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Royal Government of Bhutan
National Environment Commission

IV National Report to the Convention on Biological Diversity

National Environment Commission

GEF

UNDP

TABLE OF CONTENTS

ACRONYMS

BAFRA	Bhutan Agriculture and Food Regulatory Authority
BAP I	Biodiversity Action Plan for Bhutan 1998
BAP II	Biodiversity Action Plan for Bhutan 2002
BAP III	Bhutan Biodiversity Action Plan 2009
BTFEC	Bhutan Trust Fund for Environmental Conservation
B2C2	Bhutan Biological Conservation Complex
CBD	United Nations Convention on Biological Diversity
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
DANIDA	Danish International Development Assistance
DoA	Department of Agriculture
DoE	Department of Energy
DoF	Department of Forests
DoL	Department of Livestock
EU	European Union
FAO	Food and Agriculture Organization of the United Nations
FMU	Forest Management Unit
GNH	Gross National Happiness
ICIMOD	International Centre for Integrated Mountain Development
IFAD	International Fund for Agriculture Development
ITMS	Institute of Traditional Medicine Services (Ministry of Health)
IUCN	World Conservation Union, formerly known as the International Union for Conservation of Nature and Natural Resources
JOCV	Japan Overseas Cooperation Volunteer
MoA	Ministry of Agriculture
NBF	National Biosafety Framework
NCD	Nature Conservation Division (Department of Forests)
NEC	National Environment Commission
NLC	National Land Commission
NRDCL	Natural Resources Development Corporation Limited
NWFP	Non-wood Forest Product
PAs	Protected Area System
RGoB	Royal Government of Bhutan
RNR	Renewable Natural Resources
RNR-RC	Renewable Natural Resources Research Centre
RSPN	Royal Society for the Protection of Nature
SNV	Netherlands Development Organization
UNCCD	United Nations Convention to Combat Desertification

UNDP	United Nations Development Programme
UNFCCC	United Nations Framework Convention on Climate Change
WWF	World Wildlife Fund in the United States and Canada, and World Wide Fund for Nature elsewhere

EXECUTIVE SUMMARY

Environmental conservation has always occupied a pivotal place in the country's development policies and strategies. The Bhutanese decision-makers have characterized environmental sustainability as one of the four pillars of the GNH development philosophy. *Bhutan 2020*, the country's vision document to maximize GNH emphasizes that "development must be pursued within the limits of environmental sustainability and carried out without impairing the biological productivity and diversity of the natural environment."

Recognizing the enormous importance of biodiversity to humankind and to its own goal of environmentally sustainable development, Bhutan became a party to the Convention on

Biological Diversity to address the concerns of loss of biodiversity through international cooperation and collective actions – in 1995, three years after the Convention was conceived.

Subsequently, Bhutan has taken several initiatives that have augmented its efforts to conserve its rich biodiversity. These include the operationalization of a network of protected areas, establishment of biological corridors linking the protected areas, creation of conservation areas outside the protected areas system, targeted programs to protect globally threatened keystone species such as the tiger, snow leopard, white-bellied heron, and black-necked crane, the establishment of the National Biodiversity Centre including facilities such as the Royal Bhutan Gene Bank and Royal Botanical Garden, and strengthening of programs to conserve indigenous varieties of plant and animal genetic resources.

Bhutan have already prepared and implemented two Biodiversity Action Plans – the first produced in 1998 and the other in 2002. BAP III will be published by mid 2009 and will be implemented during the 10 FYP (2008-2013). The most significant achievements made with the implementation of BAPs are the establishment of PAs. The PAs constitute about 15,192 km 2 or 39.6 per cent of the country is one of the most comprehensive in the world not only in terms of area coverage but also in terms of the balance and contiguity in distribution across the country. The system encompasses a continuum of representational samples of all major ecosystems found in the country ranging from the tropical/ sub-tropical grasslands and forests in the southern foothills through temperate forests in the central mountains and valleys to alpine meadows and scree in the northern mountains. By 2013, about 48.5 per cent of the country will be under PAs. With establishment of PAs, the most of the targets of 2010 and the convention are well taken care.

Besides, Bhutan has acceded to several multilateral environmental agreements/conventions; strengthened environmental legislation and framework; developed environmental codes of practices, standards and norms and promoted environmental awareness at all levels of

Bhutanese society.

However, in fulfilling the principles of CBD, the main challenge is the lack of financial resources and inadequate human capacity to implement. Although, there are strong policies that integrate biodiversity issues in all the sectors but lack of proper coordination during the implementation causes lots of insolvencies. Besides, there is a need for a greater focus on key priorities in the BAP document. It should be desinged to provide with time-bvound objectives and targers for bviodiversity conservation across the nation in future.

CHAPTER 1
OVERVIEW OF BIODIVERSITY STATUS, TRENDS AND THREATS

1. INTRODUCTION

The Eastern Himalayas have been identified as a global biodiversity hotspot, and counted among the 234 globally outstanding eco-regions of the world in a comprehensive analysis of global biodiversity undertaken by WWF (1995 – 97). The Kingdom of Bhutan is a small, landlocked nation nestled in the southern slopes of the Eastern Himalaya. To its north lies the Tibet Autonomous Region of China and to the west, south and east lies the Indian states of Sikkim, West Bengal, Assam and Arunachal Pradesh. The terrain is some of the most rugged in the world, characterized by huge variations in altitude. Within the 220 km between the southern and northern borders, Bhutan's elevation rises from 150 to more than 7,500 meters. This geographical diversity combined with diverse climate conditions, contributes to Bhutan's outstanding range of biodiversity and ecosystems. The country can be divided into three broad physiographic zones:

1. The southern belt consisting of the Himalayan foothills adjacent to a narrow belt of flatland (Duars) along the Indian border with altitude ranging from under 200 m to about 2,000 m;

2. The inner Himalayas made up of the main river valleys and steep mountains with altitude ranging from about 2,000 m to 4,000 m;

3. The great Himalayas in the north along the Tibetan border consisting of snow-capped peaks and alpine meadows above 4,000 m.

2. ECOSYSTEM DIVERSITY

2.1 FOREST ECOSYSTEMS

2.1.1 STATUS OF BIODIVERSITY IN FORESTS ECOSYSTEM

Forests are the most dominant land cover, making up 72.5 percent of the country's territory. Mixed conifers and broadleaf forests are the most dominant forest types and virtually all forests are natural with plantation forests accounting for a mere 0.2 percent of the country's area. As a result of great altitudinal range, with corresponding variation in climatic conditions ranging from hot and humid sub-tropical conditions in the southern foothills to cold and dry tundric conditions in the northern mountains, the country supports a wide range of forest ecosystems and vegetation zones. Broadly speaking, the country can be divided into three distinct

ecofloristic zones. The alpine zone comprises areas above 4,000 m with no tree cover but scrub vegetation and meadows. The temperate zone, lying between 2,000 m and 4,000 m, contains temperate conifer and broadleaf forests. The subtropical zone, which lies between 150 m and 2,000 m, contains tropical and subtropical vegetation.

Several forest types occur within the spectrum of the above three broad ecofloristic zones. These vegetation types are briefly described below:

FIR FOREST

The Fir forests are found on the highest ridges, between 2,700 m and 3,800 m. It requires relatively high precipitation, part of which is obtained as condensation. A thick layer of moss with rhododendron, sub-alpine bamboo, primula, and *Bryocarpum hamalaicum* characterizes the undergrowth. Few hemlocks (*Tsuga dumosa*) and birches may also be present. Toward the tree line (at 3 600 to 3 800 m) the fir forests become stunted and grade into juniper and rhododendron scrub.

MIXED CONIFER FOREST

The Mixed Conifer forests occupy the largest portion of the sub-alpine regions of the country between 2,000 m and 2,700 m altitude and cover an area of about 486,710 ha. The dominant species are spruce (*Picea spinulosa*), hemlock and larch. Hemlock tends to be found on wetter slopes than spruce. The undergrowth consists of rhododendrons, bamboo and other shrubs.

BLUE PINE FOREST

The blue pine forests occur in the temperate regions between 1,800 m and 3,000 m in the Ha, Paro and Thimphu valleys in the West and Bumthang and Gyetsa valleys in central Bhutan covering an area of about 128,570 ha. The blue pine is dominant and demonstrates fast colonization. It is sometimes found mixed with oak (*Quercus griffithi*) and rhododendron (*R. arboratum*). This is probably a secondary type and the original might have been a dry oak forest with scattered blue pine.

CHIR PINE FOREST

The Chir forests are found at low altitude (900-1800 m) in the deep, dry valleys of the Sankosh, Kuri Chu and Kulong/Dangmechu river systems under sub-tropical conditions and cover about 100,870 ha. A long dry season is characteristic of these areas and the annual precipitation (1,000-1,300 mm) falls primarily during the summer monsoon. These forests are influenced by biotic activities such as resin tapping, tree felling, and frequent ground fires, which are deliberately set to produce fresh grazing for livestock and to promote new lemon grass growth for essential oil production.

BROADLEAF MIXED WITH CONIFER FOREST

In some parts of the country, the succession between broadleaf and conifer forests are gradual and, as a result, there are extensive areas of a mixture of these two forest types. These mixed forests are generally oak mixed with blue pine or higher altitude broadleaf species mixed with spruce or hemlock, and generally occur between 2,400 m and 3,000 m.

BROADLEAVED HARDWOOD FOREST

The total area under broadleaved hardwood forests is about 1,512,160 ha and can be divided into three subcategories; Upland (Temperate) Hardwood, Lowland Hardwood and Tropical Hardwood. The upland hardwood type dominates temperate hillsides, occurs between 2,000 and 2,900 m altitudes and includes two main forest sub-types:

1. Evergreen oak forests: These are more common in the drier areas, especially in the Trongsa and Mongar districts. Maple and *Castanopsis* spp. predominate at lower altitudes, while oak predominates higher up. With increasing altitude these forests grades towards blue pine with xerophytic oaks.
2. Cool broad-leaved forests: These are located on the wetter hills and are richer in species.

The lowland hardwood forests occupy the sub-tropical hills between 1,000-2,000 m altitudes and are very rich in species of both sub-tropical and temperate genera.

The tropical lowland forests are multistoried, very rich in species diversity, and found on the low hills below 700 m. These forests are broadly classified as semi-evergreen but vary from almost totally deciduous on exposed dry slopes to almost totally evergreen in the forest valleys.

FOREST SCRUB

The forest scrub includes alpine and temperate scrub occurring naturally between the limits of the tree line and barren rocks and covering an area of about 325,730 ha. The dwarf juniper (*J. squamata*), *Rhododendron setosum and R. lepidotum* and sometimes even dwarf oaks and willows are common species in the forest scrub. On the drier and higher ridges, however, xerophytic scrub like *Caragana* spp., *Chesneya* spp. and *Ephedra* spp. are much more common. Temperate scrub consists of dense bamboo or other xerophytic, spiny shrubs, which grow in cleared temperate forests that are not converted for agriculture or pasture.

2.1.2 TRENDS (I.E. CHANGES IN STATUS)

There are no long-term studies (time-series) conducted to ascertain the trend in overall forest status. However, the analysis of satellite imageries of 1989 by Land Use and Planning Project (LUPP, 1997) of Bhutan indicate a declining trend of forest cover through 1958 to 1978 and from 1978 -1989 there has been a steady increase in forest cover. Though the total forest cover

has increased the areas under agriculture and shifting and shifting cultivation have declined substantially. This analysis also indicates that the areas under close forests have significantly increased and that under open forest categories have decreased.

However, analysis of same imageries by Gupta (1992) indicates that loss of natural forest during last ten-year period (1978-89) has been much more than that during the earlier period of twenty years (1958-1978) mainly due to extensive expansion of agriculture. It also indicates that the area of closed forest has declined and that of open forest has increased over the entire period.

In 1991 it has been estimated that a total of 231,000 hectares of forest area in the country is degraded with an annual rate of forest degradation estimated at 0.5 % (MoA 1991).

2.1.3 MAIN THREATS

The main threats to forest biodiversity are due to the state of the country's development process and their associated needs for forest products, infrastructure development, population growth & living space requirements, rapid urbanization, agricultural expansion, grazing pressures, and forest fires.

2.1.4 IMPLICATIONS OF CHANGES ON HUMAN WELL-BEING

Forest use in Bhutan is intrinsically linked with traditional practices and culture. It is an integral part of farming system. Some uses are better documented (fuel wood) than others (non-wood products). Current fuel wood consumption has almost reached the level of the total annual sustainable cut (don't u need a reference?). Dependence of local people on the government for forest resources is increasing following enactment of Forest Act, 1969. The value of self-reliance, group effort and customary regulation is declining with an increase in the capacity of the state to provide products and enforce legislation. At the national level, Bhutan is a forest sufficient (what do you mean by forest sufficient?) state but at the local level this is not the case leading to degradation. Increasing population and income are putting additional demands on forest resources.

2.2 AQUATIC ECOSYSTEMS

2.2.1 STATUS OF BIODIVERSITY IN AQUATIC ECOSYSTEM

The Bhutan aquatic ecosystems consist of rivers, lakes and marshlands.

RIVERS

The country is endowed with tremendous inland water resources. There are extensive network of rivers, rivulets and streams arising from high level of precipitation, presence of huge number of glaciers and glacial lakes, and relatively well-preserved forests. The country's river system

can be divided into four major river basins, namely Amo Chhu (Torsa), Wang Chhu, Puna Tsang Chhu (Sunkosh), and Drangme Chhu (Manas). Drangme Chhu, which is the largest river basin, drains more than one-third of the country. In addition, there are several small river basins occupying largely the southern part of the country. These include Samtse Area multi-river, Gelegphu Area multi-river, Samdrupjongkhar Area multi-river, and Shingkhar-Lauri multi-river.

LAKES

There are a large number of small and medium-sized lakes spread across the country. At present, except for glacial lakes, there is no adequate assessment of the area and location of various lakes in the country. As for glacial lakes, the inventory of Glaciers, Glacial Lakes and Glacial Lake Outburst Floods in Bhutan produced in 2001 by the Department of Geology and Mines reports a total of 2,674 lakes in the country. However, most of the glacial lakes are extremely small. The largest of all the lakes is the Raphstreng Tsho at an altitude of 4,360 m in the north-west part of Bhutan.

MARSHLANDS

In addition to rivers and lakes, marshlands in the form of depressions and water-logged areas, are envisaged to be a major part of the aquatic ecosystems in the country although no proper survey of marshlands have been carried out so far. Marshlands are generally known to be rich in biota and good habitat for resident as well as migratory birds, reptiles, amphibians and fishes. The best known marshland in the country is the Phobjikha valley, where the globally threatened black-necked cranes *Grus nigrocollis* roost in large numbers during winter. The valley is also highly valued for its outstanding scenery and cultural ethnicity.

2.2.2 TRENDS (I.E. CHANGES IN STATUS)

Although freshwater is in abundance in Bhutan, pressure on the resource is bound to increase with growing urbanization and industrialization. The urban population in 1999 accounted for 21 percent of the total population and is likely to increase by 50 percent by the year 2020, which will raise the demand for water in urban centers (UNEP 2001). Local and seasonal water shortages are becoming more frequent, and there is evidence of increasing sediment loads in Bhutan's extensive river system (RGOB 2002). The latter is a threat to the rapidly-growing hydropower industry, which needs a reliable water supply to sustain much-needed revenue that currently underwrites about 45 percent of Bhutan's development budget.

2.2.3 MAIN THREATS

The main threats to aquatic biodiversity mainly the river ecosystem include water pollution by domestic sewage because of population growth and urbanization. .

As the earth's temperature increases with global warming one plausible effect is the melting of the snowfields and the glaciers, which are Bhutan's freshwater reservoirs. This will mean there will be less water flowing into our river(s) during the dry season.

The threats for lakes are not that prominent at the moment since they are situated away from human settlements but because of global warming, the biodiversity in lakes might see some visible impact of deterioration.

2.2.4 IMPLICATIONS OF CHANGES ON HUMAN WELL-BEING

The pressure on the water resources is mounting due to competing demands from different users. In the past, water was mainly used for domestic and agricultural purposes. The domestic water demand is increasing due to changing lifestyles caused by socio-economic development. The water use for agriculture is expected to increase due to its intensification to keep pace with food demand of a growing population. New demands are emerging from other sub-sectors such as hydropower and other industries. Urbanization has become a key issue that has serious impact on both water demand and quality.

Hydropower electricity generation in Bhutan is increasingly becoming synonymous with economic development because of its immediate positive impact on the country's balance of payments and future development. However, the large hydropower potential can only be realized if the forests in the catchment areas of the rivers are adequately protected.

2.3 AGRICULTURAL ECOSYSTEMS

2.3.1 STATUS OF BIODIVERSITY IN AGRICULTURAL ECOSYSTEM

The country is known to have six major agro-ecological zones corresponding with altitudinal range and climatic conditions.

ALPINE ZONE

This zone, which lies between 3,600 – 4,600 m, is characterized by alpine meadows and is basically too high to grow any food crops. The meadows are used as summer pastures for yaks by the nomadic yak-herding communities.

COOL TEMPERATE ZONE

This zone covers cultivated areas between 2,600 – 3,600 m. Rainfall is low, so dry-land farming is common. Livestock farming is a predominant feature and, in particular, a small but distinct population of pastoralists maintains herds of yak and sheep in a nomadic manner. Horses, mules and dogs are the other livestock found in this zone. Key crops that are grown include wheat, potato, buckwheat, mustard and barley.

WARM TEMPERATE ZONE

This zone occurs between 1,800 – 2,500 m where rainfall is still low but temperature is moderately warm, excepting during winter when frost occurs. Migratory cattle herding is common and the herders have family links with the agricultural communities in the lower altitudes. People in this zone also keep pigs, poultry, dogs, cats, horses and small ruminants. In the wetland agricultural areas, rice is most commonly grown followed by wheat, potato, and several kinds of vegetables.

DRY SUBTROPICAL ZONE

Occurring between 1,200 – 1,800 m, this zone is warm with moderate rainfall averaging 850 – 1,200 mm in a year. Rice and maize are the major crops grown in this zone, in addition to wheat and mustard.

HUMID SUBTROPICAL ZONE

This zone lies between 600 – 1,200 m with relatively higher rainfall and temperature. Cattle rearing are common but are not done in a migratory fashion as in the temperate zones. The main cropping pattern in the wetland agricultural areas is rice followed by wheat and mustard. Citrus (mandarin types, locally called "oranges") are grown as cash crops. In the dry-land agricultural areas, maize is the main crop followed by mustard, millet and buckwheat.

