



**BHUTAN:**

**COUNTRY REPORT  
TO THE FAO INTERNATIONAL  
TECHNICAL CONFERENCE  
ON PLANT GENETIC RESOURCES**

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# CHAPTER 1

## Introduction

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### 1.1 COUNTRY BACKGROUND

The kingdom of Bhutan is situated on the southern slopes of the Eastern Himalayas. It is landlocked between China to the north and India to the east, west and south (Map 1). It covers an area of 46,500 sq. Km and has a population of 650,000. The terrain of the country characterised by mountains rises from the foothills in the south to the high Himalayas in the north. The hills and mountains are cut by deep north-south valleys. Valleys in the inner mountains receive less than 900 mm of annual rainfall, while rainfall in the foothills is as high as 5,000 mm. Varying altitudes, rainfall and aspects of the mountains combine to give each valley a unique set of conditions. The extremely wide diversity of the country's climate, ranges from wet sub-tropical to alpine (Table 1). Development in Bhutan is guided by the principles which emphasise the need to ensure that its rich natural and cultural heritage is preserved, and that development from a subsistence to more modern economy proceeds on a sustainable manner.

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### 1.2 SOCIO-ECONOMY

Bhutan is a least densely populated country and about 85% of its population lives in rural areas. The settlement patterns are determined by the local topography and it is concentrated in the valleys of Inner Himalayas and foot hills in the south. The population is growing rapidly at an estimated rate of 3.1% per annum. In Bhutanese society women enjoy equal status as men in all respect. The Renewable Natural Resources (RNR) Sector of the Royal Government of Bhutan (RGOB) covers Agriculture, Livestock and Forest sub-sectors including nature conservation. Although the economy has been diversified, the RNR Sector remains the single most important sector accounting for 40.7% of GDP in 1993. It is estimated that arable and horticultural production together account for 53% of sector output. Livestock production account for about 21% and forest products for 26% of sector output. The RNR sector, through export of horticultural and forest products, has continued to contribute a significant positive trade balance. Imports, primarily of rice, wheat, livestock products and edible oils are offset by the export mainly cardamom, orange, apples, potato, timber and other forest products. Imports of rice and wheat in recent years averaged around



35,000 - 40,000 MT annually, amounting to about 35% of annual consumption.

| Box 1 Agro-Ecological Zones (AEZs) of Bhutan |                  |                     |             |        |                |   |
|--|------------------|---------------------|-------------|--------|----------------|---|
| AEZs   | Altitude m.a.s.l | Mean Temperature °C |             |        | Rainfall mm/yr | Dzongkhags (Districts/Regions)                          |
|  |                  | Monthly Max         | Monthly Min | Annual |                |   |
| Alpine                                       | 3,600-4,500      | 12.0                | -0.9        | 5.5    | <550           | Whole Northern Region                                   |
| Cool Temperate                               | 2,600-3,600      | 22.3                | 0.1         | 9.9    | 650-850        | Bumthang, Ha. Gasa                                      |
| Warm Temperate                               | 1,800-2,600      | 26.3                | 0.1         | 12.5   | 650-850        | Paro, Thimphu, Trashigang, Lhuntse, Trashigang Yangtse  |
| Dry Subtropical                              | 1,200-1,800      | 28.7                | 3.0         | 17.2   | 850-1,200      | Punakha, Wangdue, Trangs, Tangsa, Trashigang, Mongar    |
| Humid Subtropical                            | 600-1,200        | 33.0                | 4.6         | 19.5   | 1,200-2,500    | Samtse, Trashigang, Zhemgang, Tsirang, Sarpang, Chhukha |
| Wet Subtropical                              | 150-600          | 34.0                | 11.6        | 23.6   | 2,500-5,500    | Samtse, Sarpang, Samdrup Jongkhar                       |

