

WWF has provided and continues to support NCD to purchase field equipment, conduct awareness campaigns or undergo training. A private consultant was hired to prepare a National Anti-poaching strategy document, which has to be reviewed and discussed further. The document identified poaching trends and root causes of the problem. Existing forest policies and legislation pertaining to protection of wild flora and fauna and weaknesses in the translation of these policy directives for implementation were also reviewed.

In order to assess the current situation in the country and to monitor trends in illegal activities throughout the country, the Antipoaching unit in NCD is in the process of collecting information from all the Territorial Divisions and Protected Areas. A detailed report will be compiled by NCD and submitted to the headquarters for necessary action. This is part of NCDs monitoring program, and will become an annual procedure to gauge the status (extent/nature/frequency) of such activities.

iii. Biodiversity Assessment

A limited amount of studies have been conducted on the black-necked crane by the RSPN, the distribution of the snow leopard habitat, blue, sheep, golden langurs and takin to name a few. Not many plant species have been studied in detail either.

iv. Aquatic Biodiversity

For the present the only conservation effort outside of protected areas (where no fishing is allowed) is the strict vigilance over the issuance of fishing licenses and monitoring that the regulations are strictly followed.

Very little fisheries work has been done in Bhutan, and no comprehensive list of fishes occurring in Bhutanese waters is available. Dubey (1978, cited by Tamang 1993) collected 42 species, primarily from western and central Bhutan, as part of an FAO fisheries project in 1976 and an additional two species were collected in connection with surveys for the Wangdi Hydroelectric Project in western Bhutan in 1992. Tamang (1993) developed a more extensive list (197 species) based on species occurring elsewhere in the Himalayas and their foothills (Meghalaya, Auranachal Pradesh, Nepal, Sikkim), but the occurrence of all of the same species in Bhutan is highly speculative. MacKinnon et al (1994) provides a list of species for Manas National Park.

It is noteworthy that in Bhutan fish species richness probably varies considerably with altitude with by far the greatest number of species occurring at low altitudes and very few that are expected to occur above 2000m. This is in agreement with the general observation that in the Himalayas fish populations are confined primarily to the major rivers and their immediate tributaries, and are absent from many small streams due to extensive waterfalls and other barriers. Nevertheless, many of the fish species expected to occur in Bhutan are adapted to turbulent and swift-flowing stream habitats (Tamang 1993). In addition, a number of species are widely distributed across a range of elevations and/or are seasonal migrants.

Virtually nothing is known regarding the conservation status of Bhutan' fish populations although given that fishing pressure is very light, and that water pollution or other forms of habitat degradation are not major problems in Bhutan, fish populations would be expected to be in good condition. Three of the (unconfirmed) species have ranges that are confined to the Eastern Himalayas, and Bhutan may provide regionally important habitat and harbour regionally important populations of these species, especially as habitat degradation is becoming a serious problem in virtually all of the Eastern Himalayas outside of Bhutan.

So far no detailed information on the adverse effects of a cross dam and the effectiveness of providing a fish ladder is available as no such studies has yet been undertaken because there is only one dam in the country.

The introduction of the exotic fish species for enhanced production per unit water area in a shorter period by use of fast growing fish species to obtain higher economic benefits may have adverse effects. For instance, the introduction of the Brown Trout (*Salmo trutta fario*) in the cold water regions in the western parts of the country has had bad effects on the indigenous fish, the Asla (*Schizothorax spp.*). It is believed that this has become a voracious competitor to the indigenous fish and above all it is believed that this exotic fish, being carnivorous in its feeding habits, forages on the young ones of the indigenous fish. The group of fish brought into the country for the purpose of culturing in the village ponds for their high food value have been restricted to ponds only for the time being and they have not been released into the natural waters. These are the Common Carp (*Cyprinus carpio*), the three Chinese Carps: *Ctenopharyngodon idella*, *Hypophthalmichthys molitrix*, and *Aristichthys nobilis*; the three Indian Major Carps: *Catla catla*, *Labeo rohita* and *Chirrinus mirgala*. The Gold fish (*Carassius carassius*) in some of the water bodies of the country, due its ability to breed and thrive in worst conditions have made closed waters become over saturated and they have started showing signs of stunting.

2.2.2.2. Social Forestry

In 1979, recognizing the importance of community involvement in the protection and management of forest resources, His Majesty the King commanded that a scheme on Social forestry to involve the local people in the planting of trees in their own private or villages be prepared. Thus the Social forestry scheme was initiated by distributing free seedlings to households, schools, monasteries and other institutions. Under the decentralization programme, Social Forestry was designated as a district-level programme and staff were transferred to the Dzongkhag administration. A Dzongkhag Forestry Extension Officer is responsible for management of Private Forestry, Community forestry, School Social Forestry, Protection of forest from fire; Protection from encroachment into Sokshing; Tsamdo and Allocation of dry firewood.

To promote tree planting the Department of Forestry declared Coronation day June 2nd, as Social Forestry Day. A scheme for annual tree planting on this day by school students and staff now known as the Social forestry day was later formalised between the Department of Forests and the Department of Education in 1985.

The Social Forestry and Extension Section was established in 1989 to cater to coordination of all social forestry related programmes. This followed a series of extension schemes in various parts of the country first in Chukha and later in Thimphu, Punakha and Wangdue Dzongkhag. Under the Decentralization initiative of the Royal Government of Bhutan, Social forestry was designated as a district level programme in 1993. At the Directorate level, the Forestry Extension Section (Social forestry Section), which will become a full-fledged Division in the future is mandated to coordinate nationwide decentralized programmes.

The Forest and Nature Conservation Act of 1995 to a large extent provides a strong legal basis for all social forestry related activities to take place on a large scale. This is further reinforced with the promulgation of the Forest and Nature Conservation Rules of Bhutan, which in the chapter IV specifies social forestry rules.

Nursery Management

Prior to decentralization, tree seedlings were produced in Forest Range nurseries of the Forest Service Divisions (FSD). With the decentralization of forestry activities, nurseries were and are being established in the dzongkhags by the Dzongkhag Forestry Extension Sectors (DFES) to supply seeds for community and private forestry. In some Dzongkhags the establishment of nurseries has been assigned to private entrepreneurs; the DFES properly assesses the requirement of seedlings to be produced by private nursery sectors.

The foundation of all social forestry and re-forestation activities depend on the availability of appropriate seedlings for a particular site. A plethora of seedlings types are produced for both temperate and subtropical plantations. As an incentive poly pots and seeds are distributed free of cost by the Forestry sectors. The seedlings are sold and purchased at rates approved by the

Department of Forestry services at Nu. 4/- (in the north) and Nu. 3.50/- (in the south include bordering areas).

Community and Private Forestry

Sustainable management of forestry resources at various levels, especially at village level through the involvement of individuals in tree planting and other forestry related activities in their private lands; and groups of traditional users, implementing activities specified in a community management plan enabling local forest management on government reserved land. The ultimate objective of this programme being decentralization of forestry related activities to rural communities for effective management and protection.

