NEPAL FIFTH NATIONAL REPORT TO CONVENTION ON BIOLOGICAL DIVERSITY

Government of Nepal
Ministry of Forests and Soil Conservation
Singha Durbar, Kathmandu, Nepal
March 2014

NEPAL FIFTH NATIONAL REPORT TO CONVENTION ON BIOLOGICAL DIVERSITY

Prepared by
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Foreword

Nepal emphasizes the critical role of ecosystem function for human well-being and economic development, which is reflected in national policies and plans. Nepal is also making concerted efforts to strengthen three pillars of the Convention on Biological Diversity namely, conservation, sustainable utilization and benefit sharing through national biodiversity strategies and action plans.

With the conviction that healthy ecosystems harbour rich biodiversity, Nepal's efforts to conserve vital ecosystems and biodiversity spread over number of fronts. Restoration of degraded ecosystems at the landscape level is contributing to the creation of important corridors for the safe movement of mega-faunal species. Expansion and strengthening of the protected area network across the country has provided encouraging conservation results. Likewise, community seed banks and agro-genetic research through gene bank have contributed towards agrobiodiversity conservation.

Nepal is home to an extensive number of species of flora and fauna that are important from national and global perspectives. Their continued future existence is key to our success in conservation which is possible through collaborative efforts of all stakeholders concerned. This document provides ample evidence to justify that biodiversity conservation provides the missing link for maintaining the richness of Nepal's flora and fauna.

Nepal pioneered the participatory approach to natural resource management and biodiversity conservation. This approach has helped, not only in making substantial improvements in ecosystem wealth, but also in bringing the public perspective to the forefront of conservation-development. Local communities continue to make positive visible impacts on biodiversity conservation and also in promoting conservation-based livelihoods.

Nepal has made significant efforts in the biodiversity sector since the publication of the Fourth National Report to the CBD in 2009. Protected areas now cover 23.23% of the country's total land area. The coverage of national forests now managed by community forest user groups has also increased from 1.23 million hectares to 1.65 million hectares. It is a commendable fact that the numbers of flagship species, such as tiger and rhinoceros are increasing and we are able to celebrate The 'Zero Poaching of Rhino for 365 days' in the years 2011 and 2013/14. The establishment of gene-bank and a network of 115 community seed banks have enhanced research on agro-genetic diversity and resilience towards food security, respectively. Conservation and management of wetlands have provided livelihood security and have maintained the richness of important flora and fauna. Similarly, the National Rangeland Policy of 2012 initiated the strategic management of habitat and ecology in rangelands. These achievements would not have been possible without the support of people and national legislations.

This report presents the scenario of biodiversity in Nepal and its status and trends. It also presents the past efforts and achievements in biodiversity conservation. The report will certainly serve to monitor and measure the success of biodiversity programs, especially those that abide by the Aichi Targets that were designed aimed and agreed to during the tenth meeting of the conference of parties to the CBD in 2010.

This report was prepared through a consultative process that engaged a wide range of stakeholders, including, but not limited to, policy-makers and grassroots-level community members. Therefore, I am confident that this report will prove helpful for all stakeholders working in the biodiversity sector in Nepal and beyond.

Ganesh Raj Joshi, PhD
Secretary

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Acknowledgement

The report has been prepared through extensive consultations that engaged a wide range of stakeholders at the national, regional, district and community levels. With critical analysis of the Nepal Biodiversity Strategy 2002, and the Nepal Biodiversity Strategy and Implementation Plan 2006-2010, and underscoring the past achievements and lesson learnt, this report has been prepared. I would like to acknowledge all the people who were involved during various stages of the report preparation.

I would like to thank Global Environment Facility and the United Nations Environment Program for providing financial support to carry out the assignment. In this regard, the Multi-Stakeholder Forestry Program also deserves appreciation for their support. Likewise, I would like to extend my sincere thanks to CBD Secretariat for providing technical support and feedback on the report. The members of the National Steering Committee deserve special appreciation for their critical comment, coordination and support.

I am pleased to note the sincere effort put by the consultant team from Kathmandu Forestry College led by Dr. Ambika Prasad Gautam in preparing the draft report. The entire expert team deserves appreciation for delivering the report on time. I would like to extend my sincere thanks to the people who provided their valuable input during consultation sessions.

My sincere gratitude goes to Dr. Ganesh Raj Joshi, (Secretary-MoFSC), Mr. Bishwa Nath Oli (Director General, Department of Forests) and Mr. Krishna Prasad Acharya (Joint Secretary, MoFSC) for reviewing and providing constructive suggestions in finalizing this report. I am also grateful to the reviewers for providing feedback and peer review on the report.

I am highly thankful for the invaluable and determined work of Mr. Sagar Kumar Rimal (Under Secretary, MoFSC) for coordinating the report preparation and providing technical guidance. Similarly I appreciate the good work of Mr. Hem Raj Acharya, Assistant Environment Officer and Mr. Kapil Khanal, Program Officer for providing excellent support in completing this report.

Finally, I would like to appreciate the hard work of the colleagues at Environment Division for completing the report preparation in time.

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Mr. Braj Kishor Yadav
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EXECUTIVE SUMMARY

The National Context

Nepal is a landlocked country situated in the central part of the Himalayas between India and China. It has tremendous geographic diversity that ranges from tropical alluvial plains in the south to the very rugged and permanently snow and ice covered Himalayan Mountains in the north. The country can be divided into five major physiographic zones, namely, from north to south, the High Himal, High Mountains, Middle Mountains, *Siwalik* Hills and *Tarai* Plains. All five zones extend lengthwise from east to west across the country. The climate varies from alpine cold semi-desert type in the trans-Himalayan zone to tropical humid type in the tropical lowlands in the south.

Forests, together with shrub lands, covered 39.6 percent of the Nepal's land area in 1994. There are regional variations in terms of changes in forest conditions. In the last few decades, forests of commercial and biological value in the tropical lowlands and adjoining *Siwalik* Hills have suffered from high rates of deforestation and degradation. Forests in the Middle Mountains have been generally better managed, and in many places forest cover has increased in recent years due to community forestry programs.

Many marginal agriculture lands, particularly in the hills and mountains, have been temporarily abandoned in recent years primarily due to labour shortages as a result of youth outmigration in search of off-farm and foreign employment. This trend has increased the scope for the introduction of perennial agricultural crops/commodities and forest species in those areas.

Nepal is a multi-lingual, multi-religious, multi-ethnic and multicultural country inhabited by over 125 castes and ethnic groups. A majority of the country's 26,494,504 people live in rural mountain areas with fragile physiography and low economic productivity, thereby creating a very strong poverty-environment-health and vulnerability nexus. The last decade, however, witnessed substantial declines in poverty, improvements in income inequality**,** increases in literacy rate and improvements in food insecurity. Remittances played a crucial role in these developments, and continue to do so. Despite these positive signs, the country's overall economic growth has remained slow (<4%) since 2007.

Many development projects in recent years were implemented with little attention to environmental safeguards, thereby posing a direct threat to biodiversity. This has caused considerable damage to biodiversity and local environments.

Importance of Biodiversity in Nepal

The economy of Nepal is very much dependent on the use of natural resources. Biodiversity is closely linked to the livelihoods and economic well-being of most Nepalese people. The subject relates to almost every aspect of Nepalese life, including agricultural productivity, food security, human health and nutrition, indigenous knowledge, gender equality, culture, climate, water resources and aesthetic value to the society. The country's biodiversity is also an important source of revenue.

Status and Trends of and Threats to Biodiversity

Nepal's unique geography with its dramatic changes in elevation along the relatively short north-south span and the associated high variability in eco-climatic conditions has resulted in a uniquely rich diversity of flora and fauna in the country. Moreover, the country's position at the crossroad of two major biogeographic regions (Indo-Malayan to the south and Palearctic to the north) has made Nepal a melting pot of species originating from both regions.

A total of 118 ecosystems have been identified in Nepal, including 112 forest ecosystems, four cultivation ecosystems, one water body ecosystem and one glacier/snow/rock ecosystem. These ecosystems range from the tall grasslands, marshlands and tropical and sub-tropical broadleaf forests along the *Tarai* and *Siwalik* Hills to the sub-tropical and tropical broadleaf and conifer forests in the Middle Mountains. Furthermore, there are mixed and conifer forests in the High Mountains and alpine meadows above the tree line. Among the rangeland ecosystems, the tropical savannas and alpine meadows are exceptionally rich in biodiversity. Nepalese wetlands have very significant ecological significance, as they provide habitat for many threatened and endemic species of flora and fauna and serve as resting places for many migratory and globally threatened birds. The wetlands also have high cultural and economic significance. Nepal also has a high degree of agro-ecological diversity.

Species diversity, particularly *beta* diversity, is very high in Nepal. The country occupies about 0.1 percent of global area, but harbors 3.2 percent and 1.1 percent of the world's known flora and fauna, respectively. Diversity of birds, bryophytes, mammals, and butterflies is especially high. A total of 284 species of flowering plants, 160 animal species, species of bird, and 14 species of herpetofauna are reportedly endemic to Nepal. The high altitude rangelands are especially important from the perspective of endemism. The diverse climatic and topographic conditions have favored a maximum diversity of agricultural crops, their wild relatives and animal species.

Many species of plants and animals are threatened. This includes 55 species of wild mammals and 18 species of trees found in the mountains. Birds are among the most threatened group. Fourteen bird species have not been recorded in the country for at least ten years, and the number of Threatened, Endangered, and Critically Endangered species significantly increased between 2004 and 2010. Birds relying on wetlands that inhabit the tropical and subtropical and lower temperate zones are particularly at risk. Given that 56% of Nepal's nationally threatened bird species inhabit lowland forests where forest loss and degradation is high, this is a worrying trend. Among the known species of domestic animals, *achhami* cattle (*Bos indicus*) and *lampuchhre* sheep (*Capra ovis*) are near endangered. Very limited information exists regarding the genetic diversity of specific species in Nepal.

Nine species of plants, 55 mammals, 149 birds, 64 herpetofauna, and 21 fish are included in the IUCN Red List. Similarly, 15 groups and species of plants, 52 mammals, 108 birds and 19 reptiles and three insects have been listed in the CITES Appendices. Several species of plants and animals, including 27 mammals, nine birds, 14 angiosperms, and four gymnosperms have been declared as protected species by the government.

Nepal's biodiversity is threatened by multiple factors. Loss and degradation of natural habitats, such as forests, grasslands, and wetlands due to the expansion of settlements, agriculture and infrastructure; overexploitation; invasion by alien species; and pollution of water bodies remain the predominant threats. Poaching and illegal wildlife trade and human-wildlife conflict are other major direct threats to forest biodiversity, particularly in protected areas. Rapid expansion of hybrid varieties and improper use of insecticides and pesticides are major threats to agrobiodiversity. Widespread mining of gravel from streams and rivers beds has emerged as a major threat to aquatic biodiversity. Such activities have also caused deforestation and forest degradation rates to spike in the *Siwalik* zone. Natural disasters such as landslides, glacial lake outburst floods and drought pose considerable threat to mountain ecosystems and the people living in those areas. Climate change can have profound impacts in the future, particularly in mountain ecosystems.

Demographic changes; poverty; weak enforcement of law and governance; ignorance to biodiversity values in government and corporate accounting systems; inadequate awareness and motivation to conserve biodiversity; gender, caste and ethnicity based inequality; and lack of an integrated approaches to development planning at the national and district levels are major underlying factors contributing to the threats.

Sources and Trends of Funding for Biodiversity Management in Key Sectors

In the absence of a dedicated budget code and monitoring system, it is difficult to assess the exact funding trends for biodiversity management. An analysis of the program budget allocated for the Ministry of Forests and Soil Conservation shows that it continuously and substantially increased during the last decade. A bulk of the funds (i.e. 84.4%) came from the government or internal sources, and the remaining amount from foreign assistance in the form of grants (14.1%) and soft loans (1.5%). Similar positive trends were found in allocation of budget for management of agrobiodiversity and climate change adaptation and management.

Key Efforts and Achievements made after the Fourth National Report

Nepal has been making substantial efforts to conserve and sustainably use the country's biological resources. Key achievements made by the country after submission of the Fourth National Report to CBD include: (i) increase in protected areas by 17 percent, (ii) increase in population of some threatened wild animals, including tiger and rhinoceros, (iii) design and implementation of landscape management programs in two additional landscapes (Kailash and Chitwan-Annapurna), (iv) declaration of seven biodiversity-rich forests covering a total area of 133,579 ha as protected forests, (v) further promotion of participatory forest management and protected area management programs for improved management of biodiversity and livelihoods enhancement, (vi) regular population monitoring of some important wildlife species, (vii) initiation of Chure Conservation Program in 26 districts situated in the geographically sensitive, rugged, and fragile *Siwalik* range, (viii) successful piloting of an integrated management project in two Ramsar sites, (ix) establishment of a vulture conservation and breeding center and seven community-managed 'vulture restaurants' for conservation of two vulture species (*Gyps tenuirortris* and *G. bengalensis*), (x) promotion of REDD and PES, including successful implementation of a REDD+ pilot project in three sub-watersheds, (xi) implementation of an Ecosystem-based Adaptation project in one protected forest area, (xii) establishment and management of National Agriculture Genetic Resource

Centre (Gene Bank), and community gene or seed banks, (xiii) formulation of five cross-sectoral and 12 sector-specific policies, strategies or legislations related to biodiversity, (xiv) strengthening of national institutional mechanism, including formation of high level committees, and (xv) improving awareness and education.

Status of implementation of Nepal Biodiversity Strategy (2002)

The Government of Nepal, Ministry of Forests and Soil Conservation (CBD Focal Agency) developed the Nepal Biodiversity Strategy (NBS) and Nepal Biodiversity Strategy Implementation Plan in 2002 and 2006, respectively. A subjective assessment of the progress made in implementation of the strategy and the action plan indicated that around 30 percent of the NBS strategies related to the six thematic areas were well implemented. Implementation of 30 percent of the strategies was “good” and 41 percent “average". Of the 17 cross-sectoral strategies, four were almost fully implemented and two could not be implemented. Implementation status of the rest of the strategies remained fair. Of the 13 priority projects planned by the NBSIP (2006), seven were either fully or partially implemented. Status of implementation of three projects remained average, and the remaining three projects could not be implemented for various reasons.

Lessons Learned

The following are some of the key lessons learned from management of biodiversity in Nepal: (i) meaningful participation of local communities in the management of natural resources is a key to ensuring success and sustainability of program interventions., (ii) landscape approach is an appropriate strategy for addressing multiple drivers of biodiversity loss, enhancing ecological processes and conserving threatened species, (iii) multi-stakeholder cooperation and collaboration is crucial to achieve success in biodiversity conservation, (iv) cooperation among law enforcement agencies is necessary for curbing illegal trade of wildlife species, (v) international cooperation can be helpful to curb trans-boundary trade of wildlife parts and strengthening ecological security in trans-boundary regions, (vi) there is a very good scope for further promotion of nature-based tourism to generate necessary fund for conservation, and to provide economic opportunities for local communities, (vii) enabling policy is necessary to achieve the intended outcome and appropriate legislation is also necessary in order to translate the policy pronouncements into practice, (viii) positive incentive measures, that promote conservation-friendly behaviors, are necessary to encourage local people in biodiversity conservation, and (ix) prior consultation and discussion with local communities is necessary before making any important decision that affects the local communities’ use of the local resources.

Development of National Biodiversity Strategy and Action Plan (2014)

The Government of Nepal is currently in the process of revising the Nepal Biodiversity Strategy (2002) and developing a National Biodiversity Strategy and Action Plan (NBSAP). The overall objective of the NBSAP is to provide a strategic planning framework for management of Nepal’s biodiversity. There was a broad-based participation of national level, regional level, district level, and community level stakeholders in its development. The NBSAP is expected to be implemented from mid-2014 after it is endorsed by the Council of Ministers.

Some of the salient features of the NBSAP are: (i) adoption of program-based approach, (ii) built on and aimed at consolidating the successful past efforts and achievements, (iii) broad-based participation of stakeholders in its development, (iv) comprehensive and balanced in terms of thematic and sectoral coverage, (v) provides a clear analytical account of the past efforts, achievements and gaps, (vi) gives due consideration to emerging issues such as climate change and invasive alien species, and gender and social concern, (vii) direct linkage of the thematic strategies and targets with priority actions, Aichi Biodiversity Targets, and performance indicators, and (viii)inclusion of a plan and framework for managing biodiversity at the local level.

Plan for Meeting the Aichi Biodiversity Targets and relevant Millennium Development Goal

A number of strategies have been formulated by the NBSAP to meet the Aichi Biodiversity Targets and the Millennium Development Goals (MDGs) to ensure environmental sustainability by 2020. Each strategy is to be met through implementation of a number of priority actions linked to each of the strategies. The strategies have been grouped into six biodiversity themes, namely protected areas, forests, rangelands, wetlands, agriculture, and mountains. Cross-sectoral issues have been dealt with separately. The strategies and priority actions are designed to address the key biodiversity threats, issues and gaps, alongside meeting the relevant Aichi Targets and MDGs. The key strategies, targets and milestones set by the National Biodiversity Strategy and Action Plan towards meeting the relevant Aichi Targets and Millennium Development Goals have been summarized in the first part of the Chapter 3, and details on selected national targets set by the NBSAP and corresponding indicators are presented in Annex 4.

Acronyms and Abbreviations

ANSAB	Asian Network of Sustainable Agriculture and Bio-resources
BCN	Bird Conservation Nepal
BIMS	Biodiversity Information Management System
CA	Conservation Area
CBD	Convention on Biological Diversity
CBO	Community Based Organization
CBS	Central Bureau of Statistics
CBFM	Community Based Forest Management
CEO	Communication, Extension and Outreach
CFUG	Community Forest User Group
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
COP	Conference of Parties
DDC	District Development Committee
DFID	Department for International Development (UK)
DFO	District Forest Office/Officer
DNPWC	Department of National Parks and Wildlife Conservation
DOF	Department of Forests
EbA	Ecosystem-based Adaptation
EIA	Environmental Impact Assessment
FECOFUN	Federation of Community Forest Users in Nepal
GDP	Gross Domestic Product
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit (The German Society for International Cooperation)
IAS	Invasive Alien Species
ICIMOD	International Centre for Integrated Mountain Development
I/NGO	International/ Non Government Organization
IUCN	International Union for Conservation of Nature
LI-BIRD	Local Initiatives for Biodiversity, Research and Development
MAP	Medicinal and Aromatic Plant
MDGs	Millennium Development Goals
M&E	Monitoring and Evaluation
MoFSC	Ministry of Forests and Soil Conservation
MRV	Monitoring, Reporting and Verification
NARC	Nepal Agriculture Research Council
NBCC	National Biodiversity Coordination Committee
NBS	Nepal Biodiversity Strategy (2002)
NBSAP	National Biodiversity Strategy and Action Plan
NBSIP	Nepal Biodiversity Strategy Implementation Plan (2006)
NBU	National Biodiversity Unit
NPC	National Planning Commission
NPR	Nepali Rupees

NTFP	Non-Timber Forest Product
NTNC	National Trust for Nature Conservation
PES	Payment for Ecosystem Services
REDD	Reducing Emissions from Deforestation and Forest Degradation
SALT	Sloping Agricultural Land Technology
SPCR	Strategic Program for Climate Resilience
TEEB	The Economics of Ecosystem and Biodiversity
UNDP	United Nations Development Program
UNEP	United Nations Environment Program
USAID	United States Agency for International Development
VDC	Village Development Committee
WWF	World Wildlife Fund

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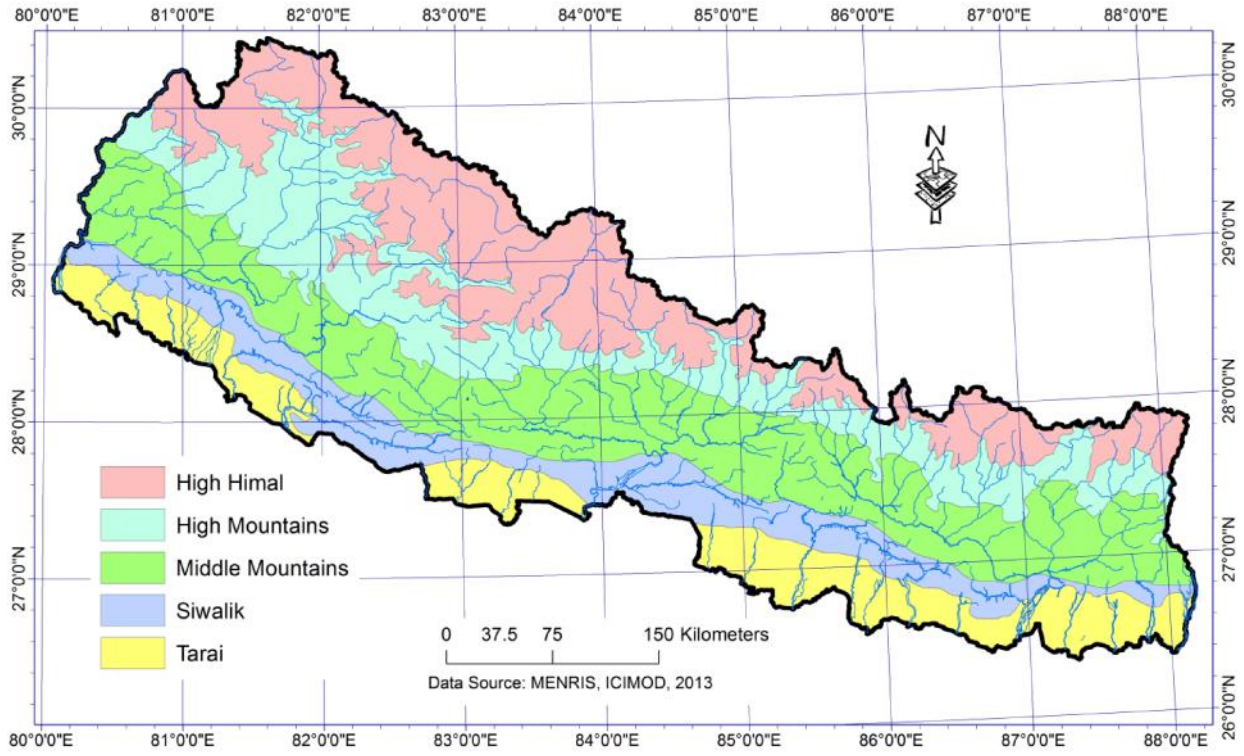
1. NEPAL'S BIODIVERSITY: STATUS, TRENDS AND THREATS

1.1 The National Context

1.1.1 Physiography, Climate and Drainage

Nepal is situated in central part of the Himalayas between $26^0$22' and $30^0$27' N latitudes and $80^0$04' and $88^0$12' E longitudes, covering an area of 147,181 square kilometers with geographical condition. The elevation ranges from around 70 meters above sea level in the eastern alluvial plains to 8,848 meters at the Mount Everest. The country can be divided into five major physiographic zones, namely the High Himal, High Mountains, Middle Mountains (or Middle Hills), *Siwalik* (or *Chure*), and the *Tarai* Plains (Figure 1).