Source MOA

### 1.3 PRODUCTION SYSTEM

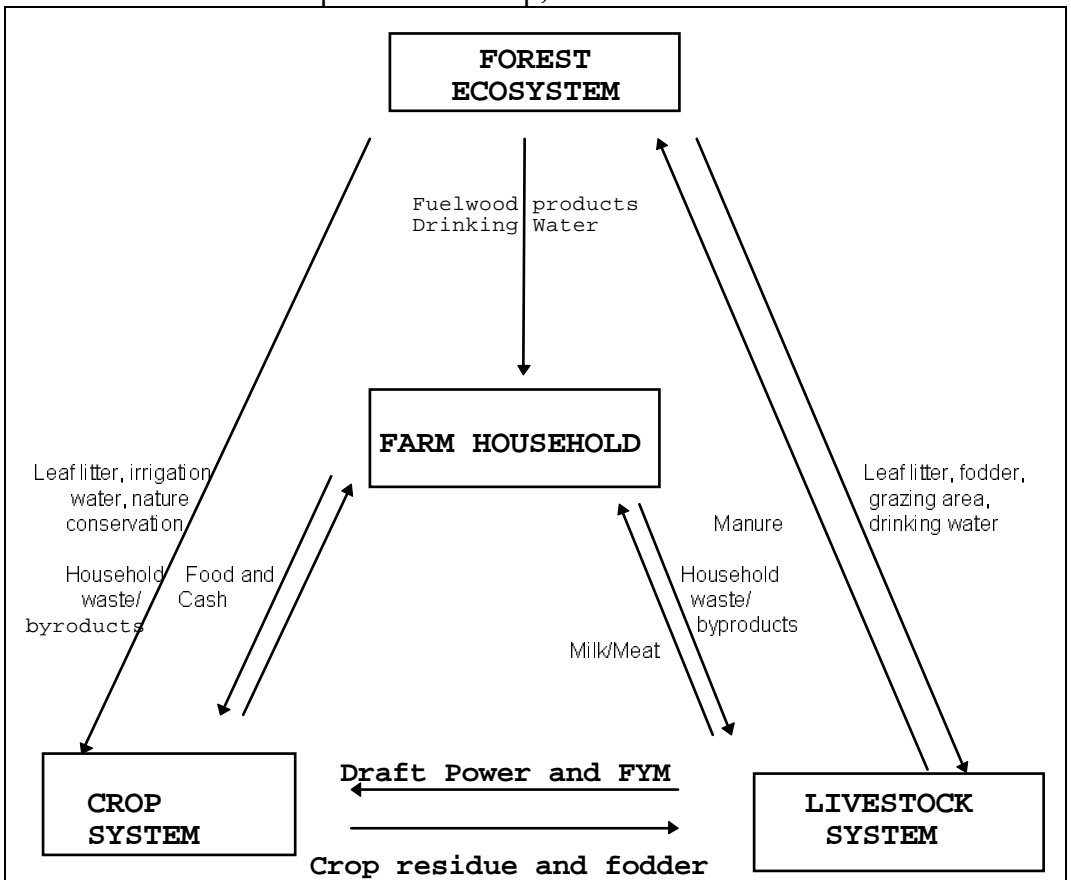
Within the RNR sector, crop production, livestock and forestry activities are closely interrelated and interdependent (Box 2). Increasing population pressure on traditional production system is leading to more extensive resource use. Since there is little scope for expanding agricultural land, intensification of the production system and introduction of improved technologies are the main options to meet the increasing demand for food and income generation. These options may pose threats to the environment and biodiversity when short term benefits are exploited at the cost of long term requirements.



## 1.4 LAND USE

Updated estimates of land cover, based on the analysis of 1989 satellite data, show that forest accounted for 72.5% of land area (64.4% forest tree cover, and 8.1% scrub forest), while cultivated area accounted for 7.8%. In the arable areas, virtually all accessible and moderately sloped land is utilised. The cultivated area is distributed among cultivated wetland, dryland, tseri land(long fallow rotation), mixed cultivated land, and others (Box 3). The cultivated wetland, which is only 12.3% of the area under agricultural land, is by far the most important land use and it contribute 40% of the country’s food production. The area under horticultural commodities account 10% area under cultivation and provide major horticultural export commodities.

Box 2: Interrelationship Between Crop, Livestock and Forest Sub-Sectors





| Box 3: Land Cover Figures |                         |               |
|---------------------------|-------------------------|---------------|
| Land Use                  | Area (km <sup>2</sup> ) | %             |
| Forest                    | 25,787                  | 64.4%         |
| Scrub Forest              | 3,258                   | 8.1%          |
| Pasture                   | 1,564                   | 3.9%          |
| Agriculture               | 3,146                   | 7.8%          |
| Snow & Glacier            | 2,989                   | 7.5%          |
| Water Spread & Marshy     | 339                     | 0.9%          |
| Rock Outcrop              | 2,008                   | 5.0%          |
| Other                     | 985                     | 2.5%          |
| <b>Total</b>              | <b>40,076</b>           | <b>100.0%</b> |

| Agricultural Land      | Area (km <sup>2</sup> ) | %             |
|------------------------|-------------------------|---------------|
| Cultivated Wetland     | 388                     | 12.3%         |
| Dryland & Horticulture | 977                     | 31.1%         |
| Tseri/Fallow-Rotation  | 883                     | 28.1%         |
| Mixed Cultivated Land  | 840                     | 26.7%         |
| Other                  | 58                      | 1.8%          |
| <b>TOTAL</b>           | <b>3,146</b>            | <b>100.0%</b> |

Source: Land Use Planning Section, Ministry of Agriculture.