WET SUBTROPICAL ZONE

This zone has excellent areas for crop cultivation. Fodder is scarce, so the cattle are tethered in the cropping areas prior to preparation. As in the humid subtropical zone, cattle rearing are normally sedentary in this zone. Rice is the main crop grown in summer while maize or wheat is grown in winter depending on irrigation. Rainfall is very high, ranging between 2,500 – 5,500 mm in a year. Irrigation sources are mostly rain-fed and dry up in the winter when rainfall becomes very low. As a result, large-scale winter cropping normally does not take place. In the dry-land agricultural areas, maize is the main crop. Other crops include cowpea, mustard, niger, millet and sorghum.

2.3.2 TRENDS (I.E. CHANGES IN STATUS)

The total arable agriculture land is less than 8 per cent mostly located in the mid-altitude valleys and adjacent hills, and in southern foothills. Between 1998 and 2007, about 161 hectares of prime agricultural land has been converted to other forms of land use.

2.3.3 MAIN THREATS

The main threat to agricultural biodiversity is the conversion of land to other uses mainly for infrastructure development such as urbanization, roads etc. Land degradation in form of erosion

is affecting the agriculture ecosystem.

2.3.4 IMPLICATIONS OF CHANGES ON HUMAN WELL-BEING

The reduction of agricultural land has tremendous affect on the lives of people especially the rural populace as 79 per cent (RNR statistics, 2008) of the total population depend primarily on agriculture. The land degradation has clear implications for food security and sustainable livelihoods.

3. THE OVERVIEW OF BIOLOGICAL SPECIES DIVERSITY

Biogeographically, the country is located at the juncture of the Palearctic realm, the Indo-Malayan realm and the Oriental realm. Bhutan has many floristic elements: Asian-Malaysian, Himalayan-Chinese-Japanese, Deccan (India), Tibetan (China), and Euro-Siberian (Grierson and Long, 1983-1999). Bhutan has 5,603 vascular plant species, 667 bird species, 200 mammal species, 49 fresh water fishes, and uncounted invertebrate species.

3.1 THE STATUS OF WILD SPECIES DIVERSITY

3.1.1 FLORAL DIVERSITY

The flowering plants (spermatophytes) consist of about 5,603 species under 220 families and 1,415 genera. Of 220 families in Bhutan flora, the Orchidaceae (369 species), Gramineae (321 species), Compositae (272 species), Leguminosae (211 species), Cyperaceae (142 species), Rosaceae (132 species), Scrophulariaceae (127 species), Ranunculaceae (96 species), Rubiaceae (94 species) and Labiatae (87 species) rank highest in number of species (Table 1). These ten families comprise approximately 45.31% of the species found in Bhutan. Of the total flora, 52 families are represented by only a single species and 30 families with two species. Seventy-five (34%) families have 10 or more species. The average number of species per family is approximately 21.

At the genus level, the largest genus is *Carex* (61 species), followed by *Primula* (58 Species), *Pedicularis* (54 species), *Rhododendron* (46 species), *Gentiana* (41 species), *Juncus* and *Rubus* (34 species), *Corydalis* (33 species), and *Bulbophyllum* and *Ficus* (31 species). About 44.1 % (97) families are represented by only single genus and 37 families have only two genera. Of the 1,415 genera, 751 (53 %) genera are represented by single species and about 249 (17.60 %) genera have two species. In contrast, only 6.36 % (90 genera) of the genera have 10 or more species. The mean number of species per genus is approximately 3.

There are no endemic families but a single genus (*Cromapanax* Grierson*)* under Araliaceae is endemic to Bhutan. However, there are about 105 species which are endemic to Bhutan. At least thirty-six families have one endemic species. The family with highest endemic species is

Scrophulariaceae with 23 endemic species mostly under the genus *Pedicularis* (17 species). The Orchidaceae with 14 species and Primulaceae with 12 species are other families with more than 10 endemic species. About 17 families have only one endemic species.

The wild flora also includes several plant species of enormous commercial and scientific values. The Institute of Traditional Medicine Services (ITMS) uses more than 200 species for the formulation of various traditional medicines. The Himalayan yew *Taxus baccata* (subspecies *wallichiana*) is known to have cancer-curing properties and the Chinese caterpillar fungus *Cordyceps sinensis* has multiple therapeutic and clinical properties, thus commanding a very high price in the international market. Other examples include: *Podophyllum hexandrum, Aconitum lacinatum, Delphinium bronanianum, Pleurospermum amabile, Gentiana unrulla, Corydalis gerdae, Parnassia ovata,* and *Polygonatum verticilliatum* for their valuable alkaloids and various medicinal properties; *Allium spp, Fritillaria spp,* and *Lilium spp* as wild gene pools for future crop research; and *Rheum nobile, Pterocephalus hookeri, Aster spp, Senecio spp, Saussurea spp, Rhododendron spp, Geranium spp, Meconopsis spp, Epilobium spp, Anemone spp,* and *Potentilla pedicularis* as potential horticultural crops for ornamental purpose.

Table 1. The 20 most species-rich families in the Bhutan flora, ranked by number of species. Na. = native plants, Al. = naturalized plants.

Family	No. of Species		Family	No. of species	
	Na	Al.		Na	Al.
Orchidaceae	369	0	Gentianaceae	84	0
Gramineae	278	43	Euphorbiaceae	70	12
Compositae	241	31	Umbelliferae	77	4
Leguminosae	185	26	Ericaceae	80	0
Cyperaceae	142	0	Primulaceae	79	0
Rosaceae	127	5	Saxifragaceae	73	0
Scrophulariaceae	123	4	Cruciferae	69	1
Ranunculaceae	95	1	Acanthaceae	67	0
Rubiaceae	92	2	Urticaceae	60	0
Labiatae	85	2	Polygonaceae	55	0

In addition, the National Biodiversity Center has recorded 410 species of pteridophytes (ferns and fern-ally species such as mosses, quillworts and horsetails) through ongoing inventories in various regions of the country.

3.1.2 FUNGAL DIVERSITY

With regards to mushrooms, the National Mushroom Center has recorded more than 90 species of forest mushrooms in the country. Several species such as Sissi shamu (*Cantherellus cibarius*), Bjichu kangro (*Clavaria botrytis*) and Jilli namchu (*Auricularia auricula*) are popular in Bhutanese cuisine. Sangay shamu (*Tricholoma matsutake*) is much sought in

European and Japanese culinary markets.

Bhutan, given its wide-ranging geo-climatic conditions, is also expected to be very rich in insect-fungi although records are currently very limited. Chinese caterpillar fungus (*Cordyceps sinensis)* is highly valued for its medicinal properties. Although listed as a totally protected species, collection and trade of *Cordyceps sinensis* have been legalized since 2006 to provide local communities with additional income-earning opportunities. Field studies have been initiated to study the occurrence and ecology of insect-fungi, starting with the subtropical region of the country. About 50 species of insect-fungi have been recorded in Gedu forest area alone by a survey team comprising Bhutanese foresters, a biochemist from the Bhutan's Institute of Traditional Medicine Services, and an international insect-fungi scientist. The preliminary record includes a highly possible new species of insect-fungi, which has been provisionally named *Cordceyps bhutanensis.*

3.1.3 THE MAMMALIAN DIVERSITY

Close to 200 species of mammal are known to occur in the country. This is extraordinary for a country which is one of the smallest nations in the Asian region. Although there are relatively few endemic mammal species, the high species richness combined with the availability of well-preserved habitats across various altitudinal and climatic zones together make for what is probably the only example of an intact faunal assemblage in the Eastern Himalaya. This ecological integrity provides preconditions in Bhutan for a prime sanctuary for numerous Palearctic and Indo-Malayan mammal species. These species include a number of globally threatened mammals such as the Bengal tiger *Panthera tigris tigris*, snow leopard *Uncia uncia*, clouded leopard *Neofelis nebulosa*, red panda *Ailurus fulgens*, Bhutan takin *Budorcas taxicolor whitei*, golden langur *Trachypithecus geei*, capped langur *Trachypithecus pileatus*, Asian elephant *Elephas maximus*, and Himalayan musk deer *Moschus chrysogaster leucogaster*. Altogether, there are 26 globally threatened species of mammal in the country (Table 2).

Table 2. Globally Threatened Mammal Species in Bhutan

Critically Endangered	Endangered	Vulnerable
1. Pygmy Hog *Porcula salvanius*	1. Golden Langur *Trachypithecus geei* 2. Dhole/ Wild Dog *Cuon alpinus* 3. Bengal Tiger *Panthera tigris tigris* 4. Snow Leopard *Uncia uncia* 5. Asian Elephant *Elephas maximus* 6. One-horned Rhinoceros *Rhinoceros unicornis* 7. Asiatic Water Buffalo *Bubalus bubalis* 8. Hispid Hare *Caprolagus hispidus* 9. Ganges River Dolphin *Platanista gangetica*	1. Capped Langur *Trachypithecus pileatus* 2. Red Panda *Ailurus fulgens* Sloth Bear *Melursus ursinus* 3. Himalayan Black Bear *Ursus thibetanus laniger* 4. Smooth-coated Otter *Lutrogale perspicillata* 5. Fishing Cat *Prionailurus viverrinus* 6. Marbled Cat *Pardofelis marmorata* 7. Clouded Leopard *Neofelis nebulosa* 8. Asiatic Golden Cat *Catopuma temmincki* 9. Swamp Deer *Cervus duvauceli* 10. Gaur *Bos gaurus*

	10. Fishing Cat *Prionailurus viverrinus* 11. Asiatic Golden Cat *Catopuma temmincki (Near Threatened)* 12. Assamese Macaque *Macaca assamensis (Near Threatened)*	11. Serow *Capricornis sumatraensis* 12. Takin *Budorcas taxicolor* 13. Mandelli's Mouse-eared Myotis Mouse-eared Bat *Myotis sicarius* 14. Sikkim Rat *Rattus sikkimensis*

3.1.4 AVIFAUNA DIVERSITY

Bhutan is enormously rich in terms of bird diversity. Of the 667 species recorded, 78% are resident and breeding, 7% are passage migrant, 8% are winter visitor, 6% are uncertain and 1% fall in the data deficient category; 27% show elevational migrations.

Bhutan has two critically endangered (white-bellied heron *Ardea insignis, Gyps bengalensis* white rumped vulture), one endangered, 12 vulnerable (black-necked crane *Grus nigricollis*, rufous-necked hornbill *Aceros nipalensis*, chestnut-breasted partridge *Arborophila mandellii*, Pallas's fish eagle *Haliaeetus leucoryphus*, beautiful nuthatch *Sitta formosa*, wood snipe *Gallinago nemoricola*, Blyth's tragopan *Tragopan blythii*, greater spotted eagle *Aquila clanga*, Imperial eagle *Aquila heliaca*, Baer's pochard *Aythya baeri*, Hodgson's bushcat *Saxicola insignis*, dark-rumped swift *Apus acuticauda*, and grey-crowned prinia *Prinia cinereocapilla*), 11 near-threatened, and 11 restricted range bird species (Blyth's tragopan *Tragopan blythii*, chestnut-breasted partridge *Arborophila mandellii*, dark-rumped swift *Apus acuticauda*, ward's trogon *Harpactes wardi*, rufous-throated wren babbler *Spelaeornis caudatus*, hoary-throated barwing *Actinodura nipalensis*, brown-throated fulvetta *Alcippe ludlowi*, white-naped yuhina *Yuhina bakeri*, yellow-vented warbler *Phylloscopus cantator*, and broad-billed warbler *Tickellia hodgsoni*) as per IUCN 2003.

3.1.5 OTHER FAUNA DIVERSITY

HERPETOFAUNA

In terms of herpetofauna, there has been very little survey and documentation done although the country is considered to be rich in reptiles and amphibians particularly in the tropical/ sub-tropical areas. Preliminary wildlife surveys in the early 1990s lists 15 reptiles and three amphibians in Royal Manas National Park (MacKinnon J, 1991 and 1994). Subsequently, in 1999, 23 species of reptiles and amphibians were recorded in the same park during week-long herpetological survey training for the park staff of Royal Manas National Park (WWF, 1999). The recorded list includes globally threatened species such as the Gharial *Gavialis gangeticus*, Indian Python *Python molurus molurus* and Yellow Monitor Lizard *Varanus flavescens*.

INVERTEBRATES

Documentation of invertebrates is currently very limited. Some documentation of the butterflies of Bhutan has been carried out only in the recent years. The country is reportedly

expected to have 800 to 900 species of butterfly (van der Poel P and Wangchuk T, 2007). Of these, 140 species have been catalogued with photographs in the *Butterflies of Bhutan* booklet published by the Royal Society for the Protection of Nature in 2007[1]. These include some rare species such as the Blue Dake *Euthalia durga* and Blue Forester *Lethe scandal*. Internationally protected species such as the Bhutan Glory *Bhutanitis lidderalii* and Kaiser-i-Hind *Teinopalpus imperialis* are also known to occur in the country although they have not yet been photographically catalogued since they are rarely seen.

At present, four indigenous species of bees are to be found in the country, namely, *Apis cerena, Apis dorsata, Apis laboriosa,* and *Apis florae*. However, the beekeeping industry in the country is currently promoting an introduced European species *Apis melifera*. Observations made by beekeeping veterans in the country suggest changes taking place in the population dynamics of the wild bees. Information on their distribution, trends and characteristics are limited. Their contribution to agricultural productivity through pollination is also not widely recognized in the country. *Apis laboriosa*, which is considered a rare species, is still less understood and not many references are available.

FISH FAUNA

The fish fauna of the country has not yet been properly assessed. Existing records list 49 freshwater fish species, including eight introduced species[2]. The main indigenous fish species include Himalayan trout *Barilius spp* and mahseer *Tor tor*, which is listed as a totally protected species in the Forest and Nature Conservation act 1995. Amongst introduced species, brown trout *Salmo trutta trutta* is the most common.

3.2 THE STATUS OF THE DOMESTIC DIVERSITY

3.2.1 AGRICULTURAL CROPS

Bhutan's diversity of crop species is quite impressive. More than 90 species of food crops are expected to occur in the country. The main crops include: cereals such as rice, maize, barley, millet, wheat, and buckwheat (pseudo cereal); fruits such as apple, orange, and pear; vegetables such as potato, bean, and cabbage; and spices such as chili, cardamom, garlic, and ginger. The crop species diversity can be further broken down into numerous landraces that occur as a consequence of adaptation to micro-environments created by altitudinal and climatic variations. For instance, there are some 350 landraces of rice, 47 of maize, 24 of wheat, and 30 of barley.

1 The booklet catalogues butterflies sighted in habitats ranging from 800 to 3,000 m.

2 As per www.fishbase.org

Several of the crop varieties represent adaptations to some of the highest agricultural lands in the world, with cultivation in the alpine agro-ecological zone extending up to 4,600 m. For example, while wheat is not an indigenous crop, varieties grown around Laya are adapted to higher altitudes and colder climatic conditions than wheat varieties in other parts of the world. Similarly, maize and barley have undergone a natural process of breeding and selection to evolve into high-elevation varieties. Other crop species have been domesticated *in situ*. For example, buckwheat is indigenous and at least one putative wild relative, *Fagopyrum debotrys*, is found in the wild in Bhutan. Foxtail millet is another indigenous crop species with a wild relative, *Setaria viridis*. Two wild relatives of oats, *Avena fatua and A. sativa,* are found in the country. There are also numerous wild relatives of horticultural crops such as apple, pear and citrus in the temperate and subtropical forests of the country.

Bhutanese rice is unique as it represents an intermediate type between the two major groups of *Oryza sativa*, "indica" and "japonica" which is a less significant third group (Chhetri, 1992). There are an estimated 350 varieties of rice in the country, many adapted to micro-environments, and thus creating a very valuable and unique genetic pool. At least two wild relatives of rice, *O. minuta* and *O. rufipogon,* are known to be found in the country.

3.2.2 LIVESTOCK

Livestock diversity in Bhutan basically consists of bovines, caprines, ovines, equines, avians, swines, canines and felines. Among cattle, Siri (*Nublang* in Dzongkha) is a *Bos indicus* breed believed to have originated in Sombe *geog* of Haa. Its key characteristics are disease resistance, strength and high butterfat content in milk. Mithun *Bos frontalis* is a descendant of Gaur, which originated in Northeast India but has been bred in Bhutan since the 17 century. Mithun (male) are often crossbred with Siri (female) to reproduce *Jatsa* and *Jatsham*, which are productively superior compared to either of the parent breeds.

The yaks in Bhutan are similar to those which occur commonly elsewhere in the Himalayas and Tibetan plateau. There appears to be distinct genetic differences between yaks in eastern and western Bhutan, with higher level of genetic diversity in the east. Yak and cattle hybridization is commonly practiced in central and eastern Bhutan, producing several sub-breeds such as *Zo* and *Zom.*

Horse breeds found in the country are also considered to be unique. These breeds are *Yuta, Boeta, Mera-Saktenpa,* and *Jata.* Ass breeds are imported from Tibet or India for crossbreeding with horses to produce mules.

Bhutanese sheep have been genetically investigated and classified into three types, namely *Jakar*, *Sipsu* and *Sakten* types. In particular the *Jakar* type is unique to central Bhutan. It is highly endangered as farmers are giving up sheep husbandry practices because they are no more economically viable.

3.2.3 TRENDS (I.E. CHANGES IN STATUS) IN SPECIES DIVERSITY

The information on the rate of species loss are not being evaluated but there are possibilities that few are being lost. Earlier, medicinal plants were collected in abundance but it is becoming difficult to get the same quantity. Same is true for other non wood forest product species such as ferns, bamboos and canes etc. However, Bhutan is not losing much of the diversity since most of the ecosystems are under various protected areas providing safe haven for biodiversity to thrive.

On the domestic biodiversity, many of the indigenous crops species are losing since many new varieties are introduced promising more yields. However, the NBC through the Gene bank is conserving the indigenous species found in the country.

3.2.4 THREATS AFFECTING SPECIES DIVERSITY

Threats to the Ecosystem in general has been already indentified and included under the respective ecosystem type. However, there are certain threats associated with biological species diversity.

WILD SPECIES DIVERSITY

1. Land conversion causing habitat destruction and fragmentation, resulting in the loss of biomes, ecosystems and wildlife species that depend on the habitats, particularly in the tropical and subtropical zones of the south and the temperate zones of the interior.
2. In certain areas overexploitation of land, causing habitat degradation and direct attrition or loss of plant and animal species
3. Competition with/replacement of indigenous species by domestic and/or exotic species and varieties
4. Reliance on wood for fuel is exacerbated wherever there is human habitation
5. Forest fires, both manmade and natural
6. Overexploitation of plants and animals, especially through collection (medicinal plants), poaching and unsustainable use

DOMESTIC BIODIVERSITY

1. Unsustainable cropping practices - such as permanent dry land cultivation on steep slopes without proper soil conservation, or shifting cultivation where fallow periods are being reduced - result in declining soil fertility and diminution of species composition
2. Conversion of agricultural land for other development (urbanization, roads, industries, etc)
3. Cultivation of exotic agricultural crops has reduces the diversity of indigenous crops especially the cultivation of minor indigenous crops

3.2.5 IMPLICATIONS OF CHANGES ON HUMAN WELL-BEING

In Bhutan, the loss of biodiversity and consequent changes in ecosystem services will lead to a decline in human wellbeing. With almost 79% of its population living in rural areas, forest resources, including NWFPs, form a major source of livelihoods. With decline in the NWFP resources species, the rural livelihood is at stake.

