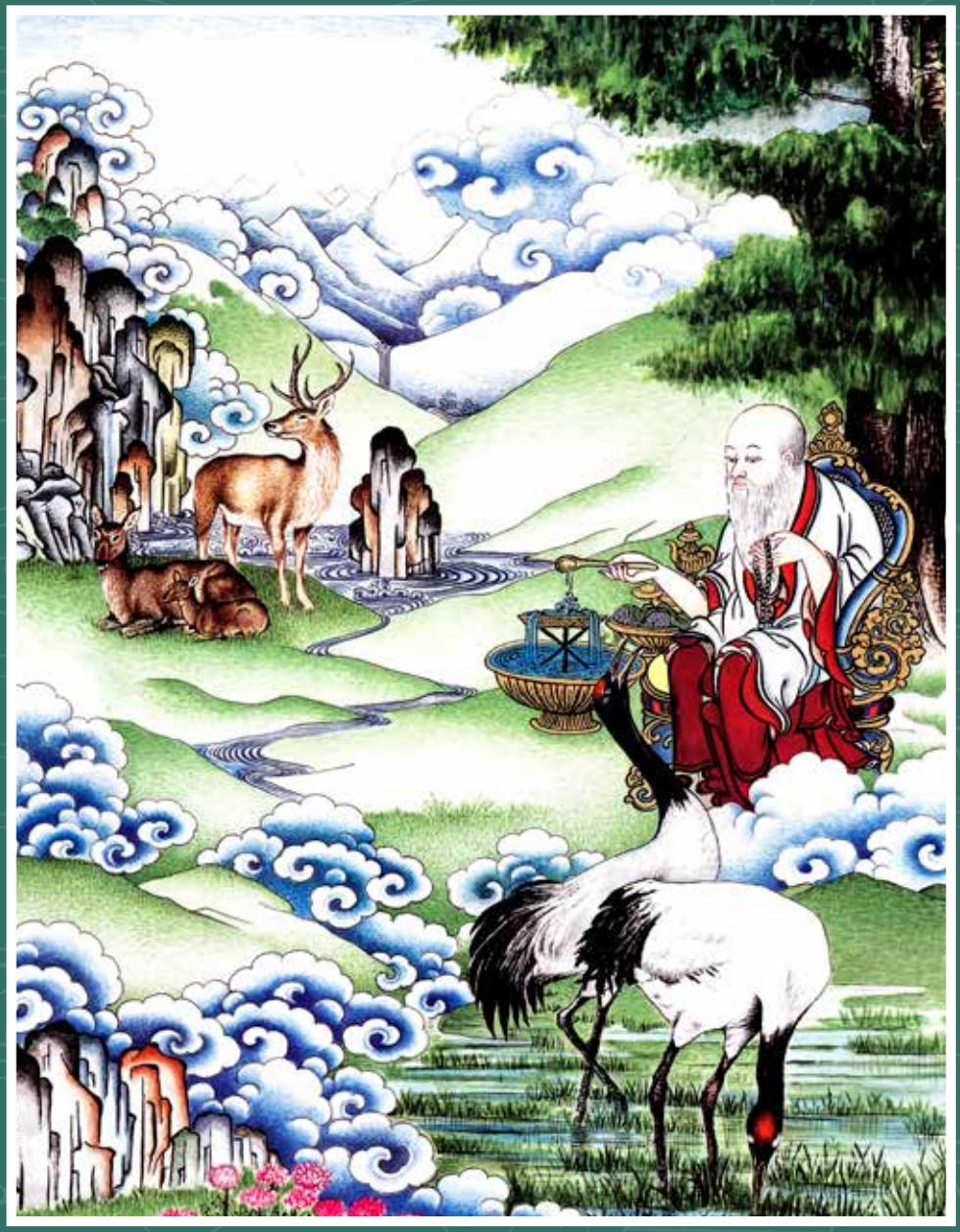
NATIONAL BIODIVERSITY STRATEGIES AND ACTION PLAN



BHUTAN 2014

NATIONAL BIODIVERSITY STRATEGIES AND ACTION PLAN (NBSAP)

BHUTAN 2014

Ministry of Agriculture and Forests
Royal Government of Bhutan

Suggested citation:

National Biodiversity Strategies and Action Plan of Bhutan, 2014. National Biodiversity Centre, Ministry of Agriculture and Forests, Royal Government of Bhutan.

NBSAP Drafting Team and National Task Force Members:

1. Dr. Tashi Yangzome Dorji, Program Director, NBC, MoAF
2. Mr. Karma C. Nyedrup, Environment Specialist III, NECS
3. Mr. Tirtha Bdr. Katwal, Maize Specialist III, RDC-Yusipang, MoAF
4. Dr. N.B. Tamang, Livestock Breeding Specialist III, DoL, MoAF
5. Ms. Sangay Dema, Deputy Chief Biodiversity Officer, NBC, MoAF
6. Mr. Ngawang Gyeltshen, Deputy Chief Forestry Officer, DoFPS, MoAF
7. Ms. Kunzang Choden, Deputy Chief Research Officer, CoRRB, MoAF
8. Ms. Thinley Choden, Sr. Forestry Officer, DoFPS, MoAF
9. Mr. Chukey Wangchuk, Chief Program Officer, BTFEC
10. Mr. Singay Dorji, National Coordinator, GEF-Small Grants Program,UNDP
11. Mr. Tshering Phuntsho, Coordinator, CSLP, RSPN

Editorial Team:

Dr. Tashi Yangzome Dorji, Program Director, NBC, MoAF
Ms. Sangay Dema, Deputy Chief Biodiversity Officer, NBC, MoAF

Project Manager:

Ms. Sangay Dema, Deputy Chief Biodiversity Officer, NBC, MoAF

Cover art:

The Six Longevities - A Buddhist mural representing the blessing of long life, interdependence and bio-resource sustainability.

Layout and Design:

Mr. Pema Gyamtsho

"Throughout the centuries, the Bhutanese have treasured their natural environment and have looked upon it as the source of all life. This traditional reverence for nature has delivered us into the twentieth century with our environment still richly intact. We wish to continue living in harmony with nature and to pass on this rich heritage to our future generations."

His Majesty the Fourth Druk Gyalpo Jigme Singye Wangchuck

Acknowledgement

The Ministry of Agriculture and Forests extends its deep appreciation and gratitude to all organizations and individuals involved in the preparation of this important document.

The NBSAP is endorsed at the highest level – the National Environment Commission chaired by the Honourable Prime Minister, as testament of the strong political will and national commitment towards biodiversity conservation. We are grateful to His Excellency Lyonchhen Tshering Tobgay and the esteemed members of the National Environment Commission for their unwavering support and highest assurance.

We are also grateful to the Environment and Urban Development Committee of the National Assembly and Natural Resources and Environment Committee of the National Council for their valuable recommendations and feedbacks on the draft document.

We also acknowledge the contribution and valuable guidance received from both within and outside the Ministry during the preparation of this document through the national and regional stakeholder workshops, RNR-GNH Committee, and individuals.

The Ministry would like to sincerely acknowledge the institutional support rendered by the parent organizations of the National Task Force Members.

The Ministry is proud and appreciative of the hard work and dedication demonstrated by the National Task Force Members who worked tirelessly to prepare a comprehensive document with time-bound targets and strategies for Bhutan's biodiversity conservation and its sustainable use.

At the international front, we would like to thank the IUCN (Asia Regional Office, Bangkok); National Biodiversity Centre, Singapore; Ministry of Natural Resources and Environment, Malaysia; Department of National Parks, Wildlife and Plant Conservation, Thailand; and Aichi Biodiversity Target Champions for their valuable comments and feedback.

We are extremely grateful to the Global Environment Facility for their financial support towards the preparation of this document through the GEF-UNEP Expedited Enabling Support to Bhutan for the revision of the NBSAP project and for their continuous support to Bhutan's biodiversity conservation and sustainable development.

PRIME MINISTER

འབྲུག་གྱལ་ཁབ་ཀྱི་གཞུང་།

Royal Government of Bhutan

30 September 2014

FOREWORD

The **Constitution of the Kingdom of Bhutan 2008** decrees that the country maintain a minimum of 60 per cent of the total land under forest cover for all time. Indeed, Bhutan has always recognized and upheld the significance and role of environmental conservation in human well being, guided by the enlightened leadership of our beloved Monarchs and the state religion of Buddhism that teaches respect for all life forms and their interdependence.This has ensured the emergence of Bhutan in the 21st century with its biodiversity largely intact in comparison to the global trends of unprecedented loss of biodiversity in the past fifty years with no sign of slowing down.

Cognizant of the significant role of biodiversity in sustainable development, the country is guided by the development philosophy of Gross National Happiness, promulgated by our Beloved Fourth King, His Majesty Jigme Singye Wangchuck. This guiding philosophy identifies environmental conservation as one of the four pillars of Gross National Happiness and effectively ensures that development is never achieved at the cost of the environment. Under the leadership of our beloved King, His Majesty Jigme Khesar Namgyel Wangchuck, this philosophy has been mainstreamed further with the establishment of the Gross National Happiness Commission as the apex body for planning in Bhutan to ensure that GNH remains the cornerstone of Bhutan's development philosophy.

Bhutan developed its first Biodiversity Action Plan in 1997, two years after it became a signatory to the Convention on Biological Diversity, to provide a framework for action for strategic biodiversity management. The Biodiversity Action Plan has always been regarded as a living document reflecting the changing needs and priorities in biodiversity management and has undergone two revisions in the past in 2002 and 2009.

A stocktaking analysis during the process of the current revision reveals significant achievements in biodiversity management since the first Biodiversity Action Plan. Bhutan has committed a total of 51.44 per cent of the country's area as protected area and biological corridors till date and designated two RAMSAR sites in 2012. Over twelve Acts, Policies and Strategies supporting biodiversity conservation and use have been enacted or adopted. Species conservation programs on Tiger, Snow Leopard, White-bellied heron and black-necked crane have been instituted. A Human Wildlife Conflict (HWC) Management Endowment Fund has been established. The National Crop and Animal Gene banks have also been institutionalized to conserve and promote agro-biodiversity. A total of 556 community forests have been established, covering 2.3 per cent of the total forest cover until now. Concurrently, weaknesses were also identified with the lack of a coordination mechanism for the implementation of the Biodiversity Action Plan standing out as the most notable one followed by the lack of a clear funding strategy to implement the activities prioritized in the action plan.

It is most heartening to see that the current revision of the National Biodiversity Strategies and Action Plan has been prepared by a National Task Force

representing key biodiversity stakeholders in the country under the coordination of the National Biodiversity Centre, and undergone a series of consultations with all relevant stakeholders. I am also pleased to note that this document has provided a clear coordination mechanism to mobilize funds and ensure the effective implementation of the strategies outlined in this plan. There is no doubt that biodiversity conservation is an integral part of our happiness paradigm since it contributes to food security, increases resilience to natural disasters, ensures energy security and access to clean water and raw materials. Since this document will be the guiding policy document on biodiversity management in the country, I urge all stakeholders, government and non-government, civil society organizations, academia, private sector and private citizens to take part in this process to ensure that we achieve the targets that we have set out in this Action Plan and we bequeath a country with its rich biodiversity intact to our future generations for their sustenance and happiness.

Tashi Delek!

(Tshering Tobgay)

Table of Contents

Abbreviations and Acronyms

ABS	Access and Benefit Sharing
ADB	Asian Development Bank
AnGR	Animal Genetic Resources
BAFRA	Bhutan Agriculture and Food Regulatory Authority
BAP	Biodiversity Action Plan
BC	Biological Corridor
BEO	Bhutan Environment Outlook
BhuFED	Bhutan Forestry Enforcement Database
BP	Bioprospecting Program
BTFEC	Bhutan Trust Fund for Environmental Conservation
BTM	Bhutan Tourism Monitor
BWS	Bumdeling Wildlife Sanctuary
CBD	Convention on Biological Diversity
CBNRM	Community-Based Natural Resource Management
CBST	Community-Based Sustainable Tourism
CTEM	Clean Technology and Environmental Management
CF	Community Forest
cft	Cubic feet
CGI	Corrugated Galvanized Iron
CHM	Clearing House Mechanism
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
CMS	Convention on Migratory Species
CO_2	Carbon dioxide
CoRRB	Council for Renewable Natural Resources Research of Bhutan
CSO	Civil Society Organization
CSR	Corporate Social Responsibility
CWR	Crop Wild Relatives
DAMC	Department of Agriculture Marketing and Cooperatives
DHMS	Department of Hydro-Met Services
DGM	Department of Geology and Mines
DLG	Department of Local Governance
DoA	Department of Agriculture
DoFPS	Department of Forests and Park Services
DoL	Department of Livestock
DRE	Department of Renewable Energy
DYT	Dzongkhag Yargye Tshogchung

EA	Environment Assessment
EDP	Economic Development Policy
EE	Environment Education
EIA	Environmental Impact Assessment
EFRC	Environmental Friendly Road Construction
EU	European Union
FCPF	Forest Carbon Partnership Facility
FFF	Forestry Facts and Figures
FMU	Forest Management Units
FPED	Forest Protection and Enforcement Division
FRMD	Forest Resource Management Division
FYP	Five Year Plan
GDP	Gross Domestic Product
GEF	Global Environment Facility
GNH	Gross National Happiness
GNHC	Gross National Happiness Commission
GYT	Gewog Yargye Tshogchung
GRF	Government Reserved Forest
HAW	High Altitude Wetlands
HWC	Human-Wildlife Conflict
IAS	Invasive Alien Species
IBA	Important Bird Areas
ICDP	Integrated Conservation and Development Program
ICIMOD	International Centre for Integrated Mountain Development
IEC	Information, Education and Communication
IP	Intellectual Property
IT	Information Technology
ITMS	Institute of Traditional Medicine Services
ITPGRFA	International Treaty for Plant Genetic Resources for Food and Agriculture
JDNP	Jigme Dorji National Park
KBA	Key Biodiversity Areas
LCMP	Bhutan Land Cover Assessment
LG	Local Government
M&E	Monitoring and Evaluation
masl	metres above sea level
MEA(s)	Multilateral Environmental Agreements
MoAF	Ministry of Agriculture and Forests
MoF	Ministry of Finance
MoH	Ministry of Health
MoU	Memorandum of Understanding

MSP	Menjong Sorig Pharmaceuticals
MW	Megawatt
NAP	National Action Plan (NAP) to Combat Land Degradation
NAPA	National Adaptation Plan of Action
NBC	National Biodiversity Centre
NBSAP	National Biodiversity Strategies and Action Plan
NC	National Council of Bhutan
NCA	National Centre for Aquaculture
NCD	Nature Conservation Division
NEC	National Environment Commission
NECS	National Environment Commission Secretariat
NEPA	National Environment Protection Act
NGO	Non-Governmental Organization
NH	National Herbarium
NMC	National Mushroom Centre
NOP	National Organic Program
NP	Nagoya Protocol
NPK	N (Nitrogen), P (Phosphorus) and K (Potassium).
NRDCL	Natural Resources Development Corporation Limited
NRED	Nature Recreation and Ecotourism Division
NSB	National Statistical Bureau
NSSC	National Soil Service Centre
NTF	National Task Force
NWFP	Non-Wood Forest Products
ODA	Official Development Assistance
PAs	Protected Areas
PBO	Public Benefit Organization
PEER	Public Environmental Expenditure Review
PES	Payment for Environmental Services
PGR	Plant Genetic Resources
PPD	Policy and Planning Division
RBGS	Royal Botanical Garden, Serbithang
RNR-RDC	Renewable Natural Resources Research and Development Centre
REDD+	Reducing Emissions from Deforestation and forest Degradation
RGoB	Royal Government of Bhutan
RMNP	Royal Manas National Park
RNR	Renewable Natural Resources
RSPN	Royal Society for Protection of Nature
RUB	Royal University of Bhutan
SAWEN	South Asia Wildlife Enforcement Network

SFED	Social Forestry Extension Division
SH	Stakeholder
SLM	Sustainable Land Management
SLMP	Sustainable Land Management Program
Sq.m	Square metre
Sq.km	Square Kilometer
SWS	Sakteng Wildlife Sanctuary
SNV	Netherlands Development Organization
SYB	Statistical Yearbook of Bhutan
TCB	Tourism Council of Bhutan
TD	Territorial Division
TK	Traditional Knowledge
ToR	Terms of Reference
UNCCD	United Nations Convention to Combat Desertification
UNDP	United Nations Development Program
UNEP	United Nations Environment Program
UNFCCC	United Nations Framework Convention on Climate Change
USD	United States Dollar
UWICE	Ugyen Wangchuck Institute for Conservation and Environment
WCD	Wildlife Conservation Division
WCP	Wangchuck Centennial Park
WMD	Watershed Management Division
WHC	World Heritage Convention
WWF	World Wildlife Fund

Glossary of Bhutanese Terms

Chatrim	Act, statute
Chhu	River
Chusups	Village Water Guards/In-charge of drinking and irrigation water in a village
Chhuzhing	Wetland cultivation
Dru Na Gu	Nine important food grains
Dzongkhag	District
Dzong	Fortress-like structure which serves as a centre for public administration and religious affairs
Dzongkha (Dz)	National language
Gewog	Smallest public administration unit made up of a block of villages
Kamzhing	Dryland cultivation
Ladam	Customary practices which restrict access to sacred mountain passes during certain time of the year
Lhakhangs	Temples
Lhomenjong	The southern valley of medicinal herbs
Lhotsamkha (Lh)	Language spoken in southern part of Bhutan
Meesups	Forest Fire Watchers
Ridam	Customary practices which restrict access to mountains, groves, lakes, etc. during certain time of the year
Reesups	Village Forest Guards
Sharshopkha (Sh)	Language spoken in eastern part of Bhutan
Shingsungpa	Agricultural Crop Damage Arbitrator
Sokshing	A plot of land with rights for leaf litter production and collection.
gSo-ba Rig-pa	Traditional Bhutanese Medicine
Tsamdro	Grazing land
Tseri	Shifting cultivation
Tshachu	Hot Springs

List of Tables

List of Figures


©Yeshey Dorji

CHAPTER: 1

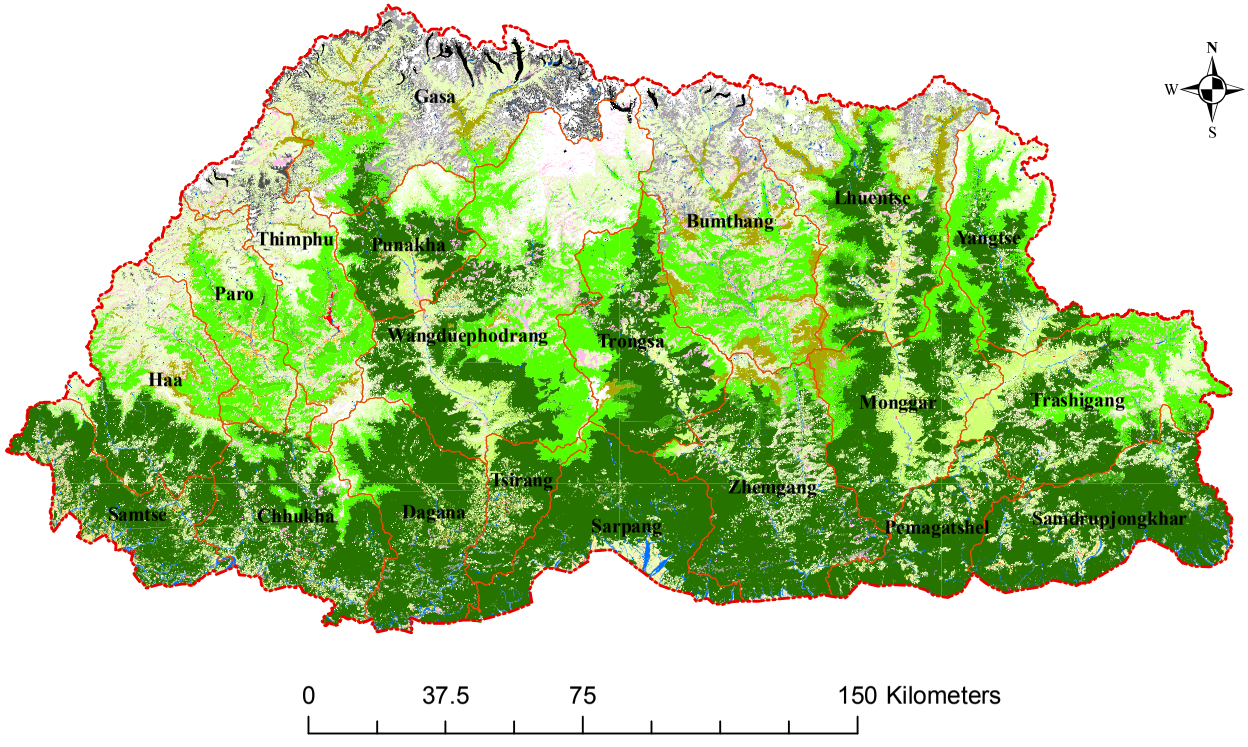
Introduction

1.1 Bhutan: A Brief Background

Bhutan is a small, landlocked country with an area of 38,394 sq.km situated on the southern slope of the Eastern Himalayas, bordering China to its North and India to its south, east and west. The country is almost entirely mountainous with altitudes ranging from 150 to 7,500 masl, within a short south-north distance of 170 kilometres. Straddling the two major Indo-Malayan and Palaearctic biogeographic realms, Bhutan is part of the Eastern Himalayan region which contains parts of three global biodiversity hotspots, 60 ecoregions, 330 Important Bird Areas, 53 Important Plant Areas, and a large number of wetlands including 29 Ramsar sites (ICIMOD, 2010).

1.2 Bhutan's Conservation History

Formal conservation programs in Bhutan started as early as the 1960s, when Bhutan embarked on the Five Year Plan (FYP) development cycle in 1961, with the designation of the Northern and the Southern Wildlife Circles and the subsequent designation of the first protected area, the Manas Wildlife Sanctuary in 1966. The Forest Act of Bhutan 1969 was the first modern Act to be enacted by the Royal Government of Bhutan (RGoB), which stipulated the requirement for the maintenance of a minimum of 60 per cent of the total land area under forest cover for all time. This was further enshrined in the Constitution of the Kingdom of Bhutan enacted in 2008. Currently, the country has 70.46 per cent of the total area under forest cover[1] (LCMP, 2010) and 51.44 per cent of the total area secured as protected areas and biological corridors.



Source: LCMP. 2010

Figure 1: Land cover map of Bhutan

Bhutan's current status of conservation and biodiversity is a result of the far-sighted vision and leadership of our Kings and our rich tradition of living in harmony with nature throughout the centuries. This has been further strengthened through the formal adoption of the development philosophy of Gross National Happiness (GNH), which categorically states environmental conservation as one of the four pillars of Gross National Happiness. This effectively ensures that development is never achieved at the cost of the environment. The Public Environmental Expenditure Review (PEER, 2014) of the Royal Government of Bhutan shows that a substantial portion of the public expenditures is spent on the environment for achievement of the government's environmental related policy objectives. From 2010 to 2013, seven per cent of the public expenditures went into RGoB's environment related programs.

1. The total forest cover for Bhutan including shrubs is 80.89 % (LCMP 2010)

1.3 Overview of Biodiversity of Bhutan

A: Ecosystem Diversity

I. Forest Ecosystem:

Forests[2] constitute the dominant ecosystem in Bhutan, with 70.46 per cent (LCMP, 2010) of the country under forest cover. Further, as a result of variance in the altitudinal range, with corresponding variation in climatic conditions, the country supports a wide range of forest types and vegetation zones. Broadly speaking, the country can be divided into three distinct eco-floristic zones with different forest types (Table 1).

Broadleaf forest, Chukha

2. "Forests" refer to a minimum area of land of 0.05-1.0 hectare with tree cover (or equivalent stocking level) of more than 10-30 per cent with trees with the potential to reach a minimum height of 2-5 metres at maturity in situ (LCMP 2010)

Table 1: Eco-Floristic Zones of Bhutan

Eco–Floristic Zones	Main Forest Types and dominant flora (plants)	Characteristic fauna (animals)
Alpine Zone Altitude – (4,000 + masl)	Alpine meadows and scrubs dominated by Rhododendron scrubs, Juniper and medicinal plants and herb species such as *Aconitum, Gentiana, Nardostachys, Delphinium, Rhodiola, Meconopsis, Osnoma, Dactylorhiza, Ophiocordyceps sinensis, Picrorhiza, Fritillaria,* etc.	Snow leopard, Lynx, Blue sheep, Himalayan marmot, Tibetan wolf, Takin, Musk deer.
Temperate Zone Altitude – (2,000-4,000 masl)	**Fir Forest – 3,000 masl+** Fir forest consists either of largely pure stands of *Abies densa* or mixed with other species such as *Juniperus, Taxus* and *Larix*. **Mixed Conifer Forest – 2,500-3,500 masl** Mixed conifer forest includes mixed stands of spruce, hemlock, juniper, fir, larch, taxus. Some broadleaf species are also common particularly *Quercus semecarpifolia, Quercus griffithii, Rhododendron spp., Acer spp., Betula spp.* **Blue Pine Forest – 1,500-3,200 masl** Blue pine forest consists of pure or dominant stands of blue pine. It is sometimes mixed with *Quercus semecarpifolia, Populus rotundifolia and Rhododendron spp.* **Broadleaf mixed with Conifer Forest – 2,000-2,500 masl** Consists of blue pine mixed with poplar, and other species such as *Castanopsis, Quercus, Persea, Litsea, Populus ciliata*.	Goral, Serow, Black bear, Grey langur, Red panda, Assamese macaque, Leopard, Tiger, Golden cat, Clouded leopard.

Sub Tropical Zone Altitude – (150-2,000 masl)	**Broad leaf Forest – 1,000-2,000 masl** Represented by species of *Castanopsis, Lithocarpus, Schima,* and *Quercus.*	Water buffalo, Golden langur, Sambar deer, Tiger, Golden cat, Clouded leopard, Capped langur, Gaur.
	Chir pine Forest – 700- 2,000 masl Pure stands of Chir pine or in association with *Quercus lanata, Quercus griffithii, Quercus glauca* and *Alnus nepalensis* along water courses. **Tropical Lowland Forest - <700 masl** Broadly classified as semi-evergreen but varies from almost totally deciduous on exposed dry slopes to almost evergreen in the moist valleys. Forests are multi- storied with high species diversity. Floristic composition consists of tropical species like *Shorea robusta, Terminalia myriocarpa, Bombax ceiba, Daubanga grandifolia, Sterculia villosa, Acacia catechu,* and *Terminalia nudiflora.*	

Source: Adapted from Ohsawa (1987) and LCMP (2010)

Alpine shrub forest, Phajoding

II. Aquatic Ecosystem:

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

a. Rivers

Due to the presence of a large number of glaciers and glacial lakes, high level of precipitation and the relatively well-preserved forests and watersheds, Bhutan is endowed with tremendous inland water resources in the form of rivers, rivulets, springs and streams. The four major river basins are *Amo Chhu* (Torsa), *Drangme Chhu* (Manas), *Puna Tsang Chhu* (Sunkosh) and *Wang Chhu*. *Drangme Chhu*, the largest river basin, drains more than one-third of the country's area.

Source: LCMP, 2010

Figure 2: Major river systems of Bhutan

Omta Ter Tsho, Wangduephodrang

b. Lakes

There are large numbers of small and medium-sized lakes spread across the country. Rajbanshi and Csavas (1982) had listed some 52 lakes in Bhutan from which about 24 were above 3,000 masl and added another eight as unexplored High Altitude Wetlands (HAWs[3]) in the Dagala area. Further, Mool *et al.* (2001) recorded a total of 2,674 glacial lakes in the country, with 24 posing potentially high risks. An inventory of HAW by the Ugyen Wangchuck Institute for Conservation and Environment (UWICE) reports about 3,027 HAWs (2,963 lakes and 63 marshes) covering 0.26 per cent of the country's total land cover with sizes varying from the smallest at about 35 sq.m to the largest at about 1.5 sq.km. The HAWs in Bhutan serve as the main source of freshwater in the country. The largest of all the lakes is the glacial lake at the terminus of Luggye glaciers at 4,506 masl (UWICE and WWF, 2010). However, currently, except for glacial lakes and HAWs, there is inadequate assessment of the area and location of lakes in other parts of the country.

3. High Altitude Wetlands (HAWs): HAW in Bhutan includes supra-snow lakes, supra-glacial and glacial lakes, open water lakes and marshes above 3000 m of elevation (UWICE-WWF Bhutan Program, 2010)

c. 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 ecosystem in the country. However, there has been no proper assessment carried out so far, except for 63 high altitude marshlands reported by UWICE. Marshlands are generally known to be rich in biota and are good habitats for resident as well as migratory birds, reptiles, amphibians and fishes. The best-known marshland in the country is the Phobjikha valley (1,244 ha.) at an altitude of 2,900 masl, where the globally threatened Black-necked Cranes roost in large numbers during winter[4]. The valley is also highly valued for its outstanding scenery and cultural ethnicity. Other important marshlands recognized as wetlands of international importance are Bumdeling (142 ha) (Ramsar site No. 2032) and Khotokha (114 ha) (Ramsar Site No. 2033) (www.ramsar.org).

Phobjikha valley - a popular winter habitat for Black-necked Cranes

4. Annual Black-necked Crane (BNC) counts by the Royal Society for Protection of Nature from 1986/1987 to 2013/2014 winter period (October-March) show that on an average around 245 BNC individuals arrive in Phobjikha to spend their winter. Since the 2005/06-winter period, the annual arrival of BNCs in Phobjikha has exceeded 300 individuals (RSPN, Thimphu, 2014)

Paddy field in Laptsakha, Punakha

d. Hot Springs

Hot springs, known as *Tshachu* in Dzongkha, are very popular in Bhutan. People in Bhutan mainly use hot springs for therapeutic benefits to ease ailments, especially those affecting bone and skin. So far, ten hot springs have been officially reported in the country but the number could be more. Some of the popular hot springs are Gasa *Tshachu* (Gasa), Duenmang *Tshachu* (Zhemgang), Dhur *Tshachu* (Bumthang) and Chubu *Tshachu* (Punakha).

III. Agricultural Ecosystem

The country has six major agro-ecological zones corresponding with different altitudinal ranges and climatic conditions. Table 2 gives an overview of the major agro-ecological zones along with characteristic features in terms of agriculture practices followed. The main land uses defined for agriculture include the *Chhuzhing* (Wetland Cultivation), *Kamzhing* (Dry land Cultivation), Apple Orchard, Citrus Orchard, Arecanut and Cardamom Plantation.

Table 2: Agro-Ecological Zones of Bhutan

Agro-ecological zone	Altitude (masl)	Rainfall (mm/annum)	Farming systems, major crops and agriculture produce
Alpine	3600-4600	< 650	Semi-nomadic people, yak herding, dairy products, barley, buckwheat, mustard and vegetables.
Cool Temperate	2600-3600	650-850	Yaks, cattle, sheep, horses, dairy products, barley, wheat and potatoes on dryland, buckwheat and mustard under shifting cultivation, temperate fruits and vegetables.
Warm Temperate	1800-2600	650-850	Rice on irrigated land, double cropping with wheat and mustard, barley and potatoes on dryland, temperate fruit trees, vegetables, cattle for draught and manure.
Dry sub-tropical	1200-1800	850-1200	Maize, rice, millet, pulses, fruit trees and vegetables, wild lemon grass, cattle, pigs and poultry.
Humid sub-tropical	600-1200	1200-2500	Irrigated rice rotated with mustard, wheat, pulses and vegetables, tropical fruit trees.
Wet sub-tropical	150-600	2500-5500	Irrigated rice rotated with mustard, wheat, pulses and vegetables, tropical fruit trees.

Source: Adapted from MoAF's 9th FYP and BAP, 2009

B. Species Diversity

I. Wild Species Diversity

a. Vascular Plants

The country's diverse ecosystems and eco-floristic zones harbour a rich array of vascular plants. The Flora of Bhutan records more than 5,600 species of seed plants out of which approximately 94 per cent are native species and about 105 species are currently endemic to Bhutan. The Bhutanese flora is also rich in plant species with enormous commercial value and scientific intrigue. The Institute of Traditional Medicine Services (ITMS) uses more than 200 plant species for formulation of various kinds of traditional medicines. Local healers are known to use more than 160 species as recorded in the National Traditional Knowledge (TK) database housed within the National Biodiversity Centre (NBC).

In terms of Pteridophyte diversity (Ferns and allies), currently 411 species in 27 families are recorded from the country (NBC, 2009).

Ceropegia bhutanica, an endemic plant species

Gentiana urnula, a medicinal plant from the alpine region

Cypripedium elegans, an orchid species

c. Non-vascular plants

Although there are many species of non-vascular plants, such as sphagnum mosses, liverworts and hornworts, there is no detailed inventory of this group of plants. Currently, only 282 species under 156 genera of mosses are recorded from Bhutan (Long, 1994).

d. Fungus

In terms of fungal diversity in the country, currently, about 350 species have been identified and recorded, although the number could be much higher once a complete survey is carried out and species identity determined. The current number is based on a partial inventory carried in the country and only of those species whose identity is confirmed. Out of this, about 53 are edible mushroom species. Many of these edible mushrooms are local delicacies and contribute to the livelihoods and nutrition of the rural poor (Mata *et al.,* 2010).

Sangay Shamu (Tricholoma matsutake)

Golden Oyster Mushroom (Pleurotus cornucopiae var. citrinopileatus)

e. Insect Fungi

The diversity and complexity of the associations of fungi and insects are poorly understood worldwide and more so in Bhutan. However, even with the limited studies on this group of organisms, more than 100 species are currently recorded from Bhutan and several species are suspected to be new to science (Mata *et al.,* 2010).

