25 Convention on Biological Diversity
YEARS SAFEGUARDING LIFE ON EARTH

25 Years of Achievements on

Biodiversity Conservation in Nepal

Government of Nepal
Ministry of Forests and Environment
Singha Durbar, Kathmandu
Nepal
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Published by : Environment and Biodiversity Division, Ministry of Forests and Environment (MoFE)

Cover photos : Gokyo Lake (Amit Poudyal)
Rhinocerous, Tiger and Farming Land (Sagar Giri)
Padamchal (Prabin Bhandari)
Copper-Headed Trinket (Mahendra Kotila)
Gharial Crocodile (KB Thapa)
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ISBN : 978-9937-0-4160-7

Available from :

Environment and Biodiversity Division
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Phone: +977-1-4211892
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Message

Shakti Bahadur Basnet
Honourable Minister
Ministry of Forests and Environment

The year 2018 marks the 25th anniversary of the entry into force of the Convention on Biological Diversity. The year is also coincide with the adoption of the Convention by Nepal. We are proud to the achievements that the Nepal has made in conserving its biodiversity during these 25 years. Nepal is trying to achieve sustainable economic growth through wise use of its natural resources. The Government of Nepal fully recognizes that the efforts to economic growth would only be sustainable if undertaken through sound environmental management and biodiversity conservation. We are fully committed to manage the country's rich biological diversity as per the national need and in the spirit of the Convention on Biological Diversity. I would like to take this opportunity to thank all our conservation and development partners for their support and local communities for their sincere efforts to conserve and sustainable use the biological resources.

Foreword

The CBD Secretariat has announced that this year's International Biodiversity Day theme will be "25 years of Convention on Biological Diversity: Safeguarding Life on Earth". This 25th anniversary of the Convention presents us a unique opportunity to highlight our conservation efforts and achievements and also provides an opportunity to review and look towards the future. We have made remarkable achievements in the conservation field, which cannot be summarized in this one publication. However, this document has tried to summarize a few of them. I look forward to even stronger cooperation and collaboration among all the national and international stakeholders in our conservation efforts in the upcoming days.

Dr. Bishwa Nath Oli
Secretary
Ministry of Forests and Environment

Acknowledgements

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I would like to thank all the authors and contributors of this publication. I am equally thankful to everyone who provided time and effort to make this publication in this form. A special thanks goes to the colleagues of the Environment and Biodiversity Division and IUCN for their tireless support. I am looking for the similar cooperation in the days to come.

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Photo: Sagar Giri

POLICY AND INSTITUTIONAL REFORM TO BIODIVERSITY CONSERVATION IN NEPAL

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Maheshwar Dhakal, PhD
Joint Secretary, Ministry of Forests and Environment

Photo: Amit Poudyal

Introduction

Nepal has formulated a number of polices and legislative instruments to biodiversity conservation. Similarly, institutional reform has been made in the past to address issues of biodiversity conservation. After the adoption of United Nations Convention on Biological Diversity (UNCBD) in 1992, Nepal has continuously been working with the spirit of the convention. As a result, remarkable achievements have been made in the field of biodiversity conservation. Success in biodiversity conservation is one of the areas that Nepal can showcase to the international communities. This papers highlights the policy and institutional reforms since the adaptation of the convention by the Government of Nepal focusing to the 25 years biodiversity conservation actions in the country.

Major policy intervention

Biodiversity being a common property

resource, it demands constant policy reform for its long term conservation, management and utilization. For access and equity of local communities over the biodiversity resources and its benefit sharing among the beneficiaries it demands policy back up. Policy not only support to develop enabling environment, but also help to safeguard the resources from possible threats and externalities. Nepal being a party of Convention on Biological Diversity, a number of policies have been formulated from the very beginning.

Even before the adoption of the Convention, the Forest Nationalization Act 1957 is one of the pioneer policies of its kind. This policy had an intention to protect the public forests from individual misuse and encroachment. Similarly, the Forest Act 1962 is another milestone to protect the forests and keep intact in Nepal. These two forest policies largely guided by state owned principles while local communities largely excluded in the forest protection and utilization process.

Along with the adoption of Convention on Biological Diversity in 1992, the Government of Nepal has been applying participatory approach to forest protection, giving especial attention over the rights and responsibilities of local communities. The community forestry program is one of the successful examples where they can take every decisions of forest management without any further degradation of the forests. Forests Act 1993 and Forest Regulation 1995 aim to ensure the basic needs of the local communities and supports the principles of sustainable forest management. These forest polices are promulgated just one year behind the adoption of Convention of Biological Diversity in 1992. The community forestry program become the most popular program with largest coverage in terms of people and forest area as well. Around 20,000 community forest user groups are actively engaging on forest protection, management and utilization. These groups has covered more than one third of the forests across the country. The community forest user group network is expanded all over the country and it is also praised by international communities. The role of community forest user groups are further expanded not only in access and equity issues, but also community development and livelihood improvement activities. Such community based organization are also approaching to engage on carbon trade and developing mechanism on payment for environmental services. Similar decentralized approach has also been adopted in the protected area system. Following the 4th amendment of National Parks and Wildlife Conservation Act (1993), the Government of Nepal has been providing 30-50% of the annual revenue generated from the protected area to the local communities for the sake of biodiversity conservation, community development, livelihood improvement and conservation education and communication focusing to the people and marginalized people, living in and around the protected areas, which are the major outcomes of biodiversity conservation in Nepal.

In 2015, Nepal promulgated the new constitution with the adaptation of federal system. The biodiversity issues are considered the subject matters all three levels of the government: local, state and federal. The national forest policy, national parks and wildlife reserve, wetlands and carbon trade which are exclusive power of federal government while management of national forests goes to state jurisdiction. In the meantime, environmental and biodiversity conservation issues along with Boundary Rivers are considered as the concurrent matter of both federal and state governments. Similarly, watershed and wildlife conservation are the jurisdiction of local government while forests, wildlife

and biodiversity are also considered as the concurrent matters of all three governments considering the properties and characteristics of the forest and biodiversity resources. Along with forest policy, it is fundamental to redesign the new forest act, national parks and wildlife conservation act and environmental act, and their subsequent regulations. Similarly, the bill on access and benefit sharing of genetic resources is under discussion and the government is planning to finalize it shortly.

Major 25 Polices in Biodiversity Conservation

1. Constitution of Nepal (2015)
2. National Parks and Wildlife Conservation Act (1973)
3. Soil Conservation and Watershed Management Act (1982)
4. Forest Act (1993)
5. Environmental Protection Act (1995)
6. Convention on International Trade of Endangered Species of Wild Flora and Fauna (2017)
7. Plant Protection Act (2007)
8. Forest Regulation (1995)
9. National Parks and Wildlife Conservation Regulation (1974)
10. Himali National Parks Regulation (1980)
11. Soil Conservation and Watershed Regulation (1983)
12. Wildlife Reserve Regulation (1978)
13. Environmental Protection Regulation (1995)
14. Buffer Zone Regulation (1996)
15. Conservation Area Management Regulation (2001)
16. National Biodiversity Strategy and Action Plan (2014-2020)
17. Forest Policy (2015)
18. Elephant Management Policy (1966)
19. National Wetland Policy (2013)
20. Agroforestry Policy (2004)
21. Rangeland Policy (2012)
22. Climate Change Policy (2011)
23. REDD+ Strategy (2018)
24. Agriculture Development Strategy (2017)
25. Non-Timber Forest Products and Herbs Development Policy (2004)

All these polices lead to maintain the rich biodiversity in Nepal. No doubt that the forest coverage (44.74%) and protected area coverage (23.39%) are the outcomes. The gradual shift from species conservation to ecosystem and landscape level conservation in one side and involvement of local communities on the other are visible achievements of biodiversity conservation in Nepal. All these outcomes in cumulative form is one of the areas that Nepal can showcase to the international communities.

Major institutions

In order to conserve, manage and use biodiversity resources, a number of institutions have been engaged from center to local levels. The parliament supports to formulate the laws (acts) while councils of ministries supports biodiversity conservation through regulation and policy formulation. Similarly, National Planning Commission coordinates planning, implementation and monitoring process of biodiversity conservation. The strongest part of biodiversity conservation of Nepal is either one or another institutional representation at every level of the government from local to central. As the national authority of biodiversity conservation, the Ministry of Forests and Environment and its divisions and departments have been engaging on biodiversity conservation under the frame of Biodiversity Strategy and Action Plan. The Department of Forests has the largest network to 74 districts, while Department of Soil Conservation and Watershed Management has coverage to 61 districts. Similarly, 20 protected areas under Department of National Parks and Wildlife Conservation are engaging on protected area management and biodiversity conservation activities. Since the adoption of Convention on Biological Diversity in 1992, a number of institutions have been reformed to address the three objectives of CBD.

The eight plant resource offices have been working on plant resources and their conservation and management activities. These institutions are supported by policies and also train human resources.

Similarly, Ministry of Land Reform, Agriculture and Cooperative take cares of all issues of agrobiodiversity of Nepal. Nepal Agricultural Research Council supports through research and extension. The council has a gene bank to save the species and genetic resources. Agriculture ministry is also working as the focal ministry of the International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA), adopted in 2001, a global response to promote the conservation of plant genetic resources and to protect farmer's rights to access and have fair and equitable sharing of benefits arising out of their use. Besides, civil society organizations, indigenous and local communities, university and academia, conservation and development partners are also supporting the biodiversity conservation missions of the government of Nepal.

These institutions are established in such a way where each and every natural resources are addressed appropriately. For example, Department of Soil Conservation and Watershed Management is established to look over the soil and water related issues, which is the grounds for biodiversity resources. The Department of National Parks and Wildlife Conservation is responsible for protected area systems and animals alone while Department of Forests is established to look over the forests and trees outside the forests or plant parts. Department of Plant Resources supports plants research, botanical garden, development of biotechnologies and support to entrepreneurs of plant resources. The Department of Forest Research and Survey is mandated to carry our research on both natural and mandate forest, and periodic inventory of forest resources in Nepal. This department has just published forest resource assessment of Nepal in 2016. The Regional Forest Directorates are responsible to carry out monitoring and evaluation of field activities and reporting to the ministry on regular basis.

Biodiversity resources in federalism

The Constitution of Nepal (2015) is giving especial attention to forests and environment protection in Nepal. The right to live in clean environment is secured under fundamental rights (article 30) of the citizens. Similarly, the state policy directives and principles give especial focus to adopt appropriate measures to abolish or mitigate existing or possible adverse environmental impacts on the nature, environment or biological diversity, to pursue the principles of environmentally sustainable development such as the principles of polluter pays, of precaution in environmental protection and of prior informed consent. Similarly, the constitution has provision of making advance warning, preparedness, rescue, relief and rehabilitation in order to mitigate risks from natural disasters. The constitution has also provided an exclusive power to federal government on forest policy, national parks and wildlife reserve, wetlands and international carbon trade. Similarly, the national forest management, water resource and environment is given to the state government while watershed and wildlife are given to the local government. The forest, wildlife, birds, water use, environment and biodiversity are considered concurrent subject matters to all three tires of the governments.

Based on the provisions in the constitutions, the government of Nepal has recently been approved the new structure of the ministry. The Ministry of Forests and Soil Conservation and Ministry of Population and Environment are merged and Ministry of Forests and Environment is established. A separate

division is designed in the ministry for taking care environment and biodiversity issues. Similarly, the Department of National Parks and Wildlife Conservation is designed to take care all protected area system in Nepal. The local governments are independent to set new institutions based on their resources and responsibilities.

