NEPAL FOURTH NATIONAL REPORT TO THE CONVENTION ON BIOLOGICAL DIVERSITY

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Ministry of Forests and Soil Conservation
Singha Durbar, Kathmandu, Nepal
March 2009

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Tel: +977 1 4220 067 / 4224 892
Fax: +977 1 4223 868 / 4224 892
Website: www.mofsc.gov.np
Email: mfsced@wlink.com.np

Review Team
Uday R. Sharma, PhD.
Pralad Yonzon, PhD.
Eklabya Sharma, PhD.

Prepared By:
Prof. Ram Prasad Chaudhary
Krishna Chandra Paudel, PhD.
Sudhir Kumar Koirala

Edited and Processed by:
Deependra Joshi

National Report Coordination Team

1. Dr. K.C. Paudel	Coordinator
2. Dr. S.B. Bajracharya	Member—NTNC
3. Dr. M.P. Upadhyay	Member—NARC
4. Dr. Narendra Man Babu Pradhan	Member—DNPWC
5. Prof. Madan Koirala	Member—NEFEJ
6. Prof. Pramod Kumar Jha	Member—TU
7. Dibya Gurung	Member—UNDP
8. Sagar Kumar Rimal	Member—DoF
9. Sudhir Kumar Koirala	Member and Contact Person—MFSC

Design and Production by: **Ultimate Marketing (P.) Ltd.**
Ranibari, Lazimpat, Kathmandu, Nepal
Tel: 4352223, Fax: 4365195
E-mail: info@marketingultimate.com

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Government of Nepal
Ministry of Forests and Soil Conservation

Ph. 4220067
4224892
4262428
4224864
4223862
Fax. 4223868

P.O.Box No. 3987
Singha Durbar, Kathmandu

Ref. No.

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Preface

Nepal has been moving towards the fulfilment of its commitment to the Convention on Biological Diversity (CBD). Since long time, Nepal has been adopting all the decisions emanating from the Conference of the Parties. As Nepal is rich in biological diversity, we are committed to play the important role of conserving this heritage despite the depletion of species. Nepal has also become party to various legally binding international instruments that are in line with CBD and hence very much committed to meet the international obligations. A wide array of biodiversity conservation policies, plans and legislative instruments have been formulated and promulgated. Likewise, participatory forest and protected area management programmes are getting much popular that have added greater values to biodiversity conservation. People of Nepal have become more aware about the advantage of biodiversity conservation and now are in better position to bring their voice in making wise utilisation of their valuable genetic resources.

In the context of political transformation, I am very much confident that Nepal will be able to maintain its profile in the field of biodiversity conservation with all the focus on the need to the conservation of biological resources, sustainable use of its components, and the fair and equitable sharing of the benefits arising out of the use of natural resources. The Nepal Fourth National Report to the CBD is expected to greatly benefit the people of Nepal, including the indigenous communities, who have been meaningfully contributing to promote, conserve and protect the biodiversity and traditional knowledge.

Let me also take the privilege of thanking the entire team of the Fouth National Report Coordination Team. Without their hard work this report would not have been completed on time. I find this report as outstanding, which is different than the previous documents. This report has been developed after having a series of consultative meetings with all the concerned and relevant stakeholders both at local and national levels. I am very much sure that it reflects all our commitments towards our promises of the long-term conservation of biological resources.

We, as the CBD focal point, would like to take every possible initiative to meet the Convention's goal despite all challenges and difficulties ahead. I believe that the report will serve the purpose of getting acquainted with actual scenario of biodiversity status in Nepal. The report certainly inspires all involved in the conservation of Nepal's biological diversity. As we are also part of the global biodiversity conservation, every effort towards the better management of our biological resources will help in benifitting global community. I would like to ensure that the ministry will continue to play the catalytic role in coordinating the overall biodiversity conservation efforts in future as well.

This report would not have been possible without the extraordinary commitment of academia, scientists, researchers and professionals, reviewers, and the communities who have contributed their knowledge, creativity, time and enthusiasm to the preparation of the report. My special thankfulness goes to the Coordinator Dr. Krishna C. Paudel, Contact Person Mr. Sudhir K. Koirala, Government of Nepal, and Consultant Prof. Ram P. Chaudhary, Tribhuvan University, who took the lead in order to prepare this report. Finally, I would like to recognise the contribution of UNDP GEF (both financial support and technical guidance) in the preparation and publication of the report.

Uday R. Sharma, PhD.
Secretary, Ministry of Forests and Soil Conservation

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The Nepal Fourth National Report to the CBD is an outcome of the extensive consultation with relevant stakeholders comprising various cross-section of society in general and the participants of all those workshops held during the preparation of the report in particular. Regular contacts from CBD Secretariat was instrumental and inspiring as it provided valuable guidance and enriched with the comments in the first draft.

Unlike other reports, this report is different because of broader consultations among stakeholders through mass media, publications, interview in FM radios, visits to the different relevant institutions that made the report more realistic and created a sense of common belongingness. I am extremely grateful to the members of the National Report Coordination Team withour their hard work this report would not have been made possible. Also, I would like to thank all the participants who have contributed their time and effort to preparte this report.

The consultant team comprising Prof. Ram Prasad Chaudhary (Team Leader) and Mr. Surya Prasad Khanal deserve special thanks for preparing quality report on time. I also extend sincere thanks to the peer reviewers Dr. Uday R Sharma (MFSC), Dr. Pralad Yonzon (Resources Himalaya) and Dr. Eklabya Sharma (ICIMOD), Dr. Siddhartha Bajra Bajracharya (National Trust for Nature Conservation), Mr. Vijaya P. Singh (UNDP Nepal), and Mr. Jhamak B. Karki (DNPWC) for their contribution in enhancing the quality of the report, and Mr. Deependra Joshi for excellent editing.

I would like to pay special thanks to the Heads of the Departments and Regional Directorates under the Ministry of Forests and Soil Conservation for their invaluable support during the report preparation process. I am also thankful to the Ministry of Agriculture and Cooperatives, Ministry of Local Development, Ministry of Environment, Science and Technology, Nepal Agricultural Research Council, UNDP Nepal, Resources Himalaya, ICIMOD, BCN, WWF, IUCN, NTNC, National Foundation for Development of Indigenous Nationalities, Federation of Community Forest Users Nepal, Biodiversity Sector Assistance Project-Siwaliks and Terai, Western Terai Landscape Complex Project and HIMAWANTI for their every support during report preparation.

I am also grateful to Mr. Lijie Cai, Programme Officer, CBD/UNEP, for providing timely comments on the first draft.

Finally, I would also like to extend my sincere thanks to all who contributed a lot in various consultation workshops during the preparation report.

Krishna Chandra Paudel, PhD.
Coordinator
Nepal Fourth National Report Coordination Team and
Director General, Department of Forests.

Executive Summary

The goal

In 2002, Nepal developed a comprehensive Nepal Biodiversity Strategy (NBS) with the participation of a broad cross-section of Nepali society as well as in consultation with international experts to fulfil its obligations of being a party to the Convention on Biological Diversity (CBD). Nepal signed the CBD on June 12, 1992, which was ratified by the Nepali parliament on November 23, 1993, and has been enforced in Nepal since February 21, 1994. The Government of Nepal (GoN) carried out extensive consultations with different stakeholders and experts and prioritised 13 concept projects for the period of 2006-2010 that comprises a cross-sectoral and six sectoral thematic areas such as protected areas, forests, rangelands, agriculture, wetlands and mountains; and are published in the Nepal Biodiversity Strategy Implementation Plan (NBSIP).

The Nepal Fourth National Report to the CBD has been prepared strictly following the (UNEP/CBD/4NR/CBW-ASI/1/1) guidelines, and is organised into four chapters.

- Chapter 1 comprises an overview of biodiversity status, trends and threats.
- Chapter 2 deals with current status of Nepal Biodiversity Strategy and Nepal Biodiversity Strategy Implementation Plan.
- Chapter 3 presents sectoral and cross-sectoral integration of mainstreaming biodiversity considerations.
- Chapter 4 draws conclusions by analysing progress towards the Convention on Biological Diversity's 2010 targets and implementation of the NBS.

Chapter 1: Biodiversity Assessment: An Overview of Status, Trends and Threats

Nepal, situated in the central Himalaya, occupies a total area of 147,181 km^2. About 86% of the total land area is covered by hills and high mountains, and the remaining 14% are the flat lands of the Tarai with altitudes varying from some 67m asl in the south-eastern Tarai to 8,848m at the peak of the world's highest mountain, Sagarmatha (Mount Everest) in the north. Nepal's biodiversity at ecosystem and habitat, species and gene levels is a reflection of its unique geographic position and wide altitudinal and diverse climatic conditions.

The latest physiographic data shows that Nepal harbours 29% forest area, 10.6% shrubland and degraded forest, 12% grassland, 21% farmland, 2.6% water body, 7% uncultivated inclusions, and 17.8% others. The population in 2007 is estimated at 26 million; increasing from 23 million in 2001 with an annual population growth of 2.25%.

1.1 Ecosystem and habitat diversity

Nepal lies at a transition zone comprising six floristic regions. The country is a part of biodiversity hotspot, among four hotspots occurring in the Himalayan region. There are six biomes occurring in Nepal, i.e. only two less than India. In terms of Global 200 Ecoregions, Nepal hosts nine important ecoregions among 60 ecoregions found in the Himalayan region. As many as 35 forest types and 118 ecosystems have been classified on the basis of altitudinal, climatic variations and vegetation types.

Approximately, 3.56 million ha of forests have been estimated potential for community forest in Nepal. The latest figure shows that approximately 1.23 million ha (34.6% of the potential community forest area) of forests are handed over to 14,431 Forest User Groups (FUGs) benefiting 1.66 million households (HH) (about 40% of Nepal's total HH) by the end of October 2008. Of these, women FUGs manage 23,258 ha of community forests. A total of 34,359 ha forests were handed over to the communities before 1992. The area increased to 1.02 million ha between 1992-2002, and to 1.23 million ha between 2002-2008. The trend of national forest hand over to the communities shows that the community forests were handed over at a high rate (2882%) in one decade during the period 1992-2002, whereas the trend was rather slow (20%) during 2002-2008. One of the reasons for the slow process could be attributed to heightened conflict in the country. The trend of community forest handing over is higher in hills than the Tarai.

The leasehold forestry programme has been implemented in 28 districts of Nepal. By the end of October 2008, over 17,320 ha of national forests were leased to 3,417 user groups involving more than 29,892 households. While the community forest is spreading fast, the handing over process has been slow because of relatively more time taken in the preparation and implementation of operational forest management plans.

So far, 16 protected areas have been declared in the country covering an area of 28,999 km^2, *i.e.* 19.7% of the total area of Nepal, and are established in three different ecological zones. They belong to different categories, comprising a total of 9 national parks (35.5% of the total protected areas), 3

wildlife reserves (3.37%), 3 conservation areas (39.05%), 1 hunting reserve (4.56%) and 11 buffer zones (17.52%) around PAs. The distribution of PAs in Nepal shows that highlands in general are well protected in terms of coverage; whereas midhills and Tarai are less represented under protected area system.

Rangelands in Nepal are estimated to cover 1.75 million ha, nearly about 12% of the country's total area. The rangelands have high biodiversity. They provide habitat for various flowering plants, including endemic species and wildlife as well as globally threatened species. In addition, these grasslands also sustain domestic livestock, an important source of local livelihoods. The rangeland ecosystems are under high grazing pressure and on the verge of depletion of palatable species, especially the legume components.

Wetlands of Nepal comprise about 2.6% of the country's area. Wetlands are rich in biodiversity supporting habitat for 172 species of birds and major wetland plants, including threatened plant and animal species. Wetland sites of international importance show wide disparity in distribution at altitudinal zones. A total of 34,455 ha has been designated under the Ramsar site, and of these approximately 68.2% (23,488 ha) wetland sites are located in the Tarai followed by 31.6% (10,877 ha) in the High Himalaya; whereas midhills remain poorly represented, less than 1% (90 ha). Wetland ecosystem is under threat from encroachment of wetland habitats, unsustainable harvest of wetland resources (over-fishing and indiscriminate use of poison and dynamite), industrial pollution, agricultural run-off, siltation and the introduction of exotic and invasive species into wetland ecosystems.

About 21% of the total land area of Nepal is used for agriculture. Principal crops grown are rice (45%), maize (20%), wheat (18%), millet (5%) and potatoes (3%), followed by sugarcane, jute, cotton, tea, barley, legumes, vegetables and fruits. Similarly, horticultural diversity, although not well documented in Nepal, includes over 100 high yielding varieties of various fruit crops. There is also a great diversity in indigenous livestock breeds in Nepal. Agrodiversity of Nepal is in a state of depletion which is primarily due to the destruction of natural habitat, over-grazing, land fragmentation, commercialization of agriculture, indiscriminate use of pesticides, and the extension of modern high-yielding varieties.

Mountain ecosystem in Nepal comprises high number of endemic species occurring in subalpine and alpine zones. The mountain programme adopted in 2004 (COP 7) aims to make a significant reduction of mountain biological diversity loss by 2010 at global, regional and national levels. However, economic marginalization (poverty), ecological fragility and instability of high mountain environments, deforestation, poor management of natural resources, and inappropriate farming practices are primary threats to mountain biodiversity.

Priority habitat includes Important Bird Areas (IBAs) and Important Plant Areas (IPAs). Given the small size of the country, there are 27 IBAs in Nepal hosting richest bird species in Asia. Habitat loss and its degradation, wetland degradation, poisoning by diclofenac and pesticide, hunting and trapping, invasive alien species, climate change, etc. are major threats to the very survival of birds. Population study of Gull-billed Tern (*Gelochelidon nilotica*) and River Tern (*Sterna aurantia*) at Koshi barrage undertaken at regular intervals after 1990s has been found declining. However, there exists some promising examples of maintaining population of threatened bird species in wild; one of them is the population of Cheer pheasant (*Catreus wallichi*) in Dhorpatan Hunting Reserve.

A total of 54 Important Plant Areas (IPAs) comprising 230 IPAs for medicinal plants and NTFPs have been provisionally identified. Estimates for the number of medicinal plant species in Nepal range from 593 to 1,700 species. In the mountains of Nepal, 10-100% of households are involved in the collection of medicinal plants and other NTFPs; and in certain rural areas this contributes up to 50% of the family income. Volume of trade of NTFPs from Nepal Himalaya is not clearly known, and estimated between 10-15 thousand tons of raw NTFPs annually between worth US $ 8.6 million to US $ over 35 million. Major conservation issues include over-harvesting (premature and unsustainable harvesting) due to trade pressure (which is often undeclared in most cases), habitat destruction, livestock grazing, forest fire, etc.

1.2 Species diversity

Species richness among floral diversity comprises Lichens 465 species (2.3% of the global diversity); Fungi 1,822 species (2.4%); Algae 687 species (2.6%); Bryophytes 853 species (5.1%); Pteridophytes 534 species (4.71%); Gymnosperms 27 species (5.1%); and Angiosperms 5,856 species (2.7%). Faunal diversity includes Platyhelminthes 168 species (1.4%); Spiders 144 species (0.2%); Insects 5,052 species (0.7%); Butterflies 640 species and Moths 2,253 species (together 2.6%); Fishes 182 species (1.0%); Amphibians 77 (1.84%); Reptiles 118 species (1.87%); Birds 863 species (9.53%); and Mammals 181 species (4.52%). Taxonomic research has been undertaken in Nepal to update the number of taxa (species and subspecies levels mainly) with focus on some selected groups. For instance, the number of bryophytes has been increased to 1,150 species; angiosperms 6,391 species (including subspecies levels); spiders 175 species and butterflies 785 species/subspecies; fishes 187 species; mammals 208 species; and 10 species of earthworms. There are strong correlations between species

richness and altitude observed at four groups of plant species in Nepal Himalaya. Species richness has been observed maximum at 1,500m for angiosperms; 2,800m for liverworts; 2,500m for mosses; and 1,900m for ferns.

1.3 Genetic diversity

Genetic diversity among wild species is least known in Nepal indicating much scope for future research. However, a substantial genetic diversity is inferred among both flora and fauna, and is apparent in terms of morphological features. Agricultural crops have high genetic diversity relative to other food crops. The seed repository of plant genetic resources section at NARC has preserved 10,781 accessions of the orthodox seeds collected from different regions of the country. Altogether, 4,151 accessions were characterized before 1999, and by now the number has reached 5,662 by adding 200-565 accessions each year between 2000-2007 with the help of molecular techniques (Isozyme, RAPD and Microsatelite).

1.4 Protected and threatened species

The Government of Nepal has imposed restrictions on the export of 12 plant species and one forest product under the Forest Act (1993). Similarly, 27 mammal species, 9 bird species, and 3 reptile species have been given legal protection under the National Parks and Wildlife Conservation Act (1973). Protected animals of Nepal are also being monitored through census. The recent tiger census shows that the population of tiger is being maintained since the census of 1999/2000. Similarly, population of snow leopard (*Uncia uncia*) in Nepal is estimated between 350-500 out of estimated 4500-7500 snow leopard in the world. There is an urgent need to update the list of other protected and threatened species with their status and distribution.

1.5 Endemic species

Approximately, 342 plant species and 160 animal species have been reported as being endemic to Nepal concentrated at subalpine and alpine zones. The maximum angiosperms species endemic to Nepal lies at 3,800-4,200m.

1.6 Major threats to biodiversity

The threats to biodiversity are at the level of ecosystem, species and gene with little difference between them in their magnitude.

- The threats to ecosystem include habitat loss, deforestation, fire, grazing, illegal timber harvesting, haphazard and unmanaged tourism, pollution, over-fishing, poaching, climate change, etc.
- The threats to species include over-exploitation of species, alien species and climate change.
- The threats to genetic resources include loss of local landraces, loss of genetic variability, increased vulnerability to pests and diseases.

1.7 Root cause of loss of biodiversity

The weaknesses, gaps, difficulties and other problems in conserving biological diversity in Nepal are attributed to socio-economic causes (poverty and population growth); natural causes (landslides, flood and drought); and anthropogenic causes (pollution, fire, over-grazing, introduction of alien species, illegal trade and hunting). Two other issues affecting biodiversity in Nepal include: (i) Climate change (global warming); and (ii) political conflict for over a decade.

Nepal is rich in biodiversity at all levels disproportionate to the area of the country. The threats to biodiversity are also alarming at all levels. Therefore, it is suggested to develop biodiversity indicators that are used to assess the status of biodiversity in Nepal, monitor the trends of biological diversity, and assess the threats to fulfil the commitments of the country as outlined in the CBD.

Chapter 2: Current Status of Nepal Biodiversity Strategy and Action Plan

2.1 Overview

The Nepal Biodiversity Strategy (NBS) is an important tool for implementing the provisions under CBD. It serves as an overall framework for the conservation and sustainable use of biodiversity and biological resources through the management of habitat, species and genetic diversity in the country.

The Nepal Biodiversity Strategy Implementation Plan (NBSIP) is a framework to materialize the vision of the NBS into practical actions for effective conservation of biodiversity and sustainable use of its resources. The overall goal of the NBSIP is to contribute to achieve the goals and objectives of NBS through its successful implementation of the conservation of biological diversity, the maintenance of ecological processes, and the equitable sharing of the benefits accrued. The objectives of the NBSIP set for the period of 2006-2010 are to: (i) conserve biodiversity of Nepal within and outside protected areas; (ii) identify, develop and establish legislative, policy and strategic measures necessary to conserve, sustainably utilise and provide access to and share benefits of Nepal's biological resources; (iii) conserve endangered species of wildlife; (iv) develop legislation (*viz*. *sui generis* legislation, access to genetic resources and benefit sharing), sub-sectoral policies and strategic measures; (v) develop sustainable eco-friendly rural tourism; and (vi) domesticate NTFPs and explore marketing opportunities for poverty reduction.

2.2 Review of NBSIP

The NBSIP, developed in 2006, has identified 13 priority concept projects to be implemented by relevant executing agencies (mostly national) in consultation with the concerned stakeholders. These projects belong to seven sectors that include six thematic areas and one cross-sectoral area. Altogether, 24 criteria are used to select the priority projects comprising: (i) biological criteria; (ii) socio-economic criteria,;and (iii) socio-cultural criteria. In addition, 14 cross-cutting criteria related to poverty reduction, cultural heritage, environment and ecotourism were also used. The projects were ranked in terms of priority determined by the concerned stakeholders.

International targets and indicators recommended by COP 7 (2004) were not adequately considered during the development of NBSIP and the Nepal Third Report to the CBD. So, an attempt in the Nepal Fourth National Report has also been made to identify Nepal's biodiversity target for 2010 based on the assessment of progress made in the implementation of all 13 prioritised concept projects identified under NBSIP. The parameters used to identify the status of the priority projects are qualitative and adapted from the Millennium Development Goals of Nepal (2005) with some modifications. For example: 'Will objectives be reached' has four categories: (i) Achieved; (ii) Likely; (iii) Less likely; and (iv) Lack of data. The next parameter used is 'Status of supportive environment', also comprises four categories: (i) Strong; (ii) Fair; (iii) Weak but improving; and (iv) Weak.

In the category 'Will the objectives be reached,' more than 50% of the objectives of the 13 priority projects identified under NBSIP show progressive trend and are considered likely to be achieved. These objectives are found to be of high level consistency, well focused and community-oriented. Similarly, the status of supportive environment in general is 'Weak' for the priority projects, particularly those projects that require coordination between two or more institutions and additional funding. However, many project objectives are having 'Fair' supportive environment and may be achieved by 2010.

A general review of the NBSIP during the preparation of this report has underpinned the need of a greater attention on key priorities that are linked to participatory conservation approaches with livelihoods links. For specific objectives of the projects, quantitative, measurable and realistic targets need to be developed by 2010 for the period of 2011-2015. The process has been initiated by the MFSC.

2.3 Gap analysis of effectiveness of NBSIP

There is a lack of systematic approach in determining country's capacities and developing implementation modalities. This has negatively impacted prioritisation, operation, implementation, and ability to monitor performance at the programme/project level. The primary gaps are:

- Priority sectors are several and dispersed.
- Priority sectors and national budget allocation do not match. Funding is not ensured according to its priority.
- Inter and intra-ministerial coordination as well as institutional coordination among the stakeholders are poor that weaken timely accomplishments of the objectives of individual projects.
- There is inadequate linkage between the priority projects and donor assistance as funding in some sectors is complimentary and in others, supplemental to the existing donor funds.
- There is weak transboundary cooperation with the project that requires regional approach to successfully implement across the national boundary.
- Poor performance in achieving some key targets is largely due to the inability to raise financial resources as envisaged in the NBS and NBSIP (see Chapter 3.4).

The three objectives of CBD: conservation, sustainable use and fair and equitable sharing of benefits are likely to be achieved if Nepal makes progress on law enforcement and natural resource governance.

Chapter 3: Sectoral and Cross-sectoral Integration of Biodiversity Considerations

The NBS aims to integrate and mainstream the conservation of biological diversity and sustainable use of its components into sectoral and cross-sectoral plans and policies.

3.1 Systemic level

Efforts have been made to incorporate biodiversity considerations into policy, planning and strategy long before the development of NBS in 2002. These include Nepal's commitment to biodiversity conservation by signing more than 20 international agreements and obligations, and translating many of them into national policies and acts. Recent commitments can be seen as Nepal's current Interim Constitution (2007) and the Three Year Interim Plan (2007/08-2009/10) give emphasis on biodiversity conservation and promotion of traditional knowledge. However, complementarities and gaps in legislations have been observed between the Forest Act (1993) and the Local Self-Governance Act (1999) with respect to the management, utilisation and ownership of natural resources, particularly forest resources and the scope of the UGs and NGOs. Integration and harmonisation of environmental laws have been essential to overcome inconsistencies

and overlap in addressing cross-cutting issues related to biodiversity.

3.2 Implementation arrangements

3.2.1 Sectoral

The overall responsibility for implementing NBSIP rests with the Ministry of Forests and Soil Conservation (MFSC) in its role as the national focal point for CBD. The MFSC, with its five departments and two divisions, are primarily responsible for project implementation, monitoring and evaluation. The other relevant ministries and line agencies that lie outside the mandate of MFSC and implement CBD include the Ministry of Agriculture and Cooperatives (MoAC), Ministry of Environment, Science and Technology (MoEST), Ministry of Local Development (MLD), Ministry of Water Resources (MoWR), and the National Planning Commission (NPC). It is recommended that the NPC would take the responsibility to integrate the relevant ministries and stakeholders working in biodiversity conservation.

3.2.2 Cross-sectoral

Biodiversity and environment conservation have been integrated into cross-sectoral plans of the government such as the Millennium Development Goals and the Poverty Alleviation Fund.

Millennium Development Goals (MDGs). Nepal has incorporated the MDGs into its strategic framework in the Poverty Reduction Strategy Paper. Biodiversity conservation plays a crucial role to meet the MDGs, in particular Goal 1 'Eradicate Extreme Poverty and Hunger,' and Goal 7 'Ensure Environmental Sustainability' in addition to other goals.

Poverty Alleviation Fund (PAF). The PAF, established in 2004, is working to reduce poverty to 10% by 2020 in pursuant to the long-term goals of the Government of Nepal, and to reduce poverty by half (21%) by the year 2015, as per the Targets of the MDGs. Biodiversity provides essential materials linked to the livelihoods of people and their economic development.

Climate Change. The current knowledge for the prediction of climate change impacts on biodiversity, including species of narrow range in Nepal Himalaya, is inadequate. It is suggested to establish long-term monitoring mechanism representing species richness at three different spatial scales, such as local, landscape and macro-scale in the region through systemic research.

3.3 Organisational structure of the Implementation Plan

Following the NBS, a 13-member National Biodiversity Coordination Committee (NBCC) has been formed under the chair of Hon'ble Minister of Forests and Soil Conservation with the representatives from key government ministries, private sector, user groups, civil society, academic institutions and major donors. Five thematic sub-committees (forest, agriculture, sustainable use, genetic resources and biosecurity) have also been formed to adequately address the issues of different themes related to biodiversity. The coordinators of each of these thematic sub-committees represent as member of the NBCC. Serious attempts have to be undertaken by the Government of Nepal to actively involve NBCC, and the thematic sub-committees meeting the goals of the Convention as well as aspirations of the people of Nepal.

At the district level, District Biodiversity Coordination Committee (DBCC) has been formed (so far in 10 out of 75 districts) under the chairmanship of the Chairman of the District Development Committee (DDC) with appropriate representation from district level stakeholder organisations. The process of the formulation of DBCC has to be immediately and actively extended in all the districts of Nepal if objectives of the NBSIP are to be met by 2010, and beyond.

3.3.1 People's participation

Peoples' participation and dialogue is important for the successful implementation of conservation plans. The NBS has stated a strong commitment to promote local governance and involve people's participation at early stage of planning as well as implementation stage of resource use and conservation.

Financial resources. The following resources are being used for biodiversity conservation: (i) National treasury included in the national development plan as well as the annual plans of the sectoral ministries; (ii) Recycling of government revenues generated from the tourist entry fee to visit protected areas have been ploughed back for conservation and development activities in the buffer zone programme of several PAs; (iii) Contribution by NGOs/CBOs is a potential financial source for conservation of biological and cultural heritage; (iv) Private sectors are being encouraged to invest in the promotion of tourism and biodiversity conservation (*viz*. Upper Mustang and Dolpo); and (v) Grants and soft loans from the bilateral/ multilateral donor agencies have been utilised at various levels in the country.

3.4 Obstacles and challenges in the implementation

- **Resource availability:** The challenges in the implementation of the NBS and its projects under NBSIP are also due to inadequate availability of financial resources. An estimated amount of US $ 86.07 million was proposed to be invested for accomplishing the objectives of the priority projects in the first implementation phase during 2006-2010. There has been no progress in developing Nepal Trust Fund for

Biodiversity (NTFB) as proposed by NBS as an autonomous legal body, independent and separate tax free, from the government, and fully empowered to manage the capital and investment income.

- **Coordination and monitoring:** There is a lack of adequate coordination and accountability among the stakeholders, whereas monitoring has been poor.
- **Conflict:** Nepal faced over a decade-long armed conflict. Law enforcement and monitoring during the conflict period was either very poor or non-existent.

3.5 Way forward

The Government of Nepal aims to review and update the implementation of the NBSIP, and reorganise the committees. The updates will be done by taking into account the need to bring harmony with other conventions, as well as by addressing the issues of climate change, biosafety protocol, etc.

Chapter 4: Global and National Indicators

This chapter draws upon the information in the first three chapters of the report. An analysis has been made to assess how national actions taken to implement the CBD Strategic Plan (2002-2010) are contributing to the achievement of 2010 target, and relevant goals, objectives and strategic plans of NBS.

In the Third National Report to the CBD, a number of initiatives have been mentioned. However, they do not reflect biodiversity indicators. Quantitative indicators at the national level have been developed and endorsed by the MDGs. However, no specific time-bound and measurable national targets related to biodiversity conservation have been developed. At the local level, quantitative targets have been set for two districts of Nepal (Mustang and Manang) for achieving the sustainable development goal by National Trust for Nature Conservation.

The chapter summarizes an account of goals, targets and indicators towards 2010 Biodiversity target. In order to highlight whether things are moving in right or wrong direction, a set of 'traffic lights' are used as set by the UK Biodiversity Indicator. The information has been presented in the form of a table: (i) Column 1 provides the framework of goals and targets from COP Decision 7/30; (ii) Column 2 includes high level national targets to be achieved by 2010, although some targets may be provisional; (iii) Column 3 lists the means of implementation to achieve the goals and targets; and (iv) Column 4 provides an overall scenario to achieve the targets by 2010 on the basis of the trends observed between 2002-2008.

4.1: Goals, targets and Indicators towards 2010 Biodiversity Target

The goals and targets set by the COP 7 have been followed as guidelines to develop national indicators for Nepal to be achieved by 2010. A brief account is given in this section.

Focal Area: Protect the components of biodiversity

Goal 1: Promote the conservation of the biodiversity of ecosystems, habitats and biomes

- Target 1.1 *'At least 10% of each of the world's ecological regions effectively conserved'*, there are three national targets. The targets are: (i) the government shall ensure at least 40% of the country's forest resources under forest cover for all times; (ii) existing 19.7% of protected areas (PAs) effectively managed; and (iii) at least two new PAs declared. *Reaching the target is challenging but achievable.*
- Target 1.2 *'Area of particular importance to biodiversity protected'* there are four national targets. The targets are: (i) All declared nine Ramsar (wetlands) sites conserved and managed; (ii) One additional Important Bird Area (IBA) within PAs declared as Ramsar site, and three additional IBAs outside PA system put under management; (iii) Two Important Plant Areas (IPAs) complex put under management; and (iv) Important biological corridors managed. Despite undertaking multiple approaches, progress has been slow; *the trend of Target 1.2 is having little or no overall change*.

Goal 2: Promote the conservation [and documentation] of species diversity

- Target 2.1 *Restore, maintain, or reduce the decline of population of species of selected taxonomic group*, there are two national targets: (i) Decline of selected big cat (*viz*. tiger, snow leopard), and birds of prey (vulture) reduced; and (ii) Decline of selected plant groups *viz*. Orchidaceae, Dioscoreaceae, Lichens, and Rhododendrons reduced. *Reaching the target is challenging but achievable*.
- Target 2.2 *Status of threatened species improved* has 3 national Targets The targets are: (i) Population of rhino, blackbuck, crocodile, musk deer maintained; (ii) Population of plant species *viz*. 'Bijaya sal (*Pterocarpus marsupium*)', 'Satisal' (*Dalbergia latifolia*), 'Loth salla' (*Taxus wallichiana)* maintained; and (iii) Monitor the population of major animal species *viz*. gharial, and elephant; and medicinal plant species *viz*. *Swertia chirayita, Nardostachys grandiflora, Neopicrorhiza scrophulariiflora*, 'Yarsa gumba' *Cordyceps sinensis*. *Reaching the target is challenging but achievable.*

- Target 2.3 *Documentation of Flora and Fauna*. Despite undertaking multiple approaches, progress has been slow; *the trend of Target 2.3 is having little or no overall change*. The targets are: (i) Two out of 10 volumes of Flora of Nepal published; (ii) At least four fascicles (volumes) published: (iii) Conservation biology of red panda published: (iv) Fish for the Poor published.

Goal 3: Promote the conservation of [crop] genetic diversity

- Target 3.1 *Genetic diversity of crops, livestock, and other valuable species conserved, and associated indigenous and local knowledge maintained*. The six targets are: (i) *In-situ* conservation of crop genetic resources effectively implemented in 8 districts; (ii) On-farm crop conservation effectively maintained in two districts; (iii) One national gene bank established; (iv) Initiate conservation of endangered farm animal species; (v) Strengthen community seed bank at Bara district; and (vi) Develop *sui generis* system of plant variety protection to maintain indigenous and local knowledge. *Reaching the target is challenging but achievable.*

Focal Area 2: Promote sustainable use

Goal 4: Promote sustainable use and consumption

- Target 4.1 *Biodiversity products derived from sources are sustainably managed, and production area managed consistent with the conservation of biodiversity*. The five targets are: (i) Management plans of all PAs prepared and implemented; (ii) Forest management plans of all 74 districts prepared and implemented; (iii) Participatory Plant Breeding (PPB) and grassroot breeding initiated in three districts; (iv) Mango field gene bank established; and (v) Effectively implement forest certification mechanism in CF for major NTFPs (such as Lokta – *Daphne bholua*, *D. papyracea*, Argeli – *Edgeworthia gardneri*, Allo–*Girardinia diversifolia*. *Reaching the target is not certain due to insufficient or lack of comparable data*.
- Target 4.2 Unsustainable consumption of biological resources, or that impacts upon biodiversity, reduced. The targets are: (i) Reduce unsustainable harvesting of selected medicinal plants, including *Rauvolfia serpentina*, *Bergenia ciliata*, *Asparagus racemosus*, *Aconitum* species; (ii) Reduce illegal hunting of selected game animals such as blue sheep, deer, dolphin. *Reaching the target is not certain due to insufficient or lack of comparable data*.
- Target 4.3. *No species of selected wild flora and fauna endangered by international trade*. The national Targets are: (i) Monitoring of wild forest products regulated; (ii) Regulate and monitor selected animal species; (iii) Draft CITES bill finalised for endorsement; and (iv) CITES and anti-poaching units strengthened. *The trend of Target 4.3 is having little or no overall change*.

Focal Area 3: Address threat to biodiversity

Goal 5: Pressure from habitat loss, land use change and degradation reduced

- Target 5.1 *Rate of loss of degradation of natural habitats decreased*. One national target is loss of degradation of natural habitats decreased. Despite undertaking multiple approaches, progress has been slow; *the trend of target 5.1 is having little or no overall change*.

Goal 6: Control threats from Invasive Alien Species (IAS)

- Target 6.1 *Pathways for major potential alien species controlled*. The targets are: (i) Major IAS identified and their threat value assessed. *Reaching the target is not certain due to insufficient data or lack of monitoring*.
- Target 6.2 *Management plans in place for major alien species that threaten ecosystems, habitats or species*. The target is the management plan of at least three major IAS prepared and implemented. *An overall condition seems to be deteriorating or likely to deteriorate*.

Goal 7. Address challenge to biodiversity from climate change and pollution

- Target 7.1 *Maintain and enhance resilience of the components of biodiversity to adapt to climate change*. The targets are: (i) NAPA process initiated; (ii) Climate change research and monitoring initiated; (iii) Extend study of climate change impacts on the livelihoods of communities; and (iv) REDD policy finalised, endorsed and implemented. *Reaching the target is not certain due to insufficient data or lack of monitoring*.
- Target 7.2 *Reduce pollution and its impact on biodiversity*. Two proposed targets are: (i) establish baseline information on at least three important wetlands (Bagmati River, Ghodagodi Lake and Koshi Tappu), monitor water quality and biodiversity; and (ii) establish baseline information on air pollution. *Reaching the target is not certain due to insufficient data or lack of monitoring*.

Focal Area 4: Maintain goods and services from biodiversity to support human well-being

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

- Target 8.1 *Capacity of ecosystems to deliver goods and services maintained*. One Target is—Maintain Siwaliks ecosystem to deliver goods and services. *Reaching the target is not certain due to insufficient data or lack of monitoring*.
- Target 8.2 *Biological resources that support sustainable*

livelihoods, local food security and health care, especially of rural people maintained. One target is—Maintain biological resources for livelihoods, food security and health. Progress has been slow; *the trend of Target 8.2 is having little or no overall change*.