Insect fungi (Isaria tenuipes)

Insect fungi (Ophiocordyceps sinensis)

f. Lichens and Lichenicolous fungus

Lichens are a conspicuous element of biodiversity in Bhutan. However, very little studies are undertaken in this group. Currently only about 287 lichens and lichenicolous fungi are known from Bhutan, although experts estimate the occurrence of more than 1,000 species. Most species are those common to the Himalayas, except for some eastern North American species also found in Bhutan. For example, the rare *Ropalospora chlorantha*, so far only known from eastern North America is reported to occur in Bhutan. *Lepraria nigrocincta* is another species first reported in the Northern Hemisphere from Bhutan while *Pyrrhospora bhutanensis* is described as new to science (Aptroot and Feijen, 2002).

g. Mammals

Close to 200 species of mammals are known to occur in the country, including 27 globally threatened species (Table 3). Bhutan is also known to be rich in wild felids, harbouring 11 of the 36 globally recorded species. A study conducted in Royal Manas National Park in 2012, in an area as small as 74 sq. km, recorded six felid species, which is about 16 per cent of the global felid species confirming Bhutan as a hotspot for wild felids (Tempa *et al.,* 2013).

Snow leopard in Jigme Dorji National Park

Golden Langur (Trachypithecus geei)

Takin (Budorcas taxicolor) - The National Animal of Bhutan

Table 3: List of Globally Threatened Mammal Species found in Bhutan

Sl. No.	Species	Common name	Global Threat Category
1	*Sus salvanius*	Pygmy Hog	Critically Endangered
2	*Trachypithecus geei*	Golden Langur	Endangered
3	*Trachypithecus pileatus*	Capped Langur	Endangered
4	*Cuon alpinus*	Dhole/ Wild Dog	Endangered
5	*Ailurus fulgens*	Red Panda	Endangered
6	*Panthera tigris tigris*	Bengal Tiger	Endangered
7	*Uncia uncia*	Snow Leopard	Endangered
8	*Elephas maximus*	Asian Elephant	Endangered
9	*Rhinoceros unicornis*	One-horned Rhinoceros	Endangered
10	*Bubalus bubalis*	Asiatic Water Buffalo	Endangered
11	*Caprolagus hispidus*	Hispid Hare	Endangered
12	*Platanista gangetica*	Ganges River Dolphin	Endangered
13	*Macaca assamensis*	Assamese Macaque	Vulnerable
14	*Melursus ursinus*	Sloth Bear	Vulnerable
15	*Ursus thibetanus laniger*	Himalayan Black Bear	Vulnerable
16	*Moschus chrysogaster*	Himalayan Musk Deer	Vulnerable
17	*Lutrogale perspicillata*	Smooth-coated Otter	Vulnerable
18	*Prionailurus viverrinus*	Fishing Cat	Vulnerable
19	*Pardofelis marmorata*	Marbled Cat	Vulnerable
20	*Neofelis nebulosa*	Clouded Leopard	Vulnerable
21	*Catopuma temmincki*	Asiatic Golden Cat	Vulnerable
22	*Cervus duvauceli*	Swamp Deer	Vulnerable
23	*Bos gaurus*	Gaur	Vulnerable
24	*Capricornis sumatraensis*	Serow	Vulnerable
25	*Budorcas taxicolor*	Takin	Vulnerable
26	*Myotis sicarius*	Mouse-eared Bat	Vulnerable
27	*Rattus sikkimensis*	Sikkim Rat	Vulnerable


©NRED

The first captive bred juvenile White-bellied Heron release by RSPN in 2011

Rufous-necked Hornbill, Gomphu, Zhemgang

g. Avifauna

Bhutan is recognized as a part of several globally important bird areas, such as Sino-Himalayan mountain forests, Indo-Burmese forests, Indo-Gangetic grasslands, South Asian arid habitats, and Tibetan plateau wetlands (Bird Life International 2014). This explains the rich bird diversity that Bhutan has within its small geographic area. Currently, around 700 species are estimated to be found in Bhutan out of which 18 are globally threatened. Of the three critically endangered species found in Bhutan (Table 4), the White-bellied Heron is the most studied species with a population of 22 individuals[5] out of the estimated global population of 50-200 birds.

h. Herpetofauna

In terms of herpetofauna, there are limited studies and documentation carried out in the country so far. Nevertheless compiling all the past records, Bhutan has 61 species of amphibians (59 anurans, one caudata, one caecilian) and 124 species of reptiles (82 snakes, 20 lizards, two crocodile, 20 turtles and tortoise) recorded thus far (Wangyal, 2013, Wangyal, pers.com. Aug, 2014).

5. Source: www.rspnbhutan.org. RSPN,2014

Table 4: List of Globally Threatened Bird Species found in Bhutan

Sl. No.	Species	Common name	Global Threat Category
1	*Gyps bengalensis*	White-rumped Vulture	Critically endangered
2	*Ardea insignis*	White-bellied Heron	Critically endangered
3	*Sarcogyps calvus*	Red-headed Vulture	Critically endangered
4	*Aythya baeri*	Baer's Pochard	Critically endangered
5	*Arborophila mandellii*	Chestnut-breasted Partridge	Vulnerable
6	*Tragopan blythii*	Blyth's Tragopan	Vulnerable
7	*Aceros nipalensis*	Rufous-necked Hornbill	Vulnerable
8	*Apus acuticauda*	Dark-rumped Swift	Vulnerable
9	*Grus nigricollis*	Black-necked Crane	Vulnerable
10	*Gallinago nemoricola*	Wood Snipe	Vulnerable
11	*Haliaeetus leucoryphus*	Pallas's Fish-eagle	Vulnerable
12	*Sitta formosa*	Beautiful Nuthatch	Vulnerable
13	*Prinia cinereocapilla*	Grey-crowned Prinia	Vulnerable
14	*Aquila clanga*	Greater Spotted Eagle	Vulnerable
15	*Aquila heliaca*	Eastern Imperial Eagle	Vulnerable
16	*Mulleripicus pulverulentus*	Great Slaty Woodpecker	Vulnerable
17	*Chlamydotis undulata*	Houbara Bustard	Vulnerable
18	*Saxicola insignis*	White-throated Bushchat	Vulnerable

Source: BirdLife International (2014) Country profile: Bhutan. Available from: http://www.birdlife.org/datazone/country/bhutan. Checked: 2014-07-15

i. Invertebrates

Invertebrates are one of the least studied groups in the country giving an incomplete picture of the diversity of this species-rich group. The information presented here are of those groups, which have been studied to some extent. Although, Bhutan is reportedly expected to have 800 to 900 species of butterfly (van der Poel and Wangchuk, 2007), currently only about 586 species of butterfly and 69 species of moth are recorded (Singh, 2014). The first preliminary report on macro-invertebrates at *Nika Chhu*, *Mangde Chhu*, *Chamkhar Chhu* and *Kuri Chhu* and their tributaries catalogued about 1,107 fresh water insects belonging

to nine orders (WCP and WWF, 2012). There is also a record of a relict species of dragon fly, *Epiophlebia laidlawii*, an indicator of pristine water quality, from the head waters of *Dreychhu* stream above Dechencholing, Thimphu and *Lamchela Chhu* in Chendebji, Trongsa (BEO, 2008).

Wild Eri Silk Moth (Samia canningii), Mendrelgang, Tsirang

Ludlow's Bhutan Swallowtail - The National Butterfly of Bhutan

Table 5: A Summary of Butterflies, including Rare and Threatened Species Recorded from Bhutan

Sl. No.	Family	No. of Species Recorded	Rare and Threatened Species
1	Papilionidae	50	16
2	Pieridae	44	10
3	Lycaenidae	146	38
4	Nymphalidae	240	93
5	Hesperiidae	106	25
	Total	586	182

Source: Singh, 2014, www.biodiversity.bt

Odonates have been studied to some extent. Currently, from an inventory done in a few selected pockets in the country, 50 species of Odonata are recorded (Mitra, 2008). In case of hymenopterans, about six species of bees are recorded from Bhutan, out of which two are native honeybees *(Apis cerana* and *Trigona iridipennis*), while *Apis mellifera* is an exotic species introduced for commercial beekeeping. The other native bee species are *Apis laboriosa*, *Apis dorsata* and *Apis florea*.

j. Fish Fauna

Recent studies have reported a total of 91 freshwater native fish species[6] from Bhutan (Gurung, *et al.,* 2013) inclusive of the 49 species identified earlier (Dubey, 1978). However, it is widely believed that the current list of fish species in Bhutan is a gross underestimate of the actual freshwater fish diversity. Amongst the known species, Golden Mahaseer *(Tor putitora)* is considered endangered and is enlisted as a totally protected species in the Forest and Nature Conservation Act of Bhutan 1995. Apart from the currently known native species, there are nine introduced fish species[7] being promoted to increase fish production to enhance rural income and household nutrition and food security.

II. Domestic Biodiversity

a. Crops

As a predominantly agricultural country, Bhutan is rich in agricultural diversity. More than 100 species of agricultural crops are known to occur in the country. As a consequence of adaptation to microenvironments created by altitudinal and climatic variations, there are numerous landraces of crop species. NBC has so far recorded 384 landraces of rice, 105 of maize, 36 of wheat, 10 of sweet buckwheat, 11 of bitter buckwheat, 32 of barley, 22 of amaranth and 36 of millets. Several of the varieties and landraces represent adaptation to some of the highest agricultural lands in the world, with cultivation in the alpine agro-ecological zone extending up to 4,600 masl. While wheat is not an indigenous crop, varieties grown around Laya at 3,839 masl, 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.

In terms of Crop Wild Relatives (CWR), around 230 species belonging to 120 genera in 51 families are expected to occur in Bhutan (Tamang, 2003). For example, *Fagopyrum debotrys*, a putative wild relative of buckwheat and *Setaria viridis* of Foxtail millet are reported from

6. Check www.biodiversity.bt for Annotated checklist of fish species recorded from Bhutan

7. Check www.biodiversity.bt for introduced fish species list of Bhutan

Bhutan. Further, at least three wild relatives of rice *Oryza minuta* and *Oryza rufipogon* are reported in the Flora of Bhutan, while *Oryza officinalis* was recorded from Southern Bhutan in 2012 (NBC, 2013).

In terms of horticultural crops, while the country is believed to have rich diversity, there have been no detailed assessments carried out so far.

Oryza officianalis Wall. ExWatt. Wild rice species from Lhamoizingkha

A variety of crop seeds from a household on display at a biodiversity fair in Mongar, 2012

b. Livestock

At the species level, the livestock diversity of Bhutan is not different from those commonly occurring elsewhere in the Himalayas. However, there are many livestock breeds with marked genetic differences. For example, amongst the cattle breeds, *Nublang,* a traditional cattle breed of Bhutan believed to have originated in Sangbay Gewog of Haa, is genetically distinct from any other cattle breeds (Tshering and Rai, 2008). Another important animal genetic resource is the Mithun, a descendant of Gaur, which originated in Northeast India but has been bred in Bhutan since the 17th century. Mithuns are important due to the unique tradition of crossbreeding Mithun (male) with *Nublang* (female) to produce *Jatsa* and *Jatsham,* which are superior compared to either of the parent breeds. Similarly, yaks in Bhutan have distinct genetic differences between the population in Eastern and Western Bhutan.

Horse breeds found in the country are also considered to be unique. These breeds are *Yuta*, *Boeta*, *Merak-Saktenpa*, and *Jata*. 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 and is highly endangered as farmers are giving up sheep husbandry since it is no longer economically viable. Traditional Poultry breeds are classified into nine types with the popular *Yubja Naap*, *Belochem* and *Bailetey* featuring amongst them.

Nublang (Bos indicus), a native breed of cattle believed to have originated in Sangbay Gewog of Haa

Table 6: Livestock and Poultry Breeds of Bhutan

Sl. No.	Livestock Species	Traditional Breeds and Crosses	Exotic Breeds and Crosses
1	Cattle (*Bos indicus* and *Bos taurus*)	Nublang	Jersey
		Jaba	Brown Swiss
		Bajo	Jersey crosses
		Goleng	Brown Swiss crosses
2	Mithun (*Bos frontalis*)	Mithun/ Mithun crosses	
3	Yak (*Bos grunniens*)	Yak	
		Yak Crosses (*Zo, Zom*- Dz)	
4	Buffalo (*Bubalis bubalis*)	Buffalo (non-descript)	
5	Pigs (*Sus scrofa*)	*Jitupha*- Dz/ *Sapha*- Sh.	Large black
		Dhompha- Dz	Saddle back
			Duroc jersey
6	Chicken (*Gallus gallus*)	Pure black (*Yubja Naap*-Dz)	Ross 308 (Broiler strain)
		Naked neck (*Khuilay*- Lh)	Hyline Brown (Layer strain)
		Hairy comb (*Belochem*- Dz)	
		Frizzled (*Pulom*- Dz/*Dumsey*- Lh)	
		Native white (Yubja kaap- Dz)	
		Barred Yubja	
		Jarizam- Dz./ *Kaurey*- Lh	
		Jatey- Dz/*Sekini*- Lh	
		Bailetey- Lh	
7	Goat (*Capra hircus*)	Goat (non-descript)	
8	Sheep (*Ovis aries*)	*Jakar type*	Comeback cross
		Sakten type	
		Sipsoo type	
10	Horse (*Equus cabalus*)	*Yuta*	Hequ
		Boeta	Spiti
		Merak-Saktenpata	Haflinger crosses

1.4 Values of Biodiversity

Biodiversity conservation remains a pivotal part of Bhutan's rich heritage. As an agrarian society, biodiversity holds great economic, social, ecological, cultural and spiritual importance and has always been a source of sustenance, tradition and spiritual well-being. The distinct customary practices and traditions associated with biodiversity is testimony to the harmonic and vibrant relationship that exists between nature and culture. For example, the use of *Dru Na Gu* (nine important food grains) in offerings and rituals is very much alive even today, signifying the sacred role of biodiversity in culture and tradition.

The value of biodiversity can best be understood by looking at some key provisioning services. In the last five years (2008-2013), about 50 million cubic feet (cft.) of timber was allotted for commercial and rural purposes, out of which 16 million cft was for firewood alone (Table 7 and 8). Firewood still remains a major source of energy in rural areas with 58.96 per cent of the energy coming from biomass, which is primarily firewood (Dhital, 2009).

Other significant biological resources utilized include more than 60 species of Non-Wood Forest Products (NWFP) such as edible mushrooms, medicinal plants, wild vegetables, bamboos and canes, with over 99 NWFP management groups formed in the country (SFED database 2014). The most well known insect fungus, *Ophiocordyceps sinensis,* found in the alpine meadows of the country, is a highly valued biological resource due to its medicinal properties. It plays a significant role in uplifting the livelihood and economic prosperity of alpine dwellers due to its commercial value. In 2014, a total of 671.5 kgs of *Ophiocordyceps sinensis* was declared of which 554.6 kgs was auctioned and traded, fetching as high as Nu. 1.326 million per kilogram and earning Nu. 5.64 million in royalties to the government (DAMC, 2014).

Ethnobotanical artifacts

Table 7: Timber allotment by the DoFPS from 2008-2013

Product type	Concessional Royalty	Commercial Royalty	Free of Royalty	Total (2008-2013)
	Vol. in cft	Vol. in cft	Vol. in cft	Vol. in cft
Cham	7,625,770	53,693	129,227	7,808,690
Dangchung	360,167	9,712	7,968	377,847
Drashing	6,105,553	1,021,767	294,481	7,421,800
Fencing post	192,015	116,699	2,039	310,754
Firewood	8,776,923	6,704,714	511,363	15,993,000
Flagpole	154,346	32,019	-	186,365
Hakaries	-	49,085	254	49,340
Logs	327,667	3,805,321	19,938	4,152,926
Other poles	243,068	417,889	4,386	665,343
Other posts	64,628	56,414	119	121,161
Sawn Timber	43,585	250,513	2,451	296,549
Shinglep	225,281	8,899	19,143	253,323
Tsim	260,510	8,643	7,251	276,404
Woodchips	6,268	1,883,006	4,127	1,893,401
Total	**24,385,780**	**14,418,374**	**1,002,747**	**39,806,901**

Source: Forestry Facts and Figures (FFF), 2013

Table 8: Timber supplied by NRDCL from 2008-2012

Year	Concessional *(Qty. supplied in cft)*	Commercial *(Qty. supplied in cft)*	Total *(Qty. supplied in cft)*
2008	152,526	1,559,657	1,712,183
2009	180,326	1,888,526	2,068,852
2010	248,115	1,751,292	1,999,407
2011	213,691	1,757,874	1,971,564
2012	185,306	1,988,520	2,173,826
Total	**979,964**	**8,945,868**	**9,925,832**

Source: FFF, 2013

The other significant beneficiaries of Bhutan's rich biodiversity and the pristine environment are Hydropower and Tourism, the two major drivers of economic growth in the country, contributing 20 per cent to the GDP (GNHC, 2013a). Hydropower, which has the national potential to produce 20,000 MW of electricity, is a result of the maintenance of critical watersheds and provisioning of abundant supply of clean water. In tourism, although Bhutan is mainly a cultural tourist destination, nature and culture tourism is largely intertwined. For example, those on a cultural tour take time out to experience some form of nature-based activities, while those on treks take a few days to do some cultural sightseeing (BTM, 2013). However, there is huge untapped potential in nature tourism. In 2012, nature-based activities including trekking, bird watching, ecology, and adventure sports accounted for only about 13 per cent of about 100,000 tourists that visited the country (BTM, 2013). This has led to recent government initiatives in promoting nature-based tourism through opening of more landscapes and trekking routes, promoting community-based nature tourism and training more nature guides.

1.5 Policy and Legal Framework

Bhutan's commitment to environmental conservation has been translated into numerous Policies and Acts, and immortalized in the Constitution itself.

- The **Constitution of the Kingdom of Bhutan 2008** decrees that the country maintain a minimum of 60 per cent of the total land under forest cover for all time. Article 5.1 of the Constitution states that: "Every Bhutanese is a trustee of the Kingdom's natural resources and environment". The government is tasked 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 **Food and Nutrition Security Policy of Bhutan, 2014** was promulgated to create an enabling environment for a healthy population through physical, economic, and social access to safe and adequate nutritious food by the population at all times thereby contributing to Gross National Happiness. Amongst others, it promotes biodiversity conservation for food security and resilience.

- The **National Forest Policy, 2011**[8] ensures that Bhutan's forest resources and biodiversity are managed sustainably to provide a wide range of social, economic and environmental benefits while still maintaining the constitutional requirement of a minimum of 60 per cent of the country's total land area under forest cover. Some of the main features of the policy include a science-based participatory approach to forest governance and sustainable forest management with emphasis on efficient and environment-friendly technologies for value-addition and waste minimization.

- The **Biosecurity Policy of the Kingdom of Bhutan 2010** ensures the protection of the Bhutanese people and Bhutan's biodiversity from the harmful effects of pests and diseases, invasive alien species, genetically modified organisms, toxic chemicals and food additives.

- The **Economic Development Policy (EDP)** of the Kingdom of Bhutan 2010 identifies a broad range of economic growth opportunities based on "Brand Bhutan" as a Unique Selling Point and recognizes the success of the country's environmental conservation as one of the main drivers for developing the "Brand Bhutan" theme for which it calls for protection of biodiversity, genetic resources and promotion of indigenous knowledge. The vision of the EDP is "to promote a green and self reliant economy sustained by an IT-enabled knowledge society guided by the philosophy of GNH". It states that the

8. Revision of the Forest Policy 1974

economic development process will include environment mainstreaming in a phased manner to promote industrial growth and engage in environmentally-friendly production. The EDP also provides incentives to promote green technology, micro-hydro projects, solar, wind, biomass and energy efficiency and conservation programs.

- The **Bhutan Water Policy 2003** focuses on conservation of all forms of water resources and calls for integrated water resource management through extensive soil conservation, watershed area treatment, conservation of forests and increasing the forest area.

- The **Water Act of Bhutan 2011** establishes water resources as a state property and ensures that it is protected, conserved and/or managed in an economically efficient, socially equitable and environmentally sustainable manner.

- The **Waste Prevention and Management Act of Bhutan 2009** requires all development activities that generate waste to be planned and executed in harmony and within the carrying capacity of the country's fragile ecological settings. The Act states that a person polluting the environment or causing ecological harm shall be responsible for the costs of avoidance, containment, abatement, medical compensation, mitigation, remediation and restoration.

- The **Local Government Act 2009**[9] was formulated to support decentralized governance after the introduction of parliamentary democracy in 2008. In terms of environmental conservation, the Act empowers the local government with authority to regulate air, water and noise pollution; approve clearance for mining activities as per law, monitor the establishment of mines and quarries; regulate the harvesting of edible forest products in accordance with forest legislation; prevent encroachment into forests, community and government lands; hold in custody community forests and land as well as medicinal herbs; and to protect and conserve water sources and bodies.

- The **National Environment Protection Act (NEPA) 2007** provides for the establishment of an effective system to conserve and protect the environment through the National Environment Commission or its successors, designation of competent authorities and constitution of other advisory committees, so as to independently regulate and promote sustainable development in an equitable manner. The Act calls for the conservation of natural resources to be based on a participatory approach aimed at achieving an equitable sharing of the costs and benefits of conservation among resources users. It also promotes the use of clean energy and alternative technologies in order to reduce

9. Superseding DYT and GYT Chathrim 2002

use of fuel wood/timber from primary forests. The Act also calls for conservation and protection of wetlands, alpine regions, watersheds, and other vulnerable ecosystems in addition to the existing protected areas.

- The **Land Act of Bhutan 2007**[10] provides for the leasing of State land for economic and various other activities. All Tsamdro (grazing land) and Sokshing (forest land for collection of leaf litter) rights revert to the State and convert to leasehold uses with management plans giving preference to previous rights holders.

- The **Biodiversity Act of Bhutan 2003** provides for the conservation and sustainable utilization of biological resources and associated traditional knowledge and ensures protection of new plant varieties through a Sui Generis system. It also authorizes the implementation of the Access and Benefit-sharing regime to derive additional benefits in a fair and equitable manner.

- The **Environmental Assessment Act 2000** directs the government to ensure that environmental concerns are taken into account when formulating, renewing, modifying and implementing any policy, plan or program. It requires the issuance of environmental clearance as a pre-requisite to the approval of any development activity.

- The **Seeds Act of Bhutan 2000** regulates the import and export of agriculture seeds and prevents introduction of unwanted plants and diseases. It also promotes the seed industry with the aim to enhance rural income and livelihood.

- The **Pesticide Act of Bhutan, 2000** encourages the practice of organic agriculture and integrated pest management with a centralized system that controls and limits the import, sale and use of pesticides.

- The **Forest and Nature Conservation Act of Bhutan 1995** covers forest management, prohibitions and concessions in State Forests, forestry leases, social and community forestry, transport and trade of forestry produce, protected areas, wildlife conservation, soil and water conservation, and forest fire prevention.

- The **Plant Quarantine Act 1993** was enacted to prevent the introduction of pests not already present or widespread in the country; control those pests already present by restricting their spread and by endeavoring to eradicate them; provide facilities for services for import of plants and plant products; and extend cooperation in the prevention or movement of pests in international trade and traffic.

10. Amendment of the Land Act 1979

1.6 International Cooperation for Biodiversity Conservation

In keeping with Bhutan's strong environmental conservation history and commitment to the global process in addressing environmental concerns, it is now party to a total of 15 regional and international environment agreements and treaties.

Table 9: Membership of Bhutan to Biodiversity-related International Conventions and Treaties

Sl. No.	Treaties/Agreements	Year of Ratification/ Acceded
1	The Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization to the Convention on Biological Diversity	September 2013
2	RAMSAR Convention on Wetlands	January 2012
3	South Asian Wildlife Enforcement Network (SAWEN)	January 2010[11]
4	Vienna Convention for the Protection of the Ozone Layer	April 2004
5	Montreal Protocol on Substances that Deplete Ozone Layer	April 2004
6	International Treaty on Plant Genetic Resource for Food and Agriculture (ITPGRFA)	September 2003
7	UN Convention to Combat Desertification (UNCCD)	August 2003
8	The Cartageña Protocol on Biosafety to the UN Convention on Biological Diversity	September 2002
9	Kyoto Protocol to the UN Framework Convention on Climate Change	August 2002
10	Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)	August 2002
11	UNESCO World Heritage Convention	October 2001
12	UN Convention on Biological Diversity	August 1995
13	UN Framework Convention on Climate Change (UNFCCC)	August 1995
14	International Plant Protection Convention	June 1994
15	UN Convention on the Law of Sea	December 1982

11. The South Asia Wildlife Enforcement Network (SAWEN) was formally launched during the Second Meeting of the South Asia Experts Group on Illegal Wildlife Trade held from 29-30 January 2011 in Paro, Bhutan (www.sawen.org)

1.7 Existing Institutional Arrangement

The **Ministry of Agriculture and Forests** (**MoAF**) is the central organization for the formulation and implementation of policies and legal frameworks related to biodiversity, forests, livestock and agriculture. The Ministry has taken the leadership in the development of all the Biodiversity Strategies and Action Plans of the country. The following Departments and Central agencies of the Ministry implement various biodiversity programs, including programmes of work on thematic and cross-cutting issues of CBD as specified below:

- The **National Biodiversity Centre** (**NBC**) is mandated to coordinate the implementation of biodiversity conservation and sustainable utilization programs in the country, and specifically the objectives of the CBD. Currently it also implements the programmes of work for thematic areas and cross-cutting issues namely Agricultural Biodiversity, Biodiversity Information Management, Access to Genetic Resources and Benefit-sharing, Global Strategy for Plant Conservation, Global Taxonomy Initiative (flora), Invasive Alien Species and Traditional Knowledge, Innovations and Practices -Article 8(j).

- The **Department of Forests and Park Services** (**DoFPS**) is the overall authority for the management of forest resources and wild biodiversity. It is responsible for in situ conservation of wild biodiversity through the creation and management of a protected area system; protection and management of forest and wildlife resources; and education and public awareness.

- The **Department of Agriculture** (**DoA**) is mandated to enhance food security and income through improved management of field crops, horticulture crops and medicinal plants. Access to markets, farm inputs, construction of farm roads, selection of improved technologies and sustainable land management; and integrated pest management are some of the means identified to achieve its national goals.

- The **Department of Livestock** (**DoL**) is responsible for coordination, administration and management of services related to livestock production, livestock input supply and livestock health. It works towards attaining food-security and self-sufficiency in livestock products by ensuring prompt delivery of appropriate technologies and services.

- The **Bhutan Agriculture and Food Regulatory Authority** (**BAFRA**) regulates the trade of restricted biological resources and its parts and prevents the introduction of pests, diseases and Invasive Alien Species, including Genetically Modified Organisms. It also ensures safety of food and food products in the country for public health.

Apart from the Ministry of Agriculture and Forests, the other key stakeholders are:

- The **National Environment Commission** (**NEC**), chaired by the Prime Minister and composed of high-level multi-sectorial representatives is an independent authority and the highest decision-making body on all matters related to the environment and its management in the country. The National Environment Commission Secretariat (NECS) is responsible for implementing the policies, regulations and directives issued by the National Environment Commission.

- The **Department of Local Governance** (**DLG**) is responsible for overseeing development and governance affairs in the Local Governments for effective management and delivery of public services through provision of overall coordination and guidance in social, economic and political progress of Local Government affairs within the country's overall development guideline and implementation framework.

- The **Local Administration** (**Dzongkhag or Gewog**) is cross-sectorial and consists of government and locally elected representatives responsible for planning and implementation of plans and programs at the local level. They play an instrumental role in biodiversity conservation and sustainable utilization programs and in disseminating related information to the local communities.

- The **Royal Society for Protection of Nature** (**RSPN**) is a registered Public Benefit Organization (PBO) under the Civil Society Organization (CSO) Authority of Bhutan since 2010. RSPN has been engaged in environmental conservation through environmental education and advocacy, conservation of natural resources and sustainable livelihoods since 1987. It also focuses on research and emerging issues such as climate change, solid waste and water management.

- The **Bhutan Trust Fund for Environmental Conservation** (**BTFEC**) is an independent grant making Organization. It uses its annual investment income of USD 1.5 – 1.8 million to finance field programs for biodiversity/environmental conservation and the promotion of social welfare in the country.

1.8 Review of the Past NBSAPs

There have been notable achievements in the field of biodiversity conservation since the formulation of the first Biodiversity Action Plan (BAP) in 1997. In the thematic area of policy and legislation, over 12 acts, policies and strategies supporting biodiversity conservation and use were developed. In the thematic component on the protection of biodiversity, the country declared 51.44 per cent as protected area network and two RAMSAR sites. In the thematic component on conservation of species diversity, amongst other achievements, notable ones include the establishment of Human-Wildlife Conflict (HWC) Management Endowment Fund and Species conservation programs on Tiger, Snow Leopard, White-bellied Heron and the Black-necked Crane. To address the component on genetic diversity, major achievements include establishment of the National Crop and Animal Genebanks. To promote sustainable use of biological resources, a national strategy for Non Wood Forest Products was implemented and 556 community forests established covering 2.3 per cent of the total forest cover (SFED database, 2014).

In terms of gaps, the lack of a coordination mechanism for the implementation of the Biodiversity Action Plan stands out as the most severe in ranking. The other gaps range from inability to implement the activities prioritized in the action plan due to limited resources and capacities to sometimes conflicting policies.

Table 10 provides a comprehensive review of the past BAPs and identifies achievements and gaps in key biodiversity thematic areas and cross-cutting issues.

Table 10: Review of Past Biodiversity Action Plans- Key Achievements and Gaps

Biodiversity Thematic Areas	Key Strategies/ Actions Outlined	Key Achievements	Gaps/Issues
1. Policy, Legislation and Institutional development	a. Development of biodiversity policy and legal frameworks. b. Strengthening of institutional development and co-ordination mechanism at the national level. c. Enhancement of scientific knowledge base and technical capacity of staff.	a. Over 12 acts, policies and strategies supporting biodiversity conservation and use developed b. New institutions established to strengthen biodiversity conservation and sustainable use, namely National Biodiversity Centre in 1998, Ugyen Wangchuck Institute for Conservation and Environment (UWICE) in 2006, Watershed Management Division (WMD) in 2009, Nature Recreation and Ecotourism Division (NRED) in 2010 c. Quality Control and Regulatory Services upgraded to Bhutan Agriculture and Food Regulatory Authority (BAFRA) in 2003 d. Key publications on biodiversity include Mammals, Butterflies, Birds and Pteridophytes of Bhutan e. Study on endemic plants of Bhutan initiated f. Assessment of fish diversity initiated g. National Forest inventory initiated	a. Synergy and coherence among existing policies and acts on biodiversity b. Protocol on introduction of exotic plants and animals breeds c. Enforcement of existing policies and acts d. National coordination and institutional mechanism for the implementation of Biodiversity Action Plans. e. Studies on lower groups of plants, invertebrates, aquatic biodiversity, microbes, ecosystem services and valuation, etc. f. Capacities in taxonomy, valuation of ecosystem services, species conservation, Invasive Alien Species, etc

2. Protection of components of biodiversity (ecosystems, habitats and biomes)	a. Protection and management of protected areas, biological corridors, buffer and enclave zones. b. Protection and management of conservation areas outside protected areas system.	a. Increase in Protected Area System from 26.23 per cent in 1997 (Year of 1st Biodiversity Action Plan) to 51.44 per cent in 2008 b. Management zonation completed in three parks: Sakteng Wildlife Sanctuary (SWS), Bumdeling Wildlife Sanctuary (BWS)and Royal Manas National Park. (RMNP) c. The declaration of nine per cent of the country's area as biological corridors in 1999, as a gift to the earth from the people of Bhutan d. Regulatory Frameork[12] for Biological Corridors in Bhutan developed. e. Establishment of Royal Botanical Garden, Serbithang in 1999 f. Establishment and Management of Phobjikha Conservation area. g. Establishment of Royal Botanical Park, Lamperi in 2008 h. Declaration of two RAMSAR sites: Bumdeling and Khotokha in 2012 i. Guidelines for Zonation in National Parks and Wildlife Sanctuaries in Bhutan (2012) developed[13]	a. Operationalization of Khaling Wildlife Sanctuary and Biological Corridors b. Zonation of remaining parks and formulation of management plans for biological corridors c. Adequate financial and human resources for the development and implementation of management plans d. Legal status for Conservation Areas outside Protected Areas

12. Policy recommendations and framework for developing corridor management plans

13. DoFPS Working document 2/2013

3. Promote the conservation of species diversity	a. Conservation of globally threatened species and their habitats. b. Control and reduction of poaching of wildlife and illegal trade in their parts and products. c. Development of strategies to mitigate impacts of climate change on flagship species.	a. Species conservation programs on Tiger, Snow leopard, White-bellied Heron, and Black-necked Crane initiated b. Bhutan Forestry Enforcement Database (BhuFED) developed[14] c. Bhutan, one of eight countries to establish the South Asia Wildlife Enforcement Network (SAWEN) in 2011 to counter trans-boundary illegal wildlife trade d. Smart Patrolling System initiated in Protected Areas since 2011 e. Establishment of Human-Wildlife Conflict Management Endowment Fund in 2011 f. Electric fencing as a means for HWC management initiated since 2003 g. Climate change vulnerability assessment for three northern parks of Bhutan completed (JDNP, WCP and BWS) and climate change integrated in their management plans	a. Targeted species conservation program only for two out of 27 globally threatened mammal species and two out of 18 globally threatened bird species found in the country b. Adequate resources for research and enforcement. c. Sustainability of Human-Wildlife Conflict Management Endowment Fund.