Table: 11. Approved Community Forests

| Dzongkhag | Geog | Location | Year | Area (ha) | Plan Approved | Status |
|-----------------------------------|--------------------------------|--------------------------------------|------|------------------|---------------|---------------------------------|
| Lhuentse | Menbee | Tshopecthang | 1997 | 3.33 | June 98 | Plantation |
| Monggar | Drametse Monggar | Dozam Yakpugang | 1997 | 300.00 260.00 | May, 2001 | Plantation Natural Forest |
| Punakha | Guma Limbu Tala Kabji | Gumakha | 1991 | 0.88 | June 1999 | Plantation |
| | | Umtakha | 1998 | 6.00 | Oct, 1999 | Plantation |
| | | Nobgang | 1992 | 1.30 | Nov, 1999 | Plantation |
| | | Issukha | 1995 | 0.40 | Nov, 1999 | Plantation |
| Trashigang | Yangneer | Tholong- pangthang | 1998 | 10.00 | June 1999 | Plantation |
| Zhemgang | | Rebati | | 1.21 | June, 1999 | Plantation |
| | | Yumdang | | 1.21 | June, 1999 | Plantation |
| Trashigang Yangtse | Teotsho Khamdang | Tshurgang pek Shang shangphola | 1998 | 5.26 | Dec, 1998 | Plantation |
| | | | 1997 | 2.50 | Oct, 1999 | Plantation |
| Wangdue | Dangchu - | Nobding | 1994 | 8.00 | June, 1999 | Plantation |
| | | Motalungchu | 1998 | 8.00 | Oct, 1999 | Plantation |
| Thimphu | Taba | Achey | 1991 | 1.36 | May, 1999 | Plantation |
| Pemagatshé | | Gazor | 2001 | 20.9 | Sept., 2001 | Plantation |
| Total Area under Community Forest | | | | 630.35 | | |

Source: Forestry Extension Division, DoFS

2.2.2.3. Forest Management and Planning

Forest management planning has undergone profound changes in the recent years, mainly as a result of the New Forest Policy and Act. In keeping with the policies forest management aims to ensure:

- Environment safety of the units
- Critical watersheds and Riparian zone protection and rehabilitation
- Biodiversity conservation and protection of special habitats within the units
- Meet social goals and respect traditional use rights
- Sustainable utilization through accurate calculations of AAC
- Successful regeneration of harvested areas through appropriate silvicultural systems
- Research to provide specific management information and improve the silvicultural systems.

The over-riding principal of the forest policy is Conservation of flora and fauna and only thereafter utilization of the forest resources.

2.2.2.4. Afforestation Activities

The DoFS to facilitate in the implementation of afforestation programs classifies plantations into two main types (FED, 2001):

- Normal plantation: Plantation of suitable species in barren, degraded wastelands near settlements.
- Rehabilitation plantation: Plantation in critically degraded areas such as those affected by erosion, fires, landslides and mine spoils.

Afforestation plantation dates back to as early as 1940 with the country's national policies oriented towards conservation and protection of our fragile ecosystem. The present goal of the afforestation programme is the restoration of forest on denuded and degraded forestland to expand forest cover and to enhance sustainability (FED, 2001). Plantations during the 1960's were mostly confined to the foothills and it was during this period the programmes reached Dzongkhag level. A total of about 17,803 ha of both conifer and broadleaf plantations have been established till at the end of December 1998. The decentralization of afforestation activities effectively took place from July 2000 with implementation currently being carried out by Dzongkhag authority. The desirable attributes of species used in plantation include indigenous, fast growing possessing extensive root systems.

The long-term objectives of afforestation programs (FED, 2001) include:

- To protect, rehabilitate, and manage degraded watershed within government as well as in private lands.
- To make full use of the productive capacity of degraded lands by planting economic species, which will increase the availability of forest resources for industries and the local people with the potential to generate employment and revenue.
- To combat soil erosion.
- To protect farms and provide basic needs of farmers through social and community forestry programmes.
- To contribute to conservation of bio-diversity by supplying need from planted forest rather than from the pristine forest.
- By greening the country, to contribute to the reduction in the detrimental effects of green house gases.
- To maintain a minimum of 60% of the country under forest cover at all times.

2.2.3. Ex-situ Conservation Efforts - Wild Biodiversity

Current ex-situ conservation efforts for wild biodiversity include the National Herbarium and the establishment in 1999 of the Royal Botanic Garden at Serbithang. These are further discussed below at section 2.4.3

2.2.4. Status of Knowledge about Biodiversity

2.2.4.1. Existing Information about Ecosystems and Species

Although there are land cover maps, there is no countrywide inventory of ecosystems as such. However, it is possible to provide an idea of their range using survey information from eastern Bhutan (ranging from approximately 200 to 3,800 meters elevation) and from the Jigme Dorji National Park in the Northwest (ranging from approximately 1,400 to over 5,500 meters elevation).

All of the potential avenues for both expanding economic benefits from biodiversity and better ensuring its conservation are currently constrained by the shortage of basic scientific knowledge about the identity, status, and distribution of species and genetic resources in the country. The status and distribution of habitats, the ecological requirements of various species, and the ecological functioning of ecosystems. Basic ecological and systematic information on Bhutan's biodiversity is limited. Surveys of birds and plants are the most complete, with a fairly extensive plant inventory conducted in the 1970s and the nine-volume *Flora of Bhutan* just published. Recent survey work has been undertaken by the NCD in conjunction with the development of management plans for the Royal Manas and Jigme Dorji, Jigme Singye, Phibsoo and Bumdiing sanctuary, but these have involved relatively limited collecting and inventory. There are no baseline data, which would permit determinations of status and trends in plants and animals, and there are very few (or virtually no) data from Bhutan on the ecology or ecological requirements even of key species. Bhutan has few if any trained taxonomists or ecologists working for the government.

In Bhutan, the number of described plants and vertebrates amounts to about three percent of the total number of species estimated to exist (Reid, 1996). Bhutan is thus among the most poorly known countries in the world from the standpoint of its biodiversity. There is a need to identify the populations or rare plants and their microhabitat in order to protect and monitor them. These microhabitats include glacial moraines, marsh meadows, stream courses, moist rocks and seeps, caves and caverns etc. (NCS, 1996)

The Flora of Bhutan has only covered the flowering plants. Much work needs to be done in order to have a complete inventory of the floristic diversity of the country. Gap analysis and identification under collect groups and their inventory will be the next step towards building up the information. Lower plants like ferns, mosses, and lichens etc. has not been collected. As such, fern inventory has been identified as one of the major activity for the 9th FYP. The fieldwork will be undertaken with the national parks.

2.2.4.2. Traditional Knowledge about Biodiversity and its Use

The National Institute of Traditional Medicine Services (ITMS) is undertaking the only systematic investigation into traditional knowledge about biodiversity for traditional medicine involving the uses of medicinal plants. Because the majority of the Bhutanese live in such close relationship with biodiversity, there is undoubtedly a substantial reservoir of traditional knowledge. Some of this information surfaced at the BAP workshops where government representatives were impressed by the local knowledge of biodiversity. This is another area where systematic research should be undertaken as soon as possible, to ensure that information is not lost which may be of great importance to conservation and especially to the development of regimes of sustainable use for the country's biodiversity.

2.2.4.3. Databases

Efforts have been made to establish databases with biological and socio-economic information in and around protected areas. However, it is becoming apparent that these databases cannot be established and maintained until there is a trained database manager along with computers that are solely dedicated to these databases and their management. Thus a GIS unit under NCD has been fully established with adequate computer facilities and staff to cater to the needs of the different protected areas.

Data Collection and Analysis

All round improvements are necessary to enhance the technical standards through more reliable data collection and analysis methods. The Forest Resources Development Section now has a well-established system for forestry inventory, data processing, photo interpretation and GIS.