Ways forward

The biodiversity policies, legislations and their institutions are gradually advancing to biodiversity conservation, sustainable use of its components and access and benefit sharing of genetic resources in Nepal. The government of Nepal has been implementing various biodiversity conservation policies in order to maintain ecological integrity, create an environment to live people in harmony with nature, balance between conservation and development, and continuous support to increasing demands of the people in a way that meets the needs of the present without compromising the ability of future generations. The biodiversity policies are intended to conserve biodiversity resources on eternal basis. Therefore, the policies are intended to minimize and control the threats mainly invasive alien species, forest encroachment and habitat degradation, minimize human-wildlife conflicts, reduce disaster, pests and diseases, and control wildlife crime through law enforcement process. As Nepal has entered into the federal system, it is crucial time to move forward with clear policy and institution mandate for biodiversity conservation among the three tires of the governments based on the past experiences. However, wider understanding and strong coordination among the stakeholders is fundamental for long term biodiversity conservation in Nepal.

Photo: Amit Poudyal

AGROBIODIVERSITY IN NEPAL

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Anil Kumar Acharya
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Introduction

Nepal is mountainous agricultural country, where crop cultivation ranges from 60 m (in Kechana Kalan, Jhapa where rice is grown) to 4700 m (in Khumbu, Solukhumbu where potato is grown) altitude. Rice is grown at an altitude of 3050 m in Chhumjul, Jumla, which is the highest elevation of rice growing areas in the world. Nepal represents 3.2% of global angiosperm and flora diversity. This biodiversity is mainly because of prevailing climatic variation ranging from tropical to alpine cold semi desert. Main four components of agrobiodiversity are plant and crop genetic resources, animal genetic resources, aquatic genetic resources and associated genetic resources. For each component, there are four sub-components i.e. domesticated, semi-domesticated, wild edible and wild relative species.

Implementation status of agrobiodiversity

In the late 1980s, agriculture was the livelihood for more than 90% of the population, although only approximately 20% of the total land area was cultivable, it accounted for, on average, about 60% of the GDP. Due to expansion of other livelihood opportunities in the country, it has reduced to 65.6% of the population in agriculture and the share of agriculture sector to GDP is estimated to remain at 29.37% in fiscal year 2016/17.

It is estimated that the cereal crops grow increased by more than 114% and 175% to area (3306316 ha) and production (8614284 Mt.) respectively, in fiscal year 2015/16 as compared to the 1992/1993. Likewise, production of vegetable and fruit crops have also increased by more than 328% and 354% respectively in fiscal year 2015/16 as compared to the 1993/1994.

Policy and legislation support

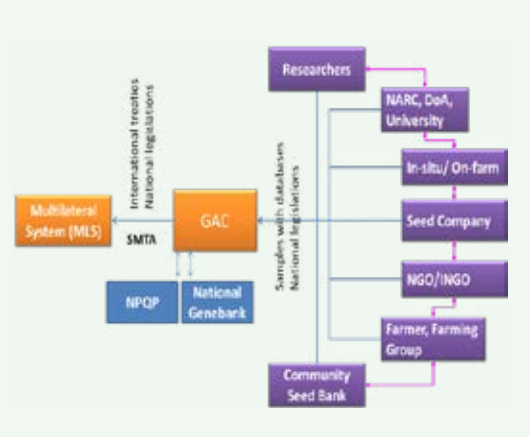
Agrobiodiversity includes all types of living organism as well as their differences and inter-relationship of the animals, plants, microbial organisms relating to food and agriculture. It specifically denotes: i. Agriculture Genetic resources (Plant genetic resources, Livestock genetic resources, Fisheries genetic resources, Insect genetic resources, Micro-organism genetic resources, Wild relatives of cultivated and domesticated livestock species) ii. Ecosystem services associated with agricultural production system and living organism providing such services (Nutrient cycle, Decomposition, Soil heath, Pest and disease regulation, Pollination, Habitat conservation management, Water cycle conservation, Carbon sequestration, soil erosion control, Climate regulation iii. Non-living factors affecting Agrobiodiversity iv. Social, economical and cultural factors (Traditional and

local knowledge, Cultural factors and inclusive processes; Agro eco-tourism and other socio-economic aspects).

Thus, agrobiodiversity is an integral part of biodiversity and the basis of agro and nutritional security, livelihood, poverty alleviation, ecosystem balance and sustainable development. Farmers are playing major role to conserve, preserve and develop agrobiodiversity and associated traditional knowledge.

In the context, Agrobiodiversity Policy 2063 (2007 AD) was formulated aiming to identify, conserve, maintain, develop and sustainable use of agrobiodiversity and traditional knowledge; to establish farmers' rights in agriculture genetic materials/resources and traditional knowledge; to carryout fair and equitable distribution of agriculture genetic materials/resources and traditional knowledge as well as the benefit acquired from the access of it; and to manage, conserve and sustainable use of agrobiodiversity and traditional knowledge to balance the ecosystem attuned with climate resilience and reduce the impacts of climate change. Again for the streaming of different international obligations, being contracting parties of CBD (Convention on Biological Diversity) and ITPGRFA (International Treaty on Plant Genetic Resources for Food and Agriculture), the policy has been amended in 2071 (2014 AD) for the incorporation of those obligations aligned with the national context.

Figure 1: Export mechanism of germplasm



ITPGRFA MLS Implementation Strategy and Action Plan (IMISAP) (2018-2025) is developed in 2017 and implemented from 2018 to 2025 for guiding exploration and collection, conservation, documentation, exchange of materials, non-germplasm base technology transfer, resources utilization, capacity building, germplasm export and import, and monitoring of germplasm flows. One window system for germplasm export (as depicted in Figure 1) will be adopted though SMTA (Standard Material Transfer Agreement), whereas for import of germplasm (Figure 2), multi-window system will be adopted. Germplasm Exchange Authority Committee (GAC) has been formed, comprising of IT Focal Person, Chief of Agrobiodiversity Section, MoAD; Chief of National Genebank, Chief of Seed Quality Control Centre (SQCC) and Chief of National Plant Quarantine Program (NPQP) to authorize the exchange of Agriculture Plant Genetic Resources (APGRs) (modern cultivars, breeding lines and genetic stocks, landraces, farmer's varieties, obsolete cultivars, crop wild relatives, weeds, potential domesticates, biotechnological cell lines/ agricultural microbes) in the country.

Figure 2: Import mechanism of germplasm

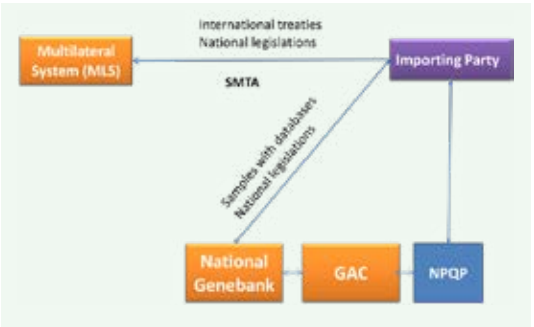


Photo: Yadav Uprety

Community Seed Dank Directives 2008 and Procedures 2009 is under implementation to enhance access, exchange, use and management of quality seeds of FVs and MVs according to the preferences and choice of the farmers which are produced, processed and stored locally in a community undertaking. Legislation 'Agrobiodiversity Conservation and Utilization Bill' required for the conservation, regulation and utilization of agriculture plant genetic resources within and outside the country harmonizing with the related international provision is being drafted with the consulation of relevant national stakeholders. Similarly, Farmers right and breeder's right bill is also under draft form.

Access and benefit-sharing of genetic resources

Multilateral System (MLS) of Access and Benefit Sharing (ITPGRFA Article 10) is the common gene pool applicable to 35 food crop species and 29 forages species listed in Annex 1, that account for >80% of human calorie intake from plants. Non-Annex I material from CGIAR Centres, Contracting Parties and natural and legal persons is voluntarily included. On ratifying the Treaty, country agrees to make their genetic diversity and related information about the crops stored in their gene banks and public domains available to all through the MLS. Ministry of Agriculture has notified the 614 accessions (food 607 and forages 7) of plant genetic resources (Nepal Annex-1 Crops) to the Secretary of the Treaty for food and agriculture in January 2017. Arrangements are being made to prepare the passport information of these accessions in NAGRC. Germplasm held in the collections listed will be made available to users under the conditions of the Standard Material Transfer Agreement (SMTA) of the ITPGRFA. Till now, the following contracting parties have notified following accessions for MLS:

Contracting party/ Country	Accessions	Contracting party/ Country	Accessions
Canada	1,00,500	Bhutan	60
Japan	40,000	The Philippines	811
India	26,523+7	Italy	16,943+ 29,845
Nepal	614	Germany	1,08,675
Netherlands	18,510	International Rice Research Institute	1,17,417
World Agroforestry Centre	1996	International Potato Center	16,061
International Livestock Research Institute	19,215	International Maize and Wheat Improvement Center	1,64,326
Total PGRFA material (accessions) globally: 4,362,100			
Annex 1 crops	4,143,281	95%	
Non-Annex 1 crops	218,737	5%	

Thus, Nepal has ample access to use those accessions available in the global MLS for improvement and development of high yielding and better performing varieities in the country.

National report and documentation reports: SoWBFA and SoNBFA

Ministry of Agriculture, Land Management and Cooperative as part of its function, has prepared the Consolidated National Report on State of Word Biodiversity for Food and Agriculture (SoWBFA) in 2016, covering all Plant Genetic Resources, Forest Genetic Resources, Animal Genetic Resources, Fisheries Genetic Resources and Associated Biodiversity of Nepal. As a part of international obligation, the report was submitted to Commission on Genetic Resources for Food and Agriculture, FAO and then it is globally available.

Based on the SoWBFA-Nepal chapter, its synthesis book ''The State of Nepal's Biodiversity for Food and Agriculture (SoNBFA)" was prepared in 2017 to share national and international experts as well as to support future conservation and utilization activities of agrobiodiversity.

National document on plant genetic resources

National document on plant genetic resources entitled ''Conservation and Utilization of Agriculture Plant Genetic Resources" is prepared in 2017 through the organization of workshop during the International Day for Biological Diversity (May 22 and 23 of 2016) with the close collaboration of different stakeholders viz. MoAD, DoA (Department of Agriculture), FDD (Fruit Development Directorate), and NAGRC. The document has been filled with updated information covering the status of conservation, diversity, utilization and distribution of APGRs in the country. It has listed the existing agrobiodiversity particularly English name, Nepali name and scientific name of most of the crop species including crop wild relatives. In addition, action matrix including group recommendations will help guide the nation for future works on agrobiodiversity.

Program intervention

Different organizations such as DoA through DADOs and commodity dirctorates, Gene Bank and research stations (NARC), Libird, Bioversity International Nepal (BI), Action Aid Nepal (AA), FORWARD, CEAPRED are involved for the production expansion of crops, their value addition and institutional support to Community Seed Bank in the country. Likewise, joint implementation (Gene Bank, BI, Libird and DoA) of Local Crop Project is undergoing in 4 districts for the promotion of 8 special crops

(Humla, Jumla, Lamjung, Dolakha: amaranth, buckwheat, naked barley, beans, proso millet, foxtail millet, finger millet, cold tolerant rice). Field gene bank and parks such as potato, sugarcane, Ginger& Turmeric are established in their specific locations. DADOs, in high hill and remote areas, have production, marketing and value addition interventions for underutilized and neglected crops.