## 1.5 BIODIVERSITY

The Eastern Himalayas, within which Bhutan lies, is one of the world's biodiversity hot-spots where several biogeographic zones meet together. With over 70% forest cover, Bhutan is known to harbour a large number of species of vascular plants. An extensive protected area system extending from wet sub-tropical environment to alpine ecosystem, serves as an unique system of *in situ* conservation of biodiversity. It is the reflection of a strong national conservation ethics. The natural forest and the traditional highly integrated farming systems remains largely intact. Bhutan not only has a wide diversity of plant genetic resources but also has a large number of endemic, both cultivated and wild, species. Thus it must be noted that Bhutan, a least developed country with a small population, plays an important role in conserving, as a custodian, the biological diversities of the Eastern Himalayas.

The major forest types of Bhutan are sub-tropical and temperate broad leaf, and temperate conifers forest. The alpine pastures consist of dwarf junipers and rhododendrons and extensive meadows with several endemic species. The diversity of ago-ecological zones has enable Bhutan to cultivate extremely wide range of crops and many of them are indigenous, and wild relatives in the natural forests are expected. Very little work has so far been done on inventorising, characterising, collection and *in-situ* and *ex situ* conservation of the genetic resources that exists in Bhutan.



## CHAPTER 2

# Indigenous Plant Genetic Resources.

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Bhutan's flora is still in the process of being documented. Over 10,000 species of vascular plants constituting about 70% of the flora of Bhutan, have been recorded to date, including at least 47 tree species thought to be endemic by the National Herbarium. Many of these species are valued for medicinal and ornamental purpose. For example, about 300 species of plants are used in the 110 traditional Bhutanese medicines prepared in the National Institute of Traditional Medicines. Of these, some 150 are high-altitude species. Ornamental species taken away from Bhutan totals to 168 species.

There is no synthesised information on agro-biodiversity. The major crops traditionally cultivated in the country are maize, rice, wheat, barley, buckwheat, potato, apple, cardamom and a wide range of millets, vegetables, pulses, oilseeds and citrus. Mandarin orange, apple, cardamom and potato are the major export crops. The list of minor agricultural crops adds up to 20 out of which 12 are wide spread across the country, and the list of traditionally cultivated vegetables adds up to 27 (Roder 1990) . From about one third of the country's rice growing area 188 rice varieties have been collected and the country's wide diversity on other crop species are yet to be recorded.

No systematic attempt has so far been made for assessing the indigenous forage genetic resources. Only recently the RNR research programme has initiated the process of compiling the list of most common forage genetic resource of the country.





## CHAPTER 3

# National Conservation Activities

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### 3.1 IN SITU CONSERVATION

Guided by the national policy, between 30-40% of the forest areas (2.6 million ha) are declared as national parks/protected areas and it accounts for 26% of the land area of the kingdom. It is against the global standard of 12% desired for each country. There are a total of nine parks and protected areas which are evenly distributed across the country. These include Black Mountain, Jigmi Dorji, Royal Manus and Thrumshing-La National Parks, Torsa Strict Nature Reserve, and Khaling/Neoli, Kulong Chu, Phibsoo and Sakten Wild Life Sanctuaries. In-situ conservation of flora and fauna including the wild relatives of domesticated species is the ultimate objective of these conservation areas. By the end of the 7th FYP (June 1997), management plans will have been prepared for the Royal Manas National Park, the Jigme Dorji National Park and the Black Mountain National Park. During the 8th FYP management plans will be completed for another four areas (Bomdelling Wildlife Sanctuary, Thrumshingla National Park, Khaling Wildlife Sanctuary and Sakteng Wildlife Sanctuary).