Focal Area 5: Protect traditional knowledge, innovations and local communities

Goal 9: Maintain socio-cultural diversity of indigenous and local communities

- Target 9.1 *Protect traditional knowledge, innovations and practices*. The target is—Ensure protection of traditional knowledge through Access to Genetic Resources and Benefit Sharing (AGRBS) legislation. *The trend to achieve target 9.1 has insufficient data*.
- Target 9.2 *Protect the rights of indigenous and local communities over their traditional knowledge, innovations and practices, including their rights to benefit sharing*. One target is—Protect IPRs through *sui generis* system. *The trend to achieve target 9.2 has insufficient data*.

Focal Area 6: Ensure the fair and equitable sharing of benifits arising out of the use of genetic resources

Goal 10: Ensure the fair and equitable sharing of benefits arising out of the use of genetic resources

- Target 10.1 *All access to genetic resources is in line with the CBD, and its relevant provisions*. One target is: (i) Access to genetic resources and benefit sharing (AGRBS) drafted as per guidelines of CBD Articles. *The trend of the target is having little or no overall change*.
- Target 10.2 *Benefits arising from the commercial and other utilisation of genetic resources shared in a fair and equitable way with the countries providing such resources in line with CBD and its relevant provisions*. The target is—Make an attempt to develop a regional AGRBS framework and policy. *The target 10.2 is achievable, but depends on political will*.

Focal Area 7: Ensure provisions of adequate resources

Goal 11: Nepal has improved financial, human, scientific, technical and technological capacity to implement the Convention at all levels

- Target 11.1 *New and additional financial resources are transferred to developing country parties, to allow for the effective implementation of their commitments under the Convention, in accordance with Article 20.* One target is - Full implementation of NBS and NBSIP by ensuring financial and human resource development. *An overall condition seems to be deteriorating or likely to deteriorate*.
- Target 11.2 *Technology and skills transferred to developing country parties, to allow for the effective implementation of their commitments under the Convention in accordance with its Article 20, paragraph 4*. One target is—Nepal Biodiversity Portal Database established. *Reaching the target is not certain due to insufficient transfer of technology*.

4.2 Specific conclusions and suggestions

Implementation of CBD in Nepal. Implementation of the Strategy and the Plan has improved conservation and sustainable use of biodiversity in various ways. Some of these include (i) updating and reflecting the current state of knowledge; (ii) sensitising the stakeholders involved in biodiversity conservation; (iii) identifying important policy and planning gaps; (iv) raising awareness; (v) focusing on priority implementation projects; and (vi) providing a framework of National Biodiversity Coordination Committee (NBCC) through which planning, implementation and the sharing of best practices can take place efficiently and effectively. Despite some successes, there are considerable inefficiencies in implementation, which have led to significant delays to successfully accomplish the objectives of the NBSIP.

4.3 Lessons learned

Various lessons have been learned during the course of the implementation of CBD in Nepal. These include:

- Community-based conservation is most essential for the conservation and sustainable use of biodiversity. Different community perspectives should be considered in making decisions on the use and management of biological resources.
- Empowering the communities and dissemination of the knowledge to them at the grassroots level have been vital for effective implementation of CBD in Nepal. During stakeholders' consultation at district level, it was observed that the terminology such as 'biodiversity', 'climate change', 'access to genetic resources and benefit sharing' are generally unfamiliar to the local communities. However, they possess feeling of the words (terminologies). Such feelings need to be internalised by ensuring their participation in biodiversity conservation and sustainable use.
- The national policy debates are now increasingly considering the issues of Tarai forest governance. It is crucial time to capture learning from communities at the grassroots level as an opportunity to revise the forest policy for the Tarai region.
- Landscape level approach to conservation has been important to conserve and monitor biodiversity, in

particular at trans-boundary scale as well as resolve issues related to benefit sharing at the regional level.

4.4 Summary of future priorities and capacity building needs

The future priorities need to be focused on:

- Shifting paradigms which include a holistic and community-based landscape approach to conservation and livelihoods in line with ecosystem-based approach as advocated by the CBD, and moving from species conservation to landscape conservation approach.
- Sustainable use of biological resources, mitigation and adaptation to the local effects of global changes, ecosystem services, economic valuation of biodiversity at different levels, and fair and equitable sharing of benefits.
- Capacity building at all levels, in particular focused at community level.

4.5 Suggestions for action

(i) Global level. The convention's language (CBD article 20; Goal 11 of 2010 Biodiversity target), related to the transfer of new and additional financial resources to allow for effective implementation of CBD, has to be understood in a holistic way. Lack of financial and technical assistance has substantially put limitations to effectively implement the programmes. Nepal has to purposefully improve financial, human, scientific, technical and technological capacity to implement the Convention at all levels.

(ii) Regional level. (i) Further regional collaboration with respect to conservation, sustainable use and fair and equitable sharing of benefits of biodiversity will strengthen and enhance regional capacity for joint initiatives on resolving transboundary issues. (ii) Despite countries in this region differ to an extent in terms of economic, social, cultural and political situation, harmonization of conservation related legislations would be extremely useful to resolve, to a certain extent, cross-border issues such as illegal hunting, unsustainable trade, pollution, etc.; (iii) A regional approach should be undertaken to study the impact of climate change on biodiversity in the Himalayas, and enhancing resilience, supporting adaptation to local communities, and establishing upward-downward ecosystem services linkages.

(iii) **National level**. (i) Serious attempts have to be undertaken to actively mobilise NBCC, and the thematic sub-committees to meet the goals of the convention and aspirations of the people of Nepal. (ii) There is a need to review priority habitats in the country that are within the protected area system and outside along West-East (regional) and South-North (altitudinal) axes by considering biodiversity at biome, ecosystem, habitat, species and genetic level. As an example, many of the IBAs and IPAs in Nepal remain unprotected. (iii) Landscape level planning and monitoring should be strongly implemented for biodiversity conservation. This should include linkages at different ecological zones in the new federal structure of Nepal and bring harmony between national, sub-national and local levels and among the neighbouring districts for access to genetic resources and benefit sharing. (iv) Biodiversity documentation has yet to be internalized as a regular government programme by providing adequate training to the field staff and increasing public awareness activities. (v) There is a need to establish clear objectives, indicators and targets at the project/programme level and ensure sufficient linkages with country programmes and with individual projects. It is recommended that the indicators chosen are realistic and should include biological, social and economic processes.

(iv) Local level. (i) As per the provisions in NBS and NBSIP, the government's plan to constitute District Biodiversity Coordination Committee (DBCC) in all 75 districts of Nepal need to be undertaken. The process of formation of DBCC has been extremely slow. In addition, it is extremely vital to build the capacity of DDCs and VDCs to manage the biological resources and link DBCC with them.

(v) Non Government Organisations (NGOs) and Community Based Organisations (CBOs). (i) The NGOs and CBOs, including user groups (UGs), should play catalytic roles through developing innovative conservation case studies and identifying sustainable use practices, especially at the community level by collaborating/coordinating their programmes with District Development Committees (DDCs) and Village Development Committees (VDCs).

4.6 Suggested goals and objectives

In the area of global change, the goals and objectives that need to be incorporated, in addition to those given in NBS and NBSIP, include: (i) climate change issue at policy, implementation and monitoring levels–MFSC and MoEST should jointly undertake this issue as lead agencies; (ii) incorporation of research and development programmes on economic, ecological, cultural and social valuation of biodiversity–MFSC as the lead agency in collaboration with its different government departments, academic institutions, and NGOs; (iii) land use assessment of Nepal to understand the changes in area, coverage, density, structure, and biodiversity composition, at regular periods–DFRS as the lead agency in collaboration with other stakeholders; (iv) develop funding mechanism from Clean Development Mechanism (CDM) to

develop forests as carbon sink–MoEST and MFSC as lead agencies.

4.7 Suggested mechanism

- It is suggested to undertake, by a team of experts, a critical review of NBS (2002) and NBSIP (2006-2010), identify gaps and weakness and revise the NBSIP beyond 2010, and incorporate issues such as climate change, ecosystem service, polluters pay principle, carbon trade, etc.
- The Nepal Fourth National Report to the CBD requires wider circulation among the policy makers and planners, public, academia, media, communities and NGOs. The final report shall be made available to a wide range of stakeholders through print and electronic media. In addition, the report is planned to be launched during the celebration of the International Day of Biological Diversity on May 22, 2009.
- It is suggested to develop, on the basis of wider consultation, well focused quantitative and measurable national goals, targets and objectives to be achieved by 2015 by harmonising the criteria such as MDGs and the Millennium Ecosystem Assessment.
- It is recommended to address properly the protection of environment and its components such as conservation of biodiversity, access to resources, and their sustainable use as fundamental rights in the Constitution of Nepal, which is under formulation. It has been felt necessary to incorporate in the new Constitution of Nepal that at least 40% of the natural forest cover will be conserved in the country.

Acronyms

ABS	Access to Benefit Sharing
ADB	Asian Development Bank
AIDS	Acquired Immune Deficiency Syndromes
AGRBS	Access to Genetic Resources and Benefit Sharing
BCN	Bird Conservation Nepal
BISEP-ST	Biodiversity Sector Program for Siwaliks and Terai
BPP	Biodiversity Profiles Project
BZMC	Buffer Zone Management Committee
CA	Conservation Area
CBD	Convention on Biological Diversity
CBM	Community Biodiversity Management
CBO	Community Based Organisation
CBR	Community Biodiversity Register
CBS	Central Bureau of Statistics
CCA	Community Conserved Area
CDM	Clean Development Mechanism
CF	Community Forest
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
COP	Conference of the Parties
DBCC	District Biodiversity Coordination Committee
DDC	District Development Committee
DFRS	Department of Forest Research and Survey
DIVERSITAS	An International Programme of Biodiversity Science
DLS	Department of Livestock Services
DNPWC	Department of National Parks and Wildlife Conservation
DoA	Department of Agriculture
DoF	Department of Forests
DoL	Department of Livestock
DPR	Department of Plant Resources
DSCWM	Department of Soil Conservation and Watershed Management
EIA	Environment Impact Assessment
FAO	Food and Agriculture Organisation
FCS	Farmer's Capacity Society
FECOFUN	Federation of Community Forestry Users, Nepal
FINNIDA	Finnish International Development Assistance
FNCCI	Federation of Nepalese Chamber of Commerce and Industry
FUG	Forest Users Group
GEF	Global Environment Fund
GMBA	Global Mountain Biodiversity Assessment
GMO	Genetically Modified Organisms
GNP	Gross National Product
GoN	Government of Nepal
GR	Genetic Resources

GRPI	Genetic Resource Project Initiative
GSPC	Global Strategy for Plant Conservation
ha	Hectare
HDI	Human Development Index
HH	Household
HIV	Human Immunodeficiency Virus
HKH	Hindu Kush-Himalaya
HMGN	His Majesty's Government of Nepal
HPPCL	Herbs Production and Processing Company Limited
HR	Human Resource
IAS	Invasive Alien Species
IBA	Important Bird Area
ICIMOD	International Centre for Integrated Mountain Development
IEE	Initial Environmental Examination
ILO	International Labour Organisation
IPA	Important Plant Area
IPCC	Intergovernmental Panel on Climate Change
IPGRI	International Plant Genetic Resource Institute
ITPGRFA	International Treaty on Plant Genetic Resources for Food and Agriculture
IUCN	International Union for Conservation of Nature
KCA	Kanchenjunga Conservation Area
KU	Kathmandu University
LI-BIRD	Local Initiative for Biodiversity Research and Development
LRMP	Land Resource Mapping Project
LSGA	Local Self-Governance Act
MCTCA	Ministry of Culture, Tourism and Civil Aviation
MDG	Millennium Development Goal
MFA	Ministry of Foreign Affairs
MFSC	Ministry of Forests and Soil Conservation
MLD	Ministry of Local Development
MLJPA	Ministry of Law, Justice and Parliamentary Affairs
MoAC	Ministry of Agriculture and Cooperatives
MoEST	Ministry of Environment, Science and Technology
MoH	Ministry of Health
MoWR	Ministry of Water Resources
NARC	Nepal Agricultural Research Council
NARMSAP	Natural Resource Management Sector Assistance Program
NAST	National Academy of Science and Technology
NBCC	National Biodiversity Coordination Committee
NBS	Nepal Biodiversity Strategy
NBSIP	Nepal Biodiversity Strategy Implementation Plan
NBU	National Biodiversity Unit
NEPAP	Nepal Environment Policy and Action Plan
NGO	Non Governmental Organisation
NGS	National Geographic Society

NMA	Nepal Mountaineering Association
NP	National Park
NPC	National Planning Commission
NTB	Nepal Tourism Board
NTFB	National Trust Fund for Biodiversity
NTFP	Non Timber Forest Product
NTNC	National Trust for Nature Conservation
PA	Protected Area
PAF	Poverty Alleviation Fund
PGR	Plant Genetic Resources
PGRFA	Plant Genetic Resources for Food and Agriculture
PPB	Participatory Plant Breeding
PRSP	Poverty Reduction Strategy Paper
RAPD	Rapid Amplification of Polymorphic DNA
RH	Relative Humidity
REDD	Reduced Emission from Deforestation and Degradation
SHL	Sacred Himalayan Landscape
TAAN	Trekking Agents Association of Nepal
TAL	Terai Arc Landscape
TISC	Tree Improvement and Silviculture Component
TU	Tribhuvan University
UC	User Committee
UG	User Group
UNCED	United Nations Conference on Environment and Development
UNCT	United Nations Country Team
UNDP	United Nations Development Program
UNEP	United Nations Environment Program
UNESCO	United Nations Educational, Scientific and Cultural Organisation
UNFCCC	United Nations Framework Convention on Climate Change
VDC	Village Development Committee
WHS	World Heritage Site
WR	Wildlife Reserve
WWF	World Wildlife Fund
WTLCP	Western Terai Landscape Complex Project

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REPORTING PARTY

Contracting Party	NEPAL
NATIONAL FOCAL POINT	
Full name of the institution	Government of Nepal Ministry of Forests and Soil Conservation
Name and title of contact person	Surya Prasad Joshi Chief, Environment Division Ministry of Forests and Soil Conservation
Mailing address	Government of Nepal Ministry of Forests and Soil Conservation Singha Durbar, Kathamndu, Nepal
Telephone	+977 1 4220 067 / 4224 892
Fax	+977 1 4223 868 / 4224 892
E-mail	mfsced@wlink.com.np
CONTACT OFFICER FOR NATIONAL REPORT (IF DIFFERENT FROM ABOVE)	
Full name of the institution	Government of Nepal Ministry of Forests and Soil Conservation
Name and title of contact person	Sudhir Kumar Koirala Environment Officer, Environment Division Ministry of Forests and Soil Conservation
Mailing address	Government of Nepal Ministry of Forests and Soil Conservation Singha Durbar, Kathmandu, Nepal
Telephone	+977 1 4220 067 / 4224 892
Fax	+977 1 4223 868 / 4224 892
E-mail	sudhirkoirala@yahoo.com; mfsced@wlink.com.np
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Signature of officer responsible for submitting national report	Surya Prasad Joshi 
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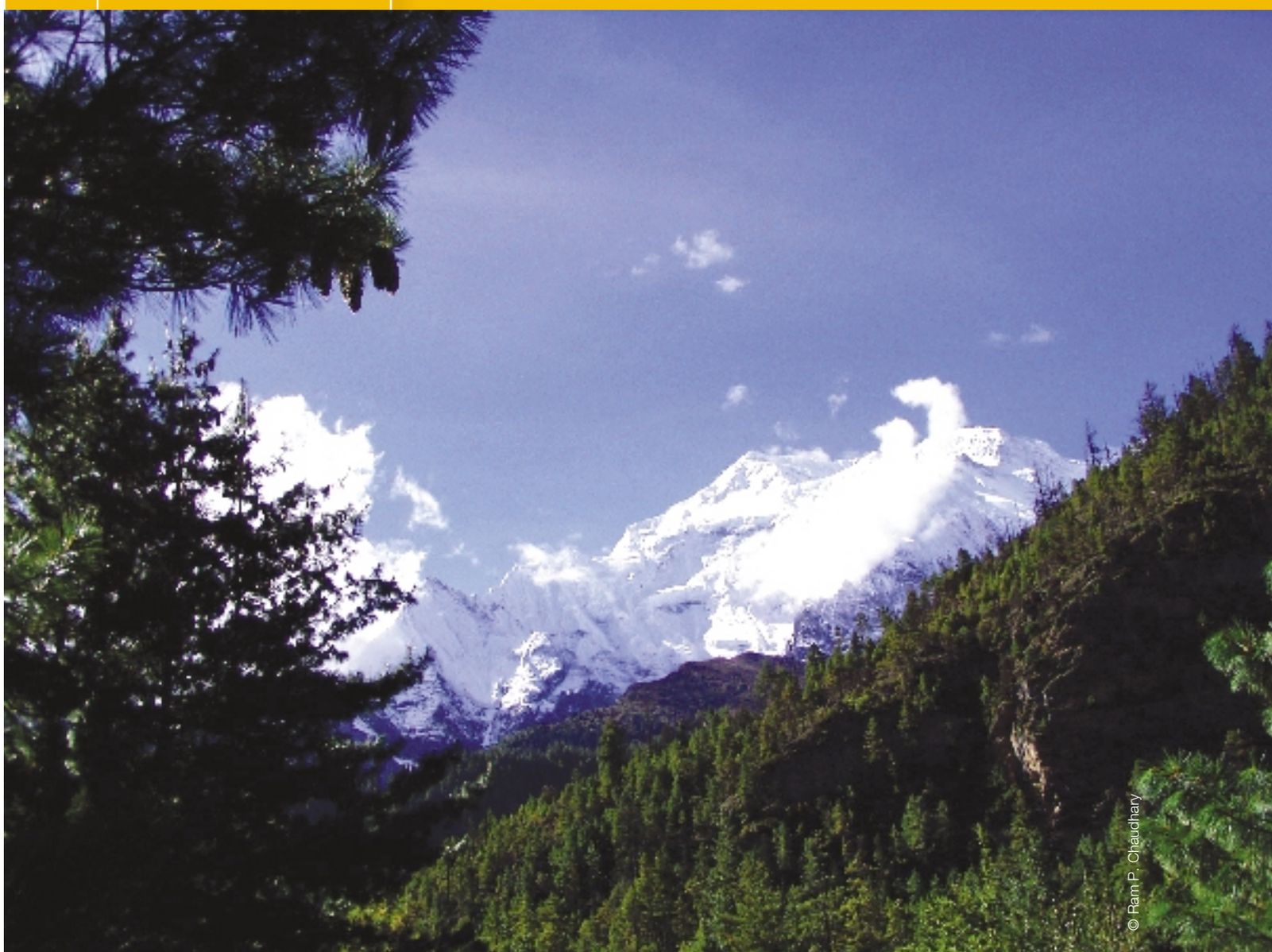
Chapter 1



Biodiversity Assessment: An Overview of Status, Trends and Threats

1. Biodiversity Assessment: An Overview of Status, Trends and Threats

Nepal has published a comprehensive Nepal Biodiversity Strategy (NBS) in 2002 which was developed with the participation of a broad cross-section of Nepali society as well as in consultation with international experts to fulfil the obligations of the Convention on Biological Diversity (CBD) to which Nepal is signatory. The Government of Nepal (GoN) carried out extensive consultations with different stakeholders and experts, and prioritised concept projects on biodiversity to implement for the period of 2006-2010 with the publication of the Nepal Biodiversity Strategy Implementation Plan (NBSIP) in 2006 (GoN/MFSC 2006). The NBSIP prioritised implementation projects comprise of a cross-sectoral and six sectoral thematic areas such as protected areas, forests, rangelands, agriculture, wetlands and mountains. Furthermore, the government, non-government, private and community organisations, indigenous communities, and the people of Nepal have made commitment to the protection and use of biological diversity and resources, on a sustainable basis, for the benefit of the Nepali society. The country has also embarked on assessments of biodiversity at different levels, and identification of threats to the ecosystem, indigenous fauna and flora, all of which have contributed to the preparation of the report.

Biodiversity supports Nepali society ecologically, economically, culturally and spiritually. Despite the importance of biodiversity, ecosystems are being reduced at an alarming rate due to the impacts of habitat destruction, growing human population, fire, climate change, etc.

The NBS and NBSIP have been developed as a guide to the implementation of the CBD in Nepal. All the strategic directions contained in the Strategy and Implementation Plan are relevant from national, regional and global perspectives. However, some essential changes would be required in the changing political scenario of Nepal. New federal structure will guide to set out new strategic directions, according to policies, plans, priorities and fiscal capabilities of the government, as well as define the roles and responsibilities of the communities in conservation, access and use of biodiversity.

Chapter 1 provides a general overview of Nepal's rich biological diversity, its status and trends, and threats in brief, rather than providing an exhaustive documentation of the status of the country's biological wealth. The general overview of biodiversity informs the people, the government and other stakeholders of Nepal, and the global community the status of the country's biological wealth. The chapter is structured as follows:

- Section 1.1 provides a brief introduction to physical and socio-economic setting of Nepal;
- Section 1.2 gives an overall snapshot of the status and trends of biodiversity in Nepal; and
- Section 1.3 introduces general threats to biodiversity in Nepal.

1.1 Physical and socio-economic setting

Location

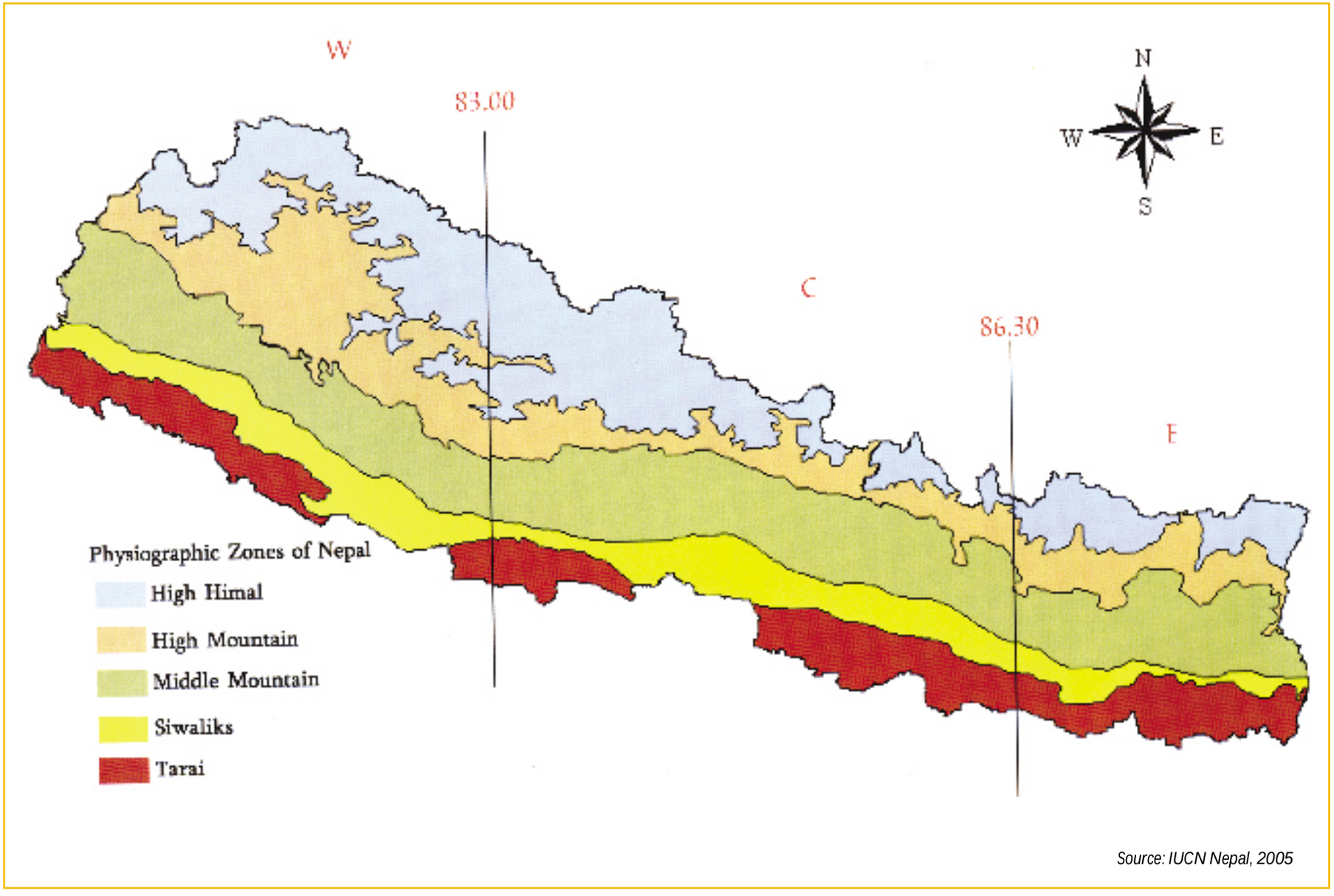
Nepal is situated on the southern slopes of the central Himalaya and occupies a total area of 147,181 km^2. The country is located between the latitudes 26° 22' and 30° 27'N and the longitudes 80° 40' and 88° 12'E. The average length of the country is 885 km from east to west and its width varies from 145 km to 241 km with a mean of 193 km north-south. About 86% of the total land area is covered by hills and high mountains, and the remaining 14% are the flat lands of the Tarai with less than 300m in elevation. Altitude varies from some 67m above sea level at Kechana Kalan, Jhapa, in the south-eastern Tarai to 8,848m at the peak of the world's highest mountain, Sagarmatha (Mount Everest).

Physiography

Nepal has a complex biogeography due to its past geological history and its presence of two biogeographic realms (Palaeoarctic and Indo-Malayan realms), and two major phytogeographical divisions: Holarctic in the north and Palaeotropic division in the south. Nepal's biodiversity is a reflection of its unique geographic position, wide altitudinal variations and diverse climatic conditions that result in five main physiographic zones from tropical to nival within a short horizontal span (LRMP 1986).

Nepal is physiographically categorised into five physiographic divisions which are, from south to north, the: (i) Tarai; (ii) Siwaliks; (iii) Middle mountains (Mahabharat Lekh); (iv) High mountains; and (v) High Himal (LRMP 1986) (Fig. 1.1).

Fig. 1.1: Map of Nepal showing physiographic zones with phytogeographic divisions



Source: IUCN Nepal, 2005

Nepal's lowland comprises of the Tarai (67-300m), Bhabar, and the Siwaliks (700-1,500m). The Middle Mountains (Mahabharat Lekh), also known as the Inner Himalayan range, falls between the Siwaliks in the south and the High Mountains in the north with an elevation ranging from 1,500m to 2,700m. The High Mountains lie north of the Middle Mountains and occupy densely populated cities, *viz*. Kathmandu, Pokhara, Trishuli and Banepa in the central region of the country with elevations ranging from 600m to 3,500m. In this region, forests have been severely degraded and soil erosion occurs at a higher rate. The High Himalaya lies to the north of the country, above 4,000m elevation and comprises subalpine and alpine zones where the lower parts have summer grazing pastures, and the upper parts have high altitude plants, with species adapted to extremes of cold and desiccation. Above 5,500m, the Himalayas are covered with perpetual snow and there is no vegetation, and above 6,000m, the region is considered as Arctic Desert or the Nival Zone. There are several Inner Himalayan valleys with dry condition such as the Upper Kaligandaki and Bheri Valleys located at an altitude above 3,600m. The Tibetan Marginal Mountain Range lies in the northern part of Dhaulagiri and Annapurna Himal (arid parts of Dolpa, Mustang and Manang districts), and the climate and vegetation are Tibetan in character representing mainly bushes (Table 1.1).

Climate

The average annual rainfall in Nepal is about 1,600mm with mean annual precipitation varying from more than 4,000mm along the southern slopes of the Annapurna Himalayan range to less than 250mm in the rain-shadow areas near Tibetan plateau. About 80% of rain falls between June to September in the form of summer monsoon. The eastern region is wetter than the western region. Most of the winter rainfall occurs during December to February. The temperature varies with topographic and orographic variations. The maximum recorded temperature during summer varies from 25°C to 46°C and the minimum temperature during winter varies from -26°C to nearly freezing point. Deforestation, industrialization and urbanization have influenced the rise in temperature in recent years. Aspect has an important influence on vegetation. In general, moisture is retained more on north and west faces, while south and east faces are drier due to their longer exposure to the sun. The soil is alluvial and fine to medium-textured in the Tarai, with sedimentary rocks and sandy texture in the Siwaliks; medium to light texture in the midhills, shallow, stony and of glacial type soil in the high mountains (HMGN/ADB/FINNIDA 1988).

River system

The major river systems are Mahakali, Karnali, Narayani and Koshi, and all of them originate in the Himalayas. The medium-sized rivers include the Babai, west Rapti, Bagmati, Kamla, Kankai and Mechi, and they generally originate in the midhills or in the Mahabharat range. The Tarai region has a large number of small and often seasonal rivers, most of which originate in the Siwaliks (HMGN/ADB/FINNIDA 1988).

Land use

The latest physiographic data indicates that Nepal comprises around 4.27 million ha (29% of total land area) of forest, 1.56 million ha (10.6%) of shrubland and degraded forest, 1.76 million ha (12%) of grassland, 3.09 million ha (21%) of farmland, 0.38 million ha (2.6%) water body, 1.03 million ha (7%) of uncultivated inclusions, and 2.61 million ha (17.8%) others (Fig.1.2).

Table 1.1: Physiographic zones of Nepal

Physiographic Zone	Surface Area (%)	Elevation (m)	Climate
Lowlands (Tarai)	14	below 500	Hot monsoon/Tropical
Lowlands (Siwaliks)	13	500-1,000	Hot monsoon/Subtropical
Middle Mountains (Mahabharat)	29	2,000-3,000 1,000-2,000	Higher: Cool temperate monsoon Lower: Warm temperate monsoon
High Mountains	20	4,000-5,000 3,000-4,000	Alpine Subalpine
High Himalaya	24	above 5,000	Tundra type, Arctic

Source: LRMP (1986)

Fig. 1.2: Land use distribution in Nepal

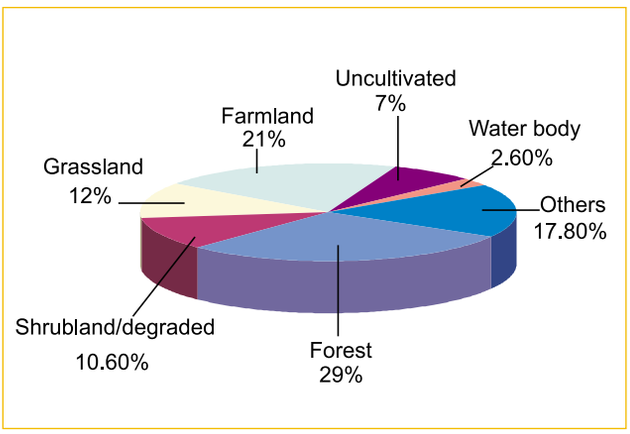
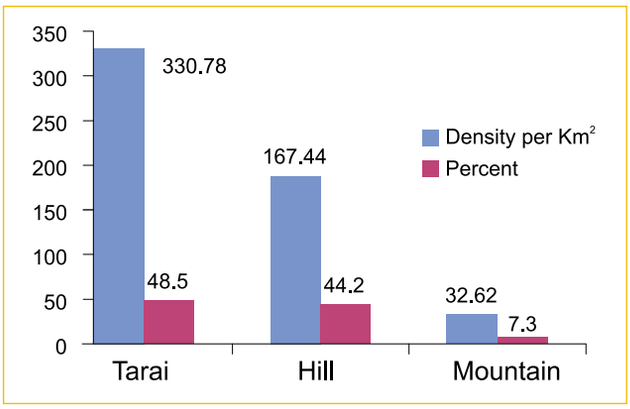


Fig. 1.3: Density (per/km^2) and population distribution (%) in different physiographic zones of Nepal



According to DFRS/HMGN (1999a & b), forest area has decreased at an annual rate of 1.7% from 1978/79 to 1994, whereas forest and shrub together has decreased at an annual rate of 0.51% in the entire country. The forest cover in the Tarai has decreased at an annual rate of 1.3% from 1978/79 to 1990/91. In the hills, the forest area has decreased at an annual rate of 2.3% from 1978/79 to 1994, whereas forest and shrub altogether have decreased at an annual rate of 0.2%. However, information on change in forest cover are conflicting and confusing. According to FAO (2005), deforestation rate increased in Nepal at an annual rate of 1.4% between 2000—2005 (cf Baral *et al*. 2008).

Administrative, socio-economic and socio-cultural setting

Administratively, Nepal has five development regions, 75 districts, 58 municipalities and 3,913 Village Development Committees (VDCs). The population was 9.4 million in 1961, which increased at the rate of 2.2% per annum and reached 23 million in 2001. The population in 2007 is estimated at 26 million; increasing from 23 million in 2001 (CBS 2001 and 2002) with an annual population growth of 2.25%. Distribution of population in geographic regions is uneven. About 48.5% of the population lives in the Tarai, 44.2% in the hills and 7.3% in the mountains. The average population density is 157.73/km^2, with the highest density (330.78/km^2) in the Tarai, medium in the hills (167.44/km^2) and lowest in the mountains (32.62/km^2) (Fig.1.3).

The per capita national income is US $ 320 in 2006 (World Bank 2008). Nepal is renowned for its socio-cultural diversity of 100 ethnicities (including 59 indigenous ethnic groups), and 92 languages. Nepal still remains one of the poorest countries in South Asia, although the country has witnessed progress in poverty reduction, from 42% in 1996 to 31% in 2004 (NPC 2005). The 2006 Human Development Index (HDI) value for Nepal based on 2004 data is 0.527 (UNDP 2005) (Table 1.2).

1.2 Status and trend: An overview

Biogeography

Nepal lies at a transition zone comprising six floristic regions: (i) Central Asiatic in the north; (ii) Sino-Japanese in the east; (iii) Southeast Asia-Malaysian in the south-east; (iv) Indian in the south; (v) Sudano-Zambian in the south-west; and (vi) Irano-Turanian in the west.

Table 1.2: Key socio-economic indicators

Indicator	Value	Year
Population size (million)	23 26	2001 2007
Population growth rate (%)	2.25	2001
Gross Domestic Product (GDP) per capita (US $)	320	2006
Human Development Index (value)	0.527	2005
Percentage of population below poverty line	31	2003-04

Table 1.3: Biome type in Nepal and their distribution in the region

Biome No.	Type	Distribution of Biome
Biome 5	Eurasian High Montane (Alpine and Tibetan)	Nepal, Bhutan, China, India, Mongolia, Myanmar, Pakistan, Russia
Biome 7	Sino-Himalayan Temperate Forest	Nepal, Bangladesh, Bhutan, China, India, Laos, Mongolia, Myanmar, Pakistan, Russia, Taiwan, Thailand, Vietnam
Biome 8	Sino-Himalayan Subtropical Forest	Nepal, Bangladesh, Bhutan, Cambodia, China, India, Laos, Myanmar, Pakistan, Philippines, Taiwan, Thailand, Vietnam
Biome 9	Indo-Chinese Tropical Moist Forest	Nepal, Bangladesh, Bhutan, Cambodia, China, India, Laos, Myanmar, Thailand, Vietnam
Biome 11	Indo-Malayan Tropical Dry Zone	Nepal, Bangladesh, Bhutan, Cambodia, China, India, Indonesia, Laos, Malaysia, Myanmar, Pakistan, Sri Lanka, Thailand, Vietnam
Biome 12	Indo-Gangetic Plain	Nepal, Bangladesh, Bhutan, Cambodia, China, India, Laos, Myanmar, Pakistan, Thailand, Vietnam

1.2.1 Hotspot, biome, ecoregion and vegetation types

Nepal is a part of the Himalaya biodiversity hotspot among four hotspots (Himalaya, Indo-Burma, Mountains of South-West China and Mountains of Central Asia) occurring in the region.

BirdLife International has identified Biomes across the world (Table 1.3). Although a small country, there are six biomes occurring in Nepal, and only two less than India (cf Baral and Inskipp 2005). However, different types of biomes are distributed across political boundaries.

Ecoregions. In terms of Global 200 ecoregions, Nepal hosts nine important ecoregions among 60 ecoregions found in the HKH region. Their distribution and conservation status are given in Table 1.4. Those ecoregions that occur in low and middle altitudes are relatively critical and endangered than those located at high altitudes above 3,000m. The ecoregions are also distributed across political boundaries.

Vegetation types

Schweinfurth (1957) developed the first vegetation map of the Himalayas which provided foundation for more detailed work in Nepal. Three landmark publications based on many years of fieldwork by two authors (Stainton 1972; and Dobremez 1972, 1976) and their team combined the climatic and phytogeographical regions of Nepal. These two systems of vegetation classification are widely used even today.