14. Software for data maintenance and reporting

4. Maintain genetic diversity	a. Expansion of *ex-situ* conservation of Crop and Animal Genetic Resources. b. Promotion of on-farm conservation of traditional crops and livestock breeds c. Promotion of *in-situ* conservation of crop wild relatives. d. Promotion of development and commercialization of under-utilized crops and species.	a. National crop and animal gene bank established at NBC in 2005 b. On-farm conservation of local livestock breeds of *Nublang, Jakar* Sheep and *Saphag* (local pig) initiated c. On-farm conservation of traditional crops and animal breeds institutionalized. d. Integration of participatory conservation of traditional/local crops and breeds into research and extension system e. Community seed banks piloted at two sites f. Community-based crop and livestock insurance schemes piloted since 200 g. Revitalisation of buckwheat cultivation and product diversification in buckwheat, soya bean and maize initiated	a. Crop and livestock production programs aimed at increasing yield/ production without regard to maintaining genetic diversity b. Facilities for conservation of recalcitrant seeds c. Studies on extent and status of genetic diversity including characterization. d. Inventory of crop wild relatives and their habitats. e. Incentives for maintaining traditional crop varieties and animal breeds
5. Education and Awareness on biodiversity values	a. Development of Integrated Biodiversity Information System. b. Development of National Biodiversity Information System for monitoring the state of biodiversity resources. c. Promotion of public awareness on the value of biodiversity conservation and use. e. Scientific research to improve the status of knowledge.	a. Development of Bhutan Biodiversity Portal in 2013 b. Annual celebration of significant environment days on the global calendar institutionalized c. Organization of Biodiversity fairs through community participation. d. Introduction of agriculture curriculum in high schools e. Institutionalization of nature clubs in schools, colleges and monastic bodies f. Introduction of different-themed park festivals (Takin, Rhododendron, Mushroom, Nomads and Mountain) g. Framework for Environmental Studies for classes PP to X developed	a. Contribution of available and updated data and information to the Bhutan Biodiversity Portal b. Biodiversity information system for monitoring state of biodiversity resources c. Coordinated approach to advocate awareness on biodiversity and its values. d. Effective Information, Education and Communication (IEC) materials on biodiversity values e. Translation of research results into extension materials and dissemination

6. Promotion of Sustainable Use	a. Development and implementation of Integrated Conservation and Development Programs (ICDPs). b. Management of forest resources for sustainable production and utilization. c. Implementation of community and private forestry programs enhancing local community involvement in forest management whilst enhancing socio-economic benefits in terms of increased availability of and access to forest products. d. Promotion of sustainable land management technologies to protect the productivity and stability of various land uses. e. Promotion of sustainable agriculture through diversification of crop production and genetic base of crops.	a. At least 10 different forms of ICDPs implemented in seven protected areas b. Guidelines for Resource Assessment and Management of 10 Non Wood Forest Products (NWFP) developed in 2008 c. National Strategy for Non Wood Forest Products (2008-2018) developed d. National Strategy for Community Forestry (2010) developed e. Forest Resources Potential Assessment (2004 and 2014) carried out f. 556 Community Forests established g. 6.4 per cent of the forest area brought under sustainable forest management through 17 Forest Management Units and six working schemes established as of June, 2013 h. Forest Management Code of Bhutan 2004 developed. i. Management of areas outside FMU system initiated j. Sustainable Land Management (SLM) Program adopted and promoted at the national level. A total of 10,826.90 acres of vulnerable land improved and over 8,320 acres of Tseri (shifting cultivation) land converted to more sustainable land use k. The National Framework for Organic Farming in Bhutan (2007) and Master Plan for Organic Sector Development (2012) developed l. Participatory Varietal Selection (PVS) on paddy, maize, buckwheat and millet carried out to broaden genetic base/ diversity	a. Sustainability of ICDPs b. Management plan for timber extraction outside FMUs c. Equitable sharing of resources and benefits from Community Forests d. Regular monitoring and evaluation of natural resource base/ carrying capacity, including NWFPs and Community Forests e. Efficient timber harvesting technologies f. Cost effective Sustainable Land Management Technologies and Capacities at the local level g. Implementation of Master plan for Organic Sector Development. h. Support for informal seed system

7. Address Threats to biodiversity	a. Implementation of programs and development of 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. b. Enforcement of environmental impact assessment requirements.c. Harmonization of biodiversity conservation and infrastructure development /urban development plans. d. Development and implementation of comprehensive forest fire management programs. e. Reduction of grazing pressure on natural ecosystem. f. Development and implementation of measures to mitigate the impacts of climate change on natural ecosystem.	a. Land Act 1979 revised; Enactment of The Water Act 2011, The Environmental Assessment Act 2000, Waste prevention and Management Act of Bhutan 2009, and National Environment Protection Act, 2007; National Forest Policy 1974 revised; Biosecurity Policy 2008 developed b. The Environmental Friendly Road Construction (EFRC) manual/guidelines developed c. Institutionalization of Forest Fire Volunteers Program in 2008 and establishment of Community Forest Fire Management groups d. Initiatives to reduce grazing pressures such as improved feed and fodder technologies, stall feeding, pasture development and breed improvement in place e. Regional Climate Change Summit led by Bhutan to address impact of Climate Change on Biodiversity, Food Security, Water and Energy convened in 2011 f. Sectorial (Renewable Natural Resources) Adaptation Plan of Action for Climate Change 2013 developed g. 2nd National Adaptation Plan of Action for Climate Change, 2013 developed and under implementation	a. Monitoring and evaluation of compliance after issuance of Environmental Impact Assessment (EIA) clearances for developmental activities. b. Environmental safeguards and mitigation measures to reduce adverse impacts of developmental activities on biodiversity. c. Funds and capacity to implement EFRC. d. Sustainable solutions to address grazing pressures. e. Baseline data, information and knowledge on Climate Change and adaptation measures. f. Coordinated approach to address threats to biodiversity from Climate Change.

8. Control threats from invasive alien species	2. Development and implementation of measures to protect natural ecosystems against invasive species.	a. Preliminary inventory of invasive alien plant species conducted in 2009 b. Quarantine check points at strategic locations established	a. Technical and institutional capacity to monitor and manage invasive species b. Resource to manage porous border c. Awareness on invasive species
9. Maintain goods and services from biodiversity to support human well-being	a. Promotion of the use of biodiversity resources to support local livelihood based on the principles of Community Based Natural Resources Management (CBNRM). b. Enhancement and systematization of sustainable nature tourism products. c. Promotion of research and development in sustainable use of biodiversity resources.	a. Legalization of Ophiocordyceps sinensis (Cordyceps) collection by highland dwellers in 2004 b. Payment for Environmental Services (PES) initiated c. Watershed Roadmap developed in 2010 d. Eco-tourism initiated (10th FYP) and guidelines developed in 2012 e. MoU between MoAF and Tourism Council of Bhutan to promote eco-tourism in 2009-10 f. Bioprospecting initiatives implemented since 2009	a. Valuation of ecosystem goods and services b. Capacities of the local communities in natural resource management and PES framework c. Capacity in community-based tourism management. d. Bioprospecting capacities
10. Protect traditional knowledge, innovations and practices	a. Systematic documentation and protection of traditional knowledge associated with biodiversity.	a. Bio-prospecting and Traditional Knowledge (TK) unit established at NBC in 2011 b. TK database developed (2011) and inventory of TK associated with biodiversity initiated	a. Resources for documentation of TK b. Technical capacity for protection and scientific utilization of TK

11. Ensure the fair and equitable sharing of benefits arising out of the use of genetic resources	a. Development of comprehensive biodiversity policy and legal framework. b. Development of institutional mechanism and technical capacity for bio-exploration. c. Development of regional and international collaboration for Bioprospecting.	a. Enactment of the Biodiversity Act of Bhutan, 2003 b. Formulation of Access and Benefit Sharing (ABS) policy (Draft 2014) c. Bhutan Access and Benefit Sharing Fund established in 2010 d. Five ABS agreements executed since 2009	a. Revision of the Biodiversity Act of Bhutan, 2003 in line with the Nagoya Protocol and ABS Policy of Bhutan b. Legal, technical and institutional capacities to implement ABS regime c. Formalization of a national institutional mechanism for implementation of the ABS regime

1.9 Lessons Learned from the Earlier BAPs/ NBSAPs

The process for preparation of Biodiversity Action Plans (BAPs) has progressed since the release of the first BAP in 1997 to BAP III in 2009. The following are the major lessons learnt from the development and implementation of past BAPs:

a. The BAP development process brought together different stakeholders under one umbrella, which was instrumental in preparing comprehensive and integrated Biodiversity Action Plans.

b. The Action Plans provided a good reference on biodiversity and emerging issues, assisting institutions and individuals in preparing project proposals for funding.

c. While the past BAPs had strategies and actions outlined to address the issues related to biodiversity, lack of clear targets and indicators, including a monitoring and evaluation mechanism, made it difficult to assess progress and achievements in an objective manner.

d. The lack of fund projections and a resource mobilization strategy for the actions outlined in the past BAPs led to poor implementation.

e. The lack of a communication and outreach approach in the past BAPs resulted in poor ownership and implementation by partners.

f. Relevant institutions established to support the implementation of actions outlined in BAPs were not delegated with rightful authorities and opportunities.

g. The lack of a national mechanism for coordination, fund mobilization and implementation of various programs of works under CBD also resulted in poor implementation of past BAPs.

1.10 Process of Formulating the Updated NBSAP

Unlike the past BAPs (which was developed by consultants through the support of technical working groups), the current National Biodiversity Strategies and Action Plan (NBSAP) is prepared by a National Task Force (NTF) representing key biodiversity stakeholders in the country under the coordination of the National Biodiversity Centre. The process was adopted to strengthen national capacity, ease mainstreaming of strategies and actions in sectorial development plans and programs, and promote ownership of the NBSAP as

a guiding document. The development and finalization of NBSAP 2014 involved the following process:

i. Stakeholder mapping to identify agencies to constitute the National Task Force (NTF) for the revision of the NBSAP.

ii. Review of existing biodiversity conservation and use programs in the country and understanding of 2020 Aichi Targets.

iii. Formulation of NBSAP 2014 framework and conceptual features.

iv. Review of past BAPs to understand the progress of implementation of programmes of work and thematic areas, and identification of gaps, issues and opportunities.

v. Identification of current threats and trends affecting biodiversity conservation and sustainable use.

vi. Taking stock of the baseline information.

Regional stakeholder workshop in east-central region


©Pema Gyamtsho

vii. Identification and prioritization of issues related to biodiversity in setting national targets.

viii. Setting of draft national targets and indicators based on national context and guided by the 2020 Aichi Targets.

ix. Development of strategies and actions to achieve the set national targets.

x. Stakeholder mapping to identify stakeholders for participation in the consultation workshops.

xi. Sub-national (East, West and South-Central regions of the country) and national consultation workshops held in a participatory and inclusive manner through group discussions, questionnaires, quiz, etc., to identify and incorporate national/local issues and prioritize draft national targets.

xii. Stakeholder mapping for identification of key implementing agencies in the NBSAP implementation framework.

xiii. Presentation and discussion of the draft NBSAP 2014 to conservation institutions in the Asia region.

xiv. Sharing of the draft NBSAP with biodiversity target and indicator champions in international organizations to get their feedbacks and comments.

xv. Presentation of the draft NBSAP to policy makers for further review and consensus.

xvi. Endorsement of the revised NBSAP by the government and its adoption as the national guiding document on biodiversity management in the country.


©Pema Gyamtsho

CHAPTER: 2

Threats to Biodiversity: Direct and Indirect Pressures Affecting Biodiversity

2.1 Direct Pressures

One of the major factors of natural habitat loss affecting the ecosystems of Bhutan is land use conversion while forest fire is the major factor causing habitat degradation and fragmentation. Over grazing on rangelands and unsustainable agricultural practices are some of the other factors leading to soil erosion and subsequent land degradation.

2.1.1: Land Use Conversion

Given the fast pace of socio-economic development[15] in the country, forest areas are either lost or cleared for various activities such as construction of hydro-power and transmission lines, roads, schools, hospitals, mining and quarrying, etc. A total of 38,577 acres of Government Reserved Forest (GRF) has been allocated for developmental activities from 2008 to 2013. Out of the total forest area converted for various uses, land allotted for construction of power transmission lines and roads make up 49 per cent, while land leased for other purposes account to 30 per cent (Table 11).

15. Real growth rate averaging 8 per cent per annum over the five years of the 10th plan (11th FYP, RGOB)

Road construction in Gasa, 2014. Land allotted for construction of power transmission lines and roads accounted to 49 per cent of the GRF land allotted for development activities from 2008-2013

Table 11: State Forest Land allotted for different purposes in acres from 2008-2013

Activity	2008-09	2009-10	2010-11	2011-12	2012-13	Total	Percentage
Allotment to Govt. institutions	823	784	440	1,150	524	3,720	9.64
GRF land allotment	336	250	339	474	563	1,961	5.08
Kidu land	48	35	52	65	318	518	1.34
Land exchange	80	45	37	14	14	189	0.49
Lease	2,503	928	4,818	2,211	1,180	11,640	30.17
Lhakhang	27	21	16	8	9	81	0.21
Road	758	1,608	2,236	1,275	5,704	11,581	30.02
Satshab	320	256	401	290	254	1,520	3.94
Transmission lines	1,862	1,515	1,947	757	1,286	7,368	19.10
Total	6,757	5,441	10,286	6,243	9,851	38,577	100.00

Source: FFF, 2013

Pressures from mining on ecosystems and biodiversity result mainly from clustering of mines within a certain geographical area as reflected by the fact that 48 per cent of the mines in Bhutan are concentrated within one district of Samtse (National Council of Bhutan, 2013). These activities not only lead to loss of natural habitat *vis-à-vis* forest land but also trigger habitat fragmentation and degradation, impacting negatively on biodiversity and often resulting in human-wildlife conflict.

Further, construction of hydropower is seen as one of the key threats to aquatic biodiversity due to fragmentation of river ecosystem resulting in destruction of habitats and spawning ground and physical barriers to fish migration.

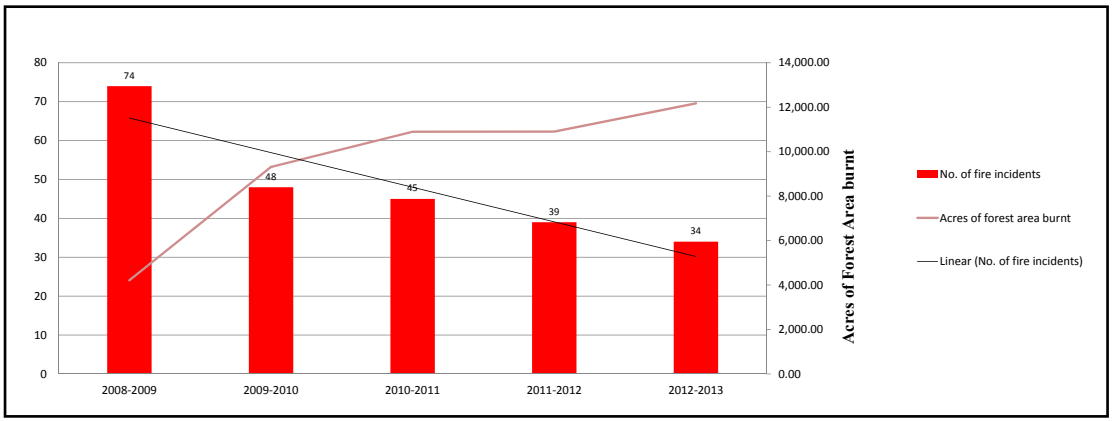
2.1.2: Forest Fire

Forest fire is one of the main causes of forest degradation and loss of forests and associated biodiversity in Bhutan. DoFPS has recorded an average of 48 fire incidents annually in

Forest fire in a chirpine forest, Wangduephodrang, 2013

the last five years causing damage to a total of 47,501 acres of forest land. Although the incidence of forest fire is seen to decline over the years with just 34 cases in 2012-2013 in comparison to 74 in 2008-2009, the area destroyed has increased from 4,211.3 acres to 12,175.2 acres in those years (Figure 3).

Forest fires are not always detrimental to biodiversity, especially in fire adapted ecosystems or when used as a management tool. Recurrent forest fires, however, can lead to a gradual degeneration of the site and obliteration of associate species, rendering the site vulnerable to land degradation and ecosystem change. Furthermore, forest fires in Bhutan generally spread to steep, inaccessible areas beyond the intended ecosystem/habitat and ravages everything in



Source: FFF, 2013

Figure 3: Trends in forest fire incidence and acreage burnt from 2008-2013

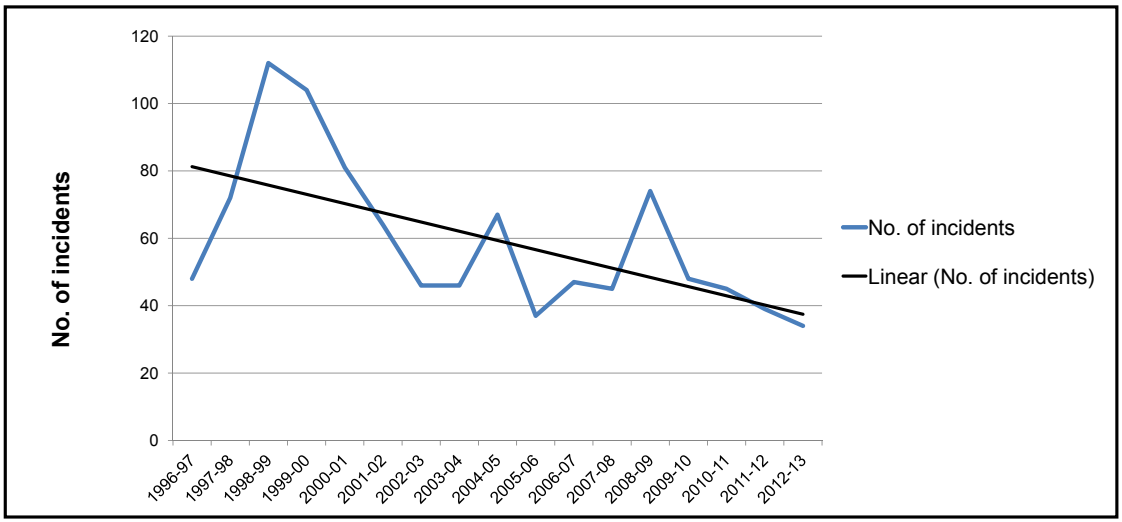


Figure 4: Forest fire trend in the last 17 years

Source: FFF, 2013

its path, leading to detrimental effects that far outweigh any potential benefits. Moreover, the causes of fires are mostly man-made such as increasing area for cattle foraging, preventing wildlife invasions and other accidental cases. Therefore, forest fire still poses a serious threat to biodiversity in the country.

2.1.3: Over Extraction of Timber and Fuel wood

The current trend of timber extraction is of serious concern given the fact that most of the timber resources are supplied on an *ad hoc* basis from unmanaged forests. The Natural Resources Development Corporation Limited (NRDCL) has extracted about 10 million cft of commercial timber in the last five years (2008-13) from Forest Management Units (FMUs) and working schemes, based on the annual allowable cut determined by the DoFPS. In addition, during the same period, the DoFPS allotted about 40 million cft of timber for various uses, much of which were supplied on an *ad hoc* basis[16]. Therefore, the sustainable limits of these forest resources, particularly those supplied from areas outside FMU systems are a concern.

Stacked fuel wood, Phobjikha

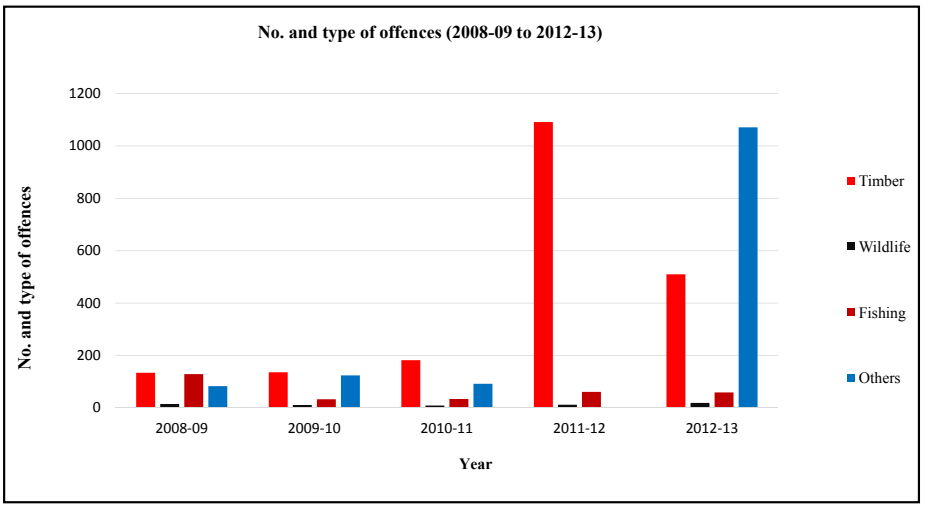
16. Refer Table 7 and 8

2.1.4: Overgrazing

There is a general perception in Bhutan that rangelands[17] are degrading due to overgrazing. Choephyel (2009) reported that overgrazing was noticeable in rangelands of Trashigang and Mongar because of increased livestock population and decreased grazing areas due to gradual colonization by unpalatable woody species. The overgrazed bare ground was exposed to soil erosion. However, others believe that change in vegetation cover may have resulted from other factors such as forest fire, lack of fire (discontinuation of the use of fire in range land management regimes in the alpine region), extreme weathers and natural events, land use change and grazing by herbivore other than domestic livestock (Gyamtsho, 1996; Gibson, 1991). Furthermore, due to the lack of detailed assessments of rangeland resources and quantitative data, the widespread claims of overgrazing and resulting rangeland degradation cannot be substantiated or generalized (Gyeltshen, undated).

2.1.5: Forest offences and wildlife poaching

The most common forest offence reported pertains to illegal trade and transport of timber (FFF, 2013). Other offences include wildlife poaching, illegal harvesting of NWFP, fishing, retaliatory killings, forest fire, etc. The driving factors are most likely to be the booming construction sector, lucrative market for high value medicinal species, and expansion of farm roads.



Source: FFF, 2013

Figure 5: Forest offences detected from 2008-2013

16. Refer Table 7 and 8

17. The rangelands of Bhutan comprise alpine and sub alpine grasslands, temperate scrublands and sub-tropical forests

2.1.6: Unsustainable Agricultural Practices

Factors contributing to unsustainable agricultural practices are farming on steep slopes, increasing and imbalanced use of inorganic fertilizers, shifting cultivation, and increasing use of chemical pesticides (NAP, 2009). These factors are of concern when we consider the fact that only 2.93 per cent of the country's area is cultivated agricultural land (LCMP, 2010).

Problems from steep slope agriculture arise mainly due to the fact that 31 per cent of farming is on land with more than 50 per cent slope. Imbalance in the use of inorganic fertilizer is largely due to high use of urea (nitrogen supplying compound) which is affordable compared to other inorganic fertilizers. This has resulted in an increasing gap between the application of N (Nitrogen) and that of P (Phosphorus) and K (Potassium), creating an imbalance in soil nutrient management with the average national NPK ratio of 6:1:1 (NAP, 2009).

Although increasing use of chemical pesticides is identified as one of the unsustainable agriculture practices, the impacts of chemical pesticides on land and environment is not yet known (NAP, 2009).

Shifting cultivation, known as *Tseri* in Bhutan, is an age-old farming practice prevalent among many farming communities of the country especially in the east and south-central

Shiftng cultivation in a remote village, Zhemgang

regions. While it does not cause major environmental degradation when carried out using traditional knowledge and practices and is even known to increase biodiversity, the concern arises when there is prolonged cultivation and shortening of fallow cycles leading to decline in productivity and stability of the land. However, the government has currently imposed a ban on *Tseri* cultivation.

2.1.7: Pollution

Pollution is an emerging concern and the different sources of pollution are all indicative of the rapid socio-economic development, urbanization, increasing population densities in localized areas and industrialization in the country. Solid waste is a major source of land pollution. Domestic sewage, waste oil and effluents from automobile and industries are the major water pollutants. Carbon dioxide emissions from industries, energy sector and vehicles and ambient dust from industries are the main sources of air pollution. Increasing sediment load in the rivers and streams from surface erosion and poor percolation due to developmental activities is also an emerging concern. Measures in place to control and manage pollution include adoption and enforcement of vehicle emission and industrial

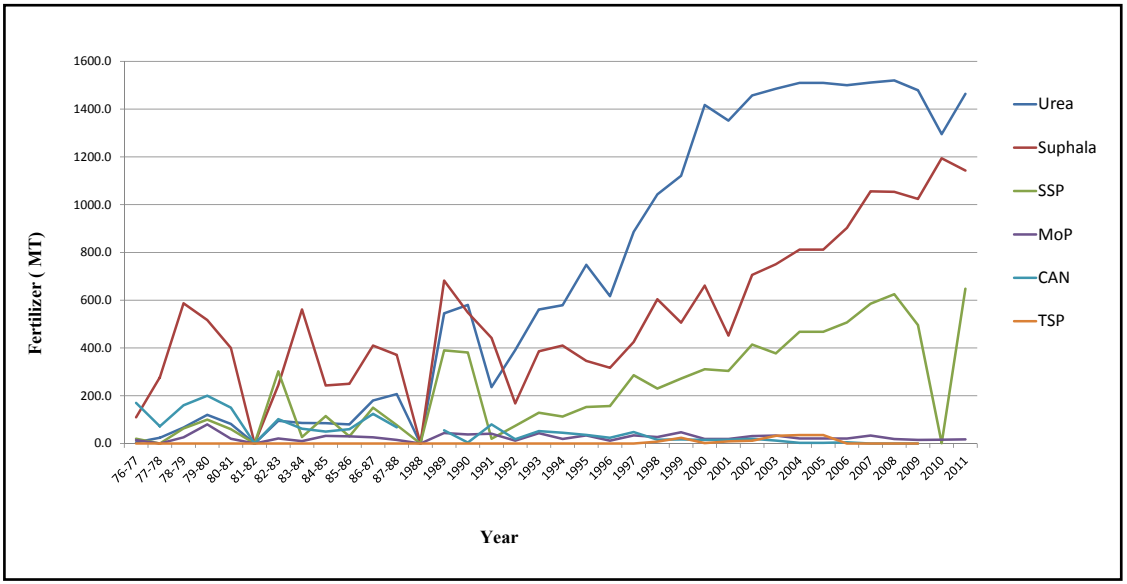


Figure 6: Fertilizer distribution by year and type

Source: Master Plan for Organic Sector Development, MoAF, 2012

18. Refer Annexure 2.1for list

discharge and emission standards 2004 to control air and water pollution. The Clean Technology and Environmental Management (CTEM) Fund is also established to support industries which existed before the enactment of the Environmental Assessment Act 2000, to upgrade pollution abatement equipment to meet the industrial emission standards. Furthermore, the Waste Prevention and Management Act 2009 addresses pollution from all kinds of waste (BEO, 2008). The Green Tax levied since 2012 on any new purchase of fossil fuel run vehicles is also an important initiative of the government.

Bhutan started using synthetic agro-chemicals like fertilizers and pesticides in agriculture in the 1960's as a way to increase food production. Although the import of inorganic fertilizers has been rising (Figure 6), the rate of its application at the current estimated rate of 24.6 kg/ha cropped land is considered low compared to global fertilizer application rate. Furthermore, the use of these chemicals is restricted to the regions that are accessible by roads and mainly for some major food and cash crops such as potato, apple, rice and maize. The import and use of synthetic agrochemicals and fertilizers are also regulated by the government and currently only about 30 per cent of farmers use inorganic fertilizers, which is mostly mixed with farm yard manure. The use of agrochemicals (pesticides) also shows an increasing trend (Figure 7) but is mainly due to the increasing use of herbicide Butachlor in rice and Metribuzin for weed control and haulm destruction in potato (NOP, 2012).

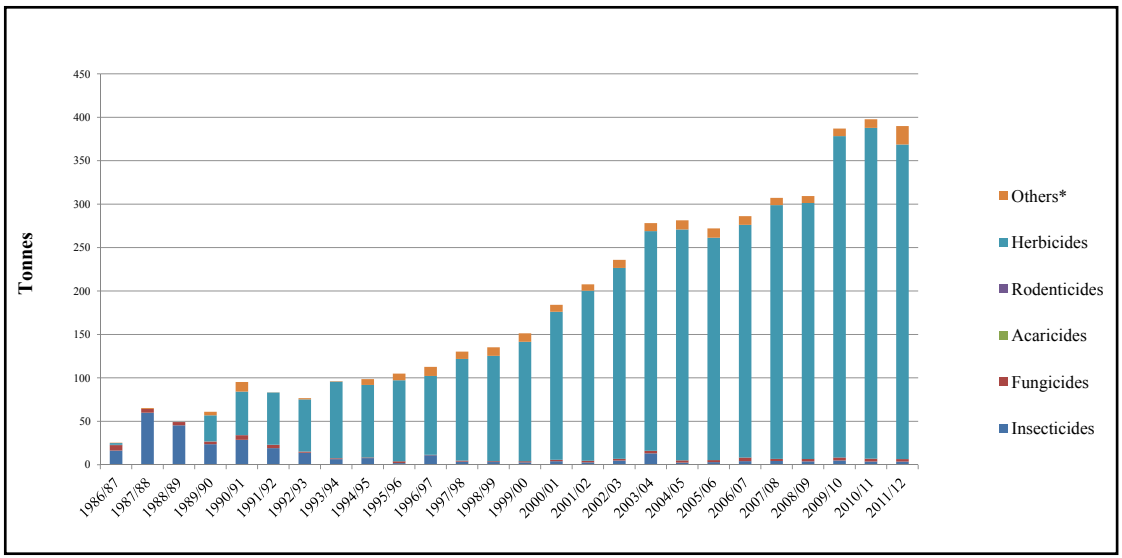


Figure 7: Overall trend in pesticide consumption for pest management since 1986

Source: Master Plan for Organic Sector Development, MoAF, 2012

2.1.8: Invasive Species

Global Invasive Species database records 46 Invasive Species from Bhutan out of which 11 are alien[18]. However, there has been no systematic and comprehensive inventory of Invasive Alien Species (IAS) in Bhutan, apart from a few scattered studies. A pilot inventory carried out by the National Biodiversity Centre recorded more than 40 invasive plant species, out of which eight were categorized as major invasive plant species[19].

There is also no assessment carried out on the socio-economic and environmental impacts of IAS. However, the spread of some of the IAS such as *Trifolium repens* (white clover), *Ageratina adenophora, Chromolaena odoratum, Eichhornia crassipes*, into the local landscape and water bodies is well known. Concerns also arise from the accelerated establishment of IAS due to changing climate and native plant species such as *Potamogeton distinctus* becoming invasive, which is reported to reduce rice yield by 35 per cent (http://www.rcbajo.gov.bt/technology/plant_protection.php - accessed on 22nd April 2014).

Ageratina adenophora - Invasive Alien Species

19. Refer Annexure 2.2 and 2.3 for list

Farmers guarding their maize field against wildlife, Trashigang

2.1.9: Human-Wildlife Conflict

Human-Wildlife Conflict (HWC) is a growing concern in a country that has more than half of its total area under protected area system and at least two thirds of the populace dependent on agriculture and livestock farming. Livestock depredation and crop damage are two major problems caused by wildlife, posing serious threats to livelihood and domestic diversity. Records show about 55 per cent of the crop damage in the country is attributed to wildlife damages, while livestock losses account for more than 2,035 heads from 2002-12. According to the latest report, on an average, a household spends 110 nights in a year guarding crops (WCD, 2013), reflecting the deleterious impacts these recurrent conflicts have on rural livelihood and quality of life. HWC is also one of the contributing factors in agriculture land fallowing and rural-urban migration.

Since human-wildlife conflict causes substantial economic and social costs to the rural communities, it also results in retaliatory killings, resentment against policies, and lack of support towards conservation initiatives. For example, retaliatory killing through poisoning of dholes a few decades ago almost eliminated the species from the wild (WCD, 2013).


©RSPN

2.2 Indirect Pressures

2.2.1: Climate Change

Although there are no systematic studies of climate change impacts on biodiversity and ecosystems *per se*, there are observations of Bluepine (*Pinus wallichiana*) encroachment into spruce/maple/birch forests and decline of *Abies densa* forests on the mountain tops in the 1980s due to moisture stress (Gratzer *et al.,* 1997). Such effects could be exacerbated due to increased incidence of moisture stress from rising temperature. Concerns are similar for the montane cloud forests of Bhutan which occur around 2,500 masl in the inner deep dry valley slopes of Dochula-Bajo series (Wangda and Ohsawa, 2010). These are vulnerable to change in temperature and human disturbances which could lead to habitat loss for some important relict plant species like *Taxus, Magnolia, Tetracentron* and endangered bird species such as hornbills.

Other threats to biodiversity which could be exacerbated due to climate change include loss of agrobiodiversity, increased incidence of pests and diseases, accelerated establishment of IAS, forest fires and bio-cultural loss.

2.2.2: Population

The total population of the country is estimated at 733,004[20]. Despite a gradual decrease in population growth rate from 3.1 per cent in 1994 to 1.3 per cent in 2005, the population is projected to grow to around 809,937 in 2020 (SYB, 2013). The population density will increase from 16 persons (2005 estimate) to about 21 persons per square km (GNHC, 2013a). Although the overall population is still low, the limited arable and habitable land could result in demographic pressures on the natural environment.