Figure 1: Physiographic Zones of Nepal



Different types of climates are found in Nepal, ranging from alpine cold semi-desert type in the trans-Himalayan region to tropical humid type in the *Tarai*. The climate is predominantly influenced by three major factors, namely the altitudinal variations, monsoon rains, and westerly wind disturbances. Aspect also plays an important role in determining local climatic condition. The country receives average annual rainfall of around 1,600 millimeters. The annual precipitation ranges from 165 millimeters in the rain shadow areas (north of the Himalaya) to 5,500 millimeters in the Pokhara Valley in western Nepal. Most of the precipitation occurs during June-September, in the form of monsoon rains. The country is drained by four major Himalayan river systems, a few

medium-sized perennial rivers that rise in the High Mountains region, and a number of seasonal streams that mostly originate in the *Siwalik* Hills.

1.1.2 Land Use

Out of total land-mass of Nepal, 29 percent is covered by forest and additional 10.6 percent is under shrubs. Agriculture and grasslands cover 21 percent and 12 percent, respectively. In between 1978/79 and 1994, the country lost its forest area by an annual rate of 1.7 percent and shrubland increased by an annual rate of 8.4 percent. The area under agriculture and grassland remained more or less stable during the period (LRMP, 1986; DFRS/FRISP, 1999).

There are regional variations in terms of changes in forest conditions. Most of the forests in the *Siwalik* and *Tarai* suffered from high rates of loss and degradation during the last few decades. In recent years, the government has started scientific management of some production forests in the *Tarai* under a collaborative arrangement, which has helped to slow down the deforestation and forest degradation, to some extent. Trees grown on farmland and other community-based forest management programs, including the community forestry, leasehold forestry, and buffer zone community forestry have helped to abate the deforestation and forest degradation in those regions. Forests in the Middle Mountains are, in general, better managed and in many places forest cover increased in recent years due mainly to the community forestry program (Gautam, 2009; Niraula *et al*., 2013).

The Department of Forest Research and Survey is currently in the process of updating the country's forest cover information using high resolution satellite data and ground sample surveys. The work, which is expected to be completed within the first half of 2015, may provide a clearer picture of current status of the country's forest resources.

1.1.3 Demography and Socio-economy

Nepal is a multi-lingual, multi-religious, multi-ethnic and multicultural country inhabited by 125 castes and ethnic groups. The country's population grew with an average annual rate of 1.35 percent during the last decade and reached 26,494,504 people in 2011. The last decade witnessed a substantial decline in poverty and an improvement in income equality. The average literacy rate increased from 54.1 percent in 2001 to 65.9 percent in 2011 (CBS, 2011). Despite these progresses, the rate of the country's economic growth has remained slow (<4% after 2007), and the Human Development Index (0.463) and Gender Inequality Index (0.485) were below the South Asian average in 2012 (UNDP, 2013). The prolonged and uncertain political transition and is believed to have direct bearings on the country's sluggish economic growth.

Nepal's economy is very much dependent on the use of natural resources, including agricultural lands, forests, wetlands, and rangelands. Agriculture (including fishery) and forestry remain the country's principal economic activities, and employ 80 percent of the population and contribute 35 percent of the total Gross Domestic Product (GDP). At the national level, 28 percent of all household income comes from agriculture and forestry, 37 percent from nonfarm enterprises, 17 percent from remittances, and 16 percent from own household consumption (CBS, 2011).

Non-Timber Forest Products (NTFPs), including Medicinal and Aromatic Plants (MAPs), play a critical role in meeting the food and healthcare requirements of millions of rural people, particularly in the mountains. Some commercially valuable NTFPs, however, are facing unsustainable exploitation. The high demand for agricultural land and high dependency on forests for meeting subsistence needs (fuel, fodder, construction material) have caused substantial degradation of forests, particularly in the *Tarai* and *Siwalik* regions.

Labour scarcity due to youth outmigration seeking off-farm and foreign employment and other factors have caused increased abandonment of marginal agriculture lands in recent years. The effect of this landuse change on biodiversity is not well known. This trend has a suspected negative impact on the country's agricultural production, but has increased the potential for the expansion of private forestry and the introduction of perennial cash crops and NTFPs, including high-value MAPs, in those private lands.

1.2 Importance of Biodiversity in Nepal

Biodiversity is closely linked to the livelihoods and economic well-being of most Nepalese people. Biodiversity relates to almost every aspect of Nepalese life, including agricultural productivity, food security, building materials, human health and nutrition, indigenous knowledge, gender equality, culture, climate, water resources and aesthetic value for society.

Agrobiodiversity is the backbone of sustainable development in agriculture, food security and poverty alleviation, as it provides for both the immediate needs and the long-term sustenance of the country's agrarian communities. Crop and animal diversity is particularly vital to the country's marginalized mountain communities for maintaining food security.

Millions of rural people directly depend on forest biodiversity for meeting their daily subsistence livelihoods requirements. According to an estimate, at least 1,463 species of herbal medicinal plants are used by the rural people in Nepal (MoFSC, 2006). The collection and trade of several valuable herbs, such as *Swertia chirata*, *Nardostachys grandiflora*, and *Cordyceps sinensis* has generated considerable employment opportunities and income for local people in remote areas. Millions of households are now directly benefitting from forest biodiversity managed under the widely acclaimed community-based forestry and participatory protected area management programs.

Nepalese wetlands have great ecological, cultural and economic significance. The rich diversity of plants and animals that exist in wetlands provides a wide range of goods, services and income-generating opportunities for local people, including many indigenous ethnic communities. Despite being of great importance, wetland ecosystems have been degraded in recent years. This has direct negative impact on biodiversity and livelihoods of over 20 ethnicities and caste groups that are traditionally dependent on wetlands (IUCN, 2004; World Bank, 2008).

Mountain biodiversity in Nepal is of high importance for a number of ecological functions, including soil retention and slope stability. Those functions are often closely connected with the extent of aboveground and below-ground vegetation. The high functional diversity of plants in mountain ecosystems might have added to the resiliency of those ecosystems that often provides effective barriers to high-energy events such as landslides, rockfalls and avalanches.

The country's biodiversity is also an important source of revenue. Nature-based tourism is the second most important source of foreign exchange for Nepal. The revenue from protected area based tourism has been continuously increasing since 2003 (DNPWC, 2012). This has provided incentives to conserve biodiversity for the government, conservation agencies and local communities. Income from protected areas is directly contributing to management of buffer zones and conservation areas.

1.3 Overview of Status, Trends and Threats to Biodiversity

The dramatic changes in elevation along the relatively short (150-250 km) north-south transect and associated variability in the eco-climatic conditions have resulted in a disproportionately rich diversity of flora and fauna in Nepal. Besides these local factors, the country's standing at the crossroads of two major biogeographic regions of the world (Indo-Malayan to the south and Palearctic to the north) has also contributed to high level of biodiversity in the country.

1.3.1 General Overview of Ecosystems, Species and Genetic Diversity

The natural ecosystems in Nepal range from the tall grasslands, marshlands and tropical and sub-tropical broadleaf forests along the *Tarai* and *Siwalik* foothills to subtropical and temperate broadleaf and conifer forests in the Middle Mountains. There are mixed and conifer forests in the High Mountains, and alpine meadows above the tree line. All of these ecosystems, and more, are found within the 300 kilometer south-north span of Nepal and resulted primarily through the abrupt changes in geomorphology found throughout the country's land area.

A total of 118 ecosystems have been identified in Nepal, including 112 forest ecosystems, four cultivation ecosystems, one water body ecosystem and one glacier/snow/rock ecosystem. Among the five physiographic zones found in Nepal, the Middle Mountains have the highest number (53) of ecosystems. The High Himal and High Mountains combined have 38 ecosystems. The *Tarai* and *Siwalik* have 14 and 12 ecosystems, respectively. Water body ecosystems occur in all zones, except the *Siwalik* (Biodiversity Profiles Project, 1995). Forest ecosytems in this categorization include all natural terrestrial ecosystems, including the shrublands, rangelands and alpine meadows.

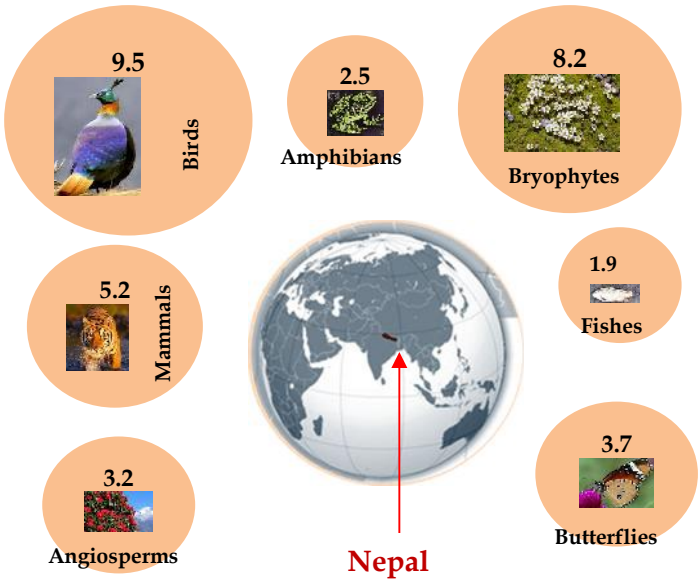
Species diversity, particularly *beta* diversity, is very high in Nepal. The country occupies about 0.1 percent of the global area, yet harbors 3.2 percent and 1.1 percent of the world's known flora and fauna, respectively. Diversity of birds, bryophytes, mammals, and butterflies is especially high (Kunwar *et al*., 2010; BCN and DNPWC, 2011; Jnyawali *et al*., 2011; Figure 2).

A total of 284 flowering plants are endemic to Nepal (DPR, 2013). Similarly, 160 animal species, including one species of mammal (i.e. *Apodemus gurkha*); one species of bird (i.e. *Turdoides nepalensis*); and 14 species of herpetofauna are reportedly endemic to the country (MoFSC, 2005; ICIMOD and MOEST, 2007).

Some agriculture species, such as rice (*Oryza sativa*), rice bean (*Vignaun bellata*), eggplant (*Solanum melongena*), buckwheat (*Fagopyrum esculentum, F. tatricum*), soybean (*Glycine max*), foxtail millet (*Setaria italica*), citrus (*Citrus aurantium, C. limon, C. medica*) and mango (*Magnifera indica*) have high genetic diversity. Similarly the genetic diversity is under-utilized for

minor crops, such as calocacia, yam, buckwheat, horse gram, sweet potato, amaranthus, proso millet, foxtail millet, and tropical fruit species such as litchi, jack fruit, jujube, and black plum. Traditional farming systems and wild relatives found in proximity have helped maintain the genetic variability in these species (Jha *et al*., 1996).

Figure 2: Nepal's (%) share of global diversity of some species



Knowledge regarding Nepal's floral and faunal **genetic diversity** is limited. The Silviculture Division under the Department of Forests has been working to identify, characterize and conserve the genetic resources of 38 socially and economically important tree species. The Division has established seedling breeding orchards at 27 locations across the country for *ex-situ* conservation of forest genetic resources (TISU, 2013). The Central Zoo located in Lalitpur is an important center for *ex-situ* conservation of animal genetic resources. The zoo has housed 854 individual animals, including 34 species of mammals, 58 species of birds, 10 species of reptiles and 10 species of fishes. Similarly, the 11 botanical gardens established across the country by the Department of Plant Resources have been making important contribution in conservation of plant genetic resources (CBS, 2012). Many wetlands are found to be important sources of genetic material for wild relative of rice varieties found in the *Tarai* (Bhandari, 1998). MoFSC has initiated programs for the research and conservation of forest genetic resources through DoF, DNPWC, DPR and DFRS. So far, genetic variation of six species of tress has been recorded (MoFSC, 2013a).

The Nepal Tiger Genome Project has been employing a scientific and conservation-friendly method of extracting DNA of the tiger (*Panthera tigris tigris*) from non-invasively collected scat samples and to create a baseline genetic database of the species in the country. The findings are expected to facilitate a better understanding of species genetics and aid in designing effective conservation policies and strategies.

The National Agriculture Genetic Resource Centre (the Gene Bank) established in 2010 at NARC has been playing a crucial role in *ex-situ* conservation of agricultural genetic resources. The Gene Bank has also established a tissue bank and laboratories for *in-vitro* culture, molecular research and seed testing. Since the creation of the Gene Bank, it has created links with community seed banks (Bhatta *et al*., 2012).

1.3.2 Forest Biodiversity

The country's forest ecosystems can be categorized into 10 major groups: (i) tropical, (ii) subtropical broad-leaved, (iii) subtropical conifer, (iv) lower temperate broad-leaved, (v) lower temperate mixed broad-leaved, (vi) upper temperate broadleaved, (vii) upper temperate mixed broadleaved, (viii) temperate coniferous, (ix) subalpine, and (x) alpine scrub (Stainton, 1972). These ecosystems are of international importance both in view of the number of globally threatened wildlife and floral elements as well as the diversity of ecosystems represented within these areas (ICIMOD and MOEST, 2007).

Many species of animals and plants are threatened. For example, among the 208 known species of wild mammals, nine are "critically endangered", 25 "endangered", 14 "vulnerable" and seven "near threatened" (Annex 1). Similarly, 18 species of trees found in the mountains are reportedly threatened (Annex 2; Shrestha and Joshi, 1996; Press *et al*., 2000). Many of the threatened species of flora and fauna are wetland dependent.

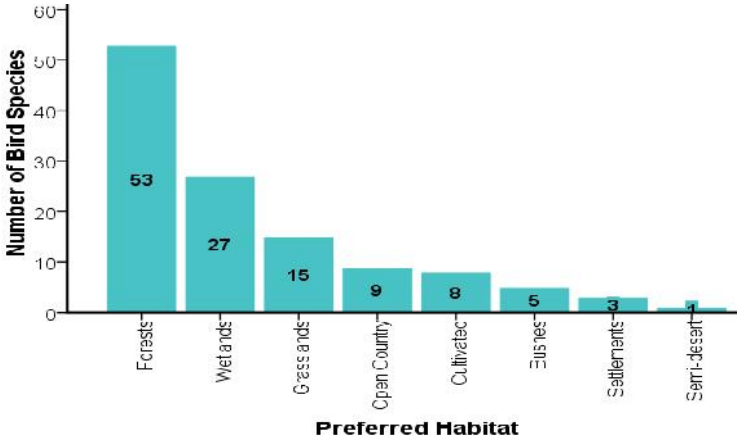
A total of 14 bird species have not been recorded in the country for at least ten years, and the number of Critically Endangered, Endangered, and Near Threatened species significantly increased between 2004 and 2010 (Table 1; BCN and DNPWC, 2011). Birds that rely on wetlands and inhabit the tropical and subtropical and lower temperate zones are particularly at risk.

Table 1: Changes in number of threatened bird species

IUCN Category	2004	2010	% Change (2004-2010)
Critically Endangered	40	61	52.5
Endangered	32	38	18.8
Vulnerable	61	50	-18.0
Near Threatened	133	149	12.0

Over half (i.e. 56%) of Nepal's nationally threatened birds inhabit forests; over a quarter in wetlands, and smaller numbers in grasslands. Most of these species occur in the lowlands (75–1,000 m) (BCN and DNPWC, 2011; Figure 3).

Figure 3: Habitat preferences of threatened birds



A number of species, including nine plants, 55 mammals, 149 birds, 64 herpetofauna, and 21 fish are included in the IUCN Red List (Table 2). Similarly, 15 group and species of plants, 52 mammals, 108 birds and 19 reptiles and three insects have been listed in the CITES Appendices.

Table 2: Number of selected group of species in the IUCN Red List

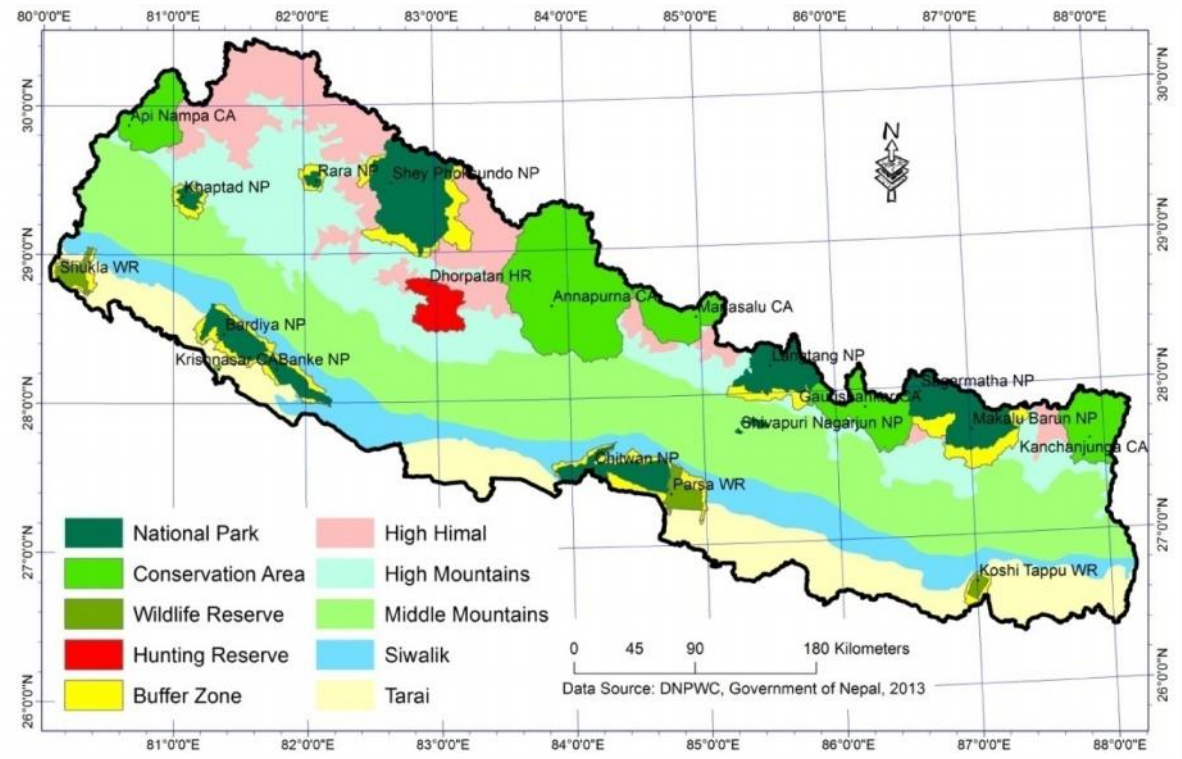
Category	Plants	Mammals	Birds	Herpetofauna	Fish
Critically Endangered	N/A	8	61	1	3
Endangered	2	26	38	3	1
Vulnerable	5	14	50	7	4
Near Threatened	2	7	N/A	4	13
Total	**9**	**55**	**149**	**15**	**21**

Source: ICIMOD and MOEST (2007); Jnyawali et al. (2011); BCN and DNPWC (2011); Shah (2013)

Twenty-seven (14.9% of country's total) species of mammals, nine (1.0%) species of birds, three (2.4%) species of reptiles, two species (3.7%) of amphibians, 14 species (0.2%) of angiosperms, four species (15.4%) of gymnosperms, and one species (0.1%) of lichen are declared as protected species by the Government of Nepal (GON, 2001; Chapagain and Dhakal, 2003; Shah and Tiwari, 2004; BCN and DNPWC, 2011*;* Jnyawali *et al*., 2011).

Protected areas have remained the dominant approach to biodiversity conservation in Nepal. Currently, protected areas cover a total of 34,185.62 square kilometers or 23.23 percent of the country's total area. These include 10 national parks (31.7% of total protected area), three wildlife reserves (2.9%), one hunting reserve (3.9%), six conservation areas (45.1%) and 5602.67 square kilometers of buffer zone areas (16.4%) (Figure 4). Four of the protected areas, including one national park and three conservation areas, covering a total area of 4,632 square kilometers were established in 2010. A buffer zone covering 343 square kilometer was also declared in the same year.

Figure 4: Protected Areas in Nepal



The protected areas in Nepal are managed under four types of management modalities. The national parks, wildlife reserves and the hunting reserve are exclusively managed by the Department of National Parks and Wildlife Conservation (DNPWC). The main focus of the national parks and wildlife reserves is conservation of flagship wild fauna, such as tiger (*Panthera tigris tigris*), rhinoceros (*Rhinocerus unicornis*), Asian elephant, snow leopard (*Panthera uncia*) and red panda (*Ailurus fulgens*) along with their habitats. Among the six conservation areas, two, Api Nampa and Blackbuck Conservation Areas, are directly managed by the DNPWC. The Annapurna, Manaslu and Gaurishankar Conservation Areas are managed by the National Trust for Nature Conservation under a multiple use policy. Kanchenjunga Conservation Area has been managed by a local management council since 2006 with support from the DNPWC and WWF Nepal. Buffer zones for all protected areas are managed by local buffer zone councils.

Biodiversity in protected areas in Nepal is threatened mainly by: (i) illegal hunting and trade of important wildlife species, (ii) human-wildlife conflict, (iii) invasion by alien species of flora and (iv) intrusion of tree species into grasslands. Furthermore, encroachment of forest areas for cultivation and settlement is a threat in some areas.

The threat of illegal hunting is particularly severe for some vertebrates driven in particular by demand for wildlife parts and products on the international market. Rhinoceros (*Rhinocerus unicornis*), tiger, musk deer (*Moschus moschiferus*), pangolin (*Manis spp.),* red panda (*Ailurus fulgens*), common leopard (*Panthera pardus*), Himalayan black bear (*Ursus thibetanus*) and some bird species are especially at risk from poaching. Effective enforcement of the law is a major challenge associated with these threats, both inside and outside protected areas.