Stainton (1972) described the following climatic and vegetational divisions of Nepal:

i. Tarai [Terai], bhabar, dun valleys and outer foothills;
ii. Midlands and the southern slopes of the main Himalayan ranges (West midlands, Central midlands, East midlands and South of Annapurna and Himalchuli);
iii. Humla-Jumla area;
iv. Dry river valleys;
v. Inner valleys; and
vi. Arid zone.

The Biodiversity Profiles Project (BPP 1995) made a synthesis of vegetation types of Nepal into 118 ecosystems based on vegetation types described by Dobremez and his Nepali colleagues totaling 189 categories. An attempt was made to provide a simple form of classification for forest and vegetation of Nepal. During 1998-99, IUCN revised the country's vegetation types into 59 vegetation types, which was further reduced to 36 types to give a simplified ecological character of Nepal's vegetation on the ground of climax and near-climax vegetation type, and ecological homogeneity (TISC/NARMSAP 2002). This approach has been recommended for Tree Improvement and Silviculture Component (TISC).

On the ground of distribution of floristic elements, Stearn (1960) divided the country into three regions using the lines of longitudinal of 83^0 E and $86^03^{"}$E. The $83^{0"}$E line of longitude separating central and western Nepal marks a transition zone between comparatively warm, wet areas with eastern elements and cold, dry areas with

Table 1.4: Ecoregions: Distribution and conservation status in Nepal

Symbol	Ecoregion type	Distribution and Altitude (m)	Conservation Status
IM0115	Himalayan subtropical broad-leaved forest	Nepal, Bhutan, India (500-1,000)	Critical/Endangered
IM0301	Himalayan subtropical pine forest	Nepal, Bhutan, India, Pakistan (1,000-2,000)	Vulnerable
IM0401	Eastern Himalayan broad-leaved forest	Nepal, Bhutan, India (1,500-3,000)	Stable/Intact
IM0403	Western Himalayan broad-leaved forest	Nepal, India, Pakistan (1,500-3,000)	Critical/ Endangered
IM0501	Eastern Himalayan subalpine conifer forest	Nepal, Bhutan, India (3,000-4,000)	Vulnerable
IM0502	Western Himalayan subalpine conifer forest	Nepal, India, Pakistan (3,000-4,000)	Vulnerable
IM0701	Tarai-Duar savannah and grassland	Nepal, Bhutan, India (< 500)	Critical/Endangered
PA1003	Eastern Himalayan alpine shrub and meadows	Nepal, Bhutan, India, China, Myanmar (4,000-5,000)	Relatively stable/Intact
PA1021	Western Himalayan alpine shrub and meadows	Nepal, India (3,700-4,400)	Relatively stable/Intact
IM – Indo Malayan; PA – Palearctic			
Source: NGS and WWF 2001; Available at http://www.nationalgeographic.com/wildworld/			
Modified after TISC/NARMSAP 2002; Bhuju *et al.* 2007			

western elements. The same line divides arid areas on the northern side of the Great Himalaya around Dolpo and Mustang districts. Both districts have very similar flora, but Dolpo belongs to western Nepal and Mustang belongs to central Nepal (Yoshida 2006).

1.2.2 Ecosystem, habitat diversity and management practices

a. Forest types and their management

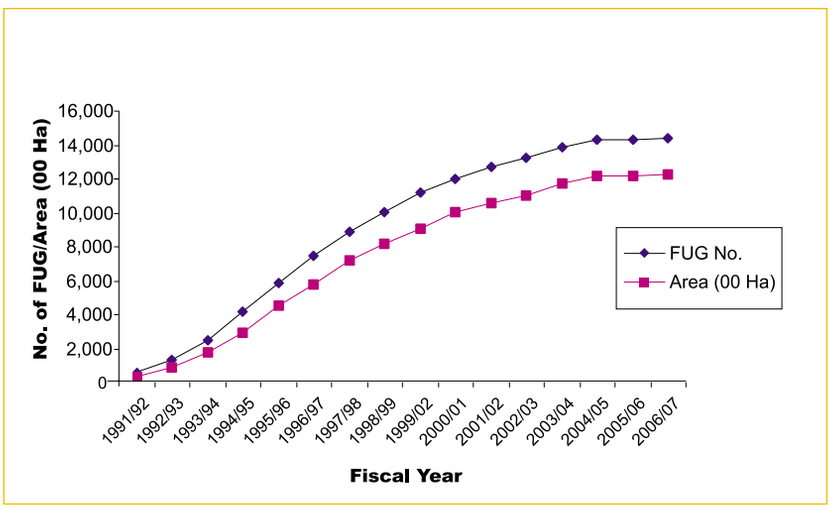
As much as 35 forest types have been classified on the basis of the levels of altitude, and with different types

Table 1.5: Major groups and forest types in Nepal (after Stainton 1972)

Major groups	Forest types
Tropical and Subtropical	Sal forest, Tropical deciduous riverine forest, Tropical evergreen forest, Subtropical evergreen forest, *Terminalia* forest, *Dalbergia sissoo-Acacia catechu* forest, Subtropical deciduous hill forest, *Schima-Castanopsis* forest, Subtropical semi-evergreen hill forest, *Pinus roxburghi*i forest
Temperate and Alpine Broad-leaved	*Quercus leucotrichophora-Quercus lanata* forest, *Quercus floribunda* forest, *Quercus semecarpifolia* forest, *Castanopsis tribuloides-Castanopsis hystrix* forest, *Quercus glauca* forest, *Lithocarpus pachyphylla* forest, *Aesculus-Juglans-Acer* forest, Lower temperate mixed broad-leaved forest, Upper temperate mixed broad-leaved forest, *Rhododendron* forest, *Betula utilis* forest
Temperate and Alpine Conifer	*Abies spectabilis* forest, *Tsuga dumosa* forest, *Pinus wallichiana* forest, *Picea smithiana* forest, *Abies pindrow* forest, *Cedrus deodara* forest, *Cupressus torulosa* forest, *Larix* forest
Minor Temperate and Alpine associations	*Alnus* woods, *Populus ciliata* woods, *Hippophae* scrub, Moist alpine scrub, Dry alpine scrub, *Juniperus wallichiana* forest

of climate by Stainton (1972). These forest types are categorised into ten major groups: (i) tropical forest; (ii) subtropical broad-leaved forest; (iii) subtropical conifer forest; (iv) lower temperate broad-leaved forest; (v) lower temperate mixed broad-leaved forest; (vi) upper temperate broad-leaved forest; (vii) upper temperate mixed broad-leaved forest; (viii) temperate coniferous forest; (ix) subalpine forest; and (x) alpine scrub. Major forest types within these groups are listed in Table 1.5.

Fig. 1.4: Community forest areas handed over to the communities



a.1 Community forest. The community forests are national forests handed over to a Forest User Group (FUG) for development, conservation and utilisation for the collective benefit of the community. Approximately, 3.56 million ha of forests have been estimated potential for community forest in Nepal (Tamrakar and Nelson 1991). The government's policy is to adopt community forestry for all successive midhills and high mountain forest, as well as in some Tarai districts.

Expansion trends of community forest area. The latest figure shows that approximately 1.23 million ha (34.6% of the potential community forest area) of forests are handed over to 14,431 FUGs benefiting 1.66 million households (about 40% of Nepal's total HH) by the end of October 2008. Of these, 520 women's Forest User Groups manage about 23,258 ha of community forests. A total of 34,359 ha forests were handed over to the communities before 1992; the area increased to 1.02 million ha between 1992-2002; and to 1.23 million ha between 2002-2008. The trend to hand over the national forests to the communities shows that the community forests were handed over at a high rate (2882%) in one decade during 1992-2002, whereas the trend has been rather slow (20%) during 2002-2008 (Fig. 1.4). One of the reasons for the slow handing over process can be assumed due to conflict in the country. The trend of community forest handing over is higher in the hills than the Tarai.

Issues: Although forest areas handed over to the community FUGs have been considerably increased in both number and area, there exists limited information on biodiversity conservation in terms of species richness, taxic diversity and crown coverage due to the lack of an in-depth study. Emphasis on forest protection has led to many poor people, including distant, seasonal and indigenous ethnic users, being cut-off from their sources of livelihoods (Winrock International 2002). In high mountains, livelihoods of some livestock herders have been affected as the forests [and grasslands] traditionally relied on for seasonal feed have been closed to grazing. Ethnic groups in the Tarai have been traditionally dependent on forests for their livelihoods but are mostly absent from Tarai forest user groups, which are primarily dominated by migrants from the hills (UNCT 2007). Recently, there has been effort to understand the appropriateness of biodiversity conservation by incorporating the issues of conservation in their operational plans. For example, Tappujaruwa Community Forest covering 47 ha forest in Ilam district has prepared an operational plan in 2008 and incorporated biodiversity conservation and sustainable use into their management plan. However, monitoring of biodiversity has not been undertaken at regular intervals in the community forests of Nepal.

a.2 Leasehold forest. National forests are leased to any institution for the production of forest products, agroforestry, tourism or farming of insects and wildlife to the conservation and development of forests. The leasehold forestry has been implemented in 28 districts in Nepal. By the end of October 2008, 17,320 ha of national forests have been leased to 3,417 user groups involving about 29,892 households.

Issues: While the community forest is spreading fast, there has been delay in the preparation and implementation of operational forest management plans of leasehold forests. The leasehold forestry programme gives emphasis on multiple use and sustained harvest of forest products. However, biodiversity conservation has received little priority.

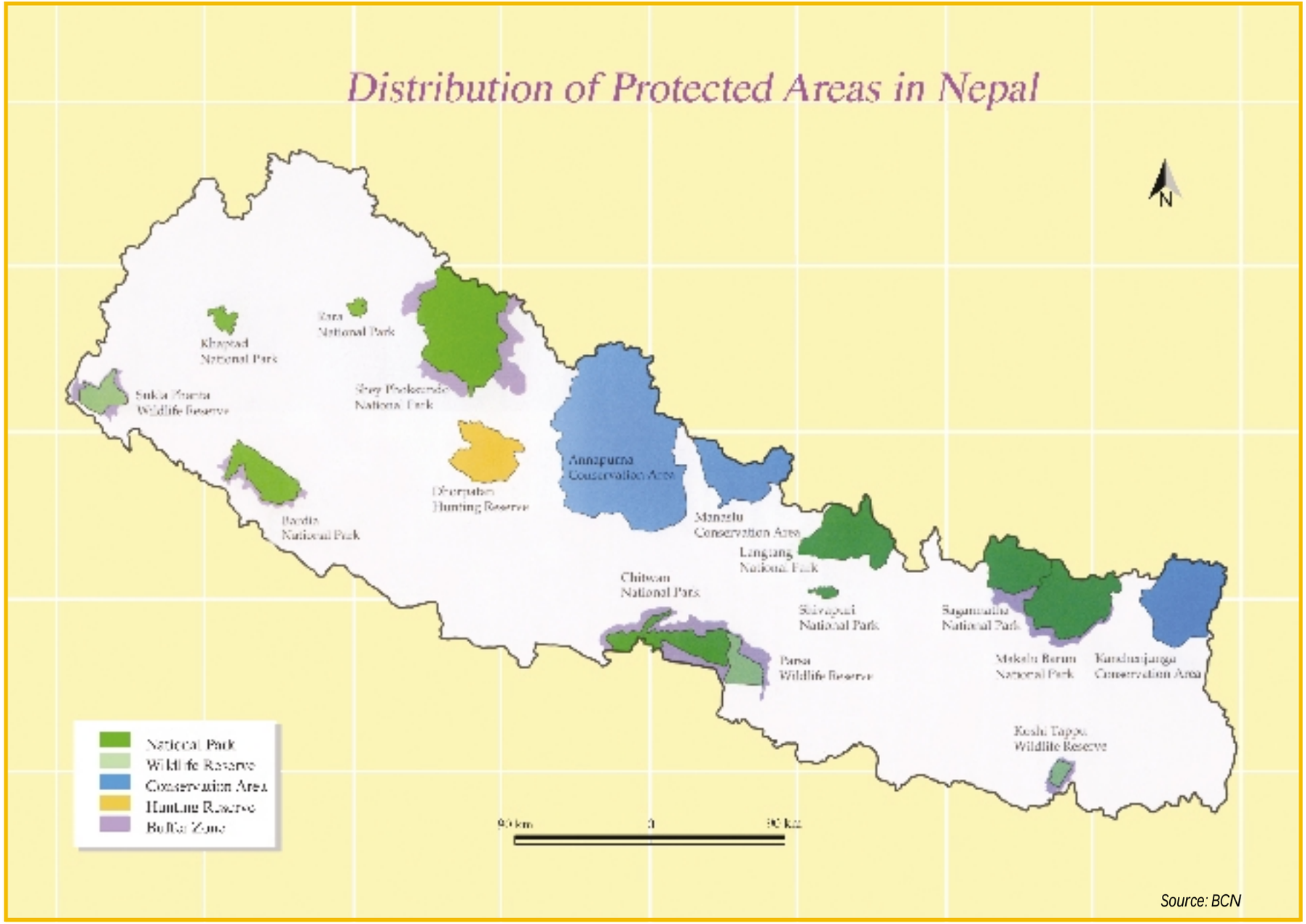

Distribution of Protected Areas in Nepal
N
Khaptad
National Park
Rara
National Park
Shey Phoksundo
National Park
Annapurna
Conservation Area
Manaslu
Conservation Area
Langtang
National Park
Chitwan
National Park
Parsa
Wildlife Reserve
Makalu Barun
National Park
Kanchanjanga
Conservation Area
Kosh Tappu
Wildlife Reserve
National Park
Wildlife Reserve
Conservation Area
Hunting Reserve
Buffer Zone
Source: BCN

Fig. 1.5: Categories of protected areas in Nepal

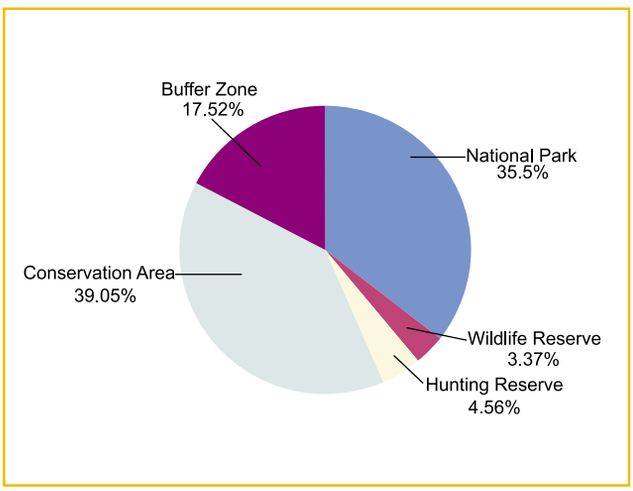
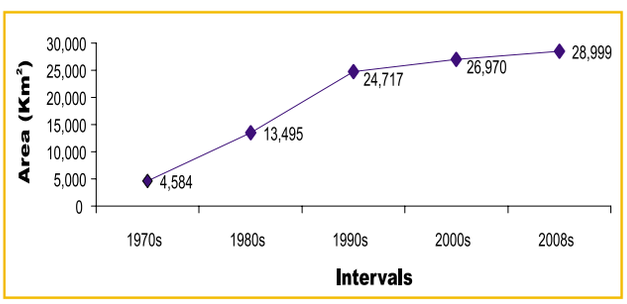


Fig. 1.6: Expansion of protected areas of Nepal



b. Protected areas. Protected Areas (PAs), initially developed in Nepal for the protection of wildlife, especially endangered biological resources, include the preservation of natural, historic, scenic, cultural and wildlife values also. So far, 16 protected areas have been declared in the country covering an area of 28,999 km^2, *i.e*. 19.7% of the total area of Nepal, and are established in three different ecological zones—lowland (Tarai), midhills and high mountains (Fig. 1.7). They belong to different categories, comprising a total of 9 national parks (35.5% of the total protected areas), 3 wildlife reserves (3.37%), 3 conservation areas (39.05%), 1 hunting reserve (4.56%), and 11 buffer zones (17.52%) around the PAs (Fig. 1.5; Table appendix 3.1).

Expansion trends of PAs: An effective PA management programme was started in 1970. Six PAs were established in 1970s covering a total of 4,584 sq km which increased to 13,495 sq km in the first decade (at the rate of 194.4% per decade) in 1980s; to 24,717 sq km in the second decade (@ 83.2% per decade) in 1990s; to 26,970 sq. km in the third decade (@9.1% per decade) in 2000s; and to 28,999 sq km (@ 7.5% per decade) between 2001-2008 (Fig. 1.6).

Issues: Ecosystem representation in PAs. Out of 118 ecosystems identified by Dobremez (1970) in different physiographic zones of Nepal, 80 ecosystems are represented within the present protected area system (Table 1.6).

The distribution of PAs in Nepal shows that highlands in general are well represented in terms of coverage whereas eastern midhills and Tarai are less represented under protected area system (Table 1.7).

c. Rangelands. Rangelands in Nepal comprise grasslands, pastures, scrubland and are distributed from tropical savannah to temperate grasslands, subalpine and alpine meadows. Nepal's total grassland areas are estimated to cover about 1.75 million ha, nearly 12% of the country's total area. The rangelands supply forage or vegetation for grazing or browsing livestock. About 70% rangelands are situated in Western and Mid-western regions. Distribution of rangelands is higher in the High Himalaya and High Mountains (Fig. 1.8). The transformation of traditional pastoral production systems and a general dessication of alpine rangelands due to climatic changes are considered to be modifying the vegetation composition and reducing plant productivity (Miller 1993).

Nepal's rangelands have high biodiversity. They provide habitat for various flowering plants (see HMGN/MFSC 2002 for details of plant species found in the rangelands of Nepal), and for wildlife, including blackbuck, swamp deer, rhinoceros, hog deer, chital, gaur and sambhar in tropical and subtropical grasslands, musk deer and ghoral in subalpine and alpine grasslands. Nepal's high altitude rangelands are home to unique assemblages of flora and fauna (Yonzon and Heinen 1997), including endemic species. Endangered wildlife species include snow leopard, Tibetan wolf, Tibetan argali, lynx, brown bear, Tibetan wild ass and wild yak. Although only 9

Table 1.6: Ecosystem identified by Dobremez (1970) and their representation in protected areas

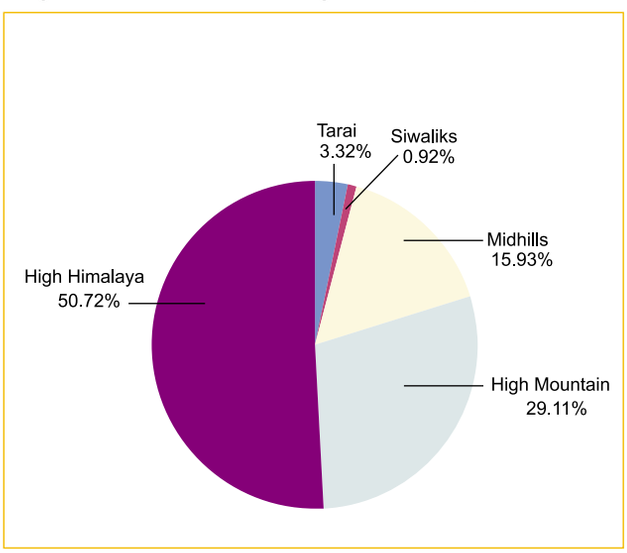
Physiographic zone	Total number of ecosystems	Number in protected areas
Tarai	10	10
Siwaliks	13	5
Midhills	52	33
Highlands	38	30
Other	5	2
Total	118	80

Source: Modified from BPP (1995) by Maskey (1996)

Table 1.7: Protected sites in the altitudinal and phytogeographic regions

Highlands–West	Highlands–Centre	Highlands–East
• Shey-Phoksundo NP	• Annapurna CA	• Sagarmatha NP
	• Manaslu CA	• Makalu Barun NP
	• Langtang NP	• Kanchenjunga CA
Mid Hills–West	**Mid Hills–Centre**	**Mid Hills–East**
• Khaptad NP	• Shivapuri NP	
• Rara NP		
• Dhorpatan HR		
Tarai and Siwaliks–West	**Tarai and Siwaliks–Centre**	**Tarai and Siwaliks–East**
• Bardia NP	• Chitwan NP	• Koshi Tappu WR
• Suklaphanta WR	• Parsa WR	

Fig. 1.8: Distribution of rangelands in Nepal



species of birds are restricted to alpine rangelands, of these, 5 species are of international significance, *viz*. Imperial eagle, Pallas fish eagle, Hodgson's bushchat, lesser kestrel and Kashmir flycatcher (Inskipp 1989). In addition, these grasslands also sustain domestic livestock, which are another important biological resource and source of livelihoods.

Issues. The rangeland ecosystems are under high grazing pressure that deplete palatable species, especially legume components. Most rangeland ecosystems located in arid regions and high mountain pastures are relatively susceptible to degradation because they are less resilient in response to disruption than subtropical ecosystems. Moderately degraded rangeland can usually be restored over time through integrated management systems. Over-grazing can also cause changes in faunal diversity. Birds on grazed grasslands are largely seed eaters, while those on ungrazed grasslands are insectivores as the loss of grass cover reduces insect population (HMGN/MFSC 2002).

d. Wetlands. Nepal has many types of wetlands with an estimated 382,700 ha in total (about 2.6% of the country's area). Wetlands range from areas of permanently flowing rivers to areas of seasonal streams, lowland oxbow lakes, high altitude glacial lakes, swamp and marshes, paddy fields, reservoirs and ponds. Wetlands in Nepal are rich in biodiversity supporting habitat for large population of water birds, 172 species of major wetland plants, including threatened plant and animal species (see HMGN/MFSC 2002 for details).

Wetlands of International Importance. Nepal signed the Ramsar Convention on December 17, 1987, by designating Koshi Tappu Wildlife Reserve in the Ramsar list. The Ramsar Convention came into force for Nepal on April 17, 1988, as the 44th contracting party. As of now, 159 countries have joined the Convention as contracting parties. The Department of National Parks and Wildlife Conservation is the national focal point and the administrative authority in Nepal.

Wetland sites of international importance show wide disparity in the distribution of altitudinal zones. So far, a total of 34,455 ha has been designated as the Ramsar sites. An increasing trend has been observed in the designation of wetlands under Ramsar site (Fig. 1.9). Approximately, 68.2% (23,488 ha) wetland sites are located in the Tarai followed by 31.6% (10,877 ha) in the High Himalaya; whereas Midhills remain poorly represented, less than 1% (90 ha) (Fig. 1.10 and Table 1.8). The government has been working to include wetlands of international importance in Nepal, particularly from midhills and High Himalaya (for example wetlands in Khaptad NP shall be proposed next).

Fig. 1.9: Wetland areas—Trend in designation of Ramsar Sites in Nepal

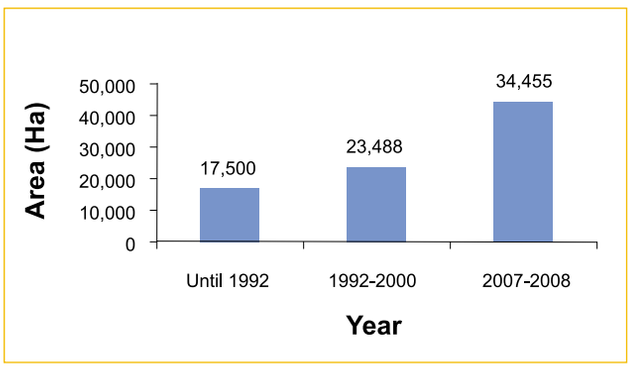
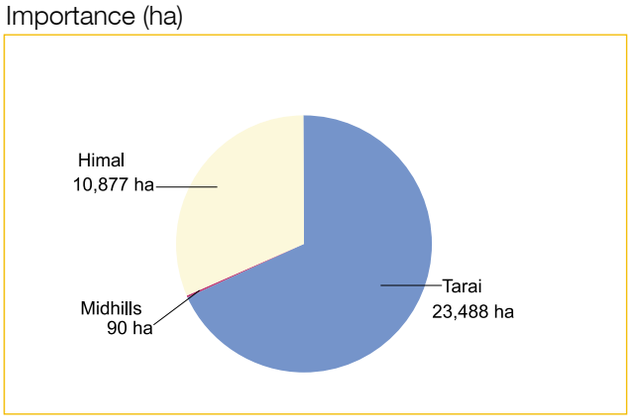


Fig. 1.10: Distribution of wetlands of International Importance (ha)



Issues. Wetland ecosystem is under increasing threat from encroachment of wetland habitats, unsustainable harvest of wetland resources (over-fishing and indiscriminate use of poison and dynamite in fishing), industrial pollution, agricultural run-off, siltation and the introduction of exotic and invasive species into wetland ecosystems. Poaching is a major threat to gharial found in the Kali Gandaki river and major tributaries of the Narayani river. These encroachments have posed serious threats to the production of species.

Empirical evidence collected from a rapid reconnaissance survey of 163 wetland sites and their resources revealed that wetlands of the Tarai are vulnerable to many threats, including the proliferation of exotic species such as *Eichhornia crassipes* (water hyacinth). Wetlands in hills and mountains are threatened by siltation. About 66% of these wetlands are exposed to siltation problems, whereas 62% show problems stemming from agricultural run-off (IUCN Nepal 1996). Species diversity in the Bagmati river has declined from 54 species to 7 species within a decade as a result of the inflow of industrial sewage. High concentration of organic matter and chemicals in the effluent has destroyed fish diversity and their habitats. (Shrestha *et al*. 1979).

e. Agriculture. About 21% (3.1 million ha) of the total land area of Nepal is used for cultivation. Principal crops grown are rice (45%), maize (20%), wheat (18%), millet (5%) and potatoes (3%), followed by sugarcane, jute, cotton, tea, barley, legumes, vegetables and fruits. They belong to 172 families, 294 genera and 551 species/subspecies of agricultural crops that are grown in the Himalayas (HMGN/MFSC 2002). Crops such as rice, rice bean, egg plant, buckwheat, soybean, foxtail millet, citrus and mango have high genetic diversity compared to other food crops. Crop species in Nepal owe their variability to the presence of about 120 wild relatives of the commonly cultivated food plants and their proximity to cultivated areas that have listed 60 food species (fruit, vegetables, legumes) and 54 wild relatives of food plants (NARC/MoAC 2008, Draft).

There is a great diversity of indigenous livestock breeds in Nepal. Altogether, 24 breeds of cattle, buffalo, sheep, goat, pig and poultry are recognised in Nepal. Among known breeds, *Siri* cattle have become extinct in Nepal and crossbreeds of *Siri* cattle are only seen in small

Table 1.8: Wetlands of international importance in phytogeographic regions

Highlands–West	Highlands–Centre	Highlands–East
• Phoksundo Lake (494 ha)	• Gosainkunda and Associated Lakes (1,030 ha)	• Gokyo and Associated Lakes (7,770 ha)
• Rara Lake (1,583 ha)		
Midhills–West	**Midhills–Centre**	**Midhills–East**
		• Maipokhari (98 ha)
Tarai and Siwaliks–West	**Tarai and Siwaliks–Centre**	**Tarai and Siwaliks–East**
• Ghodaghodi Lake (2,563 ha)	• Beeshazari and Associated Lakes (3,200 ha)	• Koshi Tappu (17,500 ha)
• Jagdishpur Reservoir (225 ha)		

numbers. *Lulu* and *Acchame* cattle are on the verge of extinction, *Lime* buffalo have become endangered, *Lampuchhre* and *Kage* sheep are at risk, *Bampudke* pig is on the verge of extinction while *Chwanche* and *Hurrah* pigs are only seen in small numbers, and wild yak population is also decreasing (HMGN/MFSC 2002, NARC/MoAC 2008 Draft).

Issues. The agrobiodiversity of Nepal is in a state of depletion which is primarily due to over-grazing, land fragmentation, commercialization of agriculture and the extension of modern high-yielding varieties, indiscriminate use of pesticides, population growth and urbanization, changes in farmers' priorities, and lack of awareness about the importance of agrobiodiversity.

f. Mountain. The mountain agenda ratified during the 1992 UN Conference on Environment and Development (UNCED) has brought international interest in conserving mountain ecosystems. COP 7 in 2004 (Decision 27) also adopted the programme of work on mountain biological diversity. The overall purpose of the programme is the significant reduction of mountain biological diversity loss by 2010 at global, regional and national levels.

Biodiversity in Nepal varies with physiographic zone, and represents high number of floral and faunal groups. The number of species decreases with altitude, but large number of endemic species occur in high (subalpine and alpine) Nepal Himalayas.

Issues. Economic marginalization (poverty), ecological fragility and instability of high mountain environments, deforestation, poor management of natural resources, and inappropriate farming practices are the primary threats to mountain biodiversity. The cumulative impacts of these threats result in accelerated soil erosion, catchment degradation and loss of biodiversity on site (Jha 2005).

g. Priority habitat. This includes: (i) Important Bird Areas (IBAs); and (ii) Important Plant Areas (IPAs).

g.1 Important Bird Areas. Bird species diversity in Nepal is richest in Asia, particularly considering the small size of the country. In total, 863 species of birds have been recorded so far, including nearly 600 breeding species and 31 globally threatened species. As many as 72 bird species are thought to be critically threatened or endangered. Given the small size of the country, there are 27 IBAs (covering about 18% of the country's land) in Nepal hosting richest bird species in Asia. Habitat loss and its degradation, wetland degradation, poisoning by diclofenac and pesticide, hunting and trapping, invasive alien species, climate change, etc. are major threats to the very survival of birds. Of these, 24 IBAs support globally threatened species, 13 have restricted-range species, 24 have biome-restricted species, and 8 qualify as IBAs because they hold large population of water birds (Baral and Inskipp 2005) (Fig. 1.13). Habitat loss and damage is the major threat to the birds at risk. Other threats include wetland degradation, poisoning by diclofenac and pesticide, hunting and trapping, invasive alien species and climate change.

Fig. 1.11: Population of Gull-billed Tern at Koshi

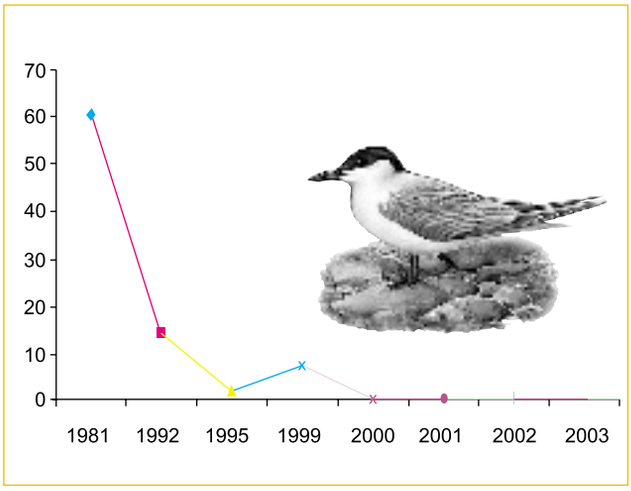
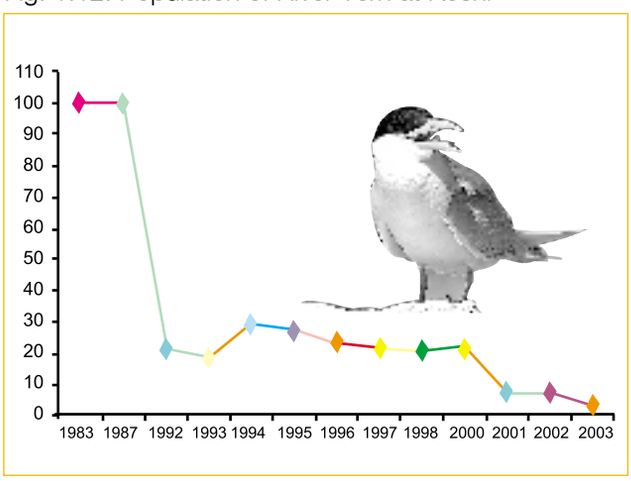


Fig. 1.12: Population of River Tern at Koshi



Population study of some of the threatened bird species has been monitored in different parts of Nepal. A study on bird species at Koshi barrage has been undertaken at regular intervals after 1990s. Among many nationally threatened species, the population of Gull-billed Tern (*Gelochelidon nilotica*) and River Tern (*Sterna aurantia*) has been found declining in Koshi barrage as shown in Fig. 1.11 and 1.12 (See Baral and Inskipp 2004 for details).

Fig. 1.13: Important Bird Areas (Baral and Inskipp 2005)

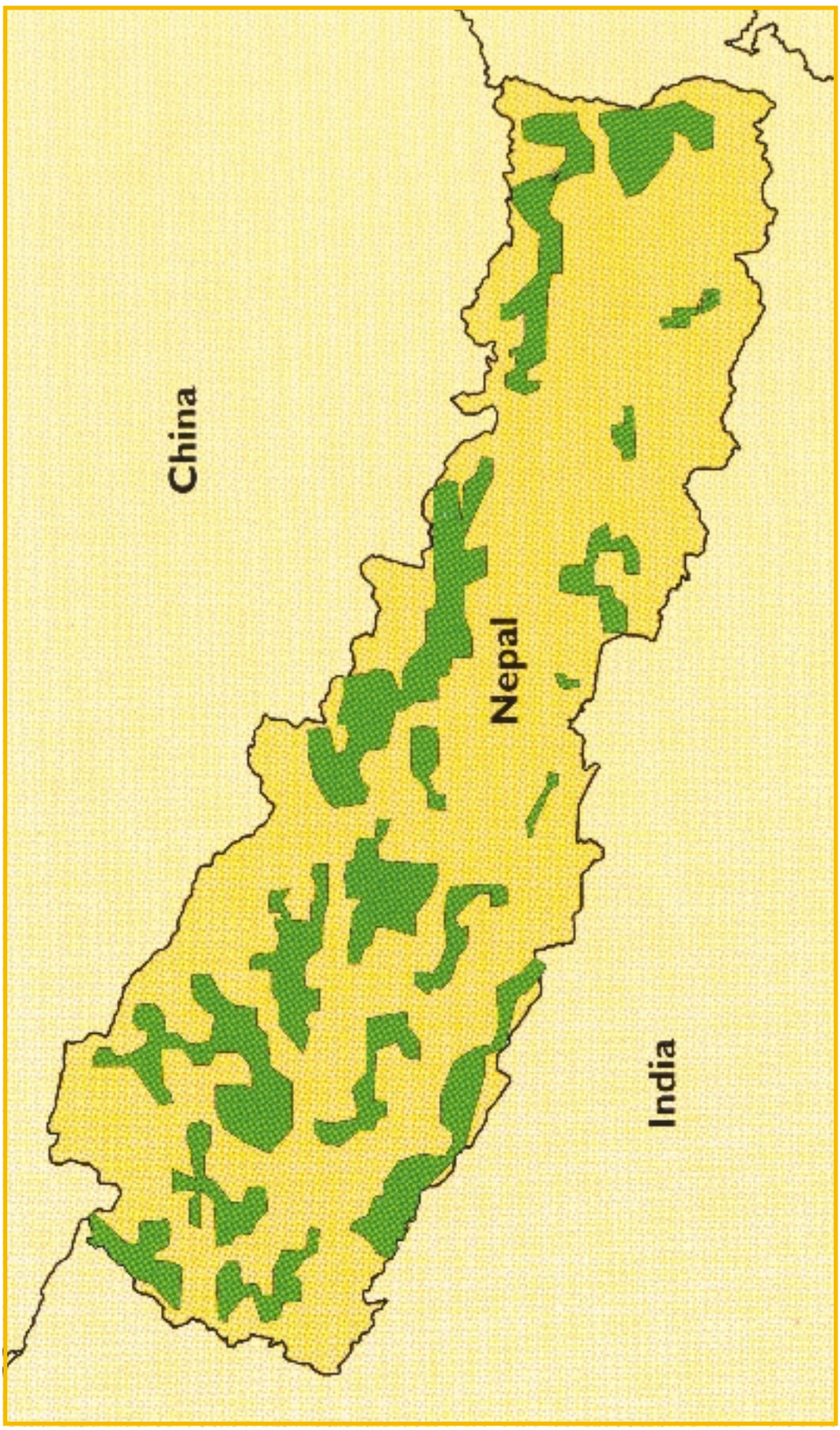


Fig. 1.14: Important Plant Areas (Hamilton and Radford 2007)

Box 1.1: Status of Cheer pheasant *(Catreus wallichi)* in Nepal

The cheer occurs in sparsely wooded grassland and open scrub, at c. 1,200-3,250m on precipitous slopes in the Himalayan foothills between north-east Pakistan and west-central Nepal, the Kali-Gandaki Valley. Studies have shown that the population of cheer in the upper Dhorpatan Valley has remained unchanged since 1981, and is estimated to be 100-200 breeding territories, making this one of the largest known population of cheer in the world. The other areas include Baglung, Myagdi, lower Kali-Gandaki and Rara lake. The status of cheer in Nepal is still poorly known, especially outside protected areas.

