



BHUTAN BIOLOGICAL CONSERVATION COMPLEX

(Living in harmony with the Nature)



A Landscape Conservation Plan: a way forward.

Prepared by
Nature Conservation Division, Dept. of Forestry Services, Ministry of Agriculture,
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Thimphu, February 2004

NEC (1998) *The Middle Path: Bhutan's national environment strategy*. National Environment Commission, Thimphu.

NEC (2000) *Environmental Assessment Act, 2000*. National Environment Commission, Thimphu.

Norbu UP (1998) *Human-Nature Interactions and Protected Area Management: A study of the situation in Lower Kheng part of Royal Manas National Park*. Unpublished M.Sc. thesis, University of Wales, Aberystwyth, UK.

Norbu UP (1999) *From Islands to a Network*. Panda Quarterly Summer 1999, WWF Bhutan Programme newsletter.

Norbu UP (2002) *Two Years and Beyond: Report of the biennial programme review of the UNDP/GEF Small Grants Programme in the Kingdom of Bhutan*. UNDP/GEF Small Grants Programme, Thimphu.

Norbu UP (2003) *A Report of the Assessment of ICDP Activities in Bumdeling Wildlife Sanctuary*. Report prepared for Nature Conservation Division, Department of Forestry Services, Ministry of Agriculture, and Environment Sector Programme Support, Danida, Thimphu.

RC Consultancy Firm (2003) *Anti-Poaching Strategy for Bhutan*. Document prepared for Nature Conservation Division, Forestry Services Division, Ministry of Agriculture, and WWF Bhutan Programme, Thimphu.

RGoB (2000) *Bhutan 2020: A vision for peace, prosperity and happiness*. Bhutan's Vision Document, Planning Commission, Thimphu.

RGoB (2002) *Ninth Plan Main Document (2002-2007)*. Planning Commission, Royal Government of Bhutan, Thimphu.

SDC (2002) *Switzerland's International Cooperation Annual Report 2002*. Swiss Agency for Development and Cooperation.

van der Poel P (2003) *Nature Conservation: Conservation topics for further discussion*. Danida/ BWS Advisor's end-of-the-assignment Report.

Wikramanayake ED et al (1998) *Where Can Tigers Live in the Future? A framework for identifying high-priority areas for the conservation of tigers in the wild*. In: *Seidensticker et al (eds) Riding the Tiger: Tiger Conservation in human-dominated landscapes*. Cambridge University Press, UK.

WWF International (2002) *Conserving Tigers in the Wild, A WWF framework and strategy for action 2002-2010*. Species Programme, WWF International, Gland, Switzerland.

www.helvetas.org.bt : Website of Helvetas Bhutan

www.panda.org : WWF International's website.

www.redlist.org : IUCN's website on red list of globally threatened species.

དཔལ་ལྷན་འབྲུག་གཞི་རིམ་སྐྱོལ་ཁག་
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ROYAL GOVERNMENT OF BHUTAN
MINISTRY OF AGRICULTURE
TASHICHHODZONG
THIMPHU, BHUTAN

“Walking the Extra Mile”

FOREWORD

Bhutan Biological Conservation Complex (B2C2) is one of the most ambitious programmes of Nature Conservation Division that looks at conservation at landscape- level. Through this programme an effort is made to reinforce, and translate Nature Conservation Division's Vision and Strategy 2003 into a holistic and *landscape- approach* that would eventually sustain the country's diverse ecosystems.

Key characteristics of the programme include: focus on biodiversity conservation in protected areas; biological corridors and conservation areas; commitment to positive human-nature interactions; promotion of public environmental education; encourage partnerships in conservation programmes to address a wider range of issues; and optimizing the use of limited resources.

Stakeholder consultation was the first step in the preparation of the B2C2 programme where the concept of managing Bhutan's ecosystems at a landscape level was discussed. An extensive desktop analysis was carried out to condense the key biodiversity conservation and socio-economic issues raised at the stakeholders consultation meeting including current trends and priorities. The outcome of the analysis formed the major part of the programme.

In recognition of the uniqueness of landscapes, ecosystems and species, which include economic, cultural and inherent values, the B2C2 approach will be one of the most effective strategies for the conservation of biological and landscape diversity in Bhutan for many years to come. I am confident that this programme will provide Bhutan the opportunity to sustain the biological diversity at the landscape level, and would ensure that a balanced ecosystem is passed on to our future generations.

My best wishes to all the staff of the Nature Conservation Division, Department of Forests for the successful implementation of the programme. I am thankful to WWF Bhutan for their continued and timely support in the preparation of B2C2 programme.


(Sangay thinley)

SECRETARY

MoA (2002) *Renewable Natural Resources Sector Ninth Plan (2002-2007)*. Ministry of Agriculture, Thimphu.

MoA (2002) *Biodiversity Action Plan for Bhutan 2002*. Ministry of Agriculture, Thimphu.

MoA (2002) *Community-based Natural Resource Management in Bhutan: A framework*. Department of Research and Development Services, Ministry of Agriculture, Thimphu.

MoA (2002) *Renewable Natural Resources Statistics 2000*. Ministry of Agriculture, Thimphu.

MoA (2003) *Facts and Figures of RNR Sector 2003*. Policy and Planning Division, Ministry of Agriculture, Thimphu.

MoHA (2002) *Geog Yargay Tshogchhung Chathrim, 2002*. Ministry of Home Affairs, Thimphu.

Namgyal P (2003) *Household Income, Property Rights and Sustainable Use of NTFP in Subsistence Mountain Economy: The case of Cordecyps and Matsutake in Bhutan Himalayas*. Paper (revised version) presented at the CBNRM Workshop, 4 – 7 November 2003, Lobesa, Bhutan.

NCD (1995) *Royal Manas National Park: Conservation management plan 1995 – 2000*. Nature Conservation Division, Department of Forestry Services, Ministry of Agriculture, Thimphu.

NCD (2001) *Black Mountain National Park: Conservation management plan January 2001 – June 2002*. Nature Conservation Division, Department of Forestry Services, Ministry of Agriculture, Thimphu.

NCD (2001) *Bumdeling Wildlife Sanctuary: Conservation management plan July 2001 – June 2007*. Nature Conservation Division, Department of Forestry Services, Ministry of Agriculture, Thimphu.

NCD (2002) *Thrumshingla National Park: Conservation management plan 2002/03 – 2006/07*. Nature Conservation Division, Department of Forestry Services, Ministry of Agriculture, Thimphu.

NCD (2003) *Biodiversity Conservation Project 2 – Community-based Biodiversity Conservation and Ecosystem Management*. Project Proposal submitted to Sustainable Development Secretariat, Thimphu.

NCD (2003) *Vision and Strategy for the Nature Conservation Division 2003*. Department of Forestry Services, Ministry of Agriculture, Thimphu.

NCD (2003) *Jigme Singye Wangchuck National Park: Conservation management plan July 2003 – June 2007*. Nature Conservation Division, Department of Forestry Services, Ministry of Agriculture, Thimphu.

7. REFERENCES

BirdLife International (2003) *Saving Asia's Threatened Birds: A guide for government and Civil Society*. Cambridge, UK: BirdLife International.

BTF (2002) *Annual Report December 2002*. Bhutan Trust Fund for Environment Conservation, Thimphu.

Chamling KD and Williams PJ (2000) *Mid-Term Review of Integrated Management of Jigme Dorji National Park*. Report prepared for the Nature Conservation Division, Department of Forestry Services, Ministry of Agriculture, and UNDP/ Global Environment Facility.

Choden D and Namgay K (1996) *Report on the Findings and Recommendations of the Wild Boar Survey*. Project for Assessment of Crop Damage by the Wild Boar, National Plant Protection Centre, Research, Extension and Irrigation Division, Ministry of Agriculture, Thimphu.

CSO (2002) *Bhutan at a Glance 2002*. Planning Commission, Royal Government of Bhutan, Thimphu.

DFS (2002) *Forestry Sub Sector Plan, Ninth Five Year Plan (2002-2007)*, Draft – February 2004. Department of Forestry Services, Ministry of Agriculture, Thimphu.

Dorji N and Fuller S (2003) *Terminal Review of Integrated Management of Jigme Dorji National Park*. Final Report prepared for the Nature Conservation Division, Department of Forestry Services, Ministry of Agriculture, and UNDP/ Global Environment Facility.

DoT (2001) *Bhutan National Ecotourism Strategy*. Department of Tourism, Ministry of Trade and Industry, Thimphu.

Gyamtscho P (1996) *Assessment of the Condition and Potential for Improvement of High Altitude Rangelands of Bhutan*. P.hd dissertation, Swiss Federal Institute of Technology, Zurich.

LUPP (1997) *Atlas of Bhutan: Land Cover and Area Statistics of 20 Dzongkhags*. Land Use Planning Project, Ministry of Agriculture, Thimphu.

MacDougal C and Tshering K (1998) *Tiger Conservation Strategy for the Kingdom of Bhutan*. Nature Conservation Division, Department of Forestry Services, Ministry of Agriculture, Thimphu.

MoA (1995) *Forest and Nature Conservation Act of Bhutan, 1995*. Ministry of Agriculture, Thimphu.

MoA (1998) *Biodiversity Action Plan for Bhutan 1998*. Ministry of Agriculture, Thimphu.

MoA (2000) *Forest and Nature Conservation Rules of Bhutan, 1995*. Ministry of Agriculture, Thimphu.

Table of Contents

Acronyms and Glossary of Bhutanese Terms	iii
1. Rationale and Purpose	1
1.1.Rationale	1
1.2.Purpose of the Plan	2
2. The Overall Context	3
2.1.Country Background	3
2.2.Conservation History	4
2.3.Conservation Significance	7
2.4.Conservation Policy and Legislation	9
3. Description of Bhutan Biological Conservation Complex	12
3.1.Introduction	12
3.2.Historical Background	13
3.3.Current Status	14
3.4.Profiles of Protected Areas and Biological Corridors	16
3.4.1. Bumdeling Wildlife Sanctuary	16
3.4.2. Jigme Dorji National Park	17
3.4.3. Jigme Singye Wangchuck National Park	18
3.4.4. Khaling Wildlife Sanctuary	19
3.4.5. Phipsoo Wildlife Sanctuary	19
3.4.6. Royal Manas National Park	19
3.4.7. Sakten Wildlife Sanctuary	20
3.4.8. Thrumshingla National Park	21
3.4.9. Toorsa Strict Nature Reserve	22
3.4.10. Biological Corridors	22
4. Conservation and Related Issues	23
4.1.Human-Wildlife Conflict	23
4.2.Over-grazing	23
4.3.Excessive Wood Consumption	25
4.4.Unsustainable Collection of Biodiversity Resources	26
4.5.Poaching and Wildlife Trade	27
4.6.Forest Fires	27
4.7.Poverty	28
4.8.Limited Institutional Capacity	29
4.9.Lack of Transboundary Cooperation	30
5. The Plan – The Way Forward	31
5.1.The Vision and Mission	31
5.2.Strategic Operational Principles	31
5.2.1. Participation and Multidisciplinarity	31

5.2.2. Adaptive Management	31
5.2.3. Integrating Conservation and Development	32
5.2.4. Recognizing Conflicting Interests	32
5.2.5. Magnification/ Scaling Up	32
5.2.6. Non-negotiable Principles	33
5.2.7. Sustainability	33
5.3.Areas of Intervention, Corresponding Objectives and Activities	33
5.3.1. Human-Wildlife Conflict Mitigation	33
5.3.2. Improved Livestock and Fodder Management	34
5.3.3. Sustainable Wood Consumption	36
5.3.4. Sustainable Use of Biodiversity Resources	37
5.3.5. Species Conservation	38
5.3.6. Forest Fire Prevention and Control	39
5.3.7. Poverty Alleviation and ICDP	40
5.3.8. Institutional Capacity Building	41
5.3.9. Conservation Management Planning and Intervention	44
5.3.10. Transboundary Cooperation	45
6. Implementation Arrangement	46
6.1.General Implementation Framework	46
6.1.1. Profiles of Implementing and Partner Agencies	46
6.2.Monitoring and Evaluation	54
References	55
List of Tables	
Table 1. Vegetation Zones of Bhutan and Corresponding Range of Altitude and Precipitation.	3
Table 2. List of Protected Areas and Biological Corridors and their areas	12
Table 3. Old National Protected Areas System, 1983	13
Table 4. Current Operational and Funding Status of Protected Areas	15
Table 5. List of Totally Protected Specis	26
Figures	
Figure 1. Conservation Timeline... Last Fifty Years or So	6
Figure 2. Map of Existing Protected Areas System of Bhutan	14
Figure 3. Cattle and Yak Population 1991-2000	24
Figure 4. Staff situation in Four Selected PAs	29
Figure 5. Black-necked Crane Population Trend 1991/92-2001/02	39
Boxes	
Box 1. Bhutan's Conservation Significance	7
Box 2. Forest Areas Leased to RSPN	51

ACRONYMS AND GLOSSARY OF BHUTANESE TERMS

Acronyms

AAC Annual Allowable Cut

Helvetas and Swiss Agency for Development and Cooperation

The Helvetas and SDC are among the first international development agencies to operate in Bhutan. Swiss assistance to Bhutan started in 1968, initially focusing on agriculture development and gradually expanding to forestry and rural infrastructure development. Today, Helvetas/ SDC Country Programme is dedicated in three areas: education and culture; renewable natural resources; and rural infrastructure. Under the RNR sector, seven projects are ongoing with a funding of over Nu. 420 million. These include support to RNRRCs at Jakar, Yusipang and Bajo, and to NRTI at Lobesa, Participatory Forest Management Project, Rural Development Training Project, and East Central Region Agriculture Development Project.

6.2. MONITORING AND EVALUATION

The implementation of the Plan will be monitored through existing mechanisms, which include progress reporting on the following periodic basis:

- Quarterly activity progress and input reporting
- Semi-annual/ annual result monitoring
- Sub-programme semi-annual progress reporting
- Sub-sector annual progress reporting
- RNR sector annual progress reporting

The above hierarchy of progress reporting will facilitate reporting from the *geog/* warden post level to the ministry level. In addition, donor reporting requirements and Steering Committee meetings will serve as important monitoring instruments.

At the end of the second year of the implementation of the Plan, a formative evaluation will be carried out in the form of an independent mid-term review mission. The mission will visit activity sites and interview stakeholders to assess progress (including lessons learnt), identify constraints and opportunities, and determine any changes that need to be made in the Plan. After the final year of the implementation of the Plan, a summative evaluation will be carried out in the form of an independent terminal review mission to evaluate the results of the Plan implementation and specify recommendations to sustain programme interventions.

advocacy, policy advice and support for national conservation strategies. Two, it works with local communities through pilot initiatives that show people how to break the poverty cycle while conserving the environment on which they rely. Three, the Small Grants Programme – with financing from the Global Environmental Facility (GEF) – is boosting local community actions to address global environmental concerns, namely biodiversity loss and climate change.

As a GEF Implementing Agency, UNDP has managed and continues to manage a number of GEF-funded projects. Past UNDP/GEF support to NCD includes the Integrated Management of Jigme Dorji National Park and Biodiversity Action Plan for Bhutan 1998 and 2002 while ongoing support includes the Management of Thrumshingla National Park and adjacent biological corridors.

Netherlands Development Organization

The Netherlands Development Organization, SNV, is a key development partner of Bhutan. In the field of biodiversity conservation, SNV provided technical assistance in Jigme Singye Wangchuck National Park and in institutional strengthening of NCD. A product of SNV's institutional capacity building support is the NCD Vision and Strategy 2003 itself.

GTZ

The Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ) GmbH is a government-owned corporation for international cooperation with worldwide operations currently in around 130 countries. It aims to positively shape the political, economic and ecological and social development of partner countries. The Bhutan-German Sustainable RNR Development Project, covering Punakha and Wangduephodrang *dzongkhags*, is GTZ's flagship project in Bhutan. It aims to improve coordination and inter-disciplinary planning between RNR sub-sectors at *dzongkhag* and *geog* levels, develop RNR extension services, support local communities in development of private and community forest management plans, improve forest management planning for FMUs, increase agriculture and livestock productivity, and develop infrastructure to support RNR activities.

WWF Bhutan Programme

WWF is one of the oldest partners of NCD. The organisation started supporting conservation work in Bhutan in 1977, initially focusing on staff training and provision of equipment and subsequently expanding to protected area management, keystone species conservation, anti-poaching, and ICDP. At the present, it is supporting the management of Thrumshingla National Park and adjacent biological corridors, the conservation management planning for Sakten Wildlife Sanctuary, and implementation of ICDP Pilot Project. In the past, it helped the NCD in revamping the protected areas system and creating the biological corridors, and in starting up the tiger conservation programme. Along with UNDP and GEF, it was also a principal collaborator of the RGoB in establishing the BTF.

