded 7,000 species of vascular plants which include 360 species of orchids and 46 species of rhododendrons. Moreover 82 of the plant species are recorded are endemic to the country. Wildlife includes 770 species of birds and 200 species of mammals. According to the Red List of threatened species maintained by IUCN, 14 species of birds and 26 species of mammals found in Bhutan are threatened.

Protected Area management is not without teething problems/issues. Key issues in the management of Protected Areas are (i) attacks on human beings by animals, (ii) livestock depredation, (iii) crop damage, and (iv) illegal hunting for bile, skins and paws of animals. Some of the activities initiated by the Department of Forest to address the issues include: (i) reviewing and revising the Forestry Rules and making them more implementable and (ii) initiating eco-tourism activities in the Protected Areas focusing on culling the wild pigs that are responsible for crop depredation.

The Nature Conservation Division under the Department of Forest is the overall responsible agency for (i) formulating policy and (ii) drawing up management plans for Parks and Wildlife Sanctuaries management. The Management Plans are implemented in the field with the help of Park Managers.

Forests and climate change

The importance of forest in ameliorating the climate has been recognized and in the recently drafted Constitution of the country it has been made mandatory to keep 60 percent of the land area under forest cover for all time to come. Managing climate change is a complex issue and there is a need to address the issue in a collaborative manner. Important activities already outlined to counter the impacts of global warming and climate change are: (i) to reduce the volume of water in some glacial lakes that are nearly full; (ii) setting up an early warning system in dangerous areas; (iii) hazard mapping; (iv) retaining 60 percent of the land area under forest in perpetuity; (v) reforestation of degraded areas; (vi) reducing the use of ozone-depleting substances like CFC-based refrigerators; (vii) reducing GHG emissions; (viii) using energy-saving devices etc. Further Bhutan is trying to access funds from the LDC Adaptation Fund and use the support to set up Adaptation Projects. Further Bhutan needs to do much more in creating awareness and switch over to the use of cleaner fuel like electricity. Use of firewood, as a primary source of energy, will continue for the coming decade which is going to put pressure on forest.

Policy and institutional framework

The Bhutan Forest Act of 1969 was the first legal framework for regulating forest resources in the country and this Act provided legal basis for consolidation of numerous directives relating to forest rights, forest products and royalties. The Act stipulated that at least 60 percent of the country area should remain forested for all time to come. Thereafter in 1974 the National Forest policy was passed. This Policy was the first formal statement of forest policy in Bhutan. The policy took into consideration economic development and focused on the protection and preservation of renewable natural resources. The main objectives of the National Forest Policy were related to conservation, afforestation, resource survey, forest utilization, wildlife management, recreation, forest administration and training, investment and Government revenue, forest research and publicity.

The Forest Act which was passed in 1969 served a legal purpose for 26 years. With changing conditions and situation, there was a need to revise the Act incorporating all the required changes. Bearing this in mind, the National Assembly of Bhutan revised the Bhutan Forest Act of 1969 and a new Act was promulgated, i.e. the Forest and Nature Conservation Act, 1995.

The new Act provided the legal framework for the protection and sustainable use of forests, wildlife and related natural resources for the benefit of present and future generations. Through this Act, CBNRM and utilization was encouraged. The Act also provided the legal basis for defining management restrictions in the process of forest function mapping and planning.

During the 9th five year plan period the concept of CBNRM was tested. The Ministry of Agriculture mandated one of the Research Institutes to undertake research on CBNRM. An implementation framework was prepared and based on this framework activities were implemented. The activities that were tested under this scheme were (i) management of *Cordyceps* and (ii) management of *Matsutake* mushroom and other natural resources that had significance for local people. The concept was deemed successful therefore the Forest and Nature Conservation Rules of 2006 were revised to incorporate the changes. This change in the Rules will give legal backing for the concept to be used for other activities as well.

The Act was followed by the first sets of rules which were promulgated by the Council of Ministers in 2003 to exercise powers and duties reflected in the Forest and Nature Conservation Act of 1995. Under the Forest and Nature Conservation Rules of 2003 it is a legal requirement for a forest management plan to be prepared for all forest areas. The Forest and Nature Conservation Rules 2003 were revised/amended in 2006 after incorporating the required changes. According to these Rules, the FMU is a designated geographic area of Government Reserved Forest for scientific management of forest for producing timber and NWFPs.

Otherwise the Environment Assessment Act 2000 established procedures for the assessment of potential impacts of strategic plans, policies, programmes and projects on the environment, and for the determination of policies and measures to reduce potential adverse impacts and to promote environmental benefits.

The National Environment Commission of Bhutan formulated a visionary document in 1999 known as the “Middle Path” which constitutes a national environment strategy (NES) for Bhutan. The NES envisages three avenues for sustainable economic development:

- Expanding hydropower
- Increasing agricultural self-sufficiency
- Expanding the industrial base

The NES does not include a specific focus on forestry development however the importance of mitigating watershed degradation in order to secure hydroelectric potential is stressed.

Further the five year forestry development plans provide direction to the Department of Forest for implementing the major programmes and projects for fulfilling sectoral goals; e.g. the Ministry of Agriculture’s sectoral goal for the 9th Five Year Plan (2001-2007) were:

- Enhancement of household and national food security;
- Conservation and management of natural resources;
- Enhancement of rural income;
- Generation of employment opportunities.

Forests have been playing a central role in the overall development of the country by virtue of being the largest renewable natural resource. Forest resources are an integral part of agricultural production systems and will continue to play an important role in the welfare of both rural and urban populations. Forest conservation and development are also intimately and uniquely linked in Bhutan through the protection of watersheds to guarantee hydroelectric potential, contributing to the overall socio-economic development of the country.

Broad overview of the forestry sub sector plan: Tenth Five-Year Plan (2008-2013)

Overall national goal and priorities

The overall thrust of the Tenth Plan is to improve the quality of life of the people. The development philosophy of GNH shall continue to guide Bhutan's development process. The four pillars of GNH will, therefore, form the core values for the Tenth Plan.

Accordingly, the priorities, strategies and programmes for the Tenth Plan have been formulated to ultimately contribute towards strengthening the four pillars of GNH: (i) promotion of equitable and sustainable socioeconomic development, (ii) preservation and promotion of cultural values, (iii) conservation of the natural environment, and (iv) good governance.

Bhutan has made remarkable socio-economic progress since the first Five-Year Plan was initiated in 1961. However, despite strong pro-poor development policies and interventions, poverty continues to be a serious concern. Although there is lack of data on poverty, recent statistics reveal that 31.7 percent of the total population falls below the national poverty line.

Such a situation is incompatible with the development ethos of GNH. Hence, Poverty Reduction has been the main development priority for the Tenth Plan. In particular, the emphasis for the Tenth Plan shall be to reduce the proportion of the population living below the poverty line from 31.7 percent to about 20 percent by the end of the Plan.

The focus on poverty reduction is also consistent with the Government's international commitments such as the MDGs, especially Goal # 1: Eradicating Extreme Poverty and Hunger by 2015 and the declaration of 2006-2015 as the SAARC Decade of Poverty Alleviation.

In addition to the overall focus on poverty alleviation, the Bhutan 2020 plan has set the following milestones that are directly or indirectly relevant to the Forestry Sector.

1. Achieve a three-fold increase in real incomes of farmers by 2012;
2. Ensure that 75 percent of the rural population lives within half a day's walking distance from the nearest road;
3. Maintenance of 60 percent forest cover in perpetuity;
4. Preparation of a master plan for all watershed areas by 2007;
5. Inventory of the biodiversity resource base by 2002.

The policy objectives

The policy objectives of the forestry sub-sector during the 10th FYP are as follows: The broad objectives of the forest policy are outlined below:

- To conserve the unique biodiversity of the country for the benefit of the future generations of Bhutanese citizens and the world community as a whole.
- To protect the fragile mountains from erosion, landslips and other natural calamities.
- To protect the limited agricultural land and to support the farming systems so as to contribute to the policy of self-sufficiency of the Government and improve the socio-economic conditions of the rural people;

- To protect and rehabilitate watersheds for the production of quality water for drinking, irrigation and for the production of hydroelectric power;
- To encourage people's participation in forestry and forest management in order to improve understanding and make rural communities self-sufficient in forest products;
- To maintain at least 60 percent of the country's land area under forest cover by protection of forests from forest fires, epidemics, encroachment, shifting cultivation and by reforestation, publicity and extension;
- To manage forest resources on a sustainable yield basis in order to improve the conditions of forests and at the same time derive economic benefits;
- To provide forest products through scientific harvesting for local communities and industries and thereby contribute to the development of the country and generate revenue.