Human-wildlife conflict relates to crop raids and livestock depredation, property damage and human injury and casualty by wild animals, which is common in and around most of the protected areas. Wildlife involved in crop raiding include Asian elephant (*Elephas maximus*), rhinoceros (*Rhinocerus unicornis*), wild water buffalo (*Bubalus arnee*), Himalayan black bear (*Ursus thibetanus*), spotted deer (*Axis axis*), black buck (*Antiope cervicapra*), blue bull (*Boselaphus tragacamelus*), wild boar (*Sus scrofa*), barking deer (*Muntiacus vaginalis*), Himalayan tahr (*Hemitragus jemlahics*), blue sheep (*Pseudois nayaur*), rhesus monkey (*Macaca mulatta),* langur (*Semnopithecus hector)* and parakeets (*Psittacula krameri*). Animals involved in livestock depredation include tiger, snow leopard (*Panthera uncia*), common leopard, Himalayan black bear and wolf (*Canis lupus*) and the animal involved in property (houses, grain-stores, cash crops) damage is elephant. Similarly, Asian elephant, rhinoceros, tiger, common leopard, Himalayan black bear, sloth bear (*Milursus ursinus*), wild water buffalo and wild boar are mainly responsible for human injury and casualty. The retaliatory killings of wildlife due to poisoning, snaring and trapping, electrocution and using food bomb is also another major human to wildlife conflicts (Bajiyama, 2012). The government is trying to resolve the problem through a system of awareness and relief with the provisions mentioned under the Wildlife Damage Relief Guideline, 2011.

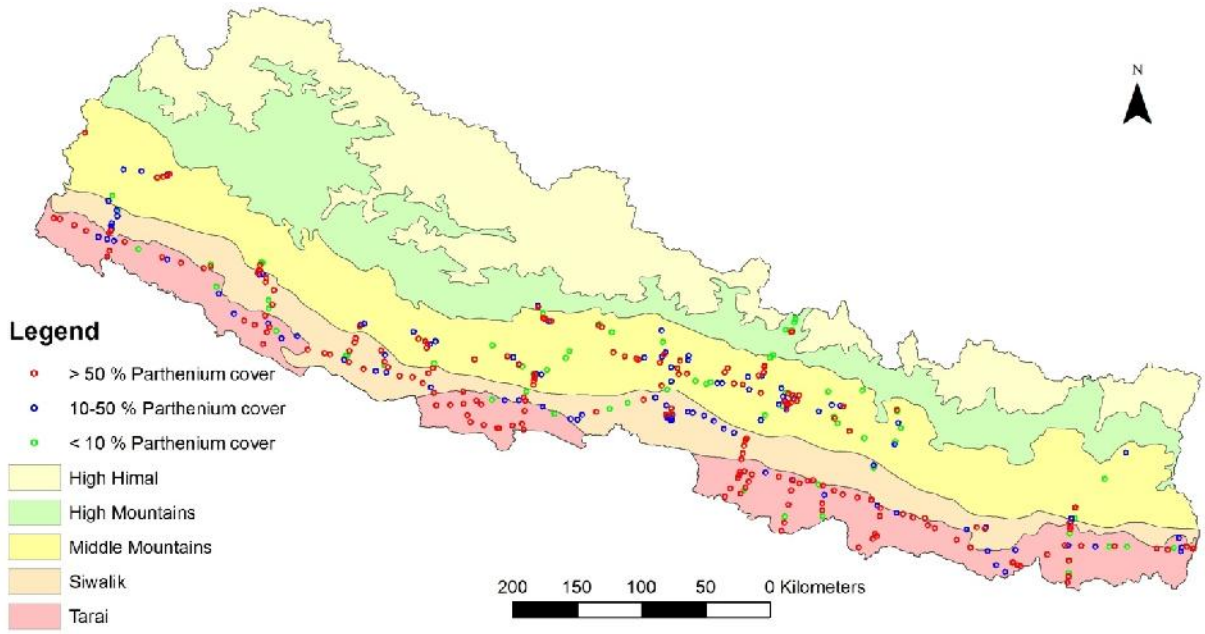
Invasion and rapid expansion of alien plant species, such as *Mikania micrantha*, *Eupatorium adenophorum*, *Eupatorium odoratum*, and *Lantana camara* has emerged as a major threat to protected areas and other forests located in the *Tarai, Siwalik* and Middle Mountain zones in recent years.

In addition to the threats mentioned above, there are some gaps, issues and challenges in the management of biodiversity through the protected area approach. Some of these include: (i) inadequate representation of the Middle Mountain ecosystems in Nepal's protected area system, (ii) gaps in conservation of a large number of threatened plants and some animal species and in some cases (iii) conflicts among local communities, government authorities and forest user groups.

Forest biodiversity outside protected areas falls under six main types of management arrangements: (i) community, (ii) collaborative, (iii) leasehold, (iv) religious, (v) protection, and (vi) government-managed. Except for government-managed forests, there is a different level of local community involvement in the management of the forests. Leasehold forestry can be further categorized into pro-poor leasehold forestry and forests for specific purposes. Since 2002, the government has taken the initiative to manage natural forests with high biodiversity value as protection forests. Some forest patches throughout the country are under the care or management of local religious institutions. Private forests and trees grown in farmland have been contributing to the conservation of biodiversity by minimizing pressures on national forests.

Forest biodiversity outside protected areas is threatened mainly by deforestation and forest degradation. Deforestation and forest degradation have been occurring through land-use conversion for agriculture, illegal settlements, infrastructure (including roads and electric transmission lines), and actions relating to the use of resources including overgrazing, unsustainable exploitation of forest produts, habitat fragmentation and uncontrolled forest fires. Invasion by alien species, such as *Mikania micrantha*, *Eupatorium adenophorum*, *Eupatorium odoratum*, and *Lantana camara* and *Parthenium hysterophorus* has emerged as a major problem, and its severity and extent is consistently increasing (Figure 5; Timsina *et al*., 2011; Shrestha, 2014).

Figure 5: Distribution of *Parthenium hysterophorus* across different physiographic regions of Nepal
(map source: Shrestha, 2014)



Overexploitation and illegal exploitation of biological resources, including extraction of wood and non-wood forest products and poaching of wildlife are other major threats particularly in the *Tarai* and *Siwalik* areas, which are partly caused by weak enforcement of the law. Along with this, climate change has emerged as a major threat in many areas, although its effect on different forest ecosystems and species is not well known.

Besides the above threats, poor scientific forest management; inadequate technical capacities of the district forest offices and user groups; inadequate attention to management of biodiversity in community forests; wide variations in the success of community-based forestry program across the country; poor linkage of community forestry with livelihoods and poverty alleviation; passive approaches to the management of community forests; poor relationships among stakeholders; and limited participation of women and other disadvantaged social groups are some of the key gaps and issues in forest management. Controlling forest encroachment and illegal logging have particularly been the major challenges to the government.

1.3.3 Rangeland Biodiversity

Rangeland ecosystems in Nepal are comprised of grasslands, pastures, shrublands and wetlands, which are distributed all over the country and covers about 1.7 million hectares or nearly 12 percent of country's land area (LRMP, 1986). The rangelands can be broadly grouped into five categories: (i) tropical savannas, (ii) sub-tropical rangelands, (iii) temperate rangelands, (iv) subalpine rangelands, and (v) alpine meadows.

Among the different types of rangelands found in the country, tropical savannas and alpine meadows are especially important from the biodiversity conservation point of view. Tropical savannas, which are comprised of a mosaic of tall grasslands dominated by *Saccharum spontaneum* and *Imperata cylindrica* intermixed with broadleaf forests of species such as *Eugenia jambolana, Bombax ceiba*, *Trewia nudiflora*, and *Mallotus philippensis*, are excellent habitat for some of the endangered wildlife species such as rhinoceros (*Rhinoceros unicornis*), and tiger (*Panthera tigris tigris*). Many of these grasslands are also home to several species of globally threatened grassland birds (Baral and Inskipp, 2009). The alpine meadows are exceptionally rich in floral diversity, including numerous species of colorful flowers of alpine herbs. These grasslands are also home to endangered snow leopard, Himalayan goral (*Naemorhedus baileyi*), serow (*Capricornis sumatraensis*) and Himalayan tahr (*Hemitragus jemlahicus*) and are very rich in faunal diversity (Mittermeier *et al*., 2004).

Threats to rangeland biodiversity differ with the location and type of rangelands. Overgrazing and trampling by large herds of livestock (especially yak) is the main threat in high altitude pastures. The loss and fragmentation has greatly affected grassland-dependent wildlife, including bird species. Intrusion of riverine tree species has caused declines in quality and the extent of some grassland habitats, including in Chitwan National Park. Invasion by alien plant species is a threat to many *Tarai*, *Siwalik* and Middle Mountain grasslands. Forest fire is another major threat, especially to grassland birds and reptiles, as they destroy the nests and eggs. Inadequate management grasslands, including untimely and intensive annual cutting in protected areas have posed a serious threat to country's specialist grassland birds, many of which are now almost entirely confined to protected areas (BCN and DNPWC, 2011).

1.3.4 Wetland Biodiversity

The wetland ecosystems of Nepal can be categorized on the basis of (i) ownership (wetlands located in protected area, forest areas, outside forest area-public land and private land), (ii) risks associated (high risk, near-extinct and extinct), (iii) management regime (wetlands located in forest area of government managed, protected area, community managed, leasehold, religious, agricultural land, locally conserved and others), and (iv) use and importance (local, national and international) (GON, 2012).

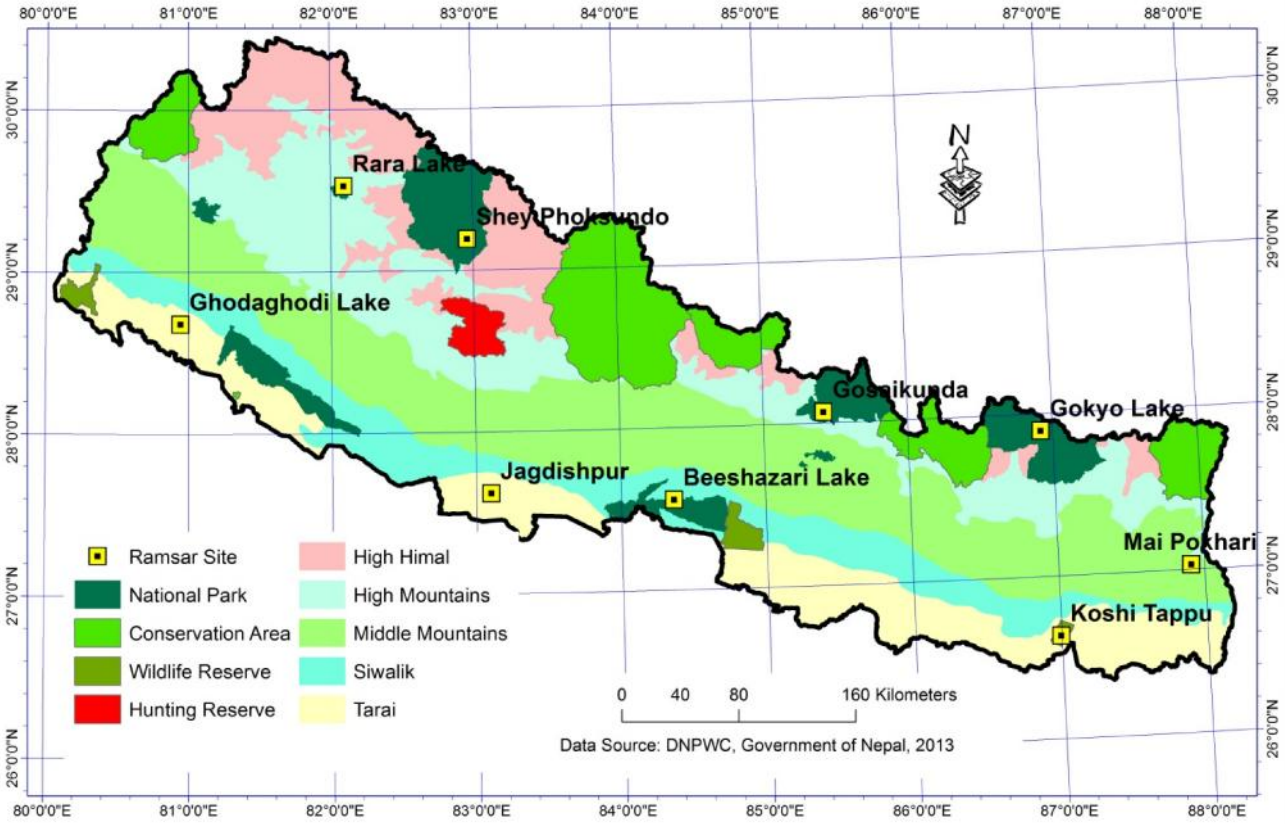
Ghodaghodi Lake

Photo ©: Sagar Kumar Rimal

Nepalese wetlands have very great ecological significance, as they harbor many threatened and endemic species of flora and fauna and serve as resting places for many migratory and globally threatened birds. The country's wetlands sustain an estimated 230 species of indigenous fish, including 16 species that are endemic to Nepal (Rajbanshi, 2013). The wetlands also harbor an estimated 117 species of amphibians (ICIMOD and MOEST, 2007).

Nepal's wetlands also play a significant role in floral diversity conservation. Twenty-five percent of Nepal's vascular plants, including 26 endemic species of flowering plants are believed to be wholly or significantly dependent on wetlands. Four of the 17 plants that are legally protected by the Government of Nepal are dependent on wetlands. The wetlands also hold several species of wild cultivars and relatives of cultivated crops, including five species of rice, namely *Oryza nivara, Oryza granulata, Oryza officinalis, Oryza sativa f. spontanea* and *Oryza rufipogon* (CSUWN, 2010). The wetlands also have high cultural and economic significance. Many ethnic groups are dependent on wetlands for their livelihoods.

Figure 6: Ramsar sites in Nepal



Wetland biodiversity is threatened by: (i) drainage and encroachment for agriculture, settlement and infrastructure development, (ii) diversion of water for irrigation, (iii) unsustainable exploitation of wetland resources, including overfishing and destructive fishing, and overgrazing of marshes (iv) widespread mining of gravel from streams and rivers beds, (v) water pollution from municipal wastes, households and industrial discharges and agricultural run-off, (vi) invasion of alien species into wetland ecosystems, (vii) illegal hunting and trapping of birds and other wildlife, and (viii) siltation.

High dams that have been built on many rivers have posed threat to many species of fish and other aquatic animals. The scale of this threat is expected to further increase in future. Improper use of

pesticides and chemicals is a significant threat to many species of birds and aquatic life. The eutrophication of wetlands due to over-use of chemical fertilizers can cause more severe damage to freshwater biodiversity.

Invasion of water hyacinth (*Eichhornia crassipes*) is a major threat to tropical and sub-tropical wetlands in eastern, central and western Nepal. Important wetlands, including the Beeshazari Lake in the Barandabhar corridor forest in Chitwan, and Phewa Lake in Pokhara, are already severely invaded by water hyacinth. Invasive species such as *Ipomoea carnea* and *Mikania micrantha* are also becoming abundant in areas near wetlands, thereby affecting habitats of water birds and other wetland dependent fauna.

Eleven alien fish and one freshwater prawn species have been introduced in Nepalese wetlands for aquaculture development. Research at the national level, regarding the extent of exotic species introduction, has not yet been conducted. However, limited studies conducted at specific locales show the rapid expansion of exotic species' habitat, and its significant potential negative effects on local biodiversity in the future (CSUWN, 2011).

Over-fishing and fish-poisoning have significantly reduced the food supply of fish-eating birds. Cumulative effect of the reduced food, habitat degradation and illegal hunting and trapping has caused continuous decline in populations of some wetland bird species such as brahminy kite (*Haliastur indus*), caspian tern (*Sterna caspia*), black-bellied tern (*S. acuticauda*) and river tern (*S. aurantia*). Some other species, including lesser fish eagle (*Ichthyaetus humilis*) and tawny fish owl (*Ketupa flavipes*) have been included in the nationally threatened list (BCN and DNPWC, 2011).

1.3.5 Agrobiodiversity

Nepal has a high degree of agro-ecological diversity. The diverse climatic and topographic conditions have favored the maximum development of the maximum diversity of agricultural crops, their wild relatives, and animal species. There are differences in traditional cropping systems across the country. These traditional farming systems, which use local indigenous knowledge and experiences, are assumed to have great role in maintaining agricultural diversity. However many of the traditional systems are still to be documented. Agrobiodiversity contributes substantially to Nepal's species diversity. Farm animal production systems in the country can be grouped into three major types: (i) transhumance migratory system, (ii) stationary with semi-migratory or with semi-intensive system, and (iii) stationary stall feeding or closed system intensive system. Several breeds and strains of domestic animals (including poultry) found in different ecological belts are yet to be identified and characterized at the molecular level (MoFSC, 2002).

Photo ©: Sagar Kumar Rimal

Agricultural Landscape in Far-Westeren

A total of 550 crop species are identified as having food value, and around half of those species are believed to be currently under cultivation. The country is also very rich in fruit, vegetable and

animal diversity. More than 200 species of vegetables are being grown in the country, of which 50 species have been commercialized and available in local and urban markets.

The hills and mountains generally have higher agricultural biodiversity (both crop and animal) as compared to the lowlands (MoFSC, 2002). High climatic and physiographic variability, relatively low influence of modern technology, and higher level of ethnic diversity is believed to have contributed to higher richness of crop and livestock species in the mountains as compared to the *Tarai*.

There are variations in the distribution of crop genetic diversity across the country. For example, the highest number of farmer-named cultivars of rice, taro and sponge gourds is found in Kaski district (Middle Mountains). Genetic diversity of buckwheat and barley are found to be high in Jumla (High Mountains), and the diversity of pigeon pea is found to be highest in Bara district of *Tarai* (Upadhyay and Joshi, 2003).

Agrobiodiversity is under threat due to: (i) commercialization of agriculture and the extension of modern high yielding varieties, (ii) improper use of pesticides, (iii) population growth and urbanization, (iv) lack of incentives to conserve the low-yielding local species and varieties, and (v) changes in farmer's priorities (MoFSC, 2002).

Livestock diversity is threatened by: (i) decline of local breeds, (ii) weak quarantine mechanisms, (iii) limited ex-situ conservation of local breeds, (iv) inadequate research and technologies, (v) limited access to good quality seed of local breeds (live or semen), and (vi) lack of incentives to continue keeping less productive local breeds. Among the known species of domestic animals, pure *siri* cattle has become extinct and *Achhami* cattle (*Bos indicus*) near endangered (Neopane and Pokhrel, 2005). Pure *Tarai* goat has become rare due to indiscriminate crossbreeding of the breed with Indian large size goat (Neopane and Pokharel, 2008). Lampuchhre sheep (*Capra ovis)* is close to endangerment (Neopane *et al*., 2008).

The type and intensity of threats to agrobiodiversity vary among the physiographic zones and physical and market accessibility. For example, commercialization of agriculture and the extension of modern high yielding varieties, and urbanization are more relevant to the *Tarai*, while poor level of awareness is more related to the mountains.

1.3.6 Mountain Biodiversity

Mountain biodiversity is a cross-cutting theme in Nepal. The country's mountains are the centers of immense cultural and biological diversity. Moreover, scenic landscapes and clean air make mountains target regions for recreation and tourism. However, mountain ecosystems are exceptionally complex and fragile, and both poverty and ethnic diversity are high in mountain regions, where communities and people in the region are often more vulnerable than those inhabiting elsewhere.

Photo ©: Sagar Kumar Rimal

A Mountain Landscape in Eastern Nepal (Sagarmatha National Park)

The mountain regions contain 84 percent of the country's protected areas, as well as about half of the country's 12 global priority ecoregions (Annex 1.3). Many endangered species of flora and fauna inhabit the mountains. For example, 34 percent of the plants and animal species are found in the High Mountains (above 3,000m), and 63 percent in the Middle Mountains (1,000-3,000 m). The highest number of plant species occurs between 1,500 and 2,500 m elevations. About 420 flowering plant species are distributed in the areas that lie above 5,000 m. Many vascular plants including angiosperms (*Christolae himalayayensis)* have even been recorded at more than 6,000 m elevation in the eastern Himalaya (MoFSC, 2002; MoFSC, 2005).

The high elevation mountains are very rich in species and genetic resources of wild fauna. Some 80 species of mammals are known to occur in the High Mountains and High Himal areas of which eight, namely snow leopard, grey wolf, Tibetan argali (*Ovis oman*), lynx (*Felis lynx*), brown bear (*Ursus arctos*), musk deer, red panda and Tibetan antelope (*Pantholops hodgsoni*), are major wildlife species found in Nepal. Similarly, eight out of 20 endemic breeds of livestock are from the alpine region (Sherchan and Pradhan, 1998; MoFSC, 2005).

Among the bird species, 413 species are reported to live above 3,000 meter altitude. Of these, 19 species are known to breed in high altitude habitats. Nine species of birds are restricted to alpine rangelands of which five species, including imperial eagle (*Aquila heliaca*), Pallas' fish eagle (*Haliaeetus leucoryphus*), Hodgson's bush chat (*Saxicola insignis*), lesser kestrel (*Falco naumanni*), and Kasmir flycatcher (*Ficedula subrubra*) are of international significance (Inskipp and Inskipp, 1991).

Five of the nine Ramsar sites in Nepal are located above 2,000 meter elevations. The mountain biodiversity of Nepal also contributes significantly to global biodiversity, as Nepal sits at the center of the Himalayan biodiversity hotspot.

Mountain biodiversity in Nepal faces significant threat from human activities. Some of the main threats include: (i) overexploitation of non-wood and wood products and mineral resources, (ii) unplanned and unregulated construction of rural roads, and (iii) inappropriate farming practices.

Mountain ecosystems are fragile and vulnerable to natural disasters, such as landslides, glacial lake outburst floods and drought, which cause considerable damage to mountain ecosystems and the people living in those areas. The impacts of climate change have exacerbated the threats to biodiversity and livelihoods in the mountain region.

1.3.7 Factors Underlying the Threats

The threats to biodiversity discussed in the preceding sections are the results of several underlying causes. These causes constitute a complex of social, political, economic, technological, and cultural variables that operate at various spatial levels. The major underlying causes of biodiversity loss in Nepal include: (i) ignorance to the value of biodiversity in government and corporate accounting systems, (ii) widespread poverty and lack of diversified livelihood opportunities, (iii) population growth and migration, (iv) weak forest governance (v) lack of an integrated approach to planning at national and district levels, (vi) land use changes (vii) overlapping administrative jurisdictions, (viii) unsustainable agricultural practices, and (ix) inadequate awareness and motivation to conserve biodiversity.

1.3.8 Threat Posed by Climate Change

Biodiversity and climate change are closely linked. According to the Millennium Ecosystem Assessment (2005), the changing climatic condition is likely to become the dominant direct driver of biodiversity loss by the end of this century. The Intergovernmental Panel on Climate Change estimated that 20-30 percent of species will likely be at a higher risk of extinction with temperature increases greater than 1.5°C and risks will increase with additional temperature rise (IPCC, 2007).