In order to improve the implementation of management plans initiatives undertaken include introduction of operational planning, providing all the necessary guidelines, introducing monitoring and evaluation of the units and setting up central and divisional level management committees for monitoring the function of the units. Till date guidelines have been prepared for forestry inventory, socio-economic survey, forest classification, mapping, identification of FMUs, forest management plans, institutional set-up, operational inventory, road construction, monitoring, regeneration survey, social forestry, afforestation and logging.

Training has been conducted in operational plan writing, reconnaissance writing, road construction, cable craning, environmental monitoring, silviculture and marking.

2.2.4.4. Monitoring in FMUs

Patrol monitoring of the different habitats of certain species and site conditions is conducted routinely by respective divisions and parks and is discussed above under section 2.2.1. Territorial forestry divisions annually monitor logging operations at the Forest Management Units. However, timely implementation of this has not been successful mainly due to limited manpower and time constraints. The Forest Resources Development Section needs to ensure that proper monitoring of operations in the FMUs is conducted and that the prescriptions outlined in the management plan are complied to.

2.2.4.5. Qualified Staff and Capacity Building

There is a lack of professional and semi-professional manpower in the functional as well as in the operational level, which is compounded by the poor infrastructure development. This is a major drawback in the preparation and implementation of scientific management plans, developing wildlife policy and rules and regulations for the different categories of protected area management. A strong need is felt for the recruitment and training of professional and semi-professional manpower for the conservation of biodiversity.

2.3 Domestic (Agro) Biodiversity Conservation

2.3.1 Agriculture

Bhutan's agricultural system is in an initial phase of modernization. Bhutanese farmers primarily cultivate the traditional crop varieties and also depend upon forest resources for their subsistent livelihood. The major crops traditionally cultivated in the country are maize, rice, wheat, barley, buckwheat, potato, apple, cardamom, oranges and a wide range of minor crops including amaranths, sorghum, millets, etc., vegetables, pulses and oilseeds. Few modern varieties of the major crops are being cultivated. In some cases, the area planted with modern varieties is increasing.

2.3.2. In-Situ Conservation and Sustainable Use – Domestic Biodiversity

Protected areas have always acted as a source of germplasm for agricultural and livestock development. For instance, 'Jatsham' one of the most important livestock for the farmer is a cross between the Gaur and the local cow. Similarly yaks have also been domesticated from the wild. This is also true for many varieties of agricultural crops, which have been developed from the varieties in the wild. In-situ conservation of wild relatives of domesticated species, however, is not yet integrated into the natural protected area system.

In-situ conservation is the continuing maintenance of a plant population within the ecological community of which it forms a part as well as in the environment to which it is adapted. It is applied to wild progenitors of crop plants, forest trees and wild fauna. But it includes conservation of

existing landraces of crops as well as the artificial regeneration of folk varieties or obsolete cultivars, whenever planting is carried out without conscious selection in the same area where a particular farming community developed seed. However, no initiative in resources and time has been set aside to encourage this to happen at the national level.

Subsistence farming based on traditional culture practised by local farmers has preserved diversity in field and vegetable crops. Indigenous agroforestry is an integrated approach to land use that is characterised by the deliberate maintenance of trees and other woody perennials in fields and pastures used for construction purposes, simple tools, firewood, medicine, livestock feed and human food. Home gardens or kitchen gardens hold indigenous germplasm in the form of folk varieties or obsolete cultivars, land races and rare species that thrive side by side and are preserved. These living genebanks provide a considerable amount of species diversity and to an extent, genetic diversity as well.

Local farmers still maintain land races and continue to grow them even when they experiment with and adopt some modern HYVs. The reasons for this practice are as diverse as the crops themselves. On several accounts these reasons are based on storage properties, nutritional and processing quality, cooking ease, secondary products, historical and cultural reasons such as dietary diversity, the use of folk varieties in traditional foods or religious ceremonies and filling of unique market niches. There are agronomic reasons too, such as better adaptation to traditional intercropping systems, early or late maturity, or greater resistance to local biotic and abiotic stresses. Yield stability in areas with unpredictable seasons is also a consideration in farmers retaining land races in addition to planting improved varieties.

The factors that promote in-situ conservation in the Bhutanese farming communities are the fragmentation of land holdings, marginal agricultural conditions associated with heavily leached, steeping mountain slopes and heterogeneous soils, economic isolation, cultural values and preference for diversity.

The Horticulture research station under the RNRRC-West has a good collection of fruits and nuts. The collection serves multipurpose roles for the researchers, students, trainees, extensionists and farmers in the country. In good sense, the collection is self-supporting financially by combining conservation activities with revenue from fruit production for the export and domestic processing markets.

Hybridisation of traditional Bhutanese cultivars with improved varieties or lines was started in the mid 1980s as a longer-term strategy for the improvement of indigenous rices. The Bhutanese rice varieties are low yielding as response to added inputs is limited by lodging and disease manifestation. However, they are valued for yield stability and grain quality. The principal objective of the cross breeding program is to assimilate desirable genes for high yield, adaptability, grain quality and disease resistance from various sources. Among diseases, breeding for blast resistance in the cold high-altitude environments is a priority. The assistance of IRRI in the generation of crossbred materials and technical backstopping has been indispensable.

To date, over 130 crosses have been made involving traditional varieties of Bhutanese and improved breeding lines and/or varieties from elsewhere. More than 40 popularly grown varieties from the high and mid-altitude rice growing zones were used as local parents. Some of the local parents frequently used in crossing are Kaap, Maap, Zakha, Kochum, Dumbja, Zuchem, Bjanaab and Attey. The hybridisation program has generated over 5000 breeding lines and bulks for testing in different parts of the kingdom. Several breeding lines have shown excellent performance in terms of suitability to local conditions, higher productivity, quality and pest resistance. Four lines with superior yield and desired grain characteristics such as the red pericarp have been identified and formally released as new varieties for mid-altitude rice valleys.

Likewise, the high-altitude rice breeding program based at Geynekha, Thimphu has been gaining success in isolating blast-resistant, cold-tolerant and high yielding lines for the warm temperate environment. The importance of blast resistance in high altitude rice varieties has been

underscored by the blast outbreak of 1995. The disease devastated about 712 ha of rice area leading to an estimated loss of 1099 tons of paddy or an equivalent Nu 11 million. Not a single traditional rice variety possessed appreciable blast resistance. Breeding for blast resistance is hence accorded high priority. So far three very promising lines, which are an improved version of the local disease-prone varieties, are awaiting official release.

2.3.3 Ex-Situ Conservation Efforts – Domestic Biodiversity

Ex-situ conservation implies conservation of germplasm outside the natural habitat of the plant concerned. In crops, this is the form of samples of seeds stored at subzero temperatures in airtight containers, tissue cultures in glass vials, or complete plants in field genebanks where seeds are recalcitrant or cannot be dried and frozen for storing in a genebank. For the farmers it means saving up their own seeds for the next season. At the present, almost all external funding is expended on ecosystem conservation without any consideration for sustaining and enhancing ex-situ conservation. This, despite the latter having laid the groundwork for expertise applied with some modification to in-situ work and to a system that will sustain the food security of the world. Therefore, in-situ methods must not detract from the overwhelming need for more effective ex-situ conservation programs for crop species.

Bhutan believes that preserving and strengthening the natural resource base is central to a sustainable development process. However, in the absence of the national capability to assume conservation and utilization activities on a concerted scale, the ex-situ needs have not been put into proper perspective. So far, limited formal germplasm collection has been undertaken in Bhutan. An IPGRI mission to Bhutan in 1981 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, but most remote areas were not visited (Pradhan, 1996). Between 1996 and 1999 the RNR-RC-Bajo with support from IRRI, collected more than 300 rice varieties. These are maintained as a breeders' working collection at Bajo, pending completion of the genebank at Serbithang.