Issues and ways forward

Joint collaboration and interventions are crucial to conserve, expand, value addition and use of agriculture plant genetic resources. There is need of creating legal space for the implementation of the Treaty and its Multilateral System, especially in the broader context of ABS legislation. The following initiatives and joint collaboration are needed for the conservation and utilization our genetic resources:

- Documentation and registration of agrobiodiversity and traditional knowledge.
- Technology development through participatory approaches.
- Product diversification of niche specific crops linking conservation along with geolinked trade.
- Promotion and legalization of community seed bank for conservation and better utilization.
- Strengthening human resource capacity in agrobiodiversity conservation programs.
- Establishment of Field gene bank/park in all the farms under DoA and NARC.
- Strengthening of database documentation and knowledge management.
- Enforcement of agrobiodiversity policy, strategy and action plans with legislations.
- Facilitation of Agrobiodiversity Index for biodiversity management, its measurement is crucial.
- Expand the diet diversity management interventions in the food deficit districts.
- Harmonization and joint participation to obligate the provision of international convention, treaty and protocols in the national context.

Photo: Yadav Uprety

ASPECTS AND PROSPECTS OF FARM ANIMAL BIODIVERSITY CONSERVATION IN NEPAL

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Introduction

Nepal is rich in farm animal genetic resources (AnGR) both in terms of diversity and numbers. There are 7.3 million cattle, 5.1 million buffaloes, 0.8 million sheep, 10.1 million goats, 1.2 million pigs, 68 million poultry and 0.3 million ducks in the country. Out of the total bovine population, only 15% cattle and 36% buffaloes are estimated to be crossbred animals. Similarly, the percentage of introduced AnGR in other species of livestock (sheep, goats, pigs and poultry) is grossly estimated to range from 5 to 50% (5 to 10% in sheep and goats, 25% in pigs, and 50% in poultry).

Current status

Because of altitudinal, geophysical and climatic variations, Nepal has a huge diversity in flora and fauna. Regarding farm animals, 25 indigenous breeds of seven species have been identified in the country. The indigenous breeds have their own special importance. Despite their low production potential, these breeds have positive attributes such as hardiness, adaptability to local harsh condition, productivity in low input system, multipurpose use, socio-cultural attachment, and contribution to food and nutrition security. However, farmers are more interested to keep exotic and crossbred animals because of their higher productivity. As a result, the population of indigenous breeds is gradually declining.

Seven indigenous breeds of cattle - *Lulu, Achhami, Pahadi, Terai, Yak/Nak, Siri* and *Khaila* -have been identified. These breeds have only been characterized at phenotypic and production leves except *Lulu* which has also been characterized at chromosomal level. *Achhami* cattle, which is less than one-meter tall, and reared in the far-western hills of Nepal, is the smallest breed of cattle in the world. *Yak/Nak* reared in high mountains under transhumance system is famous for "yak cheese", a niche product made from its milk. *Siri* cattle reared in the eastern hills are the best performing indigenous cattle. However, with the growing practice of crossbreeding through natural and artificial insemination (AI), this breed is believed to be extinct.

Lime, Parkote and *Gaddi* are the native breeds of buffaloes, which along with *Murrah*, the exotic breed, and their crossbreeds contribute about 70% of total milk production in Nepal. These native breeds have been characterized at phenotypic, production and chromosomal levels. These breeds are preferred by most of the subsistence farmers of mid-hills for milk and meat production. Among the native buffaloes, *Lime* buffaloes are declining in number. Special attention and programs for its conservation are of utmost importance.

The predominant indigenous breeds of goat in Nepal are: *Chyangra, Sinhal, Khari* and *Terai*. All these breeds are characterized at phenotypic and production levels. In addition to this, *Khari* goat has also been characterized at the chromosomal level. *Khari* goat is the best performing domestic goat in terms of fertility and meat production. Although the populations of other breeds are maintained, pure line of *Terai* goat breed is difficult to find due to indiscriminate crossbreeding with Indian breeds. *Bhyanglung, Baruwal, Kage* and *Lampuchhre* are the four domestic breeds of sheep kept for wool and

meat production. *Baruwal* breed is also used as pack animal in the High Mountain and Trans-Himalayan regions in western Nepal. The four indigenous sheep breeds account for 95% of the total sheep population in the country. These breeds have been categorized at phenotypic and production levels. Among the domestic breeds, the population of *Lampuchhre* breed has been declining and is at risk of extinction.

Similarly, *Chwanche, Hurrah* and *Bampudke* are the three indigenous breeds of pig, mostly reared by some ethnic groups. These breeds have been characterized at phenotypic and production levels. There are reports of declining numbers of *Hurrah* and *Bampudke*.

Sakini, *Ghanti-khuile* and *Pwankh-ulte* (Dumse) are the indigenous breeds of domestic poultry which are preferred for the distinct taste of their meat. So far, these breeds have been characterized at phenotypic level only. Because of the wide use of exotic dual purpose breeds of poultry in rural communities, the population of *Ghanti-khuile* and *Pwankh-ulte* are decreasing, and are at risk. The current status of some of the indigenous farm animals that need attention are presented in Table 1.

Tabel 1. Current Status of Indigenous Farm Animals in Nepal

Species	Breed	Level of Threat
Cattle	*Siri*	Extinct
	Achhami	Endangered
	Lulu	Declining population
	Pahadi	Declining population
	Khaila	Declining population
	Yak/Nak	Declining population
Buffalo	*Lime*	Declining population
	Gaddi	Declining population
Sheep	*Lampuchhre*	At risk
	Bhyanglung	Declining population
Goat	*Terai*	Pure line almost non-existent
	Chyangra	Declining population
Poultry	*Ghanti-khuile*	Declining population
	Pwankh-ulte	Declining population
Pig	*Bampudke*	About to be extinct
	Hurrah	About to be extinct

Efforts in conservation

Directorate of Livestock Production (DoLP), under the Department of Livestock Services (DLS), has been working as the focal point for conservation of farm animal genetic resources. DoLP and District Livestock Service Offices have been involved in the conservation and promotion of indigenous breeds for a long time. However, focused programs for animal genetic resource conservation were initiated only after 2009. The implementation of these conservation programs are guided by the "Livestock Genetic Resource In-situ Conservation, Promotion and Utilization Program Implementation Directive" approved in 2012. As per the provisions of the directive, conservation programs were implemented in different districts based on the availability of specific farm AnGR (Table 2). Furthermore, National Livestock Breeding Center, Pokhara has started to maintain an AnGR gene bank. To date, the center has cryo-preserved the semen of Lime and Parkote buffalo bulls. Animal Breeding Division of National Agriculture Research Council (NARC) with support from Asian Food and Agriculture Cooperation Initiative (AFACI), a Korean Government funded project, has initiated farm AnGR conservation program (NARC, 2016). The Division has

Table 2. List of Focused Farm Animal Genetic Resources In-situ Conservation Program Implemented Districts

Selected Farm Animal for In-situ Conservation	Program Implemented Districts
Lulu cattle	Manang and Mustang
Achhami cattle	Achham
Lime and *Parkote* buffalo	Kaski, Baglung, Parbat, Myagdi, Syangja, Gulmi and Arghakhanchi
Gaddi buffalo	Dadeldhura
Lampuchhre sheep	Siraha and Kapilvastu
Kage sheep	Okhaldhunga
Khari goat	Tanahun
Hurrah pig	Dang and Nawalparasi
Sakini chicken	Dang

been rearing and maintaining live specimens of *Achhami* and *Lulu* cattle; *Lampuchhre, Baruwal* and *Kage* sheep; *Sinhal, Khari* and *Terai* goats; *Gaddi* buffalo; *Sakini* chicken; and *Bampudke* pig in its Khumaltar Station for *ex-situ* conservation. It has also cryo-preserved the semen of *Lulu* cattle, *Achhami* cattle and *Khari* goat in its gene bank.

Gaps and challenges

The major gaps regarding farm animal AnGR management and conservation are as follows:

- Lack of specific organizational set up for AnGR conservation as practiced in neighboring countries.
- Lack of studies on the potential of indigenous genetic resources in comparison with their exotic counterparts in terms of adaptation, disease resistance, production enhancement with selective breeding, etc.
- Lack of special conservation activities in "Livestock Genetic Resource *In-situ* Conservation, Promotion and Utilization Program Implementation Directive- 2012": Its provisions cover only general extension activities and are not focused on activities that directly contribute towards farm AnGR conservation.
- Some of the indigenous animals are reared by specific ethnic group as they regard animal husbandry as a means of livelihood and traditional occupation. However, their occupation is under threat due to out-migration of youth.
- Limited access to rangeland resources due to the blanket approach of environmental conservation is another serious challenge that needs to be addressed through case specific resource utilization and conservation approach.
- Inadequate resources for technological interventions such as *in-vivo* and *in-vitro ex-situ* conservation, gene bank establishment, cryo-preservation, AI service with frozen semen of indigenous breeds, etc.

The production potential of the indigenous breeds is low compared to exotic breeds and their crossbreds. The milk production of indigenous cattle and buffalo per lactation is only about 400 and 1,000 liters respectively whereas the milk yield per lactation of exotic cattle and buffalo is more than 4,000 and 2,000 liters respectively. Wool production of indigenous sheep breeds is about 800 grams per animal per year but that of exotic breeds is about 4,000 grams. Similarly, the adult body weight of indigenous goat and pig is not even comparable with their exotic counterparts. On the one hand, there is a need to increase the production and productivity of livestock to fulfill the national demand through improved livestock farming. On the other hand, our indigenous breeds are under threat and may become extinct if effective programs of conservation and promotion are not carried out. Striking a balance between these two dichotomous objectives is a huge challenge.

Ways forward

It is high time to declare special farm AnGR conservation areas in coordination with local government offices. Incentive packages should be developed for the farmers who keep indigenous farm animals so as to fulfill the greater interest of AnGR conservation. Male animals of other breeds in the declared conservation areas should be castrated as provisioned in Section 16 of Animal Health and Livestock Service Act 1999 so that they cannot cross breed with the conserved breeds.

Livestock products from low producing indigenous breeds should be developed and branded as high value commodities so that they can fetch premium price. In addition to this, participatory farm animal biodiversity parks as provisioned in National Agriculture Policy 2004 need to be developed. These parks could serve as areas of agro-tourism. Diversity of farm AnGR is our national asset and the Government of Nepal has made commitment in various international forums to conserve this important resource. So, there is a need to harmonize national plans, policies and programs in line with conservation, promotion and sustainable use of indigenous livestock genetic resources. If appropriate measures are not taken, the indigenous farm animal breeds may gradually become extinct.

Photo: Sagar Giri

MAJOR ACHIEVEMENTS OF 25 YEARS OF BIODIVERSITY CONSERVATION IN NEPAL

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Introduction

Since 1990s particularly after the adoption of the Convention on Biological Diversity (CBD), the Government of Nepal has achieved commendable progress in biodiversity conservation. Some notable and visible changes in biodiversity conservation can be seen in policy and institutional reform, forest coverage increment, species conservation, expansion of protected area system, botanical and zoological garden, landscape level conservation, ex-situ and breeding centers, community forestry and other community based forest management, promotion of non-timber forest products, international and transboundary relation, engagement of local communities, research and monitoring, wildlife crime control and human-wildlife conflict management. This article highlights some 25 notable achievements of 25 years of biodiversity conservation in Nepal.