Source: Recommendations arising from Cheer Pheasant Conservation Workshop, Kathmandu, 3-8 April, 2006 (BCN 2006a) – a brochure

There exists some promising examples of maintaining population of threatened bird species in wild. One of them is Cheer pheasant (*Catreus wallichi)* which is listed as vulnerable in IUCN Red List (2005) of organisms threatened with extinction, in Appendix I of CITES (2006), and under protected species of Nepal's National Parks and Wildlife Conservation Act, 1973 (Box 1.1).

g.2 Important Plant Areas (IPAs) for Medicinal Plants and Non-Timber Forest Products (NTFPs)

Estimates for the number of medicinal plant species in Nepal range from 593 (DPR 2005) to 1,700 species (Baral and Kurmi 2006). On the basis of the available information, a total of 54 Important Plant Areas (IPAs) complex for medicinal plants have been provisionally identified which comprise altogether 230 IPAs or rich diversity of the priority medicinal plants (Fig. 1.14) (Hamilton and Radford 2007).

Non-Timber Forest Products (NTFPs)

The NTFPs are defined as all kinds of goods derived from forests, of both plant and animal origin, other than timber and phalloid. A narrower definition of NTFPs appropriate for Nepal includes all biological materials, other than timber, fodder and phalloid (Hammett 1993). Medicinal, aromatic plants and other minor forest products are among six primary programmes formulated in the Master Plan for Forestry Sector, Nepal (HMGN/ADB/FINNIDA 1988).

A large proportion of rural population depend on NTFPs for livelihoods such as food, nutrition, medicine, fodder, fibre, condiment, dye and other useful materials. In the mountains of Nepal, 10-100% of households are involved in the collection of medicinal plants and other NTFPs; and in certain rural areas this contributes up to 50% of the family income (Edwards 1996; Olsen and Larsen 2003).

The diversity of NTFPs in Nepal is very high. According to an estimate, over 2000 species of plants are considered to be potentially useful, including medicinal and food plants. They also vary in distribution, from low-lying forests (less than 100m) to high alpine, and trans-Himalaya (above 5,500m). Analysis of distribution pattern of medicinal plant species along altitudinal gradient in Nepal Himalaya shows that the lower subtropical level harbour proportionally maximum number of species, with a peak in richness of medicinal plant species at 1,200m (Ghimire *et al*. 2008). Despite lower medicinal plant species richness, subalpine (3,000-4,000m) and alpine (4,000-4,500m) levels provide important habitats supporting diversity of plant species that have high reputation in regional and international trade (Lama *et al*. 2001).

It has been estimated that the forestry sector in Nepal contributes about 15% of the national GDP, of which about 5% is contributed by NTFPs. The volume of trade of NTFPs from Nepal Himalaya is not clearly known, and is estimated between 10-15 thousand tons of raw NTFPs annually. Annual export of NTFPs from Nepal is estimated worth US $ 8.6 million by Edwards (1996); US $ 16 million in 1997-1998 by Olsen (2005), NRs. 2.5 billion (US $ over 35 million) by Subedi (2006).

An increasing harvesting trend has given rise to greater pressure for long time on selected species since almost all medicinal plants and NTFPs in trade are harvested from wild population. The most common NTFPs that were traded on a large scale (over 100t in a year) during 1990s included Pine resin *(khoto)*, *Sal* seed, *Kutch*, *Ritha*, *Timur*, *Dalchini* and *Tejpat*, *Sabai* grass or *Babiyo*, *Lokta*, *Satawari* or *Kurilo*, *Chirayito*, *Jatamansi*, *Padamchal* and *Sugandhkokila* (Malla *et al*. 1994). In 2007-2008 (2063-2064 B.S.), major 10 NTFPs traded in large quantity included *Ritha* (861t), *Timur* (461t), *Pakhanveda* (193t), *Kaulo* bark (182t), *Pawan* bark (177t), *Jhyayoo* (168t), *Amala* (52t), *Tejpat* (51t), *Chiraito* (50t), and *Majitho* (44t) (DoF/MFSC 2008).

Issues. Major conservation issue is over-harvesting (premature and unsustainable harvesting) due to illegal trade pressure (which is often undeclared), habitat destruction, livestock grazing, forest fire, etc. It is widely believed that the harvesting of NTFPs is no longer sustainable in many areas. Sustainable management of NTFPs is important because of their value as a perennial source of subsistence income to society, and as a means of conserving biodiversity. More attention, however, needs to be paid to the biological, socio-economic and conservation aspects of NTFP management (Chaudhary 1998; 2000).

1.2.3 Species diversity

Species richness among floral diversity comprises Lichens 465 species (2.3% of the global diversity), Fungi 1,822 species (2.4%), Algae 687 species (2.6%), Bryophytes 853 species (5.1%), Pteridophytes 534 species (4.7%), Gymnosperms 28 species (5.1%), and Angiosperms 5,856 species (2.7%). Faunal diversity includes Platyhelminthes 168 species (1.4%), Spiders 144 species (0.2%), Insects 5,052 species (0.7%), Butterflies 640 species and Moths 2,253 species (together 2.6%), Fishes 182 species (1.0%), Amphibians 77 species (1.84%), Reptiles 118 species (1.87%), Birds 863 species (9.53%), and Mammals 181 species (4.5%) (Table 1.9).

Taxonomic research has been undertaken in Nepal to update the number of taxa (species and subspecies levels mainly) with focus on some selected groups. For example, the number of Bryophytes has been increased to 1,150 species (Pradhan and Joshi 2007 & personal comm. 2008); Angiosperms 6,391 species (including subspecies levels), spiders 175 species and butterflies 785 species/subspecies (compiled by Bhuju *et al*. 2007), fishes 187 species (compiled by Bhuju *et al*. 2007), and mammals 208 species (Baral and Shah 2008). A preliminary study

Table 1.9: An overview of species richness in Nepal

Group of Organisms	Species Number		Reference	Nepal Representation (%)
	Globally[1]	Nepal (known so far)		
Bacteria	3,000-4,000	NA		
Lichens	20,000	465	Sharma 1995	2.3
Fungi	69,000	1,822	Adhikari 1999	2.4
Algae	26,000-40,000	687	Baral 1995	2.6
Bryophytes	16,600	853	Compiled from Kattel and Adhikari, 1992; Mizutani *et al*., 1995; Furuki and Higuchi 1995	5.1
Pteridophytes	11,300	534	DPR 2002	4.7
Gymnosperms	529	27	Koba *et al*. 1994	5.1
Angiosperms	220,000	5,856	Press *et al*. 2000	2.7
Platyhelminthes	12,200	168	Gupta 1997	1.4
Spiders	73,400	144	Thapa 1995	0.2
Insects	751,000	5,052	Thapa 1997	0.7
Butterflies and Moths	112,000	640 2,253	Smith 1994; Bhuju *et al*. 2007	2.6
Fishes	18,150	182	Shrestha 2001	1.0
Amphibians	4,184	77	Shah 1995	1.84
Reptiles	6,300	118	Shah and Tiwari 2004	1.87
Birds	9,040	863	Baral and Inskipp 2009	9.53
Mammals	4,000	181	Suwal and Verheugt 1995	4.52

Source: Wilson (1988, 1992) and WCMC (1992); HMGN/MFSC 2002; NA = Not Available

Table 1.10: Number of wild species of flora and fauna occurring in each physiographic zone

Group	Tarai and Siwaliks (< 1,000m)	Midhills (1,000-3,000m)	Highlands (>3,000m)
Plantae			
Bryophytes	61 (8.40%)	493 (66.32%)	347 (46.89%)
Pteridophytes	81 (21.32%)	272 (71.58%)	78 (20.53%)
Gymnosperms	-	16 (84.20%)	10 (52.63%)
Angiosperms	1,885 (36.53%)	3,364 (65.19%)	>2000 (38.70%)
Animalia			
Butterflies	325 (51.1%)	557 (88.00%)	82 (13.10%)
Fishes	154 (83.20%)	76 (41.10%)	6 (3.20%)
Amphibians	22 (57.20%)	29 (67.40%)	9 (20.90%)
Reptiles	68 (68.00%)	56 (56%)	13 (13.00%)
Birds	648 (77.8%)	691 (82.50%)	413 (49.60%)
Mammals	91 (50.27%)	110 (60.70%)	80 (44.20%)

Source: BPP (1995f)

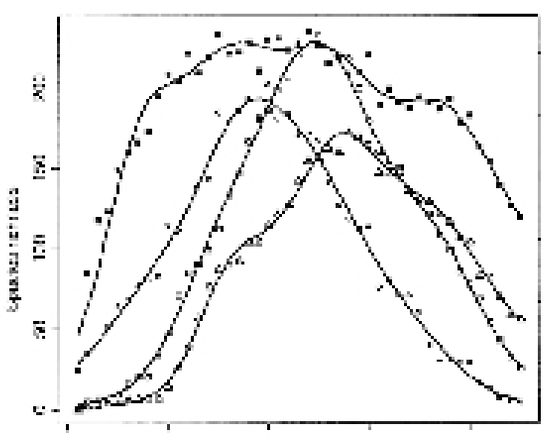
on earthworms undertaken in midhills (Tinjure-Milke-Jaljale region), east Nepal, revealed 10 species of earthworms belonging to 4 families, 8 of them were endemic species, and 2 exotic (Koirala *et al*. 2003).

Distribution of plant and animal species

Species richness is a simple, most widely used measure of biodiversity (Whittakar *et al*. 2001), and acts as a surrogate measure for many other kinds of variation in biodiversity. The number of wild species of flora and fauna occurring in each physiographic zone of Nepal is shown in Table 1.10.

There is an emerging trend to study species richness by interpolation at more in-depth level (100m elevation bands) for Nepal. There are strong correlations between species richness and altitude observed for four groups of plant species in Nepal Himalaya. Species richness of angiosperms along the altitudinal gradient in Nepal Himalaya is estimated by Grytnes and Vetaas (2002) showing that the number of species in 100m altitudinal bands increases steeply with altitude until 1,500m above sea level. Between 1,500-2,500m, little change in the number of species has been observed, but above this altitude, a decrease in species richness is evident. Species richness has been observed with maximum richness at 2,800m for liverworts and 2,500m for mosses (Grau *et al*. 2007), and for ferns at 1900m (Bhattarai *et al*. 2004). A cumulative figure of ferns, moss, liverworts and angiosperms is given in Fig. 1.15 Grau *et al*. 2007).

Fig. 1.15: Species richness in Nepal Himalaya



A comparison of species richness among different groups: Fern (°), moss (□) and liverworts (Δ) richness (values on the left-hand axis) and vascular plant richness (▪, values on the right-hand axis) in relation to altitude (m) in Nepal (Grau *et al*. 2007)

1.2.4 Genetic diversity

Genetic diversity among wild species is least known in Nepal indicating much scope for future research. However, a substantial genetic diversity is inferred among both flora and fauna, and is apparent in terms of morphological features.

Nepal is endowed with rich diversity in cereals, grain legumes, vegetables, fruits, etc. At least four species

Table 1.11: Collection and preservation of germplasm in gene bank

SN	Crop categories	No. of species	No. of accessions
1.	Cereals	11	4715
2.	Millets	06	0977
3.	Pseudo cereals	03	0383
4.	Pulses	22	3357
5.	Oilseeds	10	0640
6.	Vegetables	20	0603
7.	Spices	10	0075
8.	Fibre crops	03	0011
9.	Miscellaneous	05	0020
	Total	90	10,781

(Source: NARC/MoAC)

of wild rice *viz*. *Oryza nivara*, *O. rufipogon, O. granulata* and *O. officinalis*, two wild relatives of rice—*Hygrorhyza aristata* and *Leersia hexandra*; and several types of weedy rice *O. sativa* f. *spontanea* exist in Nepal. Wild relatives of wheat are available in the hilly and mountainous region. There is a possibility of harbouring greater genetic variability of wheat because of its proximity to the secondary source of origin. Species of *Aegilops* and *Agropyron* have been documented. Similarly, diversity in maize is also noteworthy. It may be attributed to the rich specific adaptation of crops in hills and mountain region. The variations in grain colour, husk cover, maturity, adaptation trait to inter-cropping etc. are observed in farmers' grown varieties. However, increased human population pressure, poverty, land degradation, environmental change, introduction of modern cultivars and lack of appropriate national policies have contributed to the erosion of crop genetic resources in Nepal (see NARC/MoAC 2008, Draft).

Collection and preservation of germplasm in seed bank, and molecular techniques used to characterize the seeds of different species also reveal genetic diversity of crops. The Plant Genetic Resources Section, NARC, has preserved 10,781 accessions of orthodox seeds collected from different regions of the country (Table 1.11). Sustaining *ex-situ* collection has been a real challenge for Nepal because of declining resource allocation and irregular electricity supply. A gene bank is under construction to provide facility to sustain *ex-situ* PGR collection.

Systematic characterization and evaluation of collected/preserved germplasm enhances the use of genetic resources by plant breeders and other scientists. Altogether, 4,151 accessions were characterized before 1999, and by now the number has reached 5,662 by adding 200-565 accessions each year between 2000-2007.

Molecular techniques (Isozyme, RAPD and Microsatelite) are also being used to characterize the selected species of crops in recently established biotechnology laboratory at NARC. Characterization and evaluation for disease/ insect resistance, drought, biotic and abiotic traits have not been undertaken.

1.2.5 Protected and threatened species

The Government of Nepal has imposed restrictions on the export of 12 plant species and one forest product under Forest Act (1993). Similarly, 27 mammal species, 9 bird species and 3 reptile species have been given legal protection under the National Parks and Wildlife Conservation Act (1973). Nepal, as a signatory to the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) since 1975, has listed a number of species occurring in Nepal under various CITES appendices; *viz*. a total of 15 species (1 species of angiosperms in Appendix I; 1 species of pteridophytes, 2 species of gymnosperms and 5 species of angiosperms in Appendix II; 3 species of gymnosperms and 3 species of angiosperms in Appendix III); 58 species of mammals (29 species in Appendix I; 7 species in Appendix II; 22 species in Appendix III); 40 species of birds (16 species in Appendix I, 9 species in Appendix II, and 15 species in Appendix III);13 species of reptiles (7 species in Appendix I, 4 species in Appendix II and 2 species in Appendix III); 1 species of amphibians in Appendix II; and 2 species of insects in Appendix II (HMGN/MFSC 2002).

Population of tiger. Protected animals of Nepal are also being monitored through census. The tiger census shows that the population of tiger is being maintained since the census of 1999/2000 (Table 1.12) (Poudel *et al*. 2008).

Population of snow leopard. Another promising example includes population of snow leopard *(Uncia uncia)* in Nepal. The distribution of snow leopard in Nepal in the protected areas includes Shey Phoksundo NP, Dhorpatan HR, Annapurna CA, Manaslu CA, Langtang NP, Sagarmatha NP, Makalu Barun NP, Kanchenjunga CA, and outside protected areas such as Mugu, Humla and Darchula. Approximately, 27% of the potential snow leopard habitat is protected in Nepal. The number of snow leopard in

Table 1.12: Status of breeding tigers in Nepal

Location	1999/2000	2005	2006
Protected Areas			
Chitwan National Park	50-60	50-60*	50-60*
Bardia National Park	32-40	32-40*	32-40*
Suklaphanta Wildlife Reserve	16-23	16-23	15-27
Outside Protected Areas			
Chitwan (Barandabhar north), Kailali (Basanta), Banke (Shamshergunj), Bara forest and Kanchanpur (Laljhadi forest)		8-10	8-10
Total Breeding Tiger	98-123	106-133	105-137
Total	340-350	360-370	360-370

* indicates figure carried from 1999/2000 census.

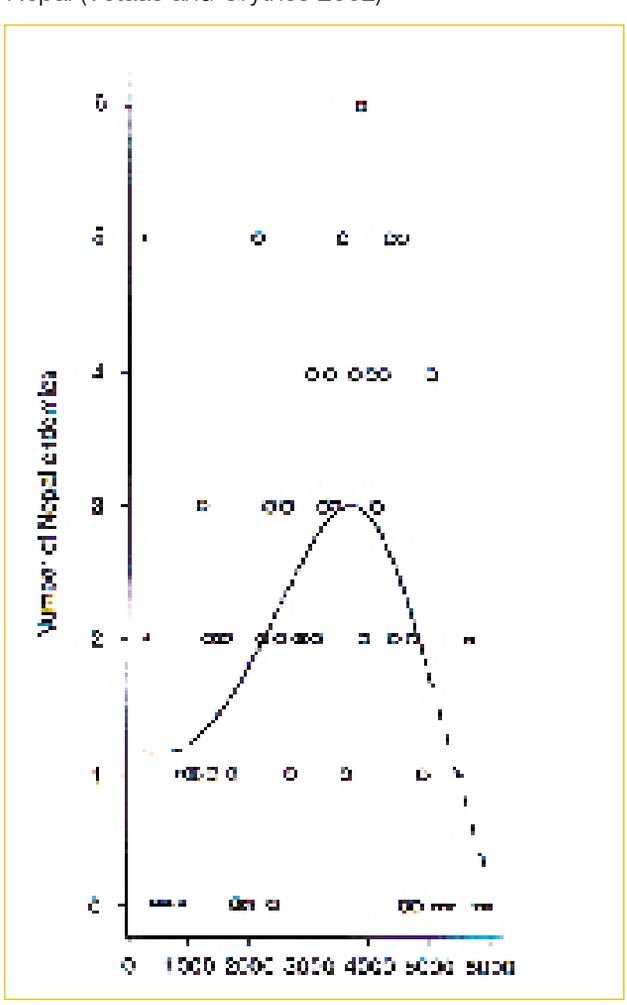
Nepal is estimated to be 350-500, occurring between 2,700-5,600m asl but main range is 3,000-5,400m. Its home range is 12-39 sq km and density is 0.1 to 10/100 sq km. The density of snow leopard is as follows: in Shey Phoksundo NP (Mugu area) 10-12/100 sq km; Shey Phoksundo NP (Dolpa area) 5-7/100 sq km; Annapurna CA (Manang area) 4.8-6.7/100 sq km; Annapurna CA (Phu area) 4-5/100 sq km; Sagarmatha NP 1-3 /100 sq km; and Kanchenjunga CA 3-4/100 sq km (Thapa 2007). Snow leopard appears to have re-inhabited in the Sagarmatha NP following the recovery of Himalayan tahr (*Hemitragus jemlahicus*) and musk deer *(Moschus chrysogaster)* (Ale *et al*. 2007).

Issues. There is an urgent need to update the list of the other protected and threatened species with their status and distribution.

1.2.6 Endemic species

Altogether, 342 plant species and 160 animal species have been reported as being endemic to Nepal (HMGN/MFSC 2002). Distribution of endemic species of flowering plants in Nepal Himalaya estimated by interpolation was used to evaluate the diversity pattern between 1,000 and 5,000m asl by Vetaas and Grytnes (2002). The maximum endemic angiosperm species to Nepal lies at 3,800–4,200m which is above the interval of maximum species richness (1,500-2,500m). The exact location of maximum species density is

Fig. 1.16: Species richness of endemic species in Nepal (Vetaas and Grytnes 2002)



uncertain and its accuracy depends on ecologically sound estimates of area in the elevation zones. However, the peak in endemism at ca. 4,000m corresponds to the start of a rapid decrease in species richness above 4,000m (Fig. 1.16). Endemic liverworts have their maximum richness at 3,300m (Grau *et al*. 2007) (Fig. 1.15).

1.3 Major threats to biodiversity and their root cause

An attempt has been made to briefly mention the status and trend of biodiversity in section 1.2. In this section, major threats to Nepal's biological diversity at different levels have been listed.

Table 1.13: Major threats to biodiversity in Nepal

Types and threats	Remarks
1. Ecosystem loss	(see section 1.1)
i. Forest ecosystem	
• Habitat loss and deforestation • Fire	• Deforestation rate 1.7% during 1978-79 to 1994 • In the Tarai, forest area decreased at an annual rate of 1.3% from 1978–79 to 1990–91 • In the hill areas, forest area has decreased at an annual rate of 2.3% from 1978–79 to 1994 • Forest and shrub together have decreased at an annual rate of 0.2% (HMGN-DFRS 1999) • Total estimated annual loss NRs. 11,551.4 million (Kanel 2000 unpublished)
ii. Protected Areas	
• Poaching	• Mainly one-horned rhinoceros, musk deer, snow leopard, tiger, etc.
• Grazing	• Year-round grazing
• Illegal timber harvesting	• Commercial tree species
• Tourism	• Haphazard and unmanaged
iii. Rangelands	
• Grazing	• Over-grazing due to high number of domestic cattle
iv. Wetlands	
• Encroachment	• Agricultural expansion, industrial development, road and dam construction, siltation, encroachment
• Over-fishing	• Loss of wetland biodiversity
• Pollution	• Discharge of sediments and pollution, eutrophication
v. Agriculture	
• Loss of agrobiodiversity	• Introduction of improved landraces
vi. Mountain	
• Poaching	• Himalayan black bear, brown bear, musk deer, snow leopard
• Over-harvesting of resources	• NTFPs
• Climate change	• Loss of endemic species predicted
2. Species loss	
• Over-exploitation of species	• Selected species for commercial trade
• Alien species	• Introduction of invasive species
• Climate change	• Loss of native species, shift in vegetation zone
3. Genetic resources loss	
• Loss of local landraces	• Farmers landraces disappearing due to habitat change, *viz*. rice (*Anadi, Tauli, Thapachini*)
• Loss of genetic vulnerability	• Wild relatives of cultivated crops and medicinal plants
• Increased vulnerability to pest and diseases	• Introduction of high yielding varieties, landscape change, chemical fertilizer, monoculture (Rice: CH-45, *Manshuli*)

1.3.1 Types and threats

The threats to biodiversity are at the level of ecosystem, species and gene; with little difference among them in their magnitude (Table 1.13); each is listed below. However, an impact on one of these three elements is also an impact on the other two (HMGN/MFSC 2002).

- Threat of ecosystems loss;
- Threat of species loss; and
- Threat of loss of genetic resources

1.3.2 Root cause of loss of biodiversity

The weaknesses, gaps, difficulties and other problems in conserving biological diversity in Nepal have been analysed in detail (HMGN/MFSC 2002). They are attributed to socio-economic causes (poverty and population growth); natural causes (landslides, flood and drought); and anthropogenic causes (pollution, fire, over-grazing, introduction of alien species, illegal trade and hunting).

a. Climate change

Mountain areas are highly sensitive to global climatic change. Global communities, including scientists, conservationists, policy makers and planners are alarmed by the reports published by the Intergovernmental Panel on Climate Change (IPCC) that the earth's temperature has become warmer and precipitation regimes substantially changed in the last 100 years (IPCC 2007). However, the prevailing climate scenario in the Himalayas is incomplete and scattered. Biogeographic variation in species richness in Nepal Himalaya is essential to our understanding and the conservation of biodiversity.

There has been strong evidence of global change, particularly an unusual increase of surface air temperature. In the 20th century, global temperature increased by 0.7^{0}C (with ten warmest years after 1990); while it is also predicted to increase by 2.4^{0}C to 6.4^{0}C by the end of 21st century (IPCC 2007). With an increase of up to 2.5^{0}C, between 20-30% of the earth's species could disappear (Schipper *et al*. 2008). Global warming in the Himalayas has been much greater than the global average. With an average increase of 0.6^0 C per decade between 1997 and 2000, Nepal Himalaya has been regarded to be highly vulnerable to climate change impact, particularly to biodiversity (Sharma 2008). The predictions are vegetation shift in high altitudes, loss of species (in particular endemic species), loss of agricultural productivity, adverse impact on sustainable livelihoods of people, and water resources. The impacts of climate change are already observed in Himalayan glaciers as they are retreating rapidly, 0.3-1 m/year (Xu *et al*. 2007).

Research projects on climate change have been initiated in partnership with several government organisations, *viz*. Department of Hydrology and Meteorology under the Ministry of Environment, Science and Technology (MoEST), Ministry of Forests and Soil Conservation, with non-governmental organisations, *viz*. WWF Nepal, ICIMOD, etc. There is a need to establish long-term systematic research at all levels representing varied ecoregions in the HKH along transboundary altitudinal gradients for generating knowledge to predict climate change. The information thus documented should be highly reproducible and statistically sound for easy communication to a broad range of society, including politicians, planners and policy makers.

Considering these, Nepal has started the process of developing the National Adaptation Plan of Action (NAPA). The project is being coordinated by MoEST. The objective of this Plan is to identify priority areas, scale up adaptation and integration of climate change into national development plans and develop priority projects. Nepal has had its first NAPA meeting. With the support from UNDP, DFID and DANIDA, the Nepali NAPA will be called NAPA Plus. The extended NAPA is a platform to include wider range of stakeholders in developing a broader strategy for adaptation and building climate resilience capacity at national and local levels (UNDP 2008).

Under the REDD (Reduced Emissions from Deforestation and Degradation) strategy for post 2012 period, carbon flux is being monitored in Nepal where communities are managing their forest. The project is also aimed at building the capacity of local communities in monitoring carbon pool within their forest by themselves.

b. Conflict

Nepal is facing a challenge of strengthening its fragile democracy. Conflict that took place in Nepal for over a decade has also an impact on biodiversity conservation. The governance mechanism in general and biodiversity monitoring in particular were highly affected due to: (i) insecurity to monitor the programmes/projects; and (ii) lack of funds to implement the programmes/projects. A few studies have been undertaken to assess the impact of insurgency and conflict on biodiversity *per se*. However, habitat loss and destruction, excessive harvesting of timber and non-timber forest products, illegal hunting and poaching within the country and across the

boundary, increase in urban population, frequent strikes accompanied by burning of rubber wheels, etc. were common incidents. A comprehensive study to assess the impact of a decade-long conflict on biodiversity would be necessary to be undertaken soon.

Conclusion

- Nepal is rich in biodiversity at all levels disproportionate to the area of the country. The threats to biodiversity loss are significant at places. It is high time to develop biodiversity indicators that are used to assess national performance important for monitoring the status and trends of biological diversity to fulfil the commitments of the country as well as to meet the obligations of the CBD.
- Biodiversity indicators provide feedback information on ways to continually improve the effectiveness of biodiversity management programmes. Well-conceived, robust and understandable indicators can help achieve the objectives as suggested by Balmford *et al*. (2005).
- Regional coordination with India and China could be an effective way of strengthening transboundary conservation and sustainable use of resources while good governance and political stability in the country could strengthen implementation of biodiversity programmes at national and field levels.
- Most indicators likely to be available in near future will be based on the existing database and monitoring schemes. It is also being realised that the countries richest in biological diversity are often those most lacking resources. Current database and monitoring may not be fully representative into plans and programmes and may not cover a wide enough range of system components (Balmford *et al*. 2005).

Peace Pagoda of Lumbini, the birthplace of Lord Buddha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Chapter 2

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Current Status of Nepal Biodiversity Strategy and Action Plan

2. Current Status of Nepal Biodiversity Strategy and Action Plan

Nepal signed the CBD on June 12, 1992. The Convention was ratified by the parliament on November 23, 1993 and was enforced in Nepal since February 21, 1994. The Nepal Biodiversity Strategy (NBS), developed in 2002, records the commitment of the government and the people of Nepal as well as to meet the obligations of the Convention, and to serve as an overall framework for the conservation and sustainable use of biodiversity and biological resources. The chapter is organised into two sections.

- Section 2.1 deals with an overview of NBS and NBSIP.
- Section 2.2 deals with a general review of the projects that are prioritised and considered to be successfully implemented, and the objectives achieved during 2006-2010.

2.1 Overview

2.1.1 Nepal Biodiversity Strategy (2002)

The NBS is an important strategy in implementing CBD in Nepal. The NBS has supported articles of the CBD with a particular emphasis on Article 6 by developing national biodiversity strategy, plans or programmes and integrating the conservation of biological diversity and the sustainable use of its components into sectoral and cross-sectoral plans, programmes and policies. It serves as an overall framework for the conservation and sustainable use of biodiversity and biological resources in the country. The strategy also reflects the national commitment to adopt a more holistic approach to biodiversity conservation through the management of habitat, species and genetic diversity in Nepal.

2.1.2 Nepal Biodiversity Strategy Implementation Plan (2006-2010)

The overall goal of the NBSIP is to contribute to achieve the goals and objectives of NBS through its successful implementation for the conservation of biological diversity, the maintenance of ecological processes, and the equitable sharing of the benefits accrued (GoN/MFSC 2006).

The objectives of the NBSIP set for the period of 2006-2010 are to:

- conserve biodiversity of the country within and outside protected areas and at the landscape level through public participation and institutional strengthening, and by ensuring sustainable funding mechanism, consolidating inventory and database system, and establishing transboundary cooperation;
- identify, develop and establish legislative, policy and strategic measures necessary to conserve, sustainably utilise and provide access to and share benefit of the country's biological resources;
- conserve endangered species of wildlife through their habitat management within and outside protected areas;
- develop legislation (*viz*. *sui generis* legislation, access to genetic resources and benefit sharing), sub-sectoral policies and strategic measures for the conservation of agriculture, rangelands (including pastoral), wetlands and mountain diversity through community participation;
- develop sustainable eco-friendly rural tourism; and
- domesticate NTFPs and explore marketing opportunities for poverty reduction by promoting biodiversity conservation within and outside the protected areas through community participation.

2.2 Review of NBSIP

The NBSIP, developed in 2006, selected 13 priority projects that cover various objectives to be implemented by relevant executing agencies (mostly national) and its related stakeholders. These projects belong to seven sectors that include six thematic areas (protected areas, forests, rangelands, agriculture, wetlands and mountain) and one cross-sectoral area. The priority projects are comprised of basic components for biodiversity conservation such as (i) public awareness and education; (ii) data information sharing; (iii) capacity building; (iv) institutional strengthening; (v) promotion of scientific research and development; (vi) technology transfer; and (vii) utilisation of indigenous knowledge, skills and practices that are considered as integral parts, wherever applicable.

The priority projects were conceptualised by considering the need, achievements and lessons learned from the

ongoing as well as completed projects/programmes. The magnitude of the problems, gaps and threats and their root causes related to biodiversity conservation was analysed and taken into consideration for prioritisation of the projects. Altogether, 24 criteria were used to select the priority projects comprising (i) biological criteria; (ii) socio-economic criteria; and (ii) socio-cultural criteria. In addition, 14 cross-cutting criteria that are related to poverty reduction, cultural heritage, environment and ecotourism were also used. The projects are also given rank in terms of priority through discussion and consultation with stakeholders. Details are given in the NBSIP (GoN/MFSC 2006).

International targets and indicators recommended by COP 7 (2004) were not adequately considered during the development of NBS and NBSIP, and in the Nepal Third National Report to the CBD (MFSC 2006). An attempt is made to: (i) identify the progress in the implementation of specific objectives as outlined in all 13 prioritised concept projects included in the NBSIP; and (ii) make a tentative projection whether the objectives shall be achieved by 2010. For facility, the status of implementation is presented in Table 2.1. The parameters used to identify the progress of the priority projects are qualitative and are adapted from the Millennium Development Goals of Nepal (NPC 2005) with slight modification. For example: 'Will objectives be reached' have four categories: (i) Achieved; (ii) Likely; (iii) Less likely; and (iv) Lack of data. The next parameter used is 'Status of supportive environment' that comprises four categories (i) Strong; (ii) Fair; (iii) Weak but improving; and (iv) Weak.

In the category 'Will the objectives be reached' more than 50% of the objectives show progressive trend and are considered likely to be achieved (Table 2.1). These objectives are found to be of high level consistency, well focused and community-oriented. However, the status of supportive environment in general is 'Weak' for the prioritised projects, particularly those projects that require coordination between two or more institutions and adequate funding. However, many project objectives are having 'Fair' supportive environment, and may be achieved by 2010.

A general review of the NBSIP during the preparation of this report has underpinned the need of a greater attention on key priorities that are linked to participatory biodiversity conservation with livelihoods. For specific objectives of the projects, quantitative, measurable and realistic targets need to be developed by 2010 for the period of 2011-2015.

It may be considered that the review process has been initiated by the Ministry of Forests and Soil Conservation during the preparation of the fourth national report to the CBD, and planned to be finalised by 2010. International goals are being considered in the review process that will provide time-bound targets and objectives for the country beyond 2010 (chapter 4). For specific objectives of the prioritised projects, quantitative, measurable and realistic targets have to be developed at the national level by 2010 for the period of 2011-2015.

2.3 Gap analysis and effectiveness of NBSIP

There is a lack of systematic approach in determining country's capacity and developing implementation modalities. This has negatively impacted prioritisation, operationalisation, implementation and ability to monitor performance at the programme/project level. The following conclusions can be made:

- There has been progress towards achieving the goals of the NBS, but there is a need for a greater focus on key priorities. The priority sectors are several and dispersed.
- Priority sectors and national budget allocation do not match. Funding is not ensured according to the priority on biodiversity conservation.
- Inter and intra-ministerial coordination as well as institutional coordination among the stakeholders are poor that weaken timely accomplishments of the objectives of the individual projects.
- There is a lack of linkage between the priority projects and donor assistance as funding in some sectors is complimentary and in others, supplemental to the existing donor funds.
- There is a weak transboundary link with the project that requires regional approach to successfully implement across the national boundary.
- Poor performance in achieving some key targets is largely due to the inability to raise financial resources as envisaged in the NBS and NBSIP (Chapter 3.4).

In conclusion, the three objectives of CBD—conservation, sustainable use, and fair and equitable sharing of benefits—is likely to be successful in Nepal if legislation, governance and society move forward in harmony.