To cope up with the threat to conserve the plant and animal genetic resources of the country, “Bhutan Trust Fund (BTF)” has been established to provide a sustainable source of income to fund conservation programme. Activities identified under the programme include training professionals, biological surveys and the development of an ecological information base, review of the conservation area system and support public awareness campaign.

A national survey of Bhutan’s flora has been on-going since the early 1970s. Fieldwork was completed some years ago but only volume I and Volume II (Part I) of the “Flora of Bhutan” have been published to date. While the bulk of the collection is presently with the Royal Botanic Garden in Edinburgh. Replica specimens are held at the National Herbarium maintained by the RNR Research Programme of the Ministry of Agriculture. Holdings are computerised, with some 10,000 specimens registered in the database. The herbarium is maintained by one person, with considerable experience in plant identification.



The *in situ* conservation of domesticated plants is also contributed by the less developed largely subsistence mountain agriculture. Bhutan maintains its sovereign right over genetic resources on its territory and Forest and Nature Conservation Acts 1995 prohibits all kinds of illegal exploitation. Bhutan pays a high cost for conserving its biodiversity, since 30-40% crops most importantly the cash crops are damaged by wild animals due to proximity between forest and farms.

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## 3.2 EX SITU CONSERVATION

Bhutan believes that preserving, indeed strengthening the natural resource base is central to a sustainable and prosperous future for the country. However, in the absence of the national capability the ex-situ conservation activities such as collection, documentation, characterisation, evaluation and their effective utilisation in crop improvement has been minimal. It does not however mean that the importance is undermined. So far, only limited formal germplasm collection has been undertaken in Bhutan mainly with IBPGR, now IPGRI in 1981, and IRRI in 1983 (Table 1). Besides rice no comprehensive collection efforts have been made on any species/crops. An IBPGR Mission came to Bhutan in 1981 and collected 483 samples, of food plants, legumes and vegetables. The Mission noted serious threat to indigenous wheat and rice varieties. In 1983, a joint RGOB-IRRI Mission collected 184 traditional rice varieties from high and medium altitude rice growing areas and most of the remote areas were not covered. Extensive collection of ornamental plants from Bhutan have been recorded. Grierson and Long (1983) listed 163 horticultural species introduced to other countries from Bhutan. Among others, this list included 52 *Rhododendron*, 34 *Primula* and 8 *Meconopsis* species.

There are limited options for plant genetic resource conservation. The country has no medium or long-term storing facility yet. The general feeling is that no time should be wasted in collecting germplasm of major food crops because it could soon be lost as improved varieties rapidly replace traditional ones. A possible option is to enter into bilateral or multilateral agreements and proceed with collecting expeditions in which case germplasm will have to be preserved on trust for Royal Government until Bhutan has the professional manpower and facilities to characterise, evaluate/ utilise and store the materials for future use. The IBPGR in 1989 suggested the establishment of a plant genetic resources unit as an integral part of the agriculture research system (Engels, 1990). It was also recommended the establishment of “field genebanks” for *in situ* conservation of genetic resources not suitable for cold stores.



**Table 1 PGRs formally collected so far in Bhutan**

| <b>Species</b>                | <b>IBPGR 1981</b> | <b>IRRI 1976/84</b> |
|-------------------------------|-------------------|---------------------|
| <i>Oryza sativa</i>           | 61                | 217                 |
| <i>Zea mays</i>               | 47                | -                   |
| <i>Triticum aestivum</i>      | 24                | -                   |
| <i>Hordeum vulgare</i>        | 30                | -                   |
| <i>Eleusine corocana</i>      | 14                | -                   |
| <i>Setaria italica</i>        | 11                | -                   |
| <i>Panicum meliaceum</i>      | 3                 | -                   |
| <i>Sorghum bicolor</i>        | 2                 | -                   |
| <i>Polygonum esculentum</i>   | 48                | -                   |
| <i>Amaranthus spp.</i>        | 17                | -                   |
| <i>Phaseolus spp.</i>         | 37                | -                   |
| <i>Glycine max</i>            | 16                | -                   |
| <i>Vigna spp.</i>             | 10                | -                   |
| <i>Pisum sativum</i>          | 9                 | -                   |
| <i>Lablab spp.</i>            | 5                 | -                   |
| <i>Sinapsis alba</i>          | 23                | -                   |
| <i>Perilla frutescence</i>    | 6                 | -                   |
| <i>Capsicum annum</i>         | 18                | -                   |
| <i>Brassica campestris</i>    |                   |                     |
| <i>subsp. Perkinensis</i>     | 16                | -                   |
| <i>Raphanus sativa</i>        | 11                | -                   |
| <i>Cucurbita pepo</i>         | 10                | -                   |
| <i>Cucumis sativus</i>        | 7                 | -                   |
| <i>Lycopersico esculentum</i> | 1                 | -                   |
| <i>Beta vulgaris</i>          | 1                 | -                   |
| <i>Solanum melongena</i>      | 1                 | -                   |
| <i>Momordica spp.</i>         | 1                 | -                   |
| <i>Coriandum sativum</i>      | 7                 | -                   |
| <i>Prunus persica</i>         | 5                 | -                   |
| <i>Musa spp.</i>              | 1                 | -                   |
| <i>Allium sativa</i>          | 14                | -                   |
| <i>Allium cepa</i>            | 9                 | -                   |
|                               | <b>465</b>        | <b>217</b>          |