The understanding of impacts of climate change on Nepal's biodiversity is weak. Some of the known impacts are: (i) shifts in agro-ecological zones, prolonged dry spells, and higher incidences of pests and diseases due to increased temperature and rainfall variability, (ii) increased emergence and fast spread of invasive alien species (e.g. *Mikenia micrantha, Parthenium hysterophorus*), (iii) increased incidence of forest fire in recent years, (iv) changes in phonological cycles of tree species, (v) shifting of treeline in the Himalaya, and (v) depletion of wetlands (MOE, 2010). The habitat shift for faunal species inhabiting narrow ranges (eg. common leopard) is another potential consequence of climate change. The limited information indicates that the High Himal and High Mountain ecosystems are likely to be the worst affected by climate change in the near future.

1.4 Sources and Trends of Funding for Biodiversity Management in Key Sectors

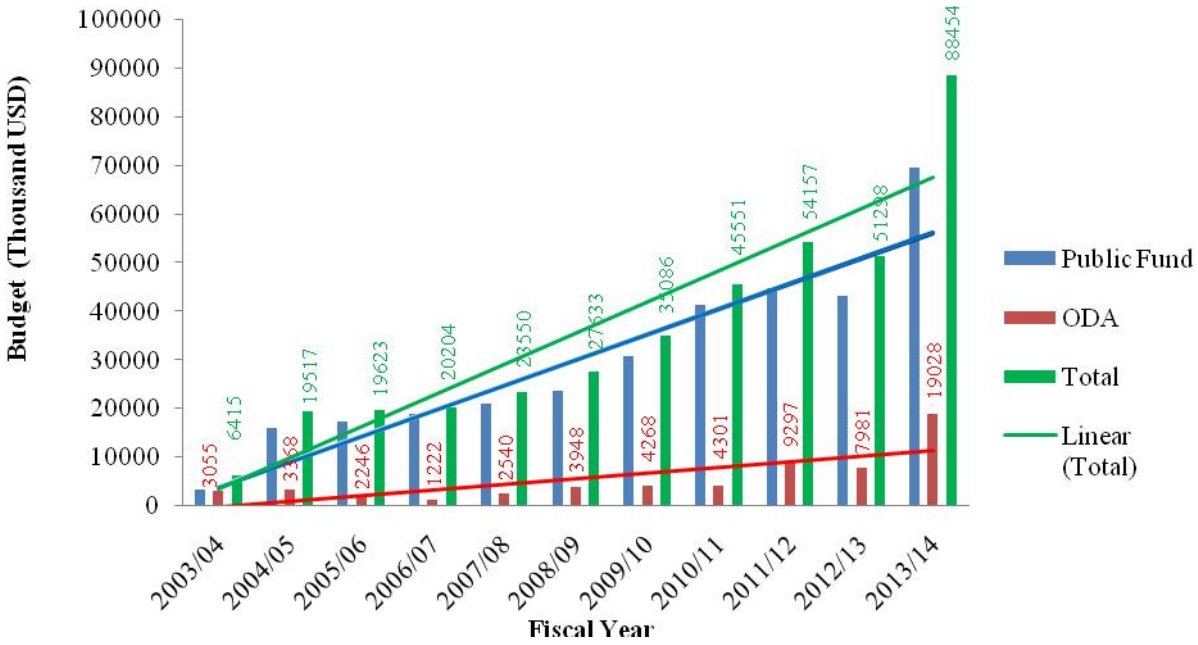
The Nepal Biodiversity Strategy (2002) envisioned establishing a trust fund for biodiversity as a long-term funding mechanism involving a number of bilateral, multilateral, private sector and the government agencies. The fund, which was designed to enable government agencies, NGOs and

other institutions, through financial and technical support, to undertake appropriate activities regarding biodiversity, could not come into existence for several reasons. Despite this dysfunction, funding for biodiversity related programs has increased continuously and substantially over the last decade.

An analysis of the program budget allocated for the Ministry of Forests and Soil Conservation shows that it continuously and substantially increased during the last decade. Bulk of the funds (i.e. 84.4%) came from the government or internal source, and remaining from foreign assistance in the form of grant (14.1%) and soft loan (1.5%) (Figure 7).

In addition, a number of other sources also contributed financially to biodiversity conservation programs. Entry fees collected by the National Trust for Nature Conservation (NTNC) has remained one of the main sources of funding for implementing biodiversity management programs in the Annapurna Conservation Area. In-kind cooperation by local communities and technical assistance from the international community were some other sources.

Figure 7: Trends and sources of funding for management of forestry programs
Data Source: MOF 2014: Red Book (2003-2014)



Similar positive trends were found in budget allocation for one of the main agencies involved in the management of agrobiodiversity (i.e. NARC, Department of Livestock and Department of Agriculture). Such government funding has been utilized for the development of the Gene Bank, documentation of biodiversity and strengthening of the institutions working in the biodiversity sector (Figure 8).

Figure 8: Trend of funding to NARC Divisions related to agro-biodiversity

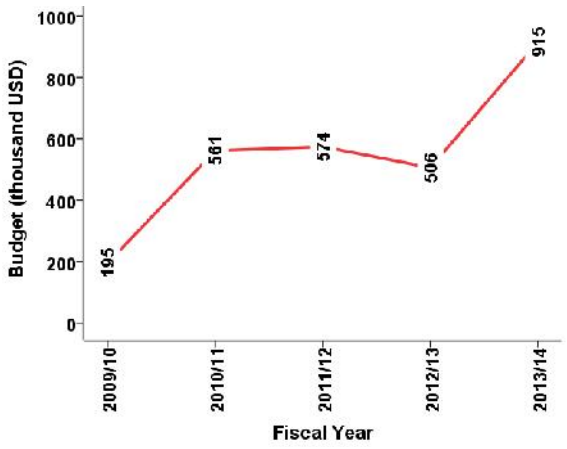
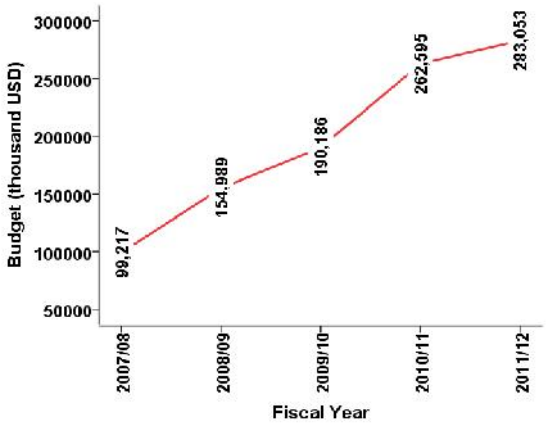


Figure 9: Trend of climate change related funding in Nepal



During the last five years, the annual expenditure in climate change related programs and activities constituted around 1.3 percent to 2.1 percent of the total Gross Domestic Product (GDP), and 5.7 percent to 7.2 percent of total government expenditure. These figures indicate that the share of climate change related budget allocations and expenditure as percentage of GDP and government expenditure are both increasing over the period (Figure 9). More than half (55%) of the total government climate change expenditure is estimated to come from external sources (Nepal, 2012).

A climate change budget code has been introduced in the national budget starting this fiscal year (i.e. 2012/2013). The government has reportedly allocated 10.34 percent (5.8 % direct and 4.6% indirect) of its budget for 2013-2014 to climate funding. There are also many other funding through bilateral, multi-lateral, NGOs and INGOs sources, which in most cases remain out of the government monitoring system.

2. OVERVIEW OF PAST EFFORTS AND ACHIEVEMENTS

2.1 Key Efforts and Achievements made after the Fourth National Report

The following sections briefly describe Nepal's key efforts and achievements that will contribute to meeting the Aichi Targets and relevant (Millennium Development Goals) MDGs. The focus of this section is to report the achievements made the submission of Nepal's Fourth National Report to CBD (i.e. MoFSC, 2009).

2.1.1. Expansion of Protected Area

Nepal has already surpassed the target of at least 17 percent terrestrial area to be conserved. Currently, the country's 23.23 percent (i.e. 34,185.6 square kilometer) area is managed under protected area network. Of this, 4,991 square kilometers of protected areas were added in 2010.

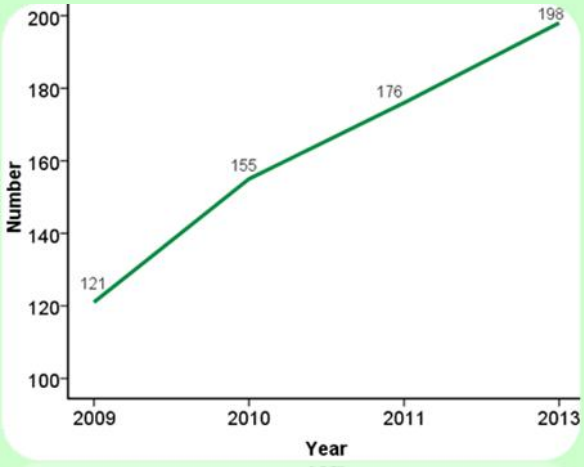
2.1.2. Conservation of Threatened Species

Species conservation action plans were prepared and implemented for some of the threatened wildlife species, including tiger (*Panthera tigris tigris*), rhinoceros, elephant, snow leopard, and vulture. Similar conservation plans for red panda, gharial (*Gavialis gangeticus*) and blackbuck are being prepared. Effective implementation of action plans and anti-poaching activities helped to abate poaching and recover the populations of important species, including tiger and rhinoceros (Acharya and Dhakal, 2012; WWF, 2012; DNPWC, 2013; Subedi *et al*., 2013; Box 2.1). For blackbuck conservation, a protected species under the National Parks and Wildlife Conservation Act 1973, the government declared the Blackbuck Conservation Area in Bardiya district in 2009. These initiatives have proved helpful in increasing the number of some flagship species and minimizing the trade and poaching of wild animals. With these efforts, Nepal has been able to observe the Zero Poaching of rhinoceros for 365 days of Years 2011 and 2013/2014.

Box 1: Recovery of tiger population was a major achievement made after 2009

Population of tiger increased continuously since 2009 (Figure 10). This is due to expansion of protected area, effective implementation of anti-poaching plans, and curbing illegal trade of wildlife parts through joint efforts of government and non-government agencies, and local communities. Strengthened cooperation with China and India also helped to curb illegal trade in animal parts. Nepal has made a commitment to double its 2010 population of tiger by 2022.

Figure 10: Changes in population of tiger in Nepal

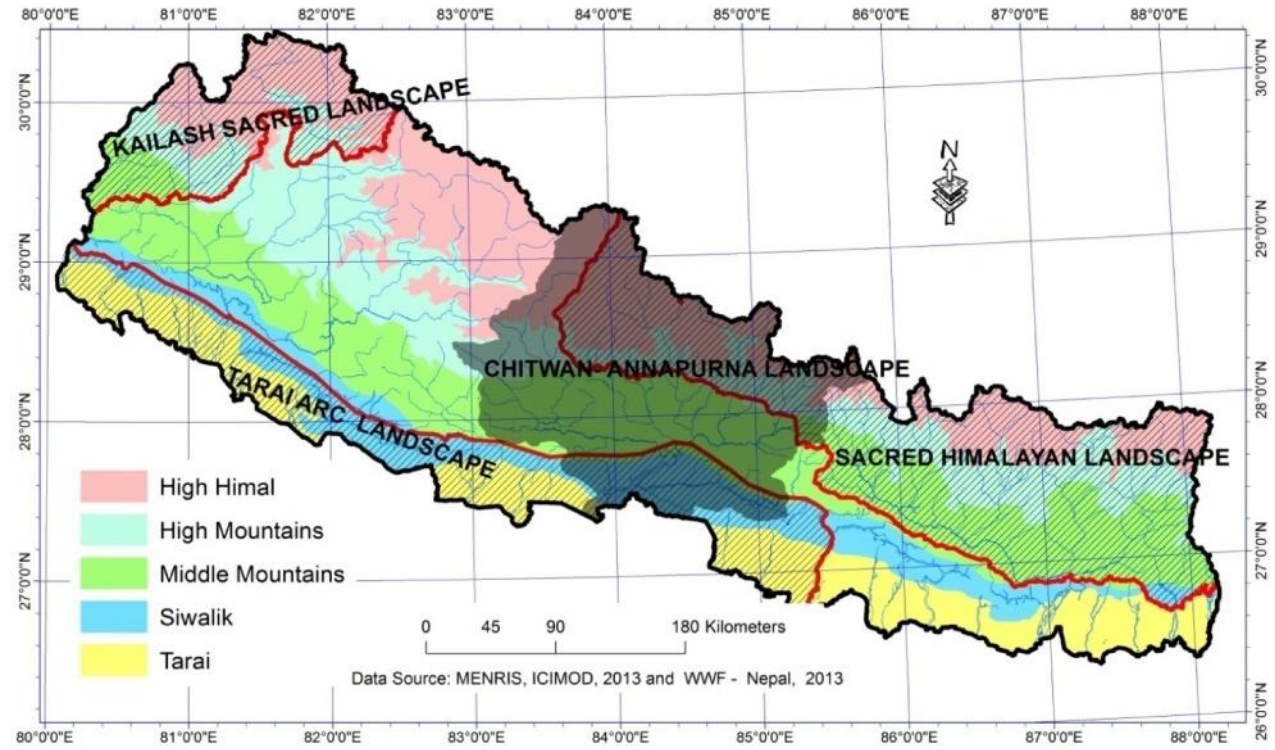


There have also been several local and sub-national initiatives aimed at the conservation of threatened species. For example, the Red Panda Network has remained active in conservation of endangered red panda (*Ailurus fulgens*) in four eastern mountain districts, which comprise one of 11 red panda sub-population areas in Nepal. Community-based monitoring, capacity building, community development to reduce forest dependency and raising awareness about red pandas among local people and schoolchildren are some of the activities being implemented by the Network in these districts. Red panda based ecotourism is being promoted as an alternative means for biodiversity conservation and livelihoods enhancement. Furthermore, a local NGO named Dolphin Conservation Centre has initiated community-based conservation of dolphins (*Platanista gangetica*) in the Mohana River and its tributaries in far western Nepal. The Rani Community Forest User Group at Chaughada, Makawanpur has been active in conservation of pangolins (*Manis spps.*). The Silviculture Division under the Department of Forests has been working for *in-situ* and *ex-situ* conservation of threatened plant species, including *bijayasal* (*Pterocarpus marsupium*) and *satisal* (*Dalbergia latifolia*).

2.1.3 Landscape Management

The Ministry of Forests and Soil Conservation has been implementing landscape management programs in three important landscapes, namely the *Tarai* Arc Landscape, Sacred Himalayan Landscape, and the Kailash Sacred Landscape. Another landscape management program has been initiated by a consortium of INGOs and NGOs in the Chitwan-Annapurna Landscape since 2011 under USAID funding (Figure 11). These landscapes provide connectivity to several protected areas and have helped enhance ecological processes and conservation of threatened species.

Figure 11: Landscapes under management



Box 2: Kailash Sacred Landscape management: a new and noble initiative
The Government of Nepal initiated a landscape management program in Nepal part of the trans-boundary Kailash Sacred Landscape that extends across parts of Nepal, China and India, in 2009. A five-year Kailash Sacred Landscape Conservation and Development Initiative (KSLCDI) has been implemented in the area since 2013 under DFID and GIZ funding provided through ICIMOD. Mainstreaming sustainable ecosystem management approaches and practices in policies and plans at all levels, and capacity building of key institutions for long-term environmental monitoring and socioeconomic research are some of the objectives of KSLCDI (ICIMOD, 2013).

2.1.4 Establishment of Protection Forests

Seven forests, covering a total area of 133,579 hactare, have been declared as protected forests since 2010. Some of those forests are important wildlife corridors, and the rest are rich in biodiversity (Table 3). The main objectives of protection forests are to enhance biodiversity through rehabilitation of habitats of rare and important species, biological corridors, and wetlands, and enhance local livelihoods through implementation of income generating activities (DOF, 2013a).

Table 3: Protected forests established after 2009

Forest	Year Estd.	Size (ha.)	Location	Conservation Significance
Madhane	2010	13,761	Gulmi	Biodiversity; eco-tourism
Barandabhar	2011	10,466	Chitwan	Biological corridor; wetland; habitat for several endangered species.
Panchase	2011	5,775.7	Kaski, Parbat, Syangja	Biodiversity; eco-tourism; religious
Laljhadi-Mohana	2011	29,641.7	Kailai, Kanchanpur	Biological corridor; wetland
Basanta	2011	69,001.2	Kailai	Wildlife habitat and corridor
Khata	2011	4503.7	Bardia	Wildlife habitat and corridor
Dhanushadham	2012	430	Dhanusha	Historical; religious; biodiversity

2.1.5 Enhancing Benefits of Conservation to Local Communities, including Disadvantaged Social Groups

The transformation of government managed national forests and protected areas into different forms of participatory forests and protected area management systems have been continuously increasing. By June 2013, 18,133 Community Forest User Groups (CFUGs) involving 2.24 million households were managing 1.7 million hectares of forestland (27% of the total national forest) under the community forestry program. Of that, around 0.47 million hectares forest was handed over to 3,702 CFUGs involving 0.577 million households in between 2008 and 2013 (Table 4; DOF, 2013b).

Table 4: Changes in status of community forestry in between 2008 and 2013

Categories	2008	2013 (June)	% Change (2008-2013)
User Groups	14,431	18,133	25.7
Households	1,660,000	2,237,195	34.8
Forest Area (ha.)	1,230,000	1,700,048	38.2

A total of 42,773 hectares of degraded forest in 39 districts across Nepal are being managed by local people living below the poverty line under the pro-poor leasehold forestry program. By July 2013, a total of 7,413 leasehold forest groups involving 74,950 households were engaged in the program. Of this, 5,758 leasehold forest groups involving 45,058 households were formed in between 2008 and 2013 (Table 5).

An additional 54,000 hectares of national forest have been transformed into collaborative management since 2008, and eight other *Tarai* forests, covering a total area of 26,608 hectares, are planned to be placed under collaborative management this year. Similarly, 34,300 hectares of buffer zone have been put under community-based management since 2010. With this increase, the buffer zone area managed by local communities reached 560,270 hectares in 2012. This move has benefitted approximately 700,000 local people organized in 4,088 buffer zone user groups and 143 buffer zone user committees (Acharya and Dhakal, 2012).

Table 5: Changes in status of pro-poor leasehold forestry in between 2008 and 2013

	2008	2013 (June)	% Change (2008-2013)
User Groups	1,655	7,413	348.0
Households	29,892	74,950	150.7
Forest Area (ha.)	17,320	42,773	147.0

Photo ©: Ambika P. Gautam

A recently established leasehold forest in the degraded Siwalik Hills, western Nepal

The community-based forest and protected area management programs have not only helped to conserve biodiversity, but have also provided access to resources for local people and contributed to the increased supply of forest products, empowered rural women, poor and the disadvantaged groups, promoted income generation and community development activities, and improved livelihoods of people in rural areas (Gautam *et al*., 2003; Gautam 2009; Shrestha *et al*., 2010; Bhattarai *et al*., 2011; MoFSC, 2013b; Niraula *et al*., 2013).

The revenue from protected area based tourism, which increased by 91 percent (from USD 1,387,000 to USD 2,648,000[1]) in between 2009 and 2012, has also increased incentives to conserve biodiversity by local communities as the communities get 30 to 50 percent of the protected area revenue for conservation of biodiversity and economic development (DNPWC, 2012).

Public land agroforestry is another initiative that is directly contributing to livelihoods and income of poor people and disadvantaged social groups, alongside biodiversity conservation (Box 3). These initiatives have put Nepal at the forefront in linking communities to benefits of conservation.

Box 3: Public land agroforestry is an example initiative that is directly contributing to biodiversity conservation and enhancement of poor peoples' livelihoods

In some central *Tarai* districts, many small agro-forestry plots have been established on public common lands. The plots, which are managed by local landless or poor people, usually possess a wide range of agriculture, horticulture and forest tree and other species. The initiative is led by the concerned district forest offices and, in some cases, supported by environmental NGOs.

Photo ©: Ambika P. Gautam

An agroforestry plot established on a public land in Dhanusha

2.1.6 Monitoring of Wildlife Populations

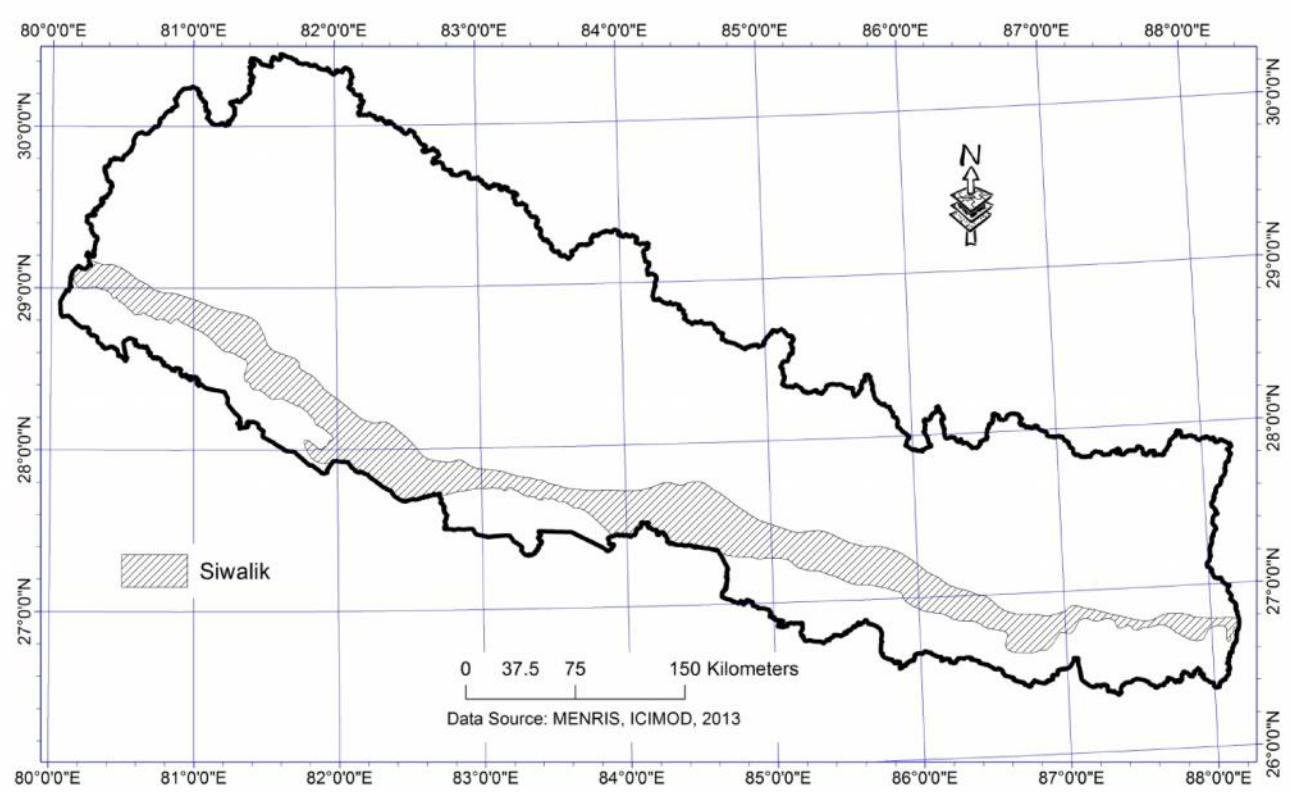
Systematic monitoring of populations of some wildlife species have been started since 2008. The monitoring of including tiger, rhino, snow leopard, gharial, blue sheep, Himalayan tahr, *gaur* (*Bos gaurus*), wild water buffalo and swamp deer (*Cervus duvaucelii)* has been started in different time interval since 2008 (WWF, 2012). Similarly, there have been regular surveys of globally threatened bird species which have provided much useful information on their population sizes, key sites, threats and conservation needs. These efforts have contributed towards saving species from extinction (BCN and DNPWC, 2011).