The introduced species in agriculture may fail to survive if there are pest and diseases outbreak as compared to indigenous varieties since they are well adapted to natural environment. These will directly affect the survival of people.

CHAPTER 2
CURRENT STATUS OF NATIONAL BIODIVERSITY STRATEGIES AND ACTION PLANS

1. THE NATIONAL BIODIVERSITY STRATEGY ACTION PLAN– AN OVERVIEW

Bhutan first prepared its Biodiversity Action Plan (BAP I) in 1998, second (BAP II) in 2002 and BAP III is expected to be out in 2009. Both the BAP (I & II) outlines a national approach to biodiversity conservation. It reflects the responsibilities and interests of the government while acknowledging the need for a national policy and a more consistent approach to protect biodiversity values across the country, including those of national and international significance. Both the document strongly emphasized on the principles of ecologically sustainable development that underpinned Bhutan Government strategic approaches to the environment and development.

Since the country has completed the implementation of BAP II and in the finalization of BAP III, it is appropriate to revisit BAP II document to assess the status.

1.1 AN INDICATION OF WHETHER AND WHERE TARGETS AND INDICATORS (BOTH GLOBAL AND NATIONAL) ADOPTED UNDER THE CONVENTION HAVE BEEN INCORPORATED INTO BAP.

The most of the targets and indicators are adopted from the convention but had been designed to fit the country's context. The action plans in BAP documents are designed with objectives that have relevance to national priorities. The action plans are set in two category; direct conservation action and essential measures that support the conservation.

The direct conservation action include in-situ conservation (establishment of parks, biological corridors, conservation areas, promoting conservation of wild crop relatives and wild plants for food production, conservation of forest management units etc.) and ex-situ conservation (expansion of botanical garden and arboretum and establishment of branch botanical gardens, capacity building etc.).

The essential measures supporting the conservation action includes building the scientific knowledge base, biodiversity surveys and monitoring, incorporation of biodiversity in related strategy and planning, strengthening biodiversity in education and awareness, encouraging and augmenting international co-operation in biodiversity

1.2 INFORMATION ON HOW ACTIVITIES UNDER THE NBSAP CONTRIBUTE TO THE IMPLEMENTATION OF THE ARTICLES OF THE CONVENTION AND THE THEMATIC PROGRAMMES AND CROSS-CUTTING ISSUES ADOPTED UNDER THE CONVENTION

1.3 AN OVERVIEW OF PROGRESS MADE IN IMPLEMENTATION OF PRIORITY ACTIVITIES OR ACTIONS, FOCUSING ON CONCRETE RESULTS ACHIEVED

The contribution of BAP towards implementation of the obligations under the various article of CBD and also thematic areas and cross-cutting issues of the Convention are described under each article of the convention.

ARTICLE 5 – COOPERATION

The continuation of bilateral Agreements for Sustainable Development signed between the Netherlands, Bhutan, Costa Rica, and Benin is one good example implemented under this article. There are also numerous conservation programs jointly implemented by various donor agencies.

ARTICLE 6 - GENERAL MEASURES FOR CONSERVATION AND SUSTAINABLE USE

The most significant contribution to this article is the adoption of environmental conservation as a key Article in the Constitution of the Kingdom. Besides, there are several policies and strategies formulated for conservation and sustainable use of resources during the BAP II. These includes Environment Impact Assessment Act 2000, Biodiversity Act 2003, the approval of Water Policy and Water Vision,

ARTICLE 7 - IDENTIFICATION AND MONITORING

Under this article, the following are important achievements:

1. Publication of first-ever Field Guide to the Mammals of Bhutan, giving brief accounts of the physical characteristics, social behavior, habitat and conservation threats of some 200 mammal species found in the country.

2. The RSPN, apart from research and monitoring of black-necked crane *Grus nigricollis* as a part of their conservation management program in Phobjikha valley, has initiated field studies on white-bellied heron *Ardea insignis* since 2005

3. The Nature Conservation has prepared "Tiger Action Plan for the Kingdom of Bhutan, 2006-2015" to continue and enhance tiger conservation work in the country

4. NCD in collaboration with WWF Bhutan Program and the International Snow Leopard Trust conducted the first Bhutan Snow Leopard Information Management System (SLIMS) training and field survey in Thimphu and Jigme Dorji NP

ARTICLE 8 - *IN-SITU* CONSERVATION

The major program under the in-situ program is the declaration of about 48.5 per cent of country's land area under protected areas system. The six PAs are operational and four will be operationalized by 2013. Besides, Bhutan has been cooperating with neighbouring countries in conservation of trans-boundary protected areas.

All the parks are connected with biological corridors which constitute about 9 per cent of the total land area. There are also about 13 important conservation areas and many community forests and plantations are established for in-situ conservation. The Nature Conservation Division has consolidated the protected areas and biological corridors into a macro-level natural landscape called the "Bhutan Biological Conservation Complex", or B2C2 in short.

On-farm conservation of crop genetic resources was initiated as a national program in 2001 by the National Biodiversity Center in collaboration with regional RNR-Research Centers and *Dzongkhag* Agriculture Sectors through assistance from the Biodiversity Use and Conservation in Asia Program.

ARTICLE 8(H) - ALIEN SPECIES

A very little effort is being initiated under the alien species. NBC is documenting the various species to developed management plan for future.

ARTICLE 8(J) - TRADITIONAL KNOWLEDGE AND RELATED PROVISIONS

The Biodiversity Act of Bhutan, enacted in 2003, explicitly protects indigenous rights over traditional knowledge. The involvement of indigenous communities in decision-making related to the use of traditional knowledge is achieved through activities such as the community-based natural resources management projects.

ARTICLE 9 - *EX-SITU* CONSERVATION

The establishment of Botanical Gardens, medicinal gardens, Gene Bank is some of the major programs implemented under this article. Besides, a total of 131 community forests were established covering an area of 16,379.16 hectares with 6,608 households and a total of 53,615.38 acres of barren and degraded areas and cleared forests have been brought under plantation as of June 2008 under the Reforestation program.

ARTICLE 10 - SUSTAINABLE USE OF COMPONENTS OF BIOLOGICAL DIVERSITY

1. Launching of nation-wide Land Management Campaign as a continuous program to instill in people the awareness and understanding of various land management techniques to address site specific land degradation problems. It carries out on-the-ground demonstrations using a broad-based participatory approach bringing together local communities, *dzongkhag* staff as well as professionals from various disciplines relevant to rural land use and management.

2. The implementation of Sustainable Land Management Project (SLMP) with funding from the GEF under their Operational Program 15, linked to UNCCD implementation. The SLMP is the first major externally funded project in the country exclusively dedicated to combating land degradation using an integrated, multi-disciplinary approach in a variety of land degradation scenarios

3. In order to cater to the demand of wood for domestic and commercial use without degrading forest resources and diminishing future forest productivity, the DoF has been planning and implementing forest harvesting operations based on the principles of sustainability

ARTICLE 11 - INCENTIVE MEASURES

Parks have developed Integrated Conservation development programs with communities. Various incentives were provided to aid in conservation.

ARTICLE 12 - RESEARCH AND TRAINING

Government has been actively promoting various researches on biodiversity and under the Ministry of Agriculture, four regional Research centers are established. Besides, other sectors (both government and NGOs) also pursue various research related to biodiversity.

ARTICLE13 - PUBLIC EDUCATION AND AWARENESS

There are many sectors engaged in this program.

The Ministry of Education has been consolidating environmental education in all level of education. Various nature clubs are formed in schools and activities such as cleaning campaign, planting trees, managing solid vast are actively pursued in schools.

The Protected Areas of Bhutan are actively involved in the following:

1. Creating environmental education awareness through games to enhance understanding of biodiversity with the communities.
2. Using different media such as: video, songs, participatory exercises, posters, etc
3. Using different types of audiences such as local communities, road workers, school children, etc

4. Establish the environmental management group at community level – garbage disposal, maintaining sanitations. etc
5. Train the focal teacher of the Nature Club to encourage public education through school children
6. Raising plantations of different species of trees

Besides, numbers of NGOs are also involved in various environmental awareness programs.

ARTICLE 14 - IMPACT ASSESSMENT AND MINIMIZING ADVERSE IMPACTS

The following are major programs implemented:

1. Developed Environmental discharge standards for pollution control and introduction of mandatory vehicle emission testing;

2. Revision of sectoral environmental clearance application guidelines for highways and roads, forestry, hydropower, industrial projects, mines, and power transmission and distribution lines, and new guidelines were developed for urban development and tourism projects. In addition, environmental codes of practice were formulated for storm water drainage system, installation of underground and overhead utilities, tourism activities, and roads.

3. Promulgation of Rules and Regulation on Control of Ozone Depleting Substances and an establishment of National Ozone Unit at NEC to coordinate the functioning of mechanisms for control, monitoring and reporting of the import and export of ozone depleting substances.

4. The National Environment Protection Act (NEPA), the Umbrella Legislation for the environment sector was approved by the 87th session of the National Assembly of Bhutan.

5. As part of UNFCCC's National Adaptation Program of Action, a project called - "Reducing Climate Change-Induced Risks and Vulnerabilities from Glacial Lake Outbursts in the Punakha-Wangdi and Chamkhar Valleys." is being formulated.

6. The standards for national ambient air quality, industrial emissions and noise were also approved by the National Environment to disseminate the information to the stakeholders, mainly industrial and mining companies

ARTICLE 15 - ACCESS TO GENETIC RESOURCES

The Biodiversity Act of Bhutan 2003 enacted in response to the concern of unregulated access to genetic resources in the country and in realization of the value of biological and genetic

resources in the development of products, substances and compounds that have medicinal, industrial and agricultural and related applications.

ARTICLE 16 - ACCESS TO AND TRANSFER OF TECHNOLOGY

Almost all the programs on conservation have this component.

ARTICLE 17 - EXCHANGE OF INFORMATION

Exchange of information is done at country, institutional and individual levels within Bhutan and outside.

ARTICLE 18 - TECHNICAL AND SCIENTIFIC COOPERATION

Participation in global environment management by acceding to several international agreements. These are: Cartageña protocol on Biosafety under CBD; Kyoto Protocol under UNFCC; Basel Convention on Transboundary Movements of Hazardous Wastes and Disposal; and Convention on International Trade in Endangered Species of Fauna and Flora

ARTICLE 19 - HANDLING OF BIOTECHNOLOGY AND DISTRIBUTION OF ITS BENEFITS

some activities under medicinal plants program by National Institute of Medicine is carrying out and Agriculture Ministry is doing initial research on this area.

1.4 AN INDICATION OF DOMESTIC AND/OR INTERNATIONAL FUNDING DEDICATED TO PRIORITY ACTIVITIES

ARTICLE 20-FINANCIAL RESOURCES

The government provides continuous support for implementation of conservation programs through the payment of the salaries of the employees involved in different projects, building of infrastructure such as research centers, purchasing of equipment, payment of Travel allowance for visit to field sites etc. The domestic revenue is able to meet the current expenditures and most of the capital expenditure are provided by various donors.

The Bhutan Trust Fund for Environmental Conservation provides funding to various conservation programs in areas of research, establishment of new protected areas, capacity building etc. The Sustainable Development Secretariat (SDS) through south South Cooperation also provide funding for conservation program.The important international partners involved in the conservation program are: WWF Bhutan Program and CERF, Government of Netherland, UNDP/GEF, DANIDA, Mac Arthur Foundation, SNV**,** Helvetas**,** Austrain Government**,** EU**,** IFAD**,** FAO**,** ICIMOD**,** Birdlife International, GTZ, The Global Fund, JICA/JOCV, World Bank and Asian Development Bank.

2. ANALYSIS OF EFFECTIVENESS OF NATIONAL BIODIVERSITY STRATEGY AND ACTION PLAN

The review of the BAP II found that the document had influenced the biodiversity policy, particularly at the level of overarching goals and strategic directions. Many of the programs are designed and implemented as per GNH policy of the government where environment conservation is one of the four pillars. Many of the targets of CDB are similar to elements of GNH and thus it also fullfills the requirement.

However, there is a need for a greater focus on key priorities in the BAP document. It should be designed to provide with time-bound objectives and targets for biodiversity conservation across the nation.

3. COP 8 DECISIONS REQUESTING PARTIES TO SUBMIT INFORMATION THROUGH REPORTS

VIII/5 (ARTICLE 8(J))

Para 2. Invites Parties to submit through their national reports, if appropriate, to the Executive Secretary, reports on progress in achieving national participation of indigenous and local communities, and associated capacity-building;

The Biodiversity Act of Bhutan 2003 explicitly protects indigenous rights over traditional knowledge. The involvement of indigenous communities in decision-making related to the use of traditional knowledge is achieved through activities such as the community-based natural resources management projects.

Since process of decentalization in 1981, the Royal Government of Bhutan has taken several steps to empower the indigeneous and local communities in planning and implementation of various program. During the process, many capacity development initiatvies are being carried out. The Forestry sector has decentralized several program to dzongkhags. Several community forestry are being established in several geogs and villages. Many farmer associations and user groups are also formed where most of the capacity development are being initiated and funded by the government.

VIII/24 (PROTECTED AREAS)

Para 4. Urges Parties, other Governments and multilateral funding bodies to provide the necessary financial support to developing countries, in particular the least developed and small island developing States, as well as countries with economies in transition, taking into account Article 20 and Article 8 (m) of the Convention to enable them to build capacity and implement

the program of work and undertake the reporting required, including national reports under the Convention on Biological Diversity, to enable the review of implementation of the program of work on protected areas in line with goal 2.2 of the program of work.

Bhutan as a developing country is not in the position to provide financial aid to other developing countries. However, it receives several funding from several developed countries as stated earlier in implementing various conservation programs such as capacity building, conducting research in protected areas, etc., and various programs geared to fulfill the requirement of meeting the targets of CBD. The GEF/UNDP is providing fund to Bhutan to develop this report to review the implementation of conservation efforts for onward submission to CBD.

After the United Nations' *Earth Summit* in Rio in 1992 and on its own initiative, a *Bilateral Agreements for Sustainable Development* (BASDs) was signed between the Netherlands, Bhutan, Costa Rica, and Benin. Under this scheme, countries not only receive or are granted technical and financial assistance, but also undertake reciprocal obligations by jointly identifying priorities, needs and compromise areas. Besides mutual assistance and consultation, the participation of each party is based on principles of solidarity, equality, reciprocity and civil society participation. As a part of this process, the participating countries have taken the opportunity to issue joint declarations on topics of mutual interest in different international forums and have also executed cooperative projects under the framework of the CBD.

A pilot online-workshop between the four participating countries proved useful in exploring the complex issues related to the access and benefit sharing arrangements under the CBD. This article shows how information technologies can even differences in the resources of different countries whilst developing common areas of cooperation. In this case the participating countries succeeded in preparing a common declaration despite earlier experiences. Assessment is made of how such technology can be used efficiently for the benefit of all participants and what the limitations are. It also highlights the fact that capacity building as far as biotechnology is concerned has to include capacity building in information technologies.

The results achieved are sharing of knowledge and experiences to pursue sustainable development among the partner countries, exchange programs to learn and appreciate each other's approaches towards sustainable development, and enhance participation of civil society organizations in the decision making process for sustainable development.

VIII/28 (IMPACT ASSESSMENT)

Para 5. Urges Parties, other Governments and relevant organizations to apply the voluntary guidelines on biodiversity-inclusive environmental impact assessment as appropriate in the context of their implementation of paragraph 1 (a) of Article 14 of the Convention and of target 5.1 of the provisional framework of goals and targets for assessing progress towards 2010 and

to share their experience, inter alia, through the clearing-house mechanism and national reporting;

The Environmental Assessment Act 2000 is overarching in that it relates to environment in a holistic manner and applies to a wide range of activities across a number of sectors. The Act establishes procedures for the assessment of potential effects of strategic plans, policies, programs, and projects on the environment, and for the determination of policies and measures to reduce potential adverse effects and to promote environmental benefits. The Act requires the government to ensure that environmental concerns are fully taken into account when formulating, renewing, modifying and implementing any policy, plan or program as per regulations that may be adopted within the appropriate provision of the Act. It makes environmental clearance mandatory for any project or activity that may have adverse impact on the environment[3].

To implement the Environmental Assessment Act 2000, regulations were promulgated in 2002 for the environmental clearance of projects and for strategic environmental assessment. The Regulation for the Environmental Clearance of Projects 2002 defines responsibilities and procedures for the implementation of the Environmental Assessment Act 2000 concerning the issuance and enforcement of EC for individual projects and to:

1. provide meaningful opportunities for public review of potential environmental impacts of projects;

2. ensure that all projects are implemented in line with the sustainable development policy of the RGoB;

3. ensure that all foreseeable impacts on the environment, including cumulative effects are fully considered prior to any irrevocable commitments of resources or funds;

4. ensure that all feasible alternatives are fully considered; ensure that all feasible means to avoid or mitigate damage to the environment are implemented;

5. encourage the use of renewable resources, clean technologies and methods; ensure that concerned people benefit from projects in terms of social facilities;

6. help strengthen local institutions in environmental decision making; and

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3 Article 6.11 of the EAA defines Environmental Clearance as the decision, issued in writing by the NECS or the relevant Competent Authority, to let a project proceed, which includes terms (and conditions) to ensure that the project is managed in an environmentally sound and sustainable way.

7. help create a uniform, comprehensive data base on the environmental and cultural conditions and assets in the country.

To support the implementation of the EA Act and Regulation, sectoral EC application guidelines have been prepared for highways and roads, forestry, hydropower, industrial projects, mines, power transmission and distribution lines, urban development, and tourism projects. In addition, environmental codes of practice have been formulated for storm water drainage system, installation of underground and overhead utilities, tourism activities, and roads and environmental discharge standards have been set to control pollution.

The Regulation for Strategic Environmental Assessment 2002 was promulgated with the specific purpose to:

1. ensure that environmental concerns are fully taken into account by all government agencies when formulating, renewing, modifying or implementing any policy, plan or program, including FYPs;

2. ensure that the cumulative and large scale environmental effects are taken into consideration while formulating, renewing, modifying or implementing any policy, plan or program;

3. complement project-specific environmental reviews as per RECOP and to encourage early identification of environmental objectives and impacts of all government proposals at appropriate planning levels;

4. promote the design of environmentally sustainable proposals that encourage the use of renewable resources and clean technologies and practices; and

5. promote and encourage the development of comprehensive natural resource and land use plans at the local, dzongkhag and national levels.