## CHAPTER 4

# In-Country Uses of Plant Genetic Resources

The food system of Bhutan is dictated by the ecological environment, ethnic background and its influence on crop choice, cultivation practices and eating habits. The people of Bhutan depend on a variety of domesticated and wild plant resources for staple food, fibre, cash, natural dye, medicine and others of ethno-botanical importance. A study carried out in a district revealed that farmers collect as many as 164 different plants from forest for their livelihood (Wagner 1994). In a similar study in a block of a district revealed that farmers collect as many as 22 different types of mushrooms, 16 medicinal plants, 11 cash generating non-timber forest products, and exploit 14 species for home utility, 6 wild fruit plants, 15 species for food, and 8 species for beverage purposes from forest (Namgyal 1996). The National Institute of Traditional Medicine use some 300 species in preparing traditional medicines. Over exploitation of wild species may lead to losses of some of these resources. In Bhutan it is extremely difficult to draw a line between agro-biodiversity and wild biodiversity.

To meet the steadily increasing demand for food and other agricultural products, Bhutan continue to introduce exotic crop varieties (Table 2) and improve local varieties through cross breeding and selection. The emerging private sector Seed Corporation and the strengthening of RNR Research are expected to accelerate this process.

**Table 2. Exotic crop varieties released for cultivation**

| Crop type     | Crop             | Number of varieties Released |
|---------------|------------------|------------------------------|
| Cereals       | Rice             | 6                            |
|               | wheat            | 3                            |
|               | Maize            | 1                            |
| Oil Crops     | Rapeseed Mustard | 4                            |
| Grain Legumes | Soybean          | 2                            |
| Tuber crops   | Potato           | 3                            |
| Vegetables    | Cabbage          | 4                            |
|               | Cauliflower      | 4                            |
|               | Peas             | 5                            |
|               | Beans            | 7                            |
|               | Tomato           | 4                            |



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| <b>Crop type</b> | <b>Crop</b> | <b>Number of varieties Released</b> |
|------------------|-------------|-------------------------------------|
|                  | Radish      | 4                                   |
|                  | Chilli      | 1                                   |
|                  | Carrot      | 2                                   |
|                  | Bulb Onion  | 3                                   |
|                  | Brinjal     | 2                                   |
|                  | Cucumber    | 1                                   |
|                  | Others      | 19                                  |

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The high yielding improved varieties are promoted to increase the level of food self sufficiency which at a level of 66% at present. Consequently the locally adapted landraces are being replaced. This may lead to the irreversible loss of genetic resources which through centuries of cultivation have developed gene complexes for adaptation to special growing conditions.



# CHAPTER 5

## National Goals, Policies and Strategies

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### 5.1 NATIONAL GOALS

Maintaining the cultural and environmental heritage are among the ultimate development goals of Bhutan. To raise the economic well-being of the Bhutanese citizens, without impoverishing the future generation is the main focus. Socio-economic and cultural integrity are emphasized in the developing policies. The aim is to find a development path that will allow the country to meet the pressing needs of the people, particularly in terms of food, health and education, without undermining the resource base of the country. New industries, new agricultural systems, new forest management innovations have to be carefully developed in the context of their broader environmental implications.