2.1.7 Conservation of Fragile Ecosystems

The *Siwalik* range (*Chure)* in Nepal is a largely forested, geographically sensitive and rugged landscape extending from east to west of the country (Figure 12). Having realized the severity of problems arising from degradation and loss of forests and other natural resources, the Ministry of Forests and Soil Conservation has been implementing integrated forest and watershed management activities in 26 districts of the *Siwalik* region since 2010 as one of the National Pride Project. Conservation of forest for natural regeneration, river bank protection through bio-engineering techniques, and plantation are the main activities.

[1] Computed based on Nepal Rastra Bank exchange rate of 19 March 2014 (USD 1= NPR 97.61)

Figure 12: *Siwalik* range in Nepal



2.1.8 Wetlands Conservation

The Ministry of Forests and Soil Conservation successfully piloted the "Conservation and Sustainable Use of Wetlands in Nepal" project in two Ramsar sites in southern Nepal, during 2008-2013. The project had the objectives of ensuring maintenance and enhancement of the national wetland biodiversity, and environmental goods and services for improved local livelihoods. The project also made important contributions to building capacity and improving the legal and policy framework for conservation and sustainable use of wetlands (GON/UNDP-GEF, 2007; MoFSC, 2013c).

2.1.9 Vulture Conservation

A Vulture Conservation and Breeding Center has been established in the Chitwan National Park in 2008 with the objective of ensuring long term survival of two vulture species: (i) slender billed vulture (*Gyps tenuirortris*), and (ii) oriental white-rumped vulture (*G. bengalensis*). The center had 59 Gyps vultures in 2012 (DNPWC, 2012). Moreover, seven community-managed 'vulture restaurants' have been established by the BCN and Himalayan Nature at different locations.

Photo ©: Bird Conservation Nepal

Vulture conservation and breeding center at Kasara, Chitwan

2.1.10 Promotion of REDD+ as a Mechanism to Control Loss and Degradation of Forest and Biodiversity

Since 2008, the Ministry of Forests and Soil Conservation has promoted REDD+ as a mechanism to control forest loss and degradation. A Readiness Preparation Proposal was prepared in 2010 and a National REDD Strategy is being prepared (MoFSC, 2010). Several REDD+ projects are being piloted in different forest regimes in Nepal.

A local cooperative has been implementing a program for community-based conservation and wise use of lake resources in Rupa Lake, Kaski District, with the objective of lake restoration and biodiversity conservation in partnership with LI-BIRD and the local municipality. The cooperative has initiated a scheme for compensating upstream forest user groups for their conservation efforts.

The above pilot cases have provided useful insights and idea of challenges for implementing REDD+ and PES projects. Moreover, strong political support, a favorable policy and legal environment, supportive donors and NGOs and extensive involvement of local communities in forest management have created favorable conditions for implementation of REDD+ and PES in future.

2.1.11 Minimizing Adverse Impacts of Climate Change on Vulnerable Ecosystems

The Ministry of Forests and Soil Conservation, together with IUCN, UNEP and UNDP, began implementing, in 2012, an Ecosystem-based Adaptation (EbA) project in the Panchase protected forest area located in Kaski, Parbat and Syangja districts. The four-year project, funded by the German Federal Ministry for Environment, will strengthen the resiliency local communities and ecosystems through sustainable natural resource management oriented activities. Generation of knowledge on EbA, development of assessment tools, and identification of appropriate ecosystem-based adaptation measures are some other specific aims of the project.

Nepal has prepared a Strategic Program for Climate Resilience (SPCR) under the global Pilot Program for Climate Resilience financed by the Climate Investment Funds. The SPCR, which complements the National Adaptation Program of Action, and Local Adaptation Plans of Action, has five components, namely: (i) building climate resilience of watersheds in mountain eco-regions, (ii) building resilience to climate-related hazards, (iii) mainstreaming climate change risk management in development, (iv) building climate resilient communities through private sector participation, and (v) enhancing climate resilience of endangered species.

2.1.12 Conservation of Agro-genetic Diversity

Some of the recent efforts to conserve agro-genetic resources include: (i) establishment and management of a National Agriculture Genetic Resource Centre (Gene Bank), and community gene or seed banks (ii) tissue culture, and (iii) production and use of cattle and buffaloes semen. The National Potato Research Program of NARC has also been implementing a tissue culture program to produce and supply pre-basic seeds of potato to farmers across the country (NPRP, 2011).

Box 4: The Gene Bank: a key initiative for ex-situ conservation of agro-genetic diversity

The National Agriculture Genetic Resource Centre (Gene Bank) was established in 2010 at Khumaltar, Lalitpur under the management of National Agricultural Research Center for *ex-situ* conservation of agro-genetic resources. In addition to conserving seeds, the Gene Bank has also established tissue bank and laboratories for *in-vitro* culture, molecular research and seeds testing, and has created its links with the 115 community seed banks that have been established across the country (Bhatta *et al*., 2012).

2.1.13 Formulation of Enabling Policies, Strategies and Legislation

Four cross-sectoral and nine sector-specific policies, strategies or legislations related to biodiversity have been formulated and implemented since 2009. Some of the main biodiversity related sectoral policies, strategies and legislations developed since 2009 include: (i) Tourism Policy (2009), (ii) Plant Protection Rules (2010), (iii) Forest Fire Management Strategy (2010), (iv) Industrial Policy (2011), (v) Rangeland Policy (2012), (vi) National Wetlands Policy (2012), (vii) Forest Encroachment Control Strategy (2012), and (viii) Wildlife Damage Relief Guidelines (2012). Climate Change Policy (2011), National Land Use Policy (2012), and Environment Friendly Local Governance Framework (2013) are some of the main cross-sectoral policies and strategies.

Box 5: Tourism policy: an example enabling policy

Tourism Policy (2009) is one of the best sectoral policies, which gives emphasis on protection of environment, pollution prevention and control, and conservation of biodiversity, traditional knowledge and skills. The long-term vision, goal, objectives, specific policies, working policies, and challenges mentioned in the Policy have given due emphasis on conservation. It is a good example of mainstreaming biodiversity conservation by one of the sectors which is not directly responsible for conservation of biodiversity.

2.1.14 Institutional Development and Cooperation

Nepal made substantial efforts to strengthen national institutional mechanisms for conservation of biodiversity in recent years. The National Tiger Conservation Committee chaired by the Prime Minister and National Wildlife Crime Control Coordination Committee chaired by the Minister of Forests and Soil Conservation were formed in 2010. Some other examples of key national level institutional mechanisms established after 2009 include formation of the National Biotechnology Coordination Committee chaired by the Minister of Science, Technology and Environment, and establishment of the REDD Forestry and Climate Change Cell under the MoFSC. Similarly, the National level Wildlife Crime Control Bureau and establishment of its 16 district cells together with the Central investigation Bureau of Nepal Police has been actively working to curb the wildlife crimes.

The signing of a Memorandum of Understanding on environment and biodiversity conservation with the People's Republic of China on 3 June 2010, the annual trans-boundary meeting on biodiversity conservation at national, regional and field level with India and the formation of the

South Asia Wildlife Enforcement Network (SAWEN) on 19 May 2010 are some key efforts to strengthen regional cooperation for curbing illegal trade in animal parts and poaching.

2.1.15 Awareness, Education and Research

Efforts made towards improving awareness of the general public include a broad range of activities. Some examples of such activities include: (i) TV and radio programs implemented by government agencies such as Department of Agriculture, Department of Forests, and DNPWC and NGOs such as the Nepal Forum of Environmental Journalists, Bird Conservation Nepal, and LI-BIRD, (ii) public awareness campaign on International Biodiversity Day, World Environment Day, National Conservation Day, International Mountain Day, International day of Forests, World Wildlife Day, World Wetlands Day, World Migratory Bird Day and International Vulture Awareness Day, (iii) exhibitions, (iv) information boards, and (v) distribution of brochures and newsletters by different agencies. Both the print and electronic media are making substantial contributions to raise awareness in recent years. Some individuals are also putting efforts to raise awareness, especially about the importance of conserving threatened birds.

Government line agencies, including district forest offices, protected area offices and district agriculture offices have been implementing different training and other capacity building programs for improving awareness of local user groups. Many NGOs are working with local communities to change local attitudes towards biodiversity by helping people recognize the importance of conserving biodiversity for their own livelihoods and wellbeing. For example, the Red Panda Network has implemented conservation education program in eastern mountain districts. Bird Conservation Nepal and Bird Education Society are working to build the capacity of grassroots conservation groups at Important Bird Areas (BCN and DNPWC, 2011). Similar programs have been implemented by Federation of Community Forest Users in Nepal (FECOFUN), conservation area management committees, and buffer zone management councils to raise awareness among members of the local user groups.

There have also been efforts to improve and strengthen biodiversity related education and research in recent years. The Central Department of Botany of Tribhuvan University, in collaboration with the University of Bergen, Norway and regional partners, has started a two year master level program in "Biodiversity and Environmental Management" in 2008. The Central Department of Environment Science has been offering a full course on Biodiversity Conservation and Management. Kathmandu University has a Department of Biotechnology. The Institute of Agriculture and Animal Science has included agricultural biodiversity in the bachelor's level course and is in the process of finalizing and approving masters program in agricultural biodiversity. The Agricultural and Forestry University, Purwanchal University, Pokhara University, and many private colleges also offer courses related to biodiversity and biotechnology. Faculty members and students in these universities occasionally conduct research in different aspects of biodiversity.

The Department of Forest Research and Survey, and Department of Plant Resources occasionally conduct research in forest and floral diversity. NARC conducts research in agrobiodiversity through its research centers located throughout the country. Some other academic institutions and I/NGOs also undertake scientific research on different aspects of biodiversity. ICIMOD, WWF Nepal, IUCN, NTNC are some of such organizations that regularly conduct research and disseminate the

findings through different means. Empirical research conducted by individual scholars affiliated to different national and international academic institutions comprises another major dimension of biodiversity related research in Nepal.

2.1.16 Monitoring and Evaluation

Monitoring and evaluation (M&E) of development plans, programs and projects has remained a priority of the Government of Nepal, although its implementation has generally remained weak. The National Planning Commission has developed M&E guidelines focusing on result-based management in 2013. Some ministries, including the Ministry of Agricultural Development and the Ministry of Forests and Soil Conservation have started using major biodiversity related indicators in their monitoring and evaluation frameworks.

2.2 Status of Implementation of Nepal Biodiversity Strategy (2002)

A subjective assessment of the progress made in implementation of the Nepal Biodiversity Strategy (NBS) and Nepal Biodiversity Strategy Implementation Plan (NBSIP) based on the review and analysis of relevant literature and secondary data, consultations, and expert opinions indicated that NBS was partially successful in achieving its goal of providing a strategic planning framework for managing biodiversity in the country. Implementation of around 30 percent of the NBS strategies related to the six thematic areas was "very good", 30 percent "good" and 41 percent "average". Of the 17 cross-sectoral strategies, four were almost fully implemented and two were not implemented. Implementation status of the rest of the strategies remained medium (Table 6).

Table 6: Status of implementation of NBS (2002) strategies

Sector/Theme	Number of Strategies	Status of Implementation*			
		Very Good	Good	Unsatisfactory	Not Implemented
Protected Area	8	2 (25)	3 (37.5)	3 (37.5)	-
Forest Biodiversity	9	2 (22.2)	3 (33.3)	4 (44.4)	-
Rangeland Biodiversity	4	1 (25)	-	3 (75)	-
Wetland Biodiversity	1	-	1 (100)	-	-
Agro-biodiversity	3	2 (66.6)	1 (33.4)	-	-
Mountain Biodiversity	2	1 (50)	-	1 (50)	-
Cross-sectoral	17	4 (23.5)	6 (35.3)	5 (29.4)	2 (11.8)

* The number in parenthesis refers to the percentage

Increase in protected area and populations of some mega wildlife species; implementation of landscape approach conservation; promotion of community based management of forest and protected areas; increased participation of local people, including women and disadvantaged group, in forest and protected area management; formulation of the National Rangeland Policy and Revised National Wetland Policy in 2012, and integrated management of two wetlands of international importance are some of the NBSIP that were successfully implemented.

The three agrobiodiversity related strategies were successfully implemented. Community based biodiversity management has been established as a successful approach for conservation of agriculture genetic resources over the period of implementation. These achievements were the result of successful collaboration among the Nepal Agricultural Research Council, Department of Agriculture, LI-BIRD and local farmers (Rijal *et al*., 2003; Subedi *et al*., 2011; Shrestha *et al*., 2013).

Of the 13 priority projects planned by the NBSIP (2006), three were successfully implemented. These include: (i) integrated wetlands management, (ii) landscape level biodiversity conservation, and (iii) conservation and management of pollinators for sustainable agriculture through ecosystem approach. Institute of Agricultural Sciences, Rampur Chitwan implemented a FAO-funded pilot project on "Conservation and Management of Pollinators for Sustainable Agriculture through an Ecosystem Approach" (Jha *et al*., 2005). Status of implementation of four of the NBSIP projects remained "good" and three "poor". Three of the priority projects, namely Phulchoki-Chandragiri Biodiversity Conservation Program, Rhododendron Conservation Program in Tinjure-Milke-Jaljale, and establishment of the Kanchenjunga Tri-national Peace Park could not be implemented.

Some other strategies and plans that could not be implemented include: (i) establishment of Nepal Trust Fund for Biodiversity, and (ii) assignment of National Biodiversity Coordinator. The strategy relating to documentation of traditional knowledge and innovations associated to Biodiversity could not be implemented due to absence of necessary legislation.

The National Trust Fund for Biodiversity, which was supposed to be the main source of funding for the National Biodiversity Coordination Committee (NBCC) and National Biodiversity Unit (NBU), could not come into existence. Coordination, monitoring and evaluation remained generally weak. The NBCC and related thematic committees, which were supposed to guide, coordinate and monitor the implementation, could not become so effective due mainly to inadequate human and financial resources in the NBU.

Some other gaps that negatively affected implementation of the NBS include: (i) inadequate inter- and intra-agency coordination and cooperation, (ii) inadequate mainstreaming of biodiversity into national development plans and programs, (iii) gap in legislation to translate the strategy and policies into actions (e.g. agro-biodiversity policy, tourism policy), (iv) inadequate incentives for conservation of native landraces of agri-crop varieties and livestock breeds, (v) absence of a system for mainstreaming indigenous traditional knowledge and innovations into national development programs, (vi) gap in linking biodiversity registration program with biodiversity conservation, use and benefit sharing, (vii) inadequate technical capacity for bio-prospecting, and *ex-situ* conservation of agrobiodiversity, and (viii) unorganized information sharing and dissemination system.

Implementation of the NBSIP suffered, among other, from: (i) disagreement among the key actors in terms of suitable approach to conservation of biodiversity-rich areas (such as the Phulchoki-Chandragiri and Tinjure-Milke-Jaljale) (ii) inadequate baseline information on biodiversity, including agro-biodiversity, and (iii) inadequate financial resource to implement the identified priority projects.

2.3 Lessons Learned

The following are some of the key lessons learned from management of biodiversity in Nepal.

(1) Meaningful and effective participation of local communities in the management of natural resources is a key to ensuring success and sustainability of program interventions. The successful management of Kanchenjunga and Annapurna conservation areas, corridors, and thousands of community and leasehold forests across the country are evidence of this. Several studies have shown that forest degradation and loss has declined significantly and even reversed in many areas, particularly the Middle Mountains**,** after implementation of the community forestry program (Gautam, 2006; Niraula *et al*., 2013). The improvement in forest condition has created habitat corridors and development of successive stages of forests, which might have played crucial role in conservation of biodiversity, including preventing local extinction of species. Ensuring meaningful local participation requires economic incentives, and incorporation of traditional practices, local knowledge and institutions in the design and implementation of the programs. Promoting cultivation of medicinal and aromatic plants such as chiraito (*Swertia chirayita*), lemon grass (*Cymbopogon* sp.) and other NTFPs (such as, broom grass) in community managed forests is found to be one of the proven approaches to benefit communities and achieve success in biodiversity conservation.

(2) A landscape approach is an appropriate strategy for addressing multiple drivers of biodiversity loss, enhancing ecological processes and conserving critical habitat and threatened species. Landscape level programs like *Tarai* Arc Landscape (TAL), Kailash Sacred Landscape Conservation and Development Initiative (KLCDI), Sacred Himalayan Landscape (SHL) and Chitwan Annapurna Landscape Programs (CHAL) have been conserving biodiversity and promoting sustainable livelihoods. Similar successes have been reported from the transboundary Kangchenjunga Landscape Project, implemented by ICIMOD in collaboration with various agencies and communities in eastern Nepal, Sikkim and Darjeeling of India, western Bhutan and China (ICIMOD, 2008).

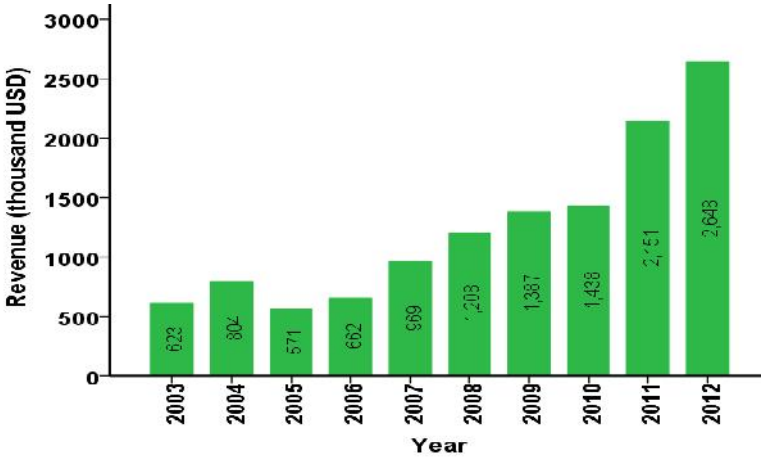
(3) Cooperation and collaboration among relevant agencies (government, I/NGOs, local communities) is crucial to achieve success in biodiversity conservation. Conservation of local varieties of crops through the establishment of seed banks at the community level has empowered communities by granting the ability to access and to conserve the genetic diversity of local seed resources (Acharya *et al*., 2010; Shrestha *et al*., 2013). The success met in conservation of agriculture genetic resources through community biodiversity registration, participatory plant breeding and participatory variety selection, and community seed bank was the result of successful collaboration among the Nepal Agricultural Research Council, Department of Agriculture, LI-BIRD and local farmers. Involving local stakeholders in planning and implementation is critical to achieving objectives of conserving agrobiodiversity and using the genetic resources in sustainably way. The continuous increase in population of endangered species such as tiger and rhinoceros in recent years was possible through concerted efforts of the DNPWC, WWF Nepal, NTNC, NGOs and local people. The achievements of the WTLCP was possible through cooperation and collaboration between the MoFSC, NARC, UNDP, district level agriculture, forest, national parks and livestock offices, local governments, NGOs and community groups.

(4) Cooperation among law enforcement agencies is necessary for curbing illegal trade of wildlife species, which in turn helps control poaching. Collaboration among the recently set up Wildlife Crime Control Bureau at central level their district chapters and Community based anti-poaching group and youth clubs at local level alongside effective implementation of anti-poaching plans and activities, can largely be credited for decreased poaching of threatened species and illegal trade of wildlife parts in recent years.

(5) International cooperation can be helpful in curbing transboundary trade of wildlife commodities and strengthening ecological security in trans-boundary regions. Cooperation with China and India has been useful in controlling illegal wildlife trade through sharing of information, knowledge, experiences and practices. Formation of the South Asia Wildlife Enforcement Network in 2010 has helped for coordinated regional response to combat illegal wildlife poaching and trafficking (Karki *et al*., 2011).

(6) There is a very good scope for promotion of tourism in protected areas to generate necessary fund for conservation and to provide economic opportunities for local communities. This was evidenced by the continuous and significant increase in number of tourists visiting protected area and associated increase in revenue over the last decade (Figure 13; DNPWC, 2012).

Figure 13: Annual revenue generated from tourism in protected areas



(7) Policy that enables conservation is necessary to achieve the intended outcome and appropriate legislation is necessary to translate policy pronouncements into practice. This is seen by the fact that the community forestry program could not gain momentum until a supportive and enabling Forest Act and Forest Regulation were promulgated in 1993 and 1995, respectively. That remained the situation despite the clear direction given by the Master Plan for Forestry Sector (1989). The implementation of the Rangeland Policy (2012) and National Wetland Policy (2012) has not actually commenced due to lack of legislation. Attempts to improve management of mountain biodiversity have been partly hindered due to lack of separate policy and legislation governing mountain biodiversity.

(8) Positive incentive measures, which promote conservation-friendly behaviors, are necessary to encourage local people in biodiversity conservation. This lesson has been learned from the implementation of benefit sharing mechanism based on PES principle conducted by the Rupa Lake Rehabilitation Fisheries Cooperative Ltd. in Kaski district, and some other sites. The Rupa Lake cooperative has started community based conservation of the lake and its wise use program with the objective of lake restoration and biodiversity conservation. The benefit from the fish harvest is shared among the beneficiaries on equitable basis. This has significantly improved conservation of

fish and other aquatic life in the lake as well as the catchment area, and there is high possibility for the long term sustainability of the initiative.