B2C2	Bhutan Biological Conservation Complex
BFA	Bhutan Forest Act 1969
BFI	Bhutan Forestry Institute
BTF	Bhutan Trust Fund for Environmental Conservation
BWS	Bumdeling Wildlife Sanctuary, previously known as Kulongchhu Wildlife Sanctuary
CBD	Convention on Biological Diversity
CBNRM	Community-based Natural Resource Management
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
Danida	Danish International Development Assistance
DFS	Department of Forestry Services
DoE	Department of Energy
DoT	Department of Tourism
DYT	<i>Dzongkhag Yargye Tshogdu</i>
EAA	Environmental Assessment Act 2000
ESPS	Environment Sector Programme Support
FAO	Food and Agriculture Organisation of the United Nations
FMU	Forest Management Unit
FNCA	Forest and Nature Conservation Act 1995
GEF	Global Environment Facility
GYT	<i>Geog Yargye Tshogchung</i>
ICDP	Integrated Conservation and Development Programme
IUCN	World Conservation Union, previously known as the International Union for Conservation of Nature and Natural Resources
JDNP	Jigme Dorji National Park
JSWNP	Jigme Singye Wangchuck National Park, previously known as Black Mountain National Park
km ²	square kilometers
KWS	Khaling Wildlife Sanctuary
LUPP	Land Use Planning Project
m ³	cubic meters
masl	meters above sea level
MoA	Ministry of Agriculture
NBC	National Biodiversity Center
NCD	Nature Conservation Division
NRTI	Natural Resources Training Institute
Nu.	<i>Ngultrum</i> , Bhutanese currency, pegged to Indian Rupee
NWAB	National Women's Association of Bhutan
PWS	Phipsoo Wildlife Sanctuary

RGoB	Royal Government of Bhutan
RMNP	Royal Manas National Park
RNR	Renewable Natural Resources
RNRRC	Renewable Natural Resources Research Center
RSPN	Royal Society for the Protection of Nature
SDA	Sustainable Development Agreement
SDS	Sustainable Development Secretariat
SDC	Swiss Agency for Development and Cooperation
SWS	Sakten Wildlife Sanctuary
TNP	Thrumshingla National Park
TSNR	Torsa Strict Nature Reserve
UNDP	United Nations Development Programme
UNCCD	United Nations Convention on Combating Desertification
UNFCCC	United Nations Framework Convention on Climate Change

Bhutanese Terms

<i>Chathrim</i>	Act, rules and regulations, codes of conduct
<i>Chhu</i>	River or rivulet
<i>Chimi</i>	Representative at the National Assembly
<i>Dzongdag</i>	Head of a district
<i>Dzongkhag</i>	District
<i>Dzongkhag Yargye Tshogchung</i>	District Development Committee
<i>Dungkhag</i>	Sub-district
<i>Dungpa</i>	Head of a sub-district
<i>Geog</i>	Block, which is usually made up of few to several villages
<i>Geog Yargye Tshogchung</i>	Block Development Committee
<i>Gup</i>	Head of a block
<i>Mangmi</i>	Elected representative of a <i>geog</i>
<i>Reesoop</i>	Village forest guard
<i>Tseri</i>	Slash and burn cultivation
<i>Tshachhu</i>	Hot spring
<i>Tshogpa</i>	Representative of a village, or a cluster of villages

Maps:

1. Map of Protected Areas System and Wildlife Corridors in Bhutan with the Eastern Himalayan Ecoregions
2. Map of Eastern Himalayan Ecoregions in Bhutan

necked cranes and their habitats. Partnership with RSPN will be vital in light of the fact that it has been accorded the parastatal responsibility of managing several forest areas on a lease basis (see Box 2). Many of these areas such as Phobjikha and Dochula fall in the buffer zones or biological corridors.

National Women's Association of Bhutan

The NWAB, as the name suggests, is dedicated to women development. Its activities include textile and handicrafts development, rural credit and savings schemes, women-oriented rural enterprise development, and promotion of improved cooking stoves. In the past, NWAB implemented the “Women in Environment” project in some villages adjacent to Royal Manas National Park.

Media Agencies

Bhutan Broadcasting Service

The BBS operates the national television and radio, which are the only broadcast media in the country. NCD has collaborated with BBS in the production of a video programme on protected areas in the country.

Kuensel

Kuensel is the only newspaper agency in the country. The newspaper is a weekly publication and features environment and science section on a sponsorship basis in addition to covering conservation-related events as and when they occur.

International Agencies

Danida

Danida is one of the largest donor agencies in the country. Its support to biodiversity conservation is channelled through the Environment Sector Programme Support (ESPS)⁵ and includes the strengthening of the NBC and the management of Bumdeling Wildlife Sanctuary.

United Nations Development Programme

The UNDP started its work in Bhutan in 1974. The focus of UNDP's work in the country is in the areas of good governance, poverty reduction and economic development, energy and environment, and information and communications technology. The involvement of UNDP in the area of energy and environment is threefold. One, it is helping the Royal Government at the national level through

⁵ This support has now been clubbed together with the urban sector and is known as the Urban and Environment Sectors Support Programme (UESPS).

Autonomous Agencies

Bhutan Trust Fund for Environmental Organization

The BTF was created in 1992 and legally incorporated under the Royal Charter in 1996 as an independent grant management organisation to sustain environmental conservation work in the country. Under the guidance of a fully nationalized high-level management board since 2001, the BTF operates with annual incomes generated by endowment now totalling more than US\$ 30 million. BTF projects range from environmental education to protected area management and study of species ecology. In the fiscal year 2001/02, it was managing projects totally budgeting around US\$ 5.6 million.

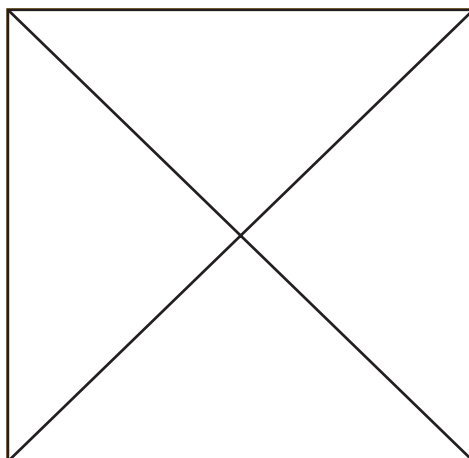
Sustainable Development Secretariat

The SDS was established to coordinate, disburse and monitor external assistance to Bhutanese organizations under the Sustainable Development Agreement, a cooperation framework between Benin, Bhutan, Costa Rica and the Netherlands. Under the SDA, the Dutch Government funded the Biodiversity Conservation Programme-Phase I for development of Jigme Singye Wangchuck National Park and institutional strengthening of NCD. An NCD proposal for Biodiversity Conservation Programme-Phase II with a total budget of Nu. 102 million, including Dutch funding of Nu. 87 million, is currently under review.

Non-Governmental Organizations

Royal Society for the Protection of Nature

The RSPN is one of the very few non-governmental organizations in the country and the only one that is exclusively dedicated to environmental conservation. The RSPN was founded in 1987 and legally incorporated as a non-profit NGO in 1997. The mission of the organization is to “inspire personal responsibility and actively involve the people of Bhutan in the conservation of the Kingdom’s environment through education, applied research and information dissemination, and collaboration with concerned agencies and indigenous institutions”. The forte of the RSPN is environmental education and this is very well reflected in the vast network of school nature clubs that they have created and sustained across the country. The staff of RSPN are also actively involved in activities to protect the black-



1. RATIONALE AND PURPOSE

1.1. RATIONALE

The Kingdom of Bhutan features a biodiversity unparalleled in the world, all encompassed in contiguous habitats within its 300X150 km boundary. While this rich biodiversity is matched by the government’s resolve in conservation, there still exist the inevitable threats spawned by the backlash of accelerated development.

Habitat destruction and fragmentation are major concerns as they result in inbreeding of species in areas of low density or intensify human-wildlife conflict where they occur in high densities. Conservation in a comprehensive sense is not just about endangered species but equally about endangered spaces. Hence, the growing importance of landscape approach to conservation.

Given its sparse population, vast contiguous forest tracts, strong conservation will at the political level and socio-economic needs profoundly intertwined with sustainable natural resource management, Bhutan is a virtual laboratory for proactive landscape conservation. Decades of emphasis on preservation now allows for foresighted action rather than post-damage restoration, which is expensive and often impracticable. The country’s natural landscape at a macro level is best manifested in the protected areas and connecting biological corridors – which we have chosen to call Bhutan Biological Conservation Complex (B2C2).

The Nature Conservation Division (NCD) has chosen to take the B2C2 landscape approach for the following reasons:

- The NCD launched “Vision and Strategy 2003” in May of the same year focusing on protected areas and biological corridors. The B2C2 landscape approach will be the engine that takes the “NCD Vision and Strategy 2003” beyond conservation management planning and infrastructure development to more substantial forms of conservation.
- The protected areas and biological corridors have resident human populations who depend on sustainable use of biodiversity for timber, fuel wood, nutrition, animal fodder, organic manure, medicine and a wide range of other non-wood forest products. The relevance of the landscape approach is underscored here in its aim to integrate conservation and development needs in a mutually reinforcing manner. In doing so, the accruing broad-based partnership will be critical in addressing a wide range of issues.

- The B2C2 landscape approach will be a useful instrument for holistic and integrated management of protected areas and biological corridors as opposed to the conventional piecemeal approach, attendant with the risk of imbalanced management. This is, however, not to deride the importance of individual protected area management. Individual protected areas are important but they will need to be seen as “building blocks” of the overall conservation landscape rather than as independent conservation units.

-There is a need to look at the big picture so that synergies and linkages can be built between the conservation efforts of different actors at different on-the-ground situations. The big picture will also help to address critical biodiversity conservation gaps and needs, avoid duplications, develop common ground for conservation action and direct limited resources on priorities.

1.2. PURPOSE OF THE PLAN

The overall purpose of this plan is to provide a comprehensive operational framework for implementation of biodiversity conservation and associated community development activities consistent with the NCD Vision and Strategy over the next five years, beginning July 2004. To do so, the plan provides:

- * The overall context of the country in relation to biodiversity conservation;
- * An overview of the B2C2, describing the evolution of the protected areas system in the country and profiling the protected areas and biological corridors;
- * Outline of major conservation and related issues;
- * the Plan, comprising of areas of intervention, corresponding objectives and activities for the next five years;
- * implementation framework, including profiles of lead implementing and partner agencies and mechanisms for monitoring and evaluation.

Department of Tourism

The erstwhile Tourism Authority of Bhutan was redesignated as DoT in 1999. It serves as the central government authority to facilitate, monitor and regulate tourism activities. It also provides technical assistance, including training of tour guides, for tourism development. In 2001, the DoT developed the National Ecotourism Strategy to elucidate ecotourism development potentials, issues and needs and outline strategies for organizational development, product development and marketing, and human resources development.

Department of Energy

The DoE, previously known as the Department of Power, has the mandate to provide adequate, safe and reliable electricity through improvement and expansion of transmission and distribution network, including environmentally sustainable development of hydropower projects. In the Ninth FYP, one of its major objectives is to significantly expand rural electrification to stimulate socio-economic development in rural areas.

Institute of Traditional Medicinal Services

The ITMS is a center for development of indigenous medicines through research, training and practice. It also works with local communities and other research institutions, such as RNRRC-Yusipang, to promote domestic cultivation of medicinal plants. JBNP has been a pilot site for ITMS in promoting domestic cultivation and processing of medicinal plants.

Local Authorities

Dzongkhag Administrations

Dzongkhag Administrations have the overall responsibility to government programmes at the *dzongkhag* level. Development programmes and activities at the *dzongkhag* level generally pertain to agriculture, livestock development, social forestry and forest fire management, education, health, and urban development and housing

Geog Yargye Tshogchhungs

In the wake of decentralization of implementation of development programmes to the *geog* level during the Ninth FYP, GYT has assumed immense importance. The GYT *Chathrim* 2002, which came into force from July 2002, empowers local community leaders with a wide range of powers, authority, functions and responsibilities to decide and implement their development plans and programmes. The GYT is made up of *gup*, *mangmi* and *tshogpa* as members and *chimi*, *geog* clerk and representatives of various government sectors as observers.

Established in the 1971 as Bhutan Forest School, BFI is the oldest forestry training institute in the country. Before the inception of NRTI, it conducted pre-service courses for forest guards and forest beat officers. Now it is limited to providing pre-service training to forest guards.

Forestry Development Corporation Limited

Formerly known as Bhutan Logging Corporation, the FDCL has quasi corporation status with MoA overseeing its operations. The FDCL carries out wood harvesting operations in FMUs as per prescriptions contained in the forest management plans with monitoring from territorial forest offices.

Government Agencies outside the Ministry of Agriculture

National Environment Commission

The NEC was first established in 1989 by Royal Decree as a National Environment Committee under the Planning Commission. Subsequently, in September 1992, the NEC was delinked from the Planning Commission to serve as a more vigorous, cross-sectorial government body with an independent Secretariat. The NEC was reconstituted on 29 September 1998 and is currently made up of the Honourable Minister of Agriculture (Chairperson), Honourable Minister of Trade and Industries, Honourable Deputy Minister of Communication, Honourable Deputy Minister of Environment (Member Secretary), Secretary of Planning Commission, Surveyor General, and Director General of Education. The NEC members also serve as the National Climate Change Committee members. Primary activities include advising RGoB on environmental matters related to sustainable development, implementing the National Environment Strategy, enforcing EAA 2000 and institutionalising Environmental Impact Assessments as an integral part of the development process, and meeting national environmental obligations to international environmental conventions such as UNFCCC and CBD. The NEC Secretariat is organized into the Technical Division and the Policy and Coordination Division. The Technical Division is responsible for research, monitoring, statistics, environmental assessment, information, communication and outreach. The Policy and Coordination Division deals with matters related to environmental policy, legislation and programme coordination.

National Commission for Cultural Affairs

The NCCA is the national focal agency for the World Heritage Convention, an important international agreement to protect sites of significant cultural and natural values. Any proposal to secure “World Heritage Site” status for our protected areas will need coordination with the NCCA.

2. THE OVERALL CONTEX

2.1. COUNTRY BACKGROUND

Located in the Eastern Himalayas, Bhutan is a tiny kingdom with an area of 38,394 sq km and a population of 714,250 (RGoB 2002, CSO 2003). It rises sharply from the Indo-Gangetic plains in the south, east and west at an altitude of about 200m to more than 7,500m in the Himalayas that form a natural northern border with China.

Bhutan can be divided into three distinct physiographic zones: the southern foothills (200 m-2,000 m), the inner Himalayas (2,000 m to 4,000 m), and the great Himalayas (above 4,000 m).

The extreme variation in altitude has created a corresponding range of climatic conditions varying from hot and humid tropical and subtropical conditions in the southern foothills to cold and dry tundra conditions in the north. Latitude, precipitation, slope gradient, and exposure to sunlight and wind further influence conditions. Consequently, the nation features an equally amazing diversity of vegetation. Grierson and Long (1983, 1994) have distinguished 11 vegetation zones along similar classification systems used in the neighbouring countries (see Table 1).

Predominantly agrarian, 79 per cent of the population practice subsistence agriculture, livestock rearing and use of forest products. However, only eight percent of all land is taken up by agriculture. The rest comprise the highest proportion of forest cover (72.5 %), protected areas (35%), rugged mountains, open pastures and glaciers.

Table 1. Vegetation Zones of Bhutan and Corresponding Range of Altitude and Precipitation		
Zones	Altitude (masl)	Precipitation (mm per year)
Sub-tropical Forest	200 – 1,000 (- 1,200)	2,500 – 5,000
Warm Broadleaf Forest	1,000 – 2,000 (- 2,300)	2,300 – 4,000
Chir Pine Forest	900 – 1,800 (- 2,000)	1,000 – 1,300
Cool Broadleaf Forest	2,000 – 2,900	2,500 – 5,000
Evergreen/ Oak Forest	1,800 – 2,000 (- 2,600)	2,000 – 3,000
Blue Pine Forest	2,100 – 3,000 (- 3,100)	700 – 1,200
Spruce Forest	(2,500 -) 2,700 – 3,100 (- 3,200)	500 – 1,000
Hemlock Forest	2,800 – 3,100 (- 3,300)	1,300 – 2,000
Fir Forest	2,800 – 3,300 (- 3,800)	1,300 or more
Juniper/ Rhododendron Scrub	3,700 – 4,200	?
Dry Alpine Scrub	4,000 – 4,600	?

Source: Flora of Bhutan Vols I, II and III

Bhutan's populace falls under three broad ethnic groups – *Ngalongs*, *Sharchops* and *Lhotshampas*, each with several sub-communities and dialects. The *Ngalongs* and *Sharchops* are collectively known as *Drukpas* and make up 80 per cent of the population. They are of Mongoloid origin and Buddhist by religion. The *Lhotshampas* of the southern foothills are largely Indo-Aryans of Nepalese origin and follow the Hindu faith. *Dzongkha* is the national language although English is also used as a medium for communication, education and administration.