It outlines the duties of government agencies formulating, renewing, modifying, or implementing any policy, plan, or program, the principles of strategic environmental assessment, and essential contents of the environmental statement.

CHAPTER 3
SECTOTAL AND CROSS-SECTORAL INTEGRATION OR MAINSTREAMING OF BIODIVERSITY CONSIDERATIONS

Environmental conservation has always occupied a pivotal place in the country's development policies and strategies. Concern for natural environment is embedded in Bhutanese traditional beliefs, socio-cultural outlook and development philosophy. The overarching Bhutanese development philosophy of "Gross National Happiness" (GNH), first propounded by the Fourth King Jigme Singye Wangchuck in the 1970s, underscores that development cannot be pursued on the premise of economic growth alone but has to take place in combination with the emotional and spiritual well-being of the people. It basically stems from the Buddhist notion that the ultimate purpose of life is inner happiness.

The Bhutanese decision-makers have characterized environmental sustainability as one of the four pillars of the GNH development philosophy. *Bhutan 2020*, the country's vision document to maximize GNH emphasizes that "development must be pursued within the limits of environmental sustainability and carried out without impairing the biological productivity and diversity of the natural environment."

Bhutan's GNH development philosophy has inspired the conception of the Gross International Happiness Project, a global initiative coordinated from the Netherlands, focusing on dialogue and research to develop indicators and programmes for true value, sustainable development and well being for nations and organizations. The project has held three international conferences and produced numerous publications on GNH, involving institutions and individual development thinkers from around the world, to operationalize GNH in globally-adaptable measurable terms.

The mainstreaming of biodiversity in Bhutan can be assessed based on the national development planning guidelines and the major development plans, programs and policies at various levels. The assessment begins with the planning guidelines to provide a clear sense of the national efforts to mainstream biodiversity conservation and sustainable use into relevant sectoral and cross-sectoral plans, programmes and policies followed by an assessment of the integration of bio-diversity considerations in the actual plans.

1. THE 10 FIVE YEAR PLAN (2008-2013) PLANNING GUIDELINES

Bhutan follows a Five Year Planning cycle and the period of reporting falls within the beginning of the 10th Five Year Plan (2008-2013). The Strategic Framework (Part I, National Planning Guideline the preparation of the 10th Five Year Plan for Bhutan) maintains that the guiding principle of the plan shall be to achieve Gross National Happiness (GNH) through the

overall priority for of poverty reduction. The pillars of GNH include Equitable & Sustainable Socio-Economic Development, Environment Conservation, Preservation and Promotion of Culture and Good Governance.

It also stresses that "Environment is a cross-cutting issue that is intimately intertwined with poverty reduction. Therefore, all sectors, agencies, districts (dzongkhags) and geogs (sub-districts) should mainstream environmental issues in all their policies, plans, programmes and projects and build adequate mitigation measures to minimize any adverse impact on the environment." Therefore, the national planning guideline provides for a broad based framework for mainstreaming biodiversity considerations in all sector and sub-sector plans in the national and sub-national development plans, programs and policies.

Sector Policy Framework and Targets (part II, Planning Guideline), requires that all policy objective and potential targets for each sector should be reviewed and refined so as to strengthen linkages to the pillars of GNH and the poverty reduction goal of the Tenth Plan. It recognizes that environment has direct linkage to poverty reduction and emphasizes its importance for economic development. Hence, it calls for the overall objective of the environment sector to ensure an enabling framework for conservation of the natural environment.

Sector Plan Preparation Process And Format (Part II, Planning Guideline), call for all sectors to
"… ensure that their programmes, particularly infrastructure development programmes, do not have adverse effects on the environment." It is also re-iterated in part IV which states that the Dzongkhag (districts) sectors should ensure that their programmes, particularly infrastructure development programmes do not have adverse effects on the environment, and are in line with the master plans, wherever available.

The planning guideline, therefore, provides for a clear direction in enabling an adequate consideration of the environmental (biodiversity) issues in all development plans, programs and policies at both national and sub national levels covering all sectors.

One of the five specific policy objectives of the 10th Plan is to: "Conserve and promote sustainable commercial utilization of forest and water resources". Among the strategic measures included is one related to the: "Establishment of Community Forests and expansion of commercial harvesting of Non Wood Forest Products (NWFPs)." This measure is clearly aimed at making progress in both devolution and poverty reduction within a broader sustainable development framework.

2. STRATEGIC FRAMEWORK FOR THE 10 FYP

The strategic framework for the 10 FYP outlays poverty reduction (through promoting economic opportunities through broad-based growth and boosting critical sectors such as agriculture and rural industries/enterprises as well as targeted poverty reduction programs), Vitalizing industries (through market orientation and enhanced export competitiveness of manufacturing, hydropower, cultural industries, tourism and ICT sectors), National Spatial

Planning (for sustainable and equitable regional development) and Integrated Rural Urban Development for Poverty Alleviation (strengthening of the agriculture, livestock and forestry sector as well as the off-farm sectors), expansion of strategic infrastructure (efficient road and transportation network), investment in human capital (excellence in education and enhanced human resource in public and private sector) and enhancing enabling environment (good governance, vibrant democracy, active media, judiciary and other institutional developments).

Among these main strategies, the strategic framework related to spatial planning encompasses the conservation of the environment. This is based on the rationale that conservation policy has spatial components relating to the protection of biodiversity habitats, forest conservation, watershed management, soil conservation and various other land use aspects. It is also for the reason that effective spatial planning concerns itself with creating conditions for an enhanced quality of life which is directly dependent on the state of the natural environment and eco-systems (including the availability of clean air and water, abundant and diverse forest resources, etc.) As such, the 10 FYP strategic frameworks considers conservation of the environment including the sustainable use and management of natural resources as being an integral and critical aspect of national spatial planning. Hence, the Royal Government will promote mainstreaming environmental issues into the development planning process through the national spatial planning framework, awareness and capacity building of relevant sectors, strengthening the environmental information management system, decentralized environmental impact assessment process, drafting of relevant environmental legislation, strengthening of the management of protected areas and botanical gardens; developing the database of biodiversity in the protected areas, introducing eco-tourism, enhanced livelihoods of people living in the protected, and biodiversity conservation through the strengthening of a field gene bank, botanical garden and a herbarium to facilitate the conservation and sustainable utilization of plant and animal genetic resources; strengthening the national biodiversity management and information system; and the implementation of bio-prospecting for the commercialization and sustainable utilization of biological resources.

3. RESOURCE ALLOCATION FRAMEWORK

The resource allocation mechanism often demonstrates the commitment for mainstreaming environmental and biodiversity considerations and hence it is essential to assess the mechanism for resource allocation at the national level.

The tenth fiver-year planning framework maintains that the allocation of resources for development programs shall be based on the projected resource availability and the need to enhance local budgets. The Dzongkhags and Geogs (sub-district level) will receive annual grants directly from the Government which will be determined based on a formula that takes into consideration factors such as Geographic area, food security as proxy for poverty incidence, population and forest cover as proxy for environmental conservation.

Therefore, the intention of mainstreaming biodiversity consideration is reflected in two

criterion of resource allocation, namely, Geographic area (geographic coverage of a Geog) and forest cover.

4. CROSS-CUTTING ISSUES & OTHER STRATEGIC FRAMEWORKS

THE CONSTITUTION OF THE KINGDOM OF BHUTAN AND LEGISLATION RELATED TO BIO-DIVERSITY

Article 5 of the Constitution of the Kingdom of Bhutan makes it clear that: "Every Bhutanese is a trustee of the Kingdom's natural resources and environment". The Royal Government is enjoined in the Constitution to conserve and improve the environment and safeguard the country's biodiversity. It is further directed to secure sustainable development while promoting economic and social development. The Constitution further charges the Government to ensure that a minimum of 60 % of Bhutan's total land area is maintained under forest cover for all time.

Therefore, there is a very strong constitutional requirement for Bhutan to mainstream biodiversity concerns not only in the national, sectoral and sub-national plans and programs but also in terms of individual actions and responsibility of every Bhutanese.

POLICIES AND LEGISLATIONS ENABLING INTEGRATIONS

1. The national policy objectives in biodiversity are:
2. Biodiversity issues will be integrated into the economic development plans and programs;
3. Special attention will be given to support parks and Protected Areas and effective buffer zones management; and
4. Information on biological diversity will be developed for conservation and sustainable use of biological resources.

Bhutan's policies on biodiversity parallel to those of the CBD, particularly those which specify:

1. Conservation of biological diversity is a priority national objective;
2. Any use of biodiversity component must be sustainable; and
3. There should be fair and equitable sharing of the benefits arising from biological resources.

NATIONAL ENVIRONMENTAL STRATEGY (NES)

The NES is called the "Middle Path" and it seeks to balance environmental conservation with economic development. Three avenues of sustainable economic development are outlined:

1. expanding hydropower,
2. increasing agriculture self sufficiency, and
3. expanding the industrial base.

The NES examines each avenue in detail, taking into the current status of the sectors and enabling conditions for development and the implications of such development. Each sector is discussed below:

Hydropower represents a sustainable and relatively clean source of revenue. Expanding this sector is expected to improve the living standards for the population and reduce the currently high levels of fuel-wood consumption. To expand this sector it is required to maintain the integrity of the country's watersheds.

The second avenue of economic development is to increase food self sufficiency. As expansion of arable land is not possible given the limited flat land area, the ways to improve food production are through intensive farming, diversification of commodities, promotion of agro-based industries, sustainable soil management, pest management practices, improved extension services and better rangeland management.

The third avenue is industrial development. It is currently based on four main resources: hydropower, wood, agriculture and minerals. Competition for different land use, topographical factors, transport and communication, and limited access of raw materials are constraints to industrial development. Some of the implications to industrial development include pollution and a variety of environmental problems. Environmental criteria need to be involved with industrial development planning. This involves setting of environmental standards, establishment of legal basis, and enforcement.

AGRICULTURAL POLICY

Large herd size of Livestock and *Tseri* (slash and burn cultivation) cultivation are the challenges faced by the agriculture sector. *Tseri* cultivation was banned through the directives of 72nd session of the National Assembly and people were encouraged to convert *tseri* to other forms of land use.

ENERGY POLICY

There is no comprehensive policy encompassing biomass, fossil fuel and renewable energy. However, hydropower energy is the most important among all energies in terms of energy use within the Kingdom especially with regard to employment generation and revenue earning capacity. The Bhutan Power System Master Plan (PSMP, 2003 – 2022) lists seven conclusive mega hydropower projects for formulation and development. By 2015 Bhutan will have over 10,000 MW of installed hydropower generation capacity.

The government also accords high priority on rural electrification to improve the quality of life and stimulate socio-economic development in rural areas. The Bhutan 2020 document envisages 50% of rural electrification by 2012. This program will involve extension of power lines from either the transmission grid or from isolated mini/micro hydroelectric power plants. A comprehensive Rural Electrification Master Plan and investment study is also being formulated for all 20 Dzongkhags (districts).

The hydropower projects in Bhutan are considered less damaging to the environment for the simple reason that they are located in the deep gorges by tapping the run-of the river potential without having to build huge dams. The turbines are made inside the tunnel with little destruction of the environment. Ultimately, electrification of the rural communities will save great amounts of fuel wood.

INDUSTRIAL POLICY

The industrial landscape of Bhutan is dominated by a few large-scale industries and a large number of cottage and service enterprises.

The existing industrial policy of the Royal Government is designed to deal with large rather than small enterprises. However, manufacturing sector needs to expand more rapidly to make greater contribution to the national income, export earnings, and to provide employment to the youth. Towards strengthening manufacturing sector more rapidly, more transparent industrial and investment policies will be formulated. The principal focus will be on the enactment of relevant legislation to establish a legal framework for industrial development. Creation of enabling environment for manufacturing sector envisages two key activities, formulation and enactment of legislations concerning industrial policy, capital markets, transfer of technology, and foreign direct investment.

Integration of environmental issues in industries will be emphasized in accordance with the Environmental Assessment Act, 2000. Institutional arrangements and administrative procedures for controlling pollution have been laid down. The Act requires line agencies to screen, monitor and enforce most of its provisions. Implementation of environmental assessment and monitoring has to be done without adding to costs and delays that will

discourage investment.

SURFACE TRANSPORT POLICY

Surface transport is the main mode of passenger travel and freight transport in the country. Over the years the vehicles imported into the country increased by manifold and air quality in the urban centers have deteriorated. Emission test carried out on 9,000 vehicles in 1999 (using the Indian Emission Standard in the absence of a national standard), 60 percent of petrol and 96 percent of diesel engine vehicles did not meet the minimum requirement. The fuel quality imported into the country and maintenance of the vehicles were the two main sources of problem.

Based on the fuel quality that is imported into country and combustion rate of fuel at high altitudes, NEC in consultation with the Road Surface Transport Authority (RSTA) formulated vehicular emission standard for diesel vehicles as 80% (Hertz smoke Unit) and for gasoline vehicles at 5% of Volume Carbon Monoxide.

There is a government commitment to gradually raise the emission standards as better fuel quality and better vehicle fitness maintenance services become available.

FOREST ACT OF BHUTAN 1969

The Forest Act of Bhutan 1969 nationalized all forests in Bhutan. Forests had earlier been managed as village forest by local communities. However, emerging thrust from development activities and opening of timber markets required regulation which the Act provided.

FOREST AND NATURE CONSERVATION ACT 1995

Bhutan Forest Act, 1969, was repealed in 1995 with the enactment of the Forest and Nature Conservation Act, 1995 (FNCA) in keeping with evolving conservation needs and to allow for community stewardship of forest resources. This Act is geared towards achieving government's policy of maintaining 60% forest cover.

ENVIRONMENTAL ASSESSMENT ACT 2000

The Environmental Assessment Act 2000 (EAA) establishes procedures for the assessment of potential effects of strategic plans, policies, programs, and projects on the environment, and for the determination of policies and measures to reduce potential adverse effects and to promote environmental benefits. The Act requires the Royal Government of Bhutan to ensure that environmental concerns are fully taken into account when formulating, renewing, modifying and implementing any policy, plan or program as per regulations that may be adopted within the appropriate provision of the Act. It makes environment clearance (EC) mandatory for any project/activity that may have adverse impact(s) on the environment.

LIVESTOCK ACT OF BHUTAN 2000

The Act highlights quality and appropriate breeds of livestock through intensification programs.This are a positive measure to curb methane production and also reduce pressure on grazing lands and forest areas.

BIODIVERSITY ACT 2003

The Act asserts sovereignty of the country over its genetic resources, the need to promote conservation and sustainable use of biodiversity resources as well as equitable sharing of benefits arising from biodiversity. It lays down the conditions for the grant of access, benefit sharing, and protection, and describes various rights, offences and penalties.

MINES & MINERALS ACT 1995

The act recognizes the preservation, protection and setting of environmental standards and conservation of natural resources consistent with the provision of the Act and other environmental legislation as a critical feature of mining practices. It requires that restoration of areas that are mined is carried out in a proper manner with the objective of creating a suitable and acceptable environment as approved by the National Environment Commission. Prior to granting a mining lease, a final mine feasibility study based on an assessment of technical, financial, environmental and social parameters, is required. Among other things, the feasibility study needs to contain a Mine Plan, Environment Management Plan and Restoration Plan.

4. CROSS-SECTOR INTEGRATION OF BIODIVERSITY CONSIDERATIONS:

4.1 NATIONAL ENVIRONMENT COMMISSION

The National Environment Commission (NEC) is a high-level autonomous agency of the Royal Government of Bhutan and is mandated to look after all issues related to environment in Bhutan. The Commission also monitors the impact of development on the environment and aims to put in place the necessary controls, regulations and incentives to the private/public sectors to achieve sustainable development through the judicious use of natural resources. The coordination of inter-sectoral programmes, the implementation of policies and legislation with regard to the environment is also another important mandate of the Commission.

The Commission's Secretariat is responsible for ensuring that Bhutan follows a sustainable development path and that all projects be it public or private, take into consideration environmental aspects. To this effect, the commission has developed National Environment Protection Act 2007, Environmental Assessment Act, 2000 and Regulations of the Environment Clearance for Projects, 2001. This defines responsibilities and procedures for the implementation of the Environmental Assessment Act, 2000 concerning the issuance and

enforcement of environmental clearances for individual projects.

The commission also coordinates and facilitates the implementation of bilateral and multilateral environmental agreements, conventions, treaties or declarations. To this effect the commission has published Bhutan National Adaptation Programme of Action, 2006, First Greenhouse Gas Inventory, 2000, Initial National Communication, under UNFCCC, 2000 and is working on their updates.

While continuing with the development of appropriate environmental policy and legal frameworks, the NEC will, in the 10 FYP focus on decentralizing environmental governance, developing a National Sustainable Development Strategy (NSDS), strengthening environmental information management system to support and improve decision making, utilizing environmental assessments as a tool for sustainable development, building and strengthening institutional capacity and in mainstreaming environmental issues in sectoral plans, projects and programmes of all government agencies.

4.2 THE DEPARTMENT OF FOREST

The Department of Forest has the mandate for forest management planning; forest inventory, mapping and data analysis; non wood forest management and development; establishment of nature and recreational parks; watershed management; degraded land management; private and community forest management; nursery and plantation; conservation management plans; establishment of protected areas; reduced crop damage and livestock depredation by wildlife; establishment of biological corridors and botanical parks and education and creation of awareness on biodiversity conservation.

1. The department's plan for the 10 FYP include the following programs with strong elements of biodiversity conservation and management:
2. Participatory Forestry Programme for community based forest management and capacity development
3. Non-Wood Forest Resource Development Programme to enhance access to NWFP resources and to strengthen its management capacity at local levels,
4. Forest Resources Development Programme for forest inventory and to enable practical timber resources use and management,
5. Watershed Management and Plantation Programme for macro and micro watershed management activities and institutional coordination
6. Forest Protection Programme to strengthen land use monitoring, regulation and protection forests from poaching and disease.
7. Forestry & Environmental Education Programme
8. Nature Conservation Programme

Among these programs, the nature conservation programs warrants elaboration as it has direct bearing to biodiversity conservation. This program includes Management and Planning of Protected Areas; Management of Biological Corridors; Management of Botanical Parks;

Species Conservation, Research & Monitoring and data management and Eco-tourism and ICDP. This program alone is allocated a budget of Nu. 190 million for the 10 FYP, which is 22% of the total budget for the Department of Forest.