2.4 Development of National Biodiversity Strategy and Action Plan (2014)

The Government of Nepal, Ministry of Forests and Soil Conservation as the CBD Focal Point is revising the National Biodiversity Strategy and Action Plan (NBSAP). The project is funded by the Global Environment Facility through United Nations Environment Program. The overall objective of the NBSAP is to provide a strategic planning framework for conservation of Nepal's biodiversity, sustainable use of the biological resources for enhancing local livelihoods and equitable sharing of the benefits accrued.

2.4.1 The NBSAP Development Process

The NBSAP is primarily based on stocktaking of current situation through extensive review of relevant plans, policies, strategies, agencies' reports and other literature, and collection and analysis of secondary data available with different government and non-government agencies. Consultations with stakeholders at various levels and limited field observations formed the main sources of primary data and information. Relevant decisions and guidelines of the CBD Conference of Parties (COP), particularly the COP 10 Decision X/2 on Strategic Plan for Biodiversity 2011–2020 adopted by the Parties in October 2010, and the Aichi Biodiversity Targets provided theoretical framework and technical guidance in its development.

Consultations with relevant stakeholders were carried out at the national, regional, district and community levels. Efforts were made to make the consultations gender-balanced and socially inclusive. Checklists were used to make the consultation meetings efficient and objective oriented. A total of 1,664 individuals, including 459 (26.7%) women and 1,205 (73.3%) men, belonging to government, I/NGOs, Civil Society, academics, media, forest user groups and other CBOs were consulted during the process (Figure 14). Consultations in Kathmandu involved interactions with officials and experts working in selected 41 organizations, including relevant government ministries and departments; Kathmandu-based INGOs and national NGOs; Civil Society groups; natural resources users' federations and networks; Nepal Federation of Indigenous Nationalities; research and academic institutions; and professionals' teams engaged in revision of forestry sector strategy, and formulation of national REDD+ strategy.

Figure 14: Representation of individuals in the consultations from different type of agencies (left), and number of individuals consulted at different levels

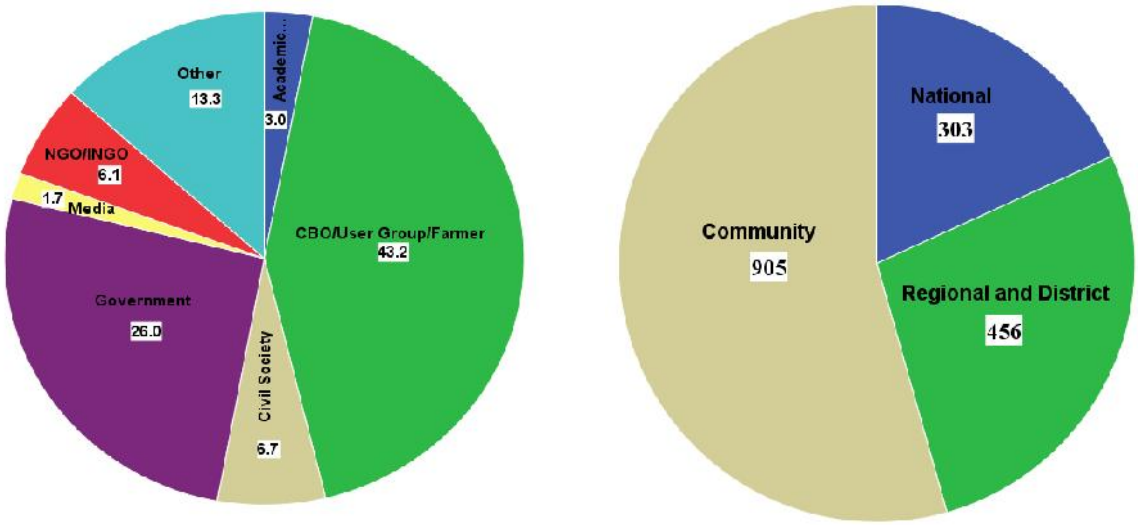
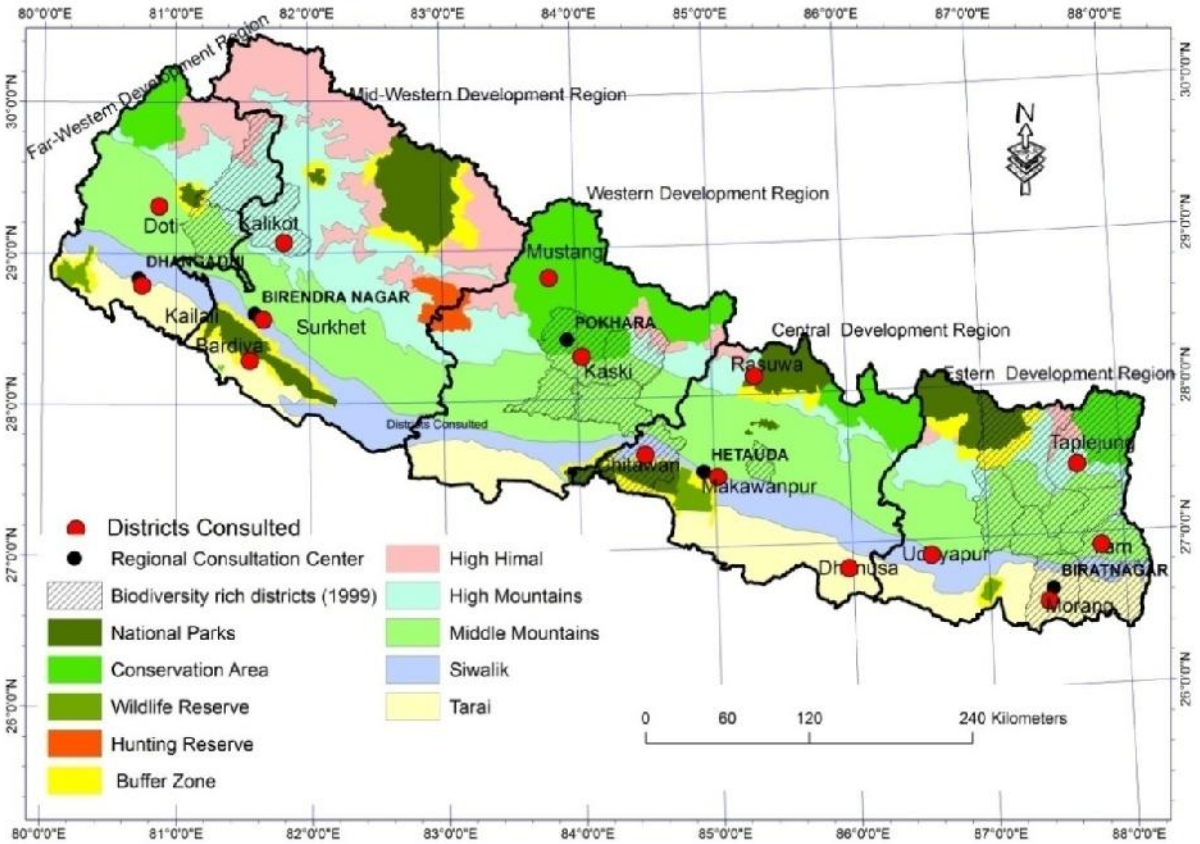


Figure 15: Location of the regional and district level consultation workshops



Regional level government and non-government stakeholders, and district level government line agencies, NGOs, Civil Society groups and other relevant agencies and individuals were consulted by organizing a day-long consultation workshop at each of the five development regions, and 15 selected districts across Nepal. Field level consultations were carried out by organizing community level meetings at 30 selected sites within the 15 selected districts (Figure 15).

2.4.2 Structure and Salient Features of the NBSAP

The NBSAP has been structured into six chapters, including: (i) introduction, (ii) the national context, (iii) threats to biodiversity, (iv) efforts to manage biodiversity and key outcomes, (v) strategy for management of biodiversity, (vi) arrangements for implementation of the strategy, and (vii) framework for local biodiversity strategy and action plan. The description and analysis of past efforts and achievements, and formulation of strategies and actions are focused around six thematic areas and sectors: (i) protected areas, (ii) forests outside protected areas, (iii) rangelands, (iv) wetlands, (v) agriculture, and (vi) mountains. Cross-cutting themes, such as livelihoods, governance, gender and social inclusion, and climate change impacts and adaptations have been dealt separately.

Box 6: Salient features of the National Biodiversity Strategy and Action Plan

- Adoption of program based approach to management of biodiversity.
- Builds on and aims at consolidating the successful past efforts and achievements.
- Broad-based participation of stakeholders in its development.
- Comprehensive and balanced in terms of thematic and sectoral coverage.
- Provides a clear analytical account of the past efforts, achievements and gaps.
- Gives due considerations to gender and social inclusion and emerging issues, such as Indigenous and local communities, climate change and invasive alien species.
- Thematic strategies and targets are directly linked to priority actions, and performance indicators. This will make implementation of the strategies and monitoring of the progress easier.
- Includes strategies to minimize the current contentions and enhance complementarities between the protected area and participatory approaches to biodiversity conservation.
- Identifies the current gaps in coverage and connectivity of existing protected area network and recommends the ways to fill those gaps.
- Includes a plan and framework for managing biodiversity at the local level.

3. PLAN FOR MEETING THE AICHI BIODIVERSITY TARGETS

3.1 Background

In the tenth meeting of Conference of Parties' (COP-10) of CBD held at Aichi of Nagoya, Japan in 2010, the Parties came up with a new plan and targets to conserve biodiversity and enhance its benefits to the people. The plan, known as the **"Strategic Plan for Biodiversity 2011-2020", includes a** set of 20 ambitious yet achievable targets, which are collectively known as the Aichi Targets. The targets are grouped into five strategic goals (CBD, 2010). As a Party to the CBD, Nepal has an obligation to prepare and implement strategies and actions to meet the Aichi Targets. Similarly, under Goal 7 of the MDGs (i.e. Ensure Environmental Sustainability), Nepal had moved to integrate the principles of sustainable development into country policies and programs and reverse the loss of environmental resources (NPC/UNDP, 2005).

In Nepal, systematic efforts to meet the Aichi Targets have begun with the development of the NBSAP. The country has, however, already made substantial progress in conservation and sustainable use of biodiversity through formulation of enabling policies and strategies and the subsequent design and implementation of various programs, projects and activities that will contribute to meeting the Aichi Targets and relevant MDGs.

3.2 Strategies and Targets set by the National Biodiversity Strategy and Action Plan (2014) Towards Meeting the Relevant Aichi Targets and MDGs

The NBSAP has formulated a number of strategies to meet the Aichi Biodiversity Targets of ensuring environmental sustainability by 2020 and the MDGs by 2015. Each strategy is to be met through implementation of a number of priority actions. The strategies have been grouped into six biodiversity themes, namely protected areas, forest, rangelands, wetlands, agriculture, and mountain. Cross-sectoral issues have been dealt separately. The strategies and priority actions are designed to address the key national biodiversity threats, issues and gaps, alongside meeting the relevant Aichi Targets and the MDG on environmental sustainability. The following paragraphs briefly describe the NBSAP strategies for meeting the Aichi Targets. Details on selected national targets set by the NBSAP and corresponding indicators are presented in Annex 4.

Aichi Target 1: *By 2020, at the latest, people are aware of the values of biodiversity and the steps they can take to conserve and use it sustainably.*

The NBSAP strategies for enhancing awareness are based on the lessons learned and built upon the successful past efforts of the government and non-government sectors. Educating and raising awareness of the policy-makers, corporate houses, local communities and general public about the importance of biodiversity and ecosystem services is to be done through effective communication, education and outreach programs, and development and implementation of demonstration programs. The communication, extension and outreach strategy and the action plan included in the

NBSAP have recommended a number of priority actions to be carried out by 2020. Some examples of such priority actions aimed at raising awareness on biodiversity include: (i) creating awareness on the importance of ecosystem, species and genetic resources, (ii) raising awareness on the value of biodiversity and related policies and strategies, (iii) effective dissemination of information related to biodiversity, and (iv) revising high school, college and university curricula by including biodiversity.

The Communication, Extension and Outreach (CEO) strategy provides a framework for use by organizations and community groups while developing and implementing their own action plans based on the local ecological and socio-economic context. If implemented successfully, the CEO strategy will provide efficient mechanisms for sharing knowledge, building capacity, enhancing cooperation among relevant agencies at different levels.

The strategy for management of protected areas includes provision for improving awareness among the general public about the role and importance of protected areas through: (i) development of on-site lecturing, demonstration and interpretation infrastructure for selected protected areas, and (ii) improving web-based dissemination of information. Designing and implementation of programs to raise awareness and build capacity of local forest user groups in the corridors and buffer zone for climate responsive management of the forests is another strategic action recommended by the NBSAP.

Aichi Target 2: *By 2020, at the latest, biodiversity values have been integrated into national and local development and poverty reduction strategies and planning processes and are being incorporated into national accounting, as appropriate, and reporting systems*

One of the priority actions identified by the NBSAP for integration of biodiversity values into national and local policies, strategies, plans and programs relates to incorporation of conservation of biodiversity, sustainable use of its components and prevention and control of loss of biodiversity and degradation of ecosystems in the mandate of National Planning Commission, and all relevant ministries.

Consideration of biodiversity values into national poverty reduction strategies and planning processes and its incorporation into national accounting and reporting systems demands better understanding of The Economics of Ecosystem and Biodiversity (TEEB). The NBSAP stives to improve this understanding through TEEB studies on selected thematic areas such as forest, protected area, agriculture, watershed and mountain ecosystem. Outcome of such studies provides logical basis to policy makers in (i) mainstreaming biodiversity management in sectoral policies and plans such as local development, energy, industry, irrigation and roads, (ii) improving relevant legislations, (iii) effective implementation of environment related provisions of different policies, strategies, and legislations. These actions coupled with the National Biodiversity Information Management System and the National Clearing House Mechanism are expected to help promote evidence-based decision making for better management of biodiversity resources.

Some actions recommended by the NBSAP to promote transparency include: (i) respecting right to information of individuals and communities by disseminating and providing information relating to biodiversity and environment, and (ii) ensuring involvement of citizens and citizen groups in the

decision making related to conservation of biodiversity, sustainable use of its components and fair and equitable benefit sharing at different stages.

Aichi Target 3: *By 2020, at the latest, incentives, including subsidies, harmful to biodiversity are eliminated, phased out or reformed in order to minimize or avoid negative impacts, and positive incentives for the conservation and sustainable use of biodiversity are developed and applied, consistent and in harmony with the Convention and other relevant international obligations, taking into account national socio economic conditions.*

Nepal has yet to put effort into identifying disincentives including subsidies that are harmful to biodiversity and to try to reduce and eliminate them. The problem is exacerbated by lack of valuation and accounting of biodiversity and ecosystem goods and services. The NBSAP attempts to address this gap through formulation or improvement of relevant legislations. Harmonizing the sectoral policies, plans and programs and legislation to avoid any perverse incentives is another strategic measure recommended by the NBSAP. The NBSAP targets to identification and elimination of perverse incentives and promote positive incentives by 2020.

The strategy related to further consolidating and promoting on-farm conservation of genetic resources is expected to create or enhance positive incentives for conservation of agrobiodiversity. The strategic actions related to management of forest biodiversity will also promote incentive-based resource management such as enterprise-oriented community forestry which would link enterprise creation to forest management in an effort to ensure the sustainable use of forest resources by making local communities responsible for protecting and monitoring the resources which they are managing. The focus is on empowering the local communities to operate enterprises and manage forest through capacity building of FUG members. The NBSAP propose establishing and implementing a system of proper valuation and accounting of biodiversity and ecosystem goods and services. Moreover, adequate incentive measures to compensate local communities for the loss of cattle and crops destroyed by wildlife or reward the presence of wild animals on private lands through public payments is to be implemented. The strategy also includes identifying incentive measures for the genetic resource conservation of traditional agriculture crop, livestock, tree, shrub and important wild animal species and performance based incentive plantation program.

Aichi Target 4: *By 2020, at the latest, Governments, business and stakeholders at all levels have taken steps to achieve or have implemented plans for sustainable production and consumption and have kept the impacts of use of natural resources well within safe ecological limits.*

Strategies and priority actions relating to sustainable production and use of biological resources have been included in the set of strategies related to management of forests, rangelands, wetlands, mountains and agrobiodiversity. Strategies such as, promoting scientific management of forests to improve forest productivity, biodiversity conservation, and climate resilience; supporting and improving community based forest governance and management; and promoting sustainable management of NTFPs are examples of forest management strategies related to this target.

Supporting community based practices, and developing and implementing management plans for sustainable management of NTFPs, especially targeting conservation and sustainable use of over-harvested high value species are some of the specific strategies for management of forest

biodiversity. Some of the strategies for management of rangeland biodiversity that are related to this target, which are to be met by 2020 include habitat restoration, managing grazing pressure, and improving production of rangelands. A number of specific priority actions have been recommended to achieve these objectives.

The strategy for management of wetland biodiversity has recommended the development of a national program for conservation and wise use of wetlands. Some of the time-bound priority actions include: (i) carrying out inventory of all wetlands by 2017 to know their status and potentials, (ii) rehabilitation of at least seven major degraded wetlands within the next five years, and (iii) promoting community based wetlands management. The strategy have also proposed the development of criteria and indicators for Sustainable Forest Management and management plan of protected areas and all forest regime

The strategy for managing mountain biodiversity strives for enhancing environmental governance for promoting green economy and environment-friendly economic development through forest and agriculture based enterprises, strengthening eco-friendly tourism, and designing and implementing green projects (water, biodiversity, forests, and clean energy). The agrobiodiversity strategy has included provisions for promotion of indigenous traditional knowledge, skills and practices, and development and implementation of programs for improving and promoting local species, varieties or breeds for contributing to food security.

Aichi Target 5: *By 2020, the rate of loss of all natural habitats, including forests, is at least halved and where feasible brought close to zero, and degradation and fragmentation is significantly reduced.*

The NBSAP targets to reduce the loss and degradation of forests by at least 75 percent of the current rate by 2020. This is to be achieved by: (i) reducing dependency on national forests, (ii) improving law enforcement, (iii) addressing the drivers of deforestation and forest degradation, (iv) reclaiming and restoring encroached forestlands, (v) reversing or at least controlling further loss and degradation of *Siwalik* forests and (vi) effectively regulating extraction of forest products. Some of the recommended priority actions include: (i) directing infrastructure expansion into non-forest lands, (ii) controlling illegal harvest and trade of timber and other forest products through effective enforcement of the law, (iii) promoting and enhancing alternative livelihoods to reduce demand for agriculture land, (iv) promoting private forestry and agro-forestry on private and community lands as alternative sources of forest products, (v) promoting alternatives to wood fuel (e.g. green energy, bio-briquette) and promoting more efficient forest products utilization technologies such as bio-briquette, improved stoves, particle board, and improved harvest, storage and processing of NTFPs, including MAPs, and (vi) developing and implementing plans to significantly reduce forest fires.

Improvement in forest and protected area governance and management through: (i) enhancing law enforcement capacities of the DOF and DNPWC staff, and training to the local communities for enhancing biodiversity conservation and livelihoods, (ii) effectively implementing the existing forest and protected area management plans and species conservation plans, and (iii) bringing stronger commitments and enhancing capacity of front-line DOF and DNPWC staff (rangers, forest guards, game scouts) in conservation sector.

The integrated landscape management strategy to focus on local, community-led actions to solve resource management, biodiversity conservation, and climate change challenges has been recommended. Identification and promotion of appropriate land use (e.g. agroforestry, private forestry in marginal lands) and land management systems (e.g. SALT) to improve biodiversity conservation, control watersheds degradation and reduce pressure on forests is another key strategy included for management of landscapes. The strategy for controlling degradation of rangelands includes pastoral development and management through integrated approach for reducing pressure on rangelands.

Aichi Target 6: *By 2020 all fish and invertebrate stocks and aquatic plants are managed and harvested sustainably, legally and applying ecosystem based approaches, so that overfishing is avoided, recovery plans and measures are in place for all depleted species, fisheries have no significant adverse impacts on threatened species and vulnerable ecosystems and the impacts of fisheries on stocks, species and ecosystems are within safe ecological limits.*

Some of the priority actions and targets recommended by the NBSAP to meet this target include: (i) developing and implementing programs and pilot projects especially targeting conservation (*in-situ* and *ex-situ*) of at least 10 economically important native fish species, by 2020 (ii) controlling and regulating introduction of invasive fish species, (iii) controlling encroachment and eutrophication of at least 10 major wetlands by 2020, (iv) declaring and managing at least three suitable sites in different wetlands as fish sanctuaries, by 2017, and (v) developing and implementing management plans for conservation of dolphin in the Karnali, Babai and Narayani rivers, by 2020.

Aichi Target 7: *By 2020 areas under agriculture, aquaculture and forestry are managed sustainably, ensuring conservation of biodiversity.*

Successful implementation of the NBSAP will promote scientific management of forests for effective conservation of biodiversity, to maximize the benefits of the forestry sector to the full potential, and enhancing resilience of forests to curb negative impacts of climate change. Another key strategy for management of forest biodiversity includes mandatory inclusion of biodiversity conservation and sustainable utilization chapters in management plans of all types of forests.

The NBSAP aims to prioritize the conservation and wise use of wetlands located outside protected areas with participation of local communities. Mismanagement, over extraction of resources, infestation of invasive species, pollution will be minimized through sustainable management practices. Sustainable utilization of wetlands will be the integral part of biodiversity conservation. Comprehensive criteria, such as controlling conversion of wetlands to other use, prevention of pollution and invasion of alien species and equitable use of water and other resources will be developed and enforced. This strategic action will be crucial in scaling up biodiversity conservation into broader geographical space, and beyond the protected areas.

Aichi Target 8: *By 2020, pollution, including from excess nutrients, has been brought to levels that are not detrimental to ecosystem function and biodiversity.*

Some of strategic actions and associated targets to meet this target include: (i) preparation and implementation of plans for monitoring the level of use of pesticides, insecticides and chemical

fertilizers by 2020, (ii) development and implementation of plans to control industrial pollution in at least five major rivers and five major wetlands by 2020, and (iii) development and implementation of plans to control invasion and spread of water hyacinth and other invasive aquatic plants in at least five major wetlands by 2020.

The strategy for improving and expanding community based and on-farm conservation of agrobiodiversity is a key measure recommended by the NBSAP to conserve agro-genetic resources. Promotion of local and appropriate management practices, such as, use of compost and green manure and other locally available organic fertilizers; promoting local genetic resources which can give satisfactory level of production with limited chemical fertilizers; promoting locally adapted species, varieties and breeds are some of the priority actions recommended. Promotion of integrated pest management technology will greatly contribute to reducing pollution from insecticides, pesticides and excess nutrients.