Programmes

Therefore the following programmes have been identified for the 10th five year plan. They are:

(i) Community forestry programme; (ii) Private Forestry programme; (iii) Afforestation and Nursery Management programme; (iv) Watershed and Soil Conservation programme; (v) Forest Fire Management programme; (vi) Forestry Extension programme; (vii) Forest Resources Development programme; (viii) Protected Areas Management programme; (ix) Forestry Education programme; (x) Institutional Development programme; (xi) Service Delivery programme; (xii) Information Management programme; (xiii) Human Resources Development programme; (xiv) Monitoring and Evaluation programme.

Institutional arrangements for forest management

The institutional framework related to forestry and forest management at national and local levels and the institutions responsible for developing and implementing the strategic plans on natural resources, their main mandates in relation to forest policy and national forest programmes are as follows:

Ministry of Agriculture

The Ministry of Agriculture is the leading government institution responsible for the Renewable Natural Resources sector and is responsible for developing the sector's policies and strategies to be implemented by its Departments, which include the Department of Forest, Department of Agriculture, Department of Livestock, Council of Renewable Natural Resources Research and Extension, Food Corporation of Bhutan, and various non-departmental agencies.

Department of Forests

The Department of Forest was established in 1952 to manage the country's forests, regulate access and utilization and protection of the forest resources, enforce restrictions, and collect taxes and dues. Its functions also include afforestation, pest management, watershed management and nature conservation. The Department has four functional divisions viz. (i) Forest Resources Development Division, (ii) Social Forestry Division; (iii) Nature Conservation Division; and (iv) Forest Protection and Utilization Division. The Bhutan

Forestry Institute and Forestry Research are also integral parts of the Department of Forests. In addition, it has 12 territorial divisions and six National Parks and Wildlife Sanctuaries covering the entire country. The territorial divisions are headed by Divisional Forest Officers who supervise three to five Forest Ranges, which in turn oversee Forest Beat Offices.

Territorial duties include demarcation, forest management, reforestation, afforestation, forest protection, wildlife management, watershed management, forest fire management and extension. The main function of the Park Managers is to prepare scientific conservation management plans and implement these plans in the Parks and Wildlife Sanctuaries for the management of wildlife and natural ecosystems and biodiversity.

With decentralization of major programmes and activities the number of staff required to be posted in the Dzongkhags will also be huge. The present staff strength of the Department as indicated in Table 29 would not be sufficient to handle all the programmes identified for the coming 10th plan period. Out of these staff, provision will have to be made to post sufficient numbers of people to various Dzongkhags to handle the 10th five year plan programmes. The present staff strength of the Department of Forest is as follows:

Table 29. Staff strength of DOF vis a vis qualifications

| <i>Graduate and above</i> | <i>P.G. Diplomas & Diplomas</i> | <i>Certificates</i> | <i>Other category</i> | <i>Total</i> |
|---------------------------|-------------------------------------|---------------------|-----------------------|--------------|
| 382 | 672 | 231 | 121 | 1406 |

Source: HRD/DOF, 2008.

The Department of Forest, in collaboration with the Royal Civil Service Commission, is making every effort to recruit more trained people at different levels. The staff strength *vis a vis* the qualifications of the staff is expected to improve in the coming years. Thus the Department of Forest would be able to handle all the programmes which have been decentralized to the Dzongkhags level.

Dzongkhag Forestry Office

The Dzongkhag Forest Officer is responsible for implementing the decentralized activities of the forestry programmes. The main functions are afforestation, reforestation, social forestry, community forestry, issuance of permits for rural needs, watershed management, forest extension programmes etc. There are 20 Dzongkhag Forest Officers in the country who are mainly responsible for the programmes that are decentralized to the districts and further to the block levels.

Building on the foundations and past experiences, the Department of Forest undertook another major reform process prior to the launch of the ninth Five year plan. The process was initiated under the aegis of the Institutional Development Initiative Fund of the World Bank and as a result, a comprehensive framework and plan for the Ninth Five Year Plan was prepared. In recognition of the evolving political environment and the new priorities of the Ninth Five Year Plan, the Department initiated appropriate programmes under the various functional and operational divisions and streamlined coordination mechanisms and incorporated the Ministry's overall monitoring and evaluation system across all the programmes.

Natural Resources Development Corporation Limited

The NRDCL is an autonomous agency, which is responsible for implementing the forest management plans prepared by the Department of Forests. The main activities that the NRDCL implements, as a part of the implementation of the management plans, are timber

harvesting, transportation of timber from the forest to depots, reforestation, marketing of timber and other forest products.

State of research and education in the forest sector

Research

The Forestry Research programme started with the creation of the Forest Research Division in 1987 under the Department of Forests. Following a review of forestry, agriculture and livestock research systems in 1992 by the International Service for National Agricultural Research (ISNAR), the forest research was integrated with fields crops, horticulture, livestock and forestry to form a network of four Renewable Natural Resource Research Centres located at Yusipang (Thimphu), Bajo (Wandue), Jakar ((Bumthang) and Wengkar (Mongar). The Forest Research programme is now one of the four national research programmes under the Council of Renewable Natural Resources Research for Bhutan. It is coordinated, nationally, from the Renewable Natural Resource Research Centre located at Yusipang. The areas of research are as follows:

The Forest Research programme is managed under eight research sub-programmes: (i) Nature conservation; (ii) Conifer forest management; (iii) Broadleaf forest management; (iv) Wood products; (v) Non-wood Forest Products; (vi) Government and industrial reforestation; (vii) Social Forestry; and (viii) Forest Protection. The Department of Forests is the main stakeholder and the research projects are planned and reviewed annually with the stakeholders during review and coordination meetings.

Even though the research system is very young in Bhutan, it has contributed significantly in solving some of the pressing issues in sustainable forest management. To cite a few examples: in the mixed conifer forest there was problem of regeneration of the main species. The research system has come up with very useful prescriptions and this issue is likely to have a solution. They have also come up with appropriate silvicultural prescriptions for various forest types. Thinning regimes for various forest types have been studied and prescriptions drawn. The Research Centres are also actively engaged in research related to NWFP development and marketing. In future these Research Centres will be strengthened and more studies will be initiated that will help in sustainable forest management in the country.

Education

Presently, forestry education at the university level is not available in the country. People go to various universities in India, Europe, the USA and also in countries in the south-eastern region for training. Recently the Government has planned to introduce a degree-level programme in the country under the auspices of the Royal University of Bhutan. This will help augment the manpower situation in the country.

On the other hand forestry education, at the diploma level, is being imparted by the College of Natural Resources which is affiliated to the Royal University of Bhutan. The training at forest guards' level is conducted by the Bhutan Forestry Institute, Taba. Training on these two programmes is imparted by different institutes. Starting July 2008, both of these programmes will be conducted by Ugyen Wangchuk, Institute of Forestry and Environment Studies which is under construction and is expected to be functional very soon.

Key issues and overall state of forest and forestry

Heavy demand on timber and fuelwood

The demand for constructional timber has increased more than the volume that can be produced sustainably. Constructional timber is produced by two agencies i.e. (i) the NRDCL and (ii) the Department of Forests. On average, about 78 percent of the total wood production goes to rural people for their use at a subsidized rate and the balance of about 22 percent is for commercial use. Since the supply of timber in the commercial market is short of demand, the price has soared considerably. Further there is also a danger that part of the demand of the commercial market may have been met by the subsidized timber. This situation may usher the development of a black market for timber in the country. The sustainable management of forest resources may be put under a severe test. Table 30 gives total production of timber in the country by the NRDCL and the Department of Forest, through its field offices, during the past three years.

Table 30. Total production of construction timber (in m³)

| Year | Const. timber produced through NRDCL (m ³) | % of total | Const. timber produced by DOF (m ³) | % of total | Total production (in m ³) |
|------|--|------------|---|------------|---------------------------------------|
| 2003 | 58,262 | 28 | 146,494 | 72 | 204,756 |
| 2004 | 63,467 | 13 | 422,845 | 87 | 486,312 |
| 2005 | 54,355 | 24 | 175,589 | 76 | 229,944 |

Source: NRDCL and DOF, 2005.