Table 2.1 Priority implementation projects (2006-2010)

Will objectives be reached? Achieved; Likely; Less likely; Lack of data
Status of supportive environment: Strong; Fair; Weak but improving; Weak

Priority – Main Executing Agency and Main Stakeholders	**Project Code and Title**	**Objectives**	**Will objectives be reached?**	**Status of supportive environment**
I. MFSC DoF, DFRS, DPR, DNPWC, FECOFUN, TU, NTNC, BZMC, ICIMOD, Trade Promotion Centre, HPPCL, Private industries, selected VDCs and DDCs of 24 districts	FO 1: Forest Biodiversity Conservation through Community Participation (outside protected areas)	To conserve biodiversity rich large blocks of forests and ecosystems (meadows, shrub land, flood plain, corridor, etc.) poorly represented under PAs with active participation of local communities	Likely	Fair
		To ensure the conservation of vegetation/habitat types in different ecosystems having endemic and legally protected plants [animals]	Likely	Weak but improving
		To develop technologies and update scientifically the indigenous knowledge and practices for their conservation	Less likely	Weak
II. MFSC, MoAC and MoEST NPC, MLD, DoF, DNPWC, DoA, DoL, DPR, NAST, NTNC, ICIMOD, TU, KU, NMA, TAAN, selected VDCs and DDCs	MO 1: National Mountain Policy and Research Network	To support the conservation of mountain biodiversity and enhance livelihoods of mountain communities through the development of a mountain policy, legislation and institutional coordination	Less likely	Weak but improving
		To study eco-physiology, adaptive strategies, reproductive biology, nutrient cycling and productivity, plants and animals interactions, impact of exotic species, genetic diversity, population ecology and species diversity status and other biological characteristics of high altitude plants and animals	Likely	Fair
III. MFSC, MoAC DoF, DNPWC, DSCWM, DoL, DoI, NARC, TU, BZMC, NTNC, BCN, APEC, selected VDCs & DDCs	WL 1: Integrated Wetland Management	To develop integrated management plan at the watershed level and conserve wetland biodiversity and critical sites	Less Likely	Weak
		To conserve the internationally significant wetland sites such as Koshi Tappu, Beeshazari Lake, Jagdishpur Reservoir and Ghodaghodi Lake	Likely	Fair
IV. MFSC DoF, DNPWC, DSCWM, MoLD, TU, selected VDCs and DDCs of Kavreplanchowk, Kathmandu, Lalitpur, Makwanpur	FO 3: Phulchowki-Chandragiri Biodiversity Programme	To maintain and manage representative sample of flora and fauna of Kathmandu Valley and midhills in a participatory way	Likely	Fair
		To manage watersheds of Bagmati and Kulekhani to conserve the midhills biodiversity represented by the Phulchowki-Chandragiri range and also protect the hydropower stations, irrigation systems and the lowland productive agricultural fields	Less Likely	Weak
		To create economic opportunities for local community	Lack of data	weak

V. MFSC MCTCA, DNPWC, NTNC, BZMC, NTB, selected VDCs and DDCs	PA 2: Poverty Reduction through Biodiversity Conservation	To conserve biodiversity in and around the PAs with the operation strategy focusing on the improvement of socio-economic and cultural conditions of the communities and arrange better management of biodiversity resources by local communities, disadvantaged groups and marginalised households, including women living in the buffer zones and adjoining areas	Likely	Fair
		To develop sustainable tourism in PAs by creating options of economic opportunities for local communities and ensure biodiversity conservation	Less Likely	Weak
VI. MFSC DoF, DFRS, DPR, TU, NTB, IUCN, selected VDCs and DDCs of Sankhuwasabha	FO 2: Rhododendron Conservation Programme in Tinjure-Milke-Jaljale	To declare Tinjure-Milke-Jaljale as a community conserved conservation area	Likely	Fair
		To promote ecotourism for enhancing local economy and promoting the values of biodiversity	Likely	Fair
VII. MFSC MoD, MoH, DNPWC, DoF, NTNC, BZMC, selected VDCs and DDCs	PA 1: Species Conservation and Habitat Management (in Protected Areas)	To ensure long-term conservation of biodiversity that are endangered or threatened with extinction through population survey, monitoring, securing key habitats, species, relocation and restoration strategy in PAs	Likely	Strong
		To strengthen capacity of DNPWC and BZ communities who are responsible for the management of PAs and BZs	Likely	Weak but improving
		To control poaching activities and effectively implement CITES legislation	Likely	Weak
		To develop mechanism for full participation of local communities in the management of buffer zones and conservation areas	Likely	Strong
		To identify practical and effective options for resolving park and people conflict and ensure long-term conservation of biodiversity	Likely	Fair
VIII. MFSC DoF, DNPWC, DFRS, DoA, DLS, WWF, NTNC, BZMC, NTB, FNCCI, selected VDCs and DDCs	CS 2: Landscape Level Biodiversity Conservation	To identify and restore important landscape for biodiversity conservation and include under-represented ecosystems in different physiographic regions	Likely	Weak
		To develop and implement integrated landscape management plans and ensure sustainable conservation of biodiversity rich ecosystems at landscape level	Likely	Fair
		To strengthen transboundary conservation cooperation	Likely	Fair
		To enhance understanding and raise awareness of biodiversity conservation	Likely	Fair
		To develop NTFB as a sustainable funding mechanism	Less likely	Weak

IX. MoAC MFSC, MoAC, MoEST, MLJPA, MCTCA, NPC, DoF, DNPWC, DSCWM, DoA, DLS, CBS, NARC, TU, BZMC, NTNC, selected VDCs and DDCs	AG 1: Agrobiodiversity Conservation through Community Participation	To develop a national agrobiodiversity (crop, livestock and fisheries) sub-sector policy to address both institutional arrangements and legislation	Likely	Fair
		To establish baseline information and a database on agricultural biodiversity, indigenous and endemic species, and their traditional usage	Likely	Fair
		To conserve on-farm agrobiodiversity that will promote food security and increase food production without the loss of on-farm biodiversity	Likely	Weak but improving
		To prepare inventory of domestic animal resources and prioritise management strategies according to their status	Less likely	Weak
		To establish a National Databank of indigenous livestock population, breed and endemism	Lack of data	Weak
		To conserve genetic resources for each breed through cryo-preservation	Likely	Strong
		To assess and maintain the genetic biodiversity of breeds of livestock and their closer relatives in Nepal	Lack of data	Weak
X. MFSC MFSC, MoAC, DOF, DNPWC, DSCWM, DoA, DLS, NARC, TU, selected VDCs and DDCs	RL 1: Integrated Rangeland Management	To ensure effective conservation of rangeland biodiversity through the development of national rangeland policy and legislation	Likely	Fair
		To protect, conserve and manage rangeland biodiversity, especially at higher altitudes, by establishing and undertaking baseline information on high value plant species, wildlife and livestock, and through training, education and awareness	Lack of data	Weak
		To demonstrate and promote affordable technological packages with community participation that optimizes rangeland use and conserves biodiversity	Lack of data	Weak
		To maintain long-term sustainability of pastureland to combat pasture-based fodder shortages	Lack of data	Weak
		To conserve pastoral biodiversity	Lack of data	Weak
XI. Government of China, India and Nepal GoN (MFSC, MFA), Governments of China and India, ICIMOD	PA 3: Establishment of the Kanchenjunga Tri-national Peace Park	To establish the management of the Kanchenjunga region a Tri-national Peace Park	Less likely	Weak

XII. MFSC MEST, MoAC, MLJPA, DPR, DNPWC, DoF, DFRS, DoA, DLS, TU, NTNC, IUCN, FNCCI, BZMC, selected VDCs and DDCs	CS 1: Institutionalisation of Biodiversity Conservation in Nepal	To accomplish comprehensive documentation and registration of biological resources and associated traditional knowledge in different eco regions of the country, including PAs and BZs comprising all groups of plants, animals and microbial diversity	Less likely	Weak but improving
		To strengthen National Biodiversity Unit (NBU) in terms of human resources and information technology	Less likely	Weak
		To develop a comprehensive database covering all sectors on status and distribution of species and their habitat	Less likely	Weak
		To monitor trends and threats to biodiversity under the aegis of NBU	Lack of data	Weak
		To develop a *sui generis* IPRs legislation that will guide Nepal to meet equitable benefit sharing requirement of the CBD	Less likely	Fair
		To develop village level biodiversity conservation plans, including land use plans in order to conserve local biodiversity	Less likely	Weak
		To provide incentives for biodiversity conservation at the village level	Less likely	Fair
XIII. MoAC MoAC, DoA, DoLS, NARC, DoF, DNPWC, TU, LI-BIRD and ICIMOD	AG II: Conservation and Management of Pollinators for Sustainable Agriculture through an Ecosystem Approach	To establish database of pollinators	Lack of data	Weak
		To conserve pollinators to balance ecosystem and ensure sustainable agriculture	Likely	Weak
		To document knowledge on pollinators	Likely	Weak
		To extend and promote pollinator friendly management practices	Likely	Weak
		To strengthen and enhance technical and infrastructure capacity	Lack of data	Weak


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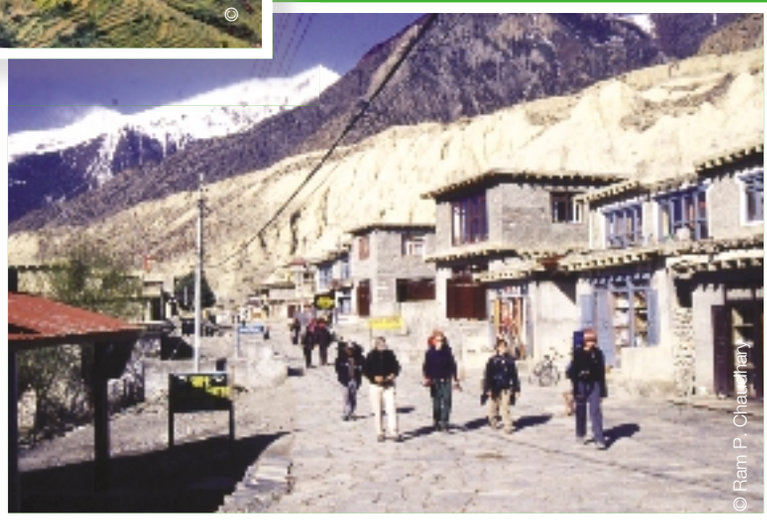
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Chapter 3

Sectoral and Cross-sectoral Integration of Biodiversity Considerations

3. Sectoral and Cross-sectoral Integration of Biodiversity Considerations

The NBS reconfirms government's commitment to the protection and management of biological diversity in accordance with the CBD. It aims at integrating conservation of biological diversity and sustainable use of its components into sectoral and cross-sectoral plans and policies. It provides an operational planning strategy for the conservation of biological diversity, maintenance of ecological processes and systems, and ensures equitable sharing of benefits. The objectives aim at integrating the conservation and sustainable use of various components of biodiversity as part of development by: (i) analysing the current state of knowledge about biodiversity, thorough review of biodiversity related documents, strategies, development plans, programmes, institutional arrangements, and policies, including those mentioned in the Master Plan for the Forestry Sector, NEPAP I and II, NBS; (ii) identifying important gaps of policies and plans, constraints, and current practices of conservation, and assessing further needs; (iii) identifying current pressures and threats to biodiversity and future trends; (iv) assessing the present and future value of biodiversity to humanity; (v) identifying conservation priorities and time frame for research, management and investments; (vi) assessing the cost scale of conserving biodiversity; and (vii) developing long-term strategies, implementation methods, monitoring and evaluation system for biodiversity conservation.

Efforts have been made to mainstream biodiversity conservation into sectoral and cross-sectoral plans and programmes in the country. This is being integrated by:

- signing international agreements;
- developing new national strategies for biodiversity use and conservation for poverty reduction as a means of livelihoods and sustainable development;
- incorporating biodiversity and environmental issues into thematic and cross-cutting areas;
- implementing and monitoring the NBS and NBSIP through National Biodiversity Coordination Committee (NBCC); and
- developing plans for financial resources, monitoring and setting goals, targets and indicators.

Biodiversity management is guided by sectoral and cross-sectoral plans, programmes and strategies (CBD 2008). This chapter is organised into four sections.

- Section 3.1 deals with the issues of mainstreaming biodiversity conservation at systemic level.
- Section 3.2 deals with a brief account of implementation arrangements into sectoral and cross-sectoral policies and plans.
- Section 3.3 briefly highlights organisational structure of the implementation plan, including the role of peoples' participation and financial resources.
- Section 3.4 deals with obstacles and challenges in implementation, including way forward.

3.1 Mainstreaming biodiversity considerations

3.1.1 Systemic level

Efforts and progress have been made to incorporate biodiversity considerations into policy, planning, and strategy long before the development of NBS in 2002. These include Nepal's commitment to biodiversity conservation by signing the international agreements and obligations, and translating them into national policies and acts.

3.1.2 International agreements and obligations

Nepal, as a party to international treaties, carries obligations to the protection of biodiversity, national heritage and its environment. Nepal has signed more than 20 international agreements related to biodiversity and environment conservation and has ratified many of them. The relevant biodiversity related treaties for Nepal include (i) 1971 Convention on Wetlands of International Importance, Especially as Waterfowl Habitat; (ii) 1972 Convention on the Protection of World Cultural and Natural Heritage; (iii) 1973 Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES); (iv) 1992 Framework Convention on Climate Change and (v) 1992 Convention on Biological Diversity (see appendices 2.1a, 2.1b and 2.1c for details of agreements and policies). The treaties certainly have exerted some influence in the policy of Nepal. However, implementation of these treaties at national level is weak, and a strong national commitment and complementary legislation are needed to make such international instruments truly effective (Belbase 1997, 1999).

A brief account of some of the national strategies newly formulated mainly after 2002 has been presented to highlight the commitment made by Nepal in conserving biodiversity. For details of other strategies, see Nepal Biodiversity Strategy (HMGN/MFSC 2002), Nepal Biodiversity Strategy Implementation Plan (GoN/MFSC 2006), and Country Report on the State of Nepal's Plant Genetic Resources for Food and Agriculture (NARC/MoAC 2008, Draft).

3.1.3 National strategies

The Interim Constitution of Nepal (2007) incorporates the issues of environment and biodiversity. All citizens shall have the right to live in a clean and healthy environment as Fundamental Rights (Article 16). It further states under the Directive Principles (Article 35) that: (i) the State, while mobilising the country's natural resources and heritage for the interest, utilisation and benefit of the nation, shall pursue a policy of giving priority to local people; (ii) the State shall make necessary provisions to keep the natural environment clean, prioritise special arrangements for the protection of environment and endangered wildlife species by not allowing physical development activities to exert negative impact on environment, and generating awareness on environmental cleanliness; (iii) the State shall make provisions for equitable distribution of benefits from the conservation and sustainable use of forests, plants and biodiversity; and (iv) the State shall pursue the policy of identifying traditional knowledge, skills and practices existing in the country. These provisions in the Interim Constitution of Nepal pay due respect to the conservation of biodiversity and environment.

The Three Year Interim Plan (2007/08—2009/10) has adopted conservation, promotion and sustainable use of biodiversity and related traditional knowledge through research, development and institutional arrangement. Community and public ownership on biological resources has been considered a key principle to meet the genuine aspiration of the Nepali people. It includes registration and documentation of the resources, regulatory mechanisms for resource conservation, promotion and utilisation, farmers and state ownership on such resources and access to the benefits from the resources. Various sectoral and cross-sectoral issues favouring biodiversity conservation in different ecosystems have been emphasised in the Plan.

The Tenth Plan (2002—2007) and PRSP contained goals and targets related to environment and biodiversity conservation by providing opportunity to formulate programmes on maintaining habitats, reducing population decline of important species and favouring conservation programmes with community participation.

The National Agrobiodiversity Policy (2007) addresses conservation, promotion and utilisation of agro-genetic resources and rights of the community and state rights on them. The priority programmes identified by the policy include scientific studies, research and extension, biodiversity registration and documentation. The policy also includes a working policy on *in-situ* conservation, *ex-situ* conservation, agrobiodiversity utilisation, benefit sharing and biosafety.

The National Biosafety Policy (2007) has been framed with the objectives of protecting biodiversity, human health and the environment from adverse effects of research and development activities of modern biotechnology. This is an outcome of the government's realisation of the significance of biosafety in the conservation of biological diversity and safeguarding human health.

Having already signed the Cartagena Protocol, now the Government of Nepal has already given the approval to MFSC to proceed in the Constituent Assembly for the ratification process so that Nepal would become the member of the Cartagena Protocol.

A National Clean Development Mechanism of the Kyoto Protocol (2007) has been developed adopting the United Nations Framework Convention on Climate Change (UNFCCC) to which Nepal is a party (signed on 12 June 1992; ratified in 1994; and entered into force on 31 July 1994). Under the Protocol, the Government of Nepal has developed a number of criteria and indicators for environmental protection and sustainable development. Some of the indicators directly related to biodiversity are: (i) maintaining sustainability of local ecological functions; and (ii) maintaining genetic, species, and ecosystem diversity and not permitting any genetic erosion. Nepal has also started the process of developing the National Adaptation Plan of Action (NAPA).

The Biosafety Guidelines (2005), framed by the Ministry of Forests and Soil Conservation, aim at balancing biodiversity conservation and public health-related concerns with the development of biotechnology in the country. Specific attention has been given to the release of Genetically Modified Organisms (GMOs) only after assessing the potential adverse effects it causes, and making sure that it will not have adverse effects on human health and environment.

The government has endorsed the Sustainable Development Agenda for Nepal in 2003 which values the conservation of biodiversity in different ecosystems. The major policy thrust on biodiversity includes (i) management of natural forests and protected areas; (ii) conservation of ecosystems and genetic resources; (iii) conservation of biodiversity at landscape level; (iv) protection of land against degradation; (v) promotion of sustainable harvest and management of NTFPs; (vi) agricultural biodiversity for marginalised mountain communities; (vii) conservation of rangelands; and (viii) research and development in medical application and income.

3.1.4 Complementarities and gaps in legislations

- The Forest Act (1993), Local Self Governance Act (1999) and some other Acts overlap with various complementary provisions, contradictions and gaps with respect to the management, utilisation and ownership of natural resources, particularly forest resources and the scope of UGs and NGOs (Belbase and Regmi 2002) (Table 3.1 & 3.2).
- The Local Self-Governance Act (1999) provides no legal measures for involving UGs in the identification, supervision and evaluation of development plans. The Act, however, stipulates that the implementation of village level projects must be done through User Committees (UCs). The involvement of UCs in the planning process will certainly strengthen project

Table 3.1: Overlapping rights regarding forest products

Forest Products	Forest Act (1993)	Local Self-Governance Act (1999)
Fuelwood, dried timber, twigs, branches, bushes	User Group	VDC
Herbs	User Group	DDC
Prohibited herbs	Government	-
Resin	Government and User Groups	DDC
Driftwood	User Group	DDC
Reeds, grass	User Group	VDC
Water resources	User Group	VDC/DDC
Natural heritage	User Group	VDC

Source: Belbase and Regmi, 2002

Table 3.2: Contradictions between Forest Act (1993) and LSGA (1999)

Forest Act (1993)	Local Self-Governance Act (1999)
…nobody shall be entitled to any right or facility of any type in national forests (section 17).	…forests granted by the prevailing laws and HMG are the property of the VDC (section 68 (1)(c).
Depending on the category of forest, for example, for community forests, the forest (not land) becomes the property of the CFUG provided it is managed according to the approved operational plan.	…natural heritage, which includes forests, lakes, ponds and rivers is the property of the VDC.
CFUGs are empowered to sell, distribute and use such forest products …(section 25[1]).	…proceeds from the sale of river sand, stone, wildlife derivatives (horn, feathers), etc. go to the DDC fund (section 215 and 218).
CFUGs can punish anyone found guilty of violating rules made by CFUGs on forest and forest products (Forest Rules 1995).	…VDCs are empowered to hear complaints relating to grassland, pasture and fuelwood (section 33[1]).
Recognises CFUGs as the responsible institution for the management of community forests (with no role for VDCs and DDCs).	Emphasises the role of the DDC and VDC in natural resource management with no reference to CFUGs.

Source: Belbase and Regmi (2002)

implementation and maintenance. The Forest Act (1993) and Forest Regulations (1995) clearly stipulate that the users themselves develop and implement the work plan whereas LSGA overlooks this aspect. Therefore, a clear line must be drawn between different pieces of legislation, and gaps and contradictions need to be corrected (Belbase and Regmi, 2002). Integration and harmonisation of environmental laws have been essential to overcome inconsistencies and overlap for addressing cross-cutting issues related to biodiversity (GoN and UNDP 2008).

3.2 Implementation arrangements: Sectoral and cross-sectoral

3.2.1 Sectoral

The NBS (2002) and NBSIP (2006-2010) are important strategies in implementing the CBD. The NBS serves as an overall framework for the conservation and sustainable use of biodiversity and biological resources. The strategy takes into account implementation of biodiversity considerations through cross-sectoral as well as sectoral approaches. The NBSIP provides a framework to materialize the vision of the NBS into practical actions through priority projects.

Sectoral responsibility for the conservation, management and sustainable use as specified in NBS and NBSIP has been duly adopted by the relevant institutions and stakeholders. The overall responsibility for implementing NBSIP rests with the Ministry of Forests and Soil Conservation (MFSC) in its role as the national focal point for CBD. The MFSC, with its five departments (Forest, National Parks and Wildlife Conservation, Plant Resources, Forest Research and Survey, Soil Conservation and Watershed Management) and two divisions (Environment, and Monitoring and Evaluation), are primarily responsible for project implementation, monitoring and evaluation.

The other relevant ministries and line agencies that lie outside the mandate of MFSC implement biodiversity conservation programmes. These include:

- The Ministry of Agriculture and Cooperatives (MoAC) implements projects related to agrobiodiversity.
- The Ministry of Environment, Science and Technology (MoEST) contributes to implement environment related projects, including Environment Impact Assessment (EIA) for eliminating and mitigating potential threats to biodiversity arising from development projects and other physical infrastructure development.
- The Ministry of Local Development (MLD), through its district and local level networks, has key role to contribute to biodiversity conservation, district level coordination and documentation of biological resources and associated traditional knowledge.
- The Ministry of Water Resources (MoWR) has the responsibility to implement projects related to wetlands (that lie outside forest and protected areas).
- The National Planning Commission (NPC) formulates policy to guide the legal, institutional and operational development for biodiversity and its related areas, and periodically review government policies on biodiversity, environment and others.

3.2.2 Cross-sectoral

Biodiversity and environment conservation have been integrated into cross-sectoral plans of the government such as the Millennium Development Goals (NPC 2005), and Poverty Alleviation Fund. Biodiversity conservation programmes are also covered by media and communication sector.

(i) Millennium Development Goals (MDGs). The MDGs are benchmarks of development progress and outline major development priorities to be achieved by 2015. Nepal has incorporated the MDGs to its strategic framework in the Poverty Reduction Strategy Paper (PRSP) in order to meet the goals of poverty reduction and sustainable development (NPC 2005). The government has well developed several goals and targets for Nepal to meet the MDGs. However, goal and targets related to environment have been inadequately addressed. There has been no consideration to incorporate Biodiversity 2010 Targets in the MDGs. Relevant MDGs related to biodiversity and environment have been discussed by Chaudhary (2006), a summary of which is presented.

- MDGs call to eradicate extreme poverty and hunger (Goal 1) by halving the proportion of people whose income is less than one dollar a day; and the proportion of people who suffer from hunger. The percentage of population in Nepal below poverty line in 1996 was 42% (CBS 1996), and the target to reduce poverty is by 21% in 2015. The poverty goal of the MDGs addresses the issues of extreme poverty, hunger, malnutrition and dietary energy consumption, which are closely related to livelihoods and food security. For the most part, poverty in Nepal continues to be a rural phenomenon (35% in rural

areas compared to 10% in urban areas), and with variables related with ecological zones (mountains, hills and Tarai), and caste and ethnicity (*Janjatis* and *Dalits*). In Nepal, *Janjatis* and *Dalits* have higher incidence of poverty than the national average (NPC 2005). The availability and sustainability of biological resources, including Non-Timber Forest Products (NTFPs), resource management through community forestry and agrobiodiversity are of direct relevance to address goal on poverty, hunger and food security for rural households who derive a large proportion of their food and income from biological resources. Agriculture sector contributes to 39.2% of GDP, with high under-employment rate and low productivity, mainly based on major crops that require adequate agricultural input (irrigation, fertilizer and pesticides). Crop species such as millets and buckwheat grains offer exceptional nutritional value, but are neglected crops. These crops are well adapted to marginal agricultural conditions and are grown in high altitudes ranging from the Tarai to subalpine zones in Nepal. The crops provide important food and nutritional security for people in remote areas.

- Dietary diversity is very valuable because it directly addresses Goal 4 'Reduce child mortality', and Goal 5 'Improve maternal health'. A general conception is that access to more food to each person would serve MDGs for hunger and poverty (Goal 1). However, this alone will not be enough. People need diversity of food, and dietary diversity can satisfy hidden hunger at the same time as meeting so many other human and environmental needs (IPGRI 2005). Diversity of food and dietary diversity can only be ensured by rich biological diversity in both the short and long terms.
- Biodiversity coupled with education and awareness plays a key role in achieving goals on health and education for all in Nepal. Biological resources supply food, fulfil dietary requirements, supply and purify water, and combat diseases (use of rich diversity of medicinal plants and cultural knowledge). Biodiversity conservation diversifies rural income and reduces burden of women and children for access to water, enabling the children and women to reduce their collection time for education.
- In 2001, women constituted 43% of labour force– 73% in agriculture and 27% in non-agricultural sector in Nepal (CBS 2001). Women who are educated are better able to seek health care for themselves, their families and neighbourhood (Goal 2), thereby reducing child mortality (Goal 4), improve maternal health (Goal 5), and preventing spread of HIV/AIDS and other diseases (Goal 6). Reproductive health and education are thus crucial not only to poverty reduction but also to sustainable human development.
- The environmental problems of Nepal have a direct relation with basic needs. Poverty, population pressure, lack of food, lack of alternative energy source for rural areas, education, good sanitation, and good governance are issues of serious concern and threat to the protection of environment and biodiversity. Biodiversity conservation and sustainable use play a key role to meet Goal 7 'Ensure Environmental Sustainability' in Nepal. Biodiversity provides essential materials linked to the livelihoods of people and their economic development, agricultural productivity, human health and nutrition, indigenous knowledge, gender equality, building materials, and provides ecosystem services by maintaining climate change, managing water resources for aesthetic and cultural well-being of society.

(ii) Poverty Alleviation Fund (PAF). The PAF was established in 2004 to bring marginalised communities into mainstream development by placing poor and disadvantaged groups in the driving seat. The PAF is working to reduce poverty to 10% by 2020 in pursuant to the long-term goals of the Government of Nepal, and to reduce poverty by half (21%) by 2015, as per the MDGs. its four major programme components are: (i) social mobilisation; (ii) income generation; (iii) small community infrastructure development; and (iv) capacity building. PAF implements its programmes in 25 out of 75 districts of Nepal. It has helped to organise communities to implement 6,000 community projects for income generation and infrastructure that include biodiversity conservation directly or indirectly, such as natural resource management, afforestation, education and awareness about environment. A cross-sectoral integration is essential to implement NBS. It is suggested that biodiversity conservation and environmental management be an integral part of the projects funded by PAF. It is also suggested that the National Planning Commission would take the responsibility to integrate the relevant ministries and stakeholders working in biodiversity conservation and with the programmes of PAF.

(iii) Media and communication. Audio and visual programmes are also broadcast covering the issues related to biodiversity conservation and livelihoods through print and electronic media. Popular environment

Fig. 3.1a Valuable plant species

Fig. 3.1b Valuable mammal species

related articles also get featured regularly in mainstream national newspapers. The Department of Postal Services has been publishing mailing stamps related to flora and fauna to raise awareness among the people as well as to communicate to the global communities about biodiversity conservation (Fig. 3.1a & b).

3.2.3 Climate change

The current knowledge for the prediction of climate change impacts on biodiversity, including species of narrow range in Nepal Himalaya, is inadequate. It is suggested to establish long-term monitoring mechanism through systematic research on species richness representing different ecoregions in the HKH at altitudinal gradients and on both north (wetter) and south (drier) aspects. An ecosystem management approach is emerging between Bhutan, India and Nepal in Kanchenjunga landscape (Chettri *et al*. 2008). Changes in species richness along altitudinal transects in general is valuable in the study of global climatic change (Korner 2007), and in Nepal (Chaudhary 2008).

Monitoring changes in species diversity by considering indicators that represent species richness at three different spatial scales, such as local, landscape and macro-scale, have been essential and discussed by Whittaker *et al*. (2001). Weber *et al*. (2004) simplifies and uses the term local biodiversity for the biodiversity within one habitat type; landscape diversity for biodiversity in a given area with different habitat types (habitat mosaics); and macro-scale diversity for the regional biodiversity, *i.e.* biogeographic regions or countries.

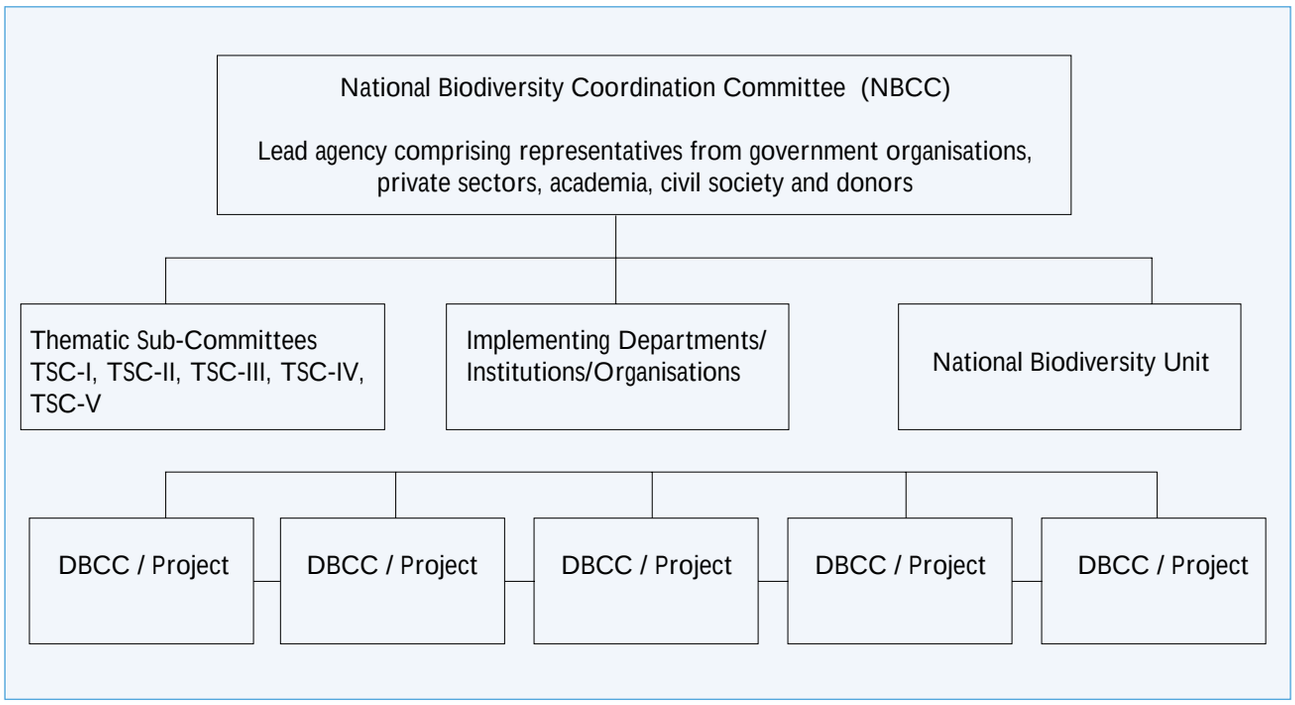
The MoEST has initiated to develop climate change policy for Nepal. The policy is aimed at covering the issues of climate change and its impact on livelihoods, biodiversity, glacier retreat, carbon trade and others. It is hoped that the policy would be finalised, endorsed and implemented soon in Nepal.

3.3 Organisational structure of the Implementation Plan

The organisational structure of the implementation of biodiversity has been described in NBS and NBSIP.

- Following the NBS, a 13-member National Biodiversity Coordination Committee (NBCC) has been formed under the chair of Hon'ble Minister for Forests and Soil Conservation with representatives from key government ministries, private sector, user groups, civil society, academic institutions and major donors. Five thematic sub-committees have been formed to adequately address the issues of different themes related to biodiversity. These are (i) forest; (ii) agriculture; (iii) sustainable use; (iv) genetic resources; and (v) biosecurity. The coordinators of each of these thematic sub-committees represent as members of the NBCC. Serious attempts need to be undertaken to actively involve NBCC, and the thematic sub-committees meeting the goals of the Convention as well as aspirations of the people of Nepal. The MFSC serves as the secretariat for the implementation of the directives and policies made by the NBCC (Fig. 3.1). The Environment Division of MFSC serves as the technical wing of the ministry for the implementation of NBSIP.
- Each thematic sub-committee is mandated to implement the projects and report to the NBCC. However, achievements made by the thematic sub-committees have been unsatisfactory. During insurgency period, the sub-committee 'Sustainable Use of Biological Resources' organised a one day seminar in Kathmandu on June 29, 2005, to discuss the issues related to conservation and sustainable use of biological resources. The seminar was attended by international speakers and national experts from government, academia and NGOs.

Fig. 3.1: Coordination and implementation framework for the NBSIP



- At the district level, District Biodiversity Coordination Committee (DBCC) has been formed (so far in 10 out of 75 districts only) under the chairpersonship of the Chair of the District Development Committee (DDC) with appropriate representation from district level stakeholder organisations, including forest, agriculture, *Ayurveda*, municipality, Village Development Committee, NGOs, etc. The District Forest Office serves as the secretariat of the DBCC, and District Forest Officer as its Member Secretary. The process of formulation of DBCC has to be immediately and actively extended in all the districts of Nepal if objectives of the NBSIP are to be realised by 2010.

3.3.1 People's participation

Peoples' participation and dialogue with them is important for successful implementation of biodiversity implementation plans (Box 3.1). The NBS has stated a strong commitment to promote local governance and involve people's participation at early stage of planning as well as implementation stage of resource use and conservation. The roles and responsibilities of the community-based organisations such as user groups of forests, water, soil, buffer zones and religious bodies are legally defined in the respective Acts and Regulations. There is a need to define the roles of women groups, and indigenous communities more precisely, as the groups play a vital role on biodiversity conservation and sustainable use.

3.3.2 Financial resources

Adequate financial resources are required to successfully implement biodiversity conservation projects in Nepal (GoN/MFSC 2006). In Nepal, the following resources are being used for biodiversity conservation:

- National treasury is one of the major sources of funding for the projects identified under NBSIP. The projects are included in the national development plan as well as annual plan of the sectoral ministries.
- Government revenues generated from tourist entry fee visiting protected areas have been recycled for conservation and development activities in the buffer zone programme of several PAs. All of the PAs have ploughed back upto 50% of the park revenue whereas the provision is to share revenues from 30-50%. Between 30-50% of park revenues under the buffer zone programme have been invested in 11 protected areas. In addition, revenues obtained from the collection permit and sale of biological resources contribute to the conservation of biodiversity.
- Contribution by heritage conservation organisations is also a potential financial source for the conservation of biological and cultural heritage; *viz*. funds generated by Lumbini, Pashupatinath, Swoyambhunath, Sagarmatha, etc.
- Private sectors are being encouraged to invest in the

Box 3.1: Conservation and management of the Ramsar site in Khumbu–Gokyo Lake

Gokyo Lake, a sacred lake for both Buddhists and Hindus at 4,700m, is situated in the Sagarmatha National Park. The lake is valued for its rich biodiversity supporting over 80 species of flowering plants with 4 endemic species. It is also the habitat of many passerine birds, including wintering ducks, ruddy shelduck, common pochard, wood snipe (globally threatened bird), and hoopoe. As a result of its significance, it received the status of Ramsar site–Wetlands of international importance on 23 September 2007. The lake has been suffering mainly from water pollution, livestock grazing and climate change. Local communities and related stakeholders, including the Sagarmatha National Park, buffer zone user groups, non-government organisations and community-based organisations are putting their efforts to maintain the lake ecosystem. People's participation is being ensured by mobilising local communities through dialogue and by institutionalising the 'Gokyo Lake Management Group' to implement better management practices in collaboration with Sagarmatha National Park, NGOs/CBOs and related stakeholders.

Source: Sagarmatha National Park (a brochure)

promotion of tourism and biodiversity conservation (*viz*. Upper Mustang and Dolpo).

- Grants and soft loans from the bilateral/multilateral donor agencies have been utilised at various levels in the country. These include landscape biodiversity conservation, genetic diversity conservation, community and leasehold forestry projects.

3.4 Obstacles and challenges in the implementation

- *Resource availability*: The challenges in the implementation of the strategy under NBS and projects under NBSIP are also lack of financial resources. When NBSIP was developed, an estimated amount of US$86.07 million was proposed to be invested for accomplishing the objectives of the priority projects in the implementation phase during 2006-2010. The government, donors and private sectors were major stakeholders proposed for financial and other resources for these projects. Nepal Trust Fund for Biodiversity (NTFB) has been proposed by NBS in 2002 as an autonomous legal body, independent and separate tax-free, from the government, and fully empowered to manage the capital and investment income. There has been no progress in this regard. To date, many activities for the implementation of the NBSIP are done through projects financed by the government, GEF and other funding through NGOs. However, resources are still inadequate to effectively implement the NBSIP, and for coordination and monitoring activities. Similar conclusion was also made by the National Capacity Self-Assessment Report and Action Plan (GoN and UNDP 2008).
- *Coordination and monitoring*: There is a lack of coordination of the activities in the field of biodiversity. The MFSC is the focal point for CBD and its coordination role is crucial. The departments and the divisions under MFSC should strengthen coordination and take full responsibility for project implementation, monitoring and evaluation within the ministry. Other relevant ministries and line agencies will implement biodiversity action programmes that lie outside the mandate of MFSC, such as MoAC for agriculture related biodiversity programmes, MoWR for programmes related to wetlands, and MoEST for programmes related to environment. In addition, international and national NGOs undertake biodiversity conservation programmes also. There has been lack of adequate coordination and accountability among the stakeholders, whereas monitoring has been relatively poor.
- *Conflict*: Nepal faced over a decade-long armed conflict. Law enforcement and monitoring during the conflict period was either very poor or non-existent.

Transboundary meeting between Nepal and India held at Suklaphanta Wildlife Reserve.

3.4.1 Way forward

- In order to effectively integrate and mainstream environmental management into sectoral and cross-sectoral plans, it is important to reinforce the linkages between strong environmental management performance and growth, sustainable livelihoods and poverty reduction (World Bank 2008).
- In Nepal, there is a plan to review the implementation of the NBSIP for 2011-2015. The Government of Nepal plans to update the NBSIP, and reorganise the committees. The updates will be done by taking into account the need to synergize biodiversity issues with other conventions, as well as by addressing in the areas of livelihoods, sustainable development, poverty reduction, climate change, biosafety protocol, etc. (see also chapter 4.3 for specific conclusion).

Chapter 4

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Global and National Indicators

4. Global and National Indicators

This chapter draws upon the information in the first three chapters of the report. An analysis has been made to assess how national actions taken to implement the CBD Strategic Plan (2002-2010) for CBD are contributing to achieve the 2010 Targets and relevant goals, objectives and strategic plans of NBS.