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

Some of the priority actions provisioned by the NBSAP to control Invasive Alien Species (IAS) by 2020 include: (a) carrying out a detailed survey of the coverage and research on modes and pathways of propagation, ecological and economic damage and loss, control measures, and possible uses of at least five most problematic IAS that have posed high threat to native species and habitats, (b) developing and implementing program to raise awareness of local people on identification of IAS, their impacts and control techniques, (c) identification and use of biological control agents, and (iv) providing technical assistance to local people in the control and management of IAS.

Strengthening the knowledge and understanding for controlling invasive alien species by enhancing national capacity for their identification, prevention, early detection and management is a part of knowledge generation and management strategy included in the NBSAP. By 2020, a detailed survey of the coverage and research on modes and pathways of propagation, ecological and economic damage and loss, control measures (including biological) and possible use of at least five most problematic invasive alien plant species that have posed high threat to native species and habitats is to be completed.

The Department of Plant Resources, Department of Forest Research and Survey, NARC and Central Department of Botany, Tribhuwan University to work closely and in cooperation with international organizations such as the CBD, Global Invasive Species Information Network, Asia Pacific Forest Invasive Species Network and or Global Invasive Species Program to develop Invasive Plant Atlas for identification, early detection, prevention and management of invasive alien plants.

Aichi Target 10: *By 2015, the multiple anthropogenic pressures on coral reefs, and other vulnerable ecosystems impacted by climate change or ocean acidification are minimized, so as to maintain their integrity and functioning.*

Nepal is landlocked country where mountains are the most vulnerable ecosystems. The strategy and priority actions for managing mountain ecosystems and biodiversity are aimed at conserving

ecosystems and species and ensuring the continued supply of mountain ecosystem goods and services that are critical to both upstream and downstream human and other biological communities.

The NBSAP strategies for the mountains are grouped into two strategic goals, namely: (i) enhanced understanding of mountain biodiversity and ecosystem services, and (ii) environment-friendly economic development. Generating and strengthening knowledge on the ecology of mountain ecosystems; promoting alternative livelihoods opportunities; building infrastructure for green development; enhancing environmental governance to promote green economy; strengthening implementation mechanisms; promoting public–private partnerships; and consolidating diverse funding mechanisms for biodiversity management, climate change, and sustainable development are some of the key strategies. Restoration of at least 10,000 hectares of degraded mountain ecosystems through ecosystem based adaptation approach, and implementation of climate change adaptation planning by at least 3,000 community managed forests are some specific actions and associated targets.

Aichi Target 11: *By 2020, at least 17 per cent of terrestrial and inland water, and 10 per cent of coastal and marine areas, especially areas of particular importance for biodiversity and ecosystem services, are conserved through effectively and equitably managed, ecologically representative and well connected systems of protected areas and other effective area-based conservation measures, and integrated into the wider landscape and seascapes.*

Nepal has already surpassed this target by putting 23.23 percent (i.e. 34,185.62 square kilometer) of its land area under protected area management. Some of the strategies provisioned by the NBSAP to establish and strengthen ecological connectivity include: (i) establishment and conservation-friendly management of ecological corridors, bottlenecks and climate refugia outside protected area, (ii) restoration of degraded forest ecosystem, rangeland, and wetland habitats located in corridors, bottlenecks and climate refugia, (iii) facilitation of wildlife movements between key adjacent habitats, and (iv) designing and implementation of an integrated landscape management strategy that focuses on local, community-led actions to solve resource management, biodiversity conservation, and climate change challenges.

Some priority actions to implement the strategies include: (a) development and implementation of conservation-oriented community based forestry, and other locally suitable conservation systems in the five corridors by 2020, (c) awareness raising, and capacity building of the local forest user groups in the corridors for conservation-friendly management of the forests, (d) planning and implementation of reforestation and afforestation programs by district forest offices and communities to restore degraded sites, (e) expansion of protection forest where appropriate, (f) building “overpass and underpass” at three key locations to allow free movement of wildlife species by 2020, and (g) applying the concept of Smart Green Infrastructure while constructing new infrastructure such as roads, railways and transmission lines inside protected area.

Aichi Target 12: *By 2020 the extinction of known threatened species has been prevented and their conservation status, particularly of those most in decline, has been improved and sustained.*

The NBSAP aims for the improvement and expansion of conservation of priority ecosystems (with highest level of species diversity) and species (with highest level of endemism and endangerment).

This is to be achieved through: (i) preparation of updated status of nationally threatened, rare and endangered species of flora and fauna by 2020, (ii) development and implementation of conservation plans for at least 10 additional priority ecosystems and 20 species (10 animals and 10 plants) by 2020, (iii) development and implementation of National Zoo Policy and (iv) strengthening *ex-situ* conservation of threatened species by establishing a new, modern zoo at a suitable location by 2020.

Development and implementation of mechanisms to reduce human-wildlife conflicts is another important strategy in the NBSAP that aims at protecting threatened species, which is to be achieved through: (a) making necessary revision in Wildlife Damage Relief Guidelines and simplifying the administrative procedure related to compensating the loss and damage of human life and property by wildlife, (b) controlling illegal settlements in and around protected area network, and (c) improving awareness of local people about behaviors of different wild animals and locally suitable low cost measures to deal with them.

The NBSAP has a strategic goal of abating poaching and illegal trade of wildlife parts. This is to be achieved by bringing stronger commitments and enhancing capacity of front-line staff to stop wildlife crime; heightening coordinated efforts between enforcement agencies; and designing and implementing more community based programs to elevate awareness. It has also recommended restructuring and improving the mandate of the district level Wildlife Crime Control Bureau to significantly reduce the illegal trade of flora and fauna from outside protected areas. Similarly, it includes a strategy and a number of priority actions to prevent the extinction of threatened species of crops and livestock.

Aichi Target 13: *By 2020, the genetic diversity of cultivated plants and farmed and domesticated animals and of wild relatives, including other socio-economically as well as culturally valuable species, is maintained, and strategies have been developed and implemented for minimizing genetic erosion and safeguarding their genetic diversity.*

One of the priority actions for management of agrobiodiversity included in the NBSAP relates to improving and expanding the existing on-farm conservation and use of agricultural genetic resources. Another important action includes a provision for strengthening the existing collection, conservation, rejuvenation, characterization, and documentation capacities of the national Gene Bank for improved and expanded ex-situ conservation of agricultural genetic resources. Enhanced networking and collaboration with relevant stakeholders at national, regional and international levels is another key strategy included in the NBSAP. The strategy for management of forest biodiversity includes a provision for restoration and recovery of economically and socially valuable wild species through *in-situ* and *ex-situ* conservation actions.

Aichi Target 14: *By 2020, ecosystems that provide essential services, including services related to water, and contribute to health, livelihoods and well-being, are restored and safeguarded, taking into account the needs of women, indigenous and local communities, and the poor and vulnerable.*

The NBSAP strategies to meet this target include: (i) development and institutionalization of a system of payment for ecosystem services, (ii) filling the policy and legislative gaps related to access and benefit sharing and intellectual property rights, (iii) provide continuity to documenting

traditional knowledge, innovations and practices associated to biological resources, and (iv) protecting traditional knowledge, innovations and practices of indigenous and local communities.

Some specific strategies aimed at restoring degraded forest ecosystems include: (i) restoration of at least additional 5,000 ha. degraded forest through pro-poor leasehold forestry, (ii) reclaiming and restoring encroached forestlands and controlling further encroachment, (iii) reversing or at least controlling the loss and degradation of *Siwalik* forests by making it a priority of the central and local governments (i.e. DDCs, VDCs), (iv) scaling up the coverage and impacts of leasehold forestry, (v) implementation of afforestation and reforestation programs by government line agencies and user groups, and (vi) improvement and expansion of participatory soil and water conservation initiatives in at least 30 critical sub-watersheds, with emphasis on bio-engineering and based on principles and approaches of integrated watershed management.

Aichi Target 15: *By 2020, ecosystem resilience and the contribution of biodiversity to carbon stocks has been enhanced, through conservation and restoration, including restoration of at least 15 per cent of degraded ecosystems, thereby contributing to climate change mitigation and adaptation and to combating desertification.*

The short-term and medium-term strategies of the NBSAP to meet this target include: (i) abating deforestation and forest degradation, (ii) planning and implementation of reforestation and afforestation schemes, (iii) designing and implementation of targeted programs to promote agroforestry and private forestry, particularly on marginal and abandoned farmlands, and (iv) implementation of PES and REDD+ where feasible. A number of priorities for actions have been indentified to translate the strategies into actions. Examples include: (i) restoration of at least 15 percent of the forested ecosystems through implementation of REDD+ and ecosystem based adaptation programs by 2020, and (ii) finalization and approval of National REDD Strategy by 2016.

Other strategies for mitigating and adapting to the effects of climate change include: (i) developing knowledge base to broaden temporal and spatial perspectives and possible risks of climate change on biodiversity, (ii) incorporating climate change adaptation measures in the design and implementation of biodiversity management programs, (iii) identifying, conserving and promoting ecological corridors and landscape connectivity to enable movement of species in the context of climate change, (iv) envisioning and planning for possible translocation of species that are restricted to confined habitat types or have low reproductive rates, (v) promoting non-conventional energy sources, such as biogas, solar energy, and small hydropower, where feasible, (vi) promoting scientific management of production forests, which will help forest managers to reduce the risk of damage and possible losses from changing climatic conditions and also to undertake effective mitigation actions, and (v) enhancing the capacities of actors to manage and learn from climatic events.

Aichi Target 16: *By 2015, the Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization is in force and operational, consistent with national legislation.*

Examples of priority actions recommended by the NBSAP to achieve this target include: (a) ratification of the Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization by 2015, (b) finalization and enactment of the Access to Genetic Resources and Benefit Sharing Bill by 2015 in order to provide legal base for access to genetic resources and the fair and equitable sharing of benefits arising from their utilization, and (c) development of *sui generis* legislation for protection of plant varieties with the aim to provide legal ownership to farmers for their varieties and knowledge and also substantive rights provided to the farmers by the Agro-biodiversity Policy (2007).

Aichi Target 17: *By 2015 each Party has developed, adopted as a policy instrument, and has commenced implementing an effective, participatory and updated national biodiversity strategy and action plan.*

The Ministry of Forests and Soil Conservation, as the national focal agency for CBD, has recently developed a revised National Biodiversity Strategy and Action Plan (NBSAP). The NBSAP is expected to be endorsed by the Council of Ministers and started implementation by second half of 2014.

Aichi Target 18: *By 2020, the traditional knowledge, innovations and practices of indigenous and local communities relevant for the conservation and sustainable use of biodiversity, and their customary use of biological resources, are respected, subject to national legislation and relevant international obligations, and fully integrated and reflected in the implementation of the Convention with the full and effective participation of indigenous and local communities, at all relevant levels.*

The NBSAP strategies to meet this target include, among others: (i) ensuring representation of indigenous and local communities in the NBCC as well as the district and VDC level institutional mechanisms, (ii) designing and implementing capacity building programs targeting indigenous and local communities, (iii) translating and distributing the NBSAP into Nepali language, and (vi) enacting intellectual property rights legislation by 2018.

Extending support to the National Foundation for Development of Indigenous Nationalities and Nepal Federation of Indigenous Nationalities to protect and promote traditional knowledge, innovations and practices of indigenous and local communities relevant for the conservation and sustainable use of biodiversity and their customary use of biological resources is another priority action. In addition, the strategies and priority actions proposed under target 14 and 16 also contribute to this target.

Aichi Target 19: *By 2020, knowledge, the science base and technologies relating to biodiversity, its values, functioning, status and trends, and the consequences of its loss, are improved, widely shared and transferred, and applied.*

The NBSAP's medium term strategic goals related to this target include: (a) significantly reducing the knowledge gap on biodiversity through research, survey and National Clearing House Mechanism by 2020 and (b) establishment of an efficient Biodiversity Information Management System by 2015. Some of the specific strategic actions to meet these goals include: (i) updating the existing information on ecosystems by 2017, (ii) completing baseline survey of NTFPs by 2020,

(iii) preparing, by 2017, national Red List of flora, fauna, and ecosystems following IUCN guidelines and updating it regularly, (iv) making the National Clearing House Mechanism fully functional by 2015.

Aichi Target 20: *By 2020, at the latest, the mobilization of financial resources for effectively implementing the Strategic Plan 2011-2020 from all sources and in accordance with the consolidated and agreed process in the Strategy for Resource Mobilization should increase substantially from the current levels. This target will be subject to changes contingent to resources needs assessments to be developed and reported by Parties.*

The NBSAP has identified eight specific cost categories and 11 possible internal and external sources of funding for its implementation. Government funding will remain the major source of funding. Some of the specific sources include: (i) recycling of government revenues collected from biodiversity-related products and services (such as wood and non-wood forest products, tourism, trekking, mountaineering fees etc), (ii) donations by private sector, (iii) contributions by NGOs and CBOs, (iv) investment by private sector (e.g. ecotourism, micro-hydropower), (v) in-kind cooperation by local communities, (vi) technical assistance by international community, (vii) grants from bilateral and multi-lateral donor agencies, and (viii) loan from international bodies, agencies and donors.

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ANNEXES

Annex 1: Nationally assessed status of wild mammals in Nepal

Critically Endangered (CR)
Pigmy Hog (*Porcula salvania*), Blackbuck (*Antilope cervicapra*), Brown Bear (*Ursus arctos*), Csorba's Mouse-eared Myotis (*Myotis csorbai*), Great Evening Bat (*la io*), Grey Wolf (*Canis lupus*), Indian Chevrotain (*Moschiola indica*), Ganges River Dolphin (*Platanista gangetica*), Tibetan Gazelle (*Procapra picticaudata*)
Endangered (EN)
Alpine Musk Deer (*Moschus chrysogaster*), Asian Elephant (*Elephas maximus*), Tiger (*Panthera tigris tigris*), Black Giant Squirrel (*Ratufa bicolour*), Chinese Pangolin (*Manis pentadactyla*), Clouded Leopard (*Neofelis nebulosa*), Dhole (*Cuon alpines*), Fishing Cat (*Prionailurus viverrinus*), Greater One-horned Rhinoceros (*Rhinoceros unicornis*), Harlequin Bat (*Scotomanes ornatus*), Himalayan Black Bear (*Ursus thibetanus*), Himalayan Field Mouse (*Apodemus gurkha*), Himalayan Pika (*Ohotona himalayana*), Himalayan Water Shrew (*Chimarrogale himalayica*), Hispid Hare (*Caprolagus hispidus*), Hog Deer (*Axis porcinus*), Indian Pangolin (*Manis crassicaudata*), Red Panda (*Ailurus fulgens*), Sloth Bear (*Melursus ursinus*), Smooth-coated Otter (*Lutrogale perspicillata*), Snow Leopard (*Panthera uncia*), Spotted Linsang (*Prionodon pardicolor*), Striped Hyaena (*Hyaena hyaena*), Swamp Deer (*Cervus duvaucelii*), Water Buffalo (*Bubalus arnee*)
Vulnerable (VU)
Assam Macaque (*Macaca assamensis*), Axis Deer (*Axis axis*), Barking Deer (*Muntiacus vaginalis*), Bengal Fox (*Vulpes bengalensis*), Common Leopard (*Panthera pardus*), Crab-eating Mongoose (*Herpestes urva*), Gaur (*Bos gaurus*), Kiang (*Equus kiang*), Leopard Cat (*Prionailurus bengalensis*), Lynx (*Lynx lynx*), Mandelli's Mouse-eared Bat (*Myotis sicarius*), Nilgai (*Boselaphus tragocamelus*), Sambar Deer (*Rusa unicolor*), Short-winged Pipistrelle (*Philetor brachypterus*)
Near Threatened (NT)
Andersen's Leaf-nosed Bat (*Hipposideros pomona*), Blyth's Horseshoe Bat (*Rhinolophus Lepidus*), Eurasian Otter (*Lutra lutra*), Ghoral (*Naemorhedus goral*), Himalayan Tahr (*Hemitragus jemlahicus*), Large Indian Civet (*Viverra zibetha*), Tibetan Tube-nosed Bat (*Murina aurata*)

Source: Jnyawali *et al.* (2011) and updated

Annex 2: Threatened tree species found in the mountains of Nepal

Botanical Name	Local Name	Elevation Range (m)	Region of Occurrence	IUCN Threat Category	Reference
Abies pindrow	Thingre salla	2100-3600	West	Rare	Press *et al*. (2000)
Alnus nitida	Utis	1800-2500	West-Central	Rare	Shrestha and Joshi (1996); Press *et al*. (2000)
Choerospondias axillaris	Lapsi	1200-1500	Central-East	Rare	Shrestha and Joshi (1996)
Cinnamomum glaucescens	Sugandhakokila	2000-2500	West-East	Rare (GON protected)	Press *et al*. (2000)
Crataeva unilocularis	Siplikan	1200-1800	Central-East	Rare	Shrestha and Joshi (1996)
Elaeocarpus sphaericus	Rudrakchhya	650-1700	Central-East	Vulnerable	
Larix griffithiana Carriere	Dhingre sallo	1100-4000	East	Rare	
Larix himalaica	Langtang sallo	2400-3600	Central	Rare	Shrestha and Joshi (1996); Press *et al*. (2000)
Magnolia globosa		3200-3400	East	Rare	Shrestha and Joshi (1996)
Michelia champaca	Champ	600-1300	Central-East	Endangered	
Michelia kisopa	Champ	1400-2800	West-East	Endangered	Shrestha and Joshi (1996); Press *et al*. (2000)
Olea ferruginea	Olive tree	500-2600	West	Rare	Shrestha and Joshi (1996)
Oroxylum indicum	Tatelo	200-1400	West-East	Vulnerable	Shrestha and Joshi (1996); Press *et al*. (2000)
Podocarpus neriifolius	Gunsi	800-1500	Central-East	Endangered; CITES Appendix III	
Talauma hodgsonii	Bhalu kath	900-1800	Central-East	Endangered; CITES Appendix III	Shrestha and Joshi (1996); Press *et al*. (2000)
Taxus wallichiana	Lauth sallo			CITES Appendix II	Press *et al*. (2000)
Tetracentron sinense		2150-3200	East	Rare; CITES Appendix III	Shrestha and Joshi (1996)
Ulmus wallichiana		1800-3000	West-Central	Rare/ Endangered	

Annex 3: Brief description of the global terrestrial ecoregions found in Nepal

Ecoregion	Description
Eastern Himalayan Broadleaf Forests [IM0401]	This ecoregion is comprised of the temperate broadleaf forests found to the east of Kali Gandaki River between 2000-3000 m. The ecoregion is globally outstanding for both species richness and levels of endemism, especially for its flora. It contains several localized areas of floral richness and endemism floral hotspots, which are especially rich in rhododendrons and oaks. Red panda (*Ailurus fulgens*), clouded leopard (*Neofelis nebulosa*), Himalayan black bear (*Selenarctos thibetanus*) are some flagship mammals found in this ecoregion. The forests are also home to hundreds of bird species, many of which are endemic to this region. The ecoregion also plays an important role in maintaining altitudinal connectivity between different habitats types found in the region.
Eastern Himalayan Conifer Forests [IM0501]	Typically found on steep, rocky, north-facing slopes between 3,000-4,000 m in eastern Nepal. It represents the transition from the forested regions to treeless alpine meadows. The forests are dominated by fir (*Abies spectabilis*), larch (*Larix griffithii*), hemlock (*Tsuga dumosa*), and *Juniperus* spp. Several colourful species of rhododendrons grow profusely in the understory, along with other broadleaf species such as *Viburnum grandiflorum* and *Betula utilis*.
Eastern Himalayan Alpine Shrub and Meadows [PA1003]	Extends eastwards from the gorge of Kali Gandaki River. The ecoregion supports one of the world's richest alpine floral diversities (Mittermeier et al., 2004). The meadows display spectacular colorful flowers of alpine herbs during the spring and summer. The main scrub vegetation in this region includes varied associations of *Rhododendron* spp. and *Juniperus* spp. The region is also very rich in faunal diversity. The endangered snow leopard, Himalayan goral (*Naemorhedus baileyi*), serow (*Capricornis sumatraensis*) and Himalayan tahr (*Hemitragus jemlahicus*) are some of the important mammals found in this region.
Himalayan Subtropical Broadleaf Forests [IM0115]	Extends between 500 to 1,000 m across the *Siwalik*s, forming a critical link in the chain of country's interconnected ecosystems that extend from the *Tarai*-Duar grasslands along the foothills to the high alpine meadows. The dry *Shorea robusta* forests and moist mixed deciduous forests are the dominant vegetation types found in the ecoregion. It houses several threatened species of mammals, including the tiger (*Panthera tigris*), Asian elephant (*Elephas maximus*), smooth-coated otter (*Lutrogale perspicillata*), and gaur (*Bos gaurus*). The ecoregion also hosts numerous species of birds, including globally threatened white-winged wood duck (*Carina scutulata*) and hornbill species (BirdLife International, 2004).
Himalayan Subtropical Broadleaf Forests [IM0115]	This ecoregion covers a large area in between 1,000 m-2,000 m. The natural vegetation is primarily comprised of dry chir pine *(Pinus roxburghii)* forests. The ground is covered by grass species such as *Arundinella setosa*, *Imperata cylindrica* and *Themeda anathera*. The Kali Gandaki valley bisects the ecoregion, dividing it into a drier, western conifer forest dominated by chir pine and a wetter and richer eastern conifer forest.