Further, the demand for firewood is also increasing steadily. At the national level firewood production potential and extraction is not a major problem. However, at the local level, extraction of firewood and sustainable management of forest for firewood supply is a critical forest management problem because of the concentration of human settlement in the valley and other favourable locations. This situation also poses extra stress on forests near the settlements leading to forest fragmentation and degradation.

Based on the supply records maintained by the Department of Forest and a study conducted by the Department of Energy in 2005, about 724,595 tonnes¹⁰ of wood had been consumed as firewood. In rural areas a major portion is used for cooking followed by fodder cooking and space heating in colder regions. In urban areas, space heating uses a large volume of fuelwood.

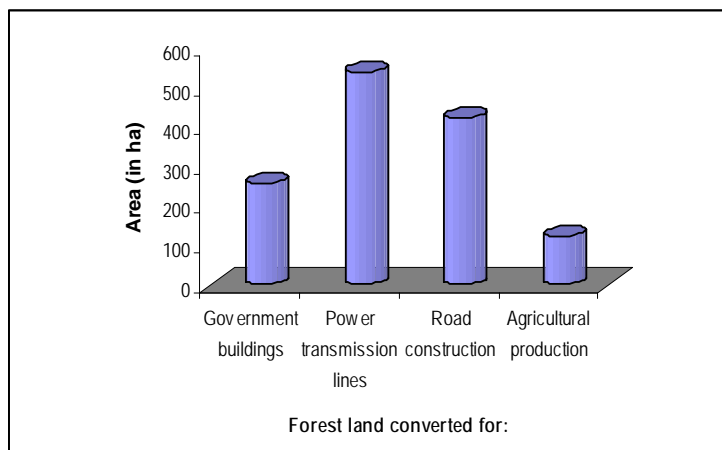
Forest land conversion to other land uses

With the rapid pace of modernization/urbanization in the country, there is an increasing demand for forestlands for conversion into urban and peri-urban areas. Bhutan being a developing country, the current phase of development also entails varying scales of infrastructure development, which has placed a significant demand for timber, and other construction materials, like sand and stones. However, foreseeing such demands, Bhutan has launched upon a more careful and cautious development planning process in light of its emphasis on conservation and sustainable development. The timely enactment of the Environmental Assessment Act, 2000 ensured that all development projects required an Initial Environmental Clearance. The timber requirements for these projects are also being supplied and regulated with the preparation of comprehensive sustainable forest management plans for every area of forests (FMUs) that are subjected to timber production. The implementation of

¹⁰ Equal to 992,596 m³/annum. Most comes from lopping, logging residues and dried fallen trees which cannot be used as constructional timber. Standing trees are rarely used as firewood.

activities in the FMU is subjected to periodic and systematic monitoring and evaluation. On the other hand, there is also concern that with infrastructure development taking place in the country, forest depletion and degradation will take place.

As in many other countries, the number of roads through the forests has led to major forest resource depletion. The dilemma is that the farmers all over the country demand a road network for easy access to markets and to bring about public utilities over time. The number of roads in the forest has also led to illegal activities like poaching, arson and encroachment. At the ecosystem level, roads have gradually caused forest fragmentation and in the long run may also cause degradation of the forest ecosystem. However, given the importance of roads in the socio-economic development of the country, the Department of Forest is constantly working with relevant agencies to pay closer attention to road network planning by taking into account its negative impacts on forest resources.



However despite all the mechanisms in place, forest land is being converted to other land uses such as (i) construction of government buildings for various purposes like basic health units, community schools etc.; (ii) construction of power transmission lines across the country; (iii) road construction; and (iv) for agricultural uses. According to the data from the Department of Forest quoted in Bhutan Environment Outlook, 2006, about 1,347 hectares of forest land were converted to other land uses from 2001–2005.

Responding to environmental problems

Fire

Given the scattered location of villages and settlements, as a result of terrain conditions, anthropogenic activities on forests have increased significantly. Rural villages that depend on open fires for lighting and other outdoor activities have been elevating the likelihood of fires spreading into forests. Another cause of forest fire is the increasing accumulation of forest debris, compounded with a marked dry season, which has significantly contributed to forest fires. For instance, in fire-prone districts, more than 20 forest fire incidences are reported annually. Other causes are also linked to negligence during outdoor activity and deliberate lighting of forest fires for various vested interests. Considering the difficulties of access, terrain and the nature of forest fires, the Department of Forest has adopted a preventive strategy rather than a reactive strategy. Given the lack of resources and constraints under field conditions, fire fighting per se poses serious challenges.

Forest fire is one of the most important environmental problems. Despite very strong regulations and awareness campaigns launched by the Department of Forest, forest fires continue to burn huge forest areas. Forest fire is more prevalent in the conifer forest of Bhutan than in the broadleaf forest zone. The incidence of fire and the area burnt since 1999 is shown in Table 31.

Table 31. Number of fire cases and area burnt

| Year | No of cases | Area burnt (ha) |
|-------------|--------------------|------------------------|
| 1999-02 | 99 | 12,987.45 |
| 2000-01 | 78 | 9,420.65 |
| 2001-02 | 57 | 5,569.23 |
| 2002-03 | 35 | 2,117.00 |
| 2003-04 | 39 | 1,033.60 |
| 2004-05 | 67 | 3,225.10 |

Source: DOF, 2005.

Overall there is a decreasing trend in the occurrence of forest fire vis a vis the area burnt in the recent years. However during 2004-05, the number of forest fires suddenly increased. But the overall decreasing trend may be attributed to the intensive awareness campaign initiated by the Forest Department. If we take the trend as an indication for future forest fire occurrence then it can be deduced that the incidences of forest fires will be reduced in the coming decades. This is not going to happen on its own; the Department of Forest will have to put plenty of resources and efforts into raising awareness of the negative impact of forest fires. The people will have to be taken on board in designing the forest fire management strategy.

Dealing with opportunities and challenges of globalization

Globalization has opened opportunities for Bhutan and other developing countries, facilitating wide and faster access to resources, capital, technologies as well as know-how and markets. On the other hand globalization also has risks. Globalization is likely to bring about financial volatility, social and economic disruptions. Private sector companies will have to be very alert and quickly adapt to the changing situations and capture newly emerging business opportunities. These companies will have to strengthen their international competitiveness and try to find ways and means of reducing the risks.

Eco-tourism is another area which Bhutan can easily build up and cash in on. More and more people from across the globe would like to visit and see Bhutanese natural eco-systems which are highly diverse and unique. More importantly this activity will have to be promoted based on the community management concept. Most of the revenue generated from this activity should go to local people. It is expected that with the implementation of this activity the household income of local people will improve significantly.

3. WHAT WILL INFLUENCE THE FUTURE STATE OF FORESTS AND FORESTRY?

The following key factors will influence the direction of change in the forestry sector in Bhutan in the coming years:

- (i) Economic changes
- (ii) Impacts of globalization
- (iii) Political changes
- (iv) Demographic changes and rural-urban migration
- (v) Environmental awareness including climate change
- (vi) Societal transition and impacts
- (vii) Technological changes

Economic changes

The change in the economy of the country will have a strong bearing on the future management strategy of forests. The country's economic growth is very healthy with GDP growth averaging at 6.5 percent for 2005 and increasing to 8.5 percent by 2008; on the other hand, there is still a high level of poverty (RGOB, 2006a). According to the Poverty Analysis Report, 2004, an estimated 31.7 percent of the population lives below the overall poverty line (at Nu.740.00 per month). The poverty is more of a rural phenomenon with more than 97 percent of poor people living in rural areas. Rural enterprises and other income-generating activities are lacking in villages. Activities based on natural resource use will help people living in rural areas to break away from the poverty cycle (RGOB, 2006a).

In Bhutan the tertiary sector is the main contributor to growth. The secondary sector is the second major contributor which accounted for 34.4 percent of the nominal GDP. The primary sector which consists of agricultural produce, livestock production, forestry and logging, mining and quarrying accounted for only 23.8 percent of nominal GDP. Table 32 gives the real GDP growth by sectors.

Table 32. Real GDP growth by sectors (change in %)

| <i>Items</i> | <i>2001</i> | <i>2002</i> | <i>2003</i> | <i>2004</i> | <i>2005</i> |
|------------------|-------------|-------------|-------------|-------------|-------------|
| GDP | 7.2 | 10.0 | 7.6 | 6.8 | 6.5 |
| Primary sector | 5.7 | 3.2 | 2.2 | 1.6 | 1.2 |
| Secondary sector | 9.9 | 18.1 | 7.3 | 4.5 | 2.6 |
| Tertiary sector | 13.3 | 7.9 | 11.8 | 12.4 | 13.3 |

Source: Kuensel, April 28, 2007 (Vol. XXII No. 32).