Extensive collection of ornamental plants from Bhutan has been recorded. Grierson and Long (1983) listed 163 horticultural species introduced to other countries from Bhutan. Among others, the list included 52 rhododendron, 34 primula and 8 meconopsis species (Pradhan, 1996).

The country is now building a genebank at Serbithang. No time should be wasted in collecting germplasm of major food crops before farming communities succumb to the pressure of population growth, migration to urban areas and a shift toward consumerism. The IPGRI in 1989 proposed the establishment of plant genetic resources units as an integral part of the agriculture research system (Engels, et al., 1990). The National Biodiversity Centre (NBC) has been established with the support from The Netherlands under the SDA framework. The NBC includes the establishment of a national genebank for crop species, which is being built, and the improvement of the



Primula sp.

national capacity to integrate the conservation of PGR with agricultural development. The on-farm management component will build on the current experiences with traditional farming systems, the indigenous germplasm exchange networks and traditional markets (REID-MOA, 1997).

2.3.4 Utilization

In Bhutan, agricultural development projects and programs include a component of preserving the crop diversity of agro-ecosystems anchored in the traditional farmers' rationale to utilise local resources together with their intimate knowledge of the environment. Over 90% of the area under rice, which is by far the most important food crop, is still being cultivated to local varieties (Chettri, 1997). The people are still dependent on a variety of domesticated and wild resources for staple food, fibre, cash crops, natural dye, medicinal plants and others of ethno-botanical importance. Thus, in some cases there is no clear difference in diversity between the cultivated and the natural ecosystem. A study carried out in a district revealed that farmers collect as many as 164 different plants from the forest for their livelihood (Wagner, 1994). A similar study in a block revealed that farmers collect as many as 22 different types of mushrooms, 16 medicinal plants, 11 cash generating non-timber forest products, 14 for home utility, 6 wild fruits, 15 food plants and 8 beverages from the forest (Namgyel, 1996).

To meet the steadily increasing demand for food and other agricultural products, Bhutan continues to introduce exotic crop varieties. The emerging Private Sector Seed Corporation and the strengthening of RNR research are expected to accelerate this process. Local varieties are still maintained by farmers for their culinary appeal, higher market prices and secondary uses, while HYVs are adopted for their yield potential and resistance to biotic and abiotic stresses. These seem to suggest that on-farm conservation of land races can be a viable proposition even though modern techniques are applied to boost yield in traditional farming practices.

2.3.5. Livestock Biodiversity Conservation Efforts

Bhutan's policy of self-reliance aims at achieving self-sufficiency in livestock and livestock products. This sub-sector, which is traditionally centered on small, subsistence and the migratory pattern of livestock farming, is of immense importance to the country's rural economy. Over 90% of the households own cattle. Livestock rearing forms an integral part of the Bhutanese farming system in integration with crop production (provides draught power, farm yard manure), forest (means of collecting, concentrating and breaking down large amounts of plant materials) and producing milk, butter, cheese, meat, eggs and pack animals in the higher altitude areas. The average farm holding of an individual farmer is 0.8 ha to earn his subsistence living. Depending upon the geographic location, livestock represent a major or minor proportion of farmers' income. The livestock production system therefore, is seldom regarded as a distinct enterprise.

Livestock, particularly the grazers, have traditionally been a very important part of the agricultural production system and the economy of Bhutan. The traditional form of agriculture that has been practiced in the past enabled livestock to be managed in harmony with the environment. The livestock numbers are however in excess compared to the country's feed resources (About 10-12 percent of the total land area is under permanent or seasonal grazing. In general there is a shortage of fodder by about 26%). The increase in livestock numbers has led to concerns about overgrazing of grasslands and forests.

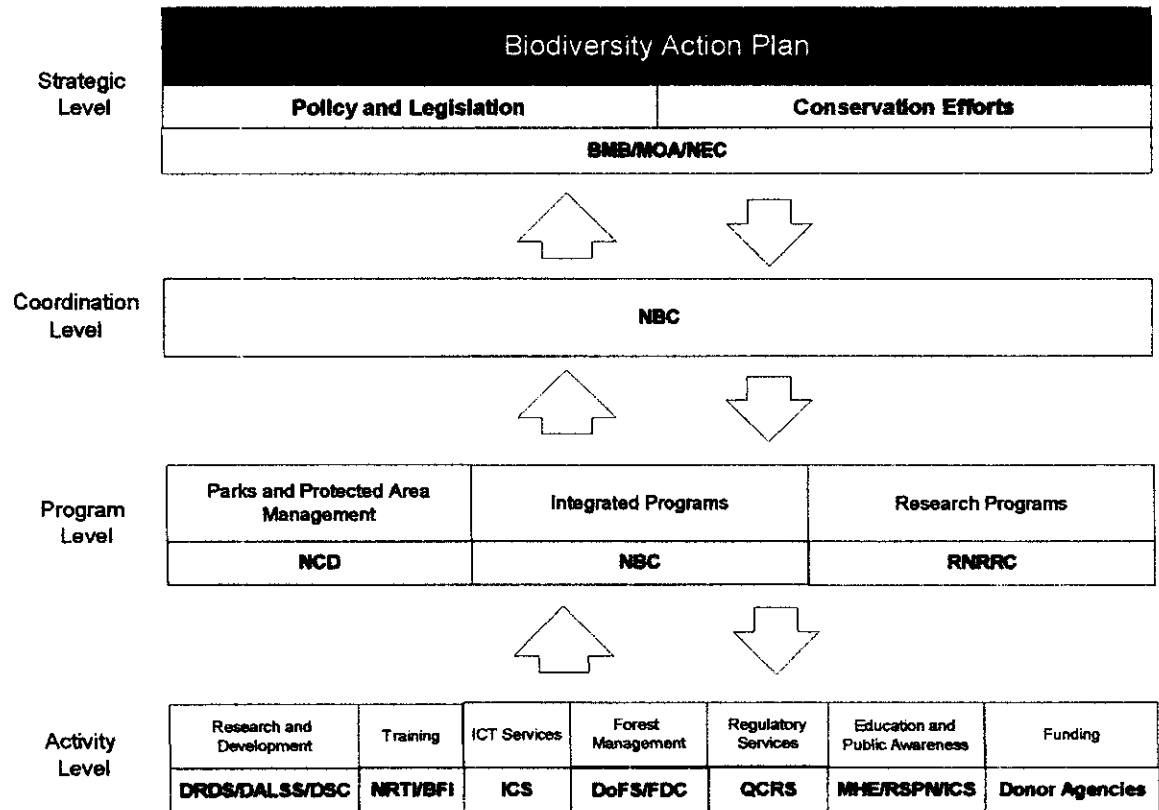
In order to combat the problem of environmental degradation, a number of strategies were introduced by the RGOB. Initially steps were taken to increase animal nutrition by the development of pastures. Intense efforts were made to encourage farmers to sow productive species of grasses and legumes, as it was believed that through the establishment of these, communal grazing land could be reduced. In addition to these strategies, the government embarked on a genetic upgrading exercise, as it believed that the remaining factor limiting animal productivity in Bhutan was the genetics of its livestock.