4.3 DEPARTMENT OF AGRICULTURE

Besides development of rice, maize, oilseeds and grain legumes as major commodity programs, equal focus is given to development of other cereals in order enhance food security and conservation of crop varieties in the country. Organic crop production is allocated a program status in order to minimize environmental impact through agriculture development and to promote low volume and high value products from Bhutan.

Medicinal and aromatic development program designed to enhance production through sustainable resource management and germplasm resource development.

All agriculture programs are supported by an integrated soil fertility & sustainable land Management Program as well as Integrated Pest Management, Awareness Campaign and Farmers Training. A national action plan for sustainable land management is being developed in order to mitigate land degradation and loss of biodiversity.

4.4 THE DEPARTMENT OF LIVESTOCK

The livestock breed improvement and conservation program of the department is accorded top priority in the 10th FYP with about 18% of total resources allocated for the program. Besides, the Targeted Highland Livelihood Support Program and the feed and fodder development programs of the department integrate participatory actions related to local biodiversity conservation and management, particularly in relation to the feed and fodder species as well as grazing and non grazing natural resources management in the highlands.

4.5 OTHER LINE AGENCIES AND ORGANIZATIONS

All projects and programs with potential impact on the environment have to pass through EIA exercise before being considered for approval. The environmental clearance process requires a separate forestry clearance before issuance of environmental clearance. Therefore, biodiversity considerations are adequately integrated into project clearance protocol.

The Ministry of Economic Affairs sets environmental code of best practices for all industries to follow to mitigate negative environmental impacts. The road construction approaches are more inclined towards Environmental Friendly Road Construction (EFRC) methods.

4.6 THE NATIONAL BIODIVERSITY CENTER

National Biodiversity Center was established in 1998 as a non-departmental agency under the Ministry of Agriculture dedicated purely for coordination of biodiversity conservation and management actions within the country. The main objective of the center is to ensure effective conservation and sustainable utilization of genetic resources for sustainable livelihood and food security, and to ensure adequate national capacity to participate in global efforts to conserve and use biodiversity resources for food, agriculture development, industrial development and

environmental conservation. Prior to and during the 9th Plan, the center focused mainly on establishing infrastructure, building human resource capacity, and strengthening national and international cooperation.

Some of the programmes initiated during the 9th FYP (2002-2007) were:

1. Development of national herbarium and flora of Bhutan;
2. Agro-biodiversity conservation;
3. Biodiversity use and conservation in Asia;
4. Animal genetic resources conservation;
5. Development of botanical garden; and
6. Development of an integrated biodiversity information system.

The Biodiversity Action Plan, which was published in 1998, has been revised in 2002 and the Biodiversity Act of Bhutan was enacted in 2003. The key strategies that will be adopted for biodiversity conservation during the Tenth Plan are as follows:

1. Strengthening gene bank, botanical garden and herbarium for ex situ and in situ;
2. collection to facilitate conservation and sustainable utilization;
3. Strengthening inventory, survey, documentation and information management system;
4. Enhancing capacity of the technical staff and farmers through on-farm management training;
5. Integration of conservation, research and development with effective utilization of genetic resources;
6. Strengthening collaboration with relevant international institutions; and
7. Commercialization/sustainable utilization of biological resources through bio-prospecting.

Major activities of the National Biodiversity Center in the 10 FYP include:

1. Ex situ conservation and sustainable utilization of plant genetic resources for food and agriculture
2. In situ conservation, development and sustainable utilization of plant genetic resources
3. Animal genetic resources conservation and sustainable utilization
4. National Herbarium and Floristic program
5. Serbithang Botanical Garden Management
6. National Biodiversity Information Development and Management
7. Pilot activities on Bio-prospecting

Within the GNH pillar, Environmental Conservation, the RNR sector plan maintains a dedicated theme for Biodiversity Conservation. Targets under this include:

1. Three additional National Parks operationalized (Centennial Park, Phibsoo, Khaling-Kharungla).
2. One Nature Reserve operationalized (Toorsa Strict Nature Reserve)
3. 75% of crop and 50% of animal genetic resources characterized and documented
4. Representative of 5000 species of vascular plants collected and conserved
5. Biodiversity Action Plan III developed and implemented
6. National Environment Strategy revised
7. 1000 acres of barren land brought under afforestation and reforestation scheme

8. One Botanical and Recreational Parks established

4.7 NATURAL RESOURCES DEVELOPMENT CORPORATION LIMITED

NRDCL is a quasi-autonomous corporate entity. Its main responsibility is to carry out sustainable harvesting operations in the FMUs according to approved forest management plans and to cater to the market demands for timber and timber products. It also has other mandates to meet demands for other natural resources such as sand and stone in a sustainable manner.

4.8 DRUK SEED CORPORATION

The Druk Seed Corporation is a quasi-autonomous corporation affiliated to the MoA. It is mandated to produce and supply seeds and seedlings for food production and horticultural purposes. It also procures and distributes fertilizers and butachlor, a herbicide widely used in paddy cultivation in Bhutan.

4.9 ROYAL SOCIETY FOR THE PROTECTION OF NATURE

Non-governmental organizations are few in Bhutan and RSPN is dedicated to environmental conservation. RSPN was founded in 1987 and legally incorporated as a non-profit NGO in 1997. The mission of the organization is to "inspire personal responsibility and actively involve the people of Bhutan in the conservation of the Kingdom's environment through education, applied research and information dissemination, and collaboration with concerned agencies and indigenous institutions". The forte of the RSPN is environmental education and this is very well reflected in the vast network of school nature clubs that they have created and sustained across the country. The RSPN is also actively involved in activities to protect the black-necked crane *Grus nigricollis* and, of late, white-bellied heron *Ardea insignis*. It is currently entrusted by the MoA with the responsibility to plan and implement conservation management activities in Phobjikha conservation area.

4.10 BHUTAN TRUST FUND FOR ENVIRONMENTAL CONSERVATION

The BTF was created in 1992 and legally incorporated under the Royal Charter in 1996 as an independent grant management organization to promote social welfare through environmental conservation of the forests, flora, fauna, wildlife, diverse ecosystems and biodiversity in Bhutan. Under the guidance of a fully nationalized high-level management board since 2001, the BTF operates with annual incomes generated by endowment now totaling more than US$ 40 million. BTF fund projects within the following framework, *in situ* & *ex situ* conservation initiatives, integrating conservation & development through biodiversity research & monitoring, and conservation education to strengthen conservation ethics among Bhutanese.

4.11 SUSTAINABLE DEVELOPMENT SECRETARIAT

The SDS is an autonomous national agency established to coordinate, disburse and monitor external assistance to Bhutanese organizations under the Sustainable Development Agreement (SDA), a cooperation framework between Benin, Bhutan, Costa Rica and the Netherlands. Under the SDA, the Dutch Government funded the Biodiversity Conservation Programme-Phase I for development of JSWNP and institutional strengthening of NCD and is presently funding Biodiversity Conservation Programme-Phase II.

5. POVERTY-ENVIRONMENT MAINSTREAMING IN BHUTAN

Recognising the strong links between poverty and environment, RGoB has committed to addressing concerns related to poverty and environment in an integrated manner in its programmes, projects and policies. Through the internal partnership between UNDP/UNEP, Poverty-Environment Initiative (PEI) is piloted in Bhutan to support RGOB's efforts to mainstream environmental management into the national development planning processes. The Initiative aims to support environmental mainstreaming focusing on expanding knowledge and understanding of how sound and equitable environmental management contributes to poverty reduction and pro-poor growth, and strengthening capacity and institutional processes within government and the wider stakeholder community to integrate the environmental priorities of poor and vulnerable groups into national development planning and budget processes, sector strategies and policies, and local-level implementation. Some of the proposed activities under this initiative include:

1. Review surveys and other data sources and analyze how poverty and environment indicators are used in reporting conditions and trends related to pro poor environmental outcomes. Identify gaps and constraints in collection, reporting and use of data. Based on the analysis, develop set of socio-economic and environmental indicators that can be used to establish baseline for assessing the impacts of pro-poor environmental mainstreaming measures (i.e., environmental outcomes that matter to the poor);
2. Review existing planning processes of 10^{th} FYP from environment sustainability and pro poor perspective (i.e., efficacy of delivering pro poor environmental outcomes);
3. Initiate public expenditure review (PER) to provide a baseline for future trend analysis in budget allocation and execution, and effectively monitor progress on the contribution of environment towards sustainable development;
4. Review policies governing rural production and livelihoods and recommend improvements to facilitate improved sustainable NRM based livelihood development;
5. Review existing sectoral environment mainstreaming guideline to also include pro-poor aspects of sector policies/strategies; and
6. Review local planning manual from poverty environment mainstreaming perspective and integrate poverty environment considerations.

CHAPTER 4
CONCLUSIONS: PROGRESS TOWARDS THE 2010 TARGET AND IMPLEMENTATION OF THE STRATEGIC PLAN

1. PROGRESS TOWARDS THE 2010 TARGET

PROVISIONAL FRAMEWORK OF GOALS, TARGETS AND INDICATORS TO ASSESS PROGRESS TOWARDS THE 2010 BIODIVERSITY TARGET

Global Goals and targets
Protect the components of biodiversity
Goal 1. Promote the conservation of the biological diversity of ecosystems, habitats and biomes Target 1.1: At least 10% of each of the world's ecological regions effectively conserved. Target 1.2: Areas of particular importance to biodiversity protected
The Royal Government has a policy that ensures at least 60 % forest cover in perpetuity which also has become a constitutional mandate of the country. In addition, about 39.5 % of the country is under Protected Areas and 9.5 % set aside as biological corridors. Currently there are 10 PAs of which 6 are operational and the rest will be brought under operation by 2013. Besides, there are about 13 conservation areas of which 2 are under effective management and the rest under some form of interventions. The Forest and Nature Conservation Act, 1995, Biodiversity Act 2003, Environmental Assessment Act, 2000, etc. are implemented through the Five Year Plans. The Five Year Plans are formulated in a manner that contributes towards the national goals. Currently, the forested tree coverage of Bhutan is recorded at 64.5 %. However, natural wilderness areas including alpine meadows and scree, riparian zones, and shrubs total another 8% bringing the total natural areas to 72.5%. PAs are managed scientifically through conservation management plans. Besides, Bhutan has also collaborated with neighbouring countries in conservation of Transboundary areas forming the Biological complex. Some of the constraints include lack of financial resources to manage PAs and inadequate technical capacity in scientific professions. Awareness among the local communities are also limited but gradually improving with awareness programs initiated by various agencies and benefits accrued through ICD programs.
Goal 2. Promote the conservation of species diversity
Target 2.1: Restore, maintain, or reduce the decline of populations of species of selected taxonomic groups. Target 2.2: Status of threatened species improved.

In order to document the status of biological species diversity, Bhutan has initiated inventory of its flora and fauna at various levels. The publication of flora of Bhutan and mammals of Bhutan are part of these initiatives. The rare, endangered, threatened species are listed under schedule I of Forest and Nature Conservation Act and are totally protected.

The strategy has been developed to control unsustainable harvesting of medicinal plant species used in indigenous medicine. Three medicinal plant species are being cultivated to reduce pressure on wild population. Tissue culture for medicinal species is being carried out for mass propagation by the research center.

Conservation strategies for Tiger, Snow leopard, Elephant, Golden Languar, Red Panda, Pygmy Hog, White Bellied Heron, Blacked Necked Crane are developed and being implemented. National strategy for human-wildlife conflict management is developed and is in the initial phase of implementation.

National strategy for conservation of about 10 Non-wood Forest Product species have been developed and included in the 10 FYP (2009-2013) as major program. The program is also designed as a means to alleviate poverty and has been integrated in all the sectors.

The major obstacle is the lack of information on most of the species diversity. Currently, we do not have enough information because of lack of professionals (taxonomists) to carry out inventory.

Goal 3. Promote the conservation of genetic diversity

Target 3.1: Genetic diversity of crops, livestock, and of harvested species of trees, fish and wildlife and other valuable species conserved, and associated indigenous and local knowledge maintained.

The national development strategy is guided by the principle objectives of self-reliance, sustainability, environmental preservation, efficiency, decentralization of Government, privatization, institutional strengthening, manpower development and regionally balanced development. The Ministry of Agriculture is the main custodian of plant and animal genetic diversity and it 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 and living and nutritional standards of the rural population; and
- Environmental conservation, emphasizing an integrated crop/livestock/forestry system development.

Currently, Gene Bank has been able to store a total of 408 accessions of 215 various cultivars belonging to 17 different crops. These include 181 accessions of 111 various cultivars of paddy, 94 accessions of 33 various cultivars of maize, and 36 accessions of 19 various cultivars of bean. The Renewable Natural Resource Research Center (RNRRC) at Bajo with support from International Rice Research Institute (IRRI), collected more than 300 rice varieties. These are maintained as a breeders' working collection at Bajo now slowly being shifted to the gene bank at the National Biodiversity Centre, Serbithang.

Conservation of indigenous livestock breed of Nublang and Jakar Sheep are under implementation. Nublang farm is maintained to conserve breeding of livestock. The documentation of TK associated with biodiversity is also being initiated by NBC.

Promote sustainable use

Goal 4. Promote sustainable use and consumption.

Target 4.1: Biodiversity-based products derived from sources that are sustainably managed, and production areas managed consistent with the conservation of biodiversity.

Target 4.2. Unsustainable consumption, of biological resources, or that impact upon biodiversity, reduced

Target 4.3: No species of wild flora or fauna endangered by international trade.

Various approaches are being adopted towards conservation and sustainable utilization of Natural Resources. Government's policy objective of maintaining 60% forest cover in perpetuity is constrained with ever increasing demand on resources and expanding development infrastructures. However, establishment of PAs have served to maintain species diversity through in-situ conservation.

Unlike other countries, all PAs in Bhutan have local communities living in and around the PAs. These communities area more or less dependent on agriculture or livestock rearing, and as such are either directly or indirectly dependent on the resources within the PAs. As such, ICDP as a tool is aimed at reducing pressure on biodiversity of PAs by integrating conservation with sustainable development programmes.

The establishment of FMUs is a major program designed to utilize forest resources in a sustainable manner. Government has banned the export of timber as a strategy to reduce over utilization of natural resources.

Besides, the enactment of Environmental Assessment Act in 2000 and the Regulation for Environmental Clearance of Projects in 2002, all the developmental activities including the private sector are subjected to regressive assessment to reduce and mitigate the adverse impact on environment. Therefore, all the activities that might pose potential impact on the biological resources or the environment in general are well regulated and incorporated in all the possible plans and programmes.

All the species included under Schedule I are protected and Bhutan being a member of CITES also restricts trade in endangered species. Anti-poaching programs are well established in every PA to curb illegal poaching and trade of wildlife and plant species.

Cross sectoral issues continues to be one of the major impediment towards addressing these issues effectively. To solicit cooperation from all stakeholders, monitoring, evaluation of sustainable harvest and consumption of biodiversity products are currently being addressed.

Address threats to biodiversity

Goal 5. Pressures from habitat loss, land use change and degradation, and unsustainable water use, reduced.

Target 5.1. Rate of loss and degradation of natural habitats decreased

The major threats to biodiversity are described in Chapter I. The government is implementing programs and developed legislations to reduce the rate of deforestation, minimize loss of land for development (urbanization, roads, and industries) and reduction of land for mining and quarry. Through afforestation, reforestation and plantation programs, many degraded land are reforested. The principle of Environmental Friendly Road Construction is being implemented. The sustainable land management programs are instituted to reduce land and water degradation. The government has developed plantation strategy, Land Act, and revised mine and minerals management regulations. The water Act is under preparation.
Goal 6. Control threats from invasive alien species
Target 6.1. Pathways for major potential alien invasive species controlled Target 6. 2. Management plans in place for major alien species that threaten ecosystems, habitats or species.
Documentation (no., entry, extent, threats) of invasive species is being carried out on pilot basis by NBC. Some research on agricultural invasive species is also being carried out by Research Centers. Once enough information are collected, appropriate management plans will be put in place.
Goal 7. Address challenges to biodiversity from climate change, and pollution Target 7.1. Maintain and enhance resilience of the components of biodiversity to adapt to climate change. Target 7.2. Reduce pollution and its impacts on biodiversity

Bhutan stands out as one of the very few countries with very low net sequestration of greenhouse gas emissions, largely due to the vast forest cover, limited industrialization, and use of clean energy. The First National Greenhouse Gas Inventory of 1994 estimated that the country's forests and land use system sequestered 3,549.52 gigagram (Gg) of CO2 annually, while the total CO2 emissions were only 228.46 Gg. While Bhutan itself is a net sequester of greenhouse gasses, it is highly vulnerable to the impacts of climate change.

Recognizing the serious economic, social and ecological consequences of climate change, and as a LDC party to the UNFCCC, Bhutan prepared its National Adaptation Programme of Action (NAPA) in 2004. This is an important first step towards developing a national response strategy that deals with the possible impacts of climate change in Bhutan.

Bhutan also has initiated preparatory programs in the areas of disaster preparedness through establishment of disaster focal agencies at the national, district and geog level. NEC is also regulating pollution levels resulting from the establishment of new industries and other developmental activities. Mali declaration was ratified and reporting on progress is on-going. The second national communication (SNC)-inventory is completed. Numerous GLOFs studies are being carried out by various sectors.

Mitigation measures are put in place to reduce all forms of pollution through vehicular emission test, reducing tax on electrical appliances, compliance monitoring of industries etc. NEC has also set discharge standards conforming to WHO standards.

Maintain goods and services from biodiversity to support human well-being

Goal 8. Maintain capacity of ecosystems to deliver goods and services and support livelihoods

Target 8.1. Capacity of ecosystems to deliver goods and services maintained

Target 8.2. Biological resources that support sustainable livelihoods, local food security and health care, especially of poor people maintained.

Under the Forest Ecosystem, the establishment of Forest Management Units, Social Forestry activities, in-situ and ex-situ conservation efforts, preconditions for an effective bioprospecting programme and other precautionary measures, the government is striving towards the maintaining long term capacity of ecosystem to support livelihoods which depends on the biological resources.

Water quality is a major environmental concern of Bhutan. However, it is difficult to assess water quality across time and space because of limited data. But we know that the country is confronted with localized and seasonal water shortages for drinking and agricultural purposes. Only 78% of the country's population has access to safe drinking water and about 12.5% of the arable land is irrigated.

Knowing these problems, Bhutan is in final stage of developing the Water Act and there are plans to establish Integrated Water Resources Management. Besides, Bhutan has implemented few watershed Management projects. Water security and payment for environmental services are being pursued with the help of UN agencies.

Since large percentage (79 %) of population depends on agriculture, numerous projects and programs geared towards reducing poverty, self sufficiency etc are carried out. The food security strategy is also being developed and food act enacted. In order to protect the agriculture ecosystem, government has developed rules to convert wet land to other land types.