1. Policy and institutional reform

Nepal has formulated biodiversity conservation policy from local to central levels. The Constitution of Nepal gives an especial attention to all three tiers of the government to conserve, manage and use biodiversity resources as a concurrent subject matter. The National Parks and Wildlife Conservation Act (1973), Forest Act (1993), Environmental Protection Act (1994) and control of International Trade of Endangered Species of Wild Fauna and Flora Act (2017) and their subsequent regulations are the visible policy reforms for biodiversity conservation in Nepal. The National Biodiversity Strategy and Action Plan have been instrumental to mainstream the biodiversity conservation following the spirit of the convention. Similarly, institutional set up from center to local level is strength of biodiversity conservation of Nepal. Parliament committees, Councils of Ministries, National Planning Commission, Ministry of Forests and Environment, and its departments and field offices and Ministry of Land Reform, Agriculture and Cooperative, and its departments and field offices are working on forest and agrobiodiversity conservation. The role of formal and informal institutions such as community forest user groups to biodiversity conservation is praiseworthy. Enactment of CITES Act (2017) is another milestone to biodiversity conservation in Nepal.

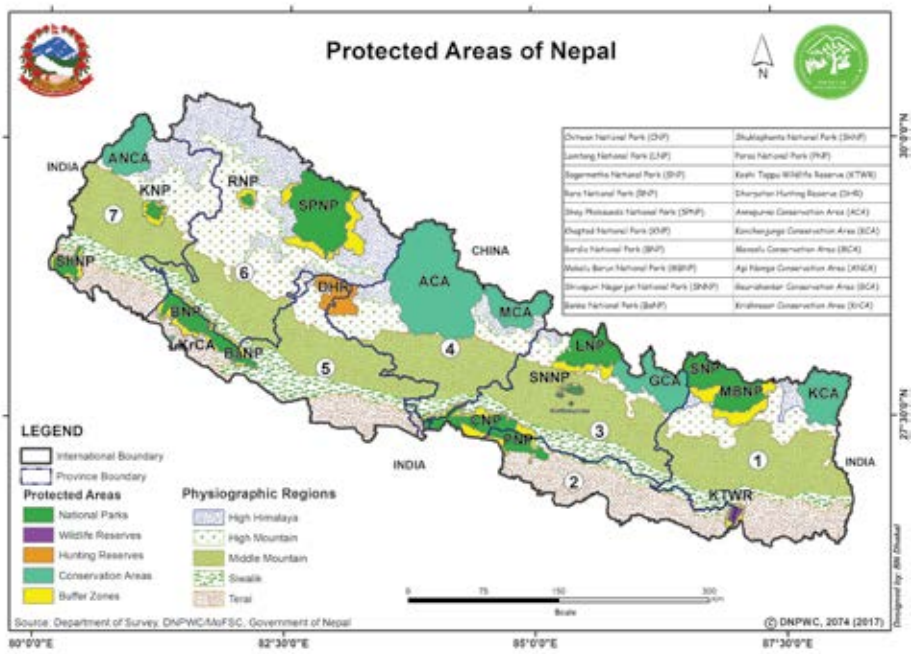
2. Mega fauna species conservation

Nepal is one of the exemplary countries in the world to increase the tiger and greater one horned rhinoceros since the adoption of CBD. As of 2013, the tiger number is 198, which is 63% increment based on the national census in 2009. Similarly, the rhino number in 2015 is 645, which is 15% increment based on the national census of 2011. These species population increment in Nepal is pride of our conservation system while other tiger and rhino range countries losing the population.

3. Protected areas expansion

The concept of protected area system was initiated in Nepal in 1970s. Chitwan is the first and oldest national park, established in 1973.

Protected Area System of Nepal

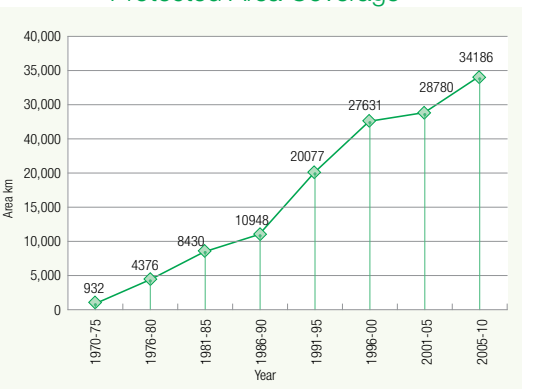


There are 12 national parks, one wildlife reserve, one hunting reserve, six conservation areas and 13 buffer zones in Nepal. Nepali protected areas are largely based on wilderness concept and fortress management principles. Since the adoption of CBD, Nepal has applied integrated conservation development program through buffer zone activities. As of 2018, 23.39% of the country land is covered by protected area system. Nepal has already met the Aichi target (17% of the terrestrial ecosystem). However, the coverage in the Himalayan and lowland region is comparatively higher while protected area system lacks adequate representation in mid-hill ecosystems.

4. Botanical and zoological garden

Botanical and zoological garden are considered as one of the parts of ex-situ conservation. However, these gardens are also considered as one of the important sites for amusement and recreation. The Central Zoo was established basically as the private zoo by then Prime Minister Juddha Sumsher J.B. Rana in 1932. But now, the Government of Nepal has established National Zoological Garden in Bhaktapur and also planning to establish state level zoo in 7 states in the future. Department of National Parks and Wildlife Conservation is the responsible government agency to manage the zoological garden in Nepal. Similarly, Department of Plant Resources is the principle agency to initiate the botanical garden in Nepal. The department is also planning to establish at least one botanical garden at each state.

Protected Area Coverage



5. Landscape level conservation

Nepal is a pioneer country to implement biodiversity conservation activities at landscape level. Terai Arc Landscape, Sacred Himalayan Landscape, Kailash Sacred Landscape, Chitwan-Annapurna Landscape and Kanchenjungha Landscape are the major conservation landscapes of Nepal. Landscape level conservation is giving an equal opportunity to all conservation partners to work in the team and produce cumulative outcome of biodiversity conservation.

6. *Ex-situ* conservation of rare and endangered species

Central Zoo, Elephant Conservation Breeding Center, Vulture Conservation Breeding Center and Crocodile Conservation Breeding Center are notable example of ex-situ conservation of Nepal.

7. Community forestry program

Community forestry program is one of the iconic programs involving local people in forest management process. The program envisions an independent institution and decision making authority over the forest product harvesting and benefit sharing on equitable basis. This programme covers nearly one-third of the forest coverage and involves one-third of country population.

8. Promotion of non-timber forest products

Besides timber, non-timber forest products including medicinal and aromatic plants play vital role to local and national economy of Nepal. Various species of medicinal and aromatic plants and their derivatives are sold in international markets. These are the sources of foreign exchange to Nepal. However, it is essential to simplify the process of medicinal and aromatic plants and their parts collection, processing and sale to the national and international markets.

9. Implementation of Multilateral Environmental Agreements (MEAs)

Nepal is a party to various multilateral environmental agreements since the very beginning. The notable MEAs are CITES, UNESCO, Ramsar Convention, UNCBD, UNCCD, UNFCCC, GTF, SAWEN, SACEP and many others. Nepal is also the State member of IUCN. Nepal is also serving standing committee members for 2015-2018 and alternative CITES standing committee members for 2016-2019 for the first time after adoption of both conventions. Further, Nepal is working as a member of Stockholm convention, Kyoto Protocol, Paris Agreement, Montreal Protocol and many others. These international agreements are providing ample opportunity to Nepal to work together with international communities.

10. Transboundary cooperation with India and China

Nepal has memorandum of understanding with China for biodiversity conservation in 2010. Similarly, Nepal has legacy having national level transboundary meeting with India annually. The national transboundary meeting between India and Nepal has also finalized a draft of MoU between two countries. The transboundary cooperation between Nepal and China, and Nepal and India is playing important role for biodiversity conservation, human-wildlife conflict management, combating wildlife crime and capacity building.

11. Engagement of indigenous and local communities

Nepal is a multilingual, multi religious, multi culture, and multi caste country. The indigenous and local communities have been engaging in various activities of biodiversity conservation since the ancient time. Nepal is also committed to engage local communities for *in-situ* conservation with due recognition

of their rights and responsibilities over the biodiversity resources.

12. Research and monitoring

Research on biodiversity conservation is a regular and an eternal process elsewhere in the world. Nepal has adopted country wide tiger and rhino census. Similarly, protected areas are started to count wildlife buffalo, swamp deer, black buck, blue sheep and other many species. ID base monitoring of rhino is also adopted. MIST and SMART patrolling are other examples for wildlife surveillance. This system has greatly supported to law enforcement system among the protected areas.

13. Rhino zero poaching

The most notable achievement of biodiversity conservation of Nepal is zero poaching of rhino. Citing this achievement, the Secretary General of CITES has provided commendation certificate to the Government of Nepal on the occasion of 65th CITES standing committee meeting in 2014.

14. Wildlife stockpile management

A historic event of the wildlife stockpile management was organized on the occasion of International Biodiversity Day on 22 May 2017 in Chitwan National Park. This event was organized with a principle of 100% transparency getting more than 48 national and international media coverage. The aim of the event was to support wildlife crime control and the message was that the wildlife are valuable when they are alive and zero value of their body parts after death.

15. Institutional reform for wildlife crime control

In order to coordinate support to wildlife law enforcement process, the Government of Nepal has reformed a number of institutions from local to central level. National Tiger Conservation Committee (NTCC) at Prime Minister Level, National Wildlife Crime Control Coordination Committee at minister level, and Wildlife Crime Control Bureau at Director General Level and wildlife crime control unit at district level are its examples.

16. Human-wildlife conflict management

Human-wildlife conflict is one of the most serious challenges to biodiversity conservation in Nepal. The Government of Nepal has adopted both preventive and curative measures to manage this challenge. The wildlife relief policy covers 14 most conflict prone species, and gives one million of Nepalese Rupees for human death. This policy also covers partial amount for human injury, livestock damage, crops depredation and property loss as well. Initiation of insurance mechanism is another positive effort to minimize the human-wildlife conflict and maintain human-nature co-existence.

17. Establishment of SAWEN

In order to coordinate and cooperate wildlife crime at transboundary level, an intergovernmental organization called South Asia Wildlife Enforcement Network (SAWEN) has been established in 2011. The secretariat of SAWEN is established in Kathmandu, Nepal. SAWEN has its own statute and five member countries namely Bangladesh, India, Nepal, Pakistan and Sri Lanka have already adopted this organization while remaining three countries namely Afghanistan, Maldives and Bhutan are on the process of its membership. SAWEN has been providing regional platform to combat wildlife crime in South Asia region.

18. Wetland conservation

Around 5.5% of the country land is covered by wetlands in Nepal. Small to large rivers, lake and reservoirs, and paddy fields are the common wetlands in Nepal. Ten wetlands of Nepal having international importance are enlisted into Ramsar Site with Ramsar Information

Sheet (RIS). The Koshi Tapu Wildlife Reserve is the first Ramsar site while Lake Cluster of Pokhara Valley is the latest one.

19. Initiation of sustainable forest management through scientific forest management

The Government of Nepal has adopted scientific forest management following the principles of sustainable forest management. The scientific forest management aims to supply forest products particularly timber, reduce timber import, and enhance forest biodiversity richness.

20. Agrobiodiversity conservation

Nepal is a mountainous country. Majority of the people depend on agriculture for their day-to-day livelihoods. The Ministry of Land Reform, Agriculture Development and Cooperative has been implementing agriculture development activities across the country.