Within the framework of the national development strategy, which is guided by the principle objectives of Self-reliance, Sustainability, Environmental Preservation, Efficiency and Decentralization of Government, Privatization, Institutional Strengthening, Manpower Development and Regionally Balanced Development, the specific RNR sector policy objectives are:

- The sustainable development of arable Agriculture, Animal Husbandry and Forestry for the enhancement of self sufficiency in food, fodder, fuel wood, construction timber and other products;
- Improvement of income, living and nutritional standards of the rural population; and
- Environmental conservation, emphasizing an integrated crop/livestock/forestry system's development.

2.4. Institutional framework

2.4.1 Overview of the Central Government Institutions and Functions Related to Biodiversity



2.4.1.1 Strategic Level

Policy, legislation and policy directives within the RGOB primarily are the responsibility of National Environment Commission, the Biodiversity Management Board, and the Policy and Planning Division of the Ministry of Agriculture.

The NATIONAL ENVIRONMENT COMMISSION (NEC) is the National Focal Point for the environment policies, and the RGOB's instrument to the undertakings under the Convention on Biological Diversity (CBD), which in turn constitutes the framework for international effort in biological diversity

The MoA, better known as the RNR sector, encompasses agriculture, animal husbandry and forestry. Its Policy and Planning Division is charged with long term planning and development of policies and proposals for legislation within the MoA's areas of responsibility. An expanded description of the MoA and RNR sector is at 2.4. below.

The National Biodiversity Management Board (BMB) is charged with advising, reviewing or reforming national policies, projects and actions taken regarding the nation's biological resources. It also oversees implementation of the BAP, has executive authority over the National Biodiversity Center, and is to develop national policy framework to foster the conservation and sustainable use of biological resources and maintenance of Bhutan's biodiversity. An expanded description of the BMB is at 2.4. below.

2.4.1.2. Coordination Level

The National Biodiversity Center (NBC) is charged with coordinating the RGOB's actions to conserve biodiversity. It is an autonomous, non-departmental agency, intended to fulfill the Royal Government's commitment to the conservation and sustainable utilization of Bhutan's diverse biological resources for ecological integrity and socio-economic well-being of the country in particular, and the world in general. An expanded description of the NBC is given under section 2.4.3.

2.4.1.3. Program and Activity Levels

The principal responsibility for implementing direct conservation of wild biodiversity lies with the Nature Conservation Division under the Department of Forestry Services. NCD is responsible for management of the Protected Areas, which constitute 26.23 percent of Bhutan's area, and also for key aspects of conservation of wild biodiversity outside of PAs. The institutions of the Renewable Natural Resources sector have responsibilities for implementing conservation of both domestic and wild biodiversity outside of PAs. Under the BMB, the NBC has responsibility for integrated programs related to biodiversity conservation, such as Agro-Biodiversity, BUCAP, Flora of Bhutan, herbariums, information and databases, and bioprospecting.

These institutions are so central to biodiversity conservation in Bhutan that they are described in more detail in the next section.

In addition to the RNR Sector, the Ministry of Health and Education (MHE) plays a particularly important role in biodiversity conservation. The Ministry has a major role in educating the citizens about the importance of biodiversity conservation. And under the MHE, the Institute of Traditional Medicine Services undertakes research and maintains collections of Bhutanese medicinal plant diversity. The Institute's role will become increasingly important in connection with bioprospecting.

2.4.2 The Nature Conservation Division of the Department of Forestry Services

2.4.2.1. Mandate of NCD

The mandate for NCD is to manage the wild biodiversity and the protected areas of Bhutan. More specifically, as formulated in the Biodiversity Action Plan for Bhutan, the mandate is to:

- Manage the wild biodiversity of Bhutan
- Develop and implement management plans for protected areas
- Formulate nature conservation policy
- Identify potential additional protected areas
- Prioritise inputs from conservation related agencies.

2.4.2.2. Vision and Strategy for the NCD and Protected Areas

In 1995 a strategy for NCD titled "Setting Conservation priorities into the year 2001, a strategy for the Nature Conservation Section, Bhutan" was prepared. This strategy highlighted four priority programs, namely i) strengthening NCD, ii) developing conservation policy and rules for protected areas management and in other natural forest areas, iii) implementing the management and

operational plans identified for the 7th and 8th five year plans, and iv) developing environmental education and public awareness programs. While the programs stated above may not be fully in place, the strategy has provided a useful direction and guide for NCD. Over the past years NCD has made tremendous progress and has built the capability and is in a position to embark on more ambitious plans.

Following a diversity of experiences and results achieved by NCD mainly through management of protected areas, it was deemed necessary to consolidate the successes and elaborate a new vision and strategy for NCD. This present vision and strategy will serve as a guide for NCD to meet the challenges that lie ahead. This vision and the associated strategy have a time horizon of 15-20 years.

There are seven strategic operational principles that are part of NCD's strategy. These principles have general applicability for each program, project or activity undertaken by NCD and its partners to realise the vision. The operational principles can be considered as crosscutting the strategic components that will help shape NCD's strategy. The operational principles reflect the integrated nature of biological conservation in Bhutan. These include participation and multidisciplinary, adaptive management, Integrating Conservation and Development, Recognising conflicting interests, Magnification / scaling up, Non-negotiable principles, and sustainability

In total four strategically chosen components will help shape NCD's strategy to realise the vision and reach the set objectives. These strategic components are linked to the analysis of the current situation, by addressing threats and realizing opportunities. NCD will focus its efforts at these components, to reach the set targets for each component, in collaboration with partners. These components are Management of protected areas, buffer zones and biological corridors Integrated conservation development projects, Environmental education, and Research, survey and monitoring. NCD aims to simultaneously put into operation these four strategic components, as only their synergy will create expected conservation impact.

2.4.2.3. Organizational structure of NCD

NCD consists of NCD headquarters and the Parks. Both have their organizational structures.

The Nature Conservation Division is administratively set up in 3 sections with 6 units. The roles and responsibilities of the different units can be described as follows.

Section 1. The Management Planning & ICDP Section

Unit 1: Protected Area Management Unit (PAMU)

- Prepare management and operational plans for the protected areas in consultation with the park management and other units.
- Provide technical assistance and back stopping to the independent national park and protected areas during management plan implementation.
- Evaluate and monitor implementation of management plans and incorporate lessons learned into preparation of next five year management plan.
- Provide technical and managerial back-stopping to the Park Management.
- Preparation and implementation of the HRD plan of the protected areas system
- Management of the taxidermy unit.

Unit 2: Integrated Conservation and Development Unit (ICDU)

- Assist in the development of ICDP's and facilitate the implementation in the protected areas.
- Prepare management plans for the protected areas in co-ordination with the PAMU and advise on the preparation of annual ICDP work plans for the protected areas.
- Monitor and evaluate the progress of ICDP implementation and provide feedback for future planning needs.

- Develop and facilitate the implementation of environmental awareness programs in the protected areas.
- Identify eco-tourism potential in the protected areas and formulate plans for its development.

Section 2. Inventory and Data management Section

Unit 3: Bio-diversity Inventory Unit (BIU)

- To conduct biological field surveys as required by workplan and in consultation with Parks.
- To conduct socio-economics field surveys in consultation with the ICDU, PAMU and Parks.
- To conduct boundary surveys and demarcation in consultation with Parks and local communities.
- To initiate and establish Herbaria in the relevant park areas of all existing flora in the country.
- To initiate a database of plants corresponding to its ethno-botanical, phenological and other characteristics.