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### 5.2 POLICY

Bhutanese people have a culture and lifestyle which are closely related to the surroundings in which they live. They have often developed sustainable methods of managing the resources, including biodiversity, they use. However, for comprehensive biodiversity conservation, there is a need for a national umbrella programme. Such a national umbrella programme will integrate and co-ordinate discrete conservation activities carried out by different sectors or programmes within a sector. The national policy and strategy "Towards Sustainable Development in Unique Environment" issued by National Environment Secretariat of Planning Ministry in 1992, has stressed the need to:

- Sustainable use of natural resources, including biodiversity.
- Strengthen existing institutions, including environmental impact assessment.
- Promotion of conservation ethics and environmentally sound farming.
- Community participation in the management and protection of natural resources.
- Revision of forest policy and legislation, and
- Human resource development.



The overall policy objective on biodiversity is that the conservation and sustainable utilisation of biological diversity should be an integral component of economic development. The principles underlying the policy are:

- Biological diversity issue will be integrated into the economic development plans and programmes.
- Special attention will be given to support parks and protected areas and effective buffer zones management.
- Information on biological diversity will be developed for sustainable utilisation and conservation.

The complexity of the actions required, combined with financial and institutional constraints, means that the first element must be to set priorities. In practice, the priorities are best set through a process that takes into account scientific and economic concerns and the extent of risk. Within the framework of the policy objectives the priority areas in conservation of biological diversity are:

- Strengthening of Institutions in the area of programmes responsible for conservation and management of biological diversity; and
- Education and training as a conduit must lead to accurate description of bio-geographic region and major eco-systems and the pattern of diversity. The output of such studies then guide policy formulation and more focused activities based on technically assessed priorities.

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## 5.3 STRATEGIES

### 5.3.1 Strengthening of Institutions

The National Environment Secretariat (NES) is a focal body in Bhutan which takes part in the international dialogues on biodiversity. The respective sub-sectors viz. Agriculture, Livestock and Forestry of the RNR Sector are independently responsible for conservation of resources they deal with. Given all of these disparate activities and institutional framework, Bhutan is in the process of developing a consolidated strategic, multi-sectoral framework for the conservation of Bhutan's full complement of biodiversity as well as action plan to actually carry out. The institutional mechanism for co-ordinating the conservation activities, monitoring and reporting on status including impact has to be put in place besides strengthening of the institution through development of facilities and human resources.



### 5.3.2 Research

Some of the priority activities that fall under the domain of research are:

- Description of bio-geographic regions and major eco-systems.
- Comprehensive national listing/ biodiversity accounting indicating their location, distribution, description, giving priority to ecologically important locations; and
- Socio-economic valuation of commercially valuable genetic resources.

The research on biological diversity will be oriented towards direct application for the conservation and sustainable utilisation of biological diversity. Multi-disciplinary team approach will be given priority which will also cover the relationship between socio-economic and cultural factors.

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## 5.4 INTEGRATED PLANNING AND DECISION MAKING:

The overall planning and decision making bodies of RGOB are National Environment Commission(NEC), Planning Commission(PC) and Royal Civil Service Commission(RCSC). All the head of the ministries are the member of these commission and all the important policies and plans have to endorsed by these apex bodies. The NEC is the lead agency responsible for entering into international dialogues. At implementation level, it is the Ministry of Agriculture, the RNR Sector of RGOB, which is responsible for conservation of biodiversity.

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## 5.5 LEGISLATION

The forest and Nature Conservation Act 1995 provides the legal protection to the country's biodiversity. It provides a framework for the establishment and management of protected areas, social forestry and species conservation. The Act encourages people's participation in forest resource management. The national Plant Quarantine Act 1993, provides legal measure to control the movement of diseases, insects and other pests of economic importance.





## CHAPTER 6

# International Collaboration

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Bhutan signed the *Convention on Biological Diversity* at the United Nations Conference on Environment and Development, held at Rio de Janeiro in 1992 and later ratified in 1995. Bhutan is also in the process of becoming a party to the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). The country is not a party to international convention concerning the Protection of the World Cultural and Natural Heritage (World Heritage Convention) and Convention on Wetlands of International Importance, nor does it participate in the UNESCO Man and Biosphere Programme.

The Government of India supported a survey of forest resources in Bhutan during 1974-80. It is the most comprehensive forest inventory carried out to date and covered 29,176 sq. km or 72% of total land area, omitting mainly the northern part of the country under permanent snow and ice. Some 78 tree species were inventorised and the data mapped at 1:50,000 scale.