21. Climate change mitigation and adaptation

Nepal is one of the vulnerable countries from climate change perspective. Glacier melting, too much water in the summer and too little water in the winter, erotic rainfall, flashfloods, disasters, river floods, change in the flowering and fruiting of the plant are some notable climate change effects in Nepal. The Government of Nepal has implemented Climate Change Policy 2011 with mitigation and adaptation measures. The concept of climate change smart village is also being implemented in selected districts.

22. REDD+ and its implementation

REDD+ is a performance based incentive mechanism to enhance sustainable forest management and discourage deforestation and forest degradation. A separate entity for REDD+ mechanism called REDD Implementation Center is working on REDD+ issues. The National REDD +strategy has recently been approved and there is huge opportunity to collaborate for both climate change mitigation and adaptation and biodiversity conservation activities.

23. Promotion of ecotourism

Nepal is one of the most attractive destinations to international tourists. More than 60% international visitors visit protected areas for sightseeing, wildlife sighting, bird watching, trekking, mountain climbing, cultural exchange, and many other activities. They visit Chitwan National park for wildlife sighting particularly tiger, rhino and crocodiles, and Sagarmatha and Langtang National Park for mountain climbing and trekking. Annapurna Conservation Area is another worldwide renowned trekking destination.

24. Provision of IEE and EIA

Balancing conservation and development is a challenge for biodiversity conservation. The Government of Nepal has developed a legal instrument for Initial Environment Examination (IEE) and Environment Impact Assessment (EIA) for all kinds of development infrastructure aiming to apply mitigates measures or compensates the damages based on the nature and extends the development effects.

25. Forestry for economic prosperity

Forests produce both tangible goods and intangible environmental services. These goods and services have huge potentiality to contribute in economic growth of the country. High value timber for example Sal and other many economically valuable medicinal and aromatic plants have huge potentiality to foreign exchange. Sustainable forest management, protected area management, wildlife farming, ecotourism and enabling environment to private sectors to invent on forest based enterprises are some of the areas to materialize the principle of forestry for economic prosperity.

Photo: Amit Poudyal

FOREST COVERAGE AND BIODIVERSITY IN NEPAL

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Photo: Hari Basnet

Forest is one of the major sources of biodiversity. It is the major habitat for terrestrial biodiversity which includes wild flora and fauna. A total of 118 ecosystems have been identified in the country and most of the ecosystems are identified inside forest areas. There are 112 forest ecosystems identified in Nepal. The country includes 12 of the 867 global terrestrial ecoregions. The country's forest ecosystems can be categorized into ten major groups, namely tropical, subtropical broadleaved, subtropical conifer, lower temperate broadleaved, lower temperate mixed broadleaved, upper temperate broadleaved, upper temperate broadleaved, upper temperate mixed broadleaved, temperate coniferous, subalpine, and alpine scrub.

Coverage of forest has significant importance form the biodiversity perspectives. Having only about 0.1 percent of global land area Nepal harbors 3.2 percent and 1.1 percent of world's known flora and fauna respectively and majority

Timeline of Nepal's Forest and Shrub Cover

Land Cover	LRMP 1978/79	NRSC 1984	Master Plan 1985-1986	NFI 1994	DoS 1995	FRA 2010-2014
Forest	38.0	35.9	37.4	29.0	38.3	40.36
Shrub	4.7	-	4.8	10.6	-	4.38
Total	42.7	35.9	42.2	39.6	38.3	44.74

Source: DFRS/FRA, 2015

of them are found in forest ecosystems. The diverse climatic and topographic conditions have favored for the diverse forest ecosystems hence providing habitat for diverse biodiversity in a considerably small area.

Forest not only have rich ecosystem but also support other ecosystem such as wetlands etc. by providing shelter and conserving required resources. Forest coverage also assist the movements of wildlife as corridors hence playing a significant role in biodiversity conservation.

Understanding such a high values of forest ecosystem, Nepal has committed to maintain a sustainable forest coverage for ecosystem and economic purposes. Constitution of Nepal has placed a provision to maintain a sufficient amount of forest cover in the country to keep necessary ecological and environmental balance. Similarly, Forest Policy 2015 has put a strategy to maintain 40% of land cover as forest for sustainable forest management and enhance the production of forest goods and services which will be ultimately beneficial for biodiversity that depends on the forest and other ecosystems.

As of the latest Forest Resource Assessment of Nepal, forest and shrubland area cover 5.96 and 0.65 million hectares respectively which is almost 45% of the total area of the country. Out of the total area of forest, more than 80% of the forest lies outside the protected area system and remaining forests are inside protected areas. The assessment also identified a total of 443 tree species belonging to 239 genera and 99 families in the sample plots. The number of tree species identified in the sample plots of Middle Mountains, Churia, High Mountains along with High Himal and Terai regions were 326, 281, 275 and 164, respectively.

Information on forest genetic diversity is very limited in Nepal. The Department of Forests has established seed stands for 38 socially and economically important tree species to conserve the genetic resources of these species. Among the forest tree species studied, *Dalbergia sissoo, Pinus roxburghii* and *Shorea robusta* have been found to possess a high level of genetic diversity.

Nepal's biodiversity is threatened by multiple factors. Loss, degradation and alteration of natural habitats, such as forests, grasslands and wetlands, overexploitation, invasion by alien species etc. The threats to forest biodiversity can be categorized into two broad groups (I) loss and degradation natural habitats and (II) over exploitation of biological resources.

Forest cover change dynamics directly and indirectly impact biodiversity. Deforestation of forest in Nepal has significantly reduced compared to the previous year's however degradation and forest disturbances have affected biodiversity steadily as these processes haven't been well considered during forest management activities. Moreover, deforestation still is taking place in some part of Nepal in accessible areas where there are richer forest ecosystems.

Forest Resource Assessment (2010-2014) results has shown that the forest cover in

Nepal has increased compared to previous assessments. However, the FRA results cannot be directly compared with the previous surveys as it has significant methodological differences than the previous ones. Nevertheless, the FRA found the largest coverage of forest and/or shrub in Nepal compared to last four decades of forest resource assessments.

There are regional variations in terms of changes in forest condition. The commercially and biologically valuable forest in the Terai lowlands and adjoining Siwalik Hills suffered from high rates of deforestation and degradation over the last four decades. According to a recent assessment of forest cover by the Forest Resource Assessment Project, however, indicates a declining rate of forest loss in the Terai in recent years (i.e. by 0.44% per annum during 2001 – 2010). Forests in the Middle Mountains are, in general, better conserved and in many places forest cover has increased in recent years due mainly to the community forestry program and other demographic dynamics.

Many species of plants and animals, including 54 species of wild mammals and 18 species of trees found in the mountains, are threatened. Birds are among the most threatened group of fauna. Over half of Nepal's nationally threatened bird species inhabit lowland forests. It is found that the species relied on the ecologically rich forests of lowland has been more vulnerable due to the loss and degradation of forest in those areas.

Continuous loss and degradation of forests in the Terai and Siwalik regions, inadequate attention to management of biodiversity in community forests, poor linkage of community forestry with livelihoods and poverty alleviation, limited participation of women and other disadvantaged social groups, inadequate technical capacity for implementation of sustainable forest management are some of the major gaps and issues in the management of forest biodiversity outside protected areas. Encroachment of forest areas; Expansion of cultivation into forest areas; Development of infrastructure inside forest land and planned conversion of forest land by government authorities are contributing to loss of habitat for forest biodiversity. Unsustainable over harvesting of timber and other non-timber uses, Uncontrolled forest fires and overgrazing in forest areas, selecting logging of commercial and valuable species contributing to forest degradation which is subsequently degrading biodiversity. Similarly, invasion by invasive alien species is noticeably impacting the forest regeneration and subsequently degrading the diversity in forest ecosystem.

As forest is the most important ecosystem for biodiversity, maintaining forest coverage will give positive results regarding biodiversity conservation.

Photo: Amit Poudyal

REDD+ AND BIODIVERSITY CONSERVATION

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Introduction

Gone are the days when environmental system would be overlooked for infrastructure and financial gain. Projects are and should be evaluated against not only their direct goals, but also how much positive or negative impacts they make on social and environmental systems. Reducing Emission from Deforestation and Forest Degradation plus associated activities (shortly known as REDD+) would follow suit. Under REDD+, the developing country parties to United Nations Framework Convention on Climate Change (UNFCCC) can claim for payment against removal of or reducing emission of carbon dioxide (CO_2) equivalent from their forests. The payment made against per metric ton of CO_2 equivalent implied that REDD+ countries would focus only on carbon by promoting fast growing tree species in their forests at a cost of biodiversity. That is why few years back, REDD+ used to be criticized of several 'assumed' trade-offs, such as 'carbon or timber', 'carbon or biodiversity', and 'centralized or decentralized decision making'. However, such paradox has not been the case in REDD+ recently.

REDD+ has been conducive for conserving biodiversity thanks to several decisions made by UNFCCC and associated institutions such as UN-REDD and the World Bank. UNFCCC's 16th Conference of the Parties (COP16) held in Cancun, Mexico in 2010 defined a set of REDD+ safeguard principles (commonly known as 'Cancun Safeguards'). It also directed REDD+ countries for establishing Safeguard Information System and Summary of Information. Similarly, COP19 of UNFCCC held in Warsaw in 2013 developed REDD+ frameworks that included 'Safeguard Information System' among others as pre-requisite for REDD+ programs across the world. Likewise, international agencies, such as the UN-REDD and World Bank have also developed guidelines for REDD+ safeguards in a way that Cancun Safeguards, Warsaw Frameworks and additional safeguard principles are fully internalized in REDD+ projects under their financial and technical assistance.

UNFCCC Safeguards for REDD+

REDD+ safeguard principles and frameworks allude to the precaution that, while REDD+ are implemented, no adverse impacts are made on social and environmental systems including biodiversity; and if made, proper measures are taken into consideration for their mitigation. Once these safeguards are properly maintained, it is argued that REDD+ and biodiversity will reinforce each other.

Cancun Safeguards Principles require that REDD+ should support and promote the conservation of biodiversity among other conservation actions. More specifically, Principle (d) of the decision underscores that REDD+ *'actions are consistent with the conservation of natural forests and biological diversity, ensuring that... (REDD+) actions are not used for the conversion of natural*

forests, but are instead used to incentivize the protection and conservation of natural forests and their ecosystem services, and to enhance other social and environmental benefits'. At least four inferences can be drawn under this principle for countries being engaged in REDD+. First, any actions that are meant to reduce CO_2 emission from or sequester CO_2 in natural forests do not result in the conversion of natural forests to other land use or plantation forests. Second, the genetic, species, ecosystem and landscape diversities of forests, which are intervened for reducing emission or sequestering CO_2 under REDD+, should be kept intact. Third, REDD+ is not used as an excuse for promoting fast-growing exotic tree species to accelerate carbon stock in the forests. Rather, the protection and conservation of natural forests, biodiversity and ecosystem services are properly incentivized through benefit-sharing plans under REDD+. Finally, other social and environmental benefits are also explored and increased through monetary and non-monitory incentives under REDD+.

Under this principle, any country participating in REDD+ should ensure that natural forests and biodiversity are properly conserved while carbon dioxide is sequestered, accounted and traded. It directly implies that neither natural forests are converted into other land-use or artificial forests, nor are any exotic fast growing tree species introduced in natural forests for expediting CO_2 sequestration. Afforestation or reforestation is allowed under REDD+ in an already barren land for a long time, but not as 'clear-felling and plantation' in the existing natural forests. This principle also suggests that application of proper silviculture system is acceptable for sustainable management of forests under REDD+, but without significantly impacting on natural environment including biodiversity.