2.2.3: Poverty

According to the Poverty Analysis Report 2012 (NSB, 2013), the poverty incidence has declined from 31.7 per cent in 2003 to 12 per cent in 2012. Rural poverty has decreased from 38.3 to 16.7 per cent. Nevertheless, all three reports of 2003, 2007 and 2012 reveal poverty to be a rural phenomenon (GNHC, 2013a) as poverty in rural areas at 16.7 per cent is significantly higher than urban areas at 1.8 per cent (NSB, 2013). This is significant considering that the rural poor are dependent on natural resources for their livelihood, often engaging in unsustainable harvesting of timber and non-wood forest products resulting in depletion of these resources.

20. Based on the exponential growth rate of 1.8 per cent derived from population projections (2005-2030)

©Tshering Phuntsho

CHAPTER: 3

Issues and Opportunities in Biodiversity Conservation and Sustainable Use

3.1 Awareness on Biodiversity and Biodiversity Values

In terms of Bhutan's efforts in environmental education and public awareness program, it has a well recognized history as early as the late 1980s. Both government and non-governmental agencies have been actively involved in running these initiatives through establishment of school nature clubs and School Agriculture Programs; awareness-raising through different

Farmers participating in a biodiversity fair, Dagapela, 2013

forms of media; celebration of the national social forestry day and significant environment days on the global calendar. However, such awareness programs have been *ad hoc* and limited to the basic understanding on environment, forests, protected areas, waste management, conservation activities, etc. The National Environment Protection Act 2007 mandates National Environment Commission (NEC) and its Secretariat to raise environmental education, advocacy and awareness. The past Biodiversity Action Plans of Bhutan and other national documents such as the Tiger Action Plan for the Kingdom of Bhutan 2006-2015, and National Action Plan on Biodiversity Persistence and Climate Change, 2011, reiterate the need for improving and up scaling Environmental Education in a coordinated manner. Despite the explicit directives provided by the Act and the national documents to implement environmental education and awareness programs at various levels, there is still a lacuna in the system in reaching out to the public at large. What has been lacking quintessentially is a well-planned and coordinated mechanism amongst the relevant biodiversity stakeholders to ensure that the environmental education and awareness program elevate the public understanding of the importance of biodiversity and their role in conserving it. This has resulted in lack of information on the level of public understanding of biodiversity and its values and formulation of appropriate awareness programs.

Student painting on the theme "Biodiversity and Water" for the International Biodiversity Day celebration in 2012

3.2 Valuation of Biodiversity and Ecosystem Services

While the overall value of forests and the environment has always been recognized and reflected in many national documents and planning guidelines and the inherent respect that people hold for the environment is well understood, till date there has not been a proper assessment of such values. Even the critical watersheds supplying clean and abundant water for the generation of hydropower, a major driver of economic growth and a revenue generator in the country has not been valuated. Recognizing this, the government has taken recent initiatives to establish Gross National Happiness Accounts, covering ecological capital, cultural capital, human capital, social capital and economic capital (GNHC, 2013a). A preliminary study has also been carried out, which estimates the total ecosystem service mean value[21] of Bhutan at approximately USD 15.5 billion per year and identifies temperate forest, cropland, grassland, lakes/rivers and inland wetland as the major contributing ecosystems and forests as the leading contributor in terms of essential ecosystems services. More importantly, a significant finding of the study was that 53 per cent of ecosystem services provided by Bhutan's environment benefit those outside Bhutan (Kubiszewski *et al.,* 2013). However, efforts to carry out valuation of biodiversity and ecosystem services are still at a very nascent stage given the limited capacities in terms of technical, financial and human resources in the country and the lack of an institutional mechanism to coordinate and lead such programs.

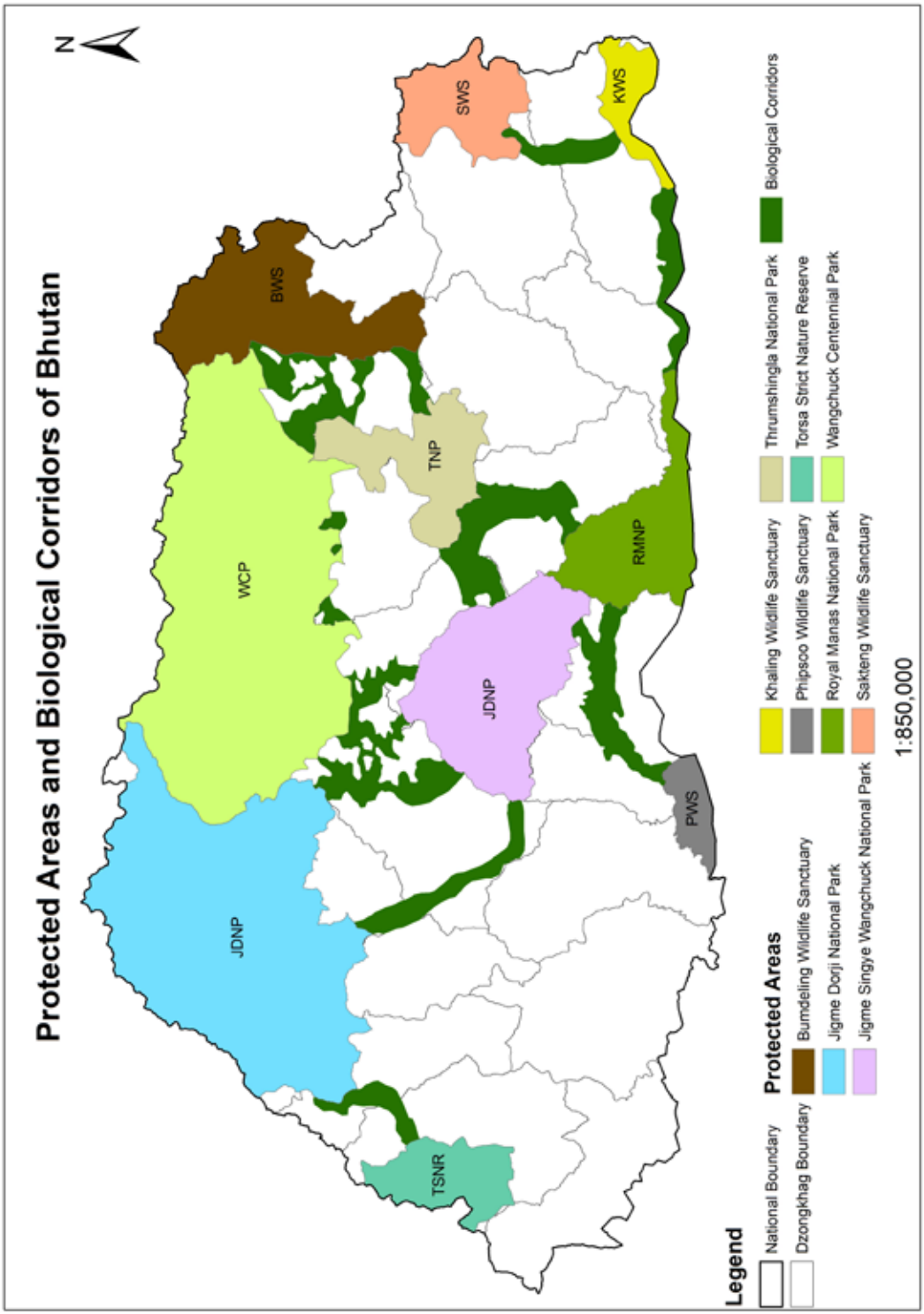
This has to be addressed rather quickly in the face of rapid socio-economic development *vis-a-vis* the conservation efforts to uphold the constitutional mandate to maintain 60 per cent of the land under forest cover.

3.3 Protected Area Management

Bhutan has a significant proportion of its area preserved through a network of protected areas which are ecologically representative of the major ecosystems ranging from sub-tropical grasslands and mixed deciduous forests to the alpine ecosystem. Humans are an integral part of the protected area landscape in the country. However, the greatest conservation challenge that Bhutan faces is to operate the protected areas at the highest standard with sustainable financing while maintaining a balance between conservation and sustainable utilization. Currently most of the protected area boundaries have not been clearly demarcated and zoned for management interventions resulting in *ad hoc* planning of services/facilities and

21. Mean value for provisioning, regulating and cultural services


©Ngawang Gyeltshen


Protected Areas and Biological Corridors of Bhutan
N
BWS
SWS
KWS
WCP
TNP
RMNP
JDNP
JDNP
PWS
TSNR
Legend
National Boundary
Dzongkhag Boundary
Protected Areas
Bumdeling Wildlife Sanctuary
Jigme Dorji National Park
Jigme Singye Wangchuck National Park
Khaling Wildlife Sanctuary
Phipsoo Wildlife Sanctuary
Royal Manas National Park
Sakteng Wildlife Sanctuary
Thrumshingla National Park
Torsa Strict Nature Reserve
Wangchuck Centennial Park
Biological Corridors
1:850,000

Sakteng Wildlife Sanctuary: Humans are an integral part of the protected area landscape in the country

resource extraction often conflicting with conservation goals and rules (NCD, 2009). The lack of physical demarcation of the different zones also poses a challenge in ensuring legal protection of these areas in case of encroachment/land conversion.

3.4 Conservation of Species

While overall biodiversity conservation is ensured through the protected area network, specific species conservation plans are limited to a few endangered species like Tiger, Snow Leopard, White-bellied Heron, and Black-necked Crane. Recent efforts have also been made by the National Centre for Aquaculture (NCA) in spearheading the development of breeding techniques of an important native fish species, (Golden Mahaseer) and enhancement of stock, with the first release of 1,200 hatchery-bred Golden Mahaseer fingerlings in March, 2014 in natural waters for augmentation of its natural population. However robust species conservation programs are still lacking due to limited funds and capacities.

Completion of the inventory and documentation of under-studied groups of biodiversity and national level assessments of the conservation status of higher floral and faunal diversity are still major tasks to be completed for adequate understanding of the country's biodiversity

and subsequent enhancement of species-based conservation.

Furthermore, wildlife crime and global trade in wildlife contraband is also a growing concern in species conservation. Inadequate resources, lack of forensic expertise and weak enforcement of laws are some of the challenges in combating wildlife crime.

First release of hatchery-bred Golden Mahaseer fingerlings in Rongri Chhu, Gelephu, 2014

3.5 Management of Native Genetic Diversity

In terms of genetic diversity, the on-going programs are limited to inventory, documentation, collection and preservation of Bhutan's crop and animal genetic resources for food and agriculture and far from complete. The National Biodiversity Centre has implemented on-farm conservation programs largely with donor funding since 2001 in collaboration with the Renewable Natural Resources Research and Development Centres (RNR-RDCs) and the DoA and DoL. Work on native horticultural crops and Crop Wild Relatives (CWR) is

yet to be initiated. The assessment of diversity at the genetic level has been carried out only for some of the livestock breeds and none of the crop varieties.

The other growing concern is the loss of genetic diversity due to factors such as increasing trend of rural-urban migration, human-wildlife conflict, reduced farm labour, introduction of exotic breeds/varieties, mono-cropping, etc. A better understanding of the genetic diversity that the country possesses and the loss of genetic diversity have to be addressed urgently in the light of food and nutrition security of the country, especially in the face of emerging challenges such as climate change and loss of resilient farming systems.

3.6 Incentives Related to Biodiversity

In the agriculture sector, in order to boost agriculture in the pursuit of food and nutrition security and to reduce the high import dependency, the provision of subsidy on agriculture inputs was initiated as early as 1961 (DoA, 2008) with support ranging from input supplies to fertilizers to irrigation facilities. However, the gradual phasing out of subsidies started in the 7th FYP with the removal of input support on land terracing. Further, in the 8th FYP, the RGoB removed the support on agriculture inputs such as fertilizers, seeds and plant protection chemicals except partial support for transportation. Presently, the different forms of direct incentives covered in the agriculture and livestock sector include free supply of seeds and seedlings of promotional crops and fodder; supply of improved breeds of livestock and poultry, veterinary drugs, farm machinery, plant protection chemicals, and inorganic fertilizers at a subsidized rate. Farm roads and irrigation are the other two key production incentives for the Renewable Natural Resources (RNR) Sector, with a total of Nu. 1,600 million allocated in the 11th FYP.

In the Forestry sector, the direct incentives include provision of subsidized timber for rural household construction, traditional harvesting rights for Non-Wood Forest Products (NWFP), and compensation for livestock lost to predation by key flagship wildlife species. Subsidized timber is also allocated for community infrastructure and construction of Dzongs and Lhakhangs.

The other incentive in place is the Integrated Conservation and Development Programs (ICDPs) in the protected areas. In the 9th and the 10th FYPs, the government spent a total of Nu. 58.70 million and Nu. 55.14 million respectively for at least ten different forms of ICDPs in seven different protected areas in the country. The various forms of ICDPs include: provision of CGI roofing and solar lights; building bridges, mule tracks and other community facilities; livestock and agriculture intensification programmes; scholarships to

students; capacity building and environmental education programmes.

In addition to the direct incentives, the provision of free agriculture, livestock and forestry extension services, subsidized loans for agriculture enterprise and development of infrastructure for farmers' markets and roadside vendors are the main indirect incentives. Other forms of incentives that have a bearing on the conservation of environment and biodiversity include a 15 per cent income tax rebate for any business firm that undertakes environment- friendly up gradation of their business beyond the minimum standard required by the law, exemption of sales and custom duties on any labour saving devices and, a 15 year income tax holiday for waste management and recycling entities (MoF, 2010).

Despite the long history of subsidies in the country, no review on their impacts has been carried out till date. The sustainability of ICDP initiatives, status of NWPFs, impacts of subsidized rural timber on forest resources, and impacts of inorganic fertilizers and agro-chemicals on biodiversity and environment in general need to be critically assessed.

On the other hand, the lack of incentives in the areas of agro-biodiversity conservation for farmers to maintain traditional varieties of crops and breeds of livestock for a resilient and diversified farming system is an issue that needs to be addressed urgently. There is also a need to develop and diversify the crop insurance scheme as the loss of crop and livestock from predation by wild animals, natural calamities and emerging pests and diseases are rapidly encouraging the communities to abandon their land and homes to move into urban areas. Developing and diversifying crop insurance against such risks will serve as a positive incentive towards the sustainable management of agro-biodiversity resources.

3.7 Sustainable Use of Biodiversity

The Renewable Natural Resources (RNR) sector is the second largest contributor to Gross Domestic Product (GDP) at 15.7 per cent (PPD, MoAF, 2013). It is accorded high priority since it directly contributes to poverty alleviation, sustainable rural livelihood, food and nutritional security and other environmental services. Although hydropower is the main contributor to GDP at 20 per cent, its sustenance hinges on the overall sustainability and management of the Renewable Natural Resources, particularly the forests and the critical watersheds that it sustains. Therefore, in the 11th FYP, the MoAF has placed high priority on sustainable utilization, conservation and management of natural resources.

In forestry, guided by the National Forest Policy, 2011, the priorities are to improve management of State Forests[22]; enhance biodiversity conservation through sustainable production of environmental goods and services; and strengthen forest governance and participation for sustainable resource management and effective delivery of services.

In Agriculture, organic farming was accorded strong national impetus in the 10th FYP with Bhutan declaring its aspiration to go 100 per cent organic by 2020 (NoP, 2007), in line with the GNH principles to make agriculture sustainable and environment-friendly. This initiative is further up scaled in the 11th FYP with interventions in all the sub-sectors. Other key interventions include improved irrigation and the promotion of Sustainable Land Management (SLM) technologies, including integrated soil and nutrient management to reduce soil erosion and degradation, increase crop diversity and fodder availability (BCS, 2011).

In livestock, the emphasis is on enhancing self sufficiency of livestock products, promotion of green livestock farming practices for climate change adaptation and mitigation and minimizing the degradation of rangeland and pastures through a "zero" grazing policy and reduction of unproductive breeds.

Although policies are in place with focus on sustainable management in agriculture, forestry and livestock sectors, there is a palpable lack of necessary tools, technologies and capacities to confront the emerging challenges. The natural resource demand, particularly for timber and NWFPs is escalating, emphasizing the need to bring more areas under sustainable timber production and to develop and implement harvesting guidelines for NWFPs based on actual resource assessment. Community forestry also demands adequate knowledge and skills to ensure sustainability in order to achieve both conservation and livelihood objectives. Expansion of SLM technologies to ensure the protection of limited arable land and rehabilitation of degraded land and habitat are the gaps that need to be addressed. Improvement in rangeland management and development of sustainable initiatives for feed and fodder are some recurrent issues requiring attention.

3.8 Science-based Knowledge, Information and Technology related to Biodiversity

Currently, there are huge gaps in biodiversity research for generating and disseminating suitable technologies, information and knowledge for effective decision-making and promoting conservation and sustainable use of biodiversity.

22. State Forests refers to Government Reserved Forests (GRF)

In the area of science-based knowledge and information, there is a lack of a coordination mechanism to ensure that biodiversity inventories and documentation are not carried out in isolation. This issue is further compounded by poor information sharing, resulting in duplication of efforts, difficulty in consolidation and meaningful interpretation of the data. There is also the issue of limited understanding of the country's biodiversity, especially of the lower groups of biodiversity since only higher groups have been documented at this stage. These issues have been raised in many fora and documents, including stakeholder consultation workshops. Recognizing this drawback, a consortium and citizen science-based approach to manage biodiversity data through a web-portal was launched in December 2013. However, this may take time to build a strong information base on the nation's biodiversity.

In terms of technologies related to biodiversity management, there is considerable space for improvement on existing technologies in several areas. These include Human-Wildlife Conflict management; forest fire management; timber felling and sawing techniques; wood/timber treatment techniques; harvesting, processing and marketing of NWFPs; integrated pest management and plant nutrient management technologies; invasive species management; energy efficient technologies; water harvesting, etc. There is also the issue of poor adoption of available technologies. A recent report on adoption status of RNR technologies in the east-central region of Bhutan shows that the overall distribution of adoption status of the available technology is only 27 per cent (CoRRB, 2014).

3.9 Traditional Knowledge and Customary Practices Associated with Biodiversity

Historically, Bhutan was also referred to as *Lhomenjong*, the valley of medicinal herbs because of its fertility, mountains and diversity of medicinal plants. Due to this, a strong tradition of use emerged resulting in the vast store of traditional knowledge (TK) held by local communities and institutions, on the use and properties of biological resources. The government has mainstreamed traditional medicine called *gSo-ba-Rigpa* through the establishment of indigenous hospitals as well as a college and a pharmaceutical unit that manufactures and supplies medicine based on traditional knowledge.

Parallel to this formal system of traditional knowledge, there is also traditional knowledge associated with genetic resources, held by traditional knowledge holders/communities, in many remote pockets. As of 2011, the known number of traditional healers spread across the country is 1,683 (Kuensel, 2013). However, there is concern that the traditional knowledge held by these individuals/communities is disappearing due to declining practices as a result

of lack of interest from the younger generations as well as access to modern medicines. Further, there is a lack of capacity in TK documentation, advocacy and prevention of misappropriation of TK.

There are also distinct customary practices and laws associated with biodiversity use and protection. Prior to the enactment of forest and environment legislations, village forests were managed by *'Reesups'* (Village Forest Guards), *'Meesups'* (Forest Fire Watchers), *'Chusups'* (Village Water Guards) and *'Shingsungpa'* (Agriculture Crop Damage Arbitrator). Other practices that are still upheld today are customary laws or protocols that protect biodiversity such as *'ladam'* and *'ridam'*, which restrict access to sacred groves, lakes and mountain passes which are believed to be abodes of local guardians and deities. In restricting disturbance or destruction of biodiversity, these customary practices have greatly helped in biodiversity conservation.

A TK holder showing a plant used in traditional formulation


© Ngawang Gyeltshen

CHAPTER: 4

National Biodiversity Strategies and Action Plan

4.1 Vision

A happy and resilient Bhutanese community, nurtured by rich spiritual and cultural traditions, valuing biodiversity and living in harmony with it.

4.2 Mission

By 2020, through a holistic, concerted and effective approach, biodiversity is valued, conserved and sustainably used to provide essential ecosystem services for the economic, environmental and social well being of the present and future generations.

4.3 Guiding Principles

1. There is national commitment towards conservation and sustainable utilization of biodiversity as reflected in the rich conservation history, the Constitution and the development philosophy of Gross National Happiness.

2. There is an intricate relationship between biodiversity and the economic, social and spiritual well being of the Bhutanese people.

3. There is a need to educate the public on the values of biodiversity and nurture

participatory approaches in conservation to garner support and ensure that the people and the state equally share the responsibility and accountability for conservation.

4. It is vital to strengthen science, reinforce traditional knowledge systems, and build national capacities to integrate research and development for effective biodiversity conservation.

5. There is an urgent need to address threats and emerging challenges to biodiversity to prevent loss of biodiversity and ecosystem services.

6. It is crucial to secure sustainable financing mechanisms to uphold national commitments in biodiversity conservation.

7. There is substantial potential to derive economic benefits from biodiversity and ecosystem services to support livelihoods and contribute to the national economy.

8. There is a need to safeguard vulnerable groups, including women and children who are highly dependent on biodiversity and ecosystem services for their livelihoods.

9. There is a need to ensure the fair and equitable sharing of benefits arising from access to genetic sources to incentivize biodiversity conservation and promote sustainable utilization.

4.4 National Targets

National targets are based on the issues, threats, gaps and opportunities identified through a series of stakeholder consultation workshops carried out throughout the country[23]. It is also based on the result of the review of the past Biodiversity Action Plans and guided by the national priorities and Aichi Biodiversity targets[24].

1. National Target 1: By 2018, at least 60 per cent of the population is aware of values of biodiversity and steps they can take to conserve and use it sustainably.

2. National Target 2: By 2018, national capacity is established for valuation of biodiversity and ecosystem services to integrate into national development planning and policy-making process and national accounting system, as appropriate.

3. National Target 3: By 2020, incentives harmful to biodiversity are reformed and positive incentives are enhanced.

4. National Target 4: By 2020, relevant stakeholders adopt the principles of sustainable production and consumption of natural resources and have kept the impacts of use of natural resources well within safe ecological limits.

5. National Target 5: By 2018, high-biodiversity value habitats are mapped, the rate of loss is accounted, trends monitored and overall loss and fragmentation reduced.

6. National Target 6: By 2020, the baseline for fish and key aquatic biodiversity is established for implementation of sustainable management plans, as appropriate.

7. National Target 7: Areas under agriculture and forestry, including rangeland are managed through the adoption of sustainable management practices, ensuring conservation of biological diversity.

8. National Target 8: By 2020, pollution from different sources, including from use of fertilizers and agro-chemicals affecting biodiversity and ecosystem functions are maintained within the national environmental standards.

9. National Target 9: By 2020, invasive alien species and pathways are identified and prioritized, priority species are controlled or eradicated, and measures are in place to manage pathways to prevent their introduction and establishment.

23. Refer Annexure 3 for issues identified through SH workshops

24. Refer Annexure 4 for national target mapping with global targets

10. National Target 10: By 2020, the potential impacts of climate change on vulnerable ecosystems are identified and adaptation measures strengthened.

11. National Target 11: The current Protected Area System is maintained with enhanced management effectiveness and financial sustainability.

12. National Target 12: By 2020, the information on conservation status of prioritized taxonomic groups is available and actions are taken to improve the status of prioritized species.

13. National Target 13: By 2020, the genetic diversity of key cultivated plants and domesticated animals, including that of crop wild relatives are documented and conserved.

14. National Target 14: By 2020, key ecosystems and ecosystem services are identified, assessed and safeguarded for human well being.

15. National Target 15: By 2020, priority degraded ecosystems and habitats are identified and rehabilitated through a landscape approach.

16. National Target 16: By 2015, the Nagoya protocol is implemented through national ABS legislative, administrative and institutional frameworks, which are consistent with the Nagoya Protocol.

17. National Target 17: By 2015, the revised National Biodiversity Strategies and Action Plan (NBSAP) is adopted as a national guiding document for effective biodiversity management.

18. National Target 18: By 2020, TK and Customary Practices of communities, relevant to biodiversity conservation and sustainable use are documented and used, and where appropriate revived and protected.

19. National Target 19: By 2020, science-based knowledge and technologies related to biodiversity are generated, improved, made accessible and applied, where appropriate.

20. National Target 20: By 2016, the funding requirement for the implementation of the NBSAP is identified and funds mobilized.

4.5 National Biodiversity Targets, Strategies and Actions

National Target 1: By 2018, at least 60 per cent of the population is aware of values of biodiversity and steps they can take to conserve and use it sustainably.

Rationale

Currently, about 66 per cent of the population interacts with Protected Areas (PAs), where environmental education is part of the protected area management as mandated by environmental legislations. However, these programs are *ad hoc* and limited to raising awareness on environmental rules and regulations or basic understanding of the environment and environmental problems. There are also a number of on-going Environmental Education programs targeting different sections of the population beyond the protected areas. However, what has been solely lacking is an institutionalized mechanism to ensure that the public understanding of the importance of biodiversity and their role in conserving it, as well as environmental legislations, are elevated.

Thus, as a first step, it is crucial to ascertain the proportion of the population aware of biodiversity and its values, which will guide in assessing the efficacy of the existing awareness initiatives, and identify gaps and target groups. In targeting 60 per cent of the population, efforts will be focused primarily on the population living within the PAs. Concurrently, the existing Environmental Education programs will be strengthened to target the general population, including schools, institutions, private and corporate sectors. Efforts will also be made to monitor initiatives that emerge from the private sector as a result of enhanced education and awareness on values of biodiversity.

Strategies and Actions

Strategy 1.1: Ascertain the existing awareness on the values of biodiversity in the country.

Action 1.1.1: Assess the awareness of biodiversity values in the protected areas and among the general population.

Action 1.1.2: Identify the gaps and target groups.

Strategy 1.2: Implement National Environmental Education Master Plan, with special focus on biodiversity values.

Action 1.2.1: Identify agencies involved in environmental education and awareness raising programs and set up a coordination mechanism for education and awareness.

Action 1.2.2: Develop and implement National Environmental Education (EE) Master Plan.

Action 1.2.3: Review current environmental studies curriculum of both formal and non-formal education sector to incorporate biodiversity components as per the National Environmental Education Master Plan.

Strategy 1.3: Strengthen capacity in biodiversity education and awareness.

Action 1.3.1: Conduct a capacity needs assessment and develop appropriate capacities for implementing environmental education and advocacy programs.

Indicators

1. Trends in the proportion of population aware of biodiversity.
2. EE Master Plan in place and status of its implementation.
3. Trends in the implementation of biodiversity-related Corporate Social Responsibility initiatives.

National Target 2: By 2018, national capacity is established for valuation of biodiversity and ecosystem services to integrate into the national development planning and policy- making process and the national accounting system, as appropriate.

Rationale

Currently, the valuation of biodiversity and ecosystem services is limited to national capacity building initiatives for REDD readiness, Payment for Environmental Services, National Forestry Inventory, and *ad hoc* valuation of some protected areas and ecosystem services. However, there is a lack of systematic valuation of biodiversity and ecosystem services in the country. This has been mainly due to inadequate national capacity and institutional mechanisms to coordinate and lead programs for valuation of biodiversity and ecosystem services.

Therefore, the focus of this target will be to build national capacities for valuation of biodiversity and ecosystem services, and incorporation of these values into the national planning and policy making process and accounting system, where appropriate.

Strategies and Actions

Strategy 2.1: Set up an institutional mechanism for valuation of biodiversity and ecosystem services.

Action 2.1.1: Identify the lead agency to coordinate biodiversity and ecosystem services valuation initiatives.

Action 2.1.2: Take stock of initiatives in valuation of biodiversity and ecosystem services.

Action 2.1.3: Develop institutional arrangements for implementing biodiversity and ecosystem valuation programs, including developing linkages with institutions outside the country.

Strategy 2.2: Build capacity for valuation of biodiversity and ecosystem services.

Action 2.2.1: Assess current capacity, gaps and needs for valuation of the prioritized biodiversity and ecosystem services.

Action 2.2.2: Build relevant capacity in valuation of the prioritized biodiversity and ecosystem services and integration of values into national planning and policy making process and accounting system.

Strategy 2.3: Incorporate biodiversity values into environmental policy, legislations, guidelines and development plans.

Action 2.3.1: Review and where relevant recommend for revision/amendment of relevant policies and legislations such as Environmental Assessment Act to incorporate biodiversity and ecosystem values.

Action 2.3.2: Incorporate biodiversity and ecosystem values into relevant national guidelines such as the five year development plan and Environmental Impact Assessment.

Indicators

1. Trends in the capacity for valuation of biodiversity and ecosystem services.
2. Trends in the number of valuation studies in the country.
3. Trends in the number of legislations/guidelines with biodiversity values integrated.

National Target 3: By 2020, incentives harmful to biodiversity are reformed and positive incentives are enhanced.

Rationale

The different forms of incentives provided in the Renewable Natural Resources sector (RNR) are mainly targeted at realizing the goals of food and nutritional security, enhancement of rural livelihood and reduction of high import dependency. Even though these incentives are relatively small, they are considered positive in terms of their contribution but their impacts on biodiversity are yet to be assessed.

In the Forestry sector, subsidized timber and the right to collect NWFPs are generally perceived to be harmful given the implications on resource sustainability from current practices and huge volumes harvested in recent years. The existing ICDP is seen as a positive incentive, albeit with sustainability issues.

Therefore, the focus of this target is to ascertain the impacts of incentives on biodiversity for appropriate interventions.

Strategies and Actions

Strategy 3.1: Reform incentives affecting biodiversity negatively.

Action 3.1.1: Review and identify incentives detrimental to biodiversity.

Action 3.1.2: Reform harmful incentives as appropriate.

Strategy 3.2: Strengthen incentives promoting conservation and sustainable use of biodiversity.

Action 3.2.1: Review and redefine incentive-based conservation including ICDPs considering sustainability, equity, community ownership and participation.

Action 3.2.2: Explore incentives such as PES, Community-Based Sustainable Tourism (CBST), Eco-tourism and agro-tourism for conservation and sustainable use of biodiversity by the local communities.

Action 3.2.3: Revisit and prioritize the Crop Promotional Program to strengthen agro-biodiversity conservation, development and management at the community level.

Action 3.2.4: Pilot Crop and Livestock Insurance Schemes for sustainable management of agro-biodiversity and to reduce the impacts of human-wildlife conflict.

Action 3.2.5: Recognize and celebrate the role of the custodians of agro-biodiversity and promote conservation stewardship.

Indicators

1. Number of harmful incentives identified and reformed.
2. Number of positive incentives reviewed and strengthened.

National Target 4: By 2020, relevant stakeholders adopt the principles of sustainable production and consumption of natural resources and have kept the impacts of use of natural resources well within safe ecological limits.

Rationale

Some of the natural resources that are under severe consumption pressures are timber and fuel wood for construction and energy, the over harvesting of NWFPs as well as the pressure exerted on landscapes due to unsustainable agricultural practices, overgrazing by domestic animals and concentration of mines in certain areas. These pressures, if left unchecked, will have severe ramifications on the fragile ecosystem and biodiversity.

The lack of relevant data and knowledge to ascertain the safe ecological limits of these vulnerable production sectors is a well-known gap. Therefore this target will focus on assessing the operation of key natural resources-based production sectors within safe ecological limits

and sustainability, and where necessary to encourage adoption of sustainable production by these sectors.

Strategies and Actions

Strategy 4.1: Strengthen science-based management of natural resources.

Action 4.1.1: Carry out studies on ecological limits of vulnerable production and consumption sectors.

Action 4.1.2: Initiate and promote interdisciplinary research in sustainable production and consumption of natural resources for developing natural resources management plans.

Strategy 4.2: Promote sustainable use and consumption of natural resources.

Action 4.2.1: Carry out resource mapping of wood and NWFPs and develop sustainable management guidelines.

Action 4.2.2: Promote the use of efficient technologies for harvesting, processing and marketing of forest resources.

Action 4.2.3: Promote alternatives to timber to reduce pressure on natural resources.

Action 4.2.4: Integrate traditional use of natural resources (grazing, leaf litter, fodder) with sustainable management plans.

Action 4.2.5: Promote and encourage community participation in the implementation of sustainable management plans of natural resources.

Strategy 4.3: Strengthen capacity in natural resources management.

Action 4.3.1: Assess capacity gaps in natural resource management.

Action 4.3.2: Strengthen capacity based on the capacity gap analysis.

Indicators

1. Availability of information on safe ecological limits of vulnerable production and consumption sectors.
2. Trends in development, adoption and implementation of sustainable management plans.

National Target 5: By 2018, high-biodiversity value habitats are mapped, the rate of loss is accounted, trends monitored and overall loss and fragmentation reduced.

Rationale

Many of the high-biodiversity value habitats such as primary forests, high altitude wetlands, and home-range of flagship species fall within the protected area system. However, some other high-biodiversity value habitats such as Important Bird Areas (IBA), Key Biodiversity Areas (KBA), Ramsar Sites, and Areas rich in crop-wild relatives are yet to be mapped in order to understand their status and to implement appropriate conservation measures.

Currently, there is no concrete data to ascertain the rate of habitat loss although land use conversion and forest fire are considered as leading factors. Therefore, the focus of this target will be to firstly map the high-value biodiversity habitats and assess the extent of degradation and fragmentation for appropriate interventions.

Strategies and Actions

Strategy 5.1: Map high-biodiversity value habitats.