## CHAPTER 7

# National Needs and Opportunities

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A national programme on biodiversity, besides having a comprehensive network of parks and protected areas, do not exist. In 1990 the research programme of the Ministry of Agriculture drew up a proposal in collaboration with IBPGR/IPGRI. The proposal has been reviewed and a revised proposal has been included in the programme profiles of the Eighth Five Year Plan (1997-2002). The main objectives will be to conserve and utilise a wide range of native and exotic food, horticulture, fodder and other useful species for sustainable development of the country. Further, it will ensure the national obligation and the benefit thereof enshrined in the “Convention on Biological Diversity”. During the 8th FYP due attention has been given to nature conservation and protected area management. Bhutan Trust Fund (BTF) will part of meet the costs for managing the protected areas.

Very little activity on agro-biodiversity (PGR) has been undertaken so far, firstly because the research programme and consequently the scientific and technical capability is weak. There is no gene bank or any other facility for *ex situ* conservation. Secondly, there is little awareness on the importance. With a PGR programme in place during 8th FYP (1997-2002) it is expected to put biodiversity conservation in proper perspective.

To ensure that its rich endowment of natural resources remains intact, Bhutan is concerned about emerging threats to its natural resources posed by the impact of a rapidly growing population and by the unavoidable consequences of efforts to broaden and modernise the economy. The country lack scientific and technical human resources and facilities to cope adequately with the growing complexity of the development process. The present level of population increase cannot be easily absorbed by existing communities because of the acute shortage of agricultural land the expansion into marginal lands is obvious. Totally stopping encroachment of forested areas has been difficult. Forest and grassland resources including medicinal plants are already being subject to increasing pressure. Uncontrolled grazing by livestock is a major constraint to natural regeneration of forest resources.

The legal mechanism to safeguard the utilisation of indigenous PGR for the benefit of the people of Bhutan is yet to be developed. Although Bhutan signed and ratified the Convention of Biological Diversity, development of a National Biodiversity Strategy (NBS), Action Plan and a National Status



Report, awaited by the CBD Conference of the Parties scheduled to be held in 1997, are still pending.

The abstract description of Bhutan's bio-geographic regions and major ecosystems have to be more scientifically and accurately defined and described. This as a priority area could address through long term fellowship training to Bhutanese scientists actually doing research on biodiversity within the country.

A National Biodiversity Action Plan (NBAP), have to be outlined carefully taking into account the rare and endangered species, commercially useful and domesticated species, and species having social values. Taking into account national need and global obligations, there is a need to develop a consolidated strategic, multi-sectoral framework for the conservation of Bhutan's full complement of biodiversity as well as an Action Plan. The immediate need and opportunities can be best outlined as:

- Stock taking and Assessment
  - biodiversity and biological resources
  - cross sectoral issues
  - policy and regulatory framework
  - institutional and human capacity
  - analysis of root causes of BD loss if any
  - technologies for conservation and Sustainable use
  - activities with adverse impacts
  - existing measures and programmes
  - preliminary statement of objectives
  - identification of gaps
  - assessment of existing needs
- Identification and Analysis of Options to meet the Objectives of the CBD
  - strategies for conservation
  - strategies for sustainable use
  - strategies for benefit sharing



- Planning and Preparation of a Strategy and Plan
  - national strategy
  - national action plan
- Preparation of first National Report
  - first national report for CBD Conference of Parties 1997.



## CHAPTER 8

# Proposals for Global Plan of Action

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Sustainable development and well-being of man-kind depend on genetic resources and their diversity. A global plan of action is thus necessary. Such a global plan of action should be an expression of genetic resources as a “Common Concern of Mankind” recognising the principle of national sovereignty. A global plan of action should:

- Ensure effective representation of the concerns of developing countries while addressing the intricate issues related to a patent system for plants. All forms of “rights” on local living materials must safeguard the national interest for legal, ethical and practical reasons;
- Ensure access to total gene pools including the products of science and technologies. A global policy of unrestricted access must continue between public service non-for-profit organisations. However, recognising a country’s sovereignty over plant genetic resources on its territory, the Biological Material Transfer Agreement should be applied for sharing genetic materials of potential economic values (e.g. medicinal plants) between non-for-profit and for-profit organisations which exclusively exercise rights and patent systems. Addressing this intricate issue an international framework of agreement for transfer and exchange of plant genetic resources must be developed within which each country should be allowed to reach its own position for ethical and practical reasons suited to national interest.
- Develop a global information system providing information in practice;
- Co-ordinate donors’ efforts leading to creation of donor consortia/ a global funding mechanism, such as GEF, to support regionally and separately the countries having weak institutional and technical capability.



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