WB and UN-REDD Safeguards on biodiversity

World Bank has its own 'Safeguard Policies' for any projects including REDD+ that are carried out in collaboration with it. It is also developing a new 'Environmental and Social Framework' that will eventually replace its current Safeguard Policies. These policies and framework have a strong biodiversity component. UN-REDD has developed 7 Principles and 24 Criteria for social and environmental safeguards for REDD+ in which Principles 5, 6 and 7 and their respective Criteria are directly related to biodiversity conservation.

Nepal's REDD+ on biodiversity

Nepal has been participating in REDD+ readiness since 2008. It has met several readiness requirements, such as REDD+ Strategy in place, submission of National Forest Reference Level to UNFCCC, and preparation of several documents including monitoring framework for non-carbon benefits, readiness package, Emission Reduction Program Document (ERPD) and associated safeguard related documents including biodiversity monitoring protocol for REDD+.

Nepal National REDD+ Strategy (2018) adopts to *'addressing and respecting social and environmental safeguards'* as one of the nine guiding principles of Nepal's REDD+. Similarly, the second among five objectives of the Strategy notes that *effective implementation of safeguards measures* would be ensured.

Nepal's draft Environmental and Social Management Framework (ESMF), 2018 identifies a number of likely positive environmental impacts of implementing Emission Reduction Program Document (ERPD) in the Terai Arc Landscape - including but are not limited to - sustainable management of forests; enhanced carbon sequestration; maintained ecosystem services;

reduced deforestation and forest degradation; biodiversity conservation; promotion of natural regeneration; landscape restoration; protection of vulnerable species (flora and fauna), greenery and maintained ecological integrity of the project area. It means that biodiversity conservation will be one of the key outcomes of implementing REDD+ in the country in addition to enhanced carbon stock in the project sites.

Biodiversity Monitoring Protocol for REDD+, a separate document has also been prepared to measure and monitor the changes in biodiversity at several levels against the implementation of REDD+ particularly in the Terai Arc Landscape.

Conclusion

Critical issues remain for the countries like Nepal, which are considering the biodiversity component in REDD+. First, there is a misconception in Nepal and elsewhere that there is a trade-off between REDD+ and biodiversity. But this is not the case. Instead, biodiversity conservation is ensured when REDD+ is implemented. If biodiversity is compromised for the sake of additional carbon benefits, it will actually be a breach of UNFCCC decisions as well as other agreements REDD+ countries make with international institutions for result-based payment. This message should be clearly disseminated to wider stakeholders including government and conservation partners. Second, payment is made only against carbon performance, i.e. it is only the reduced emission reduction measured in metric ton of CO_2 equivalent that will be paid for in REDD+.

Biodiversity conservation is not paid or directly incentivized but is put as a pre-condition for environmental safeguards. Provision of incentivizing non-carbon benefits has been addressed in Article 5(2) of the Paris Agreement, but this has not been practiced yet. While claiming for carbon payment, it is in the best interest of the REDD+ countries including Nepal that biodiversity conservation should also be accounted for the payment in addition to the carbon price. Finally, as UNFCCC has put conditions on REDD+ countries to conserve biodiversity while implementing REDD+, it should equally enforce Annex I countries to consider biodiversity as one of the elements to be paid for in addition to reduced green house gases. Actually, UNFCCC and CBD should collaborate for effective climate actions, biodiversity conservation and fair and equitable sharing of benefits coming out of REDD+ implementation in an integrated manner.

Photo: Siddhartha Bajra Bajracharya

NATURE - BASED TOURISM, PROTECTED AREAS AND ECONOMIC DEVELOPMENT IN NEPAL

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Photo: Siddhartha Bajra Bajracharya

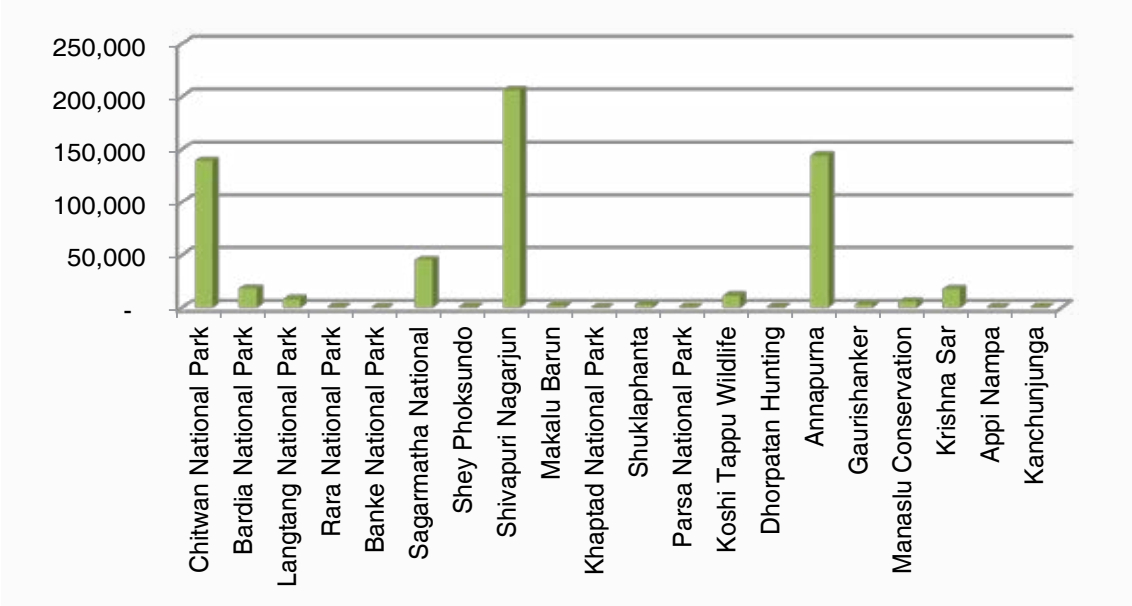
Globally, tourism is one of the fastest growing industries, and landscapes and wildlife in Nepal provides ample opportunity for developing the industry in the country. Nepal Tourism Board reported that Nepal received 940,000 international tourists in 2017 with increased of 24.8% compared to the previous year. Recently, the World Travel and Tourism Council reported that travel and tourism related economic activities generated 7.5% of Global Domestic Product (GDP) in 2016 generating US $1.6 billion for the country. More than 427,000 people in Nepal were directly employed through the tourism industry in 2016 which was 2.9% of total employment. In fact, about 945,000 people were directly and indirectly employed by the tourism industries in 2016. Mountains, rivers, wildlife, forests and associated cultural diversity are major attractions for tourists. Landscapes and wildlife are important products

for tourism in Nepal. Biodiversity contributes significantly to the attractiveness and quality of destinations. The major tourism attractions in Nepal are concentrated in key biodiversity sites and protected areas. The UN-World Tourism Organization has reported that nature and adventure travel are among the fastest-growing segments of this industry. Tourism industry could be a fundamental building block of the country if we could carefully connect together with our natural capital.

'Nature-based tourism' is the fastest growing element of tourism, and often involving excursions to national parks and wilderness areas, to developing countries where a large portion of the world's biodiversity is concentrated. In this context, all the protected areas as well as some areas outside the protected areas of Nepal are well qualified and have a great potential for the development of nature-based tourism. By definition, 'nature-based tourism is the tourism that involves experiencing natural places, typically through outdoor activities that are sustainable in terms of their impact on the environment'. Mountaineering, trekking, hiking, nature walks, birding, canoeing, and jungle safaris are all examples of nature-based tourism and Nepal could be a perfect destination for nature-based tourism. Nevertheless, nature-based experiences are intimately linked to all other aspects of the visitor's total experience of a destination, such as food, culture, relaxation, health, family needs, accommodation, transport, information, etc. All serve to complement each other and together form the basis of a visitor's overall satisfaction with their holiday.

Protected areas of Nepal provide habitats for range of charismatic as well as flagship species including tiger, rhino, snow leopard, red panda, musk deer, and many more. Some of the magnificent landscapes and nature's wonders including snow capped mountains, snow-fed river systems, natural lakes, gorges, pristine forests are housed inside the protected areas (PAs). As of 2018, there are 12 National Parks, 1 Wildlife Reserve, 1 Hunting Reserve, 6 Conservation Areas, and 13 Buffer Zones covering 23.39% or 34,419.75 sq. km of the land area of the country. Mainstreaming tourism without damaging core values of biodiversity conservation is one of the successful approaches in the protected area management of Nepal. Tourism has delivered much needed resources for conservation and provided a unique opportunity to local people with an economic incentive to protect biodiversity. Example from Annapurna Conservation Area (ACA) clearly shows that tourism in protected areas has provided new economic opportunities for the rural communities. At present, the tourism development is concentrated mainly in Chitwan National Park (CNP), Sagarmatha National Park, Shivapuri Nagarjun National Park and ACA where tourism has enabled the more effective use of economic incentives to induce positive changes; promoted conservation by raising awareness among visitors, and by raising the profile of biodiversity conservation and protected areas management at local and national levels; and supported to generate additional funds for conservation. However, gradual growth in tourism in the protected areas and concentration of tourism in a few protected areas has called attention to move tourism into new destinations. Besides moving to new destinations, a good tourism planning together with implementation of the planning and management system is realized essential. Reflecting the rich tourism sources, the management plan of all the protected areas have considered tourism as an important driver of sustainable economic development and mean to create decent job for people living in and around the parks while conserving ecosystems and biodiversity.

Number of visitors in Protected Areas in 2073/74 (2016/2017)



Annapurna and Chitwan experiences

ACA is the most popular trekking destination in the Nepal Himalayas, receiving more than 158,000 international visitors in 2017. ACA contains some of the most spectacular natural areas in the world in a remarakable physical setting. It has an exceptionally high level of biodiversity in terms of species richness and degree of endemism, which is due to the wide range of climatic conditions and altitude, which provide a diverse array of ecosystems. Local communities of the area are actively participating in the conservation area management including tourism. Tourism development and management in ACA has been considered as a good example of nature-based and community participation. Tourism data indicates that there is a gradual increase in the annual number of visitors and provided significant opportunities for economic advancement. Tourist expenditure on the way to ACA and in communities adjacent to or within the area is significant, leading to increased income, the reduced poverty, and created opportunities for vertical advancement in the tourism business. Tourism also assisted in protection of the invaluable resources in ACA on which it is based through the generation of revenue for park management agencies. Local communities in and around ACA have received substantial income and employment benefits from tourism. This is a powerful economic justification for conserving biological resources in ACA. The ACA experience clearly shows that a balanced interaction between tourism, park, and local communities – or between biophysical resources and people – provides mutual benefits for all. Such a balance is also considered important for strengthening the conservation capacity of the park authority, while at the same time influencing local attitudes toward conservation.