No specific time-bound and measurable national targets have been fixed to conserve biodiversity in Nepal. The government endorsed the NBS in 2002 and NBSIP in 2006 that provide ample opportunities for the conservation of important biodiversity. In the Third National Report to the CBD, a number of initiatives have been mentioned that do not reflect biodiversity indicators for Nepal following 2010 Targets.

The government has endorsed the MDGs, developed quantitative indicators at the national level and incorporated them to its strategic framework in the Poverty Reduction Strategy Paper (PRSP) in order to meet the goals of poverty reduction and sustainable development to be achieved by 2015. Goal 1 “Eradicate Extreme Poverty and Hunger” and Goal 7 “Ensure Environmental Sustainability” are the most important indicators related to biodiversity conservation, among others (see also chapter 3.2.2). At the local level also, quantitative targets have been set up to achieve the goal of sustainable development in two districts of Nepal (Mustang and Manang) produced by National Trust for Nature Conservation (NTNC 2008a, & 2008b).

This chapter is divided into three sections:

Section 4.1 summarizes an account of goals, targets and indicators towards 2010 Biodiversity Target. After the submission of the report, two parallel works will be done by MFSC—the assessment of NBSIP and development of detailed indicators for Nepal for the period of 2011-2015.

- In order to highlight whether things are moving in right or wrong direction, a set of ‘traffic lights’ as used by the UK Biodiversity Indicator has been followed in this report (Defra 2007).
- The information has been presented in the form of a table in which (i) Column 1 provides the framework of goals and targets from COP Decision 7/30; (ii) Column 2 includes high level national targets to be achieved by 2010 by Nepal, although some targets may be provisional; (iii) Column 3 lists means of implementation to achieve the goals and targets; and (iv) Column 4 provides an overall scenario to achieve the targets by 2010 on the basis of trends observed between 2002-2008.

Section 4.2 provides discussion on the status of goals and targets based on the framework of the goals, targets and indicators towards 2010 Biodiversity Targets.

Section 4.3 provides specific conclusions as per the guidelines of the fourth national report provided by CBD.

Grassland (Phantas) of Suklaphanta Wildlife Reserve, Kanchanpur district.

4.1: Framework of Goals, Targets and Indicators towards 2010 Biodiversity Target

Key to the symbols used:

☑	Improving or achievable	≈	Little or no overall change	☒	Deteriorating or likely to deteriorate	•••	Insufficient or no comparable data

Goals and Targets (Global)	National targets to be achieved by 2010	Means of implementation	Trend (2008)
Focal area 1: Protect the components of biodiversity **Goal 1: Promote the conservation of the biodiversity of ecosystems, habitats and biomes**			
Target 1.1 At least 10% of each of the world's ecological regions effectively conserved	• At least 40% of the lands maintained under forests and shrublands • Existing PAs (19.7%) effectively managed • At least two new PAs declared	• Incorporate the provision of forest conservation in the new Constitution • Enhance handing over of forest areas to the community organisations • Review and revise National Parks and Wildlife Conservation Act (1973) • Tinjure-Milke-Jaljale area, Gaurishankar area, Api-Nampa Himal area, Khairapur Conservation Area put under proper management	☑
Target 1.2 Area of particular importance to biodiversity protected	• All declared nine Ramsar (wetlands) sites conserved and managed • One additional IBA within PAs declared as Ramsar site and three additional Important Bird Areas (IBAs) outside PA system put under management • Two Important Plant Areas (IPAs) complex put under management • Important biological corridors managed	• Implement effectively National Wetlands Policy (2003) to manage wetlands and incorporate this into relevant acts/regulations • IBA—Bardia NP declared Ramsar site • Integrate IBAs and IPAs into organisation policy • Potential Important Bird Areas (IBAs) outside PAs include Mai Valley forests, Phulchowki forests and farmlands in Lumbini area (a total of 176,367 ha) put under management • Potential Important Plant Areas (IPAs): Karnali and Upper Sagarmatha –Kanchenjunga complex put under management through community participation • Enhance community participation to conserve biological corridors, *viz*. TAL, BISEP-ST, SHL, Kanchenjunga Complex	≈
Goal 2: Promote the conservation [and documentation] of species diversity			
Target 2.1 Restore, maintain or reduce the decline of population of species of selected taxonomic group	• Decline of selected big cat (tiger, snow leopard), and birds of prey (vulture) reduced • Decline of selected plant groups *viz*. *Orchidaceae, Dioscoreaceae, Lichens*, and Rhododendrons reduced • Restore elephant population	• Implement Snow Leopard Conservation Action Plan (2004); Tiger Conservation Action Plan for Nepal (2008); and enhance vulture conservation through conservation and captive breeding • Prepare conservation plan of selected plant groups and implement • Endorse Elephant Conservation Action Plan	☑

Target 2.2 Status of threatened species improved	• Population of rhino, blackbuck, crocodile, musk deer maintained • Population of plant species *viz*. 'Bijaya sal (*Pterocarpus marsupium*)', 'Satisal' (*Dalbergia latifolia*), 'Loth salla' (*Taxus wallichiana)* maintained • Monitor the population of major animal species *viz*. gharial and elephant; and medicinal plant species *viz*. *Swertia chirayita*, *Nardostachys grandiflora*, *Neopicrorhiza scrophulariiflora*, 'Yarsa gumba' *Cordyceps sinensis*	• Increase the capacity of DNPWC to ensure 100% conservation of threatened species in PAs • Initiate proper study and monitoring of population of selected plant species • Develop conservation plan of major animal and plant species	☑
Target 2.3 Documentation of flora and fauna	• Two out of 10 volumes of *Flora of Nepal* published • At least four fascicles (volumes) published • Conservation biology of red panda published • *Fish for the Poor* published	• *Flora of Nepal*: Volume 3 (Ranunculaceae to Rosaceae) and Vol 7 (Gentianaceae to Labiatae) in the process of publication • Fascicles by DPR published as annual programme • Raise level of education to protect red panda • Awareness of fish diversity and addressing poverty in the process of publication	≈
Goal 3: Promote the conservation of [crop] genetic diversity			
Target 3.1 Genetic diversity of crops, livestock and other valuable species conserved, and associated indigenous and local knowledge maintained	• *In-situ* conservation of crop genetic resources effectively implemented in 8 districts • On-farm crop conservation effectively maintained in two districts • One national gene bank established • Initiate conservation of endangered farm animal species • Strengthen community seed bank at Bara district • Develop *sui generis* system of plant variety protection to maintain indigenous and local knowledge	• Promote community participation through Community Biodiversity Management (CBM) in 8 districts *viz*. Jhapa, Sindhuli, Tanahu, Mustang, Nawalparasi, Dang, Humla and Doti • Effectively maintain on-farm crop conservation in Bara and Kaski districts • Gene bank under construction • Initiate conservation of endangered farm animal species such as *Acchame* and *Lulu* cattle, yak, *Bampudke* pig, *Asala*, *Jalkapoor*, *Lata*, *Tite* and *Katla* fish species • Strengthen community seed bank at Kachorba (Bara district) • Effectively implement National Agrobiodiversity Policy (2007)	☑

Focal area 2: Promote sustainable use **Goal 4: Promote sustainable use and consumption**			
Target 4.1 Biodiversity products derived from sources are sustainably managed, and production area managed consistent with the conservation of biodiversity	• Management plans of all protected areas prepared and implemented • Forest management plans of all 74 districts prepared and implemented • Participatory Plant Breeding (PPB) and grassroot breeding initiated in three districts • Mango field gene bank established • Effectively implement forest certification mechanism in CF for major NTFPs (such as Lokta (*Daphne bholua*, *D. papyracea)*, Argeli (*Edgeworthia gardneri)* and Allo (*Girardinia diversifolia*)	• DNPWC takes the lead to prepare the management plans of all PAs • DoF takes the lead to prepare 5-year forest operational plans of all 74 districts and incorporate biodiversity conservation into operational plans • Initiate PPB in the Western Terai Landscape Complex Project (WTLCP) comprising Bardia, Kailali and Kanchanpur districts • Mango field gene bank in Lothar forest of Chitwan district conserved with the participation of local communities • Resolve the issues of forest certification by addressing new markets and sustainable export mechanism in community forests	
Target 4.2 Unsustainable consumption of biological resources, or that impacts upon biodiversity, reduced	• Reduce unsustainable harvesting of selected medicinal plants, including *Rauvolfia serpentina*, *Bergenia ciliata*, *Asparagus racemosus* and *Aconitum* species • Reduce illegal hunting of selected game species such as blue sheep, antelopes and dolphin	• Effectively implement Herbs and NTFPs Policy (2004) and Agricultural Policy (2003) • Effectively enforce and monitor EIA and IEE • Implement NPWC Act (1973) as well as 'Working Policy on Wildlife Farming, Breeding and Research (2003)'	
Target 4.3. No species of selected wild flora and fauna endangered by international trade	• Regulate and monitor wild forest products • Regulate and monitor selected animal species • Finalise and endorse draft CITES bill • Strengthen CITES and anti-poaching units	• Effectively implement existing legislation to halt fauna and flora endangered by global trade • MFSC/DNPWC should take the lead to finalise CITES bill • Anti-poaching units strengthened	
Focal area 3: Address threats to biodiversity **Goal 5: Pressure from habitat loss, land use change and degradation reduced**			
Target 5.1 Rate of loss of degradation of natural habitats decreased	• Loss of degradation of natural habitats decreased	• Enhance handing over of forest areas (at least 10,000 ha each year) to the CFUGs and incorporate biodiversity conservation into community forest management plan • Amend leasehold forestry rules to incorporate agroforestry concept for degraded land • Develop a rangeland policy • Avoid monoculture	

Goal 6: Control threats from Invasive Alien Species (IAS)			
Target 6.1 Pathways for major potential alien species controlled	• Major Invasive Alien Species (IAS) identified and their threat value assessed	• Develop general methodology to monitor and control IAS • Make a detailed study of biology and pathways of selected major invasive species • Effectively implement plant quarantine rules and regulations at all major entry and exit points	
Target 6.2 Management plans in place for major alien species that threaten ecosystems, habitats or species	• Management plan of at least three major IAS prepared and implemented	• MFSC takes the lead to coordinate the relevant institutions and individuals and assigns expert/s to prepare management plan of alien invasive plant species • Abundance of major IAS and their impact on native biodiversity in Nepal assessed • Monitor introduced exotic fish species (*Salmo guirdneri*, *S. frutta*, and *Oncorhyclus rhodurns*)	
Goal 7: Address challenge to biodiversity from climate change and pollution			
Target 7.1 Maintain and enhance resilience of the components of biodiversity to adapt to climate change	• NAPA process initiated • Climate change research and monitoring initiated • Extend study of climate change impacts on the livelihoods of communities • REDD Policy finalised, endorsed and implemented	• MoEST should take the lead to complete National Adaptation Programme of Action (NAPA) to address climate change and biodiversity issues • Establish permanent monitoring transects across altitudinal and longitudinal gradients in collaboration with relevant institutions • Undertake research to study the impacts of climate change in the livelihoods of local communities	
Target 7.2 Reduce pollution and its impact on biodiversity	• Establish baseline information on at least three important wetlands (Bagmati river, Ghodaghodi Lake and Koshi Tappu), monitor water quality and biodiversity • Establish baseline information on air pollution	• Integrate relevant institutions to establish baseline information and monitor pollution • Implement Bagmati Action Plan • Develop action plans for the management of Ramsar sites and other wetlands • Establish baseline information on air polllution	

Focal area 4: Maintain goods and services from biodiversity to support human well-being **Goal 8: Maintain capacity of ecosystems to deliver goods and services and support livelihoods**			
Target 8.1 Capacity of ecosystems to deliver goods and services maintained	• Maintain Siwaliks ecosystem to deliver goods and services	• Initiate preparation of an integrated Siwaliks, Bhabar and Tarai management plans	
Target 8.2 Biological resources that support sustainable livelihoods, local food security and health care, especially of rural people maintained	• Maintain biological resources for livelihoods, food security and health	• Ensure access to biological resources for *bonafide* use by communities through legislation • Integrate use of biological resources into MDGs and PAF programme • Promote agroforestry • Link biodiversity products with market	
Focal area 5: Protect traditional knowledge, innovations and local communities **Goal 9: Maintain socio-cultural diversity of indigenous and local communities**			
Target 9.1 Protect traditional knowledge, innovations and practices	• Ensure protection of traditional knowledge of indigenous people through the Access to Genetic Resources and Benefit Sharing (AGRBS) legislation	• Ensure protection of traditional knowledge of indigenous people through the provisions in the Constitution of Nepal • Pass AGRBS and implement the same	
Target 9.2 Protect the rights of indigenous and local communities over their traditional knowledge, innovations and practices, including their right to benefit sharing	• Protect IPRs through *sui generis* system	• Develop and enact *sui generis* IPR legislation • Build the capacity of indigenous communities and stakeholders • Ensure traditional rights of indigenous people on biological resources by harmonising international instruments	
Focal area 6: Ensure the fair and equitable sharing of benefits arising out of the use of genetic resources **Goal 10: Ensure the fair and equitable sharing of benefits arising out of the use of genetic resources**			
Target 10.1 All access to genetic resources is in line with the CBD and its relevant provisions	• Access to Genetic Resources and Benefit Sharing (AGRBS) drafted as per the guidelines of CBD Articles	• Incorporate the issue of access to fair and equitable sharing of benefits arising out of the use of genetic resources in legislation, including Prior Informed Consent (PIC)	

Target 10.2 Benefits arising from the commercial and other utilisation of genetic resources shared in a fair and equitable way with the countries providing such resources in line with CBD and its relevant provisions	• Make an attempt to develop a regional AGRBS framework and policy	• Initiate development of regional framework and policy for AGRBS among the regional countries; Andean Pact (1996) and African Model Law (2003) are some examples of regional framework	☑
Focal area 7: Ensure provisions of adequate resources **Goal 11: Nepal has improved financial, human, scientific, technical and technological capacity to implement the Convention at all levels**			
Target 11.1 New and additional financial resources are transferred to developing country parties, to allow for the effective implementation of their commitments under the Convention, in accordance with Article 20	• Implement NBS and NBSIP by ensuring financial and human resource development	• Ensure financial resources for biodiversity conservation and sustainable use by strengthening Nepal Biodiversity Trust Fund • Improve human, scientific, technical and technological resources through bioprospecting	☒
Target 11.2 Technology and skills transferred to developing country parties, to allow for the effective implementation of their commitments under the Convention in accordance with its Article 20, paragraph 4	• Establish Nepal Biodiversity Portal Database	• Develop framework and partnership with wider regional and global research institutions	•••

4.2: Global Focal Area, Goals and Targets: National Indicators for Nepal

This chapter provides discussion on the status of goals and targets. The goals and targets set by COP 7 have been followed (see also chapter 4.1). In this report, provisional national targets have been set for Nepal to be achieved by 2010. The MFSC aims to thoroughly review goals, targets and indicators for the preparation of NBSIP beyond 2010 and harmonize with national plans, including MDGs.

Focal area 1: Protect the components of biodiversity

Goal 1: Promote the conservation of the biodiversity of ecosystems, habitats and biomes

Nepal has established a system of protected areas for the conservation of biodiversity to meet Target 1.1 and 1.2. An overall trend of the target is improving. *Reaching the target is challenging but achievable.*

Target 1.1 At least 10% of each of the world's ecological regions effectively conserved

- *At least 40% of the lands maintained under forests and shrublands*: The target is that the government shall ensure at least 40% of the country's forest resources under forest cover for all times by 2010 which is 39.6% at present, including all forest areas within the country. Initiatives from the government, NGOs and CBOs have led to the formation of Forest User Groups (FUGs) for *in-situ* conservation of biodiversity. It has been felt necessary to incorporate in the Constitution of Nepal that at least 40% of the natural forest area will be conserved in the country. *In-situ* conservation of biodiversity in national forests, community forests and leasehold forests has been encouraged by handing over forest areas to the communities. Similarly, attempts have been made to include activities for biodiversity documentation in the annual programmes. All these activities are in increasing trend (see chapter 1 for details).
- *Existing PAs (19.7%) effectively managed*: At least 19.7% of the PAs in the country will be effectively managed. Nepal has established protected area system that promotes the conservation of biodiversity of ecosystem, habitats and biomes (Target 1.1 and 1.2). Under the National Parks and Wildlife Conservation Act (1973), five categories of protected areas, (including buffer zones) have been established, totaling 19.7% of the total area of Nepal (see Chapter 1 for details). The PAs are unique at national and international levels in which different ecosystems, plant and animal species and abiotic parts of ecosystems of extraordinary scientific, educational and socio-economic and cultural importance are protected. An analysis shows that there is an increasing trend in the designation of the PAs in

Box 4.1: Initiative to declare additional areas as protected areas

- The Tinjure-Milke-Jaljale (TMJ) area has been regarded as a potential Community Conserved Conservation Area (CCCA) for its rich biodiversity, especially rhododendron diversity. The TMJ area is situated at the confluence of three districts—Tehrathum, Sankhuwasabha and Taplejung—in the eastern hilly region of Nepal, comprising an area of 558 sq. km, linking with the Kanchenjunga Conservation Area (KCA) to the northeast, Makalu Barun National Park (MBNP) and Sagarmatha (Mt. Everest) National Park (SNP) to the northwest. It provides a natural niche for dozens of rhododendron species-mixed to pure stands of over 28 species. The people of TMJ are heavily dependent on biological resources for their livelihoods. About 25% of the total land area in TMJ is cultivated and the remaining 75% is made up of forest, bush/shrub and grasslands. There are limited opportunities for diversifying income. However, sustainable tourism could raise income and contribute to maintain livelihoods security and minimize the risk of conflict emerging from poverty. Majority of the people are from the Limbu, Gurung and Rai ethnic groups, followed by Brahmin, Chhetri , Sherpa, Bhote and Tamang.

- While the Blackbuck Conservation Area has been declared, forthcoming initiatives of the government is to declare the conservation area for Api-Nampa Himal and Gaurishankar in the mountain, both in western Nepal. The protected areas are managed by the Department of National Parks and Wildlife Conservation and supervised by the Ministry of Forests and Soil Conservation.

Nepal (see chapter 1 for details). However, there is also a need to review and revise the NPWC Act (1973) for effective management of ecosystem, habitats and biomes.

- *At least two new PAs declared*: At least two additional areas will be put into effective conservation by 2010. Initiatives have been undertaken to designate additional PAs in Nepal, such as Api-Nampa Himal area and Gaurishankar area in high mountains, Tinjure-Milke-Jaljale in midhills and blackbuck conservation area at Khairapur, Bardia, Tarai. The midhills in Nepal are not well represented by protected areas and the former two partly represent the midhills ecosystem.

Target 1.2 Area of particular importance to biodiversity protected

The trend of conservation paradigm in Nepal has been changing from species conservation to landscape management. Several programmes have been implemented to protect the areas of particular importance to biodiversity. However, their effectiveness has not been to the level of expectation. Despite undertaking multiple approaches, progress has been slow; *the trend of Target 1.2 is having little or no overall change*.

- *All declared nine Ramsar (wetlands) sites conserved and managed*: Wetlands of international importance comprise a total of 34,455 ha. However, the sites show a wide disparity in distribution of altitudinal zones (see chapter 1). National Wetlands Policy (2003) aims to conserve and manage wetlands resources wisely and sustainably with local people's participation, including women. Emphasis has also been given to conserve and manage wetlands according to the needs and on the basis of scientific research. It may be essential to manage the wetlands by the user groups comprising indigenous communities whose livelihoods and dependency are linked with wetlands, especially in wetlands lying outside PAs or in BZs.
- *One additional IBA with PAs declared as Ramsar site and three additional Important Bird Areas (IBAs) outside PAs system put under management*: In Nepal, a total of 27 Important Bird Areas (IBAs) covering about 18% of the country's land area have been identified by BirdLife International and Bird Conservation Nepal (BCN). The IBAs support bird species of global, regional and national importance (see chapter 1 also). A part of the IBAs that do not fall under protected area system shall be effectively protected. The important areas proposed for management outside PAs include Mai valley forests, Phulchowki forests and farmlands in Lumbini area. They comprise a total of 176,367 ha. Other potential IBAs lying in lowland PAs include Bardia NP and Suklaphanta WR.
- *Two Important Plant Areas (IPAs) complex put under management*: In Nepal, a total of 16 Important Plant Areas (IPA) have been provisionally identified (Hamilton and Radford 2007). The IPAs could be used to monitor progress against this target and Target 5 of the GSPC such as 'Protection of 50% of most important areas for plant diversity assured [to be met by 2010]. A large part of the IPAs, particularly located in western Nepal, do not fall under protected area system. However, a GIS analysis would be essential to assess the distribution of IPAs. Karnali and Upper Sagarmatha –Kanchenjunga complex are potential IPAs identified on the basis of medicinal plant species richness, endemism, and uniqueness of habitat. Community-managed approach at the national scale may help to conserve the IPAs. However, there is a lack of data on density and abundance of medicinal plants from different sites.
- *Important Biological corridors managed*

i. The Terai Arc Landscape in Nepal (TAL Nepal) encompasses an area of 23,199 sq. km and covers 14 districts. The landscape is important from the national and global perspectives for its rich biological diversity (HMGN/MFSC 2004). The TAL comprises two of the WWF's Global 200 ecoregions, *viz*. the Tarai-Duar Savannas and Grassland ecoregion, and the Himalayan subtropical broadleaf forest ecoregion. It supports highest density of the tiger in the world, the second largest population of the Greater one-horned Rhinoceros, and other globally threatened and protected species like Asian Elephant, Gangetic Dolphin, Gharial crocodile, Great hornbills, Sarus cranes and Bengal Floricans. Increasing human population, deforestation, poaching of wildlife and illegal timber extraction have compounded to the deterioration of biodiversity in Nepal. Enhanced community participation will be an effective means of meeting the target.

ii. The Biodiversity Sector Programme for Siwaliks and Tarai (BISEP-ST) is a programme of the Ministry of Forests and Soil Conservation supported by the Netherlands Government through SNV Nepal. The goal is to make Nepal's forestry [biodiversity] sector institutions able to manage their forests sustainably without external assistance. The programme covers eight districts in the Tarai and Siwaliks contributing significantly to livelihoods support, biodiversity

conservation and economic development of the country. The programme needs to be extended covering other districts.

iii. The Sacred Himalayan Landscape (SHL 2006) is a proposed transboundary conservation area covering 39,021 sq km of which 73.5% falls in Nepal, 24.4% falls in Sikkim and Darjeeling of India and remaining 2.1% falls in Bhutan. The landscape connects the Bhutan Biological Conservation Complex with the SHL forming an important corridor in the eastern Himalaya from lowlands to 8,848m in Mount Everest. The landscape includes and retains two globally important contiguous ecoregions: (i) the Eastern Himalayan alpine scrub and meadows, and (ii) the Eastern Himalayan broadleaf and conifer forests. Although SHL is presently sparsely populated with about 5 million people, its inhabitants face poverty. Forestry, agriculture and tourism are dominant livelihood strategies. Governance is largely weak due to the lack of coordination.

iv. The Kanchenjunga Complex is another proposed transboundary landscape and shared by Nepal, Bhutan, India and China. The diversity of habitat types occurring in the landscape ranges from seasonally dry, deciduous woodlands in the lower foothills, through rich subtropical and temperate broad-leaved forests in the midhills to subalpine coniferous forests and alpine meadows, all within a hundred kilometres distance. The landscape is rich in biodiversity and a great proportion of species are threatened or endemic to the region. The area is still unexplored and there exists limited information on its biodiversity. Effective coordination is required to implement biodiversity conservation related activities.

Goal 2: Promote the conservation [and documentation] of species diversity

Target 2.1 Restore, maintain or reduce the decline of population of species of selected taxonomic group

Attempts have been undertaken by different stakeholders to promote the conservation and documentation of species diversity. *Reaching the target is challenging but achievable.*

- *Decline of selected big cat (tiger, snow leopard), and birds of prey (vulture) reduced*: Many species in wild will continue to decline in abundance and distribution, but restoration and maintenance of selected species is possible. Tiger population has been maintained with total individuals of 340-350 during 1992/2000 and 360-370 in 2005. Approximately, 27% of the potential snow leopard habitat is protected in Nepal; and snow leopard appears to have re-inhabited in the Sagarmatha National Park. The following conservation action plans have been prepared after 2002 and they need effective implementation. For information on restoration of species, see NBS (HMGN/MFSC 2002).

i. Snow Leopard Conservation Action Plan (2004)
ii. Tiger Conservation Action Plan for Nepal (DNPWC 2008)
iii. Vulture Conservation Action Plan has also been developed and is awaiting approval (Box 4.2)
iv. Elephant Conservation Action Plan is in the process of endorsement.

- *Decline of selected plant groups, viz. Orchidaceae, Dioscoreaceae, Lichens* and *Rhododendrons*

Box 4.2: Vulture conservation in Nepal


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A Vulture Conservation Breeding Centre has been established in Nepal. Two species of vultures, *Gyps bengalensis* (White-rumped vulture) and *Gyps tenuirostris* (Slender-billed vulture), once common in Nepal, are at sharp decline. Awareness campaign has been initiated in west Nepal. A *Jatayu* Restaurant has been established in Nawalparasi district of Nepal under the implementation of Bird Conservation Nepal (BCN). Pesticide-free carcass is fed to the vultures in collaboration with local communities. The number has sharply increased from 21 individuals in 2004/2005 to 272 individuals in late 2008, although the population was found only 17 in 2005/2006.

Currently, BCN in collaboration with NTNC, RSPB and ZSL, has drafted the Vulture Conservation Action Plan and is in the process of endorsement by the government.

Source: BCN brochure, 2008

reduced: Decline of several selected plant groups that are collected in huge amount from the wild sources for trade (*viz*. *Orchidaceae*, *Discoreaceae*, and *Lichens*), and fuelwood (*viz*. Rhododendron) shall be reduced by 2010 by preparing and implementing management plan. Orchidaceae, Dioscoreaceae and Lichens are included in the CITES list, whereas *Rhododendron arboretum* is a national flower. Lichen species and *Dactylorhiza hatagirea* (Orchidaceae) are protected plant species of Nepal.

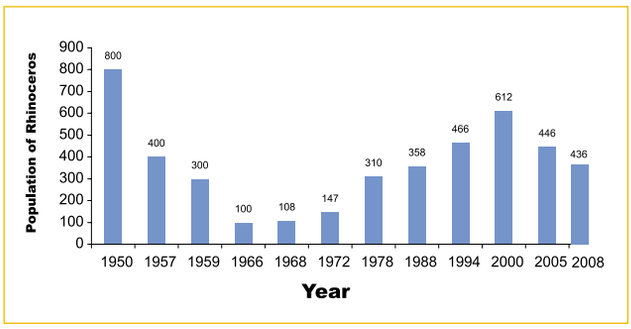
Target 2.2 Status of threatened species improved

The Target 2.2 is related to Target 2.1. In general, many species will become threatened, but species based conservation measures will improve the status of some species. The target has proposed to promote the conservation of species diversity by developing species-specific conservation programmes. The PAs also maintain, improve and restore the status of threatened species. *Reaching the target is challenging but achievable*. The following activities have been proposed:

- *Population of rhino, blackbuck, crocodile, musk deer maintained*: Population status of rhinoceros, blackbuck, crocodile, musk deer has been maintained. A few examples include implementation of action plans of globally threatened species, *viz*. big cats like tiger, snow leopard and vulture (Target 2.1). Although species census programme is limited to a few endangered and threatened species, the population of some of the animals, including globally threatened species is improving. The population of musk deer is encouraging. Population of blackbuck has been recovered. The rhino census of 2005 indicates the need for improving habitats; the census has shown that rhino population has declined from 612 in 2000 to 436 in 2008 in Chitwan National Park due to poaching, natural death and translocation (Fig. 4.1). Poaching was noticed comparatively high during the armed conflict which caused merging of security posts (from 32 to 8 posts) of the Nepal Army. There is a need to increase the capacity of DNPWC to regularly monitor the population of selected species (DNPWC 2008).

- *Population of plant species, viz.* 'Bijaya sal *(Pterocarpus marsupium)',* 'Satisal' *(Dalbergia latifolia),* 'Loth salla' *(Taxus wallichiana) maintained*: These tree species possess high medicinal and timber values and are threatened due to over-harvesting or illegal cutting. *P. marsupium* and *D. latifolia* are protected under Forest Regulations (1995) whereas trade of *T. wallichiana* is regulated under CITES. Proper study and monitoring will continue within and outside PAs to maintain the population of species.

Fig. 4.1: Population of rhinoceros in Nepal



- *Monitor the population of major animal species, viz. gharial, blue sheep and elephant; and commercially valuable medicinal plant species viz. Swertia chirayita, Nardostachys grandiflora, Neopicrorhiza scrophulariiflora,* 'Yarsa gumba' *Cordyceps sinensis*: Several programmes and projects have been implemented to monitor major animal species in collaboration with partner organisations, in particular the international NGOs, and to restore and maintain habitats within and outside PAs. However, it is yet to ascertain the population of major animal species. The population of commercially valuable plant species are on a declining trend due to inadequate protection. Over-harvesting prevails for yarsa gumba (*Cordyceps sinesnsis*), chirayito (*Swertia chirayita*), Jatamansi (*Nardostachys grandiflora*) and Kutki (*Neopicrorhiza scrophulariiflora*) in the mountains. It is suggested to develop conservation plan for monitoring population of major animal and plant species.

Target 2.3 Documentation of flora and fauna

Inventory and assessment of biodiversity are essential for management strategies and conservation. There is an increasing need for availability and accessibility of quality information on ecosystem dynamics, both at species and ecosystem levels. Despite multiple approaches being undertaken, progress has been slow; *the trend of Target 2.3 is having little or no overall change*.

- *Two out of ten volumes of Flora of Nepal published*: A comprehensive *Flora of Nepal* is being published. Publication of two volumes (Volume 3 and 7) out 10 volumes of *Flora of Nepal* is targeted by 2010 under Darwin Initiative. Volume 3 will be comprised of the description of about 600 species from Ranunculaceae to Rosaceae; and volume 7 comprising over 600 species from Gentianaceae to Labiatae (KK Shrestha, pers. Comm. 2008).
- *At least four fascicles (volumes) published*: The Department of Plant Resources (previously Department of Medicinal Plants) houses over 150,000 dry plant specimens in the herbarium (abbreviated as KATH), and is engaged in the publication of local flora. Altogether, 64 reports have been published that comprise regional and local flora, as well as fascicles related to particular families. Tribhuvan University (TU) is also involved in the exploration of local flora. The Tribhuvan University Central Herbarium (TUCH), maintained at the Central Department of Botany, houses over 20,000 specimens. The Natural History Museum maintains the collection of valuable plant species and animal species, and publishes journals and books related to flora and fauna of Nepal.
- *Conservation biology of red panda:* A book is in the process of publication by the Resources Himalaya. A comprehensive publication on the conservation biology of red panda will be published by 2010 (P. Yonzon, pers. comm. 2008). There is a need to raise awareness and education to protect the species. Documentation of fauna such as amphibians, reptiles, birds and mammals are in progress.
- *Fish for the Poor*: Publication of fish biodiversity and addressing poverty shall be published by the Resources Himalaya by 2010.

Goal 3: Promote the conservation of [crop] genetic diversity

Target 3.1 Genetic diversity of crops, livestock and other valuable species conserved, and associated indigenous and local knowledge maintained

There are several measures to conserve genetic diversity of crops and livestock which is undertaken under the supervision of the Ministry of Agriculture and Cooperatives (MoAC). Several institutions under MoAC and its affiliated institutions have been actively involved in the conservation of genetic resources. *Reaching the target is challenging but achievable.*

- *In-situ conservation of crop genetic resources effectively implemented in eight districts*: *In-situ* conservation of crop genetic resources has been initiated jointly by Nepal Agricultural Research Council (NARC), Local Initiatives for Biodiversity, Research and Development (LI-BIRD) and Bioversity International (former IPGRI). The government of the Netherlands and IDRC were the main funding organisations. Community Biodiversity Management (CBM) programme has been implemented in 8 districts covering major agroecological zones in all five development regions, *viz*. Jhapa, Sindhuli, Tanahu, Mustang, Nawalparasi, Dang, Humla and Doti.
- *On-farm crop conservation effectively maintained in two districts*: Two districts (Kachorwa village in Bara district and Begnas village in Kaski district) have been included for on-farm conservation of crop genetic resources to represent low and middle altitude agricultural ecosystem having rich crop biodiversity for *in-situ* crop conservation (MP Upadhyay, pers. Comm. 2009). Farmers' Cooperative Society (FCS) at Dalchoki in Lalitpur district has also collected and conserved local landraces at their farms and seed bank, and also practices organic farming.
- *One national gene bank established*: A national gene bank with necessary infrastructure facilities is under construction. The gene bank will conserve crop genetic resources at large scale by 2010. To date, altogether 10,781 accessions of 90 food crops have been conserved in seed bank at NARC. Out of 198 food crop varieties released by the National Seed Board of Nepal, 31 varieties were developed directly by local selection and 11 were developed by hybridization of local and exotic germplasm (NARC/MoAC 2008 Draft).
- *Initiate conservation of endangered farm animal species*. The Department of Livestock Services and the National Animal Science Research Institute have jointly identified 25 local breeds of livestock. Research has been conducted at phenotypic, chromosome and DNA levels and this process will be continued in other breeds of animals. Similarly, 13 species of fishes have been conserved. The government has also initiated conservation of endangered farm animal species such as *Acchame* and *Lulu* cattle, yak, *Bampudke* pig, *Asala*, *Jalkapoor*, *Lata*, *Tite* and *Katla* fish species. The government has implemented Domesticated Elephant Policy (2003) with the

Box. 4.3: Community seed bank

A Community Seed Bank for enhancing local seed security at Kachorwa, Bara District of Nepal, has been established with the participation of local communities. The main operation systems of the community seed bank include collection and identification of all available seeds of landraces. The collected seeds are stored by using locally available seed storage materials, and are distributed based on the traditional 'Dedha' (increase by 150%) system. To date, 60 landraces of rice (5 of sponge gourd, 3 of pigeon pea and 2 of finger millet seeds) have been collected and stored in the seed house and this number is increasing. A series of elite varieties of rice, namely, Kachorwa 4, Kachorwa 5, Kachorwa 11 and Kachorwa 17, have been developed. These varieties possess high yielding attributes along with farmers preferred traits. The community seed bank is leading to sustainable local seed security. It fulfils the community's requirement for quality landrace seed and helps to increase farmers' access to quality seed as a means of conserving local crop diversity and to maintain them on-farm. The study found that the level of awareness of community people on the conservation of PGRFA and capacity of community-based organisation have been enhanced after the establishment of community seed bank at Kachorwa. An initial effort of this approach has shown encouraging results in on-farm conservation of agricultural biodiversity and hence a partnership between plant breeding programme, agriculture development agencies and community seed bank need to be developed for better utilisation of local crop landraces conserved at community seed.

(Source: Country Report on Plant Genetic Resources for Food and Agriculture, MoAC/NARC, 2008, Draft)

objectives, *inter alia*, of maximizing the economic and environmental benefits through proper management of domesticated elephant.

- *Strengthen Community Seed Bank at Bara district*: Community seed bank consists of network of the local people organised for the purpose of seed production, use and marketing of the local genetic resource for conservation. The community led seed bank needs to be supported by Community-based Biodiversity Management (CBM) and Community Biodiversity Register (CBR) that are community-led participatory approach to *in-situ* conservation of agrodiversity on-farm by strengthening capacity of farming communities in mobilising local knowledge and expertise, resources and local institutions (Box 4.3). These approaches will be extended to 10-15 districts covering 10-15 VDCs by 2010.
- *Develop sui generis system of plant variety protection to maintain indigenous and local knowledge*: National Agrobiodiversity Policy (2007) has been endorsed by the government. The main objective of the policy is the conservation and sustainable utilisation of Plant Genetic Resources for Food and Agriculture (PGRFA) and traditional knowledge to meet the present needs and aspiration of the future generation. In addition, the Genetic Resource Project Initiative (GRPI Nepal) project provided technical inputs to develop *sui generis* system for Plant Variety Protection and Intellectual Property Rights (legislation at draft phase).

Focal area 2: Promote sustainable use

Goal 4: Promote sustainable use and consumption

Target 4.1 Biodiversity products derived from sources are sustainably managed, and production area managed consistent with the conservation of biodiversity

Biodiversity products are derived from different ecosystems that are within the PAs and outside. However, there is insufficieent data on biological resources that are obtained from managed production area. *Reaching the target is not certain due to insufficient or lack of comparable data*. Some of the national targets may be reached, while the progress of some may be at the initial phase because the implementation of targets 4.1 and 4.2 will require financial, human, scientific, technical and technological capacity.