Government also has implemented numerous area development projects through funding from various donors. One of the important strategies is the adoption and implementation of CBNRM models. Other programmes include: promoting sustainable farming, sustainable harvesting of NWFP, promotion of markets, value addition of products, pro-poor programs, nature tourism, SMEs, One-geog-three products (OGTP), and organic farming.

Protect traditional knowledge, innovations and practices

Goal 9. Maintain socio-cultural diversity of indigenous and local communities
Target 9.1. Protect traditional knowledge, innovations and practices
Target 9.2. Protect the rights of indigenous and local communities over their traditional knowledge, innovations and practices, including their rights to benefit-sharing.

The Biodiversity Act of Bhutan enacted in 2003 explicitly protects indigenous rights over traditional knowledge. The involvement of indigenous communities in decision-making related to the use of traditional knowledge is achieved through activities such as the community-based natural resources management projects.

With ICIMOD's assistance, awareness is being raised among local communities about traditional knowledge, and local communities' concerns about traditional knowledge are being included in the national draft Biodiversity Rules.

Besides, documentation of ethno-medical practices is being initiated by NITMS.

Ensure the fair and equitable sharing of benefits arising out of the use of genetic resources

Goal 10. Ensure the fair and equitable sharing of benefits arising out of the use of genetic resources Target 10.1. All access to genetic resources is in line with the Convention on Biological Diversity and its relevant provisions. Target 10.2. Benefits arising from the commercial and other utilization of genetic resources shared in a fair and equitable way with the countries providing such resources in line with the Convention on Biological Diversity and its relevant provisions
This provision has been incorporated in Biodiversity Act 2003 and rules and regulations are developed for implementation.
Ensure provision of adequate resources
Goal 11: Parties have improved financial, human, scientific, technical and technological capacity to implement the Convention Target 11.1. New and additional financial resources are transferred to developing country Parties, to allow for the effective implementation of their commitments under the Convention, in accordance with Article 20. Target 11.2. Technology is transferred to developing country Parties, to allow for the effective implementation of their commitments under the Convention, in accordance with its Article 20, paragraph
Currently, most of the conservation programs are supported by donors (WWF, DANIDA, UN, SNV, Helvetas, JICA, NORAD, GTZ, GEF, FAO, IFAD, EU, SDS, etc). To promote social welfare through environmental conservation of the forests, flora, fauna, wildlife, diverse ecosystems and biodiversity of Bhutan, an environmental Trust Fund was established through Royal Decree in 1992. Various technologies are transferred from other countries through exchange visits, study tours, long-term studies, workshops and seminar.

2. PROGRESS TOWARDS THE GOALS AND OBJECTIVES OF THE STRATEGIC PLAN OF THE CONVENTION

Bhutan's contribution to achieving the goals and objectives of the Strategic Plan is delivered under the umbrella of the Biodiversity Action Plan (BAP). As discussed in chapeter III, most of these plans and strategies are developed and implemented through a cross-sectoral, partnership approach that is replicated at all relevant geographic scales and sectoral levels. Goals and objectives are set throughout the process and are reported in a coordinated manner. National biodiversity goals, objectives and targets have not been explicitly linked to the goals and objectives of the CBD strategic plan but it is relatively easy to make the links implicitly, which is the approach taken to complete section B of this Chapter IV.

The major obstacles in implementation of these programs are universal and apply to all the goals. These includes, financial resources, research and development facilities, technical expertise (taxonomist, zoologist, botanists, etc).

Strategic goals and objectives	National input in implementation of goals and objectives
Goal 1: The Convention is fulfilling its leadership role in international biodiversity issues	
1.1 The Convention is setting the global biodiversity agenda	The convention is actively setting the global biodiversity agenda through various programs. The Conference of the Parties in its decision VI/26 adopted the Convention's Strategic Plan up to 2010. To implement the Strategic Plan, the parties undertake commitment to ensure more effective and consistent achievement of three goals of the Convention in order to reach substantial reduction of rate of biodiversity loss to 2010. Goal of biodiversity conservation fixed towards 2010 was approved by the World Summit on Sustainable Development held in Johannesburg. The Conference of the parties clarified this goal at the 7th and 8th meetings and accepted a temporary structure of goals and targets formulated for 2010, and implementation of goals and targets of the programme on protected areas adopted in the decision VII/8, and Targets of the Global Strategy on Plants Conservation.
1.2 The Convention is promoting cooperation between all relevant international instruments and processes to enhance policy coherence	
1.3 Other international processes are actively supporting implementation of the Convention, in a manner consistent with their respective frameworks	
1.4 The Cartagena Protocol on Biosafety is widely implemented	Detail of implementation of the Cartagena Protocol (Objective 1.4) is provided under goals 2.4, 3.2 and 4.2.
1.5 Biodiversity concerns are being integrated into relevant sectoral or cross-sectoral plans, programmes and policies at the regional and global levels	Issues of biodiversity conservation were incorporated in the following sectoral and intersectoral plans and programmes: Country Vision 2020. Strategic goal of Vision 2020 is to improve living standard through increasing of economic growth, improve quality of environment and biodiversity conservation. The five year plans are design to integrate interests of all the sectors and environmental conservation is one of the guiding principles. Sub-regional Environment development strategy (SEDS) of South Asia (SARRC). Millennium Development Goals, SARRC Development Goals and Plan of implementation of decisions of the World Summit on Sustainable Development were considered as a basis in preparation of the SEDS. Bhutan being member to ICIMOD has committed to implement common strategy in fields of poverty, biodiversity etc.
1.6 Parties are collaborating at the regional and subregional levels to implement the Convention	A brief list of the regional and subregional groups activities are reported below: • SAARC Center for Forestry established in Bhutan • Contribution to the SAARC countries Biodiversity Action Plan, • Regular exchange of good practice and ideas at all scales of implementation. • Implementation of Eastern Himalayan bioregion programmes • Water and Hydropower generation • Regional GLoF initiatives • Global Tiger Forum • Global climate change

Goal 2: Parties have improved financial, human, scientific, technical and technological capacity to implement the Convention	
2.1 All Parties have adequate capacity for implementation of priority actions in national biodiversity strategies and action plans	While progress has been made over the past decade in terms of building institutional capacity for biodiversity conservation, it is far from adequate. Protected areas are still inadequate in terms of trained personnel, information on key aspects of conservation such as distribution of species and demographic patterns in protected areas and biological corridors, and conservation infrastructure remains rudimentary. A rapid assessment of four protected areas carried out by the World Bank in 2002 showed that they were short of personnel by nearly 60 to 80 per cent against the requirements projected in their respective conservation management plans. Also given that conservation knowledge is evolving, human resources development will need to be continuous so that the conservation personnel are in tune with contemporary conservation science. However, with lots of investment in human resources development, it is far better compared to five years ago.
2.2 Developing country Parties, in particular the least developed and the small island developing States amongst them, and other Parties with economies in transition, have sufficient resources available to implement the three objectives of the Convention	Bhutan is not able to fulfill all the requirements stipulated under the convention mainly because of financial constraints. The financial shortage has hampered the establishment of various facilities and also the development of human capacity. Currently, few donors are providing limited financial support and through their support the conservation programs are developed. However, in 1992, through Royal decree, Bhutan Trust Fund for environmental Conservation was established This fund has so far provided enough funds to establish basic requirements in the establishing various PAs and other biodiversity related institution.
2.3 Developing country Parties, in particular the least developed and the small island developing States amongst them, and other Parties with economies in transition, have increased resources and technology transfer available to implement the Cartagena Protocol on Biosafety	Bhutan also acceded to the Cartagena Protocol on Biosafety on 26th August 2002. As a first obligation under the Cartagena Protocol on Biosafety, the National Biosafety Framework (NBF) has been drafted and is adopted. After a series of national level consultative workshop for developing the NBF of Bhutan, the Bhutan Agriculture and Food Regulatory Authority (BAFRA) was designated as the National Competent Authority (NCA) to implement the NBF since most of the activities falls within the purview of BAFRA's mandate.
2.4 All Parties have adequate capacity to implement the Cartagena Protocol on Biosafety	Currently, Bhutan do not have adequate capacity to implement the protocol. Also, labs lack the equipment and trained technicians to even conduct basic molecular work. Awareness among field inspectors on GMOs, LMOs is limited or non-existent. However, few staffs are undertaking long term studies through donors.
2.5 Technical and scientific cooperation is making a significant contribution to building capacity	There had been little initiatives. There is need to develop capacity for enforcement, inspection, and monitoring. These can range from awareness on Biosafety to the senior officials to practical training for inspectors. Specialized equipment and training on Biosafety are urgently required.

Goal 3: National biodiversity strategies and action plans and the integration of biodiversity concerns into relevant sectors serve as an effective framework for the implementation of the objectives of the Convention	
3.1 Every Party has effective national strategies, plans and programmes in place to provide a national framework for implementing the three objectives of the Convention and to set clear national priorities	There are visions, sectoral policies, Acts and strategies in place that are relevant for implementation of the three objectives of the convention. They are: • The National Environment Strategy (NES) called "The Middle Path" is in place • National Forest Policy 1974 • The Forest and Nature Conservation Act, 1995 • Environment Assessment Act, 2000 • Biodiversity Action Plan, 2002 • Biodiversity Act 2003. • National Biosafety Framework, 2006 • Vision and strategy for NCD, 2003
3.2 Every Party to the Cartagena Protocol on Biosafety has a regulatory framework in place and functioning to implement the Protocol	The main regulation is National Biosafety Framework, 2006. Besides, there are existing Biosafety related Legislation: Food Act 2005, Livestock Act 2000, Plant Quarantine Act 1993, Seed Act 2000, Biodiversity Act 2003, Environmental Assessment Act 2000. Biosafety clearing house ,
3.3 Biodiversity concerns are being integrated into relevant national sectoral and cross-sectoral plans, programmes and policies	Integration is done at various levels but it is complex in terms of implementation.
3.4 The priorities in national biodiversity strategies and action plans are being actively implemented, as a means to achieve national implementation of the Convention, and as a significant contribution towards the global biodiversity agenda	Some of the priorities are identified and are basically implemented through five year development plans. Some of the activities are implemented solely by concern agencies. In others where collaboration is needed, the programs are integrated and implemented jointly by various sectors.
Goal 4: There is a better understanding of the importance of biodiversity and of the Convention, and this has led to broader engagement across society in implementation	
4.1 All Parties are implementing a communication, education, and public awareness strategy and promoting public participation in support of the Convention	Although, there is no formalized strategy to promote awareness of the convention, but various awareness programs are being undertaken by various sectors emphasizing on specific topics under the convention. The NEC, Ministry of Agriculture, NBC, Royal Society for Protection of Nature, WWF-Bhutan Program are some of the agencies taking led in this program.

4.2 Every Party to the Cartagena Protocol on Biosafety is promoting and facilitating public awareness, education and participation in support of the Protocol	As of now public awareness, education, and participation with Biosafety-related issues is non-existent. However, public awareness programs in other sectors with regards to health and diseases awareness, agricultural extension, and so on do exist. The Information and Communication Bureau, Ministry of Health is the leading institution in health education and communication and aims to achieve a significant reduction in morbidity and mortality through changing health behavior. This is done by developing and implementing communication initiatives such as through newspaper advertisements, TV commercials, and door to door campaigning. The Information and Communication Services (ICS) of the Ministry of Agriculture is the communication arm of the Ministry of Agriculture. Its mandate is to design, develop, and produce information and communication materials in support of the Renewable Natural Resource (RNR) programs, serve as the portal of RNR information and activities and promote RNR programs and activities. It is in the same ministry as BAFRA and often employed by BAFRA for publicity campaigns.
4.3 Indigenous and local communities are effectively involved in implementation and in the processes of the Convention, at national, regional and international levels	There is policy encouraging community to participate. Most of the conservation programs include community in the implementation through participatory approaches. The participation in recent years had been encouraging and many partnership programs are also developed. The integrated conservation Development projects, community forestry programs, medicinal grower, Non-wood forest products harvest groups, farmer's cooperatives are some of the programs where community participation are becoming visible.
4.4 Key actors and stakeholders, including the private sector, are engaged in partnership to implement the Convention and are integrating biodiversity concerns into their relevant sectoral and cross-sectoral plans, programmes and policies	The private sectors are still in infancy in Bhutan. It is mandatory to have EA assessment and annual assessment of the factories and other constructions where private sectors also take part. All Biodiversity regulations are to be adhered. The Forest logging Corporation (NRDCL), Bhutan Board Product (BBPL), and Bhutan Chemical Carbide (BCCL) who depends on wood for their industry support in reforestation programs. The various private sectors are also engaged in control of forest fire. The non-governmental agencies are also involved in various conservation programs.

3. CONCLUSIONS

(a) An overall assessment of whether the implementation of the Convention has had an impact on improving conservation and sustainable use of biodiversity, and the fair and equitable sharing of benefits arising out of the utilization of genetic resources, in their country (If yes, how so? If not, why not?);

The implementation of the CBD in the Bhutan has been achieved through the Biodiversity

Action Plans (BAP I, BAP II). The Biodiversity Action Plan has undoubtedly improved conservation and sustainable use of biodiversity in a number of ways. Some of these are:

1. In providing a guiding framework through which planning, implementation and the sharing of best practice can take place efficiently and effectively.
2. In providing a forum for biodiversity community to work together.
3. In raising awareness of biodiversity.
4. In focussing action on priorities.

(b) An analysis of lessons learned regarding implementation, highlighting examples of successful and less successful actions taken;

Implementation of the Biodiversity Action Plan has been greatly assisted by the partnership approach to delivery, involving Governments, NGOs, the research community and the private sector. A targeted approach initially concentrating on carefully selected priorities has been successful in keeping delivery firmly focussed on positive outcomes for biodiversity.

(c) A summary of future priorities and capacity-building needs for further national-level implementation of the Convention

As a future priority, there is a need for a greater focus on key priorities in the BAP document. It should be designed to provide with time-bound objectives and targets for biodiversity conservation across the nation.

Capacity development needs to focus on specific profession (taxonomist, molecular biologists, agronomist, ecologist, environmental lawyers, environment M & E).

APPENDIX 1
INFORMATION CONCERNING REPORTING PARTY AND PREPARATION OF NATIONAL REPORT

1. REPORTING PARTY

Contracting Party	
NATIONAL FOCAL POINT	
Full name of the institution	**National Environment Commission**
Name and title of contact officer	**Mr. Karma C. Nyedrup, Dy. Director**
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CONTACT OFFICER FOR NATIONAL REPORT (IF DIFFERENT FROM ABOVE)	
Full name of the institution	**National Environment Commission**
Name and title of contact officer	**Mr. Thinley Dorji, Sr. Environment Officer**
Mailing address	**NEC, Thimphu, Bhutan, P. Box 466**
Telephone	**+975-2-324323**
Fax	**+975-2-323385**
E-mail	**thinleydorji@nec.gov.bt**
SUBMISSION	
Signature of officer responsible for submitting national report	
Date of submission	**30 March, 2009**

2. PROCESS OF PREPARATION OF NATIONAL REPORT

In preparing the report, various experts working in biodiversity and related field from various agencies were consulted. Two formal workshops were held. The first workshop was conducted

primarily to familiarize the new guideline and the requirements for the 4th National Reporting. The draft report was circulated and feed backs were incorporated. The second workshop was conducted to finalize the report.

Several reports that have already been published and are publicly available are referred. The most important among them are the Ten Five Plan document, BAP I, BAP II, draft BAP III and Vision and strategy 2003 of NCD.

APPENDIX 3
PROGRESS TOWARDS TARGETS OF THE GLOBAL STRATEGY FOR PLANT CONSERVATION AND THE PROGRAMME OF WORK ON PROTECTED AREAS

1. PROGRESS TOWARDS TARGETS OF THE GLOBAL STRATEGY FOR PLANT CONSERVATION

Target 1: A widely accessible working list of known plant species, as a step towards a complete world flora

The Department of Forests and the National Biodiversity Center under the Ministry of Agriculture has completed the publication of the flora of Bhutan (spermatophytes) and produced the flora in 3 volumes (details provided in chapter I). It was initiated in 1975 and was completed in 2002 in collaboration with the Royal Botanic Garden, Edinburgh, Scotland, UK.

Since the work was carried out in UK based on early collected specimens in herbarium and few field visits in Bhutan, the flora is not fully covered. Therefore, there is need for filling the gaps by continuing exploration of places through field visits for complete flora.

The Biodiversity Center is also currently working on ferns and their allies and few people have worked on specific families such as Orchidaceae, Ericaceae (Rhododendrons), bamboos, etc. However, there is dearth of information on lower plant groups such as mosses, lichens, mosses, algae, etc.

There is also need for intensive exploration to places especially Manas and Eastern Bhutan for complete documentation.

Target 2: A preliminary assessment of the conservation status of all known plant species, at national, regional and international levels

Currently, very few plant species are categorized and protected in scheduled I of Forest and Nature Conservation Act. With the funding from WWF through CEPF, preparation of Red data book for flowering plants is being initiated and is expected to be completed by end of 2009.

Target 3: Development of models with protocols for plant conservation and sustainable

use, based on research and practical experience

Various conservation and sustainable models are being adopted. Two approaches, ex situ and in situ, for plant conservation are being used. Ex situ techniques include the gene bank, herbarium and botanical gardens/recreational park and in situ on farm conservation, botanical parks, protected Areas.

Other models such as Landscape (B2C2), ecosystem and CBNRM are also adopted based on the needs.

Target 4: At least 10 per cent of each of the world's ecological regions effectively conserved

The national protected areas system covers an area of 15,192 km^2, with an additional 3660 km^2 of biological corridors representing 49% of the country's total area. This ranks Bhutan among the top 10 countries in the world with the highest proportion of area under protected areas. The national protected areas system is made up of a strict one nature reserve, 5 national parks and 4 wildlife sanctuaries. These protected areas are well distributed across the country, encompassing a continuum of representational samples of all major ecosystems found in the country ranging from the tropical/sub-tropical grasslands and forests in the southern foothills through temperate forests in the central mountains and valleys to alpine meadows and scree in the northern mountains.

All the protected areas are linked by a comprehensive network of biological corridors to facilitate movement of wildlife and contiguity of habitats between various protected areas. These corridors make up about 9% of the country's area. They, however, do not have a clearly defined conservation management status at present. Conservation management interventions have been piloted since 2003 in the biological corridors adjacent to Thrumshingla National Park in order to draw lessons and basis for development of conservation management strategy related to biological corridors. 6 of the 10 protected areas are operational at present. These 6 protected areas collectively cover an area of 10,242 km^2, constituting 67.42% of the total area under protected areas.