Administratively, the country is divided into 20 districts, known as *dzongkhags*. The *dzongkhags* are further divided into several administrative blocks, known as *geogs*. Presently there are 202 *geogs* in the country. Larger *dzongkhags* have sub-districts known as *dungkhags*. A *dzongkhag* is headed by a *dzongda*, a *dungkhag* by a *dungpa*, and a *geog* by a *gup*.

At the central level, there are ten ministries:

- the Ministry of Agriculture, Ministry of Education, Ministry of Finance, Ministry of Foreign Affairs, Ministry of Health, Ministry of Home and Cultural Affairs, Ministry of Information and Communications, Ministry of Labour and Human Resources, Ministry of Trade and Industry, and Ministry of Works and Human Settlement.

There are also a number of non-ministerial bodies such as the National Commission for Cultural Affairs, National Environment Commission, Royal Audit Authority, and Royal Civil Service Commission.

2.2. CONSERVATION HISTORY

The Department of Forests (now known as the Department of Forestry Services) was the very first government department, instituted in 1952 at Samtse. The objective was to harvest timber, the most visible natural resource at the time. The principle of conservation against exploitation began as early as 1969 when the Bhutan Forest Act was enacted. The Act brought all forest resources under state control with the intent to curb exploitation and rationalize usage. As the forerunner of all modern legislation, it also reflected the importance attached by the government to the conservation of forests. This was further consolidated in 1974 with the formulation of the National Forest Policy, the nationalization of logging operations in 1979 and the designation of a network of protected areas in 1983. The Bhutan Trust Fund for Environmental Conservation (BTF) was created in 1991 under the Royal Charter as an independent mechanism to sustain financing for environmental conservation, primarily in protected areas. The national protected areas system was revised again in 1993 to make it more representative of the various major ecosystems in the country. In 1995, the Forest and Nature Conservation Act (FNCA 1995) was ratified, repealing the Bhutan Forest Act 1969.

integrated conservation and development programmes in protected areas. Furthermore, contentious issues such as crop depredation by wildlife can be better managed through concerted efforts with the DAS.

Department of Livestock(DOL)

The DOL is responsible for services related to livestock health, livestock production and nutrition, and livestock input supply. Livestock rearing is an important rural activity and in places such as Laya, Lingshi, Lunana and Soe in Jigme Dorji National Park and Shingphel in Bumdeling Wildlife Sanctuary, it is by far the most important source of livelihood for the local communities. As with DAS, it is crucial to work with the DOL to meaningfully integrate livestock development needs in biodiversity conservation programmes. Also, problems of livestock depredation by wildlife and overgrazing can be better addressed by working with DOL.

Council of Research and Extension

The Ministry has established CORE to oversee, guide and coordinate the implementation of research and extension programmes for management of renewable natural resources. The research programme focuses on agriculture and horticulture, livestock, forestry, resource management, and agro-meteorology while the extension programme is dedicated to training and technology transfer, promotion of local development initiatives and cooperatives, and school agriculture programme. Research programme at the field level is implemented through RNR Research Centres (RNRRCs), located at Yusipang (Thimphu), Bajo (Wangduephodrang), Jakar (Bumthang), and Khangma (Trashigang).

National Biodiversity Centre

Located at Serbithang, the NBC was established in July 1998 as a non-department agency of the MoA specifically to oversee and ensure the implementation of the Biodiversity Action Plan. It serves as a focal institute for coordination and integration of biodiversity conservation efforts of the various RNR sub-sectors, namely agriculture, livestock production and forestry.

Natural Resources Training Institute

NRTI is the leading training institute within the country for renewable natural resources management. The institute, which was started in early 1990s, offers three-year diploma course in renewable natural resources management with specialization in crop agriculture, livestock production or forestry. It also has the mandate to crash courses for in-service RNR staff.

Wangchuck National Park, Royal Manas National Park, and Thrumshingla National Park.

Partner Agencies

Within the Ministry of Agriculture

Forest Resources Development Division

The FRDD is a functional division of the FSD with the responsibility of carrying out inventories of forest resources, identifying forest management units (FMUs) and preparing management plans for harvesting of timber from these FMUs on a sustainable basis. A number of FMUs fall within the multiple use zone of protected areas and biological corridors. Coordination with FRDD is critical to ensure that the biodiversity conservation aspects are well integrated in the management plans of such FMUs.

Social Forestry Division

The Social Forestry Division is also a functional division of the FSD. It is charged with responsibility of policy development, coordination and technical backstopping of social forestry and forestry extension activities, which are implemented in the field by the dzongkhag forestry extension personnel.

Territorial Forest Divisions

At the present, there are 12 territorial forest divisions spread across the country: Bumthang Division covering Bumthang and Trongsa dzongkhags; Gedu Division covering Chukha dzongkhag; Mongar Division covering Lhuentse and Mongar dzongkhags; Paro Division covering Haa and Paro dzongkhags. Samdrup Jongkhar Division covering Pema Gatshel and Samdrup Jongkhar dzongkhags; Samtse Division; Sarpang Division; Thimphu Division; Trashigang Division covering Trashigang and Trashy Yangtse dzongkhags; Tsirang Division covering Dagana and Tsirang dzongkhags; Wangduephodrang Division covering Gasa, Punakha and Wangduephodrang dzongkhags; and Zhemgang Division. These divisions are primarily responsible for implementation of forest protection activities and monitoring timber harvesting operations in FMUs based on the prescriptions of forest management plans under their respective jurisdictions.

Department of Agriculture Services

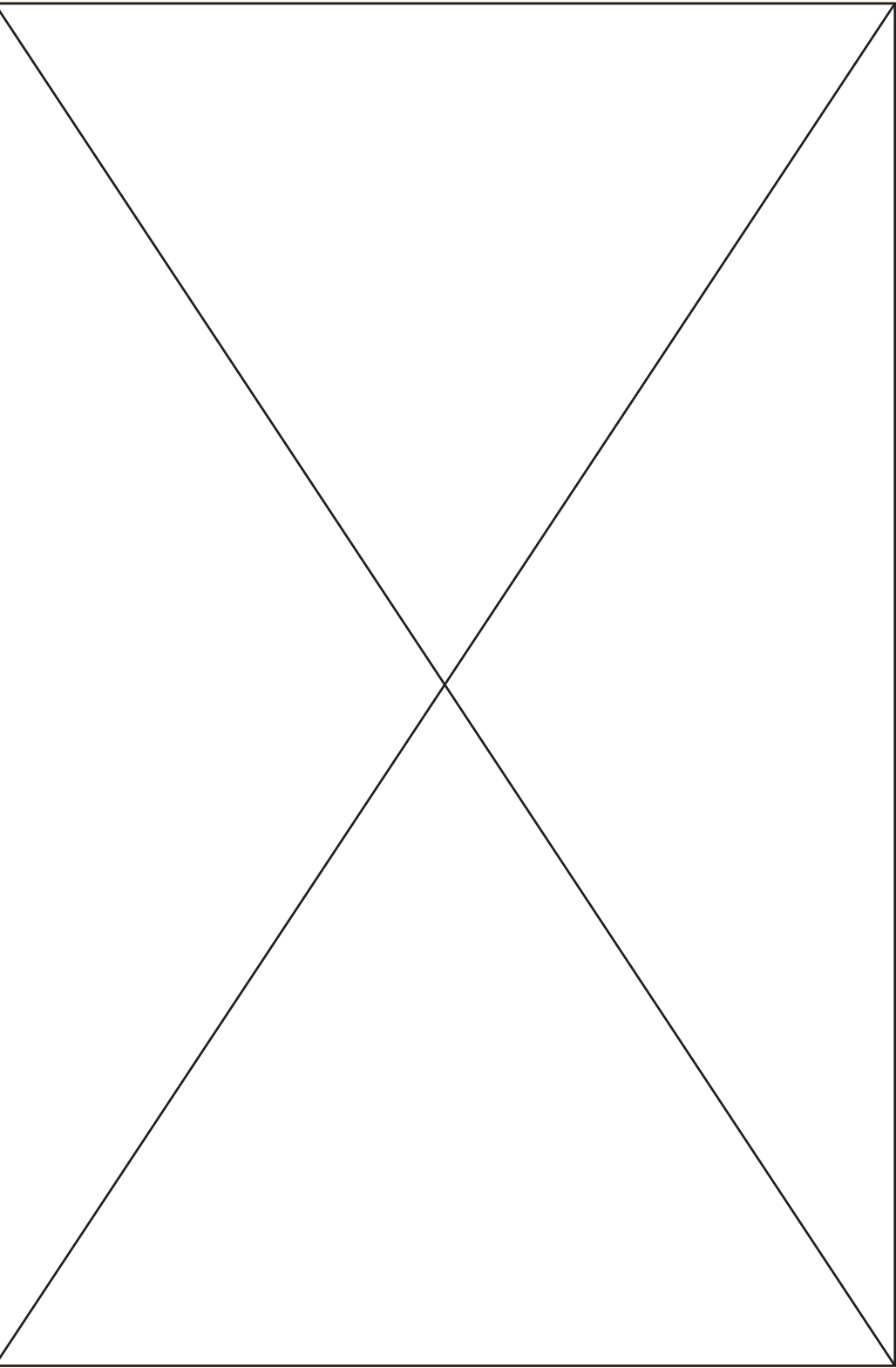
The DAS, which is made up of Field Crops Division, Horticulture Division and Engineering Division, deals with the development, management and distribution of services and inputs, including infrastructure, for agriculture development. Local communities residing in the protected areas, buffer zones and biological corridors largely subsist on crop agriculture. It is therefore important to collaborate with the DAS to effectively address local agriculture development needs as a part of the

The aim of the FNCA was to more appropriately address evolving conservation needs including community participation and protected area management. In the same year, Bhutan ratified two major international conventions related to environmental conservation – the Convention on Biological Diversity (CBD) and the United Nations Framework Convention on Climate Change (UNFCCC). In keeping with the requirements of the CBD, the country produced its first Biodiversity Action Plan in 1998 and subsequently updated it in 2002 to reflect progress and new conservation needs. A network of biological corridors linked the national protected areas system in 1999, enlarging the system from 26 per cent to 35 per cent of the country's total geographical area. In an event marking the 44th birth anniversary of His Majesty King Jigme Singye Wangchuck on 11th November 1999, Her Majesty Ashi Dorji Wangmo Wangchuck bequeathed the biological corridors as a "Gift to the Earth" from the people of Bhutan. More conservation milestones were charted as Bhutan ratified the Environmental Assessment Act 2000, National Biodiversity Act 2003, and acceded to the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) and the UN Convention on Combating Desertification (UNCCD) in 2003.

2.3. CONSERVATION SIGNIFICANCE

Bhutan's amazing biodiversity stems from its location at the junction of two major biogeographic realms – the tropical Indo-Malayan and the temperate Palearctic. The diverse ecosystems here are endemic to more than 5,400 species of vascular plants, 770 species of birds and 170 species of mammals. Among the fauna are several globally threatened species such as the Bengal tiger *Panthera tigris tigris*, snow leopard *Uncia uncia*, clouded leopard *Neofelis nebulosa*, red panda *Ailurus fulgens*, Bhutan takin *Budorcas taxicolor whitei*, golden langur *Trachypithecus geei*, capped langur *Trachypithecus pileatus*, Asian elephant *Elephas maximus*, Himalayan musk deer *Moschus chrysogaster leucogaster*, Himalayan serow *Capricornis sumatraensis thar*, black-necked crane *Grus nigrocollis*, rufous-necked hornbill *Aceros nipalensis*, and white-bellied heron *Ardea insignis*. Stable political leadership, nature-reverent religious ethics, rugged and lofty terrain, low population pressure, cautious modernization and environmentally sound development policies have delivered the country into the 21st century with much of its biodiversity and natural environment intact.. Land use surveys completed by the Ministry of Agriculture in 1995 revealed that a good 72.5 per cent of the country was under forest cover. Little wonder, the country is one of the crown jewels of the Eastern Himalayas – a region recognized as a global biodiversity hotspot. It has three of the Global 200 ecoregions¹ namely the Eastern Himalayan Alpine Meadows, Eastern Himalayan Broadleaf and Conifer Forests and Terai-Duar Savanna and Grasslands.

¹ WWF has recognized 237 ecoregions as of global importance for conservation of the Earth's most important, irreplaceable and representative facets of biodiversity and has termed these areas as Global 200 ecoregions.



6. IMPLEMENTATION ARRANGEMENT

6.1. GENERAL IMPLEMENTATION FRAMEWORK

Having built on the NCD Vision and Strategy and other existing plan documents namely the Biodiversity Action Plan for Bhutan 2002, Forestry Sub Sector Ninth Five Year Plan and the Biodiversity Conservation Programme-Phase 2 proposal, this Conservation Plan fits into mainstream conservation programme. It will be implemented using existing implementation structures and with a strong orientation towards partnership, especially with *Dzongkhag* Administrations, GYT^s and local communities.

The NCD and its protected area offices in the field will have the lead role in implementing this Plan. The NCD will also have the responsibility of mobilizing and disbursing financial and human resources required to implement the activities envisaged in this Plan.

A multi-sectoral Steering Committee will be formed to ensure coordination and provide policy guidance in the implementation of the Plan. The Committee will be chaired by the Secretary, MoA, with the Head of the NCD serving as Member Secretary. Other members will be decided through further consultations. The Committee will meet twice a year or more if necessary.

6.1.1. Profiles of Implementing and Partner Agencies

Nature Conservation Division

The Department of Forestry Services under the MoA is the overall authority for the management of forest resources and wild biodiversity. Within the DFS, the NCD has the direct responsibility for in situ conservation of wild biodiversity through creation and management of protected areas, buffer zones and biological corridors. More specifically, the main responsibilities of NCD include formulation of nature conservation policies, development and implementation of protected area management plans, identification of potential protected areas, and prioritization of resources for conservation work. At the functional level, the NCD is made up of three sections: (a) Management Planning and ICDP Section; (b) Inventory and Data Management Section; and (c) Species Conservation, Research and Monitoring Section. These Sections are subdivided into two units each. The Management Planning and ICDP Section is subdivided into Protected Area Management and ICDP Units, the Inventory and Data Management Section into Biodiversity and Data & Management Units, and the Species Conservation, Research and Monitoring Section into Species Conservation and Research & Monitoring Units. For field operations, the Division has established park management offices in all operational protected areas, which currently include Bumdeling Wildlife Sanctuary, Jigme Dorji National Park, Jigme Singye

Success indicator:

- Number of protected areas with operational conservation management plans

5.3.10. Transboundary Cooperation

Objective: Establish systematic transboundary cooperation with protected area authorities in India and China

Activity:

- Initiate dialogue with Indian and Chinese protected area authorities and based on this dialogue establish systematic transboundary cooperation, initially in the form of annual transboundary meetings to share information and experience and discuss critical issues.

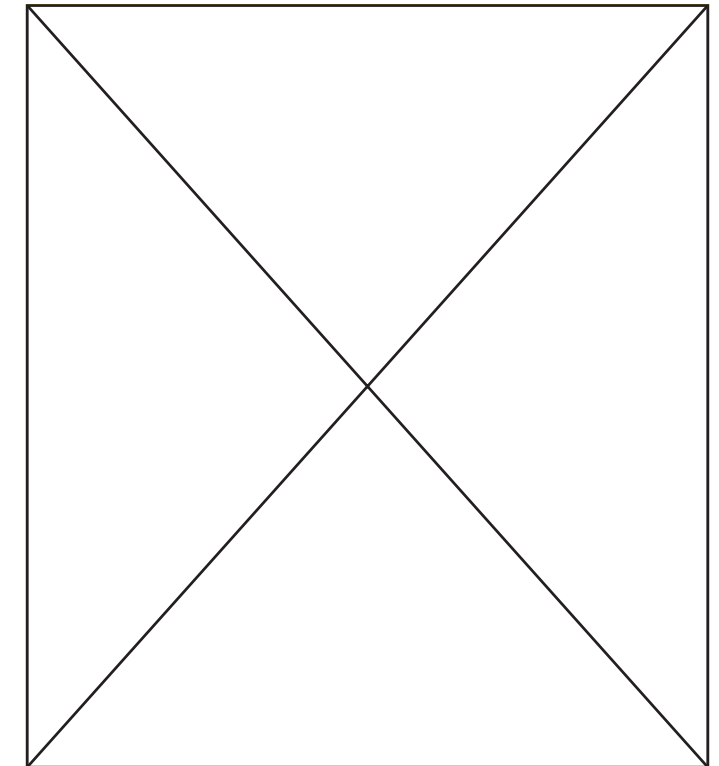
Success indicators:

- Systematic transboundary cooperation established, initially in the form of annual meetings.