- *Management plan of all PAs prepared and implemented*: The Department of National Parks and Wildlife Conservation has been actively involved in the preparation of PA management plans of all PAs in Nepal. The progress is positive and by 2010 the management plans of all 16 PAs will be prepared and implementation initiated.
- *Forest opertaional plans of all 74 districts prepared and implemented*: The Department of Forest is planning to prepare forest operational plan of all 74 districts of Nepal and implement through its district level offices.
- *Participatory plant breeding and grassroot breeding initiated in three districts*: The government aims

to prioritise Participatory Plant Breeding (PPB) programme for seed development in all parts of the country. There are three districts in the Western Terai Landscape Complex Project (WTLCP), *viz*. Bardia, Kailali and Kanchanpur (also included under TAL) selected for the effective implementation of the programme. Emphasis has been given to participatory plant breeding research, and use traditional varieties as the female parent. The national policy and legislation should encourage the benefit sharing and safeguard the Intellectual Property Right and Farmer's Right for the farmers who are conserving and managing PGR. The target is related with Target 3.1.

- *Mango field gene bank established*: Wild mango *Mangifera sylvatica* has been observed in the Lothar forest of Chitwan district while searching for wild rice *0ryza granulata* during mid 1980s by NARC. Community level approach will be undertaken to conserve the genetic resources of mango in the field.
- *Effectively implement forest certification mechanism in CF for major NTFPs such as* Lokta (*Daphne bholua, D. papyracea),* Argeli (*Edgeworthia gardneri)* and Allo *(Girardinia diversifolia)*: Forest certification is one of the market-based instruments that contribute to improve management system of forests and support forestry sector development (FAO 2000). Nepal does not exploit timber in international market, but NTFPs are exported abroad, mainly to India worth US $ 15 million per annum (DoF/MFSC 2008). The certification scheme ensures that biodiversity related products are derived that are sustainably managed, and production areas are managed in consistent with the conservation of biodiversity. Forest certification in Nepal started in early 2005, comprising 21 community forests in Bajhang and Dolakha districts, and covering 10,086 ha in 2006. These initiatives have positive contribution to enhance the sustainability of community managed forests through ecosystem benefits, and institutional strengthening. However, economic gain was not observed so far. Therefore, new markets and sustainable export mechanism must be sought first before applying certification system in community forests (Kandel 2007).

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

The target relates to the previous target (Target 4.1), but the process is very slow in Nepal like in many countries. Sustainable use of biological resources has become part of some of the policy materials of the Ministries: MFSC, MoAC and MoEST. *Reaching the target is not certain due to insufficient data or lack of monitoring*.

- *Reduce unsustainable harvesting of selected medicinal plants, including Rauvolfia serpentina, Bergenia ciliata, Asparagus racemosus* and *Aconitum* species: It has been proposed to regulate over-harvesting of a few highly exploited plant species by incorporating monitoring process in the forest operational plan. These species include *Rauvolfia serpentina, Bergenia ciliata, Asparagus racemosus, Aconitum* species. Various initiatives have been undertaken at the policy level that promote sustainable utilisation of biological resources, *viz*. Herbs and NTFPs Policy (2004) and Agricultural Development Policy (2004). The government has also adopted a policy to get necessary permission for all projects from the competent forestry organisations before conducting studies such as Initial Environmental Examination (IEE) and Environmental Impact Assessment (EIA), if the projects are planned for implementation in forest areas.
- *Reduce illegal hunting of selected game animals such as blue sheep, antelopes and dolphin*: It has been realised by the government that unsustainable consumption of biological resources will be reduced through monitoring by implementing the NPWC Act (1973) as well as the 'Working Policy on Wildlife Farming, Breeding and Research (2003)'.

Target 4.3 No species of selected wild flora and fauna endangered by international trade

Nepal is a party to CITES. The target is also guided by national laws. Despite undertaking multiple approaches, progress has been slow; *the trend of Target 4.3 is having little or no overall change*.

- *Monitoring of wild forest products regulated*: Various attempts have been made to monitor the plant species that are traded in large quantity from Nepal (see chapter 1). Plant species that are identified to be traded with more than 100 tonnes such as *ritha, timur, pakhanveda, kaulo bark, pawan bark, jhyayoo*, etc. should be given high priority in conservation and their trade. Effective implementation of laws and monitoring are the key challenges.
- *Regulate and monitor selected animal species*. Some animal species such as wild buffalo, black bear, tiger, red panda, musk deer, Asiatic elephant, gaur, Tibetan wolf, rhinoceros, etc. are given high

priority in protection, and their trade is regulated to the extent possible. Population of endangered species is increasing in protected areas. However, there are many protected species whose population is yet to be assessed [*viz*. blue sheep in Dhorpatan HR] although hunting license is regulated and issued in limited quantity.

- *Draft CITES bill finalised for endorsement*: As such, no separate legislation exists, although attempt was made to develop law related to CITES. By 2010, it is proposed to finalise and endorse the bill to effectively regulate international trade.
- *CITES and anti-poaching units strengthened*: There is a need to establish a CITES unit at the Department level. Also, anti-poaching units need to be strengthened for regulating international trade of biological resources.

Focal area 3: Address threats to biodiversity

Goal 5: Pressure from habitat loss, land use change and degradation reduced

Target 5.1 Rate of loss of degradation of natural habitats decreased

The protection of natural habitats is carried out through the establishment of: (i) General protection areas (National Parks, Wildlife Reserves, Hunting Reserves, Conservation Areas and Buffer Zones; (ii) Special protected habitats (wetland sites); and (iii) Important landscape features (corridors and connectivity). The target is related to Target 1.1 and 1.2. Rate of loss of degradation of natural habitats within the PAs has been effective. However, the natural habitats outside PAs are having anthropogenic and grazing pressure. Despite undertaking multiple approaches, progress has been slow; *the trend of Target 4.3 is having little or no overall change*.

- *Loss of degradation of natural habitats decreased*. Community, leasehold for poor and private forest programmes have been highly encouraged and implemented throughout the country. More emphasis is being given to the production aspect, leading a change to natural habitats. In addition, loss of degradation of forest habitat has not been decreased, in particular during conflict period and political instability. The degradation of aquatic biodiversity has not been reduced due to lack of effective implementation of aquatic ecosystem protection, rehabilitation and management programmes, watershed restoration and enhancement activities in all major development projects. Rangelands are degrading due to lack of the rangeland policy. A proposal, to hand over at least 5,000 ha forest each year to the CFUG, and the user groups, need to be encouraged for afforestation programme with focus on native species. At least 10,000 ha forest area is proposed to be handed over each year to the FUGs.

Goal 6. Control threats from Invasive Alien Species (IAS)

Target 6.1 Pathways for major potential alien species controlled

No serious and systematic approach has been undertaken to solve the issue of IAS in Nepal. So far, the country does not have any specific institution responsible for IAS and this remains an overlooked environmental problem. Impacts of IAS are being experienced in different types of ecosystems that fall under the jurisdiction of various government authorities. Inadequate provisions to address IAS issues exist in the Plant Protection Act (1972) and Plant Protection Rules (1974) to control and eradicate the accession and extension of destructive germs and diseases in agricultural crops, but do not address adequately the IAS that belong to higher groups of plant and animal species. There is no legal punishment for negligence in the introduction of IAS. Nepal Biodiversity Strategy (2002) and National Wetlands Policy (2003) also mention about the threat from IAS. *Reaching the target is not certain due to insufficient data or lack of monitoring*.

- *Major IAS identified and their threat value assessed*: Invasion by alien species has been recognised by the scientific community, park managers and local people in recent days. General listing and documentation of invasive alien plant species of Nepal have been made (Tiwari *et al*. 2005). The scientific community, park managers and local people in recent days have observed invasion by alien species all over the country, and even within the park area leading to habitat change. Local communities have experienced threat to the native and crop species. There is no generally accepted methodology for their monitoring and their complete eradication. There is lack of funds for biological research, monitoring and/or potential interventions. The government has authorised the responsibilities to quarantine stations, checkpoints and laboratories for inspection and treatment of the plant and plant produce. Phytosanitary certificates

for export and permits for import of germplasm need to be effectively maintained. Plant quarantine certificates are required for export of wild animals/ articles under the Act. *However, the progress is unsatisfactory.*

Target 6.2 Management plans in place for major alien species that threaten ecosystems, habitats or species

For the implementation of the Target 6.2, management plans for major IAS that threaten ecosystems, habitats or species is lacking. In general, activity to control invasive species of weed category is undertaken by the farmers during weeding. It is also important to understand that IAS poses threat to habitat or native species in different countries across the national boundary. Hence, a regional approach is also essential for effective management of major alien species. *An overall condition seems to be deteriorating or likely to deteriorate*.

- *Management plan of at least three major IAS prepared and implemented*: A list of 166 IAS have been prepared and profile of 21 most troublesome plant species have been prepared (Tiwari *et al*. 2005), important among them include *Mikania micrantha, Eichhornia crassipes* and *Parthenium hysterophorus*. It has been proposed that management plan of the species will be developed by 2010 and implemented. Another invasive plant species, *Eupatorium adenophorum* that occur in the midhills are being used by women groups to make charcoal briquettes. This method controls the species to some extent. Abundance of major IAS and their impact on native biodiversity in Nepal shall be estimated. Emphasis has also been given to promote local indigenous fish species in place of introduced exotic fish species (*Salmo guirdneri, S. frutta* and *Oncorhyclus rhodurns*).

Eichhornia crassipes, a wetland invasive species

Goal 7: Address challenge to biodiversity from climate change and pollution

Target 7.1 Maintain and enhance resilience of the components of biodiversity to adapt to climate change

The NBS (2002) and NBSIP (2006) do not deal with inter-linkages between biological diversity and climate change. There is no specific national programme in Nepal to undertake research on various aspects of climate change, including impacts in atmospheric CO_2 level on biota and livelihoods of local communities. Initiatives have been undertaken to study the challenges of climate change, enhancing resilience and supporting adaptation of communities (ICIMOD 2008). *Reaching the target is not certain due to insufficient data or lack of monitoring*.

- *NAPA process initiated*: The first Initial National Communication to the Conference of Parties of the UN Framework Convention on Climate Change (UNFCCC) with the assistance of GEF-UNEP in 2004, predicted that a total of 14,778 Gg of carbondioxide has been removed from land use change (forest cover, other woody biomas stocks and abandonment of lands). The report has also mentioned that tropical wet forests and warm temperate rain forest would disappear, and cool temperate vegetation would turn into warm temperate vegetation under double CO_2 condition. Temperature rise will likely increase paddy production upto 7.5%, and wheat production only in western region, and will likely decline in maize production. The study has concluded no major change in hydrological behaviour up to 4^0C increase in temperature. Although a cleaner energy path has, to some extent, been taken to meet the obligations of UNFCCC and Kyoto protocol, Nepal cannot escape from the consequences of climate change. It has been recognised to take concrete steps to adapt to its adverse effects, and therefore, development of a National Adaptation Programme of Action (NAPA) to climate change has been recognised as an important priority and a starting point for vulnerability reduction in climate change sectors and sub-regions (NAPA 2008). The MoEST should take the lead in this regard to complete the process.

- *Climate change research and monitoring initiated*: It has been proposed to conduct ecological research and monitoring on vulnerability and adaptation in the HKH region. For research and monitoring, ICIMOD is promoting long-term permanent Trans-Himalayan Transects for monitoring biodiversity across altitudinal and longitudinal gradients; and the issue has been felt important by the scientific community during the International Mountain Biodiversity Conference (IMBC), Kathmandu, held in November 2008. It is important to protect those critical habitats, population of species and genetic diversity that contribute to resilience and/or facilitate adaptation in the face of climate change.
- *Extend study of climate change impact on livelihoods of communities*: It is being proposed to study the impact of climate change on livelihoods of communities, their adaptation and mitigation strategies. Local effects of global changes have been studied in Manang, Trans-Himalayas, Nepal as a case study. Global changes (global warming) and international movement of people (tourism, trade and out-migration of people) have impact on agricultural productivity and tourism at the local level. The study showed that the *Manangi* people have adopted different adaptive strategies to cope up with globalization process. Traditionally managed agriculture system, forest resources, animal husbandry, glacier melt water for irrigation, tourism and trade, and t equity among the communities are crucial to sustain cultural landscape, livelihoods and production system in Manang (Chaudhary *et al*. 2007).
- The REDD policy would be finalised, endorsed and implemented in Nepal.

Target 7.2 Reduce pollution and its impact on biodiversity

In order to implement target 7.2 to reduce pollution and its impact on biodiversity, some measures are in place. There has been lack of comprehensive legal tools to reduce air, water, soil pollution by contaminants, and to protect human health and biological diversity. *Reaching the target is not certain due to insufficient data or lack of monitoring.*

- *Establish baseline information on at least three important wetlands (Bagmati river, Ghodaghodi Lake and Koshi Tappu), monitor water quality and biodiversity*: The Water Resources Strategy (2002) urges, among others, to develop water and wastewater quality standards and regulations. This provides opportunity to establish water quality standards for rivers, lakes and ponds, and also establish effluent quality standards to regulate point source discharge of pollutants into water bodies. The Environment Protection Act (1996) has provision to mobilise environmental inspectors for inspection and monitoring of pollutants, and control of pollution. The Tenth Plan (2002-2007) and Interim Plan (2008-2010) have policy to implement polluters-pays principle and introduce pollution fee. The Government of Nepal has implemented the generic standards about the tolerance limit for industrial (waste water) effluents discharged to inland surface water and public sewers and industry specific standards (leather, wool processing, fermentation, vetetables ghee and oil, paper and pulp, dairy sugar, cotton textile, and soap industries). Effective implementation of these standards will help in reducing the effects of pollution on biodiversity. Nepal has yet to establish water quality standards for different uses such as for drinking water, recreation and irrigation facilities, and establish an effective enforcement mechanism. It has been proposed to establish baseline information on at least three important wetlands (Bagmati river, Ghodagodi Lake and Koshi tappu) in terms of monitoring of water quality and biodiversity. Implementation of Bagmati Action Plan could be a step forward to reduce pollution of Kathmandu and its impact on biodiversity. The action plan of other wetlands need to be developed.
- *Establish baseline information on air pollution*. Monitoring of air quality is being started in the Kathmandu city. At present, there are six monitoring stations and they are made public to know the level of air pollutants and take necessary measures.

Focal area 4: Maintain goods and services from biodiversity to support human well-being

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

Target 8.1 Capacity of ecosystems to deliver goods and services maintained

Most ecosystem services, excluding agriculture system to produce food, are currently declining, but this could be reversed through effective actions. However, this can probably be achieved only on a selective basis. *Reaching the target is not certain due to insufficient data or lack of monitoring*.

- *Maintain Siwaliks ecosystem to deliver goods and services*: In Nepal, the Churia hills protects watershed that provide vital ecosystem goods and services supporting livelihoods to the communities in the form of forest products, fuel wood, fodder, herbs, timber, bamboo, rattan and other raw materials for handicrafts as well as deliver water resources for domestic and agricultural purposes to the downstream population in the Tarai plains, where a larger part of Nepali population reside (Karn 2008). Despite the tremendous importance, it has been facing severe problems of degradation and over-exploitation. Frequent forest fires, encroachment and uncontrolled grazing, natural disasters such as flood, erosion, population growth and other vagaries cause damage to the ecosystem at large scale. This has posed a growing threat. The two regions, *viz*. Siwaliks and Tarai are closely interlinked in terms of ecosystem goods and services and interdependent in terms of food security and water availability. Therefore, the regions have to be looked through an integrated approach as there is vital economic relationship among them. There is a need to link up the use of land and forest resources to biodiversity conservation through economic incentives to local people and safeguard their traditional livelihood opportunities.

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

While the current trend is not positive, the most important resources for the poor could be protected given effective actions and could contribute to the achievement of MDG 2015 targets, especially Goals 1, 2 and 9. Despite undertaking multiple approaches, progress has been slow; *the trend of Target 8.2 is having little or no overall change*. Major challenges have been to achieve: (i) a meaningful participation of economically marginalized (pro poor) people; and (ii) targets related to sustainable livelihoods set in MDGs in general and poverty alleviation in particular.

- *Maintain biological resources for livelihoods, food security and health*: Various types of resources are available from forests, buffer zones, wetlands, etc. It has been proposed to ensure access to biological resources for ***bonafide*** use by communities through proper legislation.

(i) Wetland resources (vegetables, fruits and mollusks) are locally eaten as supplement of food and are also sold in the market. Some grasses are collected for making mattress, household goods, and thatching huts of poor rural people. Buffer zone management activity in the protected areas have been instrumental to improve the living standard of the poor people by providing job opportunities in community development activities, and supporting income generating activities. About 30-50% of the total income generated from PAs is ploughed back to the buffer zone for community development activities. This has multifold impacts in benefiting the local people and improving the conditions of biodiversity within and around the protected areas.

(ii) Various initiatives have been undertaken to improve the living condition of the local people through sustainable use of biological resources. Cardamom (in eastern hills), and coffee (in western zone) cultivation have been promoted in ecologically suitable areas. Fish farming in lakes and reservoirs by indigenous and local communities such as ***Majhi, Danuwar, Bote, Mushhar*** and ***Tharu*** is being encouraged. The cultivation of Seabuckthorn (***Hippophae salicifolia*** and ***H. tibetana***) in mountainsdistricts such as Mustang, Manang, Dolpo, Rasuwa, Solukhumbu and Taplejung has been encouraged. The juice is used as beverage and contains high percentage of vit. C, A and B_{12}. The government has encouraged the sustainable harvesting of yarsa gumba (*Cordyceps sinensis*) by reducing the royalty. In the hills such as Sankhuwasabha district, some of the species such as Allo (*Girardinia diversifolia*), and Maling (*Arundinaria*

Seabuckthorn (Hippophae salicifolia)

species), Lokta paper (species of *Daphne* and *Edgeworthia*) have supported livelihoods to generate income of the rural people.

Focal area 5: Protect traditional knowledge, innovations and local communities

Goal 9: Maintain socio-cultural diversity of indigenous and local communities

Target 9.1 Protect traditional knowledge, innovations and practices

- *Ensure protection of traditional knowledge of indigenous people through Access to Genetic Resources and Benefit Sharing (AGRBS) legislation*: In general, a long-term decline in traditional knowledge is likely to continue given global demographic, cultural and socio-economic trends. However, measures are being undertaken to reduce the rate of decline. International, national and local level organisations working for the upliftment of indigenous communities are making attempts to protect the traditional knowledge, innovations and practices of indigenous communities. The Interim Constitution of Nepal (2007) has a provision that each community shall have the right to get basic education in their mother tongue, and maintain cultural diversity by promoting their language, thereby ensuring the protection of languages of the ethnic communities. Also, national legislation related to the access to genetic resources and benefit sharing has been developed and is in the process of being tabled in the Constituent Assembly. *The trend to achieve Target 9.1 has insufficient data*.

Target 9.2 Protect the rights of indigenous and local communities over their traditional knowledge, innovations and practices, including their right to benefit sharing

The trend to achieve target 9.2 has insufficient data but depends on political will, national, regional and international commitments, and on building capacity among the indigenous and local communities, and stakeholders.

- *Protect IPRs through sui generis system*: Nepal has ratified the CBD and the Convention on Indigenous and Tribal Peoples (No. 169) adopted by the International Labour Organization (ILO) in 1989. Nepal also became a member of the World Trade Organization (WTO) on 23 April 2004. Nepal's commitment to the WTO includes the implementation of the Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS). It has been felt important to develop and enforce a *sui generis* system of Plant Variety Protection (PVP) that protects the rights of indigenous communities, plant breeders as well as "relevant stakeholders" such as farmers.

Focal area 6: Ensure fair and equitable sharing of benefits arising out of the use of genetic resources

Goal 10: Ensure the fair and equitable sharing of benefits arising out of the use of genetic resources

Target 10.1 All access to genetic resources is in line with the CBD and its relevant provisions

Nepal has formulated the following legislations: (i) Access to Genetic Resources and Benefit Sharing (draft), and (ii) Plant Breeders Rights and Farmers Rights (draft). Nepal has also ratified the International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA) on 2 January 2007. The Ministry of Forests and Soil Conservation (MFSC) has been serving as the national focal point for the implementation of the CBD at the national level and the Ministry of Agriculture and Cooperatives (MoAC) as for the ITPGRFA. Despite undertaking multiple approaches, progress has been slow; *the trend of Target 10.1 is having little or no overall change*.

- *Access to Genetic Resources and Benefit Sharing (AGRBS) drafted as per guidelines of CBD Articles*. The CBD Article 8j and related articles comprise provisions for the conservation of genetic resources, biodiversity documentation, and associated traditional knowledge, know-how practices and innovation. It also provides provisions on access to genetic resources and fair and equitable benefit sharing with the indigenous and local communities. According to AGRBS, it has been proposed that if the government is the owner of the resources, 50% of the benefits will be shared with the government, 30% with the governing authority and 20% with the communities. Similarly, if the local and indigenous communities are the owners of the resources, 51% of the benefits will be shared with them, 29% with the authority and 20% with the government. In addition, the bill also has provisions that out of the benefits received by the owners, 20% of the received benefits will have to be shared with local government institution for investment in the conservation and development of biodiversity. The major obstacles to achieving or enhancing the fair and equitable sharing of the benefits derived from the use of genetic resources are: (i) lack of information about the use, value and importance of genetic resources, (ii) lack of mechanism of bioprospecting; (iii) lack of appropriate

documentation and registration of resources (for example, identifying the multiple owners in different districts); (iv) having limited institutional arrangements required to facilitate access, Prior Informed Consent (PIC) as well as benefit sharing at both government and community levels; and (v) lack of dispute settlement mechanism at the community level (see also NARC/MoAC 2008, Draft).

Target 10.2 Benefits arising from the commercial and other utilisation of genetic resources shared in a fair and equitable way with the countries providing such resources in line with CBD and its relevant provisions

The issue of fair and equitable sharing of benefits arising from the use of genetic resources, including biotechnological processes, has not been defined in any legislation. *The target 10.2 is achievable, but depends on political will, national, regional and international commitments, and on building capacity among the indigenous and local communities, and stakeholders*.

- *Make an attempt to develop a regional AGRBS framework and policy*: Transboundary cooperation plays an important role to conserve the biological resources of the individual country as well as strengthen cooperation for utilisation of genetic resources and associated knowledge; often both the resource and knowledge are similar. Cooperation with neighbouring countries/among all the countries in the Himalayan region to develop a common regional AGRBS framework and policy will help regulate access, promote a more equitable sharing of benefits with local communities, and promote the sustainable use of biodiversity. Such regional frameworks have been developed by Andean Pact in1996, African Model Law in 2003; whereas, Central American Agreement; and ASEAN Access and Benefit Sharing Framework is in progress. The target is related to Target 9.1, 9.2 and 10.1 and a regional approach may be important to achieve this target. A national genetic resource authority should be in place in each country to strengthen cooperation.

Focal area 7: Ensure provisions of adequate resources

Goal 11. Nepal has improved financial, human, scientific, technical and technological capacity to implement the Convention at all levels

Target 11.1 New and additional financial resources are transferred to developing country parties, to allow for the effective implementation of their commitments under the Convention, in accordance with Article 20

In Nepal, adequate amount of financial resources has not been transferred to biodiversity conservation and sustainable use of its components; whereas more emphasis has been given to address the issues of conflict, peace building and rehabilitation of a decade-long armed conflict. *An overall condition seems to be deteriorating or likely to deteriorate*.

- *Ensure full implementation of NBS and NBSIP by ensuring financial and human resource development*: A major constraint in the implementation of the strategy under NBS and projects under NBSIP is lack of financial resources. The government, donors and private sectors were the main stakeholders proposed for financial and other resources for these projects. There has been no progress in the formation of Nepal Trust Fund for Biodiversity (NTFB) as proposed in NBS in 2002. To date, many activities for the implementation of the NBSIP are done through the availability of limited funds obtained by the government, GEF and other funding through NGOs. However, resources are still inadequate to effectively implement NBSIP. Hence, financial constraints and long-term conflict have deteriorated to achieve Target 11.1. In addition, it is essential to improve human, scientific, technical and technological resources through bioprospecting.

Target 11.2 Technology and skills transferred to developing country parties, to allow for the effective implementation of their commitments under the Convention in accordance with its Article 20, paragraph 4.

The transfer of technology under Target 11.2 is being done mainly in the field of human capacity and institutional strengthening. Political will at national level and regional and international commitments on building capacity are essential to achieve Target 11.2. *Reaching the target is not certain due to insufficient transfer of technology*.

- The ultimate aim is to provide easy and open access to biodiversity information of the Himalayas via GBIF/GMBA Mountain Biodiversity Portal and the Mountain Geo-Portal of ICIMOD. The programme aims to develop a framework and partnership for standardized biodiversity database, their dissemination through standard metadata system to the wider Regional and Global Change Research Community. The Global Mountain Biodiversity Assessment (GMBA) is a cross-cutting research network of DIVERSITAT, the international program of biodiversity science (Korner and Spehn 2002).

4.3: Specific Conclusions and Suggestions

4.3.1 Implementation of CBD in Nepal

The implementation of CBD in Nepal has been achieved through NBS (2002) and NBSIP (2006). The Strategy and the Implementation Plan have improved conservation and sustainable use of biodiversity in various ways. Some of these include:

i updating and reflecting the current state of knowledge on biological diversity and biological resources;
ii sensitizing the stakeholders involved in biodiversity conservation through partnership approach;
iii identifying important policy and planning gaps, constraints on resources and facilities;
iv raising awareness of biodiversity at least at systemic and institutional levels;
v focusing on priority implementation projects; and
vi providing a framework of National Biodiversity Coordination Committee (NBCC) through which planning, implementation and the sharing of best practices can take place efficiently and effectively.

Despite some successes, there are considerable inefficiencies in implementation, which have led to significant delays to successfully accomplish the objectives of the NBSIP.

4.3.2 Lessons learned

Various lessons have been learned during the course of the implementation of CBD in Nepal. A few examples include:

- Community-based conservation is most essential and effective for the conservation and sustainable use of biodiversity. Different community perspectives (local and indigenous communities, including poor and disadvantaged people, religious leaders, local healers, women, user groups, etc.) should be considered in making decisions on the use and management of biological resources. Community forest in Nepal has been a successful programme to conserve forests and to fulfil the basic needs of user groups.
- Empowering the communities (including poor and socially excluded women) and dissemination of the knowledge to them at the grassroots level has been vital for effective implementation of CBD in Nepal through NBS and NBSIP. During stakeholders consultation at district level, it was observed that the terminology such as 'biodiversity', 'climate change', 'access to genetic resources and benefit sharing' are generally unfamiliar to the local communities. However, they are well abreast with the inter-relationship between biodiverstiy, ecosystem, livelihoods and global warming; increasing phenomenon of diseases and pests in the mountains; access to genetic resources and benefit sharing, etc. A similar conclusion has also been obtained by the joint working group of National Capacity Needs Self-Assessment for Global Environmental Management of Nepal (MoEST and UNDP 2008). Therefore, these perceptions need to be internalised by ensuring their participation in biodiversity conservation and sustainable use.
- The national policy debates are now increasingly considering the issues of Tarai forest governance. It is crucial time to capture learning from communities at the grassroots level as an opportunity to revise the forest policy for Tarai region (Jamarkattel *et al*. 2009).
- Landscape approach has been important to conserve and monitor biodiversity, in particular at transboundary scale as well as to resolve issues related to benefit sharing at the regional level (ICIMOD 2007).

4.3.3 Summary of future priorities and capacity building need

- The future priorities need to be focused on shifting paradigms that include a holistic and community based landscape approach to conservation and livelihoods in line with ecosystem-based approach as advocated by the CBD, and moving from species conservation to landscape approach.
- The future priorities need to be focused on the sustainable use of biological resources, mitigation and adaptation measures to local effects of global changes such as tourism, global warming,

international trade, etc. in different ecosystem and sustainable livelihoods, maintain ecosystem services and economic valuation of biodiversity at different levels, and ensure fair and equitable sharing of benefits.
- Capacity building at all levels, in particular focusing at community level, needs to be developed.

4.3.4 Suggestions for action

(i) Global level
- The Convention's language (CBD article 20; Goal 11 of 2010 Biodiversity Target) related to transfer of new and additional financial resources to allow for effective implementation of CBD has to be understood in a better way. Lack of financial and technical assistance has substantially put limitations to effectively implement the CBD. Nepal has to purposefully improve financial, human, scientific, technical and technological capacity to implement the Convention at all levels.

(ii) Regional level
- Further regional collaboration with respect to conservation, sustainable use and fair and equitable sharing of benefits of biodiversity will strengthen and enhance regional capacity for joint initiatives on resolving transboundary issues.
- Despite countries in this region differ to an extent in terms of economic, social, cultural and political situation, harmonization of conservation related legislations would be extremely useful to resolve cross-border issues such as illegal hunting, unsustainable trade, pollution, etc.
- A regional level approach should be undertaken to study the impact of climate change on biodiversity in the Himalaya, and enhancing resilience, supporting adaptation to local communities, and establishing upward-downward ecosystem service linkages.

(iii) National level
- As committed in the Nepal Biodiversity Strategy, a 13-member National Biodiversity Coordination Committee (NBCC) has been formed under the chair of Hon'ble Minister of Forests and Soil Conservation. Five thematic sub-committees have also been formed to adequately address the issues of different themes related to biodiversity such as forest, agriculture, sustainable use, genetic resources and biosecurity. Serious attempts have to be undertaken by the Government of Nepal to actively mobilise NBCC, and the thematic sub-committees to meet the goals of the Convention and aspirations of the people of Nepal.
- There is a need to review important habitats in the country that are within the protected area system and outside along West-East (regional) and South-North (altitudinal) axes by considering biodiversity at biome, ecosystem, habitat, species and genetic levels and by identifying threat level, in particular outside PAs. As an example, many of the Important Bird Areas and Important Plant Areas in Nepal remain unprotected. It is crucial to understand that achievement of conservation and sustainable use of biodiversity will require geographical prioritisation focusing on the conservation of key sites.
- Landscape level planning and monitoring should be strongly implemented for biodiversity conservation. This should include linkages at different ecological zones in the new federal structure of Nepal (related to point 4.2 above), and bring harmony between national, sub-national and local levels, and among the neighbouring districts in access to genetic resources and benefit sharing.
- Biodiversity documentation has yet to be internalised as a regular government programme by providing adequate training to the field staff and increasing public awareness.
- There is a need to establish clear objectives, indicators and targets at the project/programme level and ensure sufficient linkages with country programmes and individual projects. This should be accompanied by monitoring that will require the selection of indicators for assessing conservation progress at time scale. It is recommended that the indicators chosen are realistic and should include biological, social and economic processes.

(iv) Local level
- As per the provisions in NBS and NBSIP, the District Biodiversity Coordination Committee (DBCC) has been formed only in 10 districts so far. The government's plan to constitute DBCC in all 75 districts of Nepal has not been realised as the process has been extremely slow. In addition, it is crucial to build the capacity of District Development Committees (DDCs) and Village Development Committees (VDCs) to manage the biological resources and link DBCC with them.

(v) Non-governmental organisations (NGOs) and Community Based Organisations (CBOs)
- The NGOs and CBOs, including user groups, should play catalytic roles through developing

innovative conservation case studies and identifying sustainable use practices, especially at the community level by collaborating/coordinating their programmes with DDCs and VDCs.

4.4 Suggested goals and objectives

In the era of global changes, the goals and objectives on the following areas need to be incorporated, in addition to those given in NBS and NBSIP:

i. Incorporate the climate change issue at policy, implementation and monitoring levels. MFSC and MoEST would jointly take the lead.
ii. Incorporate a programme to undertake research and development initiatives on economic, ecological, cultural and social valuation of biodiversity. This should provide a basis to estimate the goods and services provided by different ecosystems (both tangible and intangible), and further encourage stakeholders to integrate biodiversity conservation into their development activities. For this, the MFSC would act as the lead agency in collaboration with its different government departments, academic institutions and NGOs.
iii. Land use assessment of Nepal has not been undertaken for over a decade to understand the land use change, forest and shrub area, coverage, density, structure, biodiversity composition, etc. An ideal approach that seems necessary is to conduct land use survey at every ten years' interval. The DFRS would be the lead agency in collaboration with other stakeholders.
iv. Access to Kyoto protocol has opened avenues to access for funding from Clean Development Mechanism (CDM) to develop forests as carbon sink. The service provided by community forest should be considered potential under CDM and included for financial compensation. The MoEST and MFSC would take the lead role. Nepal has started the process of developing the National Adaptation Plan of Action (NAPA). The project is aimed at building the capacity of local people in monitoring carbon pool within their forest by themselves.

4.5 Suggested mechanism

i. It is suggested to undertake, by a team of experts, a critical review of NBS and NBSIP, identify gaps and weaknesses and revise the NBSIP for the period of 2011-2015 by identifying priority areas and incorporating current issues such as climate change, ecosystem services, polluters pay principle, carbon trade, etc.

ii. The Nepal Fourth National Report to the CBD requires wider circulation among the policy makers and planners, public, academia, media and NGOs. The final report shall be made available to a wide range of stakeholders through website. In addition, the report would be published and launched during the International Day for Biological Diversity on May 22, 2009.
iii. It is suggested to develop, on the basis of wider consultation, well focused quantitative and measurable national goals, targets and objectives to be achieved beyond 2010 by harmonizing the criteria developed at global and regional levels as well as national level such as MDGs, Millennium Ecosystem Assessment (MEA), etc.
iv. It is recommended to address properly (as fundamental rights) the protection of environment and its components such as conservation of biodiversity, access to resources, and their sustainable use in the Constitution of Nepal which is under formulation. It has been felt necessary to incorporate in the Constitution of Nepal that at least 40% of the natural forest area will be conserved in the country.

Forest fire in the midhills of Nepal.

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Appendix 1

Information concerning preparation of the National Report

1.1 PROCESS FOR THE PREPARATION OF THE REPORT

I. National focal point

The Ministry of Forests and Soil Conservation (MFSC), the national focal point for the CBD, initiated the preparation of the Nepal Fourth National Report to the CBD. The MFSC, on behalf of Nepal as a party to CBD, applied to GEF/UNDP for the financial support to prepare Nepal Fourth National Report to the CBD and funding was approved.

II. National Report Coordination Team (NRCT)

A National Report Coordination Team (NRCT) comprising 9 members was constituted representing various stakeholders and experts to initiate the preparation of the Nepal Fourth National Report. The NRCT worked on development and selection criteria for consultant to prepare the report. A Terms of Reference (ToR) was finalised for the consultant. After the selection of the consultant, report writing was started. The report has been written by the consultants with support from experts from various national and international organisations, individuals and thematic experts.

III. Workshops

Several workshops were held to discuss on the progress of the report at various levels. The workshops provided guidelines and suggestions on the preparation of the report.

IV. Public notice

A public notice was published in the daily newspaper *Gorkhapatra* (September 18, 2008) by the Ministry of Forests and Soil Conservation (MFSC) with the aim to disseminate information about the initiative of national report preparation. Request was made to all stakeholders including local communities involved in biodiversity conservation to send their valuable information and opinion on biodiversity.

V. Desk study/review of literature

The report is based on the information collected at secondary levels which are basically drawn from document analysis and review of documents. The major source of secondary information was government reports and documents, donor agencies, and NGOs, academic institutions, and individual experts. The data compiled was analyzed to assess the status, trend and threat to biodiversity, and implementation of biodiversity.

VI. Field consultation and focus group discussion

Field consultation in Chitwan was coordinated by NTNC and held on 19 October, 2008. Similarly, a second field level consultation coordinated by MFSC was held in Dolakha on 24 October, 2008. Presentation was followed by discussion and focus group discussion (See Table Appendix 1.1 for Chitwan and Dolakha field visits).

Field visit comprised of workshop, stakeholders consultation, site inspection and observations. Discussion was initiated with political and social leaders and local communities and stakeholders. The main issues discussed in the focus group are conservation sensitivity, importance of biodiversity features, present status, present problems or difficulties, potential solutions, and consequences of the proposed Conservation Area.

VII. Stakeholders consultation

The key stakeholders: Ministries, Departments, governmental line agencies, NGOs, INGOs, experts, academia and other stakeholders were consulted.

VIII. Consultation with Community Forest User Groups

A workshop with community forest user groups was coordinated by MFSC. In the workshop, issues related to biodiversity conservation were discussed. The participants were made aware about 2010 Biodiversity Indicators and national responsibility (See Appendix 1.1 for Chitwan and Dolakha field visits).