Western Himalayan Subalpine Conifer Forests [IM0502]	Occurs on elevations between 3,000 and 3,500 to the west of the Kali Gandaki River. The forest types include pure fir forest (*Abies spectabilis*), mixed oak-fir forest (*Quercus semecarpifolia* and *A. spectabilis*), mixed rhododendron, fir, and birch forest (*Rhododendron campanulatum*, *A. spectabilis*, and *Betula utilis*), and mixed coniferous forest (*A. spectabilis, Pinus wallichiana, and Picea smithiana*). Cypress (*Cupressus torulosa*) and deodar (*Cedrus deodara*) are common above 2,400 m (Shrestha and Joshi, 1997). The ecoregion is home to snow leopard, Himalayan tahr, blue sheep (*Pseudois nayaur*), and hundreds of bird species including several species of pheasants.
Western Himalayan Broadleaf Forests [IM0403]	This ecoregion represents the temperate broadleaf forests of western Nepal, between 1,500 m to 2,600 m. It is less species-rich than the eastern temperate forests but nevertheless harbors several important species of mammals, including the black bear (*Ursus thibetanus*), leopard (*Panthera pardus*), and the Himalayan tahr (*Hemitragus jemlahicus*).
Western Himalayan Alpine Shrub and Meadows [PA1021]	Lies between 3,000 m and 5,000 m elevations in western Nepal. The ecoregion has large areas of habitat suitable for conserving viable populations of the high-altitude Himalayan predator, including the snow leopard (*Uncia uncia*), and the large montane ungulates such as blue sheep (*Pseudois nayur*), Himalayan tahr (*Hemitragus jemlahicus*), Himalayan musk deer *(Moschus chrysogaster*), and serow (*Capricornis sumatraensis*). The rich meadow flora is dominated by herbaceous plants, such as Anaphalis, Aster, Cynanthus, Jurinea, Morina, Potentilla, Gentiana, Delphinium, Gentiana, Meconopsis, Pedicularis, Anemone, Aster, Polygonum, Primula, and Saussurea (Shrestha and Joshi, 1997).
Upper Gangetic Plains Moist Deciduous Forests [IM0166], and Lower Gangetic Plains Moist Deciduous Forests (IM0120)	These ecoregions occur in the *Tarai* region. In ancient times the region harvored tropical moist deciduous forests dominated by sal *(Shorea robusta)* and impressive populations of several large mammals including tiger (*Panthera tigris*), rhino (*Rhinoceros unicornis*), es (*Elephas maximus*), and gaur (*Bos gaurus*). Currently, the region is densely populated, and the fertile plains have largely been converted to intensive agriculture, with only a few enclaves of forest remaining. The riparian forests are characterized by an *Acacia-Dalbergia* association. The ecoregion harbors numerous species of birds including two globally threatened species, the Bengal florican and the lesser florican (*Eupodotis indica*).
Tarai-Duar Savannas and Grasslands [IM0701]	This ecoregion is characterized by a mosaic of tall riverside grasslands (*Saccharum* sp.), savannas and evergreen and deciduous forests. The grasslands and marshlands of the Chitwan Valley and adjoining lowlands are examples. *Eugenia jambolana*, *Bombax* sp., *Trewia* nudiflora, and *Mallotus philippensis* are some of the common tree species that grow in association with the grass species. Sal *(Shorea robusta)* dominated deciduous forests occur in drier and higher elevation areas. These savannas and grasslands are excellent habitat for several endangered species of mammals and reptiles, including the Tiger (*Panthera tigris tigris*), Rhino (*Rhinoceros unicornis*), and Gharial (*Gavialis gangeticus*). Grasslands in Shukla Phanta and Chitwan are habitats for internationally important populations of some globally threatened grassland birds (BCN and DNPWC, 2011).
Rock and Ice	This ecoregion covers a significant proportion of the high elevation areas in the northernmost belt of the Himalayas.

Source: Compiled from various sources including Olson *et al*. (2001) and Wickamanayake, *et al*. (2002)

Annex 4: National targets and indicators for meeting the Aichi Biodiversity Targets

Aichi Target 1: By 2020, at the latest, people are aware of the values of biodiversity and the steps they can take to conserve and use it sustainably.	
Selected National Targets set by the NBSAP	**National Indicators**
1. National Clearing House Mechanism will be upgraded and made fully functional by 2015. 2. A National Biodiversity Information Management System (NBIMS) will be established at the MoFSC and operationalized by 2016. 3. By 2020, at least 100 new audiovisual packages on different aspects of biodiversity will be prepared and disseminated. 4. By 2020, all the relevant programs and annual plans of the MoFSC and MOAD will have training, awareness raising, extension related components and those components will be effectively implemented. 5. By 2020, on-site lecturing, demonstration and interpretation infrastructure will be developed in at least five selected protected areas and Ramsar sites. 6. Establishment and management of a modern zoo, multipurpose nurseries, freshwater aquarium and botanical gardens to educate people about indigenous flora and fauna and their relation to human being.	1. Status of the National Clearing House Mechanism. 2. Status of the National Biodiversity Information Management System. 3. Number of audiovisual packages developed and distributed. 4. Number of training and other awareness raising events organized. 5. Change in knowledge, attitude and capacity of stakeholders (government and non-government) towards biodiversity conservation and ecosystem services. 6. Change in number and type of awareness raising infrastructural facilities (such as on-site lecturing, demonstration and interpretation) established and operationalized in protected areas and Ramsar sites. 7. Status of the new zoo, and number and type of multi-purpose nurseries, new aquarium and botanical gardens established.
Aichi Target 2: By 2020, at the latest, biodiversity values have been integrated into national and local development and poverty reduction strategies and planning processes and are being incorporated into national accounting, as appropriate, and reporting systems.	
Selected National Targets set by the NBSAP	**National Indicators**
1. Amending, by 2016, the Government of Nepal (Allocation of Business) Regulations (2012) for giving biodiversity mainstreaming due importance by the National Planning Commission and relevant ministries. 2. The Economics of Ecosystem and Biodiversity (TEEB) study will be carried out for protected area, forest, mountains and agriculture sector. 3. Incorporation, by 2019, of biodiversity considerations in the policies, plans and programs of relevant line ministries and other relevant government and non-government agencies. 4. Development and implementation of biodiversity management programs by local governments (DDCs, VDCs and municipalities). 5. Conducting a comprehensive inventory of ecosystems and species, and updating the existing information on ecosystems, by 2017.	1. Changes in scope of the work of, NPC and relevant sectoral ministries to incorporate biodiversity in their respective mandates. 2. Number of TEEB studies. 3. Number and proportion of new and revised sectoral and cross-sectoral policies, plans, strategies, legislations and programs that have integrated biodiversity. 4. Proportion of DDCs, VDCs and municipalities integrating biodiversity in their development plans and programs. 5. Changes in the accounting systems adopted by NPC and Ministry of Finance while assessing sectoral contributions to national economy. 6. Status of information on ecosystems and species.
Aichi Target 3: By 2020, at the latest, incentives, including subsidies, harmful to biodiversity are eliminated, phased out or reformed in order to minimize or avoid negative impacts, and positive incentives for the conservation and sustainable use of biodiversity are developed and applied, consistent and in harmony with the Convention and other relevant international obligations, taking into account national socio economic conditions.	
Selected National Targets set by the NBSAP	**National Indicators**

1. By 2020, perverse incentives in agriculture and forestry sector will be identified and their phase out plan prepared and implemented. 2. Incentive measures for the genetic resource conservation of traditional agriculture crop, livestock, tree, shrub, herb and important wild animal species will be introduced.	1. Number and type of perverse incentives eliminated and positive incentives established.
Aichi Target 4: By 2020, at the latest, Governments, business and stakeholders at all levels have taken steps to achieve or have implemented plans for sustainable production and consumption and have kept the impacts of use of natural resources well within safe ecological limits.	
Selected National Targets set by the NBSAP	**National Indicators**
1. By 2015, a National Strategic Framework for Conservation will be developed and implemented. 2. Inventory of all wetlands will be completed by 2017 to know their status and potentials. 3. Low carbon economic development strategy and climate-smart biodiversity management plan will prepared by 2020. 4. By 2020, all the district forest offices and forest user groups will develop and implement NTFPs management plan, especially targeting conservation of over-harvested species. 5. By 2020, at least five major degraded wetlands will be restored. 6. Carrying out inventories to assess status and trends of rangeland resources and regulating the use of rangelands as per their carrying capacities. 7. By 2020, the criteria and indicators for Sustainable Forest Management will be developed and implemented. 8. By 2020, management plan for all forest regime will be prepared and implemented.	1. Approved National Strategic Framework for Conservation 2. Number and proportion of carrying capacity-based species and habitat management plans developed and implemented by protected areas 3. Approved low carbon economic development strategy 4. Number of districts and FUGs implementing plans for sustainable management of NTFPs. 5. Number of protected areas having and implementing ecotourism plans. 6. Status of rangeland resources inventory and proportion of rangelands with regulated resource use. 7. Criteria and indicators for Sustainable Forest Management. 8. Management plans
Aichi Target 5: By 2020, the rate of loss of all natural habitats, including forests, is at least halved and where feasible brought close to zero, and degradation and fragmentation is significantly reduced.	
Selected National Targets set by the NBSAP	**National Indicators**
1. By 2015, a comprehensive and practical strategy and action plan will be developed and implemented for effective conservation of the *Siwalik* forests. 2. The landscape management strategy will be revised and implemented by 2016. 3. By 2020, at least 10,000 ha of the encroached forestland will be reclaimed. 4. By 2020, the rate of forest loss and degradation will be reduced by at least 75 percent of the current rate. 5. By 2020, effective conservation measures are implemented in at least five critical north-south corridors.	1. Changes in the rate of deforestation and forest degradation 2. Change in patchiness of key forest habitats (e.g. Shape Complexity Index) 3. Revised strategy and status of implementation of the landscape management strategy. 4. Change in forest area under encroachment. 5. Area reforested/afforested 6. Change in number, area and quality of habitat corridors under effective conservation. 7. Number of PES and REDD+ schemes implemented and area covered

Aichi Target 6: By 2020 all fish and invertebrate stocks and aquatic plants are managed and harvested sustainably, legally and applying ecosystem based approaches, so that overfishing is avoided, recovery plans and measures are in place for all depleted species, fisheries have no significant adverse impacts on threatened species and vulnerable ecosystems and the impacts of fisheries on stocks, species and ecosystems are within safe ecological limits.	
Selected National Targets set by the NBSAP	**National Indicators**
1. By 2017, at least three suitable wetlands will be declared and managed as fish sanctuaries. 2. By 2020, pilot projects will be developed and implemented for conservation (*in-situ* and *ex-situ*) of 10 economically important native fish species. 3. By 2018, introduction and spread of invasive fish species will be effectively controlled and regulated. 4. By 2020, encroachment and eutrophication of 10 major wetlands will be controlled. 5. Initiation of commercial fish farming in at least three hydropower reservoirs, by 2020. 6. By 2020, plans for maintaining unhindered north-south biological connectivity in at least three major rivers developed and implemented.	1. Number of fish sanctuaries established 2. Number and type of projects implemented for conservation of economically important native fish species. 3. Type and scale of measures taken to control or regulate introduction and spread of invasive alien fish species. 4. Number and area of wetlands with encroachment and eutrophication controlled 5. Changes in population of threatened aquatic species (such as dolphin, gharial). 6. Number of schemes developed and implemented for commercial fish farming. 7. Number of rivers with unhindered north-south biological connectivity.

Aichi Target 7: By 2020 areas under agriculture, aquaculture and forestry are managed sustainably, ensuring conservation of biodiversity.	
Selected National Targets set by the NBSAP	**National Indicators**
1. By 2020, 50 percent of the production forests will come under scientific management to improve forest productivity, biodiversity conservation and climate resilience. 2. By 2020, 10 percent additional national forest area will come under community based management. 3. By 2020, all the districts, community forests, collaborative forests, and leasehold forests management plans will have mandatory inclusion of a biodiversity chapter and the DFOs and community user groups will be implementing those provisions. 4. By 2020, additional five wetlands of international importance will be identified and enlisted as Ramsar sites. 5. By 2020, community based management of agrobiodiversity will be expanded to at least five additional districts.	1. Change in the area of production forests that are under scientific management. 2. Change in area of community-managed forest area. 3. Proportion of forests management plans with biodiversity component 4. Change in status (coverage, number of activities and quality) of community based conservation of agroiodiversity. 5. Number of degraded wetlands reclaimed. 6. Changes in number of Ramsar-enlisted wetlands. 7. No of districts implementing community based management of agro-biodiversity.

Aichi Target 8: By 2020, pollution, including from excess nutrients, has been brought to levels that are not detrimental to ecosystem function and biodiversity.	
Selected National Targets set by the NBSAP	**National Indicators**
1. By 2020, plans will be developed and implemented to: (i) monitor the level of use of pesticides, insecticides and chemical fertilizers, and (ii) control industrial pollution in five major rivers and other five major wetlands will be developed and implemented.	1. Percent of districts and area covered by surveys to assess the current status of use of insecticides, pesticides and chemical fertilizers 2. Number of plans developed and implemented to control industrial pollution in rivers and other wetlands 3. Changes in status of eutrophication in major wetlands

Aichi Target 9: By 2020, invasive alien species and pathways are identified and prioritized, priority species are controlled or eradicated, and measures are in place to manage pathways to prevent their introduction and establishment.	
Selected National Targets set by the NBSAP	**National Indicators**
1. By 2020, detail survey of the coverage and research on modes and pathways of propagation, ecological and economic damage and loss, control measures, and possible uses of at least five most problematic IAPs will be completed. 2. By 2020, program to raise awareness of local people focusing especially on women, *dalit*, indigenous groups, *janajatis* and marginalized communites on identification of IAS, their impacts and control techniques will be developed and implemented. 3. By 2020, biological control agents to control IAS will be identified and used. 4. By 2020, local communities in IAS affected areas will be provided with technical assistance to control and manage IAS.	1. Type and number of measures taken to control invasive alien species. 2. Number and coverage of strategies and plans developed for management of invasive and alien species and status of their implementation

Aichi Target 10: By 2015, the multiple anthropogenic pressures on coral reefs, and other vulnerable ecosystems impacted by climate change or ocean acidification are minimized, so as to maintain their integrity and functioning.	
Selected National Targets set by the NBSAP	**National Indicators**
1. By 2020, at least 10,000 ha. degraded mountain ecosystems will be restored through ecosystem based adaptation approach. 2. By 2020, climate change adaptation planning will be adopted by at least 3,000 community based forest user groups.	1. Number and coverage of ecosystem based adaptation plans developed and implemented to conserve critical mountain ecosystems and species, and coverage of such plans and activities 2. Number of user groups adopting climate change adaptation planning

Aichi Target 11: By 2020, at least 17 per cent of terrestrial and inland water, and 10 per cent of coastal and marine areas, especially areas of particular importance for biodiversity and ecosystem services, are conserved through effectively and equitably managed, ecologically representative and well connected systems of protected areas and other effective area-based conservation measures, and integrated into the wider landscape and seascapes.	
Selected National Targets set by the NBSAP	**National Indicators**

1. By 2020, at least 25% area of the country will be sustainably managed under protected area system. 2. By 2020, conservation-oriented community based forestry, and other locally suitable conservation systems will be implemented in the five important corridors and climate refugia identified and mapped by the NBSAP. 3. By 2020, the local forest user groups in the corridors will be capacitated for conservation-friendly management of the forests. 4. By 2020, atleast 20 Protected forest will be declared for biodiversity conservation outside PAs. 5. By 2020, "Overpass and underpass" will be built at three key locations to allow free movement of wildlife species. 6. By 2020, The concept of Smart Green Infrastructure will be applied while constructing new infrastructure such as roads, railways and transmission lines affecting protected areas. 7. By 2020, the National Zoo Policy will be developed and implemented.	1. Area under protected area system 2. Number and quality of measures taken to enhance connectivity between adjacent habitats. 3. Changes in status of conservation of Middle Mountain ecosystems. 4. Change in coverage and quality of landscape management programs. 5. Change in coverage and quality of protected forests. 6. Number and coverage of community forests with conservation-friendly management plans and status of their implementation. 7. National Zoo Policy.

Aichi Target 12: By 2020 the extinction of known threatened species has been prevented and their conservation status, particularly of those most in decline, has been improved and sustained	
Selected National Targets set by the NBSAP	**National Indicators**
1. By 2020, status of nationally threatened, rare and endangered species of flora and fauna will be updated. 2. By 2020, conservation plans for 20 additional priority species (10 animals and 10 plants) will be developed and implemented. 3. By 2020, *ex-situ* conservation of threatened species will be strengthened by establishing additional 2 zoo and botanical gardens. 4. By 2020, awareness of local people on behaviors of different wild animals will be enhanced and locally suitable low cost measures to deal with them will be established.	1. Updated inventory of nationally threatened, rare and endangered species of flora and fauna 2. Implementation status of conservation plans for priority ecosystems and species 3. Changes in populations of threatened animal species – tiger, rhino and snow leopard. 4. No of threatened species in new zoo and botanical garden. 5. Awareness level of people on wild animals.

Aichi Target 13: By 2020, the genetic diversity of cultivated plants and farmed and domesticated animals and of wild relatives, including other socio-economically as well as culturally valuable species, is maintained, and strategies have been developed and implemented for minimizing genetic erosion and safeguarding their genetic diversity	
Selected National Targets set by the NBSAP	**National Indicators**
1. By 2020, the Gene Bank to collect and conserve genetic resources of at least 75 percent of the commonly cultivated crop and horticulture species. 2. By 2020, community based conservation of agro-genetic resources program is extended to additional five districts, covering all physiographic zones. 3. By 2020, at least 10 wild relatives of domesticated crops are conserved *in-situ* and/or *ex-situ*	1. Changes in number and trends of conserved local varieties of crops, their wild relatives and animal breeds. 2. Changes in number of samples of plant and animal germplasm collected and stored in the national and community gene banks. 3. Changes in number of sites and coverage of community based conservation of agro-genetic resources.

Aichi Target 14: By 2020, ecosystems that provide essential services, including services related to water, and contribute to health, livelihoods and well-being, are restored and safeguarded, taking into account the needs of women, indigenous and local communities, and the poor and vulnerable	
Selected National Targets set by the NBSAP	**National Indicators**
1. By 2020, participatory and integrated soil and water conservation initiatives will be implemented in at least 30 critical sub-watersheds. 2. By 2020, additional 5,000 ha. degraded forest will be rehabilitated through pro-poor leasehold forestry. 3. By 2020, the loss and degradation of *Siwalik* forests will be reversed or at least controlled by making it a priority of the central and local governments (i.e. DDCs, VDCs).	1. Number and coverage of critical sub-watersheds with participatory and integrated conservation initiatives implemented. 2. Change in number and coverage of leasehold forests. 3. Changes in coverage and quality of the *Siwalik* conservation program.

Aichi Target 15: By 2020, ecosystem resilience and the contribution of biodiversity to carbon stocks has been enhanced, through conservation and restoration, including restoration of at least 15 per cent of degraded ecosystems, thereby contributing to climate change mitigation and adaptation and to combating desertification	
Selected National Targets set by the NBSAP	**National Indicators**
1. By 2016, The National REDD Strategy will be finalized and approved. 2. By 2020, at least 15 percent of the forested ecosystems will be restored through implementation of REDD+ and ecosystem based adaptation programs. 3. By 2020, development and implementation of plans (by DFOs and FUGs) to significantly reduce occurrence of forest fires.	1. Area of degraded forest conserved, reforested and afforested. 2. Number of REDD+ and EbA schemes/projects implemented and area covered. 3. Changes in status of integration of adaptation measures in landscape/ecosystems/watershed management. 4. Status of formulation/implementation of the National REDD Strategy. 5. Changes in number, frequency and coverage of forest fires.

Aichi Target 16: By 2015, the Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization is in force and operational, consistent with national legislation	
Selected National Targets set by the NBSAP	**National Indicators**
1. By 2015, the Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization will be ratified. 2. By 2016, the Genetic Resources and Benefit Sharing Bill will be finalized and enacted. 3. By 2017, a *sui generis* legislation for protection of plant varieties with the aim to provide legal ownership to farmers for their varieties and knowledge and also substantive rights provided to the farmers by the Agro-biodiversity Policy (2007) will be formulated and enacted.	1. Nepal's position in the Nagoya Protocol. 2. Status of the Access to Genetic Resources and Benefit Sharing Bill. 3. Status of the *sui generis* legislation for protection of plant varieties.

Aichi Target 17: By 2015 each Party has developed, adopted as a policy instrument, and has commenced implementing an effective, participatory and updated national biodiversity strategy and action plan	
Selected National Targets set by the NBSAP	**National Indicators**
1. The NBSAP will be endorsed by Government and come into implementation by the end of 2014.	1. Status of development and implementation of the NBSAP.

Aichi Target 18: By 2020, the traditional knowledge, innovations and practices of indigenous and local communities relevant for the conservation and sustainable use of biodiversity, and their customary use of biological resources, are respected, subject to national legislation and relevant international obligations, and fully integrated and reflected in the implementation of the Convention with the full and effective participation of indigenous and local communities, at all relevant levels	
Selected National Targets set by the NBSAP	**National Indicators**
1. By 2017, a community biodiversity protocol will be developed. 2. By 2018, intellectual property rights legislation will be formulated and enacted. 3. By 2015, the NBSAP will be translated into Nepali language and distributed. 4. Representation of indigenous and local communities in the NBCC as well as district and VDC level institutional mechanisms will be promoted. 5. Capacity building programs targeting, women, *dalit*, *janajatis* and local communities will be designed and implemented.	1. Status of the community biodiversity protocol. 2. Status of the National Intellectual Property legislation. 3. Availability of the NBSAP in Nepali language. 4. Proportion of individuals belonging to indigenous nationalities in the NBCC and similar institutional entities in districts and VDCs/municipalities. 5. Number and type of capacity building programs implemented targeting indigenous and local communities.

Aichi Target 19: By 2020, knowledge, the science base and technologies relating to biodiversity, its values, functioning, status and trends, and the consequences of its loss, are improved, widely shared and transferred, and applied.	
Selected National Targets set by the NBSAP	**National Indicators**
1. By 2020, the Flora of Nepal project will be successfully completed. 2. By 2015, National Clearing House Mechanism will be made fully functional. 3. By 2016, a National Biodiversity Information Management System will be established at the MoFSC and operationalized. 4. By 2017, existing information on Nepalese ecosystems will be updated. 5. A national Red List of flora, fauna, and ecosystems will be prepared by 2017, following IUCN guidelines. 6. By 2020, baseline survey of NTFPs and animal genetic resources will be completed.	1. Change in status of the Flora of Nepal Project. 2. Status of the National Clearing House Mechanism. 3. Status of National Biodiversity Information Management System 4. Change in status of information on the country's ecosystems. 5. Changes in status of information on threatened (red-listed) flora, fauna, and ecosystems. 6. Number of NTFPs surveys conducted and area covered.

Aichi Target 20: By 2020, at the latest, the mobilization of financial resources for effectively implementing the Strategic Plan 2011-2020 from all sources and in accordance with the consolidated and agreed process in the Strategy for Resource Mobilization should increase substantially from the current levels. This target will be subject to changes contingent to resources needs assessments to be developed and reported by Parties	
Selected National Targets set by the NBSAP	**National Indicators**
1. Establishment and operationalization of a National Biodiversity Trust Fund by 2016. 2. Resource generation and mobilization plan will be prepared and implemented to generate an estimated USD 1,019 million required for implementation of the NBSAP. Of the total, the government, ODA, INGO, private sector and community based users' groups will bear 65.7%, 20.6%, 6.9%, 0.8% and 6% of the cost, respectively.	1. Status of the National Biodiversity Trust Fund. 2. Changes in level and sources of funding for management of biodiversity.