The growth pattern indicates that in coming decades the service and manufacturing sectors will be the major contributor to the GDP. The Government is trying its best to create opportunities for engaging the youth gainfully in the rural areas, be it in agricultural-related activities or other activities like forestry and horticulture.

With less employment opportunity in the rural areas for young school drop-outs, there is a big exodus of the youth from the rural areas to urban centres seeking job opportunities in the industry and service sectors. The horizontal expansion of agriculture is declining and as a result many acres of agricultural fields are left fallow.

The demand centres for constructional timber are in urban areas. This is because the wealth distribution is more skewed resulting in significant widening of inequalities. The demand for

constructional timber is relatively low in rural areas. However, in rural areas, the demand for fuelwood for cooking and in colder areas for space heating is increasing.

Agriculture–forestry interface issues

Agriculture and horticulture production and livestock rearing depend on the availability of land which faces serious competition amongst other land uses for infrastructure development, food production and areas for settlement. Therefore there are always potential threats from other quarters to the forest land use. The dependence of agriculture, horticulture and urban development on forest will continue to exert pressure on forests.

With 69 percent of the population living in rural areas and engaged in economic activities that are based on natural resources, enhancement of rural livelihood is an important development objective of the Government. Therefore it is pertinent that making rural livelihood more productive and sustainable will form the core development area of the sector.

It is also very important to understand that rural livelihoods in Bhutan are supported by farming which is characterized by inherent interdependence among forests, livestock and agricultural enterprises. It is in this context that the enhancement of rural livelihood will involve improvement of economic returns from these enterprises.

There is also a strong possibility that demand for energy could be one of the strong drivers which might exert more pressure on forest land. The forestry professionals are likely to face an array of economic, environmental, cultural and technological problems for the use of land on sustainable principles.

Deriving benefits by practicing sustainable management of forests is often less profitable than large-scale production of food, feed or energy crops. In many cases this situation has propelled forest conversion to other land uses especially in developing countries.

Therefore sustainable management of forest resources is very important to achieve the objectives of the MDGs which require balancing among economic, social and environmental aspects in decision making, and achieving synergies among forest, agricultural and energy land uses. Integrated approaches to national land use and resource planning balance food, feed and biofuel production with the conservation of forests and biological diversity.

Land-use change

Until now, because of the strong conservation policies pursued by the Government land-use changes taking place in the country are within reasonable limits. However, in future, with increasing population and infrastructure development and more area required for food production the situation is going to change. Further dependency on agriculture is decreasing day by day because of the strong growth of non-agricultural sectors, e.g. infrastructure development, industrial development etc.

Construction of various categories of roads contributes to the conversion of forest land to other uses. The total road network in 2001 was 3,215 kilometers which became 4,000 kilometers in 2004 and in 2005 it was 4,398 kilometers. The growth trend is increasing strongly. During the five-year period the increase in the length of roads was 1,184 kilometers indicating an average of about 234 kilometers of various categories of road per year (Table 33).

Table 33. Different categories of roads and their length (in km)

| <i>Years</i> | <i>National highways</i> | <i>District roads</i> | <i>Feeder roads</i> | <i>Urban roads</i> | <i>Farm roads</i> | <i>Forest roads</i> | <i>All roads</i> |
|--------------|--------------------------|-----------------------|---------------------|--------------------|-------------------|---------------------|------------------|
| 2001 | 1,558.0 | 476.0 | 1,092.9 | 87.7 | -- | -- | 3,214.6 |
| 2003 | 1,578.1 | 459.0 | 1,327.2 | 91.7 | -- | 555.1 | 4,011.1 |
| 2004 | 1,577.2 | 459.0 | 1,226.5 | 109.2 | 251.5 | 529.5 | 4,152.9 |
| 2005 | 1,577.2 | 459.0 | 1,278.3 | 125.1 | 388.5 | 570.6 | 4,398.7 |

Source: NSB, 2006.

Rural development and the impacts on forests

Agricultural development is very important for promoting sustainable rural development. Contribution to the GDP, by this sector, is quite significant. However it is observed that the contribution from this sector is decreasing. In 2000, the contribution from the agricultural sector was 36 percent (18 percent agriculture, 8 percent livestock and 10 percent forestry). Arable agricultural land constitutes only about 7.7 percent of the total land area and further it is not available in a contiguous stretch. The land is fragmented and scattered in difficult terrain. This situation is making the practice of intensive agriculture difficult (UNDP, 2002).

During the coming tenth five year plan period, the Government has accorded high priority to develop rural enterprises, in which the focus is to concentrate more on non-farm rural enterprise development activities besides conventional agriculture, livestock and horticulture development. The non-farm rural enterprises will be natural resource-based and since the forest occupies more than 72.5 percent of the area the forest is going to be the biggest supporter for developing rural enterprises based on natural resources like (i) traditional handicrafts from raw forest materials, (ii) cane and bamboo products, (iii) incense manufacturing using raw forest materials, (iv) traditional paper making etc. However, there are many challenges like low produce yields, very poor or no accessibility and no proper market. If these challenges are addressed systematically the opportunities from such development initiatives will be immense. Therefore in order to make rural enterprise development a reality, the Government needs to address the limiting factors or constraints and ensure the following measures are put in place (UNDP, 2002).

- The policy should be conducive to development and private sector initiatives should be given importance;
- Market information should be improved;
- Rural enterprise development should be horticulture- and NWFP-based;
- Production of organic products;
- Production of low volume but high value products, and;
- Production of handicraft items and bamboo and cane products.

Such development initiatives would also be able to address rural–urban migration and also migration of rural people from higher altitude areas to lower altitude areas. The income-generating activities at the rural level should be able to retain the youth from going to urban centres in search of better opportunities.

If more people are living in villages demand for timber, fuelwood and other NWFPs is going to increase. Local forest resources will be stressed. Further there will also be demand for raw materials for manufacturing handicrafts, traditional paper, cane and bamboo articles.

Future energy demand and its implications on forests

Based on the study conducted by the Department of Energy in 2005, the future demand for energy is going to increase. The study also stated that most of the energy consumed (58.96 percent) in the country is biomass energy, which is basically firewood. Electricity is second to firewood (13.81 percent). This trend is going to continue.

Emerging trend in the production of fuel and the potential implication on the forestry sector

The cost of fossil fuel is soaring and very soon it will become unaffordable in many countries. It will hit worst in countries where the entire consumption depends on importation. The countries in the region are spending huge sums of money on research and development and promoting the production of bio-fuel from plants. The trend is expected to occur in Bhutan as well. Presently most fuelwood is produced from government-reserved forest and partly from community and private forests. However if bio-fuel production picks up greatly then there could be heavy pressure on government-reserved forest. Large tracts of forest area could be converted to other land use. The implication is reduction in forest areas. Further people might also use their agricultural land for raising plantations of those species that can be used for producing bio-fuel. This might impact severely on national food security.

Political change and institutional development

With the introduction of parliamentary democracy, in Bhutan, effective 2008, the role of the key actors in the management of forestry resources is likely to change. The role of Central Agencies, in the management of forest, will become less crucial. Public institutions at the local level are going to be strengthened which will pave the way for the greater role of local institutions in the decision making process. The involvement of institutions of the local government will be more pronounced in the management of natural resources. Further with the enactment of Local Government Act 2007, the decision-making role in planning, management and allocation of the natural resources has already started to change. The role of communities, NGOs and private sectors will become more significant. The role of the Central Government Agencies will be more advisory, with technical backstopping, monitoring and evaluation of the implementation of plans and programmes. There will be more devolution of decision-making authority at the local level. With political realization developing, people at the local level will have greater awareness of the environment and regional issues pertaining to forest and forestry.

Further it is also expected that the political reform which is taking place at the moment, will be very stable and strong during the coming years. The net result will be that there will be a very proactive and sustainable system of forest management. The process should help increase forest cover as well.