Unit 4: Data and Mapping Unit (DMU)

- Management of biological and socio-economic data gathered by the BIU and Parks, including data entry, updating, data extraction and basic analysis as required by other units.
- All GIS related work such as interpreting, digitising, mapping, analysis for conservation management.
- Monitor park conditions using GIS/remote sensing data, and provide feedback to the various units of NCD.
- Analyse data and prepare maps at the request of other units.
- Identifying information needs like satellite images, digital data, etc, equipment needs (software and hardware) problems, constraints in the units.

Section 3: Species conservation, Research and Monitoring Section

Unit 5: Species Conservation Unit (SCU)

- Plan species conservation activities both inside and outside protected areas and integrate them into park management plans.
- Plan and coordinate tiger/other species conservation programs.
- Conduct species specific surveys as and when required on vertebrates, in vertebrates.

Unit 6: Monitoring and Research Unit (MRU)

- Conduct and coordinate all monitoring and evaluation activities related to species and habitat/ecosystem conservation, ecology and other natural resources.
- For priority areas identified by the Parks and the Head of NCD in need of information collection and investigation, submission of scientific reports based on the studies conducted (both long term and short term) with management prescriptions and recommendations.
- Formulate a long-term strategy for biodiversity conservation monitoring, evaluation, and research in consultation with other FSD sections, WWF, NEC, RSPN, and the BTF.
- In consultation with the Management Planning and Integrated Conservation Development Section (MPICDS), design and implement long term scientific studies to assess impacts of ICDPs on biodiversity conservation.
- Set permanent plots and transects for long term monitoring of biodiversity (conservation evaluation).

2.4.3. The National Biodiversity Center (NBC)

2.4.3.1. Background:

The Royal Government of Bhutan has always ensured that the developmental processes of our country's needs are always consistent with maintaining the environmental and cultural integrity of

the country. Currently, we have 72.5% of our land under forest cover and we have 26.23% of our land area representing all climatic and biodiversity zones under protected area management towards protecting the unknown number and unique species of flora and fauna. Our Kingdom has been identified as one of the ten Biodiversity hotspots of the world and as the Center of 221 Global Endemic Areas. The wide range of climate and altitude has enabled us to have a variety of crops, vegetables and animals. We have about 7,000 species of vascular plants that includes fruits, vegetables and cereal crops and many unique domesticated animals, which have descended from the wild. The traditional, self-sustained farming system integrates crop production, livestock production and use of forest products. Such diversities surpass anything one would expect considering the small size of our country.

Our commitment to protect the many rare, endangered and endemic species in our country and towards upholding the national and global responsibility was demonstrated when the 73rd session in 1995 rectified the CBD. Following this commitment, the Biodiversity Conservation Strategy and Action Plan was formulated in 1998 to provide the framework of action to enhance and to ensure the productivity, diversity and integrity our biodiversity and natural systems. In addition, the Bhutan Trust Fund for environmental conservation was created to support environmental activities in the nation.

The diverse conservation initiatives in the country suffer from co-ordinated planning and management compounded by the lack of resources and isolation from related activities. The RGoB recognized this need for organizing and coordinating the national biodiversity activities under a single administrative and management structure to establish the foundation for local, regional and global efforts in biodiversity conservation and sustainable uses of its components. Such mechanism is also expected to promote international cooperation on access to plant genetic resources and the fair and equitable sharing of the benefits arising from their uses.

The National Biodiversity Center was formally established as the non-departmental agency under the Ministry of agriculture to oversee and ensure the implementation of Biodiversity Action Plan, 1998 to promote biodiversity conservation and the sustainable use of biological resources on equitable terms of benefit sharing. The institutional arrangement was decreed on the 14th October 1997 vide Ministerial Order No. MoA/115/2108. However, it was only from July 1998 that the National Biodiversity Center was able to convene an organized modus operandi for the implementation of its roles and responsibilities. Since then, it has established itself as an important component of the RNR sector's research and development system. With its recognized vision and mission to integrate the efforts of the RNR sub-sectors in conservation activities, it provides a collective instrument for advancing sustainable development through biodiversity conservation. Its mandate is clear, the scope of involvement is realistic with concrete objectives, and the capacity and capability in terms of resources have improved several folds. Currently it is implementing three donor-assisted projects and 1 supported by BTF, to intensify efforts in the areas indicated under the Biodiversity Action Plan (BAP). There are few more potential ventures in the pipeline expected to be implemented during the 9th Five Year Plan.

2.4.3.2 Vision

The effective conservation, sustainable utilization and equitable sharing of benefits arising from the conservation and the sustainable utilization of the nations rich biological resources.

2.4.3.3. Mandate

In summary, the National Biodiversity Center is vested with the following institutional mandates:

- Co-ordinate Bhutan's biodiversity related activities and serve as a national focal institute.
- Facilitate national decision-making on biodiversity concerns, cutting across sectors, divisions and institutions;

- Guarantee a national balance between conservation and sustainable utilization of biological resources in general, and between in situ and ex situ conservation in particular;
- Assure a participatory approach to building national consensus on biodiversity around complex issues and resolving conflicting situations;
- Facilitate sub-regional, regional and international cooperation; and
- Assure continuity of biodiversity related activities over time.

2.4.3.4. Objectives

Long-term

1. To identify and meet national needs through rational, sustainable, effective, and equitable approaches to the conservation and use of biological resources in natural and agricultural ecosystems for the benefit of the present and future Bhutanese people and sustain environmental well-being of the country.
2. To ensure adequate national capacity to participate in global efforts to conserve and use biodiversity resources for food, agriculture, industry and environment and to share in the benefits arising from their use.

Intermediate

1. To give high priority to establishing the essential elements of an integrated national program with a recognized national status for the Biodiversity Conservation; and thereby improve institutional and sectoral linkages and strengthen integration of institutional and community efforts.
2. To develop appropriate policy and institutional framework including mechanisms for coordinated planning and action; and a program strategy; benefiting from help to do so.
3. To develop national capacity in the technical, managerial and policy areas of biodiversity.

2.4.3.4. Strategies

The appropriate strategies that have been outlined to meet the objectives of the NBC are;

- Institutionalization and establishment of interdisciplinary programs.
- Link conservation with utilization by identifying and overcoming constraints.
- Promote institutional collaboration and operational linkages with appropriate institutes that share our goal, at the farming communities, district, regional and national levels for integrating complementary activities during planning and implementation to achieve maximum effect.
- Effective Co-ordination of the Biodiversity activities within the country and link national work to regional and international activities.
- Enhance capacity at all levels through education and training within and outside the country to promote institutional development, program human resources, strengthen co-operation, and devise financial mechanisms.
- Integration of conservation, research and development with the meaningful utilization of genetic resources.
- Enhance the capacity of farmers and their communities through on-farm management of agrobiodiversity based on equal participation and ownership of responsibilities
- Establish gene banks, botanical gardens, herbarium and zoological parks for ex-situ collections to facilitate the conservation and sustainable utilization of the biological resources.
- Resource survey, inventory, characterization and documentation of biodiversity
- Prioritization of programs

Long-term Strategies for Sustainability

- Bioprospecting as the sustainable utilization of the rich natural resources

- Formation of a functional Board of Trustees
- User fees and memberships for Biological gardens, Gene banks, National Herbarium and Zoological garden
- Linkages with other global programs in biodiversity and the BTF for environment conservation in Bhutan.