Action 5.1.1: Develop guidelines and criteria to identify high-biodiversity value habitats.

Action 5.1.2: Identify and map high-biodiversity value habitats.

Strategy 5.2: Reduce the loss of high-biodiversity value habitats.

Action 5.2.1: Account for the extent and rate of habitat loss due to fragmentation and degradation.

Action 5.2.2: Implement appropriate interventions, including policy recommendations for designation and protection of high-biodiversity value habitats, where necessary.

Strategy 5.3: Address the major causes of habitat loss where possible.

Action 5.3.1: Strengthen national fire management program in terms of human capacity, research, technology, equipment, coordination, surveillance and response system, etc.

Action 5.3.2: Scale up community-based forest fire management approaches.

Action 5.3.3: Enhance awareness on forest fire and other potential factors causing habitat loss.

Indicators

1. Availability of information on high-biodiversity value habitats.
2. Availability of baseline information on the extent and rate of habitat loss.
3. Trends in forest fire incidence.

National Target 6: By 2020, the baseline for fish and key aquatic biodiversity is established for implementation of sustainable management plans, as appropriate.

Rationale

There are only a few scientific studies carried out till date to determine fish and other aquatic species composition of natural water bodies in Bhutan. The imminent threat to aquatic biodiversity arises from the large hydropower projects in the major rivers of Bhutan due to destruction of habitat, spawning ground and disturbance to migration routes. Given the current threat and inadequate knowledge of Bhutan's ichthyofaunal diversity, more extensive freshwater fish diversity surveys including habitat and biology, migratory patterns and spawning /breeding habitats are necessary. Similar studies also need to be initiated for other key aquatic species. Once the baseline information is established, efforts will be made to develop sustainable management plans as appropriate.

Strategies and Actions

Strategy 6.1: Strengthen institutional and technical capacity in the conservation and sustainable utilization of fish and aquatic biodiversity.

Action 6.1.1: Identify a lead agency to coordinate inventory of aquatic biodiversity.

Action 6.1.2: Strengthen institutional and technical capacity in fish and aquatic biodiversity conservation and sustainable utilization.

Strategy 6.2: Strengthen information base for fish and key aquatic biodiversity for conservation and sustainable utilization.

Action 6.2.1: Conduct a nationwide inventory and documentation of fish diversity.

Action 6.2.2: Initiate inventory and documentation of key aquatic biodiversity.

Action 6.2.3: Develop and implement sustainable management plans for fish and key aquatic biodiversity.

Indicators

1. Availability of consolidated information on fish and key aquatic biodiversity.
2. Number of management plans and implementation strategies for fish and key aquatic biodiversity.

National Target 7: Areas under agriculture and forestry, including rangeland are managed through the adoption of sustainable management practices, ensuring conservation of biological diversity.

Rationale

Forestry legislations require all areas under state forest to be strategically guided by sustainable management plans. However, as of now, only 6.4 per cent of the state forest under Forest Management Units and Working Schemes and 2.2 per cent under Community Forests have well formulated resource management plans. Although resource allocations for rural uses are also done within the protected areas, the management plans are conservation-centric and lack resource management strategies. The overall impact of the lack of sustainable management plans leaves these areas highly vulnerable to degradation due to factors such as over-extraction of forest resources, land use conversion and overgrazing. Therefore, the progressive inclusion of unmanaged forest areas under a sustainable management regime

still remains one of the key challenges.

In agriculture, the National Action Plan to Combat Land Degradation addresses unsustainable agricultural practices through appropriate management strategies which are harmonized under this target.

Therefore, this target will focus on strengthening sustainable management practices in the areas under forests and agriculture to ensure the conservation and sustainable utilization of biological diversity.

Strategies and Actions

Strategy 7.1: Improve management of State Forest, including rangeland for sustainable production of goods and services.

Action 7.1.1: Bring areas under State Forest that fall outside the FMUs and without management plans progressively under sustainable management regimes.

Action 7.1.2: Review and update codes of best practices and guidelines for holistic sustainable forest management.

Action 7.1.3: Institute a Monitoring and Evaluation mechanism to assess the efficacy of the management plans in terms of sustainability.

Action 7.1.4: Promote sustainable management practices in rangeland.

Strategy 7.2: Strengthen good governance for sustainable management of forests

Action 7.2.1: Strengthen transparency through access to information and consultative/ participatory approaches.

Action 7.2.2: Enhance institutional capacity for sustainable management of resources and effective delivery of services.

Action 7.2.3: Strengthen capacity and empower local communities for sustainable management of resources.

Strategy 7.3: Promote sustainable agricultural practices that ensure conservation of biological diversity.

Action 7.3.1: Assess major farming systems for richness in biodiversity using biodiversity indices.

Action 7.3.2: Introduce appropriate measures based on the results of the assessment to enhance the conservation of biodiversity.

Action 7.3.3: Promote organic farming as per the National Organic Sector Development Master Plan.

Action 7.3.4: Promote SLM practices supporting biodiversity conservation such as Integrated Pest Management, Integrated Soil Fertility Management Practices, Irrigation Water Management Technologies, Improved Pasture Management and Fodder Development.

Action 7.3.5: Explore innovative approaches to incentivize the adoption of sustainable agricultural practices through product diversification, niche marketing, premium pricing for organic products and products derived from sustainable sources, etc.

Indicators

1. Trends in area of state forest under sustainable management practices.
2. Trends in area under organic agriculture, including SLM practices.

National Target 8: By 2020, pollution from different sources, including from use of fertilizers and agro-chemicals affecting biodiversity and ecosystem functions are maintained within the national environmental standards.

Rationale

Currently except in areas around main industrial estates and localized water pollution, the ambient air and water quality at the macro level is found to be in good state. However, increasing sediment loads in the rivers and streams from developmental activities is a growing concern due to potential impacts on aquatic biodiversity as well as hydropower plants.

Although agro-chemical and fertilizers are potential sources of pollution of both land and water, especially if used without proper management practices, currently there is no report

on the extent of the impacts of these agro-chemicals on land and environment in general, except for sporadic observations.

While the country has legal measures in place to address pollution from all sources, the overriding concern is the weak implementation and enforcement of environmental standards and inadequate monitoring. Therefore, this target will focus on strengthening national mechanisms to implement and monitor standards for all sources of pollution, including agro-chemicals and fertilizers.

Strategies and Actions

Strategy 8.1: Major pollutants affecting environment are maintained as per the National environmental standards.

Action 8.1.1: Strengthen implementation of environmental standards for all major pollutants.

Action 8.1.2: Strengthen monitoring and reporting mechanisms for all major sources of pollution.

Action 8.1.3: Strengthen environmental performance reporting system by industries.

Strategy 8.2: Strengthen research and technical capacity for documenting, monitoring and assessing the impacts of major pollutants.

Action 8.2.1: Document and quantify major pollutants.

Action 8.2.2: Develop capacities to assess and monitor major pollutants.

Action 8.2.3: Strengthen research and technologies to assess and monitor impacts of major pollutants on environment, including biodiversity.

Action 8.2.4: Establish national baseline for river water quality.

Indicators

1. Trends in level of pollution at point source.

National Target 9: By 2020, invasive alien species (IAS) and pathways are identified and prioritized, priority species are controlled or eradicated, and measures are in place to manage pathways to prevent their introduction and establishment.

Rationale

Since there is no comprehensive inventory and assessment of IAS in the country, there is limited knowledge on IAS and their impacts. Therefore, this target will focus on understanding the diversity of IAS and their impacts, instituting measures for control and/or eradication of prioritized IAS and development of technical capacity.

Strategies and Actions

Strategy 9.1: Improve understanding on IAS and native species with potential for invasiveness.

Action 9.1.1: Complete national inventory of IAS and native/naturalized species with potential for invasiveness along with the distribution and pathways of introduction.

Action 9.1.2: Develop modules on invasive species for incorporation in the training curricula of relevant institutions.

Action 9.1.3: Promote education and awareness on invasive species and their impacts.

Action 9.1.4: Build technical capacity on invasive species management.

Strategy 9.2: Develop and implement measures to protect natural and agriculture ecosystems against IAS.

Action 9.2.1: Assess the threats of IAS and native invasive species and prioritize high-risk species.

Action 9.2.2: Develop management strategies for established high-risk species, taking into account the effects of climate change.

Action 9.2.3: Develop and implement guidelines to manage and regulate entry and introduction of IAS.

Action 9.2.4: Incorporate IAS issues into relevant policies and laws.

Action 9.2.5: Develop an institutional framework for invasive species management, including regional collaboration.

Indicators

1. Availability of information on IAS.
2. Trends in measures in place for prevention and control on spread of IAS.

National target 10: By 2020, the potential impacts of climate change on vulnerable ecosystems are identified and adaptation measures strengthened.

Rationale

Although adaptation to climate change cuts across almost all the targets and actions are reflected accordingly in Targets 9, 11, 12, 13, 14 and 15, Target 10 is identified separately with specific focus on enhancing understanding on the impacts of climate change on biodiversity and ecosystems. Currently, apart from a few scattered studies and community perceptions, there is still a huge gap in research and understanding on the impacts of climate change on biodiversity and ecosystems in the country. This drawback has been recognized and actions to address this issue prioritized in national documents such as Biodiversity Persistence and Climate change, 2011 and the Second National Communication to the United Nations Framework Convention on Climate Change (UNFCCC). Short-term and immediate adaptation measures have been implemented through the National Adaptation Plan of Action (NAPA) under UNFCCC.

Therefore, this target underscores, first, the need for strengthening efforts in understanding the impacts of climate change on biodiversity and ecosystems at the national level, and second, for enhancing resilience and adding value to regional and international efforts.

Strategies and Actions

Strategy 10.1: Elevate understanding on the impacts of climate change on biodiversity and ecosystems.

Action 10.1.1: Develop a national network of long-term climate monitoring stations for the generation of comprehensive climate data.

Action 10.1.2: Promote inter-disciplinary research on climate change, biodiversity, and ecosystems.

Action 10.1.3: Institute a national mechanism to collate and share data and information generated from research for the development and implementation of adaptation measures and policy decisions.

Action 10.1.4: Conduct systematic awareness and educational programs on the impacts of climate change on biodiversity.

Strategy 10.2: Strengthen climate change adaptation measures.

Action 10.2.1: Develop a policy on climate change with special focus on food security, biodiversity and water.

Action 10.2.2: Develop appropriate long-term ecosystem-based adaptation measures to minimize impacts of climate change on vulnerable ecosystems, biodiversity and communities.

Action 10.2.3: Strengthen implementation of immediate targeted actions for prioritized ecosystems.

Action 10.2.4: Integrate long-term ecosystem-based adaptation measures into national plans and programs.

Indicators

1. Trends in availability of information on species and ecosystems most vulnerable to impacts of climate change.
2. Climate Change Policy in place.

National Target 11: The current Protected Area System is maintained with enhanced management effectiveness and financial sustainability.

Rationale

The key issue in protected area management is the incomplete physical zonation, resulting in *ad hoc* planning of services/ facilities and resource extraction often conflicting with conservation goals and rules. Although biological corridors have been declared, the lack of a legal status for protection from development activities is also an issue that needs to be addressed. Sustainable financing is also a major challenge for protected area management in the country.

Therefore, the focus of this target is to maintain the current Protected Area System with enhanced management effectiveness and financial sustainability.

Strategies and Actions

Strategy 11.1: Enhance management effectiveness of the Protected Area System.

Action 11.1.1: Evaluate the management effectiveness of Protected Areas and Biological Corridors.

Action 11.1.2: Complete zonation of PAs by 2018.

Action 11.1.3: Enhance local community participation in the management of PAs.

Action 11.1.4: Review the functionality of Biological Corridors for demarcation, operationalization and legal protection.

Action 11.1.5: Monitor and assess the status and trends of biodiversity within the Protected Area System.

Action 11.1.6: Promote and support transboundary management and regional partnership initiatives.

Strategy 11.2: Establish sustainable financing measures for the Protected Area System.

Action 11.2.1: Develop and implement REDD+ activities to support conservation financing.

Action 11.2.2: Institutionalize and upscale Payment for Ecosystem Services (PES) initiatives.

Action 11.2.3: Upscale nature recreation and ecotourism programs with a financial plough-back mechanism.

Action 11.2.4: Explore additional innovative financing mechanisms.

Indicators

1. Trends in number of parks with zonation completed.
2. Trends in the number of biological corridors operationalized
3. Trends in financial resources mobilized for PAs.
4. Type and number of transboundary-related initiatives and agreements.

National Target 12: By 2020, the information on conservation status of prioritized taxonomic groups is available and actions are taken to improve the status of prioritized species.

Rationale

Bhutan is yet to carry out a national-level assessment of the conservation status of biodiversity resulting in inadequate legal protection of globally threatened species and implementation of species-based conservation programs. Further, the lack of assessment makes it difficult to understand the status of the other native species of national concern and subsequent actions required to improve their conservation status.

Therefore, the focus of this target will be to understand the status of the globally threatened species and other important taxonomic groups and species in the country. This assessment will be followed by the development and implementation of species-based conservation action plans for prioritized species.

Strategies and Actions

Strategy 12.1: To understand the status of prioritized taxonomic groups and species and the factors affecting them.

Action 12.1.1: Develop a national mechanism and evaluate the conservation status of prioritized taxonomic groups and species.

Action 12.1.2: Update the National Red List of prioritized taxonomic groups.

Strategy 12.2: Strengthen conservation programs for prioritized species.

Action 12.2.1: Prioritize species for conservation based on nationally agreed criteria.

Action 12.2.2: Develop and implement species-based conservation management plans for prioritized species.

Action 12.2.3: Enhance capacity in species-based conservation and monitoring.

Action 12.2.4: Strengthen institutional and legal capacities to combat wildlife poaching.

Indicator

1. Trends in availability of updated National Red List of prioritized taxonomic groups.
2. Trends in species-based conservation strategies and programs.

National Target 13: By 2020, the genetic diversity of key cultivated plants and domesticated animals, including that of crop wild relatives are documented and conserved.

Rationale

The documentation and conservation of the local diversity of cultivated plants and domesticated animals are far from being complete mainly due to the lack of technical and institutional capacities. Considering the significant role that local agrobiodiversity can play in developing resilient farming systems for adaptation to emerging challenges, this target

will focus on strengthening the systematic documentation of local diversity of cultivated plants, including crop wild relatives and domesticated animals. This will be followed by the development of strategic action plans, enabling policy framework and institutional mechanisms for enhanced conservation and sustainable utilization of local agro-biodiversity.

Strategies and Actions

Strategy 13.1: Strengthen national capacities in documentation and management of agro-biodiversity conservation and sustainable utilization.

Action 13.1.1: Strengthen technical capacities and infrastructure for *ex-situ* conservation of agro-biodiversity, including crop wild relatives.

Action 13.1.2: Develop capacity to undertake diversity studies of crops and domesticated animals.

Action 13.1.3: Strengthen capacities in on-farm management of crops and domesticated animals and *in-situ* conservation of crop wild relatives.

Strategy 13.2: Strengthen documentation and management of agro-biodiversity.

Action 13.2.1: Complete the documentation and diversity assessment of key cultivated crops and domesticated animals, including crop wild relatives.

Action 13.2.2: Develop and implement management plans of prioritized crops and livestock species.

Action 13.2.3: Identify and propose declaration of heritage sites of significant crop varieties and crop wild relatives.

Action 13.2.4: Review current legal and policy framework to address agro-biodiversity conservation and sustainable use.

Action 13.2.5: Strengthen and diversify *ex-situ* and *in-situ* conservation approaches, including incentives to conserve (e.g: promoting geographical indication products).

Indicators

1. Trends in the availability of information on the diversity and status of key cultivated crops and domesticated animals.

2. Trends in *ex- situ* and *in-situ* conservation programs.

National Target 14: By 2020, key ecosystems and ecosystem services are identified, assessed and safeguarded for human well being.

Rationale

The Bhutanese have upheld strong environmental conservation ideals recognizing the values of ecosystem and its services for their well being and sustenance. However, putting monetary value to ecosystem services, especially to non-monetary services, has neither been a tradition nor a strong research focus. This has led to the undermining of the actual value of various ecosystems and ecosystem services and thereby the lack of identification and protection of these ecosystems.

Therefore, this target in synergy with Target 2 will focus on identifying key ecosystems and assessing their status and valuation of the services provided. An important element will also be to identify poor and vulnerable sections including women and children dependent on these ecosystem services. Subsequently, appropriate strategies will be put in place to safeguard these ecosystems and ecosystem services for the well being of the Bhutanese population as well as regional neighbors.

Strategies and Actions

Strategy 14.1: Safeguard key ecosystem and ecosystem services.

Action 14.1.1: Identify key ecosystems (e.g: critical watershed) providing essential ecosystem services.

Action 14.1.2: Initiate valuation of the essential ecosystem services.

Action 14.1.3: Develop and implement strategies to safeguard key ecosystems and vulnerable groups, including women and children.

Indicators

1. Availability of information on the key ecosystems and ecosystem services.
2. Number of valuation studies on ecosystem services and safeguard measures/ framework in place for implementation.

National Target 15: By 2020, priority degraded ecosystems and habitats are identified and rehabilitated through a landscape approach.

Rationale

While there is baseline information on the acreage and location of degraded[26] and bare areas[27] in the country, what is lacking is the information on stages or degree of degradation as well as the kinds of ecosystems which are degraded. The lack of this crucial information has implications on the existing restoration and rehabilitation programs. There is also no institutional mechanism in place to oversee habitat and ecosystem degradation issues in a holistic approach. The National Action Plan (NAP) to combat land degradation is mandated to address the issue on land degradation, therefore the actions proposed in this target are envisaged to complement the NAP on land degradation.

In view of the cost as well as natural barriers to rehabilitate all degraded ecosystems and areas in the country, this target will focus on understanding the degree and causes of degradation for implementation of appropriate and feasible rehabilitation measures in prioritized degraded areas and ecosystems.

26. Bare areas captured in this figures are those non-agricultural areas with very limited vegetation and rock outcrops (<4 %) either due to natural process (surface erosion) or human interventions (LCMP, 2010)

27. Degraded areas constitute areas with landslides, gullies, ravine and moraines (LCMP, 2010)

Strategies and Actions

Strategy 15.1: Set up a national mechanism to address habitat and ecosystem degradation in a holistic approach.

Action 15.1.1: Develop a national framework for addressing habitat and ecosystem degradation.

Action 15.1.2: Strengthen institutional mandates and capacities to coordinate, implement and monitor rehabilitation program for all types of ecosystems, including aquatic habitats.

Strategies 15.2: Rehabilitate prioritized degraded areas and ecosystems.

Action 15.2.1: Map degraded areas and ecosystems, including degree and causes of degradation, based on the existing baseline data.

Action 15.2.2: Develop criteria for prioritization of degraded areas and ecosystems for rehabilitation.

Action 15.2.3: Develop strategies for rehabilitation programs.

Action 15.2.4: Explore and implement relevant rehabilitation measures such as plantation (afforestation and reforestation), agro-forestry, reclamation and application of codes of best practices.

Action 15.2.5: Strengthen enforcement of mandatory requirements for rehabilitation of disturbed areas due to developmental activities.

Indicators

1. Trends in the availability of information on the degree of degradation of degraded areas and ecosystems.
2. Trends in rehabilitation of prioritized degraded areas and ecosystems.

National Target 16: By 2015, the Nagoya protocol is implemented through national ABS legislative, administrative and institutional frameworks, which are consistent with the Nagoya Protocol.

Rationale

Bhutan became the 24th country to ratify the Nagoya Protocol (NP) in 2013 and is in the process of finalizing its ABS policy, in line with the Nagoya Protocol. While efforts are underway to establish the policy and regulatory framework for the implementation of the ABS regime in Bhutan, progress has been slow due to the limited understanding on ABS in the country, coupled with inadequate institutional, legal and technical capacities. Therefore there is an urgent need to prepare for the effective implementation of the NP through the harmonization of national legislations and strengthening of national capacities for the implementation of an ABS regime that ensures the fair and equitable sharing of benefits from the sustainable utilization of biological resources in the country.

Strategies and Actions

Strategy 16.1: Develop a national policy and legal framework for the implementation of the Nagoya Protocol.

Action 16.1.1: Adopt the National Access and Benefit Sharing Policy (ABS).

Action 16.1.2 Review and recommend for amendment/revision of the Biodiversity Act of Bhutan, 2003 in line with the National ABS policy.

Action 16.1.3: Develop regulations to facilitate implementation of the Biodiversity Act of Bhutan, as appropriate.

Strategy 16.2: Strengthen the implementation of a fair and equitable ABS model.

Action 16.2.1: Establish appropriate institutional, legal and administrative measures for the implementation of the ABS regime.

Action 16.2.2: Strengthen education and awareness on the ABS regime.

Action 16.2.3: Explore and pilot ABS ventures at local, national and international levels.

Action 16.2.4: Strengthen the Bhutan ABS fund for empowering local communities to engage in biodiversity conservation.

Action 16.2.5: Strengthen national capacities to implement the ABS regime.

Indicators

1. National ABS policy and regulatory framework in place.
2. Trends in national ABS ventures.

National Target 17: By 2015, the revised National Biodiversity Strategies and Action Plan (NBSAP) is adopted as a national guiding document for effective biodiversity management.

Rationale

Acknowledging the drawbacks of the past Biodiversity Action Plans, the focus of this target is to ensure that the current revision is taken up in an inclusive, interactive and consultative manner with relevant stakeholders in the country for identification and prioritization of actions and ownership of the document.

More importantly, to achieve the national targets, the NBSAP will be adopted as a national guiding document for biodiversity planning and management. An effective coordination mechanism for NBSAP implementation, including systematic monitoring and evaluation, will also be instituted.

Strategies and Actions

Strategy 17.1: Adopt the revised NBSAP as a national guiding document on biodiversity management.

Action 17.1.1: Revise the NBSAP in line with national priorities and Aichi Biodiversity Targets through a participatory and inclusive approach.

Action 17.1.2: Institute and document the process and procedure of NBSAP preparation and revision.

Action 17.1.3: Adopt the NBSAP as a national guiding document for all programmes of work related to biodiversity conservation and sustainable use.

Action 17.1.4: Mainstream actions prioritized in NBSAP into relevant stakeholder plans and programs.

Action 17.1.5: Raise awareness on NBSAP and prioritized national targets as detailed out in the chapter on Communication and Outreach Plan.

Strategy 17.2: Establish a national mechanism for implementation of the NBSAP.

Action 17.2.1: Establish a dedicated coordination unit for NBSAP implementation and resource mobilization, including monitoring and reporting (as detailed out in chapter 5 on Institutional Arrangements).

Action 17.2.2: Develop and implement an effective monitoring and evaluation plan for the achievement of national biodiversity targets.

Indicators

1. Updated NBSAP adopted as a national guiding document for biodiversity management.
2. National coordination mechanism for NBSAP implementation in place.
3. Trends in NBSAP actions integrated into relevant sectorial plans and programs.

National Target 18: By 2020, TK and Customary Practices of communities, relevant to biodiversity conservation and sustainable use are documented and used, and where appropriate revived and protected.

Rationale

In general, there is political good-will and government support for an inclusive and participatory approach to the integration of Traditional Knowledge (TK) and Customary Practices held by communities in biodiversity conservation and sustainable utilization. However, the process has been slow due to limited human, technical, legal and financial

resources. In line with the increasing importance of TK associated with genetic resources, this target identifies the programme of work required to document, protect and utilize TK and Customary Practices of communities, relevant to biodiversity conservation and sustainable use.

Strategies and Actions

Strategy 18.1: Promote Traditional Knowledge (TK) and Customary Practices relevant to biodiversity conservation and sustainable use.

Action 18.1.1: Inventorize and document TK and Customary Practices relevant to biodiversity conservation and sustainable use.

Action 18.1.2: Explore innovative measures to strengthen and incentivize TK and Customary Practices that promote biodiversity conservation and sustainable use.

Action 18.1.3: Strengthen measures to prevent mis-appropriation of TK associated with genetic resources and Customary Practices.

Strategy 18.2: Build national capacities for the protection, preservation and utilization of TK and Customary Practices relevant to biodiversity conservation and sustainable use.

Action 18.2.1: Build capacities on TK, ABS, Intellectual Property (IP), Community Protocols, documentation of Customary Practices, Negotiations, Contract Agreements, etc.

Action 18.2.3: Promote targeted awareness and education series on ABS, TK and Customary Practices for the general public, policy makers, academia, private sector and the local communities.

Indicators

1. Trends in documentation of TK associated with genetic resources.
2. Trends in the availability of information on Customary Practices and Community Protocols related to management of biological resources.
3. Trends in ABS agreements related to TK associated with genetic resources.

National Target 19: By 2020, science-based knowledge and technologies related to biodiversity are generated, improved, made accessible and applied, where appropriate.

Rationale

Despite Bhutan's unquestionable commitment to conservation of its natural heritage, there has been a huge lag in terms of generating and applying science-based knowledge and technologies related to biodiversity. This gap has been recognized since the formulation of the first Biodiversity Action Plan (BAP) as well as in subsequent national documents on biodiversity management.

What is crucial at this stage is to build collaborative initiatives/programs with international/ regional conservation agencies to enhance technical expertise, knowledge, and resources to bridge the biodiversity information gap and to promote the transfer, dissemination and adoption of useful technologies. This could result in holistic and integrated research programs that generate information for decision-making, policy changes, awareness and education programs and facilitate the adoption of environmental friendly technologies.

Therefore, the focus of this target is to strengthen biodiversity information and research to promote evidence-based policy and decision-making and adoption of technologies related to biodiversity.

Strategies and Actions

Strategy 19.1: Strengthen evidence-based policy and decision-making.

Action 19.1.1: Analyze existing biodiversity data and information gaps.

Action 19.1.2: Strengthen research to generate biodiversity information and expand knowledge base.

Action 19.1.3: Promote accessibility and sharing of biodiversity information and knowledge.

Action 19.1.4: Promote evidence-based decision-making on policies affecting biodiversity.

Strategy 19.2: Promote transfer and adoption of technologies related to biodiversity

management.

Action 19.2.1: Support and promote inter and intra-disciplinary research on biodiversity and related technologies.

Action 19.2.2: Strengthen national mechanisms to coordinate, promote and review transfer and adoption of appropriate technologies (e.g: HWC management, Forest fire management).

Action 19.2.3: Promote sustainable procurement initiatives such as Green Public Procurement.

Indicators

1. Trends in new biodiversity information generated.
2. Existence of an accessible central repository on biodiversity data and information.
3. Trends in evidence-based decision-making.
4. Trends in adoption of technologies related to biodiversity management.

National Target 20: By 2016, the funding requirement for the implementation of NBSAP is identified and funds mobilized.

Rationale

The availability of adequate financial resources will be crucial to the successful implementation of the NBSAP and achievement of national targets. Achieving the national targets will go beyond biodiversity conservation and contribute to sustainable socio-economic development and human well being, and ultimately the realization of Gross National Happiness. Further, Bhutan's biodiversity conservation efforts will transcend national boundaries to benefit global communities.

28. Refer Annexure 5 for calculation of budget availability

The fund allocated for the Renewable Natural Resource (RNR) sector in the 11th Five Year Plan (2013-2018) is about USD 65 million out of which, around USD 16.83 million[28] is for biodiversity-related activities (GNHC, 2013b). A tentative estimate of the total funds required for NBSAP implementation is USD 32.05 million[29] indicating a gap of 15.2 USD million, which will have to be sourced. The lack of a coordinated approach for resource mobilization and allocation further aggravates the situation. Therefore, it is of paramount importance to mainstream the implementation of NBSAP into the Five Year Plans and establish an institutional framework for NBSAP coordination and resource mobilization. The formulation of a resource mobilization strategy will be fundamental in sourcing of the funds for implementation of the NBSAP.

Strategies and Actions

Strategy 20.1: Strengthen institutional mechanisms and good governance to coordinate fund mobilization for NBSAP implementation.

Action 20.1.1: Adopt the NBSAP as a guiding document for biodiversity management in the country.

Action 20.1.2: Establish the NBC as the national coordination agency for NBSAP implementation and resource mobilization.

Action 20.1.3: Establish a funding window for NBSAP implementation within BTFEC.

Strategy 20.2: Mobilize financial resources to support implementation of the NBSAP.

Action 20.2.1: Review the financial gap for implementation of the NBSAP.

Action 20.2.2: Develop and implement Resource Mobilization Plan.

Action 20.2.3: Allocate funds as per the Resource Mobilization Plan.

Action 20. 2.4: Monitor effective and efficient utilization of available funds.

Indicators

1. Trends in funds sourced to implement the NBSAP.

29. Refer Annexure 6 for NBSAP Financial Resourced Estimate 2014 – 2020


©Pema Gyamtsho

CHAPTER: 5

NBSAP Implementation Plan

5.1 National Coordination Structure

The key gaps identified in the implementation of the past BAPs are the lack of ownership at the national, sectorial and local levels, coupled with a poor coordination mechanism for fund mobilization and subsequent implementation.

Currently, there are more than eight governmental agencies and civil society organizations implementing biodiversity management programs, often in isolation. This is largely due to the lack of a national mechanism to coordinate and oversee biodiversity management amongst different stakeholders. The current business-as-usual approach to biodiversity management needs to change to a focused, strategic, strengthened and streamlined approach through the adoption of the NBSAP as a national guiding document on biodiversity management in the country. This will lead to effective governance and institutional arrangements for successful delivery of the biodiversity targets through formation of a national committee on biodiversity and identification of a coordinating agency.

The National Committee on Biodiversity, comprising high-level representation from the key sectors, will guide the implementation of the NBSAP, in line with the obligations of CBD and other biodiversity-related regional and international conventions and treaties. It will consist of the head or their representatives including but not limited to: i) Department of Forests and Park Services, ii) Department of Livestock, iii) Department of Agriculture, iv) Bhutan Agriculture and Food Regulatory Authority, v) National Environment Commission, vi) Bhutan Trust Fund for Environmental Conservation, vii) Royal Society for Protection of Nature. The Head of the National Biodiversity Centre will act as a Member Secretary to the Committee.

The National Biodiversity Centre (NBC) is identified as the coordinating agency in view of its mandate and technical competencies, which are aligned with the objectives of the CBD. Furthermore, the NBC was primarily established in 1998 in view of this role, as required by the Biodiversity Action Plan of 1997. In order to enable the successful coordination of the implementation of the NBSAP and establish liaisons with international partners for technical and financial support, there is however, a need to further strengthen the NBC.

The NBC will coordinate NBSAP implementation through institution of five thematic groups (Figure 8) composed of representatives from implementing agencies addressing relevant national Targets, namely: 1: Knowledge, Technology and Education, 2: Species Conservation and Protected Area Management, 3: Ecosystem and Ecosystem Services, 4: Resource Mobilization, and 5: Natural Resource Management. The implementation of

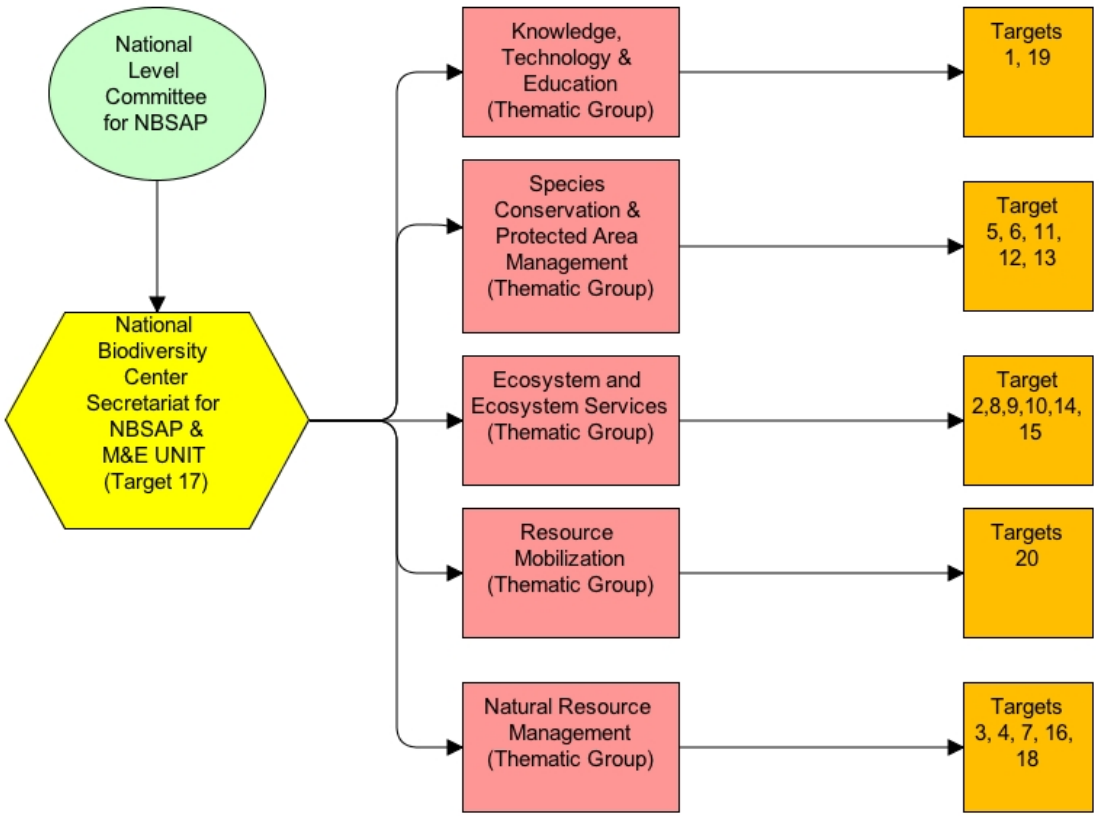


Figure 8: NBSAP Implementation Coordination Framework

the targets will be based on the Implementation, Monitoring and Evaluation Framework[30] which is guided by the results of the prioritization[31] done through regional and national consultation processes and stakeholder mapping[32]. The thematic groups will lead the implementation of the targets. A preliminary guiding Terms of Reference (ToR)[33] for the thematic groups has been proposed.