However the Department of Forest will have to play a very proactive role and re-organize the Department functionally so that it is equipped with proper manpower and authority to carry out activities efficiently. As part of the re-organization plan the Department of Forest is posting more people with higher qualifications so that the staffing pattern at the local government level is improved. More authority will be given to people working at the local level which will help them to make decisions in a much faster way. Further the Forest and Nature Conservation Rules of 2006 are being revised and the provisions that were unfriendly to the implementation of decentralization policy are being amended and more people friendly provisions are being incorporated. With the amendment of legal provisions and posting of more people with higher qualifications the decentralization policy is expected to be successful.

Further with all these changes the promotion of community, private forestry and plantation of the degraded areas will be boosted with decision-making authority for management and resource allocation handed over to communities equipped with the provisions of monitoring and evaluation by local forest offices. It is expected that about 80 percent of fuelwood for use by local people will be produced from community and private forests in the coming decades.

The private sectors are also expected to play a major and proactive role in developing local wood-based industries so that the local economy is boosted and employment is generated. As part of policy reform, the Department of Forest has revised the price of timber and also efforts are being made to prepare more management plans so that more timber is produced and brought to the market in a sustainable manner.

Impacts of globalization

Many people think that the impacts of globalization may not have very eye-catching effects in the Bhutanese context because export of timber in primary form is banned and will remain banned in the foreseeable future. However it should be realized that the impacts of globalization will have both positive as well as negative impacts even in Bhutan.

On the trade front, the export of timber, both in logs and sawn form, will not have any impacts since the in-country production will not be sufficient to meet even local demands. Therefore exports will only be finished products. However the import of timber is likely to increase. Further the trade in high value NWFPs is expected to pick up very quickly. This development, in general, will help earn foreign exchange for the country and will also boost the household income of local people in particular. Non-wood products like mushrooms, *Cordyceps* and some medicinal plants, have great scope for earning foreign exchange. Some products, if marketed as niche products with the brand name “Product of Bhutan”, have great export potential.

Globalization will push the certification of forestry products to a great extent and many countries in the region are already implementing the process. This will have serious negative impacts in the Bhutanese trade sector. The requirement of certification is likely to push the price of the products higher in the international market rendering the products less competitive.

The other most important impacts of globalization will be in the tourism sector. Since the Government has identified tourism as one of the important development avenues in future the door for tourists is going to be opened much wider than ever before. Many tourists will undertake cultural and eco-tourism. Trekking and mountaineering will be important components of tourism but may put local resources at great risk because the demand for forest produce, at the local level, will increase. Pollution could become a major issue if not managed properly. The benefits would outweigh the constraints arising from tourism. For the development of rural communities, eco-tourism should be promoted instead of “mass tourism” which is more urban-based and does not cater to the requirements of the rural masses.

The Department of Forest in close collaboration with the Tourism Department and local communities will have to develop facilities to host tourists. This programme if planned and implemented in a coordinated manner will help to improve the socio-economic status of rural people.

Demographic changes and rural–urban migration

The total population of the country was estimated at 634,982 in 2005¹¹ which is projected to grow to around 809,397 in 2020, an increase of nearly 27 percent within 15 years and by 2030 the population will be about 886,523. The population is expected to grow at an estimated average rate of 1.4 percent per annum. The present density of the population is 16 people per square kilometer. By 2020 the number of persons living per square kilometer will increase from 16 persons (2005 estimate) to about 21 persons per square kilometer (NSB, 2007). The average size of the Bhutanese family is five people and the size is getting smaller. The population projection till 2030 and the corresponding male–female ratio are given in Table 34.

Table 34. Population projection

| Years | Population | Percentage | |
|-------|------------|------------|--------|
| | | Male | Female |
| 2005 | 634,982 | 52.5 | 47.5 |
| 2008 | 671,083 | 52.3 | 47.7 |
| 2010 | 659,822 | 52.2 | 47.8 |
| 2012 | 720,679 | 52.1 | 47.9 |
| 2014 | 745,153 | 52.0 | 48.0 |
| 2016 | 768,577 | 51.9 | 48.1 |
| 2018 | 790,215 | 51.8 | 48.2 |
| 2020 | 809,397 | 51.7 | 48.3 |
| 2022 | 827,038 | 51.7 | 48.3 |
| 2024 | 843,363 | 51.6 | 48.4 |
| 2026 | 858,410 | 51.5 | 48.5 |
| 2028 | 872,759 | 51.4 | 48.6 |
| 2030 | 886,523 | 51.4 | 48.6 |

Source: NSB, 2007.

About 45 percent of the Bhutanese population is under the age of 20 which implies that the population growth rate is likely to increase in the near future as a result of the young age structure (RGOB, 2005).

According to the National Statistical Bureau, on an average, women at present are giving birth to about 3.6 children in their active reproductive life (15 to 49 years). According to the same report this is expected to drop to two children by 2020 and 1.8 by 2030. The possible implication of the decrease in birth rate is that the labour force population might decrease if the trend continues (Kuensel, June 23, 2007, vol. XXII No. 48). By 2020 the rural–urban population is expected to equalize which means equal numbers of people will be living in rural and urban areas. However it is likely that older people might dominate the rural population in the years to come and since the urban drift will continue it is expected that the rural population depending on forest resources is likely to decrease.

The Poverty Analysis Report, 2004 estimates that on average 31.7 percent of the Bhutanese live below the poverty line with higher incidences in the rural areas (38.3 percent). The highest percentage of poor people lives in the eastern part of the country (48.8 percent).

A large percentage of young and able bodied men and women has left the villages and are in towns looking for better job opportunities. The impact of urban drift is problematic and will have the following implications: (i) shortage of labour force in the villages; (ii) houses are left empty with no maintenance for years; (iii) the land will be left fallow and after a couple of

¹¹ Population census was conducted in 2005.

years inferior trees and bushes will start growing on farmland. On the other hand the condition in urban areas will be stressful involving (i) pressure on basic amenities like housing and water supply; (ii) problems in admitting children to school etc. (Kuensel June 16, 2007).

Rural-urban migration has become one of the most notable social evils in Bhutan. It is reported that each passing day people have been migrating to towns. The policies of the government to make rural life more attractive have not been very successful. A weekly newspaper, Bhutan Times of 26th August, 2007 reported that life in rural areas has been made more difficult as result of the implementation of some government policies; for example in the name of decentralization, communities are made to attend too many community development activities which deprives them from working in their fields. Another critical issue pointed out by the paper is that the forest rules are not people-friendly. People cannot fell even one tree even if this tree is invading and interfering with their agricultural land. Further because of the prolific multiplication of the wild pig population in the wild, there is rampant crop depredation and the villagers have to spend sleepless nights guarding their crops. The crop loss, because of wild pigs, is colossal and in many villages people find it very difficult to protect their crops. Other basic facilities and amenities in rural areas are also not adequate. In many villages, the schools are run by only a few teachers and basic health facilities are also very poor. All these tribulations amalgamate to compel rural people especially youth, to migrate to towns thinking that life in towns is better.

The impacts of rural-urban migration are very conspicuous. It creates social problems in urban areas. The available facilities are not able to sustain the ever-increasing population. Worse still, social evils like child labour and abuse will increase.

Implication on forestry

The demand for forest produce like timber, fuelwood and NWFPs is likely to remain at the present level even if rural-urban migration continues.

Environmental awareness

The forestry sector has adopted a conservation-oriented policy since the 1960s. As a result of such a visionary policy and the provision of political commitment with matching resources, the country is currently seen as an exemplary nation in leading and initiating conservation efforts both nationally and internationally.

The country has committed and ratified several international environmental Agreements and Conventions like (i) the Convention on Biological Diversity; (ii) the United Nations Framework Convention on Climate Change etc. Having gained the status of a 'biological hotspot', Bhutan has set aside a total of 26.32 percent of land area under the Protected Area management system and another 9 percent as Biological Corridors. In total about 35.32 percent of the land area is put under Protection for Biological Diversity. The initiatives will continue to develop in conservation programmes. In Bhutan the paradox of conservation and development is seen as an opportunity and thus development is sustainable and conservation is not undermined.

Invasive species (plants, animals and insects) pose a threat. The invasive plant species *Parthenium* sp., *Lantana camara* and *Eupatorium* sp. and climbers like *Michenia* sp. are real problems in Bhutanese forests. In plantations these species cause heavy damage to the favoured plant species by suppressing their growth. Frequent weeding and removal of these species is required which entails heavy expenditure for the Government. The number of invasive species in Bhutan is much more than indicated here. Efforts are being made to

identify and inventory all the invasive species found in the country and measures are being taken to manage or combat the problems.