2.4.3.5. Policies

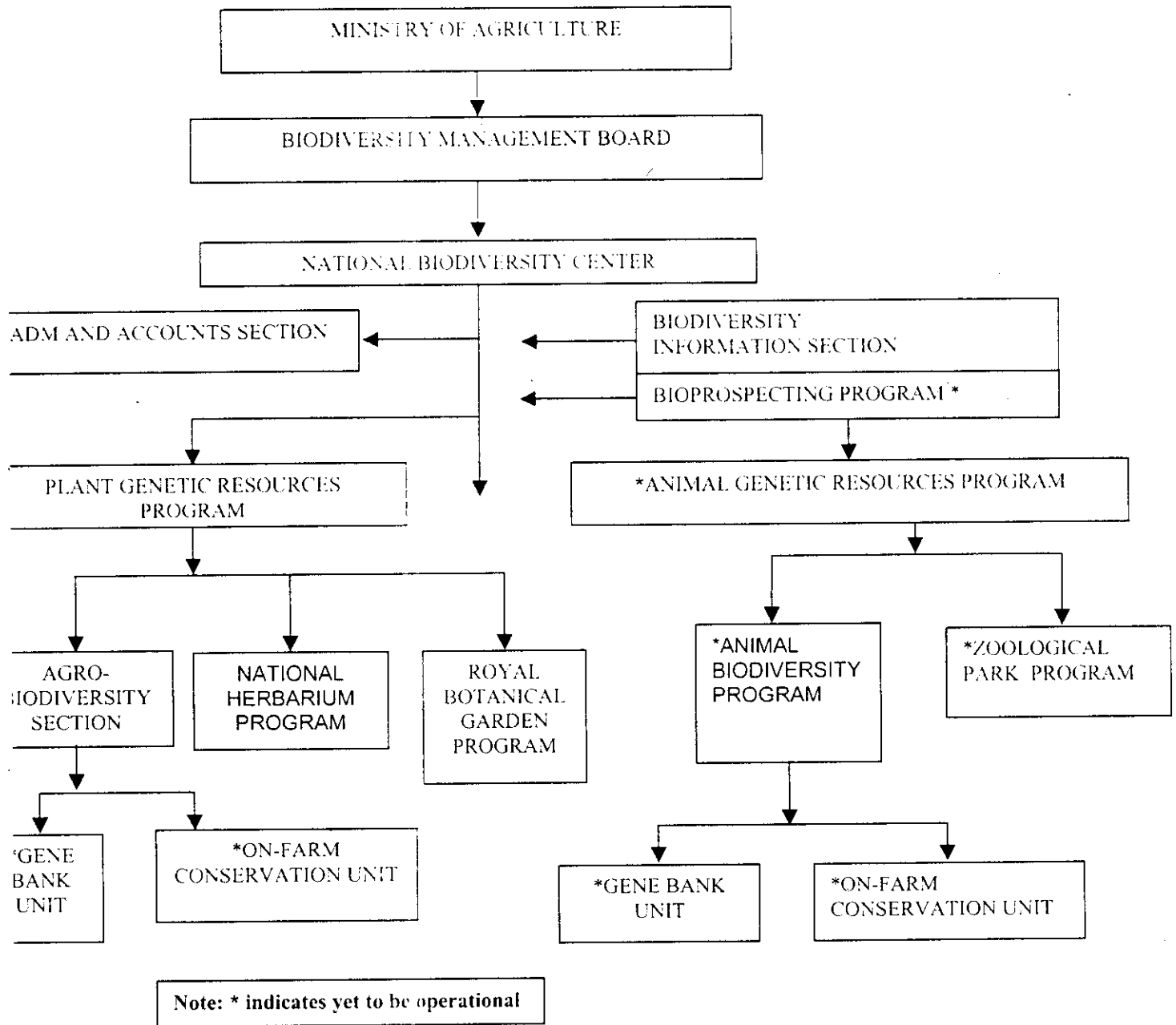
Bhutanese people have a culture and lifestyle, which are closely related to the surroundings in which they live. They have often developed sustainable methods of managing the resources they use. The national policy objectives in Biodiversity are:

- Biodiversity issues will be integrated into the economic development plans and programs
- Special attention will be given to support parks and protected areas and effective buffer zones management;
- Information on biological diversity will be developed for conservation and sustainable utilization of biodiversity resources.

Bhutan's policies on biodiversity parallel those of the Convention on Biological Diversity, particularly those, which specify that:

- Conservation of biological diversity is a priority national objective
- Any use of biodiversity components must be sustainable; and
- There should be fair and equitable sharing of the benefits arising out of biological resources.

2.4.3.6. Organization of NBC



2.4.3.7. Projects of the NBC

Since its inception in late 1998, NBC is managing the following notable projects under the different sections, to intensify its efforts towards the conservation and the sustainable utilization of the biological resources

1. Agro-biodiversity Conservation Project - Implemented by NBC's Agro-Biodiversity Section and funded by the Government of Netherlands, this project aims to (a) conserve and sustainably use plant genetic resources (PGR) for food and agriculture and (b) assist on-farm conservation techniques. To support such initiatives, a National Gene Bank is currently being constructed to act as future reservoir of plant genetic resources in the country. H.E. Lyonpo Kinzang Dorji, Minister of Agriculture, laid the foundation stone on 18th June 2001.

2. Corollary to this, a **pilot agro-biodiversity inventory and survey** in Drametse, eastern Bhutan has already been completed. Samples were collected and are being characterized. Other crop seeds, especially threatened varieties as identified by local farmers, are also being collected from the representative areas and kept temporarily in RNR-RC Bajo's cold storage. In the future, the project hopes to collect and make inventories of all kinds of Bhutan's PGR of agricultural importance and usage, including ethno-botanical resources. A draft PGR policy has been formulated and will be circulated by the end of February 2002.

Biodiversity Use and Conservation Asia Program (BUCAP) – This project is complimentary to the Agro-biodiversity project in terms of PGR on-farm conservation with emphases on rice and maize crops. It is implemented in collaboration with South East Asian Research Institute for Community Education (SEARICE) and funded by the Development Fund for Norway (NORAD), this project focuses on "Participatory Plant Breeding and Participatory Varietal Selection" techniques through "Farmers Field School" approaches.

Under this project, in-country training through "farmers field school" approaches is being conducted. The inception phase of the project is underway in collaboration with RNR-Research Centers, viz: Wangdue (RNR-RC Bajo); Drametse, Khaling, and Kanglung (RNR-RC Khangma); and Katsharabchu (RNR-RC Yusipang).

The National Gene bank. A national gene bank is being constructed as an integral part of an Agro-biodiversity complex at the National Biodiversity Center financially supported through the Netherlands government as part of the Sustainable Development Agreement between the two countries. The National gene bank, which is to be completed by the end of 2002, will assist in the ex-situ conservation efforts of the crop genetic resources in the nation. Seeds and other planting materials will be stored under controlled conditions of temperature and humidity and will represent Bhutan's base as well as active working collections.

Royal Botanic Garden, Serbithang (RBGS) – Is implemented by the Royal Botanic Garden Section and funded by the Bhutan Trust Fund (BTF). The RBGS was established on 2nd June 1999 to commemorate the 25 years of golden reign of His Majesty King Jigme Singye Wangchuck, the fourth King of Bhutan. The 28 acres of garden space is to be designed to explore and exhibit the therapeutic value of the plants. The focus will be on plants of economic significance such as those useful for food, fibre, cosmetic and industry, including those species that are endangered. Plans of the RBGS include a rock garden, subtropical house, floricultural activities, an orchidarium, an information centre and various facilities for recreation such as a children's park, restaurant and a souvenir shop. In the long run, the garden will also focus on the ecology and the evolutionary biology of plants. With maturation and experience the garden will reflect the traditional Bhutanese architecture and the traditional Bhutanese values and culture. A nature trek from Serbithang to Dagala is being developed as part of the RBGS activities. In order to establish the above objectives a garden master plan was developed with the technical support from the International Association of Botanic Gardens in Japan, that includes the landscaping, the architectural design, irrigation systems and the management plans.