The Manas-Bhutan-Namdapha Complex, the area stretching from the Manas Tiger Reserve in Assam (India) through the subtropical and temperate forests of Bhutan to Namdapha Tiger Reserve in Arunachal Pradesh (India), is a Level I Tiger Conservation Unit (WWF and WCS 1997)² and has been rated as a priority tiger conservation landscape (WWF 2002). Based on a series of tiger status surveys conducted from 1996 to 1998, the NCD has conservatively put the country's tiger population in contiguous distribution between 115 and 150, including 67 to 81 breeding adults. What is most amazing about the Bhutanese tiger population is its wide altitudinal distribution. Tigers (excepting the Siberian sub-species) are usually associated with sub-tropical/ tropical ecosystem but in Bhutan at least four reliable records, including a camera trap photograph, of presence of tigers above 4,000 m have been obtained in the recent years. This has enormous conservation significance in light of the fact that tigers have long disappeared elsewhere in the inner Himalayas.

Bhutan's conservation importance is also immense from the avifauna point of view. It is a part of the Sino-Himalayan mountain forests, Indo-Burmese forests, Indo-Gangetic grasslands, South Asian arid habitats, and Tibetan plateau wetlands – all categorized as globally important bird regions (Bird Life International 2003). Ten restricted range species have so far been recorded. These are Blyth's tragopan

Tragopan blythii, chestnut-breasted partridge *Arborophila mandellii*, dark-rumped swift *Apus acuticauda*, ward's trogon *Harpactes wardi*, rufous-throated wren babbler *Spelaeornis caudatus*, hoary-throated barwing *Actinodura nipalensis*, brown-throated fulvetta *Alcippe ludlowi*, white-naped yuhina *Yuhina bakeri*, yellow-vented warbler *Phylloscopus cantator*, and broad-billed warbler *Tickellia hodgsoni*. In addition, a total of 14 species recorded in the country have been identified as globally threatened. These are



² A Level I Tiger Conservation Unit is one offering the highest probability of persistence of tiger populations over the long term. Main attributes are large blocks of habitat suitable for tigers and prey with adequate core areas, and low to moderate poaching pressure on tigers and prey species either as a result of remoteness or vigilant protection. There are two other Levels – Level II and Level III, which respectively offer medium and low probabilities.

white-bellied heron, Pallas' fish eagle *Haliaeetus leucoryphus*, chestnut-breasted partridge, Blyth's tragopan, wood snipe *Gallinago nemoricola*, dark-rumped swift, rufous-necked hornbill, grey-crowned prinia *Prinia cinereocapilla*, beautiful nuthatch *Sitta formosa*, black-necked crane, greater spotted eagle *Aquila clanga*, Baer's pochard *Aythya baeri*, imperial eagle *Aquila heliaca*, and Hodgson's bushcat *Saxicola insignis*.

In terms of herpetofauna, there has been very little survey and documentation done although the country is considered to be rich in reptiles and amphibians, particularly in the tropical/ sub-tropical areas (MacKinnon 1991). MacKinnon et al (1994) provides a preliminary list of 15 reptiles and three amphibians in Royal Manas National Park. More recently, in 1999, 23 species of reptiles and amphibians were recorded in the same park during a weeklong herpetological survey training. The recorded list includes threatened species such as the gharial *Gavialis gangeticus*, Indian python *Python molurus molurus* and yellow monitor lizard *Varanus flavescens*.

Documentation of invertebrates is also in a nascent stage. Initial records suggest that the country is rich in butterflies, which is a good indicator of the overall biodiversity. In and around Bumdeling Wildlife Sanctuary alone, 90 species of butterflies have been recorded based on preliminary surveys.

The country's natural environment is not only important for its fauna and flora but also for its cultural resources. Secluded natural landscapes preserve the country's rich cultural heritage. Sacred places like Singye Dzong, Aja Ney and Rigsum Goempa lie in the tranquil surroundings of Bumdeling Wildlife Sanctuary. In Jigme Dorji National Park, Mount Chomolhari – the country's most famous peak – is worshipped by the local populace. In the same park, there is Gasa *Tshachhu* (hot springs), visited by hundreds of pilgrims each year for its curative beliefs. There are also a number of unique ethnic communities – for instance the *Layaps* in Jigme Dorji National Park, the *Monpas* in Jigme Singye Wangchuck National Park and the *Brokpas* in Sakten Wildlife Sanctuary – who have sustained their way of life in close interaction with their natural environments for many ages.

The economy of the country is very much dependent on the sustainability of its natural resources. 79 per cent of the population live in rural areas, subsisting on an integrated farming system of crop agriculture, livestock rearing and use of forest products. The use of forest products by rural communities is wide-ranging and includes timber, fuel wood, medicinal and aromatic plants, leaf litter for farmyard manure, animal fodder, edible plants, bamboo and cane for handicrafts and household implements, and pulp for traditional paper-making. The country has four major watersheds made up of several rivers, rivulets and glacial lakes³.

³ An inventory by the International Center for Integrated Mountain Development (ICIMOD) puts the number of glacial lakes in the country at 2,674.

Activities:

- Establish a computerised database of all collected data.
- Establish a library of all documents produced by NCD, in both hard and soft copies. The library should also maintain at least hard copies of relevant documents produced by other agencies both within and outside the country.
- Produce and maintain audiovisuals, such as videotapes, slides and digital pictures, to aid information development and public outreach.

5.3.9. Conservation Management Planning and Implementation

Objective: Develop, or update, and implement conservation management plans for the protected areas.

Activities:

- Carry out a mid-term review of the ongoing conservation management plan of BWS by 2004 and a terminal review on completion. Based on the terminal review, update the BWS conservation management plan for the subsequent five years.
- Carry out a mid-term review of the ongoing conservation management plan of TNP by 2004 and a terminal review on completion. Based on the terminal review, update the TNP conservation management plan for the subsequent five years.
- Update the conservation management plan of JDNP on the basis of the terminal review carried out in July 2003 and accordingly implement it.
- Finalize the conservation management plan for JSWNP and commence its implementation by 2004.
- Complete socio-economic and biological surveys in SWS and accordingly prepare SWS conservation management plan for commencement of implementation by 2006.
- Complete delineation and physical demarcation of the boundary of SWS by 2006.

Consistent with conservation management plans, carry out zoning of respective protected areas in consultation with local communities and *dzongkhag* / *geog* authorities.

- Increase the number of *reesoops* and build their capability through basic training and exchange programmes.
- Revise and update the terms of reference of NCD staff to address contemporary conservation needs more effectively.
- Conduct team-building and inter-personal skills development workshops for NCD staff.

Success indicators:

- Increased number of trained personnel in place in protected areas, including trained *reesoops*.
- Better technical and managerial competency within NCD.

Objective: Establish necessary infrastructure, including associated equipment, required to achieve conservation objectives.

Activities:

- Carry out infrastructure development activities in the protected areas as envisaged in their respective conservation management plans. This will include construction of park office complex, warden and guard posts, visitor information centers and patrolling trails. It will be important to ensure that these structures jell well with the local landscape and culture.
- Renovate the NCD headquarters to enhance its ergonomics and to accommodate additional staff.
- Establish a natural history museum, including a taxidermy unit.

Success indicators:

- Presence of necessary infrastructure and their high level of utility to both public and professionals.

Objective: Develop information and establish documentation facilities for preservation and dissemination of information.

These watersheds are critical for sustaining agriculture and hydropower development, the country's economic mainstays and key avenues for environmentally sustainable economic development as outlined in the National Environment Strategy 1998. In addition, the watersheds are also of immense ecological and economic consequence to the downstream communities in neighboring India and Bangladesh. Although tourism in the country has been largely culture-based, the serene and scenic natural landscapes hold added value and there is immense potential to develop tourism based on the country's natural assets, e.g. rivers for whitewater rafting and "catch-and-release" fishing, forest tracts for bird-watching, and *tshachhus* for health spas.

2.4. CONSERVATION POLICY AND LEGISLATION

Conservation is not a modern concept to the Bhutanese. Traditional values based on the Buddhist philosophy of reverence for all living things have molded a lifestyle and development approach that is very much conservation oriented. The importance of conserving the natural environment is deeply entrenched in the overall national development policy. Bhutan's development philosophy is enunciated in the statement of His Majesty King Jigme Singye Wangchuck that "Gross National Happiness is more important than Gross National Product". Around the main tenet of Gross National Happiness, Bhutan has designed its Vision Statement, *Bhutan 2020: A Vision for Peace, Prosperity and Happiness*. The Vision Statement is a strategy document to guide implementation of FYPs and environmental conservation stands at the core of this document.

Before the enactment of the Bhutan Forest Act 1969, the *Thrimzhung Chenmo* or the "Mother Act" covered legal provisions protecting forests and wildlife. The enactment of the Bhutan Forest Act 1969 was followed by the formulation of the National Forest Policy in 1974, with draft revisions in 1979 and 1991. The Policy aims at ensuring conservation of the environment before economic exploitation. It stipulates that at least 60 per cent of the country will be maintained under forest cover for all times to come. Specifically, it is based on the following four guiding principles:

- Protection of the land, forest, soil, water resources and biodiversity against degradation such as loss of soil fertility, soil erosion, landslides, floods and other ecological devastation, and the improvement of all the degraded forest land areas through proper management systems and practices;
- Contribution to the production of food, water, energy and other commodities by effectively coordinating the interaction between forestry and farming systems;

-Meeting the long-term needs of the Bhutanese people for wood and other forest products by placing all country's production forest resources under sustainable management;

-Contribution to the growth of national and local economies, including exploitation of export opportunities, through fully developed forest-based industries, and to contribute to balanced human resources development through training and creation of employment opportunities.

The Forest and Nature Conservation Act 1995 and the Biodiversity Act 2003 (BA 2003) together constitute the main legal framework for biodiversity conservation. The FNCA 1995 calls for biodiversity conservation strategies to be built upon two main precepts: conservation value lies in the cumulative effect of species diversity, and that natural resources must be used to meet the collective needs of the Bhutanese people. The BA 2003 asserts the sovereignty of the country over its genetic resources, the need to promote conservation and sustainable use of biodiversity resources as well as equitable sharing of benefits arising from sustainable use, and the need to protect local people's knowledge and interests related to biodiversity. It lays down the conditions for the grant of access, benefit sharing, and protection, and describes various rights, offences and penalties. Another key conservation legislation is the Environmental Assessment Act 2000 (EA 2000). This Act establishes procedures for the assessment of potential effects of strategic plans, policies, programmes and projects on the environment, and for the determination of policies and measures to reduce potential adverse effects and to promote environmental benefits. To support the implementation of the Act, the Regulation for the Environmental Clearance of Projects and Regulation on Strategic Environmental Assessment were adopted in 2002.

There are numerous other national policies, strategies, laws and by-laws that are relevant to biodiversity conservation. Many of them are listed below:

- Livestock Act and By-Laws, 1980
- Land Act, 1978
- Mines and Minerals Management Act, 1995
- Rules and Regulations for Trekking in Bhutan, 1996
- Pasture Development Act, 1997
- Biodiversity Action Plan for Bhutan, 1998, and its updated version, 2002
- Regulations for the Environmental Clearance of Projects and Strategic Environmental Assessment, 2000
- National Ecotourism Strategy, 2001

- Strengthen partnership with non-governmental organizations for niche conservation actions, e.g. as the Royal Society for the Protection of Nature for black-necked crane conservation and conservation education and the National Women's Association of Bhutan for poverty alleviation and wood energy conservation.

- Develop an NCD communications strategy for improved information development and dissemination, media relations and public outreach, including creation of NCD website and publication of a newsletter.

Success indicators:

- Improved level of communication and coordination within NCD.
- Improved planning and implementation of activities both at NCD and in the field.
- Greater appreciation of NCD's work by partners and NCD staff themselves.
- Increased transparency in planning and implementation of activities.
- Improved availability of information.
- Better mobilization of financial and technical assistance.

Objective: Develop the human resources of NCD and protected areas, in terms of quantity as well as quality.

Activities:

- Draw up a coordinated human resources development plan for inflow of staff and training.
- Post trained personnel in the protected areas in accordance to the requirements projected in their conservation management plans.
- Provide training opportunities to NCD personnel for specialization/ knowledge and skill enhancement in subjects such as biodiversity survey and monitoring techniques, land conservation science, natural resources conflict management, PRA, CBNRM, application of Geographic Information System (GIS) in protected area management, and so on.

- Assess the full potential of ecotourism and develop comprehensive community-based ecotourism plans within the ICDP framework for Bumdeling Wildlife Sanctuary, Jigme Dorji National Park, Jigme Singye Wangchuck National Park, and Thrumshingla National Park, in coordination with stakeholders at national, *dzongkhag* and *geog* levels.

- Provide capacity-building support and technical assistance to *Dzongkhag* Administrations and GYTs to integrate biodiversity conservation issues in their development planning and management processes.

- Link and build synergy with activities from other areas of intervention, e.g. CBNRM, human-wildlife conflict management, and fodder and rangeland management.

Success indicators:

- Stronger interface between conservation and socio-economic development needs.
- Reduced poverty and improved livelihoods as a result of ICDP activities.
- High level of public appreciation for ICDP activities.

5.3.8. Institutional Capacity Building

Objective: Improve coordination and collaboration both within NCD and with external partners

Activities:

- Convene meetings on a quarterly basis between NCD at the central level and its protected areas in the field to among other things share information on progress and future plans, and improve internal communication, understanding of management issues and needs and delivery of necessary conservation inputs. - Convene annual protected areas conference as a forum for broad-based interaction with stakeholders to among other things share information on progress and future plans, harmonize implementation and inter-agency coordination issues, and develop knowledge on topical conservation themes.

- Network with international agencies such as donors and conservation expert organizations, e.g. IUCN, WWF and Wildlife Conservation Society, to improve financial and technical collaboration.

- Plant Quarantine Act 1993
- The Seeds Act of Bhutan 2000
- The Pesticides Act of Bhutan 2000
- The Livestock Act of Bhutan 2001
- The Cooperative Act of Bhutan 2001

Also of importance are the *Dzongkhag Yargye Tshogchung Chathrim* 2002 and *Geog Yargye Tshogchung Chathrim* 2002. These *Chathrim*s comprise legal provisions for decentralized policy and decision-making in matters related to environmental management, including those concerning protection of forests and associated resources, control of environmental pollution and prevention of land degradation at the local level.

Given the strong inter-dependence between the local communities and their surrounding natural resources, there is a conscious effort to integrate socio-economic development needs and nature conservation objectives. It is thus not surprising that the protected area management approach in the country takes a major departure from the conventional “exclusionary” approach and is based on the concept of zoning, allowing for varying degrees of human intervention or use in different zones along the continuum (core zone-multiple use zone-buffer zone).

3. DESCRIPTION OF BHUTAN BIOLOGICAL CONSERVATION COMPLEX

3.1. INTRODUCTION

The Bhutan Biological Conservation Complex can be described as a large conservation landscape basically comprising all protected areas (including buffer zones) and connecting biological corridors, with a wide and contiguous spectrum of all major ecosystems found in the country. Presently, there are four national parks, four wildlife sanctuaries, a strict nature reserve, and 12 biological corridors (see Table 2). The total area covered is more than 14,800 sq km, corresponding to more than 35 per cent of the country’s total geographical area.

Table 2. List of Protected Areas and Biological Corridors and their Area

Protected Area/ Biological Corridor	Dzongkhags covered	Area (km²)
Bumdeling Wildlife Sanctuary (BWS)	Lhuentse, Mongar, and Trashigang	1,487
Jigme Dorji National Park (JDNP)	Gasa, Paro, Punakha, and Thimphu	4,349
Jigme Singye Wangchuck National Park (JSWNP)	Trongsa, Tsirang, Wangduephodrang and Zhemgang	1,723
Khaling Wildlife Sanctuary (KWS)	Samdrup Jongkhar	273
Phipsoo Wildlife Sanctuary (PWS)	Sarpang	278
Royal Manas National Park (RMNP)	Samdrup Jongkhar, Sarpang and Zhemgang	1,023
Sakten Wildlife Sanctuary (SWS)	Trashigang	650
Thrumshingla National Park (TNP)	Bumthang, Mongar, Lhuentse, and Zhemgang	768
Torsa Strict Nature Reserve (TSNR)	Haa and Samtse	644
TSNR – JDNP Corridor	Haa and Paro	149
JDNP – JSWNP Corridor	Thimphu and Wangduephodrang	275
JSWNP – JDNP Corridor	Wangduephodrang	601
JSWNP – North Corridor	Trongsa and Wangduephodrang	549
North Corridor	Bumthang, Lhuentse, Trongsa, and Wangduephodrang	663
TNP – North Corridor	Bumthang and Lhuentse	142
BWS – North Corridor	Lhuentse	119
TNP – BWS Corridor	Lhuentse and Mongar	79
JSWNP – TNP Corridor	Trongsa and Zhemgang	385
KWS – SWS Corridor	Samdrup Jongkhar and Trashigang	160
PWS – RMNP Corridor	Sarpang and Tsirang	376
RMNP – KWS Corridor	Samdrup Jongkhar and Sarpang	212
TNP- RMNP		

Source:

(a) The areas of Bumdeling Wildlife Sanctuary, Jigme Dorji National Park, Jigme Singye Wangchuck National Park, Royal Manas National Park and Thrumshingla National Park have been obtained from their respective conservation management plans.