CNP provides similar situation. CNP is first national park of the country and is a UNESCO Natural World Heritage Site. This is one of the best wildlife tourism destinations of the country with good population size of

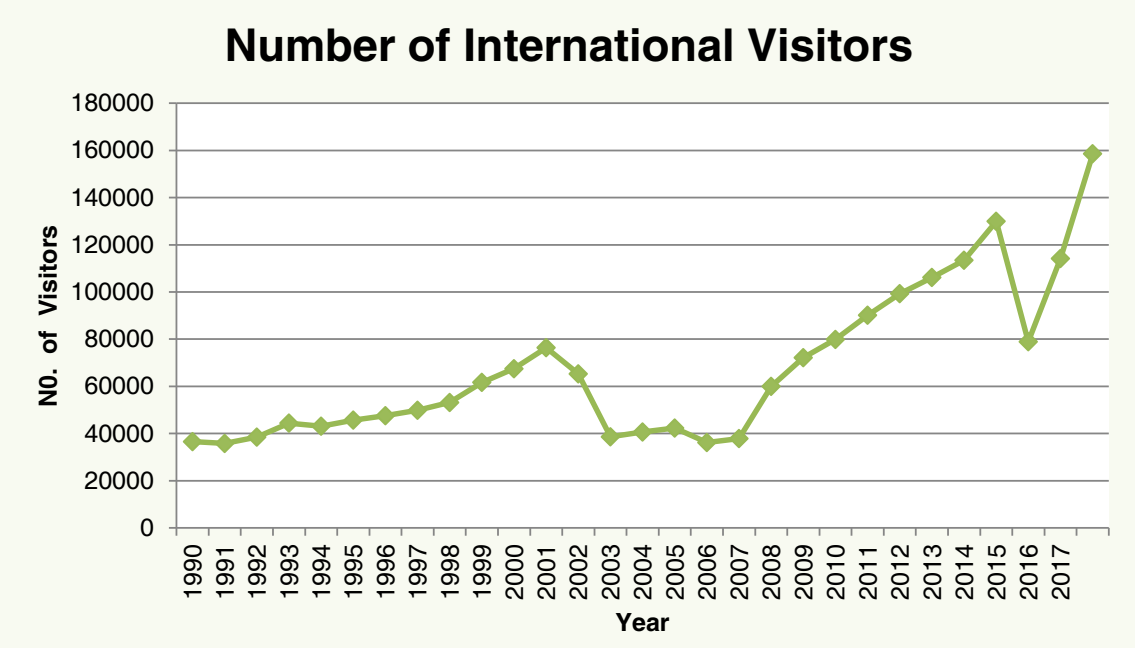
tiger, rhinoceros, elephant, and many other mammals, birds, reptiles, etc. Annually, this national park receives more than 130,000 visitors. People living in the periphery of CNP are receiving direct and indirect benefits from tourism. Tourism provided a good platform for collaboration between the CNP authorities and other stakeholder. As a result, conservation has flourished in CNP with gradual increase in the populations of tiger, rhinoceros and other prey species. More importantly, CNP has made conservation record in 'zero poaching' of rhinoceros in consecutive years. In contrast, many park authorities and institutions, both in Nepal and in other developing countries, are still seeking a mechanism for the effective park management and durable funding of parks.

Key lessons learned

Nature-based tourism contributes to conservation of biodiversity and cultural diversity; well being of local communities; provides a highest level of tourist satisfaction; and provides a meaningful experiences to the tourists. Because of importance of environmental quality and biodiversity for tourism, the tourism entrepreneurs including local communities in and around such areas has a long term interest in environmental protection and conservation.

Most of the protected areas of Nepal are unique and very attractive, both naturally and culturally, and providing ecosystem services. Although the protected areas of Nepal are providing tremendous benefits, as elsewhere in the world, there is a significant funding gap for management. Nature-based tourism is an obvious option for the sustainable financing of protected area management and for achieving sustainable development of the region. Alternatively, nature-based tourists are in search for less crowded and pristine destinations. Nepal's ambitious target to

Annual number of international visitors to Annapurna Conservation Area



increase tourist number to 2 million by 2020 also stresses the need to plan and develop tourism in other potential protected areas. The lessons learned from ACA and CNP could be replicated and if possible, scaled up in the potential protected areas of Nepal for tourism development. The potential tourism products of each protected areas and possible tourism activities should be mapped out during the planning process. In Nepal, nature-based tourism delivers funds for conservation and provides a unique opportunity to local people with economic incentives to protect biodiversity. There is always a danger that land clearance for tourism infrastructure development may contribute to biodiversity loss.

Conclusion

Least Developed Countries like Nepal may have other priority sectors for public fund investment compared to biodiversity conservation. Therefore, annual investment from the government for the protected areas management is relatively very low. Development of nature-based tourism in protected areas will create a new financial resource for the park management and has been slowly emerged as one of the ways to make the protected areas financially sustainable. Protected area such as Annapurna Conservation Area in Nepal is managed through tourism revenues alone.

The protected areas in Nepal have played a very significant role in driving Nepal's tourism industry. More than 45% of total visitors to Nepal visit protected areas. It is creating much-needed employment and micro-enterprise development opportunities to the local communities living within and outside the protected areas. The tourism revenue is significantly contributing to GDP of Nepal. The avenues of making more investment by private sector in partnership with local community will further contribute to sustainable development through the promotion of nature, culture and adventure tourism. Therefore, nature-based tourism development in protected area could provide much needed foreign currency to the country, creates economic opportunity to the local communities living in the rural areas, new financial resources of protected area management, and a unique experience to the visitors.

Photo: Ishwari Prasad Poudel

STATUS AND OPPORTUNITY OF SCIENTIFIC FOREST MANAGEMENT IN NEPAL

Ishwari Prasad Poudel
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Vijaya Raj Subedi
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Photo: Ishwari Prasad Poudel

Introduction

Most of the natural forests in the Terai and Inner Terai are old and overmatured. The success of community forestry gained biomass and greenery however actual management of forests is still lacking. Growing population and demand of wooden materials are increasing however production of timber is low due to lack of proper management of forests. The consequences is so drastically changed that Nepal is importing timber from foreign country like Mynmar, Malaysia and Indonesia. The use of aluminum materials in construction of buildings is rapidly growing due to scarcity as well as high cost of the sawn timber.

The prevailing legal instruments in forestry sector such as Forest Act 1993, Forest regulation 1995, Scientific Forest Management Guideline 2014 and and many other directives are also placed in execution however the forest health and direct economic benefit (royalty

Particular	Community forests (CF)	Collaborative forests (CFM)	Government managed forest (GMF)	Total
Implement forests number	285 (area 28,500 ha, average 100 ha/cf)	30 but effectively implemented 15 (73000 ha but effectively implemented area 40,000 ha)	6 (area 13000 ha)	321 (area 81,500 ha)
present timber production	11,40,000 cft	16,00,000 cft	5,00,000 cft	32,40,000 cft
Employment	4222 persons/year	5925 person/year	1481 persons/year	11,628 persons/year

contribution) from forestry sector is diminished. Hence forestry sector is getting low priority as well as low national investment. Due to proper management of forest, governance issue in the sector is highlighted. Being the policy instruments, competent human resources the forest management issue could not be well addressed due to enabling environment and silviculture system based management modality. Realizing the adverse scenario, first scientific forest management (SFM) operation was initiated from Tilaurakot Collaborative Forest, Kapilvastu based on application of Silviculture system since 2011.

There is good opportunity to manage the forest resource as well as creating local jobs and contribute to the national treasury. For example there is around 193,379 ha of forests in 20 districts of Terai and Inner Terai managed/ conserved under community based management modalities such as community forests, protection forest and collaborative forests. If only 50 percent of the area is managed under sustainable/ scientific management, around 1.5 billion (15 arab) Nepalese rupees can be contributed in national economy which is equivalent to the yearly government budget of Ministry of Forests and Environment. According to Forest Resouce Assessment 2015, 11,76,468 ha forest of the country in Terai, Inner Terai, Chure and Mid Hills ecological zone can be managed under SFM scheme Ultimately management contributes to the improvement of the forest health, increased supply of timber and employment to local people.

Present scenario

Scientific forest management is increasing in collaborative, community and government managed forest rapidly. In forests, irregular shelter wood system is applied where average rotation age is 80 years and regeneration period is 10 years especially in the terai hardwood. So far (by March 2018) total 81,500 hectare forest is managed by 285 community forest user groups, 30 by collaborative forest users committee and 6 by District Forest Offices (DFOs) as block forests. The summary is presented as followings.

The real situation is being positive however some sector especially not related to the forestry purposes are against the SFM. Ministry of Forests and Environment has high priority to the SFM.

Ways forward

Scientific forest management is essential to manage country's productive forest in a sustainable manner. If government is able to create enabling environment, good governance, strong financial resource and technology, we can achieve following targets within five year.

particular	1 year			3 year			5 year		
	CF	CFM	GMF	CF	CFM	GMF	CF	CFM	GMF
Implement forests number	400	30	7	1000	30	7	2200	32	9
timber production cft 00000	16	29.2	5.6	40	29.2	5.6	88	30	6.5
Employment (person/year)	5925	10814	2074	14815	10814	2074	32593	11111	2222
Required budget (0000000)	8.05	73	17.5	21	73	17.5	42	75	19
Return (10 crore)	96	175.2	33.6	240	175.2	336	528	180	4

Hence we can manage 3,10,000 ha productive forest sustainably within five year period which can contribute 1,24,00,000 cft timber and around NRs 75 Arab royalty return per year.

Assumptions: 40 cubic feet (cft) per hectare timber production.

One ha forest management requires 40 man days and 270 man days is equivalent to person/year.

Average price of timber is NRs 500/cft

One time investment for CF (average 5 to 8 lakh) from government and rest will be contributed by community themselves. For other forests (CFM and GMF) average roughly NRs 1 crore for 1,000 ha forest is required.

SFM and biodiversity conservation

Detailed boundary survey, features verification, stem mapping and regeneration survey are key technical aspects to record details of plant species. The floral diversity is also included participatory approach. For removal of trees and implementing other tending operations, at least one species per ha is left considering the biological diversity. Hence detailed floral diversity is well recorded and effective conservation activities are prescribed accordingly. Due to effective activities of canopy opening and appropriate soil conservation measures, biological diversity is highly considered in the whole SFM procedure.

Expected outcome

- More than 3,00,000 ha forest area will be sustainably/ scientifically managed.
- The supply of timber in the market will be easy. The import of timber from foreign country will be totally stopped within 3 years.
- More than 45 people will get job annually from the forest management.
- Biodiversity is well recorded and conserved.

Photo: Bishnu Prasad Shrestha

CONSERVATION EDUCATION FOR BIODIVERSITY CONSERVATION IN NEPAL

Bishnu Prasad Shrestha
Under Secretary, Department of National Parks and Wildlife Conservation

Photo: Bishnu Prasad Shrestha

Nepal has tremendous geographic diversity that ranges from alluvial plains in the south to the very rugged and permanently snow and ice covered Himalayan Mountains in the north. Nepal is rich in biological diversity due to its altitudinal and geographic variation. It is home to an extensive number of species of flora and fauna such as one horned rhino, royal Bengal tiger, elephant, gangetic dolpin, red panda, snow leopard etc; that are important from national and global perspectives. Nepal is endowed with 2.7% flowering plant species, 4.5% of mammal species, 9.3% of bird species, 2.6% of butterfly and moth species of the world. A total of 118 types of ecosystem, 75 types of vegetation and 35 types of forest have been identified.

About 45% of the country's land is under the forest. Similarly, 23.39% of the country's land is under protected area system in Nepal. There are twelve national parks, one wildlife reserve, one hunting reserve, six conservation areas and thirteen buffer zones across Nepal. Nepal now has a well-developed network of protected areas which contribute to in-situ conservation of ecosystems and biodiversity across the country. Nepal has progressively

marched from conservation policies away from 'people exclusionary' and 'species focused' towards 'people-centered and community based' approaches. Our conservation has been evolved from species level to landscape level and beyond boundaries. Nepal is one of the pioneering countries in the world to initiate and implement landscape level conservation on the ground. Currently, five major landscapes have been identified in Nepal and interventions to restore and public engagements are being done.