Target 5: Protection of 50 per cent of the most important areas for plant diversity assured

The most important areas for plant diversity are conserved through the protection of different ecosystem, conservation areas, and biological parks. Even within the multiple use zones, extractions in such areas are strictly monitored. Besides, in Bhutan most of these areas falls under PAs and are included within the core zone of the park.

Target 6: At least 30 per cent of production lands managed consistent with the conservation of plant diversity

By end of 2013, more than 49.5 per cent of country's land area representing all the ecosystem will be under protected areas thereby ensuring survival of all the reprensentative species.

Besides, FMUs are re-forested either through natural regeneration or plantation program. Agricultural lands are managed organically and multi-cropping are encouraged for agro-biodiversity conservation. Community forestry programs and agro-forestry initiatives are under implementation.

Target 7: 60 per cent of the world's threatened species conserved in situ.

With increasing population and pressure on forest areas for more agricultural land and settlement, the government established protected areas to protect the pristine forest ecology and conserve biological and genetic resources. Also, biological corridors have been established. Botanical parks are initiating the conservation of threatened species. The Royal Botanical Park at Dochula-Lamperi has already begun conserving the species of rhododendrons of Bhutan.

Target 8: 60 per cent of threatened plant species in accessible *ex situ* collections, preferably in the country of origin, and 10 per cent of them included in recovery and restoration programmes

There are efforts to conserve threatened plants in botanical gardens and some recovery or restoration programmes are initiated. The threatened medicinal species are also cultivated and techniques such as tissues culture are deployed for mass propagation.

Target 9: 70 per cent of the genetic diversity of crops and other major socio-economically valuable plant species conserved, and associated indigenous and local knowledge maintained

The National Biodiversity Center (NBC) has initiated programmes for ex-situ and in-situ conservation of crop and livestock diversity. A National Gene Bank was established in early 2003. The gene Bank has collection of over 408 accessions of 215 various cultivars belonging to 17 different crops. These include 181 accessions of 111 various cultivars of paddy, 94 accessions of 33 various cultivars of maize, and 36 accessions of 19 various cultivars of legumes.

In terms of in-situ crop diversity conservation, the Agro Biodiversity Conservation of the NBC in conjunction with the Regional RNR Research Centers and *Dzongkhag* Agriculture Offices is implementing an On-farm Plant Genetic Resources Conservation Project. This project has so far covered 18 varieties of rice and 4 varieties of maize at 11 pilot sites in six *dzongkhags*.

Target 10: Management plans in place for at least 100 major alien species that threaten

plants, plant communities and associated habitats and ecosystems

Currently, NBC has started inventory of the status of alien species in the country which would later pave way for the development of strategy for management of alien species.

The Research Centres has taken initiative to eradicate those species associated with agriculture and live stock production such as parthenium grass, Eupatorium, lantana, michinia, etc.

Target 11: No species of wild flora endangered by international trade

Bhutan became a party to CITES (Convention of International Trade on Endangered Species of Wild Flora and Fauna) on 13th November 2002 with the Department of Forests functioning as the Management Authority and the Nature Conservation Division as the Scientific Authority which are both under the Ministry of Agriculture. Trade in endangered species is controlled through regulatory authorities such as Bhutan Agriculture and Food regulatory Authority (BAFRA) and Department of Revenue and Customs.

Target 12: 30 percent of plant-based products derived from sources that are sustainably managed

The preparation of indigenous medicine utilizes number of plant species which are collected from wild. ITMS initiated on-farm cultivation of selected medicinal plants and has been able to reduce pressure on the wild species. They also manage sustainable harvesting through rotation of collection sites, creation of community medicinal gardens, encourage communities through awareness program.

Numerous plantations (reforestation, afforestation) on degraded areas are being developed for various purposes. The Woodbased industries have also strong reforestation programs.

Target 13: The decline of plant resources, and associated indigenous and local knowledge innovations and practices that support sustainable livelihoods, local food security and health care, halted.

Conservation and preservation of culture and tradition is one of the four pillars of GNH. Therefore, government has accorded top priority through documentation of information on agricultural and rural practices and local knowledge.

Target 14: The importance of plant diversity and the need for its conservation incorporated into communication, education and public awareness programmes.

Importance of plant diversity conservation at the implementation level is addressed through various conservation education programs. This is also incorporated into both formal and non-

formal education curriculum. Various agencies involved in this initiative include government (National Environment Commission, Ministry of Agriculture through Nature Conservation Division, National Biodiversity Center and Department of Agriculture) and CSOs (Royal Society for Protection of Nature).

Target 15: The number of trained people working with appropriate facilities in plant conservation increased, according to national needs, to achieve the targets of this Strategy.

Several government agencies directly or indirectly deal with the conservation of plant genetic resources such as the National Biodiversity Center, Nature Conservation Division, Department of Forest, Department of Agriculture and Council of RNR Research of Bhutan. These institutions have professionals who are trained in different fields relevant to the conservation of Plant genetic resources, however such professionals are inadequate. As an alternative measures, new college of Forestry (Ugyen Wangchuck Institute for Environmental and Forestry studies) is established to impart forestry and environment subjects including conservation. New curricula have been opened in other colleges (Sherubtse College, College of Natural Resources and Royal Thimphu College). All these colleges offer plant conservation (Ecology and biodiversity conservation, Management and protection of natural resources; Management of biodiversity).

Target 16: Networks for plant conservation activities established or strengthened at national, regional and international levels

Agro-biodiversity Section of the National Biodiversity Centre works with 4 regional research centers and the districts and Geog agricultural extension workers. Network collaboration is also strengthened through l international and regional institution such as the Royal Botanic Garden, Edinburgh and Kew (Orchids), ICFRE, ICAR, IRRI, NARC, NBPGR, SAIC

There are some activities at the regional level with institutions such as the SANPGR, ICIMOD, SAARC and BUCAP. Tsukuba botanical garden, FRI (Dehra Dun).

2. PROGRESS TOWARDS TARGETS OF THE PROGRAMME OF WORK ON PROTECTED AREAS

Although Bhutan has not set specific targets towards the goals of CBD on Protected Areas mainly because of lack of funding and technical expertise, but progress have been made in PA management which are elaborated briefly.

2.1 ESTABLISHMENT AND MANAGEMENT OF PROTECTED AREAS

Bhutan has set aside a sizeable portion of the country as protected areas. The protected areas system, which is made up of five national parks, four wildlife sanctuaries, and a strict nature reserve, covers altogether an area of 15,192 km^2 (exclusive of botanical park with 47km^2) or 39.6 percent of the country's total area[4]. This puts Bhutan at the top of the list of countries in the world with the highest proportion of area under protected areas.

The protected areas system in Bhutan is one of the most comprehensive in the world not only in terms of area coverage but also in terms of the balance and contiguity in distribution across the country. The system encompasses a continuum of representational samples of all major ecosystems found in the country ranging from the tropical/ sub-tropical grasslands and forests in the southern foothills through temperate forests in the central mountains and valleys to alpine meadows and scree in the northern mountains. In 2006, the area of Thrumshingla National Park was increased from 768 km^2 to 905 km^2 and that of Bumdeling Wildlife Sanctuary from 1,400 km^2 to 1,521 km^2 to bring additional areas of potential tiger and snow leopard habitats under the protected areas system. In June 2008, Wangchuck Centennial Park was inuguarated to commomerate 100 years of Monarchy in Bhutan.

Of the ten protected areas, six are functional at present with conservation management plans, personnel and basic conservation management infrastructure in place. These six protected areas collectively cover an area of 10,242 km^2, constituting 67.42 (of the total PA and 26.68 % of the country area) per cent of the total area under protected areas. The remaining protected areas – Wangchuck Centennial Park, Torsa Strict Nature Reserve, Phipsoo Wildlife Sanctuary and Khaling Wildlife Sanctuary – are expected to become functional in the Tenth Five Year Plan period (2009-2013)[5].

The conservation management plans of the operational protected areas essentially include conservation research and monitoring, patrolling and law-enforcement, public awareness and education, integrated conservation and development programmes, and nature tourism. In Bhutan, irrespective of the conservation category (strict nature reserve, national park, wildlife sanctuary) the protected areas are not managed as a homogeneous territory but, rather, as a mosaic of conservation zones permitting varying levels of human intervention and use. For

4 The overall protected area figure cited by DoF on the RNR website (www.moa.gov.bt) is 11,502 km^2. This, however, includes the 47 km^2 Royal Botanical Park which is actually a conservation area outside the protected areas system. Therefore, for consistency and comparability, the area of Royal Botanical Park has not been included in the calculation of the protected areas coverage.

5 Phipsoo Wildlife Sanctuary although has some basic infrastructure and staff for regular patrolling and wildlife protection. It is presently managed by Sarpang Forest Division.

instance, the core zone is fully protected, allowing only for regulated research and scientific monitoring. On the other hand, the multiple-use zone is an area which might well support local communities, their agricultural needs and practices, including grazing, and access to forest resources. This is in contrast to many other countries which follow exclusionary policies for protected area management, involving relocation of local communities to areas outside the protected areas[6].

Table 3.Operational Status of Protected Areas in Bhutan

Protected Area	Area km^2	Operational Status
Torsa Strict Nature Reserve	610	Not yet operational
Jigme Dorji National Park	4,316	Operational since 1997. Conservation management plan being revised.
Jigme Singye Wangchuck National Park	1,730	Operational since 2002. Conservation management plan being revised.
Royal Manas National Park	1,029	Operational since 1994. Prior to 1994, patrolling and some limited research activities were being implemented as well as basic park infrastructure existed in Manas.
Thrumshingla National Park	905	Operational since 2002. Conservation management plan being revised.
Bumdeling Wildlife Sanctuary	1,521	Operational since 2001. Conservation management plan being revised.
Wangchuck Centenniel Park	3,736	inuarauagted in June 2008
Phipsoo Wildlife Sanctuary	269	Not operational but patrolling and preliminary surveys ongoing under the management of Sarpang Forest Division
Sakten Wildlife Sanctuary	741	Operational with its first conservation management plan in place in 2006.
Khaling Wildlife Sanctuary	335	Not yet operational

2.2 ESTABLISHMENT AND MANAGEMENT OF BIOLOGICAL CORRIDORS

Declared in 1999, the 12 biological corridors, collectively encompassing an area of 3,660 km^2, connect all the nine protected areas. The primary purpose of the biological corridors is to maintain gene-flow through uninterrupted wildlife movements and succession of habitats (Table 2). The longest corridor is the North Corridor with a length of 76 km, connecting Jigme Dorji National Park to the corridors of Thrumshingla National Park and Bumdeling Wildlife Sanctuary. The shortest corridor is the one connecting Thrumshingla National Park to the North

6 Relocation of local communities is particularly prevalent in protected areas belonging to the category of a strict nature (category I), national park (category II) or wildlife sanctuary (category IV).

Corridor with a length of 16 km. The width of the corridors ranges from 500 m to 3 km. The corridors were identified based on field assessment of the following criteria: abundance of target wildlife; slope of terrain; occurrence of forest fires; condition of canopy and undergrowth; level of human disturbance; and width of narrowest constriction.

Conservation management interventions have been piloted since 2003 in the biological corridors adjacent to Thrumshingla National Park in order to draw lessons from and establish the basis for defining the conservation management status of and administrative framework for the biological corridors in general. Consequently, NCD has promulgated Biological Corridor Rules 2007 as an addendum to the Forest and Nature Conservation Rules 2006. The Rules describe the conservation management status of biological corridors as lower than that of a protected area but higher than that of government reserved forests. The field-level implementation of the Biological Corridor Rules 2007 and management of the biological corridors are mandated to the territorial forest divisions with the Nature Conservation Division providing coordination and backstopping to the territorial forestry staff.

Table 4. Biological Corridors and their Areas

Biological Corridor	**Area km^2**
Torsa SNR – Jigme Dorji NP Corridor	147
Jigme Dorji NP – Jigme Singye Wangchuck NP Corridor	275
Jigme Singye Wangchuk NP – Jigme Dorji NP Corridor	600
Jigme Singye Wangchuk NP – North Corridor	525
North Corridor	640
Thrumshingla NP – North Corridor	142
Bomdeling WS – North Corridor	119
Thrumshingla NP – Bumdeling WS Corridor	79
Jigme Singye Wangchuck NP – Thrumshingla NP Corridor	385
Phipsoo WS – Royal Manas NP Corridor	376
Khaling WS – Sakten WS Corridor	160
Royal Manas NP – Khaling WS Corridor	212
Total	**3,660**

Source: Nature Conservation Division, DoF, 2006

Socio-economic and biodiversity surveys are ongoing and a strategic plan is being prepared for the biological corridor connecting Torsa Strict Nature Reserve and Jigme Dorji National Park.

These initiatives have been undertaken as a part of the tri-border Kanchenjunga Conservation Programme involving Bhutan, India and Nepal[7].

2.3 ESTABLISHMENT AND MANAGEMENT OF CONSERVATION AREAS OUTSIDE THE PROTECTED AREAS SYSTEM

7 The programme is supported by the International Center for Integrated Mountain Development.

There are several natural areas which have special conservation value but are not a part of the protected areas system. BAP 2002 named a number of areas outside the protected areas system that are of great conservation value and require some special regulations and management interventions to ensure protection from potentially intrusive activities. In addition to the conservation areas that feature in BAP II, MoA has named a number of forest areas for lease to RSPN for conservation management[8]. These areas, as featured in BAP 2002 and in the MOA notification of August 2003, are all shown in Table 2.

Amongst the conservation areas listed in Table 3, Phobjikha and Dochula have conservation management programmes underway. Phobjikha valley is primarily known as a winter habitat of the globally threatened black-necked crane *Grus nigricollis.* Ministry of Agriculture (MoA) has leased Phobjikha conservation area to the Royal Society for the Protection of Nature (RSPN) for conservation management[9]. RSPN is active in the conservation area in terms of research on black-necked cranes and their habitat, public education and awareness, community empowerment for conservation, and integrated conservation and development programmes, including community-based ecotourism. An area of 162 km^2, which includes the *geogs* of Phobji, Gangte and Bjena in Wangduephodrang *dzongkhag*, has been delineated as Phobjikha conservation area. A conservation management plan for the conservation area is in place with approval from the MoA, and conservation zones have been identified and are being physically delineated jointly by RSPN and the Department of Forests (DoF) using a consultative process involving local stakeholders. Regulatory framework for the conservation zones has been using available results of ongoing studies on interactions between human land use and crane habitat in Phobjikha.

Table 5. Conservation Areas in Bhutan

Conservation Area	Dzongkhag	Remarks
Dochula	Thimphu	Identified in BAP II
Pelela	Wangduephodrang	Identified in BAP II
Yutongla	Trongsa	Identified in BAP II
Dhur tshachu	Bumthang	Identified in BAP II
Phobjikha	Wangduephodrang	Identified in BAP II
Doga	Paro	Identified in BAP II
Ada	Wangduephodrang	Listed in MoA Notification
Chelila	Haa and Paro	Listed in MoA Notification

8 The approval of the lease was notified vide Ministry of Agriculture's letter MoA/59/363 dated 4 August, 2003. However, the lease of Chelila, Dochula, Kamechu, and Goenshari was later retracted by MoA vide letter M(1)MoA/MISCE/2003/504 dated 12 October, 2004, in view of overlap with conservation programmes mandated to DoF.

9 RSPN is a non-governmental organization founded in 1987 with the objective to promote nature conservation in the country. It has been working in Phobjikha since its inception. The official lease accorded by MoA in 2003 gives RSPN the legitimacy to plan and implement conservation programmes in a full-fledged manner.

Goenshari	Punakha	Listed in MoA Notification
Kamechhu	Wangduephodrang	Listed in MoA Notification
Kangpara	Trashigang	Listed in MoA Notification
Tri-junction area	Chhukha, Haa and Samtse	Listed in MoA Notification

The Dochula conservation area is a part of the recently-declared "Royal Botanic Park." An area of 47 km^2 around Dochula has been delineated for protection and for development into a locale for ecotourism and nature education. Within this area, MoA is developing a visitor information center, a rhododendron garden, a network of eco-trek trails, and several vista points and camping sites to promote ecotourism and nature education. The Royal Botanical Park falls within the biological corridor connecting Jigme Singye Wangchuck National Park and Jigme Dorji National Park, and forms a crucial part of a long, contiguous hill range that joins Tibet to the north and India to the south. Despite its small size, the park has a very good assortment of wild fauna and flora. While on one hand accessibility and proximity to the towns of Thimphu, Punakha and Wangduephodrang make the area vulnerable to environmental degradation, on the other these very same factors lend the area great potential to develop into an outstanding locale for ecotourism and nature education to instill appreciation for nature among the urban Bhutanese as well as foreign tourists.

2.4 BHUTAN BIOLOGICAL CONSERVATION COMPLEX (B2C2)

The Nature Conservation Division has consolidated the protected areas and biological corridors into a macro-level natural landscape called the "Bhutan Biological Conservation Complex", or B2C2 in short. The B2C2 landscape approach has been adopted as a conceptual strategy for holistic and integrated management of protected areas and biological corridors as opposed to the conventional piecemeal approach, attendant with the risk of imbalanced management of the protected areas and biological corridors. The approach, however, does not deride the importance of individual protected area management. Individual protected areas are seen as the main "building blocks" of the overall conservation landscape rather than as independent conservation units. It is also meant to help address critical biodiversity conservation gaps and needs, avoid duplications, develop common ground and synergies for conservation actions, and direct limited resources on priorities.

2.5 VISION AND STRATEGY FOR THE NATURE CONSERVATION DIVISIONI

The Nature Conservation Division (NCD) under the Department of Forests is the nodal agency for the management of the protected areas in Bhutan. In 2003, "Vision and Strategy for the NCD" was adopted in continuation to earlier (1995) strategy titled "Setting priorities into the year 2001: a strategy for the Nature Conservation section, Bhutan."