The National Herbarium -- About 120000 plant specimens, some dating back to 1914, were originally placed at a temporary storage facility, which was later converted into a herbarium in Taba, in the late 1980's. This herbarium was maintained by the then Forest Research Division (now the RNR-RC Yusipang center) The herbarium at Taba has always been a matter of concern due to its old age, poor condition and inadequate space and infrastructure for collected specimens.

The need for a new Herbarium building was expressed when work on the Flora Of Bhutan Volumes was being conducted in 1998. With the financial assistance of DANIDA a new Herbarium building complex has now been constructed at the National Biodiversity Center in Serbithang. The new herbarium has adequate working space and the capacity to house more than 20,000 specimens. The old mounted specimens will be transferred from Taba to the new site within a few

months. In addition, people have now undergone specialized training in Herbarium management and plant taxonomy in order to effectively manage and maintain the National Herbarium of Bhutan

The new herbarium will also have a library with a good reference collection of botanical literature from Bhutan and outside. It is hoped that the National Herbarium will serve its purpose for research and for education for those interested in the Flora of Bhutan.

Implemented by the Herbarium Section and funded by the Danish Development Fund (DANIDA), this project aims to conserve and sustainably use the rich the nations rich wild botanical resources. In the future, the herbarium will also house samples of domesticated crop specimens, ornamental flowers, medicinal plants and other plants of economic significance.

The Flora of Bhutan Volumes. -- All the 9 Volumes of the Flora of Bhutan, documenting the nation's wild flora, have now been completed and are available for use. The work comprises three volumes in three parts completed with the financial assistance from DANIDA and the technical assistance from the Royal Botanical Gardens, Edinburgh (for the Family Orchidaceae from the Royal Botanical Gardens Kew). The completion of the Flora Volumes for Bhutan (on higher plants only) took more than ten years, with the first Volume part 1 being published in 1983 and the 3rd Volume part 3 being published and released in January 2002.

In summary, the contents of the Flora of Bhutan Volumes cover a total of 8 Gymnosperm Families (Volume I), a total of 180 dicot Families (Volumes I and II) and a total of 66 monocot Families (Volume III). In Volume III, parts two and three are totally devoted to the Family Gramineae and the Family Orchidaceae respectively.

Community based Zoological garden. -- To complement the conservation activities in PA's in the wild and to further enhance the efforts towards the protection, production and the genetic conservation of wild faunal diversity, a feasibility study for a community based zoological garden has been approved by the BMB and almost ready for implementation. The community-based zoological garden has plans to exhibit and rehabilitate some of the rare and endangered herbivore species of Bhutan. The community will be involved in managing the zoological garden and increasing public awareness and education of the species presented.

Bhutan Integrated Biodiversity Information Systems (BIBIS) Project – Based on the recommendation in the original BAP for the development of a scientific knowledge base for biodiversity in the country, and with the financial support of the WWF- Bhutan Program, the NBC along with various partners involved in biodiversity conservation and sustainable use have developed a 5 year project proposal to integrated the nations biodiversity related information into one web based system called BIBIS. The project proposal has been submitted to the government in January 2002 for the possibilities of securing funds. By the end of the 9th FYP, we expect BIBIS to be a well-known and highly accessible source of biodiversity information for use to biodiversity stakeholders in Bhutan and beyond. It should become a natural reference point for dissemination of biodiversity information for use by policy makers and planners for the conservation, management and the sustainable utilization of the biological resources in the nation. The establishment of BIBIS would further contribute to activities such as biodiversity gap analysis, eco-tourism, education and bioprospecting that has the potentials of generating additional revenue for the country. Depending on the success of the BIBIS project in addressing all biodiversity areas, it could continue to exist in the consecutive 10th FYP to complete any remaining areas of biodiversity information to be included in the system, thereafter continue to act as center of biodiversity information initiating new related activities, center of expertise, guidance and support for biodiversity information management.

Bioprospecting Program- For meaningful utilisation of our conservation efforts, it is envisaged that a pilot bioprospecting project will be initiated during the 9th Five Year Plan (i.e. after July 2002). The implementation of the pilot project will include collaboration efforts with international research institutes, pharmaceutical companies, and other concerned agencies. Bioprospecting, basically the

search for useful new genes for pharmaceutical products and agrochemicals from the biological resources, has the potential to reap benefits through commercialisation. With the assistance of the World Foundation of Environment and Development (WFED) Bhutan has drafted a bioprospecting action plan for the nation in May 2001. The project proposal for the development of the policy and legal instruments critical for the implementation of the pilot project and bioprospecting activities in the nation has been prepared and awaiting funding.

Animal Biodiversity Conservation Program- Is to be implemented in the 9th Five Year Plan in recognition of the importance of animal genetic resources to sustaining and developing food and agriculture production that is within the framework of the Biodiversity Action Plan for Bhutan. A task force of professionals is currently developing the formulation of the project proposal. The funding needs to be secured for the project. In addition, a wildlife conservation program will be implemented by the establishment of a zoological park during the 9th Five Year Plan. The centre has secured funds from the UNDP to carry out the feasibility studies along with the involvement of the local community, and to recruit external assistance as landscape architect and a zoo planner. The zoo will aim to primarily represent a collection of herbivores that are endangered and unique to Bhutan.

With these major developments, NBC as an integrated program will rationalize coordination mechanisms within the country to ensure the most effective prioritisation in the deployment of resources for biological diversity. However, international collaboration is necessary in a world where countries are interdependent and where they wish to establish practical, rational, and economical means to conserve biodiversity, enhance its use, encourage access, and share benefits. In the local front, NBC is continually conducting meeting and workshops to increase public awareness and interest in conservation and sustainable use of biological resources.

2.4.4. The National Biodiversity Management Board of Bhutan (BMB)

The National Biodiversity Management Board with 13 members was formalized on the 2nd of August 2000 with the Honorable Minister of Agriculture as the Chair person and the Honorable Secretary of Agriculture as the Vice Chairman. The Rules of Procedure for the BMB was issued on the 9th March 2001 in order to provide guidance on the procedural and the functional aspects of the National Biodiversity Management Board.

Management Board Members

The Board will consist of members that cross cut various Ministries and organizations that have relevance to the Biodiversity conservation and utilization.

Chairman: Honorable Minister, MoA, Thimphu

Vice-Chairman: Honorable Secretary, MoA, Thimphu

Members:

1. Director, DRDS, MoA, Thimphu-Member
2. Director, DFS, MOA, Thimphu- Member
3. Director, DALSS, MOA, Thimphu-Member
4. Deputy Secretary, PPD, MOA, Thimphu-Member
5. Deputy Secretary, AFD, MOA, Thimphu-Member
6. Director, NRTI, Lobesa-Member
7. Director, NITM, MOHE, Thimphu-Member
8. Joint Director, NCD, DFS, Thimphu-Member
9. Head, PPD, NEC, Thimphu-Member
10. WTO Officer, MTI, Thimphu-Member
11. Program Director, National Biodiversity Center, Serbithang – Member Secretary.