The main objective of conservation education is to bring about changes in the attitude and behavior of youth, local people, and local leaders through various awareness programs, so that they become catalysts in efforts to raise voices supporting conservation. Conservation Education (CE) plays a significant role in promoting biodiversity conservation. It helps people of all ages understand and appreciate our country's natural resources and learn how to conserve those resources for future generations. Conservation education enables people to realize how natural resources and ecosystems affect each other and how resources can be used wisely. It also encourages people to act on their own to conserve natural resources and use them in a responsible manner by making informed resource decisions. It is known that public acceptance and engagement affects the success or failure of biodiversity conservation efforts, thus, there is a need for conservation education and outreach. Conservation education programs may produce significant behavioral changes in their target audience and may be more crucial to successful long-term conservation than biologically-focused scientific work.

Most of the rural people of Nepal have low level of awareness on the issues of biodiversity conservation, Government of Nepal believes that conservation education should form the core of every conservation effort so that it can lead to a successful biodiversity conservation programs. Conservation education is adopted not only as a program for diffusing ideas and conservation messages in the community but also as a means to bring about positive changes in the prevailing attitudes regarding the sustainable use and management of natural and cultural resources. Government ministries such as Ministry of Forests and Environment (MoFE) and departments such as Department of National Parks and Wildlife Conservation (DNPWC), Department of Forests (DoF) and other concerned agencies have been implementing the awareness raising program for biodiversity conservation.

Conservation Education has always been an integral part of the Department of National Parks and Wildlife Conservation since its establishment. DNPWC runs many conservation awareness programs for different target groups helping them understand how conservation of the natural and cultural environment, including protection of biological diversity and meet their livelihoods resource needs sustainably. Conservation education programs of DNPWC for biodiversity conservation include capacity building programs, school based eco clubs, conservation campaigns, environmental awareness and extension programs, non-formal education, printed educational materials, publications, media coverage, radio/TV Programs, conservation videos/ documentaries. Using many tools to raise awareness, conservation education plays a significant role in bettering understanding among the people living in the National Parks/reserves and the surrounding Buffer Zone, about the importance of conserving the natural and cultural environment. In collaboration with conservation partners, community-based organizations, local

nongovernmental organizations, other government agencies, DNPWC organizes various awareness and capacity building programs to increase the capacities of local people to conserve and sustainably manage Nepal's biological diversity in a way that is ecologically viable, economically beneficial and socially equitable.

The Department of Forests is using different media (including television and radio) to raise awareness on forest fire, uncontrolled grazing, and afforestation. Many forest user groups are implementing awareness campaigns against forest fires. Many conservation partners are working to change local people's attitudes towards biodiversity by working with them to recognize the importance of conserving biodiversity for their own livelihoods and well-being. Some individuals are also putting substantial efforts to raise awareness of general public.

Various awareness and extension programs including campaigns, community education and extension programs, celebrations, audio/visual programs, conservation boards with conservation messages and street dramas are organized at local levels to create awareness on conservation issues among the local communities. These are more frequently organized for environmental celebration dates such as Global Tiger Day, National Conservation Day, World Environment Day, World Forestry Day, World Wetland Day, National Wildlife Week, International Biodiversity Day, etc. The Ministry of Forests and Environment has encouraged organizations working in the field of environmental conservation to make the most of celebrations as important opportunities to communicate and raise community awareness about the significance of biodiversity conservation.

Overall, Nepal has done a commendable job in wildlife and biodiversity conservation. Populations on wild animals have been increasing through consecutive years of zero poaching, improved habitat, reduced illegal trade and raising awareness program. We are heading towards meeting the target of doubling the number of wild tigers by 2022, a target set by the head of states of the Tiger Range Countries at St. Petersburg in 2010.

Photo: Bed Bahadur Khadka

CONSERVATION BREEDING CENTERS IN NEPAL

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Introduction

In-situ and *ex-situ*, both the conservation approaches are adopted in Nepal. The breeding centers are established for three most threatened species i.e. Gharial Crocodile, Asian Elephant and Gyps Vultures. Gharial and Vulture breeding centers are located at Kasara inside the Chitwan National Park and Elephant breeding center is located at Khorsor Sauraha at Bufferzone of the park.

Elephant Breeding Center

The Elephant Breeding Center (EBC) was established in 1986 in Chitwan National Park with following major objectives

- Fulfill the number of elephant calves working for protected areas.
- Conserve the species from extinction.
- Enhance scientific knowledge related to elephant reproduction, husbandry, nutrition and health.

Received From	Elephant Name
India	Airawat, Lambodar, Binayek, Bhairab, Bhawanikali, Bhagwatikali, Menakakali, Sashikali, Mangolakali, Indrakali, Devikali, Gaurikali, Parwatikali, Sitasmakali, Rambhakali, Sobhakali
Thailand	Shrutikali, Aiswarymala
Maynmar	Birendra, Dhirendra

- Retain the traditional knowledge of elephant keeping, training

In the initial stage 20 elephants were received from India, Thailand and Myanmar to start the breeding center.

EBC is being managed by the Chitwan National Park. It maintains an information center at its premises which disseminate the information about elephant management, breeding and ecology. EBC is center of excellence to train the elephant calves using traditional methods improved friendly practices. It serves training support for calves from other parks and reserve as well as private hattisars. Training begin when calves are 2-4 years old and completed in course of 20 days to one month.

Breeding elephant bulls are difficult to manage in captivity due to their seasonal musth behavior. Breeding between captive male and female is expected in the breeding center. However, it is quite often that the wild bulls visit the center and mate with the captive female elephants. Sometimes the wild bull takes captive female with him to the Jungle for mating. Since its establishment, 45 elephant calves have been produced at EBC. Among them, 25 are male (M) and 20 are female (F).

Calves born in Elephant breeding Center

SN	Calf's Name	Sex	Mother's Name	Date of Birth	Remark
1	Chitwankali	F	Rampyari	1987	
2	Ramguj	M	Bhrikutikali	1987	
3	Bahadurguj	M	Rampyari	1994	
4	Gandakikali	F	Preranakali	1998	
5	Karnalikali	F	Sitashmakali	1998	
6	Raptikali	F	Sashikali	1998	Deployed to Parsa National Park
7	Narayanikali	F	Sashikali	2000	
8	Parasguj	M	Preranakali	16.06.2001	
9	Himanikali	F	Pujakali	18.06.2001	
10	Vikram Prasad	M	Shamsherkali	07.04.2002	
11	Balmiki Prasad	M	Sitasmakali	08.05.2002	Death due to training injury
12	Laba Prasad	M	Koshikali	03.10.2003	Deployed to Shuklaphanta National Park
13	Tamorkali	F	Komalikali	28.10.2003	
14	Siddha Prasad	M	Laxmi kali	20.04.2004	Deployed to Shuklaphanta National Park
15	Krishna Prasad	M	Devikali	07.08.2004	
16	Sher Prasad	M	Shashikali	28.09.2004	
17	Bagmatikali	F	Chitwankali	20.10.2004	Death due to enteric disease
18	Kush Prasad	M	Samsherkali	30.09.2004	
19	Sarasotikali	F	Preranakali	21.03.2005	
20	Narayanguj	M	Aishworyamala	16.07.2005	Deployed to Parsa National Park
21	Chitrasenkali	F	Ganeshkali	25.08.2005	Deployed to Parsa National Park
22	Kaminikali	F	Sitasmakali	02.10.2005	Deployed to Parsa National Park
23	Dhamdhamikali	F	Pujakali	06.04.2006	
24	Loktantrakali	F	Laxmikali	26.11.2006	
25	Tirthamankali	F	Komalkali	19.05.2007	
26	Chureguj	M	Ganeshkali	22.05.2008	
27	Amaltari guj	M	Koshikali	21.02.2008	
28	Himalguj	M	Preranakali	23.02.2008	
29	Male (UN)	M	Shamsherkali	11.05.2008	Death due to EEHV
30	Ramguj	M	Devikali	07.12.2008	Twin
31	Laxmanguj	M	Devikali	07.12.2008	Twin
32	Simsarkali	F	Laxmikali	14.05.2009	
33	Anarkali	F	Aishworyamala	09.05.2011	Death due to EEHV
34	Madiguj	M	Narayanikali	14.12.2011	
35	Saurahaguj	M	Karnalikali	22.03.2012	
36	Kasaraguj	M	Ganeshkali	13.04.2012	

37	Someshworguj	M	Devikali	06.03.2013	
38	Tekguj	M	Pujakali	19.05.2013	
39	Simsimkali	F	Chitwankali	29.05.2013	
40	Luckyguj	M	Narayanikali	11.09.2014	
41	Chamchamkali	F	Aishworyamala	09.11.2014	
42	Khorshorguj	M	Pujakali	19.12.2015	
43	Ambekali	F	Karnalikali	03.01.2016	
44	Rimjhimkali	F	Chitwankali	21.03.2016	
45	KrishnaChandraguj	M	Ganeshkali	19.05.2016	

Chitwan National Park Office allocates the budget to manage EBC. In addition, the center also collects donation from visitors. The donation generated is managed by NTNC in close coordination with the park office. The donation fund is important for providing operational support such as construction and maintenance of the physical infrastructures. Currently, the EBC has staff quarters, office building, shades for elephant stables, information center and watch towers in its complex. A total of 65 staff *Darbandi* is approved from the Government of Nepal including a Senior Veterinary Doctor, a Veterinary Doctor, a Gazetted *Subba, a Raut, 20 Phanit, 20 Mahout and 20 Pachuwa.* The Senior Veterinary Doctor, in coordination with Conservation Officer of Chitwan National Park Sauraha Sector, looks after the overall management.

Gharial Conservation and Breeding Center

Gharials are highly specialized crocodile with an extremely narrow niche which poses special challenges for management. Gharials are habitat and diet specialists, survive in the fresh water and eat fish.

With the realization of the conservation of the Gharial Crocodile that were limited to a number of less than 81 individuals and the hatchlings' survival rate was as low as 1% in the wild, the Government of Nepal with the support from the Frankfurt Zoological Society, Germany established the "Gharial Conservation and Breeding Center (GCBC)" at Kasara, Chitwan National Park in 1978. The major developments such as construction of the large breeding pools, upgraded visitor Center, health laboratory and fish farm took place between 2010-2013 with the support from WWF Nepal and Save Your Logo program joint initiative of LACOSTE and Fonds De Dotation Pour La Biodiversite (FDB), French based NGO. In addition, the Zoological Society of London (ZSL Nepal) provided the financial support to renovate the GCBC infrastructure in 2017.

The GCBC activities include protection of natural nesting sites, collection and incubation of eggs from wild nests, rearing of hatchlings to a length up to 1 meter and releasing them in to major river systems of Nepal. The periodic monitoring of wild and released Gharials in the major river systems also important.

The nest watchers are hired to locate nests in Rapti and Narayani Rivers. The eggs from the Gharial nests are transported to GCBC and are incubated in the sand of breeding pools in natural conditions. The nest watchers guard the nests, so that no eggs are stolen. Hatchlings are reared in GCBC with great care resulting 80% of the hatchling survival.

Apart from supporting breeding stock of Gharials for re-introduction program, this

Center also plays major role in outreach and awareness on Gharials. A small information section depicting the Center's various activities, including in-situ Gharial conservation efforts are been set up.