In the Vision and strategy 2003, four strategic components were chosen with time horizon of ten years (2003-2013):

1. Management of protected areas, buffer zones and biological corridors
2. Integrated conservation development projects

3. Environment education
4. Research, survey and monitoring

The targets, guideline of potential activities and success indicators were established in the document. These are tabulated below:

Strategy component	Targets	Guideline of potential activities	Success indicators
Component 1: Management of protected areas, buffer zones and biological corridors	i. Prepare management plans of all the protected areas based on NCD strategy, achieved results and impact monitoring i. Priority species, critical habitats and ecosystems (hotspots) for conservation of ecological integrity in Bhutan defined in all Parks, including buffer zones and biological corridors, to control major (current and future potential) threats. i. Adaptive management and magnification principles applied, tested and adapted to Bhutan conditions to increase effectiveness of conservation efforts in all protected areas. v. Initiation and support to Environmental Impact Assessments (EIA's) where needed.	1. Establishment of tested and adapted guidelines to planning, management and monitoring of protected areas by Parks. 2. Testing and gradual integration and improvement of adaptive management approach, including flexible strategic planning, Park self-assessments and impact monitoring. 3. Definition of a strategy to achieve magnification of conservation impacts (in terms of scaling up, replication and follow-up by partners and third parties). 4. Conduct surveys for data collection and also to define critical habitats and biological hotspots to maintain ecological integrity. 5. Identification and monitoring of threats and opportunities, and definition of strategic approach for each Park to control major threats. 6. Definition of specific non-negotiable principles for each Park area. 7. Defining strategic and operational plans to manage protected areas, including buffer zones and biological corridors. 8. Ensuring participation of stakeholders and collaboration with partners where possible. 9. Ensuring and supporting environmental impact assessments (EIA's) where needed for development projects in and around protected areas.	- Positive results of impact monitoring - Participation in protected area management by stakeholders and partners. - Management plans prepared in line with vision and strategy and implemented for all the protected areas.

Component 1.1: Zonation of protected areas	i. Zonation and boundary demarcation of protected areas accomplished by 2005, at least of core zones and multiple use zones, with associated legislation and non-negotiable principles. ii. Zonation and demarcated boundaries widely known and associated legislation generally accepted and respected by all stakeholders. iii. Well established buffer zones and biological corridors, with appropriate legislation. iv. Defined management responsibilities for different zones within protected areas.	1. Development of generic principles for zonation of protected areas, buffer zones and biological corridors, including swapping of land to include critical habitats and hotspots and exclude communities where possible. 2. Taking over of areas of protected areas that are presently under the territorial divisions. 3. Revision and clarification of definitions / terminology for different types of protected areas. 4. Development / adjustment of legislation / jurisdiction for buffer zones and corridors. 5. Zonation (reconfirmation or new) through joint assessments with stakeholders, based on biodiversity surveys and local resource management practices and land-use patterns. 6. Negotiation of conflicting interests regarding land-use in and around protected areas. 7. Definition of roles and responsibilities for management of the different zones within protected areas (core zone, multiple use zone, buffer zone, corridors). 8. Boundary demarcation of core zones, followed by buffer zones and biological corridors. 9. Workshops and other communication sessions and means to inform all stakeholders about demarcations and associated legislation.	- Demarcation of protected areas in place - Demarcation respected, reduced encroachment and illegal activities - Legislation of zones widely known and respected

Component 1.2:Control of human/wildlife conflicts	i. Minimized crop and livestock damage by wildlife ii. Increased understanding of the ecological and socio-economic dynamics of human – wildlife conflicts iii. Based on action-research, measures and approaches developed to reduce human – wildlife conflicts, for application under different conditions iv. Established approach to negotiate in case of human/wildlife conflicts and avoid increasing tensions.	1. Multidisciplinary action-research to assess the problem and test options to reduce damage, including endowment funds, monetary incentives, insurance / compensation scheme, joint assessment etc. 2. Organisation of workshops and other approaches to assess the problem and negotiate in case of conflicts, development of NCD experience in these matters 3. Monitoring of results and ecological and socio-economic impacts of tested options 4. Establishment of an inventory/ monitoring/reporting/data bank of human - wildlife conflicts and the effects of measures taken 5. Research on the ecological dynamics (at landscape level) and the socio-economic issues of human – wildlife conflicts, and the interactions.	- Decrease in the number of complaints. - Decrease in the magnitude of damage to crops and livestock. - Increase in people's perception to conservation / voluntary participation
Component 1.3:Control of poaching	i. Eradicated or reduced poaching in the protected areas. ii. Illegal trade in plants and animals controlled. iii. Effective patrolling and anti-poaching approach established in collaboration with partners. iv. Protection and survival of endangered species and critical habitats ensured.	1. Identification of key areas and species subject to poaching threats. 2. Co-ordination by NCD of data collection and planning of anti-poaching activities, and purchase of required field equipment. 3. Establishment of warden/guard posts to cover all Park boundaries. 4. Development of an effective and efficient patrolling and anti-poaching strategy, using *resoops* and key informants from local communities in and around protected areas, possibly using religious support. 5. Collaboration with neighbouring countries in tightening law enforcement. 6. Identification of key informants and networking to influence the market chain of illegal trade products. 7. Awareness raising campaigns using the media.	- Decrease in instances of poaching - Decline in the trade of products from poaching

Component 2: Integrated conservation development projects	i. Conservation issues integrated in management process at Dzongkhag and / or Geog level. ii. Reduced pressures and threats to protected areas (critical habitats, species and hotspots) through focused development activities. iii. Successful ICDP's and alternative approaches	1. Formulate guidelines for planning, implementing and monitoring process of ICDP's in collaboration with relevant agencies. 2. Ensure a multidisciplinary ICDP planning process (sociologist / anthropologist, economist, ecologist), ensure conservation impacts 3. Assess best practices as regards the 'design' of ICDP's, and based on that prepare, test, monitor and evaluate a number of ICDP's and related approaches, identify best practices and expand successes. 4. Improve information through surveys and in consultation with Dzongkhag sector Heads on existing resource use pattern, problems and opportunities, and resource management systems. 5. Provide support to Dzongkhag and Geog staff to integrate conservation issues in their management process, build up capacities and provide continuous backstopping. 6. Fine-tune the participatory approach to assess the linkages between conservation and development through ICDP's and related approaches. 7. Provide support in preparation of community based natural resource management plan. 8. Assess the cost-effectiveness of ICDP's considering both short-term and long term impacts.	- Reduced pressure / threats / illegal activities in conservation areas - Diversity of income sources - Long-term positive impacts on conservation. - Communities/local residents of the protected areas in agreement with the programs that integrate conservation and development.

Component 2.1:Conservation oriented community based enterprise development	i.Enhance conservation of protected areas through concrete revenues for local communities from conservation oriented community based enterprise development. ii. Formulation and implementation of an eco-tourism strategy for the protected areas that can address some of the economic concerns of the local community while maintaining the primary objective of nature conservation. iii. Improved conservation awareness of the public through concrete revenues from community based enterprise development. iv. Assessment and control of biodiversity and environmental risks on undertaking economic development activities around protected areas.	1. Make an inventory of potential areas for conservation oriented community based enterprise development, and of best practices and lessons learned with existing experiences. 2. Identify strengths and weaknesses of current approaches and undertake relevant actions for improvement, consult economists and sociologists to do so. 3. Provide advice on ecotourism strategy and policy, help develop criteria for ecotourism, ensure feed-back of concrete experiences and impact monitoring to adjust strategy. 4. Ensure plough-back of user fees to NCD for sustaining ICDP's, and maximum revenues for local communities through local products and services provided to tourists. 5. Collaboration with commercial enterprises and marketing agencies, such as tourism agencies, to assess economic potential for community based enterprise development. 6. Monitoring of impacts on protected areas from conservation oriented community based enterprise development, and feedback to policy levels.	- Increased number of local people involved in different community based enterprise development - Increase in revenues from conservation oriented community based enterprise development. - Increase in the provision of service & recreational activities for eco-tourism.
Component 2.2: Management of historical and cultural sites	i. Preserved and well managed historical and cultural sites within protected areas ii. Management of historical and cultural sites within protected areas integrated in Parks management plans iii. Strengthened linkages between historical / cultural and conservation objectives, through national and international tourism and conservation opportunities based on religious beliefs.	1. Identification of key historical and cultural sites within protected areas, jointly with local stakeholders. 2. Integrate the management of cultural and historical sites within park management plans, based on mutual benefits. 3. Identification of opportunities to strengthen protection through linkages with religious belief systems in and around protected areas. 4. Establishing tours to strengthening of ecotourism by linkages with cultural and historical sites. 5. Establishing environmental education messages and packages and media coverage to strengthen above linkages.	- Effective collaboration between agencies responsible for the preservation of religious, cultural and historical monuments with the NCD and the parks. - Accurate data and information available of all historical and cultural sites in the protected areas.

Component 3: Environment education	i. Enhanced environmental awareness and a positive attitude towards conservation, reflected in concrete positive changed in behaviour ii. Increased participation in conservation efforts iii. Improved transparency and easy access to information on conservation issues iv. Enhanced capacity at decentralized levels to plan and implement conservation efforts.	1. Institutionalise participatory approaches in the Parks management cycle, from inventory to planning and monitoring 2. Develop and implement an environmental education component in each park 3. Provide training for staff at Geog and Dzongkhag level 4. Make use of a diversity of communication means to reach different target groups, ranging from local communities to local and national Government agencies. 5. Improve access to the Parks for the public for educational and recreational purposes, establish visitors / information centres in each park, establish a natural history museum. 6. Support school nature clubs and provide training for teachers throughout the country 7. Promote Parks and disseminate conservation messages and successes 8. Establish and implement formal and non-formal environmental education packages 9. Develop a diversity of promotion and education materials.	- Easy access to information on conservation by students and the general public through establishment of information centres and a national natural history museum. - Positive change of public perceptions to conservation.

Component 4: Research, survey and monitoring	i. Improved data and information base on biological values, at species, habitat and ecosystem level ii. Improved insight on critical habitats for endangered species and biological hot spots, for setting conservation priorities and zoning purposes iii. Improved insight in impacts of conservation efforts and ICDP's on biological values iv. Practical monitoring guidelines in place and operational, and results are used to adjust Park management.	1. Development of collaborative approaches to research, surveying and monitoring (joint actions, participatory approaches, action-research, linkages with research centres) 2. Establishment and testing of a survey and monitoring guidelines and implementation at each park. 3. Co-ordination of research, survey and monitoring activities, establishment of a data bank and information centre and library accessible to outsiders, for complete information on biological values and conservation management approaches in Bhutan. 4. Species and habitat prioritization in terms of biological and protection significance for effective management, based on complete surveys in the Parks 5. Revision and specification of protected status of species for Bhutan based on research data. 6. Initiate and develop a data bank for complete available bio-diversity information, NCD program activities. 7. Establish a computerized data base of all collected data.	- Good database management in place - Use of monitoring data for planning purposes - Use of data and information base at NCD by other institutions

3. EVALUATING THE GOALS AND TARGETS OF THE PROGRAM OF WORK ON PROTECTED AREAS IN BHUTAN

Goals 1.1. To establish and strengthen national and regional systems of protected areas integrated into a global network as a contribution to globally agreed goals.
Target: *By 2010, terrestrially and 2012 in the marine area, a global network of comprehensive, representative and effectively managed national and regional protected area system is established as a contribution to (i) the goal of the Strategic Plan of the Convention and the World Summit on Sustainable Development of achieving a significant reduction in the rate of biodiversity loss by 2010; (ii) the Millennium Development Goals – particularly goal 7 on ensuring environmental sustainability; and (iii) the Global Strategy for Plant Conservation.*

Progress: So far six protected areas are functional and four will become operational by 2013. The government has also agreed to work closely through ICIMOD and WWF in transboundary biodiversity landscape project. The Royal Manas National Park and India's Manas Tiger Reserve are collaborating in transboundary initiatives. Through Kanchenjunga Landscape (KL)[10]program, Bhutan, India and Nepal are implementing various conservation program. For the KL, national level strategic plans for Toorsa SNR –JDNP corridor development have been developed, and in some cases have already been integrated into national strategies. The framework for regional cooperation for implementation of the Convention on Biological Diversity has been published and the framework for a regional strategy for the management of biodiversity is underway.
Obstacle encountered: political commitment (among participating countries); information sharing (networking) among the countries.
Goals 1.2. To integrate protected areas into broader land- and seascapes and sectors so as to maintain ecological structure and function.
Target: By 2015, all protected areas and protected area systems are integrated into the wider land- and seascape, and relevant sectors, by applying the ecosystem approach and taking into account ecological connectivity and the concept, where appropriate, of ecological networks.
Progress: Declared in 1999, the 12 biological corridors, collectively encompassing an area of 3,660 km^2, connect all the nine protected areas. The primary purpose of the biological corridors is to maintain gene-flow through uninterrupted wildlife movements and succession of habitats.
Obstacle encountered: many settlements are inside the biological corridor; BC management will require involvement of many partner agencies which is expected to delay the process of implementation. Development activities involving numerous sectors for negotiation.
Goals 1.3. To establish and strengthen regional networks, transboundary protected

10 for further information visit http://www.icimod.org

areas (TBPAs) and collaboration between neighbouring protected areas across national boundaries.
Target: Establish and strengthen by 2010/2012 transboundary protected areas, other forms of collaboration between neighbouring protected areas across national boundaries and regional networks, to enhance the conservation and sustainable use of biological diversity, implementing the ecosystem approach, and improving international cooperation
Progress: refer Goal 1.1 and 1.2
Goals 1.4. To substantially improve site based protected area planning and management
Target: All protected areas to have effective management in existence by 2012, using participatory and science-based site planning processes that incorporate clear biodiversity objectives, targets, management strategies and monitoring programmes, drawing upon existing methodologies and a long-term management plan with active stakeholder involvement
Progress: Of the ten protected areas, six are operational at present with conservation management plans, basic human resources and conservation management infrastructure in place.
Obstacle encountered: resources (both human & capital).
Goals 1.5. To prevent and mitigate the negative impacts of key threats to protected areas.
Target: By 2008, effective mechanisms for identifying and preventing, and/or mitigating the negative impacts of key threats to protected areas are in place

Progress: various programs are implemented and initiated. Antipoaching program, various regulations[11] are developed and implemented, conservation areas are declared.
Obstacle encountered: limited staff for patrolling (lack of trasboundary agreement), people's participation and perception of conservation.
Goals 2.1. To promote equity and benefit sharing.
Target: Establish by 2008 mechanisms for the equitable sharing of both costs and benefits arising from the establishment and management of protected areas
Progress: assess and benifit sharing modules are being developed and the provision is incorporated in Biodiversity Act 2003, framework for fair & equitable benefit sharing outlined in BAP III.
Obstacle encountered: issues are complex with various stakeholders, new ideas /concept – difficult for people to accept.
Goals 2.2. To enhance and secure involvement of indigenous and local communities and relevant stakeholders.
Target: Full and effective participation by 2008, of indigenous and local communities, in full respect of their rights and recognition of their responsibilities, consistent with national law and applicable international obligations, and the participation of relevant stakeholders, in the management of existing, and the establishment and management of new, protected areas
Progress: CBNRM, Community Forestry are established, Private forestry, formation of groups in weaving, ecotourism etc.
Obstacle encountered: perception of people towards PA, implementing agencies perception.

11 refer to various regulation enumarated in chapter II

Goals 3.1. To provide an enabling policy, institutional and socio-economic environment for protected areas.
Target: By 2008 review and revise policies as appropriate, including use of social and economic valuation and incentives, to provide a supportive enabling environment for more effective establishment and management of protected areas and protected areas systems.
Progress: revise Forest and Nature Conservation Rules **,** socio-economic studies are done, resources mapping (RRA) are carried out in Parks, various development activities such as ICDPs are implemented in Parks.
Obstacle encountered: lack of professional to conduct evaluation.
Goals 3.2. To build capacity for the planning, establishment and management of protected areas.
Target: By 2010, comprehensive capacity-building programmes and initiatives are implemented to develop knowledge and skills at individual, community and institutional levels, and raise professional standards
Progress: developed local capacity (local guide), capacity of parks staffs strengthened through long term studies, study tours for communities, and involvement of local communities in planning.
Obstacle encountered: lack of knowledge transfer, and frequent transfer of staffs.
Goals 3.3. To develop, apply and transfer appropriate technologies for protected areas.
Target: By 2010 the development, validation, and transfer of appropriate technologies and innovative approaches for the effective management of protected areas is substantially improved, taking into account decisions of the Conference of the Parties on technology transfer and cooperation.

Progress: There is exchange of experiences through park managers conference. People working with parks also take study tours to other countries to get valuable information and learn different technological options.
Obstacle encountered: no mechanism in place to revive new technologies, innovations, and further application hampered, no decentralization for parks.
Goals 3.4. To ensure financial sustainability of protected areas and national and regional systems of protected areas.
Target: By 2008, sufficient financial, technical and other resources to meet the costs to effectively implement and manage national and regional systems of protected areas are secured, including both from national and international sources, particularly to support the needs of developing countries and countries with economies in transition and small island developing States.
Progress: In order to finance parks and protected areas in future, Bhutan has established Bhutan Trust Fund for Environmental Conservation (BTFEC). It is expected that the Trust Fund will provide support to carry out conservation activities. Eco-tourism initiatives and payment of environmental services are also being introduced as part of this strategy.
Obstacle encountered: BTF-erratic stock market, New ideas/concepts-difficult to adapt.
Goals 3.5. To strengthen communication, education and public awareness.
Target: By 2008 public awareness, understanding and appreciation of the importance and benefits of protected areas is significantly increased
Progress: numerous activities initiated through various agencies both government and Civil Society Organizations.
Obstacle encountered: impact of the awareness difficult to assess and need funding to continue the programs.

Goals 4.1. To develop and adopt minimum standards and best practices for national and regional protected area systems.
Target: By 2008, standards, criteria, and best practices for planning, selecting, establishing, managing and governance of national and regional systems of protected areas are developed and adopted.
Progress: see goals 1.1
Goals 4.2. To evaluate and improve the effectiveness of protected areas management.
Target: By 2010**,** frameworks for monitoring, evaluating and reporting protected areas management effectiveness at sites, national and regional systems, and trans-boundary protected area levels adopted and implemented by Parties
Progress: Currently different parks adopt their own monitoring and evaluation framework, however through the nodal agency (NCD) a uniform system of Conservation Information System (CIS) is being developed and tested. The government through GNH Commission is also developing a uniform web based monitoring system called PlaMS, which once operational will serve as a uniform reporting and monitoring system for both the government and donor agencies.
Obstacle encountered: lack of M& E staffs.
Goals 4.3. To assess and monitor protected area status and trends.
Target: By 2010, national and regional systems are established to enable effective monitoring of protected-area coverage, status and trends at national, regional and global scales, and to assist in evaluating progress in meeting global biodiversity targets
Progress: refer goal 4.2
Goals 4.4 To ensure that scientific knowledge contributes to the establishment and effectiveness of protected areas and protected area systems.

Target: Scientific knowledge relevant to protected areas is further developed as a contribution to their establishment, effectiveness, and management
Progress: There are increasing number of publications coming out from PAs on biodiversity assessment, Rapid Participatory Assessment, Population dynamics of key species etc. Park Managers are technically qualified as compared to five years ago. Species based research are initiated on the ground and species monitoring system are also in place in few of the parks.
Obstacles encountered: yearly transfer of staffs reduces the momentum of the programs. Lack of communication facilities in some of the PAs hampered in dissemination of information.