Bark beetle (*Ips scmuzinhoferin*) is a deadly beetle which attacks spruce and blue pine trees. They bore into the trunks of the trees and eventually the tree dies. The trees have to be removed from the forest to avoid further attack by the insects to the trees in the surrounding forest areas. On many occasions the management prescriptions had to be revised or modified frequently because of the attack by bark beetles. Heavy expenditure is incurred for felling the trees and in many cases the felling is done before the trees reach maturity.

Societal transition and implications on the forests

Bhutan is an agrarian society with over 69 percent of the population living in rural areas. Rapid changes are taking place in the society. Presently 31 percent of the people are living in urban areas and 69 percent is living in rural areas (NSB, 2007). It is expected that by 2020, the people living in rural areas will be reduced to about 50 percent while the people living in urban areas will increase considerably which means that the rural and urban population might equalize. However the demand for fuelwood for cooking and space heating in the rural part of the country may not decrease because the cost of other fuels like LPG and kerosene would be very high in rural areas. The cost of transportation of such fuels would be enormous.

Further the purchasing power of rural people is likely to increase and with this the demand for constructional timber will also rise considerably. The Department of Forest will have enormous challenges in meeting the demand for such timber.

With the transformation of societal structure, education and income level, the preference and demand from forests and forestry will also change. For instance, the present school enrolment is increasing at an alarming rate and in the coming two decades nearly 20 to 30 percent of these educated people will return to the villages. The rest may be living in urban centres. Table 35 summarizes the key characteristics of societal changes and their implications on forests.

Table 35. Key characteristics and implications for forests

| Key characteristics | Implication for forests |
|--|---|
| Bhutanese society is a more agrarian society | Demand for constructional timber and fuelwood will increase. |
| Increase buying power of the middle-class of the society | Demand for forest produce will increase. This is going to exert more pressure on the forests. |
| More educated people living in rural areas | The demand for forest produce will go up. |
| Preference for conservation | People will demand more forest areas to be set aside for conservation of biodiversity. With this, the area under production forest is going to be reduced. This will impact on the production of timber and fuelwood. |
| Preference for participation in forestry activities | People will demand that they should be part and parcel of the decision-making process in managing local natural resources. This means that the management regime will be changed in future. |
| Preference for recreation | People living both in urban as well as rural areas will demand that there should be more forest area declared and set aside for recreation. |
| Preference for demand and consumption | With better education and increased understanding of the people, the preference for demand and consumption of forest produce will change. People might be switching over to alternatives as well. This means there could be varied form of demand as well as consumption. |
| Demand for equity | People would like to have a share in forest products as well as revenue earned from the local forest. |

Technological changes within and outside the forest sector

Technological changes both within and outside the forestry sector have a bearing on the management of forest. Biotechnology has been increasingly used in the horticulture and agriculture. It is expected that this technology will very soon enter the forestry sector especially for seedling production for large-scale afforestation work.

The consumption pattern of the people is changing and people now prefer to use reconstituted panels rather than using sawn wood or plywood. The other technological change that might hit wood-processing industries is the introduction of medium density fibre (MDF) technology, block boards etc. using low quality materials from the forest.

Summary of key factors that are likely to impact forestry in the next 20 years

Key factors that are likely to impact forestry in the next 20 years are:

- (i) Economic change.
- (ii) Impacts of globalization.
- (iii) Political change.

Besides the factors mentioned above the following factors are also important and these factors are going to impact the forestry in the coming years. Some of these factors are:

- (i) Societal transition and their implications on forests.
- (ii) Demographic change and rural–urban migration.
- (iii) Environmental issues and policies.
- (iv) Technological changes within the forestry sector and also outside the sector.

4. PROBABLE SCENARIOS AND THEIR IMPLICATIONS

Rationale for scenario definition

Workshops and meetings were conducted involving various organizations, institutions and individuals who have stakes in the forestry sector. During these meetings seven key drivers of change were identified; out of these drivers the following were identified as having the most significant impacts on the forest sector.

1. Economic change
2. Impacts of globalization
3. Political change

Different situations

In order to define the scenarios in their proper perspective the following strengths and weaknesses were identified:

Strengths: (i) Low population base and density; (ii) strong spiritual ties and cultural traditions emanating from the concept of *gross national happiness*; (iii) relatively high per capita natural resources; (iv) relatively strong social stability; (v) ongoing effort to establish strong democratic government; (vi) strong effort to decentralize and devolve decision making authority at the local level; (vii) good opportunity for promoting cultural/eco-tourism; and (viii) very high scope for promoting organic agricultural/horticultural products.

Weaknesses: (i) Relatively high level of rural poverty; (ii) low per capita income in rural areas; (iii) high dependence on subsistence agriculture; (iv) very limited skills available; (v) inaccessibility of the major part of the country; (vi) relative isolation which limits opportunities; (vii) development primarily driven by external factors; (viii) high scope for rapid globalization.

Until now, development efforts to a large extent have focused on (a) developing hydropower resources for generating revenue for the country by selling the power; (b) improving the education and health system; and (c) construction of road networks for improving accessibility in the country.

Under these situations, the private sector cannot develop to the required level. The tax base is also very low. Further there is a very high dependency on external assistance for implementing all development activities. This external development assistance may decline in the context of increasing income from the generation and sell of hydropower. Income level is further likely to rise with more new power projects being commissioned.

Another critical situation is the landlocked nature of the country and as a result it faces serious limitations in market access. Further being located between two giant and strongly emerging economies it faces both challenges and opportunities.

Therefore given these situations, the following scenarios are likely to unfold over time.

Different scenarios

1. Gradual transition of the existing subsistence agrarian economy into a more diversified middle income rural economy maintaining societal cohesion, cultural value, etc. in accordance with the concept of *gross national happiness*.
2. Development primarily driven by external factors leading to the advancement of a dualistic economy.
3. Political changes will pave the way for the establishment of parliamentary democracy that will support institutional and policy reform and devolution of decision-making authority at the local level.

Scenario 1

Gradual transition of the existing subsistence agrarian economy into a more diversified middle income rural economy maintaining societal cohesion, cultural value, etc. in accordance with the concept of *gross national happiness*.

Over the years because of the diversified economy the GDP has started growing steadily. The growth rate is very progressive and strong and it is growing at a steady rate. The agrarian economy will be gradually transformed into a strong economy as a result of diversified activities.

It is very probable that the GDP growth rate may reach 12 to 13 percent by 2015 but the people living in the rural areas may still be poor. The ripple effects of the growth are likely to be minimal in rural areas. Therefore the net effect will be that there will still be many rural people migrating to urban centres in search of employment. People living in rural areas will continue to exert pressure on the forest.

Jobless people from rural areas will still continue to move to urban centres in search of work. The manufacturing and production sectors in the country are reasonably weak therefore it is probable that the economic growth spurred by sale of electricity, tourism, and the construction industry will not be able to offset the increase in people seeking work. This situation has led to an unemployment rate of 3.2 percent in the country which might increase in the coming years.

The implications of strong economic growth in urban areas and the gradual transition of a subsistence agrarian rural economy into a middle income economy will mean that the demand for construction timber and firewood will also increase in rural as well as in urban areas. This will put extremely heavy pressure on forest resources.

Scenario 2

Development primarily driven by external factors leading to the advancement of a dualistic economy.

The development programmes are primarily driven by external factors especially because of the demand for resources like hydropower and forest products and by tourism. These situations will help develop a dualistic economy, i.e. revenue generated through the sale of electricity, forest produce and tourism will be concentrated in urban areas while subsistence agriculture in the rural areas will remain unchanged.

Mass tourism is expected to increase in the coming years. People from all over the world have a great interest to visit Bhutan. Tourism, in general, is an urban-based industry which

normally is helpful to people living in urban areas. Rural people do not get the anticipated benefits.

Globalization will impact on the trade of timber and other wood products. The demand for constructional timber will increase with the increasing buying power of the people. The in-country production of round timber will not be sufficient to meet the internal demand therefore the country may have to resort to import of round timber for meeting the internal demand. In order to ease the import of timber the tariff will have to be reduced. On the export front the certification requirement might pose problems therefore efforts may be needed to add value to commodities and also re-orient forest management practices in line with the regional or global requirements.

There is great scope for opening avenues for (i) establishing cottage industries in rural areas based on NWFPs, horticulture and agricultural commodities. This will help people living in rural areas and they will also have the opportunity to use NWFPs for their own domestic purposes.