(b)The areas of rest of the protected areas are as per the revised notification of protected areas issued by the Ministry of Agriculture in 1993.

(c) The areas of the biological corridors are as per the NCD/WWF biological corridors survey report of 1999. Note: The areas of the protected areas do not include buffer zones.

wide array of avenues such as media (newspaper, TV and radio), school events (e.g. concerts) and public events (e.g. World Environment Day, local *Tshechus*).

- Strengthen legislation and law enforcement related to forest fire prevention and control.

Success indicators:

- Decrease in forest fires.
- Improved capacities at *dzongkhag* and *geog* levels for forest fire management.
- Increased public awareness and education about the negative impacts of forest fires and their role in forest fire prevention and control.

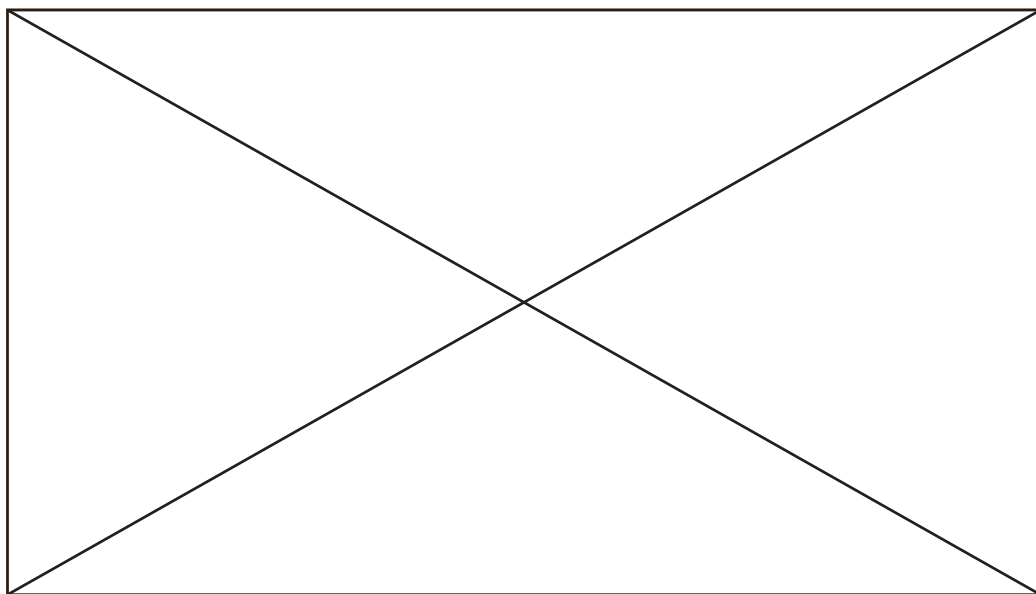
5.3.7. Poverty Alleviation and ICDP

Objective: Implement ICDPs, especially with the emphasis on scaling up successful experiences and enhancing linkages between conservation objectives and socio-economic development needs of the local communities.

Activities:

- Develop an ICDP strategy, encompassing potential models and operational guidelines for planning, implementing and monitoring, based on lessons learnt within the country and in the region.
- Enhance linkages between poverty alleviation and sustainable livelihoods and biodiversity conservation through comprehensive assessments of human-nature interactions and associated socio-economic development realities and potentials.





- Complete countrywide snow leopard status surveys, following up on the preliminary snow leopard survey carried out in the northwestern part of Jigme Dorji National Park in 1997.

Success indicator:

- Population of keystone species at current or higher levels.

5.3.6. Forest Fire Prevention and Control

Objective: *Reduce the occurrence of forest fires at least to half of 2002 level*

Activities:

- Conduct a countrywide assessment of forest fire occurrence and associated issues (including public attitude) and impacts.

- Develop and implement a comprehensive forest fire management strategy based on the above assessment.

- Strengthen forest fire management capacities at *dzongkhag* and *geog* levels through training and provision of fire fighting equipment as per recommendations specified in the aforesaid strategy.

- Develop and implement proactive public awareness-raising and education activities related to forest fire prevention and control through effective use of a

3.2. HISTORICAL BACKGROUND

The country's first protected area –presently the Royal Manas National Park – was designated in 1966. The national protected areas system was introduced in 1974 covering eight more protected areas decreed in a notification issued by the then Ministry of Trade, Industry and Forests. Five more protected areas were added to the system under a similar notification issued by the same Ministry in 1983. In the same year, three protected areas – Laya, Gasa and Jigme Dorji Wildlife Sanctuaries – were consolidated as the Jigme Dorji Wildlife Sanctuary, covering almost the entire northern part of the country. Subsequently, several reviews of the protected area systems conducted by: the World Conservation Union (IUCN) in 1984; Food and Agriculture Organization of the United Nations (FAO) in 1988 and 1989; and Bhutan's Master Plan for Forestry Development Project in 1991. World Wildlife Fund (WWF) in 1993. The conclusions arrived at by these studies indicated that:

- the distribution of protected areas did not represent all major ecosystems found in the country.
- The alpine-tundra zone was over-represented with almost the entire northern part of the country protected although most of it was bare rock and ice with few conservation threats.
- The tropical-subtropical zone was also found to be over-represented by several small protected areas.
- The system accorded no protection to the central zone, which has vast tracts of biologically rich, temperate forests and scenic natural landscapes.
- It was felt necessary to protect the easternmost and westernmost variants to capture east-west differences in species distribution.

Table 3. Old National Protected Areas System, 1983

Name	Year of Designation	Area (km ²)
Manas Wildlife Sanctuary	1966	463
Doga National Park	1974	21
Jigme Dorji Wildlife Sanctuary	1974	7,905
Namgyal Wangchuck Game Reserve	1974	195
Phipsoo Reserved Forest	1974	278
Phochu Reserved Forest	1974	140
Khaling Reserved Forest	1974	233
Dungsum Wildlife Reserve	1983	180
Neoli Wildlife Reserve	1983	40
Shumar Wildlife Reserve	1983	160
Sinchula Reserved Forest	1983	80
Zhoshing Reserved Forest	1983	5

Source: Master Plan for Forestry Development, 1983

- The protected areas in the northern zone were far too large to be effectively managed whereas protected areas in the south were extremely small to protect wildlife populations and habitats of viable size.

In 1992, the NCD, with support from WWF, undertook the exercise to revise the protected areas system. Combining earlier reviews with field reconnaissance and map studies and using IUCN classification guidelines, the NCD proposed a revised protected areas system comprising the existing four national parks, four wildlife sanctuaries and a strict nature reserve. The Ministry of Agriculture (MoA) approved and notified the revised protected areas system in 1993.

Soon after the revision of the protected areas system, the RGoB identified four priority protected areas for conservation management taking into account its limited resources in terms of trained personnel and funds. These were Bumdeling Wildlife Sanctuary (then known as Kulongchu Wildlife Sanctuary), Jigme Dorji National Park, Jigme Singye Wangchuck National Park (then known as Black Mountain National Park), and Royal Manas National Park. Accordingly, conservation management plans were developed and promulgated for Royal Manas National Park in 1995, Jigme Dorji National Park in 1997, Jigme Singye Wangchuck National Park and Bumdeling Wildlife Sanctuary in 2001. In 1999, based on NCD/WWF

- Augment anti-poaching measures, including strengthening of anti-poaching squads and local informers' network and upgrading of surveillance equipment, on the basis of the aforesaid assessment.

- Establish warden and guard posts to cover all transit points related to wildlife trade.

- Revise the totally protected species list based on CITES appendices, global status as per the IUCN red list of threatened species, and national significance.

- Increase the existing schedule of fines related to poaching and trade in wildlife parts and products based on the national status of the species and the actual value of their parts and products in the international and regional markets.

- Conduct yearly inter-agency workshops to update various law enforcement personnel on poaching and wildlife trade and to coordinate joint activities to control poaching and wildlife trade.

- Develop database and produce annual reports to monitor poaching and trade in wildlife parts and products in keeping with the requirements of CITES.

Success indicators:

Decrease in poaching incidents in relation to a consistent level of law enforcement.

- Decrease in trade of wildlife parts and products obtained from poaching.

- Increased level of cooperation and coordination between various law enforcement personnel.

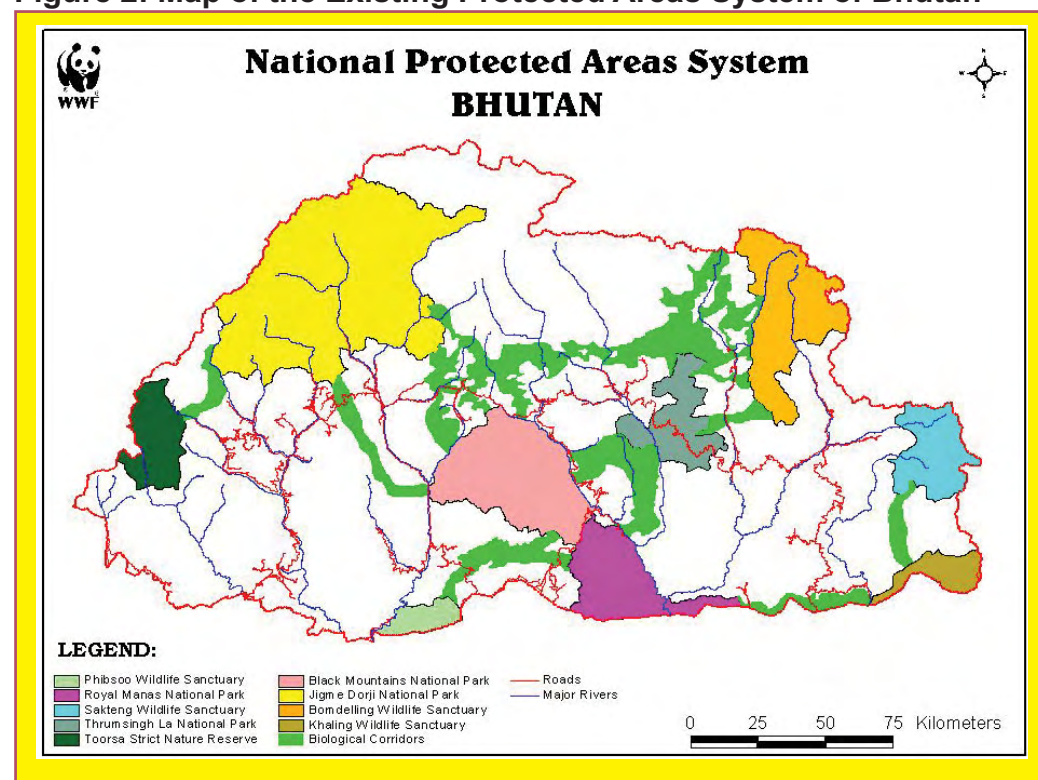
Objective: Conserve keystone species and their habitats at or higher current levels.

Activities:

- Maintain the two critical populations of black-necked cranes in Bumdeling valley and Phobjikha valley at 150+ and 200+ respectively through habitat protection, community stewardship, and annual counts and observation.

- Carry out another series of countrywide tiger status surveys, preferably from 2006 to 2008, to assess the trend in tiger population since the 1996-98 survey.

Figure 2: Map of the Existing Protected Areas System of Bhutan



5.3.4. Sustainable Use of Biodiversity Resources

Objective: Develop and propagate sustainable regimes of biodiversity resources use based on community-based natural resource management (CBNRM) framework.

Activities:

- Make a full inventory of potential areas/ resources for CBNRM.
- Develop and establish CBNRM schemes to promote sustainable use of biodiversity resources and directly benefit local communities from such initiatives, in each operational protected area based on the aforesaid inventory.
- Conduct regular extension and training activities to develop community knowledge and skills in various aspects of CBNRM.
- Conduct research trials on domestic cultivation of medicinal plants and, depending on the results, carry out extension activities to propagate it in the field.
- Provide alternatives to biodiversity resources, which are threatened by over-use or fall in core zones/ critical wildlife habitats.

Success indicators:

- Increase in number of CBNRM schemes.
- Increase in domestic cultivation of medicinal plants, thereby reducing pressure on stocks in the natural.

5.3.5. Species Conservation

Objective: Reduce poaching and trade in wildlife parts and products to half of 2002 level.

Activities:

- Identify key areas and species subject to poaching threats and assess the magnitude of the threats.

field assessments of forest areas between various protected areas and findings of the tiger status surveys carried out between 1996 and 1998, a network of biological corridors were identified and declared as Bhutan's "Gift to the Earth". Also, in the same year, the MoA included Thrumshingla National Park for conservation management. Consequently, the conservation management plan was completed and its implementation started in 2002.

Name	Operational Status	Donor Funding Status
Bumdeling Wildlife Sanctuary	Implementation of its first conservation management plan (July 2001 – June 2007) in progress; headquarters established at Chortenkor, Trashi Yangtse	Danida and BTF support ongoing. Danida support amounting Nu 48.2 million through ESPS – Phase I completed in Dec 2003, ESPS –Phase II support, starting from Jan 2004, limited to Nu. 5 million until Jun 2006, after which further support will be subject to review. Proposal for additional funding to BWS included in the Biodiversity Conservation Programme Phase II proposal submitted to SDS.
Jigme Dorji National Park	Implementation of its first conservation management plan (July 1997 – June 2002) completed; headquarters established at Damjee, Gasa.	UNDP/ GEF support completed in June 2003. Proposal for development and implementation of the second conservation management plan included in the Biodiversity Conservation Programme Phase II proposal submitted to SDS.
Jigme Singye Wangchuck National Park	Long-term conservation management planning in advanced stage. Headquarters under construction at Tshangkha, Trongsa.	Dutch Government support through SDA. Continuation of development and subsequent implementation of conservation management plan included in the Biodiversity Conservation Programme Phase II proposal submitted to SDS.
Khaling Wildlife Sanctuary	Not operational.	
Phipsoo Wildlife Sanctuary	Not fully operational but some basic activities such as wildlife patrolling and habitat monitoring are ongoing on ad hoc basis under the supervision of Sarpang Forest Division.	Basic operational funding support from WWF and BTF.
Royal Manas National Park	Basic operational activities ongoing but major conservation programme suspended due to threats from presence of Indian militants in the border areas.	Basic operational funding support from WWF, amounting to Nu 1.79 million for 2003/04.
Sakten Wildlife Sanctuary	Conservation management planning in progress. Site for headquarters tentatively identified at Phongme, Trashigang.	WWF, totaling Nu. 26.3 million from 2003 to 2006.
Thrumshingla National Park	Implementation of its first conservation management plan (July 2002 – June 2007) in progress; headquarters established at Ura, Bumthang.	WWF, amounting to Nu. 35.4 million and Nu. 28.7 million respectively from 2003 to 2008. GEF and WWF support include ICDP activities in adjacent biological corridor.
Torsa Strict Nature Reserve	Not operational	

3.3. CURRENT STATUS

The conservation management plan of the Jigme Dorji National Park was completed in June 2003. The Bumdeling Wildlife Sanctuary is into its second year of implementation with Thrumshingla National Park in its first. Subsequent to an interim 18-month conservation management plan, the Jigme Singye Wangchuck National Park has now completed a long-term conservation management plan, which will be implemented by the end of the Ninth FYP. Conservation management planning for Sakten Wildlife Sanctuary is in progress and will be completed by the end of 2006. The conservation management activities in Royal Manas National Park have been put on hold due to threats of Indian insurgency in the border areas. Table 4 summarizes the present status of various protected areas.

3.4. PROFILES OF PROTECTED AREAS AND BIOLOGICAL CORRIDORS

3.4.1. Bumdeling Wildlife Sanctuary

The Bumdeling Wildlife Sanctuary (1,487 sq km) forms the northeastern tip of the nation, encircled by Chinese Tibet in the north and the Indian State of Arunachal Pradesh in the northeast. Part of the vast Jigme Dorji Wildlife Sanctuary, the Bumdeling Wildlife Sanctuary as specifically designated in 1993 following the revision of the protected areas system.. Conservation programmes began here in 1998 with the initial focus being: biological and socio-economic surveys to prepare a five-year conservation management plan, integrated conservation and development activities to create confidence and cooperation between local communities and *dzongkhag* authorities. Since the implementation of the conservation management plan in July 2001, a more comprehensive programme continues.