5.2 Resource Mobilization Approach

A brief insight into the history of donor funding in the country shows that Official Development Assistance (ODA) provided from 2005 to 2010 amounted to about 15.5 per cent of the GDP and averaged USD 175 million per year. The Government of India (GoI) was the major donor and other important donors included the Asian Development Bank (ADB), Austria, Denmark, EU, Japan, the Netherlands, Switzerland, the UN Systems and the World Bank. During the period from 1999 to 2009, 11 per cent of the total grant was allocated for the Renewable Natural Resources (RNR) Sector (GNHC, 2011). The Bhutan Trust Fund for Environmental Conservation provides USD 1.5 million anually and the World Wildlife Fund (WWF) provides around USD 1.6 million per year[34] for biodiversity conservation. In addition, the GEF-Small Grants Program provides an average of USD 0.3 million per year for biodiversity conservation, climate change, sustainable forest management, water and sustainable land management to community-based organizations, Civil Society Organizations (CSOs) and Non-Governmental Organizations (NGOs).

Opportunities for innovative financing such as Payment for Ecosystem Services (PES), eco-tourism, REDD+ and Climate financing are also being tapped. Currently Bhutan is implementing REDD+ readiness program through the financial support of USD 3.8 million from the Forest Carbon Partnership Facility (FCPF). Further, Bhutan has also initiated projects on integrating PES and REDD+, and eco-tourism. However, all of these financial schemes are in their infancy and will require strong support from the government as well as international donors.

In the 11th Five Year Plan (2013-2018), the fund allocated for the RNR sector is about USD 65 million out of which, around USD 16.83 million[35] is for biodiversity related activities

30. Refer Annexure 7 for NBSAP Implementation, Monitoring and Evaluation Framework

31. Refer Annexure 8 for report on national target prioritization

32. Refer Annexure 9 for stakeholder mapping result

33. Refer Annexure 10 for proposed Terms of Reference for the thematic groups

34. WWF contributions based on an average of four years :2008, 2009, 2011, and 2013

35. Refer Annexure 5 for calculation of budget availability

(GNHC, 2013b). With a tentative estimate of USD 32.05 million required for NBSAP implementation, the fund gap stands at USD 15.2 million.

Recalling the crucial role that adequate financial resources play in ensuring the successful implementation of the NBSAP, National Target 20 requires developing an effective fund mobilization Strategy. This strategy will address the required systemic changes, institutional arrangements and priority conservation areas for effective fund mobilization and allocation to ensure successful achievement of the national targets.

Systemic changes will include mainstreaming NBSAP as the guiding document for biodiversity-related interventions, strengthening coordination for resource mobilization and effective utilization. The Resource Mobilization Strategy will also be guided by the prioritization[36] of the national targets done through a participatory and inclusive approach involving all relevant stakeholders in the country. NBC as the designated coordinating agency for NBSAP will coordinate the development of the Resource Mobilization Strategy as soon as the government endorses the NBSAP.

5.3 Capacity Development Approach for NBSAP Implementation

A review of the past BAPs has indicated the lack of capacity as one of the main challenges in the successful implementation of the Action Plans. The current revision addresses key capacity needs identified under different national Targets. This will however be subject to rigorous appraisal based on comprehensive systematic stocktaking and needs assessment. In order to ensure that the capacity building approach is realistic and holistic; it will target strengthening at the i) individual level (knowledge, skills and competencies), ii) organizational level (structure, processes and procedures, facilities, equipment and materials, and inter-institutional coordination/partnership) and iii) systemic level (enabling legislation, policy, governance and support). The NBC will lead the formulation of the Capacity Development Plan as soon as the NBSAP is endorsed, subsequent to which resources will be mobilized for its implementation in a coordinated and holistic manner.

36. Refer Annexure 7 for the report on prioritization of national target

5.4 Communication and Outreach Plan for the NBSAP

The need to create awareness on the national biodiversity targets prioritized in the NBSAP amongst key biodiversity stakeholders is important since lack of awareness on the existence of the document was identified as one of the main gaps in implementing the past BAPs. As a first plan of action, it will be important to adopt the NBSAP as a national guiding document for biodiversity management. Subsequent to that, a strategic Communication and Outreach Plan will be developed by NBC in consultation with key partners, which will be endorsed by the National Biodiversity Committee for implementation. The main features of the strategic Communication and Outreach Plan will include translation of the NBSAP document into the national language; awareness campaigns through public forum and media targeting legislators, administrators, relevant implementing agencies, Civil Society Organizations, communities and local government leaders and key donors of Biodiversity. The plan is targeted for implementation within the first two years of adoption of the NBSAP.

5.5 Monitoring, Evaluation and Reporting

The monitoring and evaluation unit will be established within NBC for effective coordination and monitoring the progress in the implementation of the NBSAP. This unit will be supported by the thematic groups. The progress of implementation of the thematic areas and targets will be assessed on an annual basis, using currently identified indicators and means of verification[37] and additional ones if required. This mechanism will also be used to identify implementation issues. The evaluation report in turn will be presented to the National Biodiversity Committee for necessary interventions for the successful achievement of the targets. It will also form a basis for national and international reporting obligations as well as guide the national planning process. The monitoring and evaluation mechanism will be established within the first year of the adoption of the NBSAP.

5.6 Clearing House Mechanism

Currently, the Clearing House Mechanism (CHM) is housed within the National Environment Commission Secretariat. The CHM will be used as a platform to update and report on the status of NBSAP implementation. It will also provide information on the

37. Refer Annexure 8 for NBSAP Implementation, Monitoring and Evaluation Framework

global processes and programme of works and other national obligations under the CBD.

5.7 Synergies between NBSAP and Multilateral Environmental Agreements (MEAs)

Although NBSAP is primarily a tool to implement the Convention of Biological Diversity (CBD), it complements the implementation of other biodiversity-related multilateral environmental agreements (MEAs) as evident from the table below (Table 12).

Recognizing the potential for synergies between different MEAs, it is imperative to establish a common platform for different MEAs. This will ensure proper coordination, communication and cooperation among different MEA focal points or implementing agencies for effective results and coherent reporting. In the NBSAP implementation, the National Committee and the coordinating agency will ensure synergies with other MEAs through dialogues and partnerships. Where relevant, the different MEA focal points will become part of the thematic working groups and where necessary, different MEA focal points will be invited to sit in on the National Committee meetings to provide a common platform for encouraging synergies and better cooperation.

Table 12: Synergy between NBSAP and other biodiversity related MEAs

Biodiversity-related MEAs	Relevant National Biodiversity Targets	Potential Synergies
UNFCCC	4, 7, 8, 10, 11, 15	1. Sustainable resource management strategies under targets 4 and 7 contribute towards climate change mitigation and adaptation, ensuring the common goal of achieving sustainable economic development. 2. Target 8 contributes to pollution control that is linked to stabilization of green house gases. 3. Target 10 contributes to climate change adaptation strategies. 4. Targets 11 and 15 contribute to climate change mitigation through protected areas management and ecosystem restoration.
UNCCD	5, 7, 10, 11, 14 and 15	1. Targets, 5, 11, 14, and 15 contribute to UNCCD's goal of conserving and improving the condition of ecosystems. 2. Target 7 contributes to UNCCD's approach to sustainable land management and sustainable agricultural practices.
RAMSAR Convention	14, 15	1. These targets contribute to RAMSAR's approach to conservation and wise use of wetland ecosystems.
UNESCO WHC	5, 11, 13, 14, 15,18	1. These Targets contribute to WHC's interventions to preserve the cultural and natural heritage sites of outstanding values, including protected areas and key ecosystems.
CITES	11, 12,	1. These targets ensure species or habitat conservation including listing of species and will contribute to CITES appendices and protect them from trade.
ITPGRFA	3, 4, 7, 13 and 16	1. These targets complementthe Treaty's goals of conservation and sustainable use of plant genetic resources for food and agriculture, including benefit sharing.
CMS	5, 11, 12	1. Although migratory species is not specifically mentioned and Bhutan has not formally joined CMS, these targets are expected to indirectly benefit migratory species of concern.

Reference

1. A. Aptroot and F.J. Feijen. (2002). *Annotated checklist of the lichens and lichenicolous fungi of Bhutan*. Fungal Diversity 11: 21-48.

2. Bhutan Climate Summit (BCS). (2011), *National Paper on Food Security,* Ministry of Agriculture and Forests, RGoB.

3. *Bhutan Environment Outlook (BEO). (2008)*. National Environment Commission Secretariat, RGoB.

4. Bhutan Land Cover Assessment (LCMP). (2010). *Technical Report, Bhutan Land Cover Assessment*, National Soil Services Centre (NSSC) and Policy and Planning Division (PPD), MoAF, RGoB.

5. Bhutan Tourism Monitor (BTM). (2013). *Annual Report,* Tourism Council of Bhutan, RGoB.

6. *Biodiversity Action Plan (BAP).* (2009). National Biodiversity Centre, MoAF, RGoB.

7. Choephyel, P. (2009). *Rangeland Management in Bhutan*, AMS Consultancy, Thimphu.

8. Council for RNR Research of Bhutan (CoRRB). (2014). *Report on Adoption Status of RNR Technologies in the East-Central Region of Bhutan.* CoRRB Secretariat, MoAF, RGoB.

9. Department of Agriculture (DoA). (2008). *Proposal for Subsidies in Agriculture Development: 10th Five Year Plan and beyond.* Department of Agriculture, MoAF, RGoB.

10. Department of Agriculture Marketing and Cooperatives (DAMC). (2014). *Cordyceps Marketing Report for the Year 2014,* Department of Agriculture Marketing and Cooperatives, MoAF, RGoB.

11. Dhital, D.B. (2009). *Bhutan Forestry Outlook Study In Asia-Pacific Forestry Sector Outlook Study II: Working Paper Series,* Working Paper No. APDSOS II/WP/2009/04, FAO Regional Office of Asia and the Pacific.

12. Dubey, G.P. (1978). *Survey of the waters of Bhutan physiography and fishery potential.* Document Repository. FAO, Rome.

13. Forestry Facts and Figures (FFF). (2013). Department of Forests and Park Services, MoAF, RGoB.

14. Gibson, T. (1991). *Forest Grazing Study.* Working document No 26. Department of Forests, Thimphu.

15. Gross National Happiness Commission (GNHC). (2011). *Eleventh Round Table Meeting, Turning Vision into Reality: The Development Challenges Confronting Bhutan.* 1st to 2nd September, 2011. Thimphu.

16. Gross National Happiness Commission (GNHC). (2013a). *Eleventh Five Year Plan Document,* Vol. I, GNHC, RGoB.

17. Gross National Happiness Commission (GNHC). (2013b). *Eleventh Five Year Plan Document,* Vol. II, GNHC, RGoB.

18. Gratzer, G., Rai, P.B., and Glatzel, G. (1997). *Ecology of the Abies densa forests in IFMP Ura,* Bhutan.

19. Gurung, D.B., Dorji, S., Tshering, U. and Wangyal, J.T. (2013). *An annotated checklist of fishes from Bhutan.* Journal of Threatened Taxa, 5(14): 4880–4886.

20. Gyamtsho, P. (1996). *Assessment of condition and potentials for improvement of high altitude rangelands of Bhutan.* PhD thesis, Swiss Federal Institute of Technology, Zurich.

21. International Centre for Integrated Mountain Development (ICIMOD). (2010). *Frequently Asked Question #2.*

22. Kubiszewski, I., Costanza, R., Dorji, L., Thoennes, P. and Tshering, K. (2012). *An initial estimate of the value of ecosystem services in Bhutan.* Ecosystem Services (2012) http://dx.doi.org/10.1016/j.ecoser.2012.11.004i.

23. Kuensel. (2013). Kuensel Issue of 13th February 2013.

24. Long, David G. (1994). *Mosses of Bhutan II. A checklist of the mosses of Bhutan: Journal of Bryology,* No. 2, 1994, pp. 339-364(26).

25. Mata, M., Penjor, D and Pradhan, S. (2010). *Fungi of Bhutan checklist of the mosses of Bhutan: Journal of Bryology,* No. 2, 1994, pp. 339-364(26). National Mushroom Centre, DoA, MoAF.

26. Mitra, A. (2008). *Dragonfly (Insecta:Odonata) fauna of Bhutan – An annotated and updated list with ten new records.* Fraseria (N.S.), 7((1/2)), 105 - 109.

27. Mool, P.K, Wangda, D., Bajracharya, S.R., Kunzang, K., Gurung, D.R. and Joshi, S.P. (2001). *Inventory of glaciers, glacial lakes and glacial lake outburst floods: Monitoring and early warning systems in the Hindu Kush-Himalayan Region Bhutan.* ICIMOD, Nepal.

28. National Action Plan on Biodiversity Persistence and Climate Change. (2011). National Biodiversity Centre, MoAF, RGoB.

29. National Action Program (NAP) to Combat Land Degradation. (2009). National Soil Services Centre, DoA, MoAF, RGoB.

30. National Biodiversity Centre (NBC). (2009). *Pteridophytes of Bhutan- A List of Families, Genera and Species,* National Biodiversity Centre, MoAF, RGoB.

31. National Biodiversity Centre (NBC). (2013). *The Hunt for Wild Rice, In Sanam Drubdrey,* Annual RNR Magazine, Issue 1, Vol. 3. 2013.

32. National Council (NC) of Bhutan. (2013). *Socio-economic and environmental impact assessment of mining and quarrying activities in Bhutan,* Natural Resources and Environment Committee of the National Council of Bhutan, Thimphu, Bhutan(http://www.nationalcouncil.bt).

33. National Organic Programme (NOP). (2007). *National Framework for Organic Farming in Bhutan 2007*, Department of Agriculture, MoAF, RGOB.

34. National Organic Programme (NOP). (2012). *Master Plan for Organic Sector Development,* Technical Working Group for National Organic Programme, MoAF, RGoB.

35. National Statistical Bureau (NSB). (2013). *Bhutan Poverty Analysis Report 2012.* National Statistical Bureau, RGoB.

36. Nature Conservation Division (NCD). (2009). *Zoning of Protected Areas – A Priority.* Letter No. NCD (MP and ICDP) 11, DoFPS, MoAF, RGoB.

37. Ohsawa, M. (ed.). (1987). *Life Zone Ecology of Bhutan Himalaya.* Laboratory of Ecology, Chiba University, Tokyo, Japan.

38. Ministry of Finance (MoF). (2010). *Notification ref. DRC/Tax-A and L/Hol/2020/3656* dated 2nd April, 2010: Fiscal Incentives 2010. Ministry of Finance, RGoB.

39. Policy and Planning Division (PPD). (2013). *Bhutan RNR Statistics 2012.* RNR Statistical Coordination Section, PPD, MoAF, RGOB.

40. Public Environmental Expenditure Review (PEER). (2014). *Public Environmental Expenditure Review of the RGoB for Fiscal Year 2010-2011,* 2011-2012 and 2012-2013. Department of Public Accounts, Ministry of Finance, RGoB.

41. Rajbanshi, K.G. and Csavas, I. (1982). *Establishment of Fish Seed Production Centre Project, Bhutan.* Agriculture development in Bhutan. FAO, Project report No. 1.p. 52.

42. Singh, J.I. (2014). *Species Catalogue of Rare and Threatened Butterflies and Moths of Bhutan.* Bhutan Biodiversity Portal, www.biodiversity.bt.

43. Social Forestry Extension Division (SFED) database. (2014). Database of theSocial Forest Extension Division, Department of Forests and Park Services, MoAF, RGoB.

44. Statistical Yearbook of Bhutan (SYB). (2013). National Statistics Bureau, RGoB, Thimphu.

45. Tamang, A. (2003). *Food Crop Wild Relatives Action Plan.* M.Sc. Thesis, University of Birmingham, UK.

46. Tempa, T., Hebblewhite, M., Mills, S., Wangchuk, T.R., Norbu, N., Wangchuk, T., Nidup, T., Dendup, P., Wangchuk, D., Wangdi, Y. and Dorji, T. (2013). *Royal Manas National Park, Bhutan: A hot spot for wild felids: Fauna and Flora International,* Oryx, 47(2), 207–210.

47. Tshering, G. (undated). *Rangeland and Livestock Management in Bhutan,* FAO, www.fao.org.

48. Tshering, L. and Rai, D.B. (2008). *Nublang In Animal Genetic Resources of Bhutan,* National Biodiversity Centre, MoAF, RGoB.

49. van der Poel, P. and Wangchuk, T. (2007). *Butterflies of Bhutan. Mountains, Hills and Valleys between 800 and 3000 m.* Royal Society for Protection of Nature, Thimphu.

50. Wangda, P. and Ohsawa, M. (2010). *Temperature and humidity as determinants of the transition from dry pine to humid cloud forests in the Bhutan Himalaya.* In L. A.Bruijnzeel *et al.* (ed.) Tropical Montane Cloud Forests: International Hydrology Series,Cambridge University Press. 156-163.

51. Wangyal, T. (2013). *New records of reptiles and amphibians from Bhutan.* Journal of Threatened Taxa 5(13): 4774–4783; http://dx.doi.org/10.11609/JoTT.o3539.4774-83.

52. Wildlife Conservation Division (WCD). (2013). *Assessment on Impact of Human-Wildlife Conflict Management Intervention to the Local Communities.* WCD, DoFPS, MoAF, RGoB.

Annexure

Annexure1: Protected Areas and Biological Corridors of Bhutan

Protected Areas	Notification Year	Gazettement year	Establishment Year	Dzongkhags	Total Area (sq.km)
Wangchuck Centennial Park	2008	2008	2008	Gasa, Wangduephodrang, Bumthang, Trongsa , Lhuentse	4,914.00
Jigme Dorji National Park	1993	1995	1995	Punakha, Gasa, Thimphu, Paro	4,316.00
Jigme Singye Wangchuck National Park	1993	1995	1995	Trongsa, Wangdue, Sarpang, Tsirang, Zhemgang	1,730.00
Bumdeling Wildlife Sanctuary	1993	1995	1998	Trashiyangtse, Lhuntse, Mongar	1,520.61
Royal Manas National Park	1993	1995	1966	Sarpang, Zhemgang	1,057.00
Thrumshingla National Park	1993	1999	2000	Bumthang, Lhuntse, Mongar, Zhemgang	905.05
Sakten Wildlife Sanctuary	1993		2003	Trashigang, Samdrup Jongkhar	740.60
Toorsa Strict Nature Reserve	1993			Haa	609.51
Khaling Wildlife Sanctuary	1993			Samdrup Jongkhar	334.73
Phibsoo Wildlife Sanctuary	1993			Sarpang, Dagana	268.93
Total Protected Area network					16,396.43
Biological Corridors (BC)	1999	Oct, 1999	Under process	Haa, Paro, Thimphu, Punakha, Wangduephodrang, Sarpang, Tsirang, Trongsa, Zhemgang, Bumthang, Mongar, Lhuentse, Trashigang, Samdrup Jongkhar	3,307.14
Others: Royal Botanical Park, Lamperi	2004	2004	2004		47.00
Total Area of Protected Area System (PAs) in Bhutan					19,750.57
Percentage cover of PAs					51.44 %

Annexure 2.1: List of Invasive Species Recorded from Bhutan

(Source: Global Invasive Species database, http://www.issg.org/database/species/ accessed on 14th July 2014)

Sl. No.	Scientific name	Taxonomic group	Habit	Biostatus
1	*Acacia melanoxylon*	Plant	Tree	Alien
2	*Cardamine flexuosa*	Plant	Herb	Alien
3	*Chromolaena odorata*	Plant	Herb	Alien
4	*Imperata cylindrica*	Plant	Grass	Alien
5	*Columba livia*	Bird		Alien
6	*Ctenopharyngodon idella*	Fish		Alien
7	*Cyprinus carpio*	Fish		Alien
8	*Hypophthalmichthys molitrix*	Fish		Alien
9	*Hypophthalmichthys nobilis*	Fish		Alien
10	*Salmo trutta*	Fish		Alien
11	*Vibrio cholerae*	Microorganism		Alien
12	*Hemidactylus frenatus*	Reptile		Not defined
13	*Albizia julibrissin*	Plant	Tree	Native
14	*Alternanthera sessilis*	Plant	Herb	Native
15	*Bacopa monnieri*	Plant	Herb	Native
16	*Caesalpinia decapetala*	Plant	Tree/Shrub	Native
17	*Commelina benghalensis*	Plant	Herb	Native
18	*Corvus splendens*	Bird		Native
19	*Dalbergia sissoo*	Plant	Tree	Native
20	*Dioscorea bulbifera*	Plant	Herb/vine/climber	Native
21	*Ficus microcarpus*	Plant	Tree	Native
22	*Houttuynia cordata*	Plant	Herb	Native
23	*Hygrophila polysperma*	Plant	Aquatic herb	Native
24	*Lespedeza cuneata*	Plant	Shrub/herb	Native
25	*Limnophila sessiliflora*	Plant	Herb	Native
26	*Lotus corniculatus*	Plant	Herb	Native
27	*Lygodium japonicum*	Plant	Vine/climber fern	Native
28	*Melilotus alba*	Plant	Herb	Native
29	*Neyraudia reynaudiana*	Plant	Grass	Native

30	*Paederia foetida*	Plant	Vine/Climber.	Native
31	*Verbascum thapsus*	Plant	Herb	Native
32	*Rubus niveus*	Plant	Shrub	Native
33	*Senegalia catechu*	Plant	Tree	Native
34	*Acridotheres tristis*	Bird		Native
35	*Anas platyrhynchos*	Bird		Native
36	*Anser anser*	Bird		Native
37	*Gallus gallus*	Bird		Native
38	*Porphyrio porphyrio*	Bird		Native
39	*Psittacula krameri*	Bird		Native
40	*Pycnonotus jocosus*	Bird		Native
41	*Streptopelia decaocto*	Bird		Native
42	*Hemitragus jemlahicus*	Mammal		Native
43	*Macaca mulatta*	Mammal		Native
44	*Rusa unicolor*	Mammal		Native
45	*Suncus murinus*	Mammal		Native
46	*Viverricula indica*	Mammal		Native

Annexure 2.2: List of Invasive Alien Plant Species Recorded from Bhutan[38]

Sl. No.	Botanical Name	Local/ Common Name	Family	Native range/country
1	*Acanthospermum hispidum*		Asteraceae	Brazil
2	*Acmella uliginosa*		Asteraceae	South America
3	*Ageratina adenophora*		Asteraceae	Mexico
4	*Alternanthera pungens*		Amaranthaceae	Central and South America
5	*Amaranthus spinosus*		Amaranthaceae	Tropical Americas
6	*Argemone mexicana*	Mexican poppy	Asteraceae	Mexico
7	*Axonopus compressus*		Poaceae	Southern US, Mexico & Brazil
8	*Bidens pilosa*	Beggar's tick	Asteraceae	Tropical America
9	*Cassia tora*		Legiminosae	Not known, probably South Asia
10	*Chenopodium ambrosioides*		Chenopodiaceae	Central America
11	*Chromolaena odoratum*	Baby tea, bitter bush, Christmas bush	Asteraceae	Tropical south America
12	*Convolvulus arvensis*		Convolvulaceae	Europe
13	*Conyza bonariensis*		Asteraceae	Not known, probably Central/South America
14	*Conyza canadensis*		Asteraceae	North and Central America
15	*Conyza floribunda*		Asteraceae	South America
16	*Cosmos bipinnata*	Cosmos	Asteraceae	Tropical America
17	*Crassocephalum crepidioides*		Asteraceae	Not known, wide spread in tropical regions
18	*Cryptomeria japonica*	Japanese cedar	Taxodiaceae	Japan
19	*Datura stramonium*	Thorn apple	Solanaceae	Americas
20	*Drymaria cordata*		Caryophyllaceae	Tropical America
21	*Eichhornia crassipes*	Water hyacinth	Pontedriaceae	South America
22	*Euphorbia heterophylla*		Euphorbiaceae	Mexico

38. The list as of 2014

23	*Galinsoga parviflora*		Asteraceae	Tropical America
24	*Ipomoea purpurea*	Morning glory	Convolvulaceae	Tropical America
25	*Lantana camara*	Lantana, shrub verbena	Verbenaceae	Tropical America
26	*Lepidium virginicum*	Pepper weed	Brassicaceae	United States
27	*Mikania micrantha*	American rope, Chinese creeper	Asteraceae	Americas
28	*Mimosa pudica*	Sensitive plant	Legiminosae	South/Central America
29	*Nicandra physalodes*	Apple of Peru/ Shoe-fly plant	Solanaceae	Peru
30	*Opuntia vulgaris*	Prickly pear, Jawairinga Tsang	Cactaceae	South America
31	*Oxalis latifolia*		Legiminosae	Mexico and parts of Central and South America.
32	*Parthenium hysterophorus*	Parthenium weed	Asteraceae	Mexico, Central and South America
33	*Paspalum conjugatum*		Poaceae	Not known
34	*Paspalum distichum*		Poaceae	Probably tropical America
35	*Pennisetum clandestinum*	Kikuyu grass	Poaceae	East Africa
36	*Robinia pseudoacacia*	Black locust	Fagaceae	South Eastern US
37	*Scoparia dulcis*	Sweet broom weed	Scrophulariaceae	Neo Tropics
38	*Sida acuta*		Malvaceae	Central America
39	*Stellaria media*	Chickweed	Caryophyllaceae	Europe
40	*Tagetes minuta*	Mexican marigold	Asteraceae	South America
41	*Tagetes patula*	French marigold	Asteraceae	Americas
42	*Thuja orientalis (Platycladus orientalis)*	Chinese Arbor-vitae	Cupressaceae	North Eastern China
43	*Tithonia diversifolia*		Asteraceae	Mexico and Central America

Annexure 2.3: List of Major Invasive Alien Plant Species as of 2013

(Source: Pilot Inventory of Invasive Plant Species in Bhutan, National Biodiversity Centre)

Sl. No.	Botanical Name/ Synonyms	Common/ Local name	Family	Habit	Native Country/ Origin	Current distribution in Bhutan	Altitude (m)	Flowering time
1	*Ageratina adenophora* (Sprengel) King and Robinson; *Eupatorium adenophorum* Sprengel, *E. glandulosum* Humboldt, Bonpland and Kunth non Michaux		Compositae (Asteraceae)	Herb/ shrub	Mexico	Phuntsholing, Gelephu, Punakha, Trongsa	750-2050	Jan - June
2	*Chromolaena odoratum* (L) King and Robinson; *Eupatorium ordoratum* L.	Baby tea, bitter bush, Christmas bush	Compositae (Asteraceae)	Annual	Tropical south America	Samtse, Gelephu, Phuentsholing	200-1450	Aug – Dec
3	*Eichhornia crassipes* (Martius) Solms.	Water hyacinth	Pontedriaceae	Floating perennial	South America	Chukha, Gelephu	300-1800	May- July
4	*Lantana camara* L.; *L. aculeata; L. mista* L.	Lantana, shrub verbena	Verbenaceae	Rugged evergreen shrub	Tropical America	Phuentsholing , Gelephu, Sarpang, Deothang	250-600	May - Aug
5	*Mikania micrantha* Kunth; *M. scandens* sensu F.B.I. non	American rope, Chinese creeper	Compositae (Asteraceae)	Twinning annual	Americas	Samtse, Phuentsholing, Gelephu, Sarpang	200-500	Aug – Feb
6	*Opuntia vulgaris* Miller; *O. monocantha* (Willdenow) Haworth	Prickly pear , Jawairinga Tsang	Cactaceae	Large succulent sprawling shrub	South America	Phuenstholing, Punakha, Wangdue, Trongsa – Mangdechu valley	250 -1500	April - June

7	*Parthenium hysterophorus* L.	Parthenium weed	Compositae (Asteraceae)	Annual	Mexico, Central and South America	Punakha, Trongsa, Mongar, Trashigang	200-1700	All round the year
8	*Robinia pseudoacacia* L.	Black locust (Fagaceae)	Leguminosae	Tree	South Eastern US	Serbithang, Punakha	1500-2400	April-June

Annexure 3: Synthesis of Regional Stakeholder Consultation Workshop Outcomes

(Issues, Threats, Opportunities, Strategies, Actions and Indicators proposed in Stakeholder Consultation Workshops)

1. Key issues (including challenges in implementing biodiversity conservation and sustainable use activities, adequacy of existing institutional arrangement in biodiversity conservation and use program), recurring/emerging problems, threats and opportunities in biodiversity conservation and sustainable use.

a. Challenges/issues related to implementing biodiversity conservation and sustainable use.

1. Loss of genetic resources (traditional breed & crops)
2. Increase in population and their wants and needs
3. Rural-Urban migration
4. Developmental activities (roads, towns, etc)
5. Illegal trading (market demand)
6. Lack of awareness on conservation (Community
7. Food insecurity
8. Poor co-ordination among stakeholders/implementing agencies
9. Conflicts of interests
10. Lack of infrastructures/ technical capacity and resources
11. Lack/Poor enforcement of policies, rules, laws and acts
12. Lack of capacity and awareness
13. Lack of /inadequate financial resources
14. Authority
15. Absence of scientific and spatial data and no central repository of data
16. Political influence and interference
17. Intensive Agriculture Production
18. No strong policy guidelines on conservation of native species
19. Low priority on conservation of native species/ traditional practices
20. No proper database and information sharing mechanism
21. Human wildlife conflict - no compensation/ Compensation project tied
22. Not enough focus on M & E of Community Forests
23. Lack of Technical knowledge/technology
24. Inadequate manpower for monitoring
25. Do not have clear policy & guidelines (revision)
26. Lagging behind in research and data
27. Non incorporation of conservation activities at grass root level and FYPs
28. Changing political interests (example Shingkhar Gorgan road)
29. Cultural requirements (eg. Designs requiring intensive timber)
30. Paralysis by legislation – too many – need synthesizing
31. Lack of proper incentives for conservation of biodiversity
32. Lack of public support
33. Preference for improved varieties or breeds of crops and animal
34. Forest fire
35. More priority given to developmental activity than biodiversity conservation
36. Engineers in Dzongkhags not environmentally sound
37. Indiscriminate infrastructural development
38. No clear cut boundary demarcation between PA network system and territorial division and also between Gewogs and Dzongkhags
39. No incentives for indigenous species conser-

vation
40. Need for improved collaboration among stakeholders (Forest, Agriculture, Livestock, etc.)
41. Need for more educational programs (TV, Radio, information brochures, journals, etc.)
42. Poor documentation
43. Many offices doing same job
44. The mandate of conservation is with Forest, Agriculture and Livestock departments while the documentation is with NBC which needs to be thoroughly reviewed
45. Loss of productive lands
46. Specific resources requirement (timber) - All people need a single resources (e.g. timber), need to look for alternatives resources
47. Improper harvesting methods
48. Population distribution /imbalanced facilities
49. Topography of the country
50. Many resources allotment policy not guided by the principle of equity and justice
51. Religious sentiments
52. Availability of improved breeds
53. Lack of extension support (scientific Management, Nutrition)
54. Preference over improved breed over native breeds for food self- sufficiency (undermining native breed conservation)
55. No strong govt. policy and support in native breed breeding
56. Introduction of exotic varieties of crop and animals breed
57. Low funding priority from the government
58. Policy(s) contradictions (e.g: wetland protection vs Construction; felled trees- NRDCL Vs. DoFPS)
59. Inadequate HR Capacity, Technology, Equipment
60. Political interference
61. Low public awareness on the importance/values of biodiversity

2. Views/strengths/issues related to existing institutional arrangement for the implementation of biodiversity conservation and sustainable use programs/ activities in the country.

1. Lack of regional office for biodiversity
2. Communication gaps between agencies
3. Human resource constraints
4. Lack of adequate facilities/ information dissemination
5. Policy gap
6. Lack of co-ordination among stakeholders
7. Lack of responsible Officer at the Dzongkhag level
8. Lack of awareness among the institutions
9. Lack of enforcement and implementation
10. No proper M & E mechanism
11. Weak coordination among the existing institutions/organizations
12. Inadequate mechanism to share information
13. Institutions inadequate (Ministry of Environment & Forest)
14. Too many conservation institutes and lack of proper coordination
15. Too much compartmentalizing – no common united front/show
16. Propose a separate Ministry for environment and forests –pull all conserving agencies under it – including NEC
17. To facilitate a focused approach to conservation
18. Good policies and legislations in place
19.
20. Clear roles and responsibilities for each institution
21. Decentralization of authorities
22. Poor coordination. It is only in paper that there are collaborative agencies
23. No field offices and no human resources
24. Many species without proper data
25. Not many researcher/people interested to take serious biodiversity studies

3. Recurring problems/emerging issues related to biodiversity conservation and sustainable use.

1. Loss of genetic resources (traditional crop varieties & wildlife)
2. Human-wildlife conflict
3. Recurrent forest fire
4. Deforestation
5. Climate change: GLOF, temperature rise
6. Population Growth
7. Rapid urbanization, development and industrialization
8. Extinction threat of flora and fauna
9. Introduction to the new international treaty/ conventions/etc (WTO)- complex
10. Natural Calamities (forest fire, global warming)
11. Limited implementing capacity
12. Lack of coordination among institutions
13. Illegal activities: poaching, trading, etc
14. Land/habitat fragmentation and degradation
15. Lack of improved technologies
16. Pest and diseases
17. Invasive species(e.g. Kikiyu grass)/introduction of exotic species
18. Landslides
19. Drinking and irrigation water shortages
20. Uncontrolled grazing
21. Pollution
22. Construction of hydro power
23. Uneven distribution of resources
24. Low production and longer time to attend maturity for native breeds and varieties, encouraging exotic breeds
25. Imbalance of Ecosystem
26. Insufficient technical man power
27. Lack of constant monitoring and evaluation of natural resources
28. Production programs focussed on commercialization

4. Key threats to Biodiversity

1. Forest fire, mining, illegal extraction due to increase in market demand
2. Use of excessive inorganic inputs
3. Introduction of hybrid breeds
4. Lack of conservation incentives for farmers
5. Developmental activities ((Roads, Hydro power, Industries, power transmission lines)
6. Over exploitation of natural resources
7. Invasive Spp./ introduction of exotic spp.
8. Habitat fragmentation & loss
9. Lack access to benefits and their uses
10. Extinction- i) due to climate change. ii) poor knowledge about biodiversity values
11. Exploitation of resources
12. Weak implementation of Biodiversity Conservation activities.
13. Indifferent attitude towards conservation
14. Loss/degeneration of native species and breeds
15. Loss of traditional practices due to focus on modern technologies
16. Less focus on conservation of key endangered species
17. Possible extension of endemic species
18. Improper management of CFs: over utilization of resources and increase in illegal activities
19. Poaching
20. Displacement of species due to development activities
21. Pollution /waste management
22. Limited baseline data
23. Human wildlife conflict
24. Poverty (69% of Population Agrarian) too much dependency on natural resources
25. Porous Border
26. Environmental and land degradation
27. Habitat damages and loss of agriculture lands
28. Epidemics, pests and diseases
29. Dependency on imports – less focus on subsistence farming
30. Climate change/global warming
31. Land fragmentation (loss of agricultural diversity)
32. Migration (Agriculture products)
33. Loss of soil fertility (nutrient drainage through

infrastructure developments)
34. Water sources
35. Unhealthy life style
36. Food insecurity
37. Increase human population (over exploitation of natural resources)
38. Disease out breaks in animals or plants
39. Over use of chemicals(pesticides, medicines)
40. Natural calamities like Forest fire, floods etc

5. Scope and opportunities for conservation and sustainable use of Biodiversity in Bhutan.

1. Lots of research scope in the field of native species
2. Carbon trading
3. Green power
4. Plough back Mechanism
5. Bio-Prospecting/ Bio-exploration
6. Research and Development
7. Bhutan – a global Gene bank
8. Eco-tourism – potential revenue source, next to hydropower.
9. Potential to produce NWFPs (value addition)
10. Basis for food security
11. Global research Centre for environmental / biodiversity studies
12. Organic farming
13. Soil conservation
14. Conservation of gene pool
15. Healthy foods
16. Ownership of GRF land
17. Conservation of native genetic resources.
18. Effective implementation of conservation activities.
19. Linking conservation with livelihood improvement
20. Potential for donor support
21. Low population(0.6m)
22. Article 5 of the Constitution Enshrines 60% country's area under forest cover for all times to come
23. Environmental Conservation is one of the four pillars of GNH policy
24. Country's geographical area of 72% under forest cover
25. Reforestation
26. Pasture development
27. Diversification of community groups
28. Payment for Environmental Services
29. Income generation through eco-tourism and other means
30. Maintaining balance ecosystem
31. Institutional linkages enhancement
32. Traditional variety conservation
33. Marketing
34. Scope for discovery and invention
35. Human resource development/technical capacity building (Increase expertise)
36. Employment opportunities
37. Source of income generation
38. Reduction in Rural – Urban migration
39. Value addition
40. Management plans for abundant natural resources

6. Strategies and actions identified to address the above issues related to biodiversity conservation and sustainable use.

A. Food Security

1. *Wildlife population management*
   a. Develop policy and licensing mechanism for culling of wildlife
   b. Research on wildlife population
2. *Human-wildlife conflict management*
   a. Electric fencing
   b. CBNRM/ eco-tourism
3. *Explore opportunities for sustainable and com-*

prehensive compensation/insurance programs for crops as well as animal depredation
   a. Incorporate compensation budget in annual plans (with a clearly specify criteria)

4. *Diversification of farming System*
   a. Encourage organic farming system
   b. Provide incentives
   c. Revision of existing policies
   d. Promote fallow land cultivation
   e. Preservation of native seed

B: Low awareness on biodiversity and its values

1. *Raise awareness on biodiversity and its sustainable use through various media*
   a. Create awareness at community level
   b. Promote PES
2. *Capacity development*
   a. Conduct relevant trainings/ seminars/ workshops, promotional program
3. *Awareness programs explaining benefits and effect*
   a. Invoke religious sentiments
   b. Promote eco-tourism
   c. Involve NGOs
4. *Create awareness on Biodiversity values to the communities*
   a. Encourage and support Bhutanese Film industries to produce film with Biodiversity themes and values
   b. Improve and strengthen anti-poaching programmes
   c. Promote PES

C. Loss of genetic resources (wild and domestic/ indigenous)/Extinction

1. *Minimize loss of genetic resources*
   a. Identify and document native breeds and varieties of specific areas
   b. Provide incentives for conservation of native species.
   c. Promote local varieties
   d. Germplasm collection

2. *Develop clear guidelines on how to protect and preserve native/ local spp. Or varieties*
   a. Documentation of local spp. Or breeds
   b. Promotion program on local varieties
   c. Preservation of local spp.

3. *Inventory of native species*
   a. Awareness and promotional programs for encouraging native species
   b. R and D of TK and practices
   c. Explore market opportunities for native species
   d. Incentives/ subsidy for native species users ABS-communities involved in conservation should directly benefit

4. *Declare PA for vulnerable agricultural species:*
   a. Have 3-4 PAs for vulnerable species identified and declare along with the comprehensive management plan and markets

5. *Review the list of threatened species of Bhutan*
   a. All threatened spp. listed in the IUCN Red list in Bhutan's list
   b. 90 % of communities living with threatened spp. made aware of its conservation(improved awareness)
   c. Increasing number of spp. due to increased awareness and management
6. *Conservation and Promotion*
   a. In-situ and ex-situ conservation
   b. Pilot group formation with related sector or agencies

D. Polices/legislation and enforcement issues

1. *Strengthen enforcement of policies and legislations*
   a. Review policies and legislations and make them implementable
   b. Respect customary and traditional rights and practices
   c. Strengthen environmental auditing system
   d. Lead role from implementing agencies
   e. Community empowerment

2. *Strengthen and Enhance policies and legislations*

a. Review policies
b. Empower communities
c. Respect traditional rights
d. Identify lead role

E. Unsustainable use of resources/over exploitation

1. *Sustainable management of resources*
   a. Management planning
   b Policy for licensing to hunt/ cull animals of excessive population
   c. Awareness on sustainable management, use, issues and impacts of resources
   d. Resource harvesting should be strictly as per the management plans
   e. Enhance management system and implementation
   f. Regular M and E
   g. Scientific study before utilization of resources
   h. Encourage value addition on product and salvage utilization

2. *Control poaching and illegal trade of wildlife*
   a. Ensure strict enforcement of rules and regulations
   b. Ensure adequate staff for patrolling

F. Developmental activities (Displacement due to developmental activities)

1. Proper planning

G. Coordination issues

1. Establish common forum
2. Strengthening M and E
3. Overall lead Agency
4. Strengthen co-ordination mechanism
   a. Develop policy framework
   b. Maintain proper database
   c. Conduct regular meeting
   d. Strengthen M and E
   e. Identify lead agency
   e. Clear ToRs – different agencies

5. *Strengthen institutional development and co-ordination mechanism to all levels*
   a. Awareness program
   b. Identification of lead agencies
   c. Develop TOR for all the stakeholders
   d. Consultative meeting at grass root level

H. Capacity and data issue

a. Conduct relevant trainings/ seminars/ workshops, promotional program.
b. Develop baseline date
c. Coordinate and develop a common data system on biodiversity
d. Capacity development
e. Mobilization of funds
f. Infrastructural development

I. Climate change issues

a. Protection of catchment areas
b. Resistant crop varieties

7. Strategies, actions and indicators identified by SH workshops for each national target

Target 1: Awareness

Strategies and actions:

1. *Raise awareness on Biodiversity and its Sustainable use*
   - Awareness through media
   - Create awareness at community level
   - Promote PES
   - Capacity building for local government staff

Indicators:

- Illegal trading incidents decreased by 20%

- 50 media programmes on biodiversity released
- 80% of HHs living in and around in Pas are aware of biodiversity (Survey/ Interviews)
- Develop and implement more than 5PES projects
- 2 seminars on biodiversity conducted annually
- Organize one national biodiversity festival annually
- Change in attitude of people towards biodiversity
- Inclusion of biodiversity component in legislations
- Number of programs coverage in media

Target 2: Valuation of biodiversity

Strategies and actions:

1. *Strengthen/ enforcement of policies and legislations*
   - Review policies and legislations and make them implementable
   - Respect customary and traditional rights and practices
   - Strengthen environmental auditing system

2. *Develop national capacity for valuation of biodiversity and ecosystem services*
   - Build capacity to develop national expertise and at field level
   - Incorporate values in national policy and plans

Indicators:

- All the relevant policies and legislations are revised/ amended
- Biodiversity activities identified and 2.5% of RNR budget set aside for Biodiversity activities in 12th FYP
- 100 traditional food restaurants established
- 100 acres of GRF land allotted for tsamdro/ pasture
- 90% of developmental activities complying with environmental policies/ laws
- Environmental auditing report published annually

Target 3: Incentives

Strategies and actions:

1. *Promote Organic farming*
   - Provide incentives for inputs and capacity development
   - Explore and establish markets for organic products

2. *Phase out rural timber supply gradually and emphasize on CF and PF*
   - Explore PES for CF and PF, eco-tourism

3. *Built incentives for preserving indigenous species*

Indicators:

- 40% decrease in import of chemical fertilizers / insecticides
- 10 Dzongkhags practicing organic farming
- 100 organic product sale counters established in the country
- Report and documentation

Target 4: Sustainable production and consumption

Strategies and actions:

1. *Minimize loss of native genetic resources*
    - Provide incentives for conservation of native species
    - Identify and document native breeds and varieties for area specific

2. *Promote sustainable utilization and management of natural resources*
    - Regular M and E
    - Scientific study before utilization of resources
    - Encourage value addition on products and salvage utilization

Indicators:

- Biodiversity champion identified and rewarded annually
- 80% of native breeds identified and documented
- Reports and products

Target 5: Mapping of high biodiversity value area

Strategies and actions:

1. *Sustainable management of resources*
    - Policy for licensing to hunt/ cull animals of excessive population
    - Management planning

2. *Mapping of critical biodiversity habitats and mitigation measures*
    - Prepare zonation maps
    - Plan developmental activities as per map

Indicator:

- The rate of habitat loss assessed
- 90% mines following scientific method
- 50% reduction in forest fire incidents
- 5 land management campaigns conducted

Target 6: Baseline for Fish and key aquatic biodiversity

Strategies and actions:

1. *To carry out detailed survey and documentation of aquatic life on every river basin and develop baseline data*
2. *Identify at least three species of fish and other aquatic biodiversity*

Indicators:

- Survey reports
- Information on aquatic diversity

Target 7: Areas under agriculture and forestry are managed through the adoption of sustainable management practices, ensuring conservation of biological diversity

Strategies and actions:

1. *Declare PA for vulnerable agricultural species*
2. *Improve management of CFs and PFs*
3. *Promote organic agriculture*

Indicators:

- Area under organic production increased by 20%
- Atleast 40% of the total population should be made aware on organic farming
- 3-4 PA for vulnerable agricultural species identified and declared with management plans
- Increase the number of FMUs from 19 to 22.
- Increase the number CF from 560 to 600.
- More than 70 % survival rate of plantation in CFs and PFs
- Reduced trend of non-compliance of management plans

Target 8: Pollution control

Strategies and actions:

1. *Reduce the import of chemicals and agro-chemicals by atleast 5%*
2. *Increase in the trend of effluent treatment plant (ETP) for all factories and workshops*
3. *Develop chemical profile for fertilizers and pesticides and guidelines for sound management*
4. *Monitoring of waste generation and management with strict enforcement of waste management act with focus on 3 R*

Indicator

- Decreasing trend in chemical usage
- Increase understanding on the effect of wrong usage and mishandling of chemicals
- Data on chemicals import and supply available with NPPC
- Reduced waste going to landfill (reduction by 50 %)
- Improved compliance with vehicle emission standards
- Improved water quality (Data with NECS)
- Increased number of electric cars and hybrid cars

Target 9: Invasive species

Strategies and actions:

1. *Study and document key invasive species*
2. *Develop measure to control entry and proliferation of invasive species*
3. *Promote compulsory uprooting of invasive spp.*
4. *Reduce introduction of exotic spp.*

Indicators:

- Profile of invasive species

Target 10: Climate change

Strategies and actions:

1. *Lowering of Thorthormi lake*
2. *Maintain a minimum of 60 % forest cover through sound management plans*

Indicators:

- Potentially dangerous lake lowered by 5 metres
- Green belts/no- entry zone declared in vulnerable ecosystems

Target 11: Protected areas

Strategies and actions:

1. *Operationalize all protected areas with adequate manpower*
2. *Develop sustainable financing for protected areas*

Indicators:

- Trends in number of protected areas with proper zonation.
- Trends in increase of ecosystem services
- At least one ecotourism activity initiated in each park
- At least one ABS related initiative operational in each park
- Increase in number of in-Situ and ex-situ conservation

Target 12: Conservation of prioritized species

Strategies and actions:

1. *Control poaching and illegal trade of wildlife.*
    - Ensure strict enforcement of rules and regulations
    - Ensure adequate staff for patrolling
    - Improve facilities and resources
2. *Raise awareness on biodiversity valuesI*
    - Create awareness at community level
    - Raise awareness through media/movies.
3. *Strengthen research, policies and legislation*
4. *Human wildlife conflict management*
5. *Electric fencing and Insurance schemes*
6. *Policies to licensee to hunt or cull*
7. *Reviews the list of threatened species of Bhutan*

Indicators

- All IUCN threatened species listed in Bhutan's list
- 90 % of the communities living with threatened spp. aware of conservation

- Increased population of threatened species due to increased awareness and management
- Reduced incidences of poaching and illegal activities
- Number of awareness program
- Reduced HWC incidences

Target 13: Conservation of genetic diversity

Strategies and actions:

1. *Minimize loss of genetic resources*
   - Identify/ document native breeds and plants
   - Provide incentives for conservation of native spp.
   - Promote local varieties and their market opportunities
   - Germplasm collection
2. *Explore opportunities for sustainable and comprehensive compensation programs for crops and animal depredation*
   - Promote crop and animal insurance schemes
   - Incorporate compensation budget in annual plans with clear criteria

Indicators

- Number of spp. documented.
- Number of promotional programs initiated

Target 14: Ecosystem and ecosystem services

Strategies and actions:

1. *Valuation and Implementation of PES*
   - Scale up the existing PES through lesions/ experiences
   - Identify potential/ valued ecosystem area

Indicators

- Number of PES valued and replicated in the field

Target 15: Habitat degradation

Strategies and actions:

1. *Synergize activities of 3 Rio conventions*
2. *Sustainable management of NR*

Indicators

- Area of degraded ecosystem restored

Target 17: NBSAP adoption

Strategies and actions

1. *Strengthen co-ordination mechanism*
2. *Develop M and E*
3. *Circulate revised NBSAP*
4. *Create awareness*
5. *Develop clear TOR for relevant agencies and identify lead agency*

Indicators

1. Co-ordination framework developed/ revised.
2. Lead agency identified and assigned mandates to coordinate meetings and maintain database.
3. Revived and strengthened M and E with focus on biodiversity
4. Clear ToRs for relevant agencies for biodiversity developed
5. NBSAP updated and circulated

Target 18: Traditional knowledge and customary practices

Strategies and actions:

1. *Preservation of TK/ TK and customary rights and practices*
2. *Provide incentives for conservation of TK*

Indicators

- Number of research documents on TK produced
- Recognition and number of groups formed and supported

Target 19: Information and technology

Strategies and actions:

1. *Strengthen research and development*

- Develop common database with either NSB, NBC or NEC or any relevant organization accessible to all stakeholders
- Identify active focal person for information
- Upload/report/update periodically

Indicators

- Created web-based/common database
- Number of research conducted
- Data and information sharing system improved
- Plants/ animals species rescheduled

Target 20: Funding

Strategies and Actions:

1. *Develop different financing mechanism*

Indicators

1. Endowment fund established
2. Number of PES strengthened/ implemented
3. Need-based project proposal approved and implemented

Annexure 4: Mapping of the National Targets to Aichi Biodiversity Targets

National Biodiversity Targets	Aichi Biodiversity Targets
National Target 1: By 2018, at least 60 percent of the population aware of values of biodiversity and steps they can take to conserve and use it sustainably.	By 2020, at the latest, people are aware of the values of biodiversity and the steps they can take to conserve and use it sustainably.
National Target 2: By 2018, national capacity is established for valuation of biodiversity and ecosystem services to integrate into national development planning and policymaking process and national accounting system, as appropriate.	By 2020, at the latest, biodiversity values have been integrated into national and local development and poverty reduction strategies and planning processes and are being incorporated into national accounting, as appropriate, and reporting systems.
National Target 3: By 2020 incentives harmful to biodiversity are reformed and positive incentives are enhanced.	By 2020, at the latest, incentives, including subsidies, harmful to biodiversity are eliminated, phased out or reformed in order to minimize or avoid negative impacts, and positive incentives for the conservation and sustainable use of biodiversity are developed and applied, consistent and in harmony with the Convention and other relevant international obligations, taking into account national socio economic conditions.
National Target 4: By 2020, relevant stakeholders adopt the principles of sustainable production and consumption of natural resources and have kept the impacts of use of natural resources well within safe ecological limits.	By 2020, at the latest, Governments, business and stakeholders at all levels have taken steps to achieve or have implemented plans for sustainable production and consumption and have kept the impacts of use of natural resources well within safe ecological limits.
National Target 5: By 2018, high-biodiversity value habitats are mapped, the rate of losses is accounted, trends monitored and overall loss and fragmentation reduced.	By 2020, the rate of loss of all natural habitats, including forests, is at least halved and where feasible brought close to zero, and degradation and fragmentation is significantly reduced.
National Target 6: By 2020, the baseline for fish and key aquatic biodiversity is established for implementation of sustainable management plans, as appropriate.	By 2020 all fish and invertebrate stocks and aquatic plants are managed and harvested sustainably, legally and applying ecosystem based approaches, so that overfishing is avoided, recovery plans and measures are in place for all depleted species, fisheries have no significant adverse impacts on threatened species and vulnerable ecosystems and the impacts of fisheries on stocks, species and ecosystems are within safe ecological limits.

National Target 7: Areas under agriculture and forestry are managed through the adoption of sustainable management practices, ensuring conservation of biological diversity	By 2020 areas under agriculture, aquaculture and forestry are managed sustainably, ensuring conservation of biodiversity.
National Target 8: By 2020, pollution from different sources, including from use of fertilizers and agro-chemicals affecting biodiversity and ecosystem functions are maintained within the national environmental standards.	By 2020, pollution, including from excess nutrients, has been brought to levels that are not detrimental to ecosystem function and biodiversity.
National Target 9: By 2020, invasive alien species and pathways are identified and prioritized, priority species are controlled or eradicated, and measures are in place to manage pathways to prevent their introduction and establishment.	By 2020, invasive alien species and pathways are identified and prioritized, priority species are controlled or eradicated, and measures are in place to manage pathways to prevent their introduction and establishment.
National target 10: By 2020, the potential impacts of climate change on vulnerable ecosystems are identified and adaptation measures strengthened.	By 2015, the multiple anthropogenic pressures on coral reefs, and other vulnerable ecosystems impacted by climate change or ocean acidification are minimized, so as to maintain their integrity and functioning.
National Target 11: The current Protected Area System is maintained with enhanced management effectiveness and financial sustainability.	By 2020, at least 17 per cent of terrestrial and inland water, and 10 per cent of coastal and marine areas, especially areas of particular importance for biodiversity and ecosystem services, are conserved through effectively and equitably managed, ecologically representative and well connected systems of protected areas and other effective area-based conservation measures, and integrated into the wider landscapes and seascapes.
National Target 12: By 2020, the information on conservation status of prioritized taxonomic groups is available and actions are taken to improve the status of prioritized species.	By 2020 the extinction of known threatened species has been prevented and their conservation status, particularly of those most in decline, has been improved and sustained.
National Target 13: By 2020, the genetic diversity of key cultivated plants and domesticated animals, including that of crop wild relatives are documented and conserved.	By 2020, the genetic diversity of cultivated plants and farmed and domesticated animals and of wild relatives, including other socio-economically as well as culturally valuable species, is maintained, and strategies have been developed and implemented for minimizing genetic erosion and safeguarding their genetic diversity.
National Target 14: By 2020, key ecosystems and ecosystem services are identified, assessed and safeguarded for human well-being.	By 2020, ecosystems that provide essential services, including services related to water, and contribute to health, livelihoods and well-being, are restored and safeguarded, taking into account the needs of women, indigenous and local communities, and the poor and vulnerable.

National Target 15: By 2020, priority degraded ecosystems and habitats are identified and rehabilitated through a landscape approach.	By 2020, ecosystem resilience and the contribution of biodiversity to carbon stocks has been enhanced, through conservation and restoration, including restoration of at least 15 per cent of degraded ecosystems, thereby contributing to climate change mitigation and adaptation and to combating desertification.
National Target 16: By 2015, the Nagoya protocol is implemented through national ABS legislative, administrative and institutional frameworks, which are consistent with the Nagoya Protocol.	By 2015, the Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization is in force and operational, consistent with national legislation.
National Target 17: By 2015, the revised National Biodiversity Strategies and Action Plan (NBSAP) is adopted as a national guiding document for effective biodiversity management.	By 2015 each Party has developed, adopted as a policy instrument, and has commenced implementing an effective, participatory and updated national biodiversity strategy and action plan.
National Target 18: By 2020, TK and customary practices of communities, relevant to biodiversity conservation and sustainable use are documented and used, and where appropriate revived and protected.	By 2020, the traditional knowledge, innovations and practices of indigenous and local communities relevant for the conservation and sustainable use of biodiversity, and their customary use of biological resources, are respected, subject to national legislation and relevant international obligations, and fully integrated and reflected in the implementation of the Convention with the full and effective participation of indigenous and local communities, at all relevant levels.
National Target 19: By 2020, science-based knowledge and technologies related to biodiversity are generated, improved, made accessible and applied, where appropriate.	By 2020, knowledge, the science base and technologies relating to biodiversity, its values, functioning, status and trends, and the consequences of its loss, are improved, widely shared and transferred, and applied.
National Target 20: By 2016, the funding requirement for the implementation of the NBSAP is identified and funds mobilized.	By 2020, at the latest, the mobilization of financial resources for effectively implementing the Strategic Plan for Biodiversity 2011-2020 from all sources, and in accordance with the consolidated and agreed process in the Strategy for Resource Mobilization, should increase substantially from the current levels. This target will be subject to changes contingent to resource needs assessments to be developed and reported by Parties

Annexure 5: Calculation of Budget Availability

(Source: 11th Five-Year Plan Document Vol. II. Page 333-341)

Sl. No.	Theme	Amount (Nu) for five years in million
1	Sustainable Management of Forest Landscape and Conservation of Biodiversity	237
2	Sustainable Management of State Forest	135
3	Integrated Watershed Management	518
4	Biodiversity Conservation Program	65
5	Targeted Highland Development	55
	Total	1,010
	1010/60 =USD 16.83 million for five years	USD 3.37 million/year

Assumptions:

1. Only financial support earmarked for biodiversity conservation has been reflected. For instance, support for Organic Farming, Field Crop Development Program, RNR Research and Extension Service, Rural Development Training, etc has not been accounted although it might have indirect contribution to biodiversity conservation.

2. The calculation of the financial allocation has been very loosely assessed.

3. It has been assumed that USD 3.37 million per annum includes secured financial support through Royal Government of Bhutan, Overseas Development Assistance and local donors.

Annexure 6: NBSAP Financial Resource Estimate 2014 – 2020

Target and Strategies	Indicative Budget USD	Implementation timeline	Priority Ranking
National Target 1: By 2018, at least 60 percent of the population is aware of values of biodiversity and steps they can take to conserve and use it sustainably.		2015-2018	Extremely Important
Strategy 1: Ascertain the existing awareness on the values of biodiversity in the country.	100,000		
Strategy 2: Implement National Environmental Education master plan, with special focus on biodiversity values	800,000		
Strategy 3: Strengthen capacity in biodiversity education and awareness.	500,000.00		
National Target 2: By 2018, national capacity is established for valuation of biodiversity and ecosystem services to integrate into national development planning and policy-making process and national accounting system, as appropriate.		2015-2018	Extremely Important
Strategy 1: Set up institutional mechanism for valuation of biodiversity and ecosystem values	150,000		
Strategy 2: Build capacity for valuation of biodiversity and ecosystem services.	500,000		
Strategy 3: Incorporate biodiversity values into environmental policy, legislations, guidelines and development plans.	50,000.00		
National Target 3: By 2020, incentives harmful to biodiversity are reformed and positive incentives are enhanced.		2015-2020	Very important
Strategy 1: Reform incentives affecting biodiversity negatively	200,000		
Strategy 2: Strengthen positive incentives for conservation and sustainable use of biodiversity.	2,000,000		

National Target 4: By 2020, relevant stakeholders adopt the principles of sustainable production and consumption of natural resources and have kept the impacts of use of natural resources well within safe ecological limits.		2015-2020	Very Important
Strategy 1: Strengthen science-based management of natural resources	900,000		
Strategy 2: Promote sustainable use and consumption of natural resources	400,000		
Strategy 3: Strengthen capacity in natural resources management.	600,000		
National Target 5: By 2018, key biodiversity habitats are mapped, the rate of loss is accounted, trends monitored and overall loss and fragmentation reduced.		2015-2018	Very Important
Strategy 1: Map high-biodiversity value habitats.	300,000		
Strategy 2: Reduce the loss of high-biodiversity value habitats.	500,000		
Strategy 3: Address the major causes of habitat loss where possible	1,450,000		
National Target 6: By 2020, the baseline for fish and key aquatic biodiversity is established for implementation of sustainable management plans, as appropriate.		2015-2020	Very Important
Strategy 1: Strengthen institutional and technical capacity in the conservation and sustainable utilization of fish and aquatic biodiversity.	500,000.00		
Strategy 2: Strengthen information base for fish and key aquatic biodiversity for conservation and sustainable utilization.	600,000		

National Target 7: Areas under agriculture and forestry, including rangeland are managed through the adoption of sustainable management practices, ensuring conservation of biological diversity.		2015-2020	Extremely Important
Strategy 1: Improve management of State Forest for sustainable production of goods and services.	500,000		
Strategy 2: Strengthen good governance for sustainable management of forests	300,000		
Strategy 3: Promote sustainable agricultural practices that ensures conservation of biological diversity	1,500,000		
National Target 8: By 2020, pollution from different sources, including from use of fertilizers and agro-chemicals affecting biodiversity and ecosystem functions are maintained within the national environmental standards.		2015-2020	Very Important
Strategy 1: Major pollutants affecting biodiversity are maintained within safe environmental standards.	200,000		
Strategy 2: Strengthen research and technical capacity for documenting, monitoring and assessing the impacts of major pollutants.	200,000		
National Target 9: By 2020, invasive alien species and pathways are identified and prioritized, priority species are controlled or eradicated, and measures are in place to manage pathways to prevent their introduction and establishment.		2014-2020	Very Important
Strategy 1: Improve understanding on IAS and native species with potential for invasiveness.	300,000		
Strategy 2: Develop and implement measures to protect natural and agriculture ecosystems against IAS.	300,000		
National target 10: By 2020, the potential impacts of climate change on vulnerable ecosystems are identified and adaptation measures strengthened.		2014-2020	Very important and not sure
Strategy 1: Elevate understanding on the impacts of climate change on biodiversity and ecosystems.	500,000		
Strategy 2: Strengthen climate change adaptation measures.	500,000.00		

National Target 11: The current Protected Area System is maintained with enhanced management effectiveness and financial sustainability.		2014-2018	Very Important
Stragety 1: Enhance management effectiveness of protected area systems	4,000,000		
Strategy 2: Establish sustainable financing measures for the Protected Area System	2,000,000		
National Target 12: By 2020, the information on conservation status of prioritized taxonomic groups is available and actions are taken to improve the status of prioritized species.		2014-2020	Very Important
Strategy 1: To understand the status of prioritized taxonomic groups and species and the factors affecting them.	300,000		
Strategy 2: Strengthening conservation program for prioritized species.	1,000,000		
National Target 13: By 2020, the genetic diversity of key cultivated plants and domesticated animals, including that of crop wild relatives are documented and conserved.		2014-2020	Very Important
Strategy 1: Strengthen national capacities in documentation and management of agro-biodiversity conservation and sustainable utilisation.	800,000		
Strategy 2: Strengthen documentation and management of agro-biodiversity.	500,000		
National Target 14: By 2020, key ecosystems and ecosystem services are identified, assessed and safeguarded for human well being.		2015-2020	Very Important
Strategy 1: Safeguard key ecosystem and ecosystem services.	2,500,000.00		
National Target 15: By 2020, priority degraded ecosystems and habitats are identified and rehabilitated through a landscape approach		2015-2020	Very Important
Strategy 1: Set up a national mechanism to address habitat and ecosystem degradation in a holistic approach.	100,000		
Strategies 2: Rehabilitate prioritized degraded areas and ecosystems.	3,000,000		

National Target 16: By 2015, the Nagoya protocol is implemented through national ABS legislative, administrative and institutional frameworks, which are consistent with the Nagoya Protocol.		2014-2015	Not sure and Very important
Strategy 1: Develop national policy and legal framework for the implementation of the Nagoya Protocol.	200,000		
Strategy 2: Strengthen the implementation of a fair and equitable ABS model.	1,000,000		
National Target 17: By 2015, the revised National Biodiversity Strategies and Action Plan (NBSAP) is adopted as a national guiding document for effective biodiversity management.		2014-2015	Extremely Important
Strategy 1: Adopt the revised NBSAP as national guiding document on biodiversity conservation and sustainable use program.	300,000		
Strategy 2: Establish a national mechanism for implementation of the NBSAP.	200,000		
National Target 18: By 2020, TK and Customary Practices of communities, relevant to biodiversity conservation and sustainable use are documented and used, and where appropriate revived and protected.		2014-2020	Very Important
Strategy 1: Promote Traditional Knowledge (TK) and customary practices relevant to biodiversity conservation and sustainable use.	500,000		
Strategy 2: Build national capacities for the protection, preservation and utilization of TK and customary practices relevant to biodiversity conservation and sustainable use.	300,000		
National Target 19: By 2020, science-based knowledge and technologies related to biodiversity are generated, improved, made accessible and applied, where appropriate.		2014-2020	Very Important
Strategy 1: Strengthen evidence-based policy and decision-making.	1,000,000		
Strategy 2: Promote transfer and adoption of technologies related to biodiversity management.	300,000		

National Target 20: By 2016, the funding requirement for the implementation of NBSAP is identified and funds mobilized		2014-2016	Extremley Important
Strategy 1: Strengthen good governance to coordinate fund mobilization for NBSAP implementation.	100,000		
Strategy 2: Mobilize financial resources to support implementation of the NBSAP.	100,000		
Total	**32,050,000**		

Annexure 7: NBSAP Implementation, Monitoring and Evaluation Framework

Sl. No.	National Target	Implementation time line	Thematic Groups	Stakeholders	Indicators	Method of measurement/ Means of verification
1	By 2018, at least 60 percent of the population is aware of values of biodiversity and steps they can take to conserve and use it sustainably.	2015-2018	Knowledge, Technology and Education	DoFPS (NRED, UWICE), CoRRB, RSPN, RUB, MoE, RNR-RDCs, DHMS, NECS, NSB, NBC.	Trends in the proportion of population aware of biodiversity	Measured through a survey in agreed time-interval, after getting the baseline
					EE Master Plan in place and status of its implementation	
					Trends in the implementation of biodiversity-related Corporate Social Responsibility initiatives.	
2	By 2018, national capacity is established for valuation of biodiversity and ecosystem services to integrate into national development planning and policy-making process and national accounting system, as appropriate.	2015-2018	Ecosystem and Ecosystem Services	DoFPS (WMD), DoA (NSSC), NSB, DoL, GNHC, DRE, NECS	Trends in the capacity for valuation of biodiversity and ecosystem	Measured by number of people/institutions with capacity to valuate biodiversity and ecosystem services.
					Trends in the number of valuation studies in the country.	Availability of ecosystems maps and ecosystem service tools (e.g TEEB, InVEST)
					Trends in the number of legislations/guidelines with biodiversity values integrated.	Measured through no. of legislations/guidelines with biodiversity valuation integrated. E.g Values of ecosystem services into land use plans.

3	By 2020, incentives harmful to biodiversity are reformed and positive incentives are enhanced.	2015-2020	Natural Resource Mgt.	DoFPS (FRMD, SFED, WCD), NBC (BP and NH), MSP-MoH, DGM	Number of harmful incentives identified and reformed.	
					Number of positive incentives reviewed and strengthened.	
4	By 2020, relevant stakeholders adopt the principles of sustainable production and consumption of natural resources and have kept the impacts of use of natural resources well within safe ecological limits.	2015-2020	Natural Resource Mgt.	DoFPS (FRMD, SFED, WCD), NBC (BP and NH), MSP-MoH, DGM	Availability of information on safe ecological limits of vulnerable production and consumption sectors.	Measured by number of sustainable mgt. plans (e.g: alternative to timber, efficient technologies for harvesting and processing of forest resources, NWFPs mgt. guidelines, etc) implemented
					Trends in development, adoption and implementation of sustainable management plans.	
5	By 2018, high-biodiversity value habitats are mapped, the rate of loss is accounted, trends monitored and overall loss and fragmentation reduced.	2015-2018	Species Conservation and Protected Area Mgt.	DoFPS (WCD and PA, FPED and TDs), DoA, DoL, NBC (PGR and AnGR Program, NH and RBGS), RSPN	Availability of information on high-biodiversity value habitats	Maps and lists of high-biodiversity value habitats
					Availability of baseline information on the extent and rate of habitat loss.	
					Trends in forest fire incidence	

6	By 2020, the baseline for fish and key aquatic biodiversity is established for implementation of sustainable management plans, as appropriate.	2015-2020	Species Conservation and Protected Area Mgt.	DoFPS (WCD and PA, FPED and TDs), DoA, DoL, NBC (PGR and AnGR Program, NH and RBGS), RSPN	Availability of consolidated information on fish and key aquatic biodiversity.	
					Number of management plans and implementation strategies for fish and key aquatic biodiversity	
7	Areas under agriculture and forestry, including rangeland are managed through the adoption of sustainable management practices, ensuring conservation of biological diversity.	2015-2020	Natural Resource Mgt.	DoFPS (FRMD, SFED, WCD), NBC (BP and NH), MSP-MoH, DGM	Trends in area of state forest under sustainable management practices.	Measure by acreage of forest area brought under sustainable mgt. and to include rangelands brought under sustainable management practices
					Trends in area under organic agriculture including SLM practices	
8	By 2020, pollution from different sources, including from use of fertilizers and agro-chemicals affecting biodiversity and ecosystem functions are maintained within the national environmental standards.	2015-2020	Ecosystem and Ecosystem Services	DoFPS (WMD), DoA (NSSC), NSB, DoL, GNHC, DRE, NECS	Trends in level of pollution at point source	Measure discharge and emission at point source in selected areas at an agreed interval.

9	By 2020, invasive alien species and pathways are identified and prioritized, priority species are controlled or eradicated, and measures are in place to manage pathways to prevent their introduction and establishment.	2014-2020	Ecosystem and Ecosystem Services	DoFPS (WMD), DoA (NSSC), NSB, DoL, GNHC, DRE, NECS	Availability of information on IAS.	Measured through no. of intervention for prevention and control of IAS, including capacity and management strategies developed and implemented.
					Trends in measures in place for prevention and control on spread of IAS.	Measured through number of interventions for prevention and control of IAS, including capacity and management strategies developed and implemented.
10	By 2020, the potential impacts of climate change on vulnerable ecosystems are identified and adaptation measures strengthened.	2014-2020	Ecosystem and Ecosystem Services	DoFPS (WMD), DoA (NSSC), NSB, DoL, GNHC, DRE, NECS	Trends in availability of information on species and ecosystems most vulnerable to impacts of climate change.	
					Climate Change Policy in place	

11	The current Protected Area System is maintained with enhanced management effectiveness and financial sustainability.	2014-2018 Species Conservation and Protected Area Mgt.		DoFPS (WCD and PA, FPED and TDs), DoA, DoL, NBC (PGR and AnGR Program, NH and RBGS), RSPN	Trends in number of parks with zonation completed.	
					Trends in the number of biological corridors operationalized.	Measured by no. of Biological corridors which are operationalized with mgt. Plan
					Trends in financial resources mobilized for PAs.	
					Type and number of transboundary-related initiatives and agreements.	
12	By 2020, the information on conservation status of prioritized taxonomic groups is available and actions are taken to improve the status of prioritized species.	2014-2020	Species Conservation and Protected Area Mgt.	DoFPS (WCD and PA, FPED and TDs), DoA, DoL, NBC (PGR and AnGR Program, NH and RBGS), RSPN	Trends in availability of updated National Red List of prioritized taxonomic groups.	Measured by no. of programmes/projects implemented and operational/ implementation strategy drawn out.
					Trends in species-based conservation strategies and programs.	
13	By 2020, the genetic diversity of key cultivated plants and domesticated animals, including that of crop wild relatives are documented and conserved.	2014-2020	Species Conservation and Protected Area Mgt.	DoFPS (WCD and PA, FPED and TDs), DoA, DoL, NBC (PGR and AnGR Program, NH and RBGS), RSPN	Trends in the availability of information on the diversity and status of key cultivated crops and domesticated animals.	

					Trends in *ex-situ* and *in-situ* conservation programs.	Measured by no. of accession for *ex-situ* and for *in-situ* by number of on-farm conservation initiatives.
14	By 2020, key ecosystems and ecosystem services are identified, assessed and safeguarded for human well being.	2015-2020	Ecosystem and Ecosystem Services	DoFPS (WMD), DoA (NSSC), NSB, DoL, GNHC, DRE, NECS	Availability of information on the key ecosystems and ecosystem services.	
					Number of valuation studies on ecosystem services and safeguard measures/framework in place for implementation.	Measured by the no. of valuation studies and key ecosystems/habitats that are conserved to ensure continued provisioning of ecosystem service or by number of safeguard measures/management plans implemented such environmental friendly land use planning.
15	By 2020, priority degraded ecosystems and habitats are identified and rehabilitated through a landscape approach.	2015-2020	Ecosystem and Ecosystem Services	DoFPS (WMD), DoA (NSSC), NSB, DoL, GNHC, DRE, NECS	Trends in the availability of information on the degree of degradation of degraded areas and ecosystems.	
					Trends in rehabilitation of prioritized degraded areas and ecosystems.	Measured in acreage of areas rehabilitated.

16	By 2015, the Nagoya protocol is implemented through national ABS legislative, administrative and institutional frameworks, which are consistent with the Nagoya Protocol.	2014-2015	Natural Resource Mgt.	DoFPS (FRMD, SFED, WCD), NBC (BP and NH), MSP-MoH, DGM	National ABS policy and regulatory framework in place.	
					Trends in national ABS ventures.	Measured through No. of communities benefitting from ABS agreement in terms of employment opportunity, income/business and products based on MAT and PIC.
17	By 2015, the revised National Biodiversity Strategies and Action Plan (NBSAP) is adopted as a national guiding document for effective biodiversity management.	2014-2015	Monitoring and Evaluation	NBC	Updated NBSAP adopted as a national guiding document for biodiversity management.	
					National coordination mechanism for NBSAP implementation in place.	
					Trends in NBSAP actions integrated into relevant sectorial plans and programs.	Measured by no. of strategies and actions outlined in NBSAP mainstreamed into 11th and 12th FYP of relevant sectors for sustainability of biodiversity conservation in Bhutan.

					TK associated with genetic resources.	documented each year/percent coverage of country.
18	By 2020, TK and Customary Practices of communities, relevant to biodiversity conservation and sustainable use are documented and used, and where appropriate revived and protected.	2014-2020	Natural Resource Mgt.	DoFPS (FRMD, SFED, WCD), NBC (BP and NH), MSP-MoH, DGM	Trends in the availability of information on Customary Practices and Community Protocols related to management of Biological resources.	
					Trends in ABS agreements related to TK associated with genetic resources.	
19	By 2020, science-based knowledge and technologies related to biodiversity are generated, improved, made accessible and applied, where appropriate.	2014-2020	Knowledge, Technology and Education	DoFPS (NRED, UWICE), CoRRB, RSPN, RUB, MoE, RNR-RDCs, DHMS, NECS, NSB, NBC.	Trends in new biodiversity information generated.	Measured by no. of taxonomic groups studied and information generated.
					Existence of an accessible central repository on biodiversity data and information.	Measured by no. of users assessing the biodiversity portal and trends in kind of information available.
					Trends in evidence-based decision-making.	
					Trends in adoption of technologies related to biodiversity management.	Measured by no. of biodiversity friendly technologies such as timber treatment, efficient timber felling, etc adopted.
20	By 2016, the funding requirement for the implementation of the NBSAP is identified and funds mobilized.	2014-2016	Resource Mobilization	GNHC, PPD-MoAF and PPD-MoF; BTFEC, WWF- Bhutan, Bhutan Foundation, SNV, UNDP, NBC.	Trends in funds sourced to implement the NBSAP	Measured through amount secured by number of programmes/projects formulated and implemented, directly contributing to the achievement of various NBSAP targets.

Annexure 8: Report on the Prioritization of National Targets

The prioritization of the National Biodiversity Targets was conducted at four National Stakeholder Consultation Workshops in Mongar (Central-East), Gelephu (South-Central), Thimphu (West) and Thimphu (Final National Consultative Workshop) in 2013 and 2014. The respondents represented mid-level and senior officials from various stakeholders agencies, both field and office based. The respondents were introduced to the 20 draft national targets and a questionnaire was provided to rank the targets according to the ranks provided. A total of 98 respondents ranked the 20 targets as (a) Not Sure, (b) Not Important, (c) Moderately Important, (d) Very Important and (e) Extremely Important. The over all ranking is presented below in the bar graph and the table. The targets rated as extremely important were 1, 2, 7, 17 and 20. In general, all the targets were adjudged as important by the respondents.

Bar graph depicting Target Ranking (N: 98). *Source: Stakeholder Opinion Survey, 2013-2014*

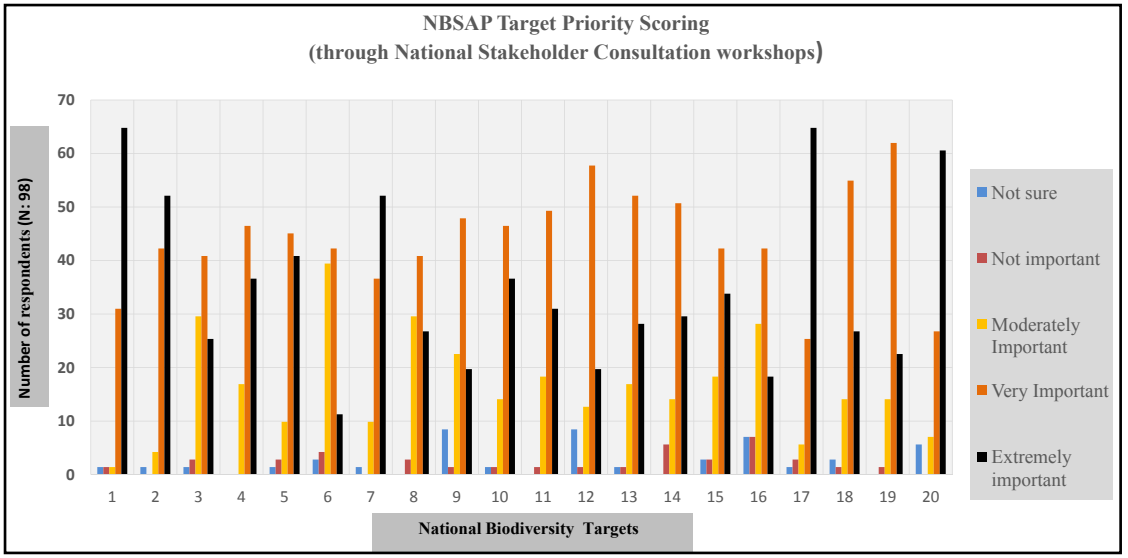


Table depicting National Biodiversity Target Ranking (N: 98). ***Source: Stakeholder Opinion Survey, 2013-2014***

Targets	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Not sure	1	1	1	0	1	2	1	0	6	28	0	6	1	1	2	32	1	2	0	4
Not important	1	0	2	0	2	3	0	2	1	1	1	1	1	4	2	5	2	1	1	0
Moderately Important	2	4	29	13	9	33	9	25	22	10	19	10	12	11	18	20	4	13	12	8
Very Important	30	42	41	50	46	49	35	40	47	33	46	51	52	51	40	30	25	58	63	25
Extremely important	64	51	25	35	40	11	53	31	22	26	32	30	32	31	36	13	66	24	22	61

Annexure 9: Stakeholder Mapping Result

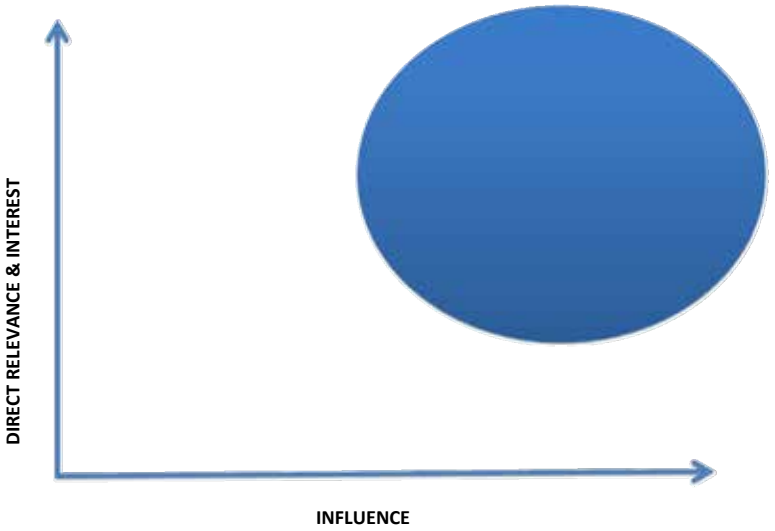
A. LIST OF BIODIVERSITY STAKEHOLDERS

1. Royal Audit Authority
2. Royal Civil Service Commission
3. Policy and Planning Division, MoAF
4. Land Use and Statistics Section, MoAF (PPD)
5. Bhutan Agriculture and Food Regulatory Authority
6. Information Communication Services (ICS), MoAF
7. Department of Agriculture, MoAF
8. Horticulture Division, DoA, MoAF
9. Department of Livestock, MoAF
10. Department of Forests and Park Services (DoFPS)
11. Forest Resource Management Division (FRMD), DoFPs
12. Nature Recreation and Ecotourism Division, DOFPs
13. Social Forestry Extension Division, DoFPS
14. Watershed Management Division, DoFPS
15. Natural Resources Development Corporation Ltd. (NRDCL)
16. Department of Renewable Energy, MoEA
17. Department of Geology and Mines, MoEA
18. Department of Curriculum Research and Development, MoE
19. Department of Public Accounts, MoF
20. Gross National Happiness Commission
21. Policy and Planning Division, MoF
22. Department of Disaster Management, MoHCA
23. National Environment Commission Secretariat
24. National Land Commission
25. Druk Green Power Corporation
26. Druk Holdings and Investment
27. WWF Bhutan
28. READ, Bhutan
29. Bhutan Foundation
30. Bhutan Trust Fund for Environmental Conservation
31. SNV, Thimphu
32. UNDP
33. Royal Society for Protection of Nature
34. Green Public Procurement Project Bhutan Office
35. Tarayana Foundation
36. Royal University of Bhutan
37. National Statistical Bureau (NSB)
38. National Biodiversity Centre
39. Menjong Sorig Pharmaceutical, MoH
40. Department of Local Governance
41. GEF - Small Grants Program
42. Environment Committees of NA and NC of Bhutan

Stakeholders should include: Beneficiaries, partner organization, donors, investors, CSOs, NGOs, INGOs, Individuals and Institutions with key knowledge, staff and managers of organizations.

B. STAKEHOLDER ANALYSIS METHODOLOGY

a. Identify the different stakeholder groups that would benefit NBSAP implementation
b. Assess their potential influence on NBSAP
c. Assess the degree of each stakeholder's potential interest in support it can provide to NBSAP



RESULT OF THE ANALYSIS

Based on the above questionnaire, the following SHs, which fell within the circle were short listed.

Short Listed based on above questions	**Key Word for Plotting**
1. Policy and Planning Division, MoAF	1
2. Bhutan Agriculture and Food Regulatory Authority	2
3. Department of Agriculture, MoAF	3
4. Department of Livestock, MoAF	4
5. Dept. of Forests and Park Services	5
6. NRDCL	6
7. Department of Renewable Energy, MoEA	7
8. Department of Geology and Mines, MoEA	8
9. Department of Curriculum Research and Development, MoE	9
10. Gross National Happiness Commission	10
11. PPD, MoF	11
12. National Environment Commission Secretariat	12
13. WWF Bhutan	13
14. Bhutan Foundation	14

15. Bhutan Trust Fund for Environmental Conservation 15
16. SNV, Thimphu 16
17. UNDP 17
18. Royal Society for Protection of Nature 18
19. Tarayana 19
20. Royal University of Bhutan 20
21. CoRRB 21
22. National Biodiversity Centre 22
23. National Statistical Bureau (NSB) 23
24. Menjong Sorig Pharmaceutical, MoH 24
25. Department of Local Governance 25

The first short listed SH were further narrowed down and only those which fell strongly within the circle of questions 1 and 2 were mapped as implementing partners for NBSAP against each thematic group as follows:

Thematic group	Targets	Agency
1. Knowledge, Technology and Education.	1, 19	DoFPS (NRED, UWICE), CoRRB, RSPN, RUB, MoE, RNR-RDCs, DHMS, NECS, NSB, NBC
2. Species Conservation and Protected Area Management	5, 6,11,12,13	DoFPS (WCD and PA, FPED and TDs), DoA, DoL, NBC (PGR and AnGR Program, NH and RBGS), RSPN
3. Ecosystem and Ecosystem Services	2,8,9,10,14,15	DoFPS (WMD), DoA (NSSC), NSB, DoL, GNHC, DRE, NECS
4. Resource Mobilization	20	GNHC, PPD-MoAF and PPD-MoF; BTFEC, WWF- Bhutan, Bhutan Foundation, SNV, UNDP, NBC, NEC
5. Natural Resource Management	3, 4,7,16, 18	DoFPS (FRMD, SFED, WCD), NBC (BP and NH), MSP-MoH, DGM
5. M and E	17	NBC

Annexure 10: Proposed Terms of Reference for the Thematic Working Group (TWG)

1. Background

Recognizing the absence of a coordination mechanism as one of the biggest gaps in implementation of the Biodiversity Action Plan and convinced that there is a need to enhance the spirit of cooperation and collaboration among different stakeholders, a multi-stakeholder thematic working group is formed with representation from the Royal Government of Bhutan, Non-governmental and Civil Society Organizations and a donor agency.

2. Composition of the Thematic Working Groups

There will be six thematic working groups, namely:
1. Knowledge, Technology and Education
2. Species Conservation and Protected Area Management
3. Ecosystem and Ecosystem Services
4. Resource Mobilization
5. Natural Resource Management
6. Monitoring and Evaluation

The table below aligns the national targets with the thematic groups and also identifies relevant agencies that may be involved in implementing the targets based on stakeholder mapping carried out by the National Task Force. Representatives from the agencies will be the members of the relevant thematic group. All members must designate alternates to attend if they are not available. Additional representatives may be invited to meetings as temporary participants, as and when required. NBC as the secretariat to the NBSAP implementation will coordinate the thematic working groups.

Thematic Working Group	Targets	Agency
1. Knowledge, Technology and Education	1, 19	DoFPS (NRED, UWICE), CoRRB, RSPN, RUB, MoE, RNR-RDCs, DHMS, NECS, NSB, NBC
2. Species Conservation and Protected Area Management	5, 6,11,12,13	DoFPS (WCD and PA, FPED and TDs), DoA, DoL, NBC (PGR and AnGR Program, NH and RBGS), RSPN
3. Ecosystem and Ecosystem Services	2,8,9,10,14,15	DoFPS (WMD), DoA (NSSC), NSB, DoL, GNHC, DRE, NECS
4. Resource Mobilization	20	GNHC, PPD-MoAF and PPD-MoF; BTFEC, WWF- Bhutan, Bhutan Foundation, SNV, UNDP, NBC, NEC
5. Natural Resource Management	3, 4,7,16, 18	DoFPS (FRMD, SFED, WCD), NBC (BP and NH), MSP-MoH, DGM
6. M and E	17	NBC

3. Operations

The TWG will meet on a quarterly basis. At the first meeting of the TWG, a team leader will be identified for each thematic group. The team leader will ensure that a notification of each meeting is sent out at least one week ahead of the meeting, accompanied by any relevant documents to be discussed at the meeting. The team leader will also circulate draft minutes of each meeting within three working days. All members of the TWG (or their alternates, if they attended the meeting) will provide comments on the draft minutes within three working days, after which the team leader will circulate the final minutes. The minutes will include the date, time, location, and subject matter of the following meeting. The final minutes will be widely circulated and formally endorsed.

4. Functional Role

The TWG is essentially a technical working group that will ensure implementation of the biodiversity targets. It will not be a decision-making body but will provide recommendations to the NBSAP National Committee. Recommendations will be formulated on a consensual basis.

5. Responsibilities of the members of the TWG

1. Act as a link between the NBSAP Secretariat and their parent agencies and promote synergies and meaningful collaboration.

2. Identify and take ownership of targets relevant to their on-going work, exercise and mandate.

3. Identify resource gaps/challenges in achieving the targets.

4. Develop project proposals in line with the biodiversity targets and liaise with NBSAP secretariat to secure financial resources, if necessary.

5. Lead the implementation of relevant targets.

6. Provide timely reporting and update of the progress of implementation to the NBSAP secretariat.

7. Develop technical documents that support the implementation of thematic targets.

8. Attend quarterly meetings and other relevant training events and workshops.

Annexure 11: Participants of Regional and National SH Consultation workshops

1. **List of Participants of Western Region SH Workshop held from 17 - 18 October 2014 at NBC Conference Hall, Serbithang, Thimphu**

S/N	Name	Designation/Organization
1	Mr. Akey Dorji	DzFO, Paro
2	Mr. Chokey Dorji	NBC
3	Mr. Choki Gyeltshen	BO, NBC
4	Ms. Choki Wangmo	EO, Chhukha
5	Mr. D N Chapagai	ADLO, Haa
6	Mr. Dawa Tshering	DzFO, Thimphu
7	Mr. Dorji Wangchuk	Dz.Ev.O, Gasa
8	Mr. Dorji Wangdi	EO, Wangdue
9	Dr. Chenga Tshering	DLO, Paro
10	Dr.Tashi Yangzome Dorji	PD, NBC, NTF
11	Mr. Gem Tshering	DzFO, Haa
12	Mr. Gyem Tshering	DLO, Punakha
13	Mr. Kaka Tshering	CFO, Paro
14	Mr. Karma C Nyedrup	Specialist, NEC/NTF
15	Mr. Kencho Dorji	Park Ranger, JDNP
16	Mr. Kencho Tshering	Sr. Livestock, Ext. Supervisor
17	Ms. Kunzang Choden	CoRRB/NTF
18	Mr. Lhab Tshering	BO, NBC
19	Mr. M L Bhattarai	DAO, Haa
20	Mr. N K Acharya	Asst.DAO, Chhukha
21	Mr. Namgay	DzFO, Haa
22	Mr. Namgyal Chencho	Offt.ADLO, Thimphu
23	Mr. Ngawang Gyeltshen	NRED, DoFPS, NTF
24	Mr. Nima Tshering	DzFO, Chhukha
25	Mr. Pema Leda	NBC
26	Ms. Pema Lhaden	Senior Agro Ext Supervisor
27	Mr. Pema Thinley	R O Lobesa, Wangdue

28	Mr. Rinchen Dorji	NBC
29	Mr. Rinchen Penjor	EO, Punakha
30	Mr. Sampa	NBC
31	Ms. Sangay Dema	Dy. CBO, NBC, NTF
32	Mr. Sangay Khandu	EO, Haa
33	Mr. Sonam Norbu	DzFO, Wangdue
34	Mr. Sonam Tobgay	DzFO, Punakha
35	Mr. Tashi Wangdi	DAO, Punakha
36	Mr. Tenzin Chejay	GFO, Mewang Gewog
37	Ms. Thinley Choden	WCD/NTF
38	Mr. Tshendu	Offt.DLO, Gasa
39	Mr. Tshering N. Penjor	DAO, Gasa
40	Mr. Tshering Tobgay	DAO, Wangdue
41	Ms. Tshering Yangchen	NBC
42	Mr. Tshewang Tobgay	DAO, Wangdue
43	Ms. Yeshi Zangmo	Offt.ADLO, Chhukha

2. List of Participants of South-Central Region SH Workshop held from 28 - 29 January, 2014 at Tsenden Hotel, Gelephu

S/N	Name	Designation and Organization
1	Mr. Chimmi Wangchuk	Dagana Dzongkhag
2	Mr. DB Biswa	NBC
3	Mr. Dorji Wangchuk	Tsirang Dzongkhag
4	Dr.Tashi Yangzome Dorji	NBC/NTF
5	Mr. Gem Tshering	Phibsoo Wildlife Sanctuary
6	Mr. Karma Wangdi	Trongsa Dzongkhag
7	Mr. Kelzang Wangchuk	CFO, JSWNP, Trongsa
8	Mr. Khampa	Sarpang Dzongkhag
9	Ms. Kunzang choden	CoRRB/NTF
10	Mr. Ngawang Gyeltshen	NRED/NTF
11	Mr. Pema Chofil	Tsirang Dzongkhag
12	Mr. Pema Tshewang	Tsirang Dzongkhag
13	Mr. Pema Wangchuk	Dagana Dzongkhag
14	Mr. Phub Dorji	Zhemgang Dzongkhag

15	Mr. Phurba Drukpa	Trongsa Dzongkhag
16	Mr. Phurpa Namgyel	DoL, Bumthang
17	Mr. Rixzin Wangchuk	Dagana Dzongkhag
18	Mr. Sampa	NBC, Thimphu
19	Ms. Sangay Dema	NBC/NTF
20	Mr. Sangay Tenzin	JSWNP, Trongsa
21	Mr. Sherab Dorji	Phibsoo WS, Sarpang
22	Mr. Sherab Tenzin	DLO, Trongsa Dzongkhag
23	Mr. Sithar Wangdi	Zhemgang Dzongkhag
24	Mr. Sonam Wangchuk	Samtse Dzongkhaa
25	Mr. Tandin Dorji	Dagana Dzongkhag
26	Mr. Tashi Dendup	Dz. Evnt. O, Zhemgang Dzongkhag
27	Mr. Tenzin Choda	Sarpang Dzongkhag
28	Mr. Thinley Dorji	DFO, Sarpang
29	Ms. Tshering Yangzom	Trongsa Dzongkhag
30	Mr. Tsheten Dorji	Tsirang Territorial Division
31	Mr. Ugyen Dorji	Sarpang Dzongkhag
32	Mr. Ugyen Lhendup	Zhemgang Dzongkhag
33	Mr. Yeshi Dorji	Samtse Forest Division
34	Ms. Yeshi Yangdon	Sarpang Dzongkhag

3. List of Participants of East-Central Region SH Workshop held from 6 - 8 March, 2014 at Druk Zhongar Hotel, Mongar

S/N	Name	Designation/Organization
1	Mr. Chhimi Wangchuk	DEnv.O, P/Gatshel
2	Mr. Choki Gyeltshen	BO, NBC
3	Mr. Chophel	ADLO, S/Jongkhar
4	Mr. DB Biswa	Accountant, NBC
5	Mr. Dendup Tshering	CFO, T/Gang
6	Mr. Dorji Khando	EO, T/Gang
7	Dr. Narayan Pokhrel	VO, P/Gatshel
8	Dr.Tashi Yangzome Dorji	PD, NBC, NTF
9	Mr. DS Rai	CFO, WCP
10	Ms. Jamyang Choden	BO, NBC
11	Mr. Jangchuk Gyeltshen	Sr.Forest Ranger, TNP

12	Mr. Jigme Tshelthrim Wangyal	Sr.DzFO, T/gang
13	Mr. Jitsen Wangchuk	ADAO, Lhuentse
14	Mr. Kado Tshering	CFO, Mongar
15	Mr. Karma Leki	Sr.DzFo, S/Jongkhar
16	Mr. KB Sandas	Sr. FR, Gyelposhing Range
17	Mr. Kuenzang Thinley	FRO, Mongar
18	Mr. Kumbu Dorji	FO, SWS
19	Mr. Leki Wangchuk	BO, NBC
20	Mr. Mani Prasad Nirola	BO, NBC
21	Mr. Ngawang	Chief DAO T/Yangtse
22	Mr. Ngawang Jamtsho	FRO, Mongar
23	Mr. Nima Gyeltshen	FRO, Bumthang
24	Mr. Norbu Wangchuk	DzFO, Mongar
25	Mr. NS Tamang	DLO, T/Gang
26	Mr. Pankey Dukpa	CFO, BWS
27	Mr. Phurpa Namgyel	Sr.AIT, Bumthang
28	Mr. Phurpa Tshering	DLO, Trashi Yangtse
29	Mr. Rinchen Wangdi	Dy.Chief DzFo, Bumthang
30	Mr. Rinzin Choney	Sr.RA RDC Wengkher
31	Mr. Sachin Limbu	Dz.Envt.O, Lhuentse
32	Ms. Sangay Dema	Dy.CBO, NBC/NTF
33	Mr. Sangay Dorjee	CFO, S/Jongkhar
34	Mr. Sangay Dorjee	DFO, S/Jongkhar
35	Mr. Shivalal Sanyasi	Sr.Ranger, DFO, Mongar
36	Mr. Singay Dorji	UNDP/NTF
37	Mr. Sonam Dorji	EA, P/Gatshel
38	Mr. Sonam Dorji	Chali Geog, Mongar
39	Mr. Sonam Gyeltshen	Sr.DzFO, Lhuentshe
40	Mr. Sonam Tobgay	FO,SWS
41	Mr. Sonam Tobgay	CFO, SWS, T/gang
42	Mr. Sonam Zangpo	Sr.DzFO, P/Gatshel
43	Mr. Tashi Gyelpo	Asst. DzFO, Trashi Yangtse
44	Mr. Tashi Phuntsho	RO, RNR Wengkhar
45	Mr. Tashi Wangchuk	Dz.Livestock sector, Mongar
46	Mr. Tenzin Dorji	Sr. DLO, Mongar
47	Mr. Tenzin Tshewang	DLO, Lhuentse

48	Ms. Thinlay Choden	Sr.FRO, RDC-Drala/NTF
49	Mr. Tsheten Dukpa	Sr. ES, S/Jongkhar

4. List of Participants at the National SH Workshop held from 21 - 22 July, 2014 at NITM Hall, Thimphu

S/N	Name	Designation and Organization
1	Mr. Chukey Wangchuk	BTFEC/NTF
2	Mr. Choki Gyeltshen	NBC
3	Mr. Choni Dendup	DAMC
4	Mr. Dawa Zangpo	PPD
5	Mr. Dechen Dorji	WWF
6	Ms. Dimple Thapa	DoFPS
7	Mr. Dorji Rabten	DoFPS
8	Dr. Lam Dorji	RSPN
9	Dr. Lungten Norbu	CoRRB
10	Dr. Pema Choephyel	BTFEC
11	Dr. Thinley	NPPC, DoA
12	Mr. Jamyang Phuntsho	DoFPS
13	Mr. Karma C Nyedrup	NEC/NTF
14	Ms. Karma Dema Dorji	NSSC
15	Mr. Karma Tenzin	RDC, Yusipang
16	Mr. Kezang	GPPB/IISD
17	Ms. KezangTshomo	DoA
18	Ms. Kinley Pelden	BAFRA
19	Ms. Namgay Bidha	WCD, DOFPS
20	Mr. NB Tamang	DoL/NTF
21	Mr. Ngawang Gyeltshen	DoFPS/NTF
22	Ms. Pem Lama	GPPB
23	Mr. Prabhat Kumar Mukhia	SFED, DoFPS
24	Mr. Raling Ngawang Drukda	NRED, DoFPS
25	Mr. Sampa	NBC
26	Mr. Samten	MSP, ITMS
27	Ms. Sangay Dema	NBC/NTF
28	Mr. Sangay Thinley Dorji	GPPB
29	Mr. Sangay Wangchuk	DoFPS

30	Mr. Santosh Katwal	FRMD
31	Mr. Singay Dorji	UNDP/NTF
32	Mr. Tashi Dorji	UNDP
33	Dr. Tashi Y Dorji	PD, NBC/NTF
34	Ms. Tashi Yangzom	ICS
35	Ms. Thinley Choden	RNR RDC-Darla/NTF
36	Mr. Tirtha Katwal	RDC, Yusipang/NTF
37	Mr. Tshering Phuntsho	RSPN/NTF
38	Mr. Vijay Moktan	WWF-Bhutan
39	Ms. Yangchen Lhamo	WMD
40	Ms. Yeshey Dema	NPPC, DoA

Annexure 12: Additional People Who Reviewed/Contributed Information

S/N	Name	Organizaiton
1	Mr. Tashi Dorji	UNDP Bhutan
2	Mr. Vijay Moktan	WWF Bhutan Program
3	Ms. Medon Yaganegi	CoRRB, MoAF
4	Dr. Jigme Dorji	NBC, MoAF
5	Ms. Asta M. Tamang	NBC, MoAF
6	Mr. Dorji Gyaltshen	WMD, MoAF
7	Ms. Rinchen Yangzom	NBC, MoAF

Ministry of Agriculture and Forests
Royal Government of Bhutan

Funded by:
GEF through Expedited Enabling Support to Bhutan for the Revision of the NBSAPs and Development of Fifth National Report to the CBD.

gef

UNEP

Convention on Biological Diversity