Some of the NWFPs have very high export value even though the volume available is small. These commodities are (a) Matsutake mushroom, (b) *Cordyceps sinensis*, (c) medicinal plants (d) natural vegetable dyes etc. However, the biggest challenge, in trading these products, is to make the price of these products competitive in the region. Unless the quality of the products improves and the price is made more competitive, exporting these products, even in the region, will be very difficult.

Trade relations in the region will be developed. The same commodities available in Bhutan are also available in huge quantity in the region therefore it is very important that the quality, price and “Bhutan Brand Name” are addressed to make these products regionally competitive.

The demand for industrial wood by wood-based industries is increasing steadily and it will be very difficult to fulfill the demand from the in-country production of timber. The Department of Forest will have to devise ways and means to improve this state of affairs. The demand situation is likely to exert pressure on the forest for producing more timber and firewood. The industrial wood supply-demand balance and the wood energy supply-demand balance will be negative or might remain at the present state. Therefore efforts need to be geared to make this situation positive by producing more small timber and firewood from plantations, community and private forests.

Scenario 3

The ongoing political changes will pave the way for the establishment of parliamentary democracy that will support institutional and policy reform and devolution of decision-making authority at the local level.

The country has been transformed from monarchic rule to a parliamentary form of democracy. The initiatives for this historic political change came from the Throne. A democratically elected government has been installed.

People in rural areas are more politically cognizant and it is evident that they will demand more social equity and forest products like constructional timber, fuelwood and access NWFPs. People will be more concerned about conserving biodiversity and be more strict in implementing forest management plans so that forest is managed in a sustainable manner.

Various institutions of the central government, local government, private sectors, civil society organizations and communities will be more organized and their roles more clearly defined. The role of central government organizations will be more advisory with provision of

technical backstopping. Local government offices will take the lead role in implementing the programmes and projects in the Dzongkhags. Civil societies working in the forestry sector will also be more active in their fields of specialization.

People living in rural areas will get an opportunity to participate in the political process. Management responsibility of forest resources will be devolved at the local level. Therefore the government will be strong enough to devolve governance responsibility of the forest to the local level.

Further the involvement of the private sector in forestry activities will increase. Distribution and marketing of natural resources, especially construction timber, will be decentralized to the local people. The allocation and marketing of commercial timber will be done by the NRDC.

The conservation and management of wildlife will be given higher importance. People will have better understanding of the importance of National Parks and Wildlife Sanctuaries. It is also likely that more tourists will visit these areas. The revenue from Parks and Sanctuaries will also increase. Community based eco-tourism is one of the avenues for alleviating rural poverty.

Urban forestry will be developed in and around the urban centres. There will be more facilities for recreation in all urban centres. Eco-tourism will be of great help in uplifting the socio-economic status of the rural people and this programme is likely to be promoted by the government in all the Parks and Sanctuaries located in different Dzongkhags with the support and involvement of local people. The other programme which is likely to be strongly promoted is the establishment of rural cottage industries based on horticultural, agricultural and non-wood forest products.

With more decision-making power devolved at the local government level, and development of cottage industries in rural areas, the rural–urban migration of people may decline. Under such situations, the demand for constructional timber and firewood will increase in urban areas.

Management of local natural resources will be handed over to local government institutions. With such reform taking place both at the central and local level, there is going to be very proactive management of forest resources in the country. Local institutions should be working towards improving local timber resources as well as NWFPs.

5. WHAT WE MAY SEE IN 2020

Forest resources in the next two decades

The population will exert more pressure on the forest. Forest areas will also be subjected to encroachment and conversion to other land uses because of rapid urbanization. Further with development activities taking place at a faster rate, forest areas will be targeted and large tracts of areas may be converted to other land uses. If the forest cover area is reduced then the composition and the density of the forest will also be reduced, and in many cases it may be fragmented and degraded in the next 20 years.

Further with the increase in buying power of the people the demand for constructional timber, firewood and non-wood resources will increase. Policy reform will promote community and private forestry in the country. It is expected that part of the demand for timber and NWFPs will be taken up by community and private forests. Some of the prioritized commercially viable NWFPs will be developed on a commercial scale. There will also be scope to develop and domesticate medicinal plants by the farmers and sell the products to the National Institute of Traditional Medicines.

The annual forest increment is currently very low. There is concern that areas of production forest may be lost to other land uses. The annual increment rates of major forest types of Bhutan are given in Table 36.

Table 36. Annual forest increment

| <i>Forest types</i> | <i>Increment/year/annum (m³)</i> |
|---------------------|---|
| Mixed conifer | 2.10 |
| Fir | 2.22 |
| Blue pine | 1.76 |
| Hemlock | 5.00 |
| Spruce | 5.40 |
| Broadleaf | 0.99 |

Source: DOF, 2005

It can be argued that the growing stock of the forest may increase marginally in future if the forest is managed scientifically. However the net increase in the growing stock may not be significant. The total annual harvest of commercial timber might increase marginally by bringing slightly more forest area under production forest in future. Since the annual increment of different forest types is relatively low there is a need to devise appropriate silvicultural methods so that the per unit area volume can be increased. If the Department of Forest takes this seriously and implements appropriate methods in coming years the net production per unit area will be increased.

The Department of Forest, as a lead agency, should develop strategy or a road map for future direction of NWFP development in the country. In particular the following elements should be taken into account.

Research and development: NWFP research needs are tremendous, touching all aspects of their management and development. They cover, among others, enhancing knowledge about NWFP resource assessment methods, inventory methods for different NWFPs, classifying plant species, identifying candidate species for development of specific products and also their domestication and cultivation.

Resource management: The management of NWFPs will have to be based on the concept of community-based management. There is a major need to develop a framework for NWFP management.

Developing marketing strategies: Lack of market information and knowledge is a key barrier to NWFP trade. Information about markets, together with the capacity to act upon it is an important pre-requisite for entering and maintaining a hold on a new market. Therefore there is a need to emphasize market orientation.

Study of value chain analysis and developing investment plans: Value chain analysis is a study which analyzes the entire chain from the forest level to the consumer. Value chain analysis for priority NWFP species will, therefore, help to identify the best marketing opportunities to provide the best economic returns. Based on the outcomes of the value chain analysis, investment plans will have to be prepared to further develop NWFP commodities in order to increase economic revenues.

An overview of the future of the country's forests and forestry in 2020

Strengths

1. Strong political will of the government
2. Strong conservation policy
3. Good forest management practices
4. Strong political will to devolve management responsibility to the people

Opportunities

1. Scope for improving the forest by reforesting degraded areas
2. There is room for getting better participation of local people in the management of forests and watersheds
3. Further scope for strengthening the monitoring and evaluation mechanism in forestry management practices
4. Bhutan's forests can play a crucial role in the regional/global outlook
5. High potential for carbon trading
6. Potential for exporting high quality semi-finished or finished wood products
7. High potential for eco-tourism development based on community management
8. High potential for employment generation in rural areas.
9. High scope for community and private forestry programmes

Weaknesses

1. Weak in the implementation of management plans
2. Weak forestry database
3. Shortage of forestry personnel
4. Lack of subsidy on timber for rural house construction has been a weakness in forest management
5. Lack of resources for implementing plans effectively

Threats

1. Limited number of forestry professionals. This could be a problem when people resign
2. With changes in the political scenario, the policy of the Government might change
3. Rapid urbanization will pose a threat to forest management
4. There could be loss of biodiversity if it is not managed properly

5. There could be loss of forest areas for other developmental activities;

Long-term economic viability of forestry

1. Forest will always have tangible and intangible benefits
2. Great scope for carbon trading
3. Scope for exporting of niche products (high value low volume products)
4. High potential for eco-tourism development
5. High potential for employment generation at the rural level based on agriculture, horticulture and NWFPs
6. Bhutan's forest can play a crucial role in the regional/global outlook
7. Potential for exporting high quality semi-finished or finished wood products
8. High potential for promoting community and private forestry which will produce small timber for construction purposes and firewood for meeting local demand

6. HOW COULD WE CREATE A BETTER FUTURE?

Responding to the changing societal needs

It is very clear that the Department of Forest will not be able to tackle all the priority programmes of the Department within the stipulated time frame. It is therefore important to identify thrust areas (according to five-year planning cycles) and concentrate on these areas within the planning period. Within the backdrop of this concept, the Department of Forest has identified the following programmes as the thrust areas to be addressed within the coming five-year period: (i) promotion of community and private forestry; (ii) watershed management; and (iii) development of prioritized NWFPs that are economically viable (and set cottage industries in rural areas); (iv) promotion of eco-tourism based on the community management concept and (v) human-wildlife conflict management. Therefore, within the scope of these thrust areas, the following activities need to be pursued further which will help increase the household income of rural people:

- (i) Development of rural cottage enterprises based on agricultural, horticultural and NWFP products;
- (ii) Promotion of rural eco-tourism based on community management;
- (iii) Promotion of community forestry for meeting the demand of timber and fuelwood of rural communities;
- (iv) Promotion of the use of alternative devices that will save energy (research on potential alternative products, improve quality of alternative products);
- (v) Development of urban parks for recreation;
- (vi) Measures to reduce rural-urban migration;
- (vii) Measures to halt conversion of forest land to other land uses;
- (viii) Measures to reduce the effect of climate change by rational use of fossil fuels;
- (ix) Addressing human-wildlife conflicts.