More than 2,200 people, subsistence farmers and herders, live in the sanctuary and adjoining buffer zone. Main crops grown are millet, maize, paddy and potato while livestock comprise cattle, horses and sheep. Five households own yaks in herds averaging about 70 yaks in each. The people here also depend upon a wide range of forest products. Besides timber and fuelwood, other products include animal fodder, roofing shingles, leaf litter for farmyard manure, bamboo and cane, daphne bark for paper-making, incense and medicinal plants, tree burs for making wooden bowls and containers, incense and medicinal plants, and wild edibles like mushrooms, fiddlehead ferns, wild tubers, and dambru (green leafy vegetable).

Ranging from 1,500 m to 6,450 m, the sanctuary's dominant vegetation is temperate broadleaf forest, pine forest, conifer forest, alpine scrub and meadows.

- Promote use of energy efficient wood stoves at household, community and institutional levels through appropriate subsidy schemes and users' training. Examples of such stoves include shielded metal stoves such as the ones produced in Bumthang and simple mud kilns with metal sheet chimney pipe and iron grate such as the ones installed in Tsirang *dzongkhag* by the Tsirang Women's Group.

- Promote use of energy efficient kitchen appliances, e.g. pressure cookers, thermos flask and hot case.

Success indicators:

- Reduction in consumption of timber and fuel wood in terms of number of permits issued.

- Increase in use of wood saving technology.

Objective: Increase wood production in non-forested areas through establishment of community and household forests on degraded forest areas and homesteads to reduce pressure on natural forests.

Activities:

- Establish community and household forests of species with high timber and fuel wood value, and preferably with other ethnobotanical value such as fodder and fruit using participatory strategies with local people, including participatory rural appraisal (PRA) and collaborative development of community forest management plans.

- Conduct regular extension and training activities to develop community knowledge and skills for community and household forest management.

Success indicators:

- Increase in wood production from non-forested areas.

- Increase in use of wood produced from non-forested areas.

- Increase in number of communities and households engaged in self-managed forestry.

- Introduce controlled burning or mechanical clearing of shrubs followed by reseeding with selected species and protection from grazing based on applied research and extension.

- Establish community and homestead forests of species with high forage and soil conservation values, and preferably with other ethnobotanical values using participatory strategies with local people. This will necessitate establishment of forest nurseries, where such nurseries do not exist.

Success indicators:

- Increase in forage reproduction.
- Decrease in forage competition between livestock and wild ungulates.
- Decrease in grazing pressure on forests.
- Better communal cohesion and organization with regards to pasture management.

5.3.3. Sustainable Wood Consumption

Objective: Reduce consumption of timber and fuel wood to a level that is within the limits of AAC from sustainably managed forests.

Activities:

- Promote use of alternative house construction materials such as corrugated galvanized iron (CGI) sheets for roofing through appropriate subsidy schemes.
- Introduce environment friendly wood treatment technology to increase the life of wood used in construction to reduce the frequency of construction wood consumption.
- Promote use of more efficient wood harvesting technology, e.g. pit sawing in place of hewing by axe, to reduce wastage.
- Promote use of appropriate electrical appliances for cooking and heating at household, community (e.g. community *lhakhangs*) and institutional (e.g. schools and military camps) levels through sound economic instruments such as removal of taxes, suitable rural electricity tariff structuring, and users' training.

Key fauna include Bengal tiger, snow leopard, Himalayan black bear, musk deer, capped langur, red panda, rufous-necked hornbill, Assamese macaque *Macaca assamensis*, Asiatic wild dog *Cuon alpinus*, and Himalayan serow. More importantly, the Bumdeling valley is the second major wintering habitat for the black-necked cranes in the country, with some 150 – 170 cranes roosting each year.

Habitat destruction and disturbance, wildlife poaching, and infrastructure development are major conservation threats to the sanctuary. These happen in the form of overgrazing by cattle and yaks, deliberate forest fires and girdling of trees to extend grazing areas, cutting of fodder species and logging operation in the buffer zone. Hunting, trapping and poisoning of wildlife are mainly in retribution to loss of livestock and crop but also for illegal trade of commercially valuable parts and products, and for food. Infrastructure development threats include the construction of farm road from Chortenkora to Dungzam and erection of electric transmission lines. From the community development point of view, major problems are livestock and crop depredation by wildlife, diminishing availability of or restricted access to forest products such as roofing shingles and daphne plants, lack of alternate income-generating opportunities, and poor access to markets.

The sanctuary covers the boundaries of three *dzongkhags*, Trashi Yangtse, Lhuentse and Mongar. Its administrative headquarter is located at Chortenkora, the *dzongkhag* headquarters of Trashi Yangtse. There are two Range Offices, one at Khoma and the other at Bumdeling. The Khoma Range has two Guard Posts, one at Singye Dzong and the other at Yarab. Similarly, the Bumdeling Range has two Guard Posts, one at Dongla and the other at Shingphel.

3.4.2. Jigme Dorji National Park

Stretching across Paro, Thimphu, Gasa and Punakha *dzongkhags*, the Jigme Dorji National Park (4,349 sq km) is the largest in the country. With altitudes ranging from 1,400m to over 7,000 m, the park contains eight of the eleven classified vegetation zones found within the nation. More than 30 species of mammals, 300 species of birds, and 1,400 species of plants have been recorded here, including several globally threatened species such as tiger, snow leopard, Himalayan black bear, takin, musk deer, and black-necked crane.

Some 6,500 people live in the park, largely subsisting on semi-nomadic yak herding, raising of other livestock, agriculture, harvesting of medicinal and incense plants, and use of other forest products. In its proximity to Bhutan's only airport at Paro and several trekking routes, the park attracts on average, a thousand international trekkers each year. In addition, the Gasa *Tsachhu* (hot springs) attracts a few thousand pilgrims – mostly Bhutanese – every year.

The most serious conservation issues pertain to over-grazing especially due to widespread presence of large herds of yaks, human-wildlife conflict due to crop and livestock depredation by wildlife, and poaching of commercially valuable species such as musk deer and Cordecyps. Other environmental concerns include littering along trails and fuel wood shortage.

3.4.3. Jigme Singye Wangchuck National Park

Designated under the revision of the protected areas system in 1993, the park (1,723 sq km) covers parts of Trongsa, Zhemgang, Wangduephodrang, Sarpang and Tsirang *dzongkhags*. Around 5,000 – 6,000 people live within the park, with another 10,000 – 15,000 estimated to be living within 3 – 5 km outside its boundary. Major human concentrations are in Phobjikha valley, Tangsibji and Langthel geogs in Trongsa, Zhemgang-Tingtibi area, and southern geogs of Doban and Surrey in Sarpang. As in most parts of rural Bhutan, the local people live from crop agriculture and livestock rearing. Agriculture cultivation is practiced by nearly all the households with local communities in Gangtey and Tangsibji having strong orientation to livestock rearing. Major crops grown are paddy, maize, wheat, buckwheat, millet and potato. Major livestock reared by the local people are cattle, yaks, sheep and goat, an equine. Use of forest products is also crucial for local subsistence. A partial ethnobotanical inventory lists some 95 species of plants that the local people use for food, shelter, household implements, and medicine.

With a dramatic variation in altitude from less than 200 m to nearly 5,000 m, the park encompasses a wide range of habitats from the moist sub-tropical forest in the south to the tundra and permanent ice fields in the north. However, what characterizes the park most is the temperate forest, which is reportedly among the largest and richest in the entire Himalayas. Largely as a result of vast tracts of primary forest, the park is very rich in birdlife. 395 species of birds have been recorded to occur in and around the park based on field surveys and literature review. These include rufous-necked hornbill, Ward's trogon, Satyr tragopan, and white-bellied heron. The adjacent Phobjikha valley to the northwest is the most important wintering site for the black-necked crane in the country with more than 200 cranes roosting each year. In terms of mammals, more than 50 species have been estimated to inhabit the park, including significant populations of tiger, red panda, musk deer, golden langur and Himalayan black bear. Other important mammal species found in the area include clouded leopard, leopard cat, serow, and Asiatic wild dog.

The most serious conservation threats in the park are human-wildlife conflict as result of crop and livestock depredation by wildlife and overgrazing due to high number of livestock and extensive grazing rights. Other threats include unsustainable collection of forest products, especially fuel wood, and poaching albeit on a limited scale and largely confined to musk deer.



- Improve yak and cattle breed through selection of superior bulls from local population on the basis of pedigree and/or progeny performance, distribution of bulls from other areas to introduce new blood lines and reduce inbreeding, and artificial insemination with imported semen.

Success indicators:

- Decrease in livestock population, specifically unproductive stock numbers.
- Decrease in grazing pressure, resulting in better natural regeneration and lesser soil erosion in otherwise vulnerable areas.
- Increase in number of improved breeds of yak and cattle.

Objective: Develop and implement improved fodder management to increase forage reproductive capacity, conserve soil and reduce grazing pressure on forests

Activities:

- Establish farmers' cooperatives that will among other things oversee proper utilization of forage resources through monitoring of stock numbers, grazing duration and grazing time, nutrient management, and shrub and weed control.
- Manipulate grazing pressure from livestock and wild ungulates by introducing livestock species that have less habitat competition with wild ungulates, e.g. cattle in Laya and sheep in Lunana.
- Establish hay meadows with high-yielding fodder legumes and grasses under high nutrient supply condition to reduce pressure on forests.

Activities:

- Implement controlled wild boar culling schemes in at least ten pilot sites, identified based on set of agreed criteria such as geographic balance and intensity of the conflict.
- Continue implementation of the tiger conservation fund to compensate farmers for loss of livestock to predators, monitor and evaluate the results of the implementation, and make necessary adjustments.
- Introduce conservation fund to compensate farmers for loss of crops to wildlife, to start within two priority protected areas and eventually in all the protected areas.
- Based on action research, develop and propagate measures and approaches to prevent or reduce crop and livestock depredation by wildlife, and evaluate their effectiveness.
- Establish a central database on human-wildlife conflicts to monitor trends and evaluate the effectiveness of the above activities.

Success indicators:

- Decrease in number of complaints of crop and livestock depredation.
- Decrease in the magnitude of crop and livestock depredation.
- Increase in positive perception of local people towards biodiversity conservation.

5.3.2. Improved Livestock and Fodder Management

Objective: Develop and implement integrated livestock management to reduce surplus livestock population.

Activities:

- Provide effective animal health coverage to provide the security that will encourage farmers to keep smaller herds of livestock.
- Revise taxation scheme on the basis of livestock holding in adult equivalents to discourage the rearing of unsustainable numbers of livestock.
- Enhance livestock sterilization service through better coverage, including mobile units.

3.4.4. Khaling Wildlife Sanctuary

The Khaling Wildlife Sanctuary (273 sq km) is the smallest of all the protected areas in the country and lies entirely inside Samdrup Jongkhar *dzongkhag*. The sanctuary is an extended modification of the earlier Neoli Wildlife Sanctuary. It is situated on the southeastern edge of the country, bordered by the Indian State of Assam to its east and south, Nyera Ama Chhu to its west, and Martshala and Shingkhar Lauri *geogs* to its north.

No protected area surveys have been carried out so far but the sanctuary is known to be a very good habitat for the rare pygmy hog *Sus salvanius*, Asian elephant and tiger. Population is concentrated in the southwestern and southeastern niches of the sanctuary, with Samrang and Daifam being the major settlements.

3.4.5. Phipsoo Wildlife Sanctuary

The Phipsoo Wildlife Sanctuary (278 sq Km) lies entirely inside Sarpang *dzongkhag* and borders the Indian State of Assam in the south, Sunkosh Chhu in the west, Beteni *geog* in Tsirang *dzongkhag* in the north, and Hile *geog* in the east. Although a comprehensive conservation management programme is yet to be developed, basic conservation infrastructure is in place. The sanctuary is unique for it has the only natural sal (*Shorea robusta*) forest in the country and is a prime habitat of spotted deer *Axis Axis*. It has the strongest representation of the tropical/ sub-tropical ecosystem in the country. Other key fauna include tiger, Asian elephant and golden langur. In terms of human population, it is relatively uninhabited except for the southwestern edge.

3.4.6. Royal Manas National Park

The Royal Manas National Park (1,023 sq Km) is the country's oldest protected area. Even prior to its official notification as a protected area in 1966, it was maintained as a *de facto* wildlife preserve for many years under the patronage of the Royal Family. Transcending the boundaries of Samdrup Jongkhar, Sarpang and Zhemgang *dzongkhags*, the park is contiguous to India's Manas Tiger Reserve in the south and Jigme Singye Wangchuck National Park in the north. Together, these three protected areas make the single most important protected region in all of Asia, with a truly unique biological treasure encompassing extremely diverse habitats ranging from grasslands and tropical deciduous forests to alpine meadows and perpetually snow-covered mountain tops in the north.

Tropical monsoon forest, evergreen tropical and sub-tropical forest, and warm and cool broadleaf forests characterize the park. In fact, it has the largest representation of tropical/ sub-tropical ecosystem among all protected areas. More

than 900 species of plants have been recorded, including 348 species of trees, 206 species of shrubs, 90 species of climbers and twiners, 192 species of herbs, and nine species of orchids. With respect to fauna, 45 species of mammals and 366 species of birds have been recorded. Mammal species include several globally threatened species such as the Bengal tiger, clouded leopard, Asian elephant, sloth bear *Melursus ursinus*, Himalayan black bear, gaur *Bos gaurus*, wild water buffalo *Bubalus arnee*, serow, golden langur, and hispid hare *Caprolagus hispidus*. Among birds are globally threatened species such as the rufous-necked hornbill, chestnut-breasted partridge, white-naped yuhina, and Pallas's fish eagle. Tiger status surveys suggest that the country's tiger density would be highest in the Manas area with about one adult tiger in every 50km².

Around 2,800 people live inside the park area and 4,500 in the buffer zone (Norbu 1998). The economic mainstay of the local people is largely subsistence crop agriculture. *Tseri* or slash-and-burn cultivation is an important agriculture practice although this practice has been discouraged since the beginning of the Fourth Five Year Plan (July 1977- July 1982) through the construction of irrigation facilities and supply of improved agricultural seeds. Main crops grown are maize, paddy, buckwheat, millet, and foxtail millet. Cash crops include mustard, orange and cardamom. Important livestock kept by the local people include cattle, chicken, pig, and goat. As in other protected areas, use of forest resources is pronounced and complementary to crop farming and livestock rearing. Most prominent of all is the ingenious use of bamboo and cane for purposes ranging from food and water containers to fodder, fuel, roofing, walling and flooring of houses.

Human-wildlife conflict, in the form of crop and livestock depredation by wildlife, is the most serious conservation issue. Crop depredation is understandably far more severe as *tseri* by nature takes place inside forested areas. Other major concerns include cross-border poaching and illegal extraction of forest products along the porous border with India, and unsustainable collection of forest resources, especially fuel wood, by the local communities. In terms of development, local community needs include improved access to markets, improved water supply and improved veterinary service.

3.4.7. Sakten Wildlife Sanctuary

The easternmost of all protected areas, the Sakten Wildlife Sanctuary (650 sq km) is in Trashigang *dzongkhag*. The sanctuary is bordered by the Indian State of Arunachal Pradesh in the north and east, Phongme *geog* and Kangpara *geog* in the west, and Shingkhari Lauri *geog* in Samdrup Jongkhar in the south. Local anecdotes have it that the Yeti or *Migoe* (the existence of which is yet to be scientifically proven) inhabits the sanctuary. The conservation significance of the sanctuary lies in the vast, pristine mixed conifer forest tracts and the diversity of rhododendron species, which is said to be the highest in the country. Biological and socio-economic assessments have been initiated and their results will form

5.2.5. Magnification/ Scaling Up

It has been observed that several experiences such as those of ICDPs undertaken in various protected areas have been positive but with isolated impact. Given the vast protected areas and magnitude of conservation threats, there is a need to scale up these experiences. It should be accepted that NCD cannot ensure protection of conservation areas alone and, thus, there is a need for concerted and coordinated efforts with partners involved. Scaling up requires strategic planning based on priority threats, broad-based partnership, and communication and promotional efforts.

5.2.6. Non-negotiable Principles

The primary mandate of the NCD is to maintain the ecological integrity of the protected areas and biological corridors, including protection of endangered species of flora and fauna. Priority issues required to fulfil this overarching mandate have to be recognized and analysed. For instance, tiger, snow leopard, takin, musk deer, snow leopard, and golden langur are considered globally threatened. Although most of these species are not threatened within the country, a policy decision has been taken to accord them totally protected species status in light of their global or regional conservation importance. This suggests that some generic non-negotiable principles will have to be adopted, which can be further specified based on the character of individual protected areas.

5.2.7. Sustainability

Sustainability refers to the need to ensure that activities will be continued and sustained. For NCD, it translates to continuous availability of financial resources for management of protected areas and biological corridors. The aim is to reduce dependency on external funding, and to strengthen mechanisms that will generate recurrent revenues that can be ploughed back into conservation efforts. Sustainability also refers to the need to develop and establish accountable institutions that will assure continuity of management of protected areas and biological corridors. This includes the need for human resources development, organisational arrangements with partners, and appropriate legislation.