IX. Capacity building workshop

Mr. Sudhir K. Koirala, MFSC, attended a workshop in Tsukuba, Tokyo, Japan with the aim to discuss on the progress of the report. Chapter one was presented and discussed. The workshop immensely contributed to the preparation of the report by providing relevant materials.

X. National Workshop

A national workshop was organized on March 4, 2009, in Kathmandu, with the objective to finalise the Nepal

Fourth National Report. The workshop was participated by wider level of stakeholders. The comments and suggestions received were later incorporated into the report.

XI. Review and peer review

The first draft of the report sent to the CBD Secretariat, provided important feedbacks to improve the report. A peer review was carried out by experts on thematic areas. The valuable comments received from there have been incorporated into the main document.

XII. Final editing

After the incorporation of the comments and suggestions from experts, final editing was undertaken vis-à-vis the process of report layout and design was also carried out.

XIII. Audio-visual preparation

An audio-visual footage of the report preparation process was also undertaken and will be submitted to the CBD Secretariat in due course of time.

XIV. Final report submission

The final CBD National Report was prepared both in electronic and print forms. The e-report (draft) was finally submitted to the CBD Secretariat on March 30, 2009. The formal launch-on ceremony of the report will be organised during the celebration of the International Day of Biological Diversity on May 22, 2009.

Table1.1: Workshop/field consultation for report preparation

Date and Workshop	Venue	Participants and Stakeholders	Remarks
19 September, 2008 Inception (First) Workshop	Kathmandu	Core group, experts and invitees	• Methodology discussed • Finalisation of the content • Discussion on biodiversity Indicators
15 October, 2008 Second Workshop	Kathmandu	Core group, experts and invitees	• Dissemination of information on biodiversity, its importance at global, regional, national and local levels and its use • Observation of community forest in the BZ • Observation of park area and wildlife
19 October, 2008 District level Workshop	Chitwan	Authorities of MFSC, consultants, FUGs, park authorities, nature guides and farmers	
24 October, 2008 District level Workshop	Dolakha	Authorities of MFSC, consultants, FUGs, DDC members, social, political leaders, indigenous communities and farmers	• Dissemination as above • Radio broadcasts (live and recorded) • Observation of community forest • Biodiversity issues, ownership, access to genetic resources and benefit sharing
12 November, 2008 Community Forest Group	Kathmandu	Community forest user groups, District Forest Officers and others	• Biodiversity conservation and community forest
4 January, 2009 In-house Workshop	Kathmandu	MFSC: Secretary, Division Chief, core group	• Progress towards report preparation • Submission of Zero Draft
4 March, 2009 National Workshop	Kathmandu	Core group, experts and invitees	• Progress towards report preparation • Obtain comments/ suggestions for report finalisation
March 2009 Review	Kathmandu	Mr. Lijie Cai Programme Officer CBD/UNEP	• Comments received
March 2009 Peer Review	Kathmandu	Experts	• Comments received and endorsed
March 2009 Final editing	Kathmandu	Experts	• Comments incorporated
Audio-visual preparation	Kathmandu	MFSC	• Audio-visual prepared
Final report submission March 30, 2009	CBD Secretariat	MFSC	• Nepal Fourth National Report to the CBD submitted (e-report)

1.2 PUBLIC SUPPORT TO AND PARTICIPATION IN THE IMPLEMENTATION OF THE CONVENTION

List of persons consulted during the preparation of fourth National Report

Table 1.2: Inception Workshop, Kathmandu, 19 September 2008

SN	Name	Organisation
1.	Dr. Pralad Yonzon	Resources Himalaya
2.	Deepak Kharal	Department of Forest Research and Survey
3.	Dr. Hem Sagar Baral	Bird Conservation Nepal
4.	Dr. Jagadish Chandra Baral	Ministry of Forests and Soil Conservation
5.	Dr. Narendra Man Babu Pradhan	Department of National Parks and Wildlife Conservation
6.	Madhu Ghimire	Ministry of Forests and Soil Conservation
7.	Dr. SB Bajracharya	National Trust for Nature Conservation
8.	HK Uprety	Conservation and Sustainable Use of Wetlands in Nepal Project
9.	CP Guragain	Ministry of Forests and Soil Conservation
10.	Neera Pradhan	Ministry of Forests and Soil Conservation
11.	Mingma Sherpa	International Union for Conservation of Nature
12.	Prakash Mathema	Department of Soil Conservation and Watershed Management
13.	Prof. KK Shrestha	Central Department of Botany, TU
14.	Prof. Madan Koirala	Nepal Forum of Environmental Journalists (NEFEJ)
15.	Dr. Tirtha B. Shrestha	Nepal Academy
16.	Arati Shrestha	Himawanti Nepal
17.	Subarna Chaudhary	NFDIN
18.	Kalu Bhai Khadka	NEFUG
19.	Suraj Ketan Dhungana	Department of Plant Resources
20.	Ananta Parajuli	Ministry of Forests and Soil Conservation
21.	Dr. MP Upadhyaya	Nepal Agricultural Research Council
22.	Sagar Kumar Rimal	Department of Forests
23.	Dr. Krishna Chandra Paudel	Ministry of Forests and Soil Conservation
24.	Prof. PK Jha	Central Department of Botany, TU
25.	Yogeshwor Rai	NECIN
26.	Prof. Ram P. Chaudhary	Tribhuvan University

Table 1.3: List of participants attending second workshop on CBD report preparation, Kathmandu, 15 October 2008

SN	Name	Organisation	E-mail	Telephone
1.	Prof. Madan Koirala	NEFEJ	mkoirala@wlink.com.np	9841259938
2.	Dibya Gurung	UNDP		5523200
3.	Dr. Narendra MB Pradhan	DNPWC		9841473115
4.	Dr. SB Bajracharya	NTNC		5526571
5.	SK Rimal	DoF	rimalsagar@yahoo.com	4247599
6.	Madhu Ghimire	MFSC		9841357247
7.	Dr.Tirtha B Shrestha	Nepal Academy	tirtha@infofamily.com.np	5521258
8.	Surbarna M Chaudhary	NFDIN	nfdin@infoclub.com.np	5528370
9.	Dr. Pralad Yonzon	Resources Himalaya		5537502
10.	Bidya Banmali Pradhan	ICIMOD	bbanmali@icimod.org	5003222
11.	Prof. Krishna K Shrestha	CDB, TU	kkshrestha@cdbtu.edu.np	4331322
12.	Dr. KC Paudel	MFSC	kcpaudel@hotmail.com	
13.	Ananta Parajuli	MFSC	avp@ecomail.com.np	
14.	Dr. MP Upadhyaya	NARC	upadhyaymp@yahoo.com	
15.	Sudhir K Koirala	MFSC	sudhirkoirala@yahoo.com	9841975841
16.	Prof. Ram P Chaudhary	TU/Botany	ram@cdbtu.wlink.com.np	9841283652
17.	Raj Babu Thapa	Training section/MFSC	rajbabuthapa@yahoo.com	9841659294
18.	Bishwa Kafle	MFSC	bishow@hotmail.com	
19.	Prof. PK Jha	CDB, TU	pkjhaprof@gmail.com	9851105646
20.	Harihar Sigdel	MFSC	hariharsigdel@gmail.com	

Table 1.4: Chitwan Workshop, 19 October 2008

SN	Name	Organisation
1.	Narayan Prasad Khanal	Kankali Community Forest User Group (CFUG)
2.	Jeet Bahadur Tamang	NGA
3.	Ishwori Prasad Dhakal	Conservation Education Centre
4.	Saraswati Sedhain	Environmental Farmers' Forum
5.	Mitra Prasad Adhikari	Nawa Jagriti Community Forest User Group
6.	Kul Prasad Kandel	Nawa Jagriti Community Forest User Group
7.	Krishna Prasad Prajapati	Bandevi Community Forest User Group
8.	Udaya Chandra Aryal	Bandevi Community Forest User Group
9.	Manoj Ghimire	Wildlife Conservation Nepal
10.	Bal Mukunda Pokharel	Wildlife Conservation Nepal
11.	Shiva Hari Koirala	Rambel Community Forest User Group
12.	Ghanashyam Timalsina	Jan Kauli Community Forest User Group
13.	Singh Bahadur Tamang	Baghmara Buffer Community Forest User Group
14.	Bhimarjun Neupane	FECOFUN, Chitwan
15.	Ana Nath Baral	Chitwan National Park
16.	Shuk Man Gurung	Baghdevi Community Forest User Group
17.	Buddhi Raj Pathak	Chitwan National Park
18.	Achyut Rat Pant	Biodiversity Conservation Centre
19.	Ramprit Yadav	Terai Arc Landscape Complex Project

20.	Dharma Raj Adhikari	Panch Kanya Community Forest User Group
21.	Sewak Subedi	Panch Kanya Community Forest User Group
22.	Dipendra Baduwal	Kantipur Daily
23.	Nava Raj Misra	Kantipur Television
24.	Pravin Dutt	Kantipur Television
25.	Ramesh Kumar Paudel	Chitwan Post Daily
26.	Nakul Lamichhane	Synergy FM Radio
27.	Subansh Prasad Chaudhari	Chitwan National Park
28.	Yogendra Lama	BCC/NTNC
29.	Prof. Ram P. Chaudhary	Tribhuvan University

Table 1.5: Dolakha Workshop, 24 October 2008

SN	Name	Organisaton
1.	Sharda Bijukchhe	Women Development Office
2.	Dr. Krishna Bahadur Karki	District Soil Conservation Office
3.	Nawaraj Neupane	Feden Nepal
4.	Shambhu Baraili	ANSAB
5.	Udit Prakash Sigdel	ECARDS
6.	Shambhu Bahadur Thapa	Barshe Dandapari Community Forest
7.	Mandira Basnet	Barshe Dandapari Community Forest
8.	Ishwar Prasad Upadhyaya	Swiss Agency for Development Cooperation
9.	Sita KC	FECOFUN
10.	Shanti Prasad Oli	Oli Agro vet
11.	Kiran Sigdel	Bochh Village Development Committee
12.	Dr. Yadav Sharma Bajgain	District Livestock Services Office
13.	Dandapani Khanal	District Agriculture Development Office
14.	Fatta Bahadur Shrestha	Farmer
15.	Bishal Ghimire	District Forest Office
16.	Yugal Kishor Lal	District Forest Office
17.	Bishwa Kafle	Ministry of Forests and Soil Conservation
18.	Gyan Bahadur Tamang	Bhitteri Pakha Community Forest
19.	Rameshwar Khadka	Eco Himal
20.	Jayaram Shrestha	Kagaz Udhyog
21.	Shiva Bhandari	Nepal Communist Party (UML)
22.	Rajendra Karki	District Administration Office
23.	Gyanendra Pradhan	Coption
24.	Bhawani Karki	District Journalist Federation
25.	Karma Sherpa	Kagaz Udhyog
26.	Chandra Bahadur Thapa	District Forest Office
27.	Sharda Ghimire	HIMAWANTI
28.	Krishna Bahadur	Municipality
29.	Harihar Neupane	FECOFUN
30.	Kamala Basnet	NGO Federation
31.	Bimal Kumar Shrestha	Ayurved health centre
32.	Krishna Karki	LHFUG
33.	Jagadish Aryal	DDC

34.	Surya P. Khanal	MFSC
35.	Sudhir Kumar Koirala	MFSC
36.	Dr. Krishna Chandra Paudel	MFSC
37.	Prof. Ram Prasad Chaudhary	Tribhuvan University

Table 1.6: Community Forest User Group Workshop, 12 November 2008, Kathmandu

SN	Name	Organisation
1.	Bhuwan Raj Sharma	FECOFUN, Baitadi
2.	Sushila Nembang	FECOFUN, Ilam
3.	Chandra Prasad Thani	FECOFUN, Surkhet
4.	Pitambar Bhandari	FECOFUN, Sindhupalchowk
5.	Bachchu Shah Kanu	CFUG, Rautahat
6.	Dron Raj Paudel	CFUG, Parbat
7.	Manju Malasi	Chisapani Mahila CF, Doti
8.	Purna Shekhar Devkota	Chimara CF, Jumla
9.	Gokarna Chaulagain	FECOFUN, Jumla
10.	Mohammad Kar Khan	FECOFUN, Bardia
11.	Anju Shah	FECOFUN, Sunsari
12.	Ran Bahadur Thapa	FECOFUN, Dailekh
13.	Shanta Bahadur Karki	FECOFUN, Kailali
14.	Bishnu Lal Shah	FECOFUN, Siraha
15.	Netra Prasad Khanal	FECOFUN, Kailali
16.	Gokul Khanal	FECOFUN, Kailali
17.	Radha Acharya	Himawanti, Dang
18.	Pushpa Raj Parajuli	FECOFUN, Makawanpur
19.	Om Lal Giri	FECOFUN, Kapilbastu
20.	Tek Bahadur Bharati	FECOFUN, Kalikot
21.	Singh Bahadur Thapa	FECOFUN, Palpa
22.	Sita Khatiwada	FECOFUN, Dhading
23.	Hari Prasad Neupane	FECOFUN, Central Office
24.	Tulsi Devkota	FECOFUN, Kailali
25.	Kamala Dhamala	FECOFUN, Dhankuta
26.	Krishna Raj Subedi	FECOFUN, Kailali
27.	Bal Bahadur Rai	FECOFUN, Dhankuta
28.	Govinda Karki	FECOFUN, Sankhuwasabha
29.	Kazi Subba	FECOFUN, Terhathum
30.	Brish Bahadur Shahi	FECOFUN, Humla
31.	Dandi Raj Subedi	Bhageshwor Community Forest, Kailali
32.	Narayan Prasad Pokharel	FECOFUN, Dhading
33.	Shovakar Sapkota	FECOFUN, Dang
34.	Shankar Sharma	FECOFUN, Dang
35.	Bhim Prakash Khadka	FECOFUN, Dang
36.	Ananda Sagar Timsina	FECOFUN, Morang
37.	Dibya Gurung	UNDP, Kathmandu
38.	Dr. Krishna Chandra Paudel	Director General, Department of Forest

39.	Sudhir Koirala	Ministry of Forests and Soil Conservation
40.	Prof. Ram Prasad Chaudhary	Tribhuvan University, Kathmandu
41.	Surya Khanal	Ministry of Forests and Soil Conservation

Table 1.7: Consultation meeting during organisations' visit, Kathmandu

SN	Name	Organisation
1.	Dr. MP Upadhyaya	Nepal Agricultural Research Council
2.	Dr. Tek Bahadur Gurung	Nepal Agricultural Research Council
3.	Dr. Sriram Prasad Neupane	Nepal Agricultural Research Council
4.	Dr. Ekalabya Sharma	ICIMOD
5.	Bidya Banmali Pradhan	ICIMOD
6.	Jeetpal Kirat	National Foundation for Development of Indigenous Nationalities
7.	Bhawani Prasad Loharung	National Foundation for Development of Indigenous Nationalities
8.	Dandi Sherpa	National Foundation for Development of Indigenous Nationalities
9.	Yogeshwor Rai	National Foundation for Development of Indigenous Nationalities
10.	Lok Bahadur Thapa Magar	National Foundation for Development of Indigenous Nationalities
11.	Jagat Rai	National Foundation for Development of Indigenous Nationalities
12.	Dr. Pralad Yonzon	Resources Himalaya
13.	Megh Bahadur Pandey	Department of National Parks and Wildlife Conservation
14.	Dr. Narendra Man Babu Pradhan	Department of National Parks and Wildlife Conservation
15.	Shyam Bajimaya	Department of National Parks and Wildlife Conservation
16.	Mr. Fanindra Raj Kharel	Department of National Parks and Wildlife Conservation
17.	Shiva Raj Bhatta	Department of National Parks and Wildlife Conservation
18.	Karun Pandit	Department of National Parks and Wildlife Conservation
19.	Sher Singh Thagunna	Department of National Parks and Wildlife Conservation
20.	Dr Siddhartha Bajra Bajracharya	National Trust for Nature Conservation
21.	Juddha Bahadur Gurung	National Trust for Nature Conservation
22.	Dr. Lokendra Raj Sharma	Department of Plant Resources
23.	Dr. Sushim Ranjan Baral	Department of Plant Resources
24.	Dr. Mahesh Adhikari	Department of Plant Resources
25.	Lalit Kattel	Department of Plant Resources
26.	Rajesh Upreti	Department of Plant Resources
27.	Asha Karki	Department of Plant Resources
28.	Balaram Kandel	Department of Forests
29.	Keshav Khanal	Department of Forests
30.	Sri Prasad Baral	Department of Forests

Table 1.8: Participants of National Workshop, Kathmandu, 4 March 2009

SN	Name	Organisation
1.	Dr. Uday Raj Sharma	Ministry of Forests and Soil Conservation
2.	Dr. Krishna C. Paudel	Department of Forest
3.	Madhab Prasad Acharya	Ministry of Forests and Soil Conservation
4.	Dr. Annapurna Nand Das	Ministry of Forests and Soil Conservation
5.	Dr. Siddhartha Bajra Bajracharya	National Trust for Nature Conservation
6.	Prof. Madan Koirala	Nepal Forum of Environmental Journalists
7.	Prof. Pramod Kumar Jha	Tribhuvan University
8.	Dibya Gurung	United Nations Development Programme
9.	Dr. Mahesh Adhikari	Department of Plant Resources
10.	Prakash Mathema	Department of Soil Conservation and Watershed Management
11.	Bishwa Nath Oli	Department of Forest Research and Survey
12.	Ganga Ram Singh	Department of National Parks and Wildlife Conservation
13.	Bidya Pandey	Ministry of Agriculture and Cooperatives
14.	Dr. Eklabya Sharma	ICIMOD
15.	Dr. Hem Sagar Baral	Ornithologist
16.	Subarna Chaudhary	NFDIN
17.	Yogesh Rai	NFDIN
18.	Sudhir Kumar Koirala	Ministry of Forests and Soil Conservation
19.	Surya Prasad Khanal	Ministry of Forests and Soil Conservation
20.	Prof. Ram Prasad Chaudhary	Tribhuvan University
21.	Sagendra Tiwari	Freelancer
22.	Ram Bhakta Malla	Ministry of Forests and Soil Conservation
23.	Neera Pradhan	Ministry of Forests and Soil Conservation
24.	Dr. Akhileshwor Lal Karna	Department of Forests
25.	Balaram Kandel	Community Forestry Division/Department of Forests
26.	Resham Bahadur Dangi	Department of Forests
27.	Dr. Rajan Pokharel	Tree Improvement and Seed Centre
28.	Dinesh Karki	Western Terai Landscape Complex Project
29.	Dr. Rishiram Koirala	Ayurveda Department
30.	Dipak Gyawali	Department of Forests
31.	Nakul Chhetri	ICIMOD
32.	Suraj Ketan Dhungana	Department of Plant Resources
33.	Bishnu B. Bhandari	IUCN
34.	Satya Narayan Chaudhary	ECCA
35.	Top Bahadur Khatri	Conservation and Sustainable Use of Wetlands in Nepal
36.	Rama Ale Magar	Himalayan Grassroots Women Natural Resource Management Association
37.	Bimala Bista	Ministry of Forests and Soil Conservation

Appendix 2
Further sources of information

2.1 Implementation of biodiversity and related Conventions

Appendix 2.1a: Major International Conventions adopted and ratified by Nepal

SN	List of Conventions	Entry into force
1.	Plant Protection Agreement for Southeast Asia and the Pacific (as amended) (1956)	12 August 1965
2.	Convention on International Trade in Endangered Species of Wild Fauna and Flora (1973)	16 September 1975
3.	Convention for the Protection of the World Cultural and Natural Heritage (1972)	20 September 1978
4.	Convention on Wetlands of International Importance, especially as Waterfowl Habitat (1971)	17 April 1988
5.	Agreement on the Network of Aquaculture Centers in Asia and the Pacific (1988)	11 November 1990
6.	Convention on Biological Diversity (1992)	21 February 1994
7.	United Nations Framework Convention on Climate Change 1992, Kyoto Protocol (1997)	31 July 1994
8.	Vienna Convention for the Protection of the Ozone Layer (1985)	4 October 1994
9.	Basel Convention on the Control of Trans-boundary Movements of Hazardous Wastes and their Disposal (1989)	13 January 1997
10.	United Nations Convention to Combat Desertification (1994)	13 January 1997
11.	Convention on World Trade Organization (WTO)	23 April 2004
Ratified		
12.	Convention on Indigenous and Tribal Peoples (No. 169)	22 August 2007
13.	International Treaty on Plant Genetic Resources for Food and Agriculture	2 June 2007
14.	National Clean Development Mechanism of Kyoto Protocol	2007

Appendix 2.1b Major Strategic Exercises in Nepal

Year	Strategic Exercise	Year of publication
1.	National Conservation Strategy of Nepal	1988
2.	Master Plan for the Forestry Sector	1989
3.	Nepal Environment Policy and Action Plan I	1993
4.	Agricultural Perspective Plan	1995
5.	Nepal Environment Policy and Action Plan II	1998
6.	Revised Forest Policy	2000
7.	Nepal Biodiversity Strategy	2002
8.	Water Resources Strategy	2002
9.	National Wetlands Policy	2003
10.	Sustainable Development Agenda for Nepal	2003

11.	Agriculture Policy	2004
12.	Herbs and Non Timber Forest Products Development Policy	2005
13.	National Agrobiodiversity Policy	2007
14.	National Biosafety Policy	2007

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Appendix 2.1c Major Acts, Regulations and Guidelines related to biodiversity conservation

SN	Acts/Regulations/Guidelines
1.	Aquatic Animals Protection Act (1961)
2.	National Parks and Wildlife Conservation Act (1973)
3.	Plant Protection Act (1973)
4.	Tourism Act (1977)
5.	Soil and Watershed Conservation Act (1982)
6.	King Mahendra Trust for Nature Conservation Act (1983), amended as National Trust for Nature Conservation Act (2007)
7.	Seed Act (1989)
8.	Pesticide Act (1992)
9.	Forest Act (1993)
10.	Environment Protection Act (1996)
11.	Livestock Health and Livestock Service Act (1998)
12.	Water Resources Act (1993)
13.	Local Self-Governance Act (1999)
Regulations	
1.	National Parks and Wildlife Conservation Regulations (1974)
2.	Royal Chitwan National Park Regulations (1974)
3.	Himalayan National Parks Regulations (1979)
4.	Royal Bardia National Park Regulations (1995)
5.	Forest Regulations (1995)
6.	Environment Protection Regulations (1997)
7.	Buffer Zone Regulations (1996)
Guidelines and Manuals	
1.	Community Forestry Guidelines (1996)
2.	Buffer Zone Management Guidelines (1999)
3.	Revised Community Forestry Guidelines (2002)
4.	Leasehold Forestry Guidelines (2002)
5.	Collaborative Forest Management Guidelines (2004)
6.	Environment Impact Assessment Review Guidelines (2059 BS)
7	Initial Environment Examination Manual, 2061 BS
8	Biosafely Guidelines, 2005

2.2 National Reports submitted to other related Conventions

MFSC 1997. National Report on the Implementation of the Convention on Biological Diversity in Nepal. Ministry of Forests and Soil Conservation, His Majesty's Government of Nepal, Kathmandu.

MFSC 2002. Second National Report to the Convention on Biological Diversity. Ministry of Forests and Soil Conservation, Kathmandu.

MFSC 2006. Nepal Third National Report to the Convention on Biological Diversity. Ministry of Forests and Soil Conservation, Kathmandu.

MOPE 2004. First Initial National Communication to the Conference of the Parties of the UN Framework Convention on Climate Change. Ministry of Population and Environment, Kathmandu.

MOPE 2004. Nepal: National Action Programme on Land Degradation and Desertification in the Context of the UN Convention to Combat Desertification. Ministry of Population and Environment, Kathmandu.

2.3 Weblinks of relevant organisations

SN	Name of Organisations	Weblinks
1.	Ministry of Forests and Soil Conservation	www.mofsc.gov.np
2.	BirdLife International	www.birdlife.org
3.	Bird Conservation Nepal	www.birdlifenepal.org
4.	Poverty Alleviation Fund	www.pafnepal.org
5.	National Trust for Nature Conservation	www.ntnc.org.np
6.	Nepal Agricultural Research Council	www.narc.org.np
7.	International Centre for Integrated Mountain Development	www.icimod.org
8.	Resources Himalayas	www.resourceshimalaya.org
9.	World Wildlife Fund Nepal	www.wwfnepal.org
10.	Department of National Parks and Wildlife Conservation	www.dnpwc.gov.np
11.	Adibasi Janajati Utthan Rastriya Pratisthan	www.nfdin.gov.np
12.	Department of Plant Resources	banaspati@flora.wlink.com.np
13.	Central Department of Botany	www.cdbtu.edu.np
14.	Nepal Academy of Science and Technology	www.nast.org.np
15.	Community Forestry Division	cfd@wlink.com.np

2.4 Other publications

Bibliographic list of Biodiversity Profiles Project, Nepal documents published in 1995

TPN*	Title	Contributors	Date	Pages
1	Biodiversity Assessment of Tarai Wetlands	WJM Verheugt	December 1995	xi+80
2	Enumeration of Amphibians and Reptiles of Nepal	K. Shah	December 1995	vii+60
3	Enumeration of Lichens of Nepal	LR Sharma	December 1995	vi+111
4	Red Data Book of the Fauna of Nepal	RN Suwal and WJM Verheugt with contribution from HS Nepali 'Kazi' and C Smith	December 1995	xi+58
5	Enumeration of Spiders of Nepal	VK Thapa	December 1995	v+43
6	Enumeration of the Mammals of Nepal	RN Suwal and WJM Verheugt	December 1995	x+86
7	Biodiversity Assessment of Forest Ecosystems of the Western Midhills of Nepal	P Bista, K Shah, P Shrestha, WJM Verheugt	December 1995	x+65
8	Biodiversity Assessment of Forest Ecosystems of the Central Midhills of Nepal	K Shrestha, P Budhathoki, HS Nepali 'Kazi', and WJM Verheugt	December 1995	x+49
9	Biodiversity Assessment of Forest Ecosystems of the East Midhills of Nepal	PM Acharya, HR Bhandary, NK Khadka and WJM Verheugt	December 1995	x+47
10	Enumeration of Fishes of Nepal	J Shrestha	December 1995	vii+64
11	Enumeration of Algae of Nepal	Sushim R Baral	December 1995	iv+153
12	Biodiversity Profiles of the Tarai and Siwaliks Physiographic Zones	SJ Keeling, RN Suwal and WJM Verheugt with contribution from HS Nepali 'Kazi', Dr. PR Shakya, C Smith and B Upreti	December 1995	xix+136
13	Biodiversity Profiles of the Midhills Physiographic Zone	SJ Keeling, RN Suwal and WJM Verheugt with contribution from HS Nepali 'Kazi', Dr. PR Shakya, C Smith and B Upreti	December 1995	Xviii+151
14	Biodiversity Profiles of the High Himal/High Mountains Physiographic Zones	SJ Keeling, RN Suwal and WJM Verheugt; with contribution from HS Nepali 'Kazi', Dr. PR Shakya, C Smith and B Upreti	December 1995	Xvii+178
15	An Assessment of the Representation of the Terrestrial Ecosystems in the Protected Areas system of Nepal	WJM Verheugt with contribution from PR Shakya and SJ Keeling	January 1996	vii+23
16	Opportunities for Investment in Biodiversity Conservation Nepal	P. Budhathoki with contribution from LP van Lavieren and WJM Verheugt	December 1995	x+29
*=TPN Technical Publication Number				

Appendix 3

Progress towards Targets of the Global Strategy for Plant Conservation and the Programme of Work on Protected Areas

3.1 Implementation of Global Strategy for Plant Conservation

- The Global Strategy for Plant Conservation (GSPC) has been approved following Decision 6/9 of the Conference of the Parties (COP) to the CBD on 19 April 2002 in The Hague. The GSPC outlines 16 clear, time-limited targets towards improving an understanding of, and conserving, the world's valuable plant resources. The first and the most fundamental of these sets down the challenge to produce, by 2010, a taxonomically standardized world checklist of plant species, as a first step towards completing a World Flora (CBD 2002). The formulation of the GSPC, mainly by plant taxonomists and botanic garden specialists, and its acceptance by the international community, was a landmark accomplishment in biodiversity conservation. The GSPC is the most obvious manifestation of the trend that recognises that taxonomy is the foundation on which wider issues and decisions regarding the future of plant diversity must be based (Crane and Pleasants 2006).
- UK funded Darwin Initiative project (2003-2006) in Nepal is coordinated by Nepal Academy of Science and Technology (NAST), Nepal and Royal Botanic Garden, Edinburgh (RBGE) with two partners: (i) National Herbarium (KATH) at the Department of Plant Resources, and (ii) Central Department of Botany, Tribhuvan University (TUCH). The goal is to contribute to Flora of Nepal, and the progress has been rather slow. This may be due to: (i) lack of financial, human, scientific, technical and technological capacity, and (ii) lack of proper coordination among the institutions involved in the preparation of flora. Collection of plant specimens (over 3,000) have been so far made and maintained at RBGE, KATH and TUCH. It is hoped that capacity building of Darwin and Non-Darwin fellows would contribute to the preparation of Flora of Nepal. By 2010, two volumes (vol. 3 Ranunculaceae to Rosaceae; and vol 7 Gentianaceae to Labiatae) are in the process of publication (see chapter 4.3).
- There are all 16 Targets set by GSPC. Implementation of 2010 Biodiversity Targets incorporates only a few of the global targets. Hence, their elaboration has been escaped in this appendix. For example, the GSPC Target 1: 'A widely accessible working list of known plant species, as a step towards a complete world flora' is not well addressed under 2010 Biodiversity Target. Therefore, Target 1 of GSPC has been incorporated in Target 2.3 in this report. The targets are subject to review by the Government of Nepal and the revised targets will be incorporated in NBSIP developed for the years 2011-2015. It is being suggested that national and international taxonomists develop targets and means of implementation of GSPC in Nepal.
- In the Sixth CoP to the CBD, taxonomy has been recognised to be a priority in implementing the CBD (Decision 6/8) and was endorsed by the Global Taxonomy Initiative (GTI). The framework of GTI aims to support maintenance of reference collections and taxonomic capacity building, to improve accessibility of taxonomic data and to generate taxonomic information to underpin decisions making concerning species conservation and sustainable development (Crane and Pleasants 2006). Department of Plant Resources is coordinating GTI in Nepal. However, its implementation and success has been unsatisfactory due to limited financial and human resources.

3.2 Programme of Work on Protected Areas

- Protected areas in Nepal cover 19.7% of the total area of Nepal (Appendix 3.1). The programmes of the protected areas in Nepal have not adopted global targets. However, the programme has well achieved the global targets. This is due to national priority and commitment made towards the conservation of biological diversity in the country. In the present report, national targets for protected areas have been assessed (see Chapter 4). It is recommended that the goals and targets related to protected areas shall be incorporated into the plans and programmes of the Department of

National Parks and Wildlife Conservation (DNPWC) in future.

- The obstacles encountered in the implementation of the programmes of DNPWC include inadequate human and finacial resources to effectively monitor the activities.
- It would be important to mention new approaches initiated by the Government of Nepal towards biodiversity conservation. This emphasises protection with the active participation of local people; from species to ecosystem focused conservation and now to landscape focused conservation approach. Establishment of Annapurna Conservation Area, Kangchenjunga Conservation Area and Manaslu Conservation Area are three important landmarks for the people-centred conservation initiatives in the country. The proposed fourth conservation area—Api Nampa Conservation Area is also based on integrated conservation and development approach with community participation.
- The Api Nampa Conservation Area (ANCA) is located between 29° 30' to 30° 15' north latitude and 80° 22' to 81° 09' east longitude (Department of Survey 1998). It covers an area of 1902.42 sq. km bordering China in the north, India in the west, Bajhang district in the east and Baitadi district in the south of Mahakali Zone of Far Western Development Region of Nepal (IEE 2008, Draft).
- Success achieved in the management of conservation areas in Nepal has led to change its conservation policy from government managed and preservation-oriented to community managed sustainable approach. Together with this shift in approach, legislations, policies and bylaws governing biodiversity are being amended with the aim to maintain proper balance between conservation and development. The provisions accommodate meeting peoples needs and practices like allowing local people to collect forest products for domestic purposes and encourage rotational grazing under the Himalayan Parks Regulation. Similarly, Conservation Area Regulations envisages the management of natural resources in CAs through CBOs.

Table 3.1: Protected areas of Nepal

S.N.	Categories (Year of Establishment)	Area (km^2) and (%)	Altitude (m)
National Parks (NP)			
1.	Chitwan NP (1973)	932	150-815
2.	Bardia NP (1976/1988)	968	152-1,494
3.	Shivpuri NP (1984, NP in 2002)	144	1,366-2,732
4.	Khaptad NP (1984)	225	1,000-3,276
5.	Makalu Barun NP (1991)	1,500	435-8,463
6.	Sagarmatha NP (1976)	1,148	2,800-8,850
7.	Langtang NP (1976)	1,710	792-7,245
8.	Shey Phoksundo NP (1984)	3,555	2,000-6,885
9.	Rara NP (1976)	106	1,800-4,048
	Sub-total	10,288 (35.5%)	
Wildlife Reserves (WR)			
1.	Koshi Tappu WR (1976)	175	90
2.	Parsa WR (1984)	499	150-815
3.	Shuklaphanta WR (1976)	305	90-270
	Sub-total	979 (3.37%)	
Hunting Reserves (HR)			
1.	Dhorpatan HR (1987)	1,325	2,850-7,000
	Sub-total	1,325 (4.56%)	
Conservation Areas (CA)			
1.	Kanchenjunga CA (1997)	2,035	1,200-8,598
2.	Manaslu CA (1998)	1,663	1,360-8,163
3.	Annapurna CA (1986, 1992)	7,629	1,000-8,092
	Sub-total	11,327 (39.05%)	

Buffer Zones (BZ)			
1.	Chitwan NP (1996)	750	
2.	Bardia NP (1996)	328	
3.	Makalu Barun NP (1999)	830	
4.	Langtang NP (1998)	420	
5.	Koshi Tappu WR (2004)	173	
6.	Khaptad NP (2006)	216	
7.	Rara NP (2006)	198	
8.	Parsa WR (2005)	298.17	
9.	Sagarmatha NP (2002)	275	
10.	Suklaphanta WR (2004)	243.5	
11.	Shey Phoksundo NP (1998)	1349	
	Sub-total	5,079.67 (17.52%)	
	Total Area	**28,998.67**	
	Total % of Nepal's Territory	**19.7%**	

Source: Department of National Parks and Wildlife Conservation (2007, BS 2064), Protected Areas of Nepal (In Nepali).
It also includes Strict Nature Reserve. Sagarmatha National Park and Chitwan National Park were declared World Heritage Sites (WHS) in 1979 and 1984, respectively. Koshi Tappu Wildlife Reserve was declared as a Ramsar site in 1987. Similarly, Shey Phoksundo National Park is in the process of inclusion as a World Heritage Site.

Appendix 4

National indicators used in the Report

4.1 Detailed information on the development of national indicators

- The indicators presented in the report are both qualitative and quantitative, and they may be provisional to an extent. The indicators are proposed to provide guidelines to develop similar, and/or modified, and/or new national targets that on the one hand are realistic, measurable and time-bound, and on the other hand meet the international goals and targets developed and proposed by COP 7. Several expert meetings were organised to discuss the issues of national goals and targets among relevant stakeholders (see Appendix 1).

4.2 Reliability of these indicators and data used for developing them

- The indicators proposed in the report contain high level of reliability. Relevant stakeholders have shown great interest and commitment to develop national goals and targets. They are based on the existing status and trends shown in the past years.

4.3 Case studies

- The indicators communicate the trends or changes in biodiversity. For example, 'At least 40% of the forest areas maintained, and at least 19.7% of the protected areas effectively managed in Nepal' have been proposed to meet 2010 Global Target 1.1 'At least 10% of each of the world's ecological regions effectively conserved'. Maintaining 40% of the forest area and managing 19.7% of the protected areas in Nepal can easily be met. However, the challenges remain to maintain forest areas of high species richness as well as delivering goods and services to support sustainable livelihoods. Equally important is managing the protected areas effectively and incorporating all types of ecosystems found in Nepal within the PAs.
- The indicators developed would be useful in planning, decision-making and reviewing the progress of the projects at the national level. The National Planning Commission of Nepal formulates policy and planning to achieve the national goals as well as to meet the targets set by MDGs and PRSP. The targets proposed in the report match with the national targets and fit well in the national and global context.

Government of Nepal
Ministry of Forests and Soil Conservation
Singha Durbar, Kathmandu, Nepal
Tel: +977 1 4220 067 / 4224 892
Fax: +977 1 4223 868 / 4224 892
Website: www.mofsc.gov.np
Email: mfsced@wlink.com.np