Policy change within and outside the forestry sector

Policy changes taking place within the forestry sector are in the following areas: (i) devolution of power at the local level in the management of forest; (ii) strong emphasis on promotion of community and private forestry; (iii) promotion of NWFP management and establish rural cottage industries based on these products; (iv) promotion of energy saving devices to reduce the possible effects of climate change; (v) raising plantations in degraded forest areas.

It is evident that what is going to happen to forest will largely depend on changes that are taking place or will take place outside the forestry sector. Therefore policy changes pertaining to the following activities, outside the forestry sector, are also going to impact on forestry. The most important are (i) policy on urban area development; (ii) policy on rural-urban migration; (iii) policy related to reducing the impact of climate change; (iv) policy on impact of globalization; (v) policy on use of fossil fuel; (vi) policy on trade of timber etc. (vii) policy on future energy uses and promotion of bio-fuel.

Institutional changes

The Forestry Development Corporation Limited (FDCL) which was responsible for harvesting and marketing of timber has been recently reorganized as the Natural Resources Development Corporation Limited (NRDCL) and the mandates have been broadened. With the reorganization of this corporation, it will be fully responsible for implementing all activities pertaining to natural resources management and marketing. This reorganization will help people to access natural resources at affordable rates and within reasonable time periods.

Private sectors will also get much impetus for development with the inclusion of people from the private sector on the Board of NRDC. The Department of Forest has also been reorganized and many activities pertaining to forest management have been decentralized at the local government level. Now local people can participate in decision making while preparing management plans and resource utilization plans. The Department of Forest has also identified the thrust areas where major resources will be channelled towards fulfilling the objectives of management of these thrust areas. Now people will be able to access natural resources without much bureaucratic procedure and also at affordable rate. Community and private forestry will have much importance and be promoted rationally.

Regional and global collaboration

Globalization is inevitable; therefore regional and global collaboration in almost all aspect of forestry and trade in wood and wood products is very important. In order for Bhutan to be playing an important role in global and regional initiatives, Bhutan will have to be very competitive and efficient especially in the following areas (i) market information for the products in which Bhutan is relatively strong and (ii) promoting trade, especially for niche products.

Overall priorities

Based on the identification of the key drivers of change and the scenarios that are likely to unfold over the years, the following priorities have been identified in the coming decades in the forestry sector in Bhutan:

1. Development of rural cottage enterprises based on agriculture, horticulture and NWFPs as raw materials.
2. Promotion of rural eco-tourism based on community management.
3. Development of strategies and plans for watershed management by involving local communities and other stakeholders like the Dzongkhag Development Committee, NGOs and Watershed Management Specialists etc.
4. Awareness raising and education on the importance of environment, sustainable forest management, and fire control.
5. Promotion of community forestry and private forestry for producing small timber and firewood for rural use.
6. Measures to reduce the effect of climate change by rationalizing the use of fossil fuels.
7. Research on propagation, management of NWFPs to ensure sustainable utilization of NWFPs by the local people and also promote prioritized NWFPs on a commercial scale.
8. Create job opportunities for youth at the local level.
9. Develop strategies and measures for halting land-use change.
10. Plans for initiating carbon trading to be developed.
11. Address the prevailing human-wildlife conflict.
12. Measures to halt conversion of forest land to other land uses.

7. SUMMARY AND CONCLUSIONS

The following are the key findings and conclusions.

- 1 The key drivers of change for the forestry sector identified are: (i) economic change, (ii) impacts of globalization, (iii) political changes, (iv) demographic changes and rural urban migration, (v) environmental awareness including climate change, (vi) societal transition and impacts, (vii) technological changes.

Based on the identification of these drivers of change the following three factors are the most important:

- (i) Economic change
- (ii) Impacts of globalization
- (iii) Political change

Further based on the aforesaid three most important drivers of change, the following three scenarios are likely to unfold over the years:

- (i) Gradual transition of the existing subsistence agrarian economy into a more diversified middle income rural economy maintaining societal cohesion, cultural values, etc. in accordance with the concept of *gross national happiness*.
 - (ii) Development primarily driven by external factors leading to the advancement of a dualistic economy.
 - (iii) The political changes will pave the way for supporting institutional and policy reform and devolution of decision making authority at the local level.
- 2 The GDP of the country is increasing steadily and within five to six years it will reach double digit growth figures. This indicates that the economic status of the people will increase and their buying power will also go up. The demand for construction timber, firewood and NWFPs will also go up significantly. There will be a major demand for forest produce which will exert heavy pressure on the forest. The demand–supply balance for construction timber as well as firewood will be negative.
 - 3 The technologies in wood-based industries have not improved in the past several years and further there is very little hope and scope of their being upgraded in the coming years. Further the production of large logs is diminishing rapidly therefore within the next two decades wood-based industries that require very clean and straight-boled timber are likely to have difficulty in finding raw materials. The wood-based industries requiring bigger timber will find it very difficult to survive in the business. It is most likely that those industries that use low quality and small-sized wood and produce internationally competitive products are likely to remain in the business.
 - 4 In the foreseeable future there will not be sufficient scope for exporting round wood or logs because the in-country production of round timber will not be enough to meet the local demand. On the other hand the import of round wood is likely to increase in future. Wood will continue to remain as one of the main sources of energy. The major portion of this wood is likely to come from government forest. The people living in rural areas will continue to use wood as the principal source of energy whereas the people living in urban areas will be using other sources of energy like electricity, LPG, kerosene etc. There will be heavy pressure to produce more wood for energy.

- 5 The most important environmental functions will be those to reduce the impacts of climate change. Bhutan being a mountainous country located in the Himalayas will have greater impacts than countries located in other regions. Further since agriculture is the main source of livelihood for Bhutanese people and about 69 percent of the population depends on agriculture, the impact of climate change will be felt even greater. Again with the impacts of global warming, glaciers will melt rapidly and fill the glacial lakes which are in the northern part of the country. The future overflowing of these lakes will have colossal impact on the lives and properties of people living downstream.
- 6 The conventional forest-related activities will not be able to generate many jobs for rural people because the volume of activities will be very limited. In addition to activities like logging, plantations, nurseries etc. people will also be employed in the wood-based industries. It is foreseen that rural activities based on NWFPs will be one of the most viable alternatives for improving the rural economy. Further it needs to be realized that these activities alone may not be the definitive solution for uplifting the rural economy radically because most of the NWFPs found in Bhutan are in small volume and used by the rural people at subsistence level only. There is a possibility of prioritizing 10 to 12 NWFP species that have good commercial prospects and developing these species on a commercial scale. Institutional arrangements should be done properly, outlining the role and responsibilities of each agency.
- 7 Globalization is inevitable as a result it will bring both opportunities and challenges for the forestry sector. Some of the opportunities could be (a) scope for promoting ecotourism based on the concept of community management; (b) benefits that may accrue by promoting the development of hydropower based on the CDM concept. In Bhutan all hydropower projects are run-of-the-river schemes with negligible environment impacts and zero GHG emissions. Therefore when electricity is exported it will displace the energy generated from fossil fuel-powered plants thus abating GHG emission. There are also challenges associated with globalization. Since Bhutan is a landlocked country accessibility, transportation and communication have always been limiting factors for efficient market access. The other limiting factor is the lack of skilled manpower in the country which means the quality of products will not be able to compete in terms of quality and price in the international markets. Further the importing countries may impose certification requirements that might not be conducive for a small country like Bhutan.

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