5.3. AREAS OF INTERVENTION, CORRESPONDING OBJECTIVES AND ACTIVITIES

5.3.1. Human-Wildlife Conflict Mitigation

Objective: Reduce human-wildlife conflict to a level that is manageable and not detrimental to both biodiversity conservation and socio-economic development

manage complex ecosystems and interactions between local communities and surrounding natural resources, characterized by a high level of unpredictability. Adaptive management will ensure that plans are not fixed but rather dynamic and sufficiently flexible to address fast-changing and immediate needs and new opportunities. Effective adaptive management depends on continuous inputs from the field and, therefore, requires strong interactions and organisational linkages between different levels of the organization. Consistent monitoring and organizational learning are important components of an adaptive management approach. So, emphasis will be given on learning from past successes as well as failures to improve planning and delivery of conservation inputs.

5.2.3. Integrating Conservation and Development

While conservation is viewed necessary, it should not be pursued independent of local community development. Conservation efforts should be able to demonstrate direct utilitarian, ecological and ethical values for the local communities. Conservation threats can be best tackled by addressing underlying development pressures and constraints, and offering alternatives. Local people, whose basic development needs are taken care of and who can see direct benefits of conservation efforts, will be more responsive to conservation needs. At the same time, it is critical that development interventions do not compromise conservation objectives. Integrating conservation and development in a mutually reinforcing manner is therefore essential.

5.2.4. Recognizing Conflicting Interests

There is a diversity of interests with respect to biodiversity resources, some of which may be conflicting. It is imperative to recognize the varying interests and find an acceptable compromise to manage conflicting issues. This will require negotiation and communication skills within NCD, and transparency between the stakeholders. Co-management may often be a viable outcome of negotiation between conflicting interests.



the basis for preparation of a conservation management plan. The development of the conservation management plan and construction of park infrastructure are on going.

3.4.8. Thrumshingla National Park

The Thrumshingla National Park (768 sq Km) is a product of the revision of the protected areas system in 1993. Mixed conifer and broadleaf forests are predominant, covering more than 66 and 23 per cent of the park area respectively. A prominent feature of the park is the old growth fir forest with thick undergrowth of rhododendrons. Some 622 species of plants have been recorded in the park so far. Plant endemism is high with recent surveys listing 21 endemic species including *Lobelia nubigena*, which is found only in the park and that too in one locality only. In terms of fauna, 68 species of mammals and 341 species of birds have been recorded. Among mammals, key species include the Bengal tiger, leopard, leopard cat, clouded leopard, Himalayan black bear, red panda, musk deer, capped langur, and Malayan giant squirrel. Birdlife includes globally important species such as rufous-necked hornbill, beautiful nuthatch, ward's trogon, white-naped yuhina, and brown wood owl *Strix leptogrammica*. Birdlife International has recognized the park as an Outstanding Important Bird Area in the Sino-Himalayan mountain forests.

Administratively, the park spreads into Bumthang, Mongar, Zhemgang and Lhuentse *dzongkhags*. The park management headquarters is located in Ura with warden posts at Autsho to cover the eastern sector, Lingmethang to cover the central sector, and Ura to cover the western sector. A total of eight guard posts have been planned: at Ladong and Gorsum under Autsho warden post; at Sengor, Tsamang and Ganglapang under Lingmethang warden post; and at Chungphel, Tang and Kheng Shingkhari under Ura warden post. Park infrastructure

development is ongoing as a part of the implementation of the conservation management plan, which commenced in July 2002.

The park is estimated to have around 2,000 people living inside its boundaries and 11,000 in the buffer zone. Overgrazing is the most serious conservation issue involving as much as 80 per cent of the forest. Other major conservation issues include human-wildlife conflict due to crop and livestock depredation by wildlife, and depletion of forest resources around settlements as a result of widespread extraction of fuel wood, timber and other forest products such as bamboo and cane. Poaching of wildlife, especially musk deer, does occur but is covert and limited to a few places. However, if unchecked, it may grow and lead to poaching of other wildlife such as tiger. Development needs of the local people include sustainable agriculture and livestock development, alternate energy development, education and awareness, and off-farm economic opportunities.

3.4.9. Toorsa Strict Nature Reserve

The Torsa Strict Nature Reserve (644 sq Km) lies mostly in Haa *dzongkhag* with a very small area spreading south into Samtse *dzongkhag*. It protects the westernmost variant of central, temperate forests in the country. With the reserve being virtually uninhabited, it is known to have one of the most pristine temperate forests and alpine vegetation in the entire Himalayas.

3.4.10. Biological Corridors

Declared in 1999, the 12 biological corridors, collectively encompassing an area of 3,640 sq Km, connect all the protected areas with the primary purpose of maintaining gene flow through uninterrupted wildlife movements and succession of habitats. The longest corridor is the North Corridor with a length of 76 km and the shortest is the one connecting Thrumshingla National Park to the North Corridor with a length of 16 km. The width of the corridors ranges from 500 meters to 3 km. The corridors were identified based on the following criteria: abundance of target wildlife; slope of terrain; occurrence of forest fires; condition of canopy and undergrowth; level of human disturbance; and width of narrowest constriction.

5. THE PLAN – THE WAY FORWARD

5.1. THE VISION AND MISSION

This Plan builds up on the NCD Vision and Strategy 2003, and naturally derives its vision and mission statement contained therein. The vision reads as follows:

“To maintain the ecological integrity embedded in the social, economic and cultural environment mainly through management of coherent and viable nature conservation areas.”

The mission is stated as:

“Conservation and management of the natural biodiversity, primarily in the protected areas and biological corridors of the country, in harmony with people’s values and aspirations.”

5.2. STRATEGIC OPERATIONAL PRINCIPLES

The NCD Vision and Strategy lays down seven inter-related strategic operational principles, reflecting the integrated nature of biodiversity conservation in the country. The principles are: participation and multidisciplinary; adaptive management; integrating conservation and development; recognizing conflicting interests; magnification/ scaling-up; non-negotiable principle; and sustainability.

5.2.1. Participation and Multidisciplinary

Virtually all the protected areas have resident populations. This means that the NCD will have to work closely with various stakeholders, including other government agencies and the local people themselves. Therefore, the approach will have to be participatory throughout the management cycle from joint surveying, planning, design and implementation to monitoring and evaluation. Emphasis will be given to eliciting knowledge and perceptions of all the stakeholders, most importantly the local people. Conservation programmes will be multidisciplinary and versatile so that the interests of the stakeholders are reconciled as much as possible. While some issues may be non-negotiable, some extent of compromise and flexibility will be exercised to take everyone along.

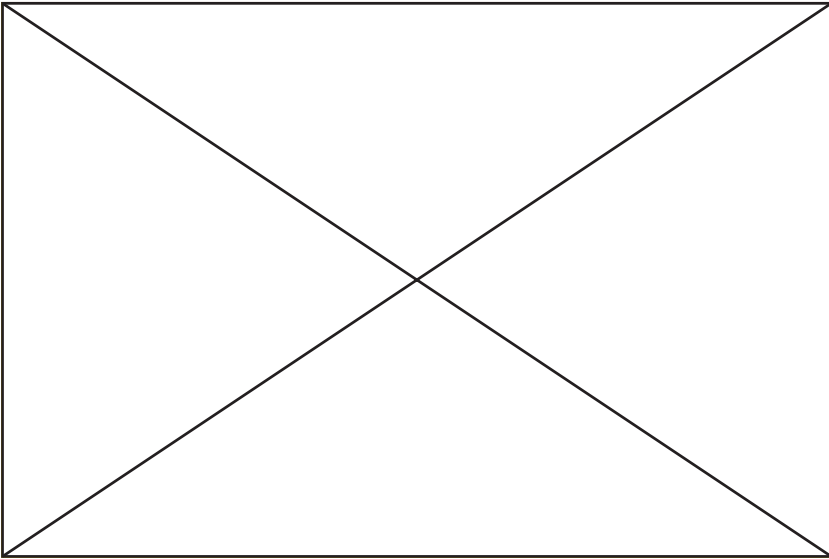
5.2.2. Adaptive Management

Conservation plans will be flexible to adapt to changing circumstances and new insights. This adaptive management approach is particularly appropriate to

species and demographic patterns in protected areas and biological corridors, and conservation infrastructure remains rudimentary. A rapid assessment of four protected areas carried out by the World Bank in 2002 showed that they were short of personnel by nearly 60 to 80 per cent against the requirements projected in their respective conservation management plans (Figure 4 in the preceding page). Also given that conservation knowledge is evolving, human resources development will need to be continuous so that the conservation personnel are in tune with contemporary conservation science. More importantly, the coordination and communication between the NCD as the central agency and protected areas as implementation bodies in the field have been weak. External communication also needs to be enhanced with partners, including donor agencies.

4.9. LACK OF TRANSBOUNDARY COOPERATION

Of the nine protected areas in the country, seven have boundaries with other countries. In the south, the Royal Manas National Park shares its southern boundary with India’s Manas Tiger Reserve while in the east the Khaling Wildlife Sanctuary shares its eastern boundary with Eagle Nest Wildlife Sanctuary in India. In addition, a few protected areas in India such as Buxa Tiger Reserve and Barnadi are located on the border with Bhutan. There is a need for transboundary cooperation between protected area personnel for two reasons; the movement of wildlife transcends international boundaries and it is therefore important that they are sufficiently protected when they cross into the other side of the border and, much of the poaching occurs along borders as a consequence of porous borders and ready market for wildlife parts and products.. Cooperation with Indian authorities is limited to occasional, ad hoc meetings while with the Chinese authorities is virtually non-existent. It will be important to establish more systematic transboundary cooperation, initially in the form of annual transboundary meetings



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4. CONSERVATION AND RELATED ISSUES

4.1. HUMAN-WILDLIFE CONFLICT

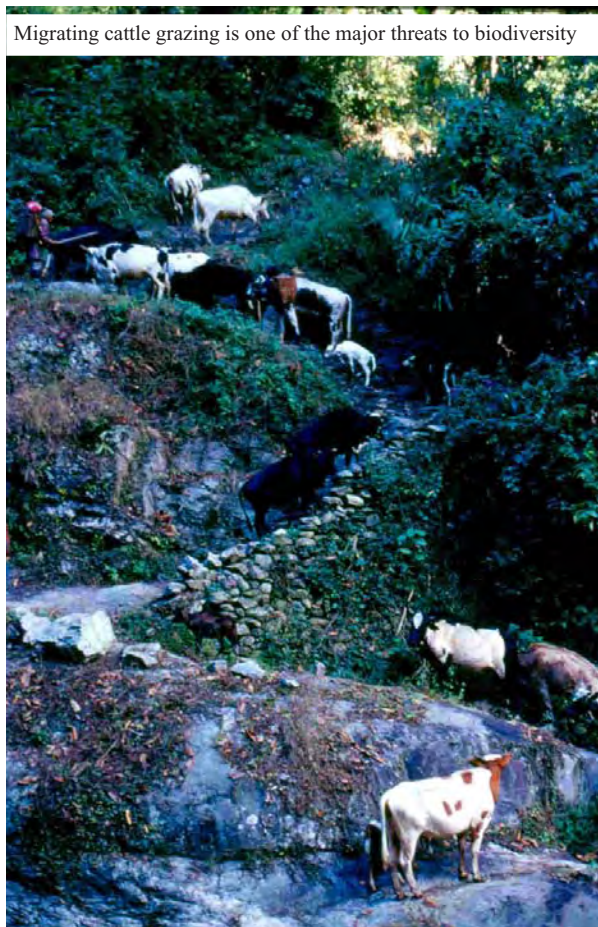
Human-wildlife conflict, in the form of crop and livestock depredation by wildlife, is all pervasive in the nation. Every year, wild boars, deer, monkeys, bears and elephants plunder fields destroying hundreds of tonnes of crops causing immense misery to the farmers. In addition to direct loss of crops, farmers have to bear several indirect costs such as loss of time, added costs of production, expenditure on items such as torches and batteries, kerosene, used tins, and building of guard sheds, and disruption in family life. Although rare, there is also the risk of human injury or death due to wildlife attacks. It therefore comes as no surprise when farmers in ten geogs across the country unanimously ranked crop guarding as the most arduous task during an assessment of crop damage by wild boar (Choden and Namgay 1996). This is corroborated by RNR Statistics 2000, which ranks crop damage by wildlife as the most severe constraint affecting farm households

Livestock depredation by predator species, especially tigers, leopards, wild dogs and black bear, is also common albeit on a lesser scale and geographically more unevenly than crop depredation. In Bumdeling Wildlife Sanctuary alone, local communities have reported losses of 17 cattle, five yaks and one horse between 1997 and 1999. In another example, 30 per cent of the households in Jigme Singye Wangchuck National Park have reported losing their livestock to predators.

Although stringent conservation law and social tolerance to wildlife inculcated by religion have so far prevented human-wildlife conflict from going out of hand, retributive killing in the form of hunting, trapping and poisoning of predator species is not uncommon. Also, interactions with local people suggest that their resentment for wildlife is growing as they persistently experience crop and livestock depredation. If unchecked, human-wildlife conflict can lead to more severe consequences such as exacerbation of poaching.

4.2. OVER-GRAZING

Livestock is maintained by the rural Bhutanese mainly for dairy and meat production, draught power and production of dung for farmyard manure. Despite consistent government efforts to reduce livestock population through introduction of improved breeds, artificial insemination and sterilization, livestock population has remained high. Cattle population has increased slightly following a rather erratic trend from 308,273 in 1990 to 320,509 in 2000. Similarly, yak population has increased from about 33,035 to 34,928 during the same period (see Figure 1 on next page). These figures are relatively huge for a small country characterized by a fragile Himalayan mountain ecosystem.



High livestock population has led to overgrazing in many instances. Overgrazing, mainly in broadleaf forests, may lead to attrition or loss of species, reduction of land productivity and soil erosion. Forest regeneration is also hampered and change in vegetation is induced where grazing is rampant. Not only does overgrazing affect forest regeneration and land productivity, it also affects the availability of forage to wild ungulates. This can lead to two major consequences; wild ungulates will increasingly raid field crops when forage in the forest becomes scarce, and insufficient forage in the forest will

While strict penalties to deter occurrence of forest fires are necessary, proactive approaches such as educating the local communities on the negative effects of forest fires and involving them in forest fire management may have more lasting impact in reducing forest fires. The use of print and broadcast media to spread messages on ill effects of forest fires, and penalties for setting forests fires will need to be more vigorous.

4.7. POVERTY

While the country's per capita Gross Domestic Product (GDP) at US\$ 553 is among the highest in South Asia, the household incomes are low (CSO, 2002, and RGoB, 2002). The monthly per capita consumer expenditure, as a proxy for income, is Nu. 1,945 for urban households and Nu. 928 for rural households. This works out to US\$ 1.4 for urban households and US\$ 0.68 for rural households. About 79 per cent of the Bhutanese fall below the global poverty of less than US\$ 1 per day. The Ninth FYP articulates one of its five development goals as "improving quality of life and income, especially of the poor".

Some of the country's poorest communities live in the protected areas and biological corridors. For these communities, long-term conservation benefits mean little when their daily subsistence is at stake and, therefore, they will be less prepared to participate in conservation and even resentful when conservation adversely impacts their subsistence, e.g. crop and livestock depredation by wildlife. Poverty in protected areas can be associated with lack of development opportunities in the form of education, access to markets, access to resources, rural infrastructure, and so on. Clearly, there is a need to integrate poverty alleviation in the management of protected areas and biological corridors.

4.8. LIMITED INSTITUTIONAL CAPACITY

While progress has been made over the past decade in terms of building institutional capacity for biodiversity conservation, it is far from adequate. Protected areas are still inadequate in terms of trained personnel, information on key aspects of conservation such as distribution of



50,000 in major destination countries such as Japan. At the border with China, poachers can sell a kg of Cordecyps for as much as Nu. 50,000 but currently there is no specific fine implying that it falls under the general category of other wildlife products of Nu. 350 per piece. The protected species listed in the FNCA has also been found to be lacking in sound basis. Some of the species that are not threatened, e.g. spotted deer, Chinese caterpillar fungus and snow down lily, have been listed whereas some that are known to be highly endangered, e.g. capped langur, hispid hare and white-bellied heron, are missing from the list. Clearly, there is a need to rationalize the existing schedule of penalties as well as the totally protected species list based on a comprehensive set of national, regional and international criteria, including the status of the species on the IUCN Red List of Threatened Species and the CITES Appendices.

4.6. FOREST FIRES

Depending on the local site conditions, the negative impact of forest fires may be immediate or on a longer term. In steep areas the negative impact may be immediate, especially if heavy rains follow forest fire. The rainwater washes away topsoil and ash, depriving the exposed area of nutrient to support natural regeneration. If such a process is repeated several times, a succession process starts whereby the site completely degenerates into a barren area. Some species such as Chir pine *Pinus roxburghii* can withstand few forest fires. However, there is gradual degeneration of the site, and the associate species would be completely destroyed rendering the site to soil erosion and degradation of the ecosystem. This may also result in a change of the ecosystem if it is repeatedly subjected to forest fires.

Forest and Nature Conservation Act 1995 prohibits setting of forest fires and imposes fines and penalties, including imprisonment. In spite of such stringent legislation, forest fires are a recurrent and widespread phenomenon. In the last five years, more than 486 km², or 48,600 ha, of forest was destroyed by forest fires. All forest fires in the country are man-made; either set deliberately to invigorate the growth of pastures or commercially valuable grasses such as lemon grass, or occur due to general public carelessness. Therefore, the causes of forest fires have to be thoroughly analyzed, and a strategy developed to reduce forest fire incidences. The strategy could include amongst others, ways and means of involving the local communities in the prevention of forest fires, use of both proactive and penal approaches to forest fire management, and introduction of new techniques in forest fire prediction, and control appropriate to mountain terrain. Since forest fire programmes have been decentralized to the *Dzongkhag* Administrations, an effective coordination mechanism will need to be developed between the DFS, the *Dzongkhag* Administrations and the territorial forest offices. It will be difficult for one agency to control and manage forest fires, which by nature are a complex, manpower-intensive and physically risky task, more so in a country like Bhutan with rugged terrain and thick vegetation.

weaken the natural prey base and, consequently, predator species will turn to lifting livestock.

While in general the impacts of grazing are said to be negative, it must be recognized that livestock rearing is integral to rural livelihood and forms a part of the fabric that links other elements of the socio-economic structure of individual households and communities. Cattle are owned by almost all of the rural households in the country and it dominates the temperate and subtropical regions of the country. In the alpine regions such as Laya and Lingshi, yaks are the dominant animals, and the economy is solely based on yak products (Gyamtsho, 1996). Individuals, households and communities have grazing rights over pastures, legitimated by the *Thrimzhung Chenmo*, Land Act 1978 and Forest and Nature Conservation Act 1995. The National Assembly has also passed resolutions relating to ownership and management of grazing land/ pastures from time to time. All these rights are recorded in the “main thram” maintained by the Ministry of Home Affairs and a copy held by the owner. Livestock rearing and forest grazing are therefore to stay both from socio-economic and legal perspectives. In this context, it is important to recognize that grazing is an environmental problem when it is excessive and not managed but when it occurs at low or moderate level it can have a positive effects on biodiversity.

4.3. EXCESSIVE WOOD CONSUMPTION

Traditional rural house construction entails extensive use of wood. Almost all housing structures – floor, roof, staircase, windows and doors, and beams and pillars – are made of wood. With dilapidation of old houses, population growth and fragmentation of families, construction of new houses becomes necessary. Moreover, roofing shingles need to be replaced every two to four years depending on climatic conditions. A report of the Forest Resources Development Division (FRDD) mentions that the annual total consumption of timber at 190,000 m³ in



the recent years exceeded the total annual allowable cut (AAC) of about 149,000 m³ from all Forest Management Units (FMUs). The excess demand was met from ad hoc sources, which is a cause for concern as these sources lacked sustainable forest management planning. Fuel wood consumption is even higher at 1.27 tonnes or 1.8 m³ per person per annum. This works out to nearly 1.2 million m³ per annum. Although collection of dry fuel wood in the form of fallen twigs and driftwood is common, bulk of the fuel wood needs is met from natural forests.

During the Ninth Five Year Plan (July 2002 – June 2007), a total of 214,267 hectares of forests has been earmarked for logging operations, primarily to harvest timber. An AAC of 208,088 m³ has been projected from these forest areas (FRDD, 2001), nearly 40 percent increase over the previous AAC. This entails creation of four FMUs in addition to the existing 10 FMUs (DFS, 2002). Additional FMUs will mean more roads into forest areas and laying of cable cranes, which will have concomitant environmental consequences, the degree of which will depend on the quality and design of road construction and logging operations. Environmental monitoring of FMUs is critical but this has been far from adequate in the past and is likely to remain so in the future too due to lack of trained personnel, funds and equipment.

4.4. UNSUSTAINABLE COLLECTION OF BIODIVERSITY RESOURCES

Apart from timber and fuel wood, there is a long list of biodiversity resources that the rural Bhutanese use. These include medicinal and aromatic plants, forest food such as mushrooms, ferns and wild greens, bamboo and cane for local handicrafts, Daphne barks for traditional paper-making, wood for agricultural and household implements, animal fodder, and leaf litter for farmyard manure. To give an idea of the magnitude of the importance of biodiversity

Table 5. List of Totally Protected Species	
Common Name	Scientific Name
Birds	
1. Black-necked crane	<i>Grus nigrocollis</i>
2. Monal pheasant	<i>Lophophorus impejenu</i>
3. Peacock pheasant	<i>Polyplectron bicalcaratum</i>
4. Raven	<i>Corvus corax</i>
5. Rufous-necked hornbill	<i>Aceros nipalensis</i>
Fish	
1. Golden mahseer	<i>Tor tor</i>
Mammals	
1. Asian elephant	<i>Elephas maximus</i>
2. Clouded leopard	<i>Neofelis nebulosa</i>
3. Gaur	<i>Bos gaurus</i>
4. Golden langur	<i>Trachypithecus geei</i>
5. Himalayan black bear	<i>Selenarctos thibetanus</i>
6. Leopard	<i>Panthera pardus</i>
7. Leopard cat	<i>Felis bengalensis</i>
8. Musk deer	<i>Moschus chrysogaster</i>
9. Pangolin	<i>Manis crassicaudata</i>
10. Pigmy hog	<i>Sus sylvanicus</i>
11. Red panda	<i>Ailurus fulgens</i>
12. Serow	<i>Capricornis sumatraensis</i>
13. Snow leopard	<i>Uncia uncia</i>
14. Spotted deer	<i>Axis axis</i>
15. Takin	<i>Budorcas taxicolor</i>
16. Tiger	<i>Panthera tigris</i>
17. Wild buffalo	<i>Bubalus bubalis</i>
Plants	
1. Blue poppy	<i>Meconopsis grandis</i>
2. Chinese caterpillar fungus	<i>Cordyceps sinensis</i>
3. Eagle wood/ Indian aloe wood	<i>Aquilaria malaccensis</i>
4. Gentiana	<i>Gentiana crassuloides</i>
5. Ginseng	<i>Panax pseudo-ginseng</i>
6. Himalayan Yew	<i>Taxus baccata</i>
7. Snow down lily	<i>Lloydia yunnanensis</i>
Source: Forest and Nature Conservation Act 1995Note: Scientific names of golden langur and snow leopard have been updated as per new information	

resources in Bhutanese life, here are some facts and figures: more than 300 species of plants are said to be used in traditional Bhutanese medicines; almost all of Bhutanese farming is based on use of farmyard manure where forest leaf litter is an indispensable ingredient; and a partial ethnobotanical inventory of Jigme Singye Wangchuck National Park recorded more than 20 species of forest plants that the local people consume for food.

There are several examples from across the country of biodiversity resources becoming scarce due to unsustainable harvesting. For instance, in Bumdeling geog, excessive collection and unsound harvesting techniques have depleted Daphne plants to the extent that several families had to give up paper-making⁴. Similarly, bamboo and cane in the Monpa area of Jigme Singye Wangchuck National Park, which were once abundantly available in the immediate vicinity of the villages, now have to be collected from 3-4 hours' walking distance (Norbu, 2002).

4.5. POACHING AND WILDLIFE TRADE

The country has several species of wild animals and plants of great commercial value in the international market, especially for use in production of traditional oriental medicines. A porous international border both in the north and south, inadequate law enforcement personnel, and general lack of knowledge of the legal consequences of poaching have made control a difficult job.

Wildlife poaching and trade is prevalent in the border areas and some interior areas. The main species targeted for poaching are musk deer and Chinese caterpillar fungus *Cordyceps sinensis* as musk pods and *Cordyceps* pieces are easy to conceal and smuggle. Poaching of other species such as tiger and bear is limited.

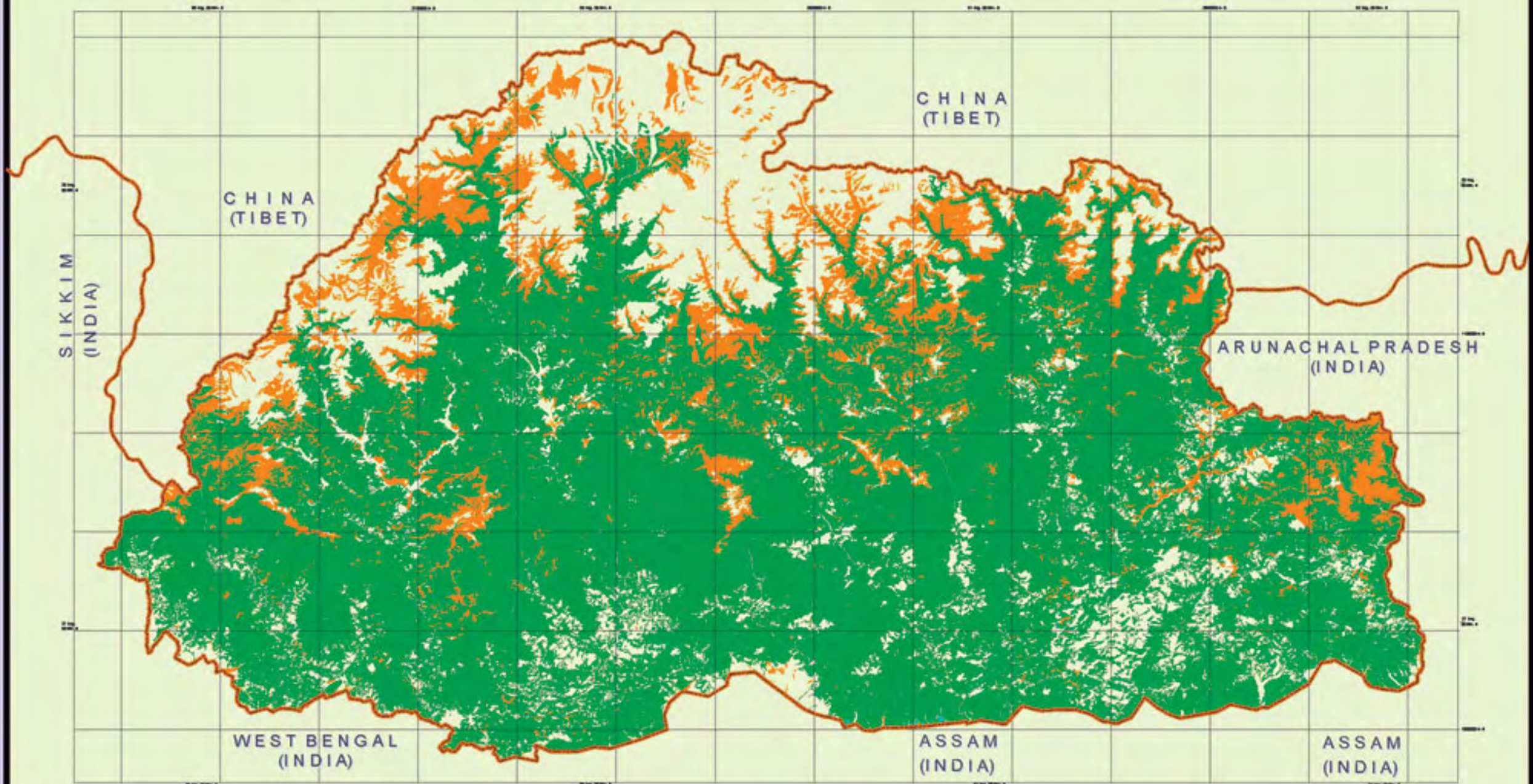
It has also been observed that the existing schedule of penalties related to poaching is lenient and therefore not much of a deterrent in contrast to the high commercial value of wildlife parts and products in the international market. For instance, the fine for failure to produce illegally acquired musk is Nu. 25,000 per piece while a kilogram (kg) of musk pods can fetch up to US\$



⁴ Personal communication with the local people of Longkhar and Dungzam villages, Bumdeling geog.



Eastern Himalayan Ecoregions in Bhutan



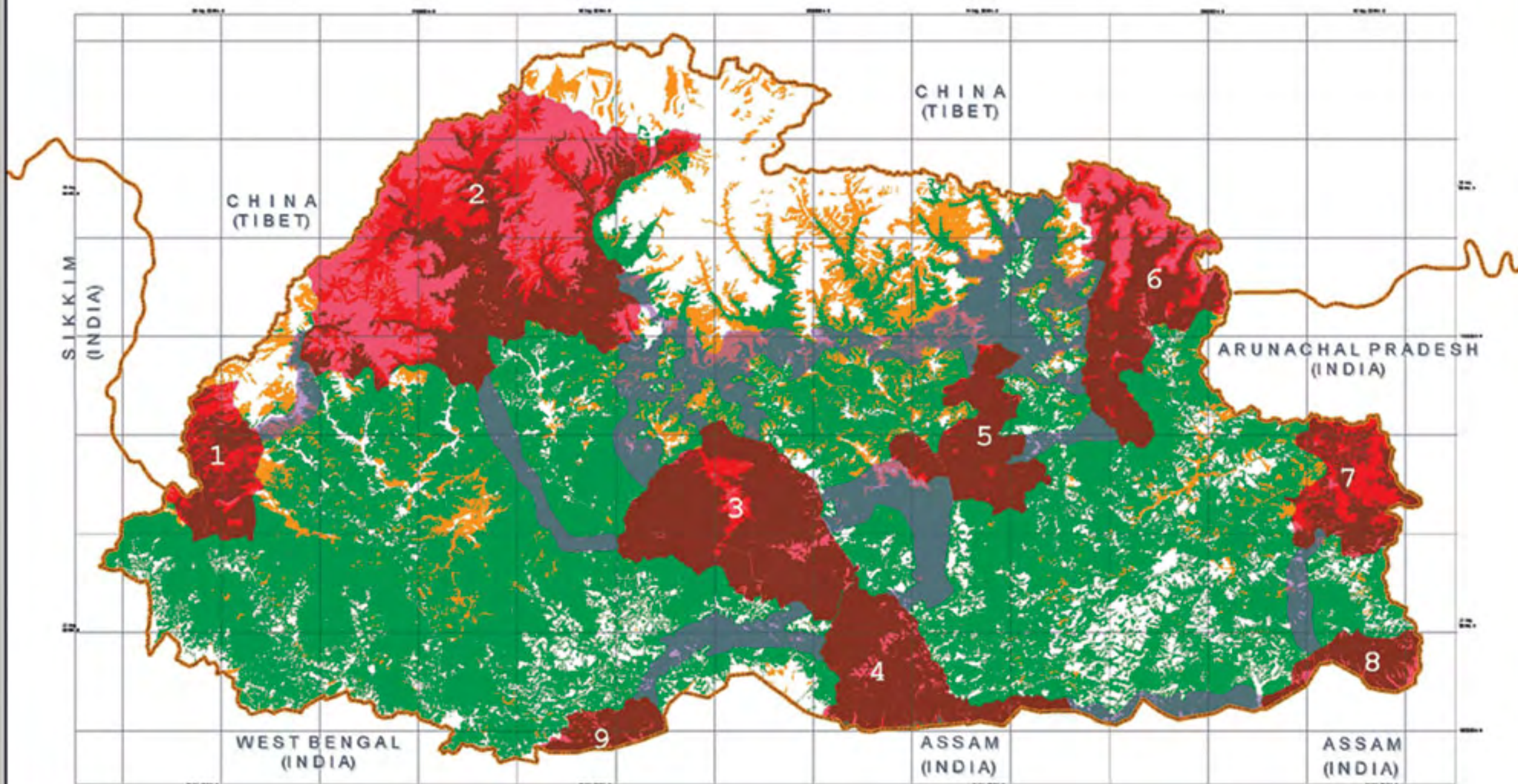
Legend

- Eastern Himalayan Broadleaf and Conifer Forest (67)
- Eastern Himalayan Alpine Meadows (112)
- Terai-Duar Savannas and Grasslands (91)
- International Boundary

0 20 40 80 Km



Protected Areas System and Wildlife Corridors in Bhutan with the Eastern Himalayan Ecoregions



Legend

- Eastern Himalayan Broadleaf and Conifer Forest (67)
- Eastern Himalayan Alpine Meadows (112)
- Terai-Duar Savannas and Grasslands (91)
- International Boundary
- Biological Corridors
- Protected Areas

1. Toorsa Strict Reserve
2. Jigme Dorji Wangchuck National Park
3. Jigme Singye Wangchuck National Park
4. Royal Manas National Park
5. Thrumshingla National Park
6. Bumdeling Wildlife Sanctuary
7. Sakteng Wildlife Sanctuary
8. Khaling Strict Reserve
9. Phibsoo Wildlife Sanctuary

0 20 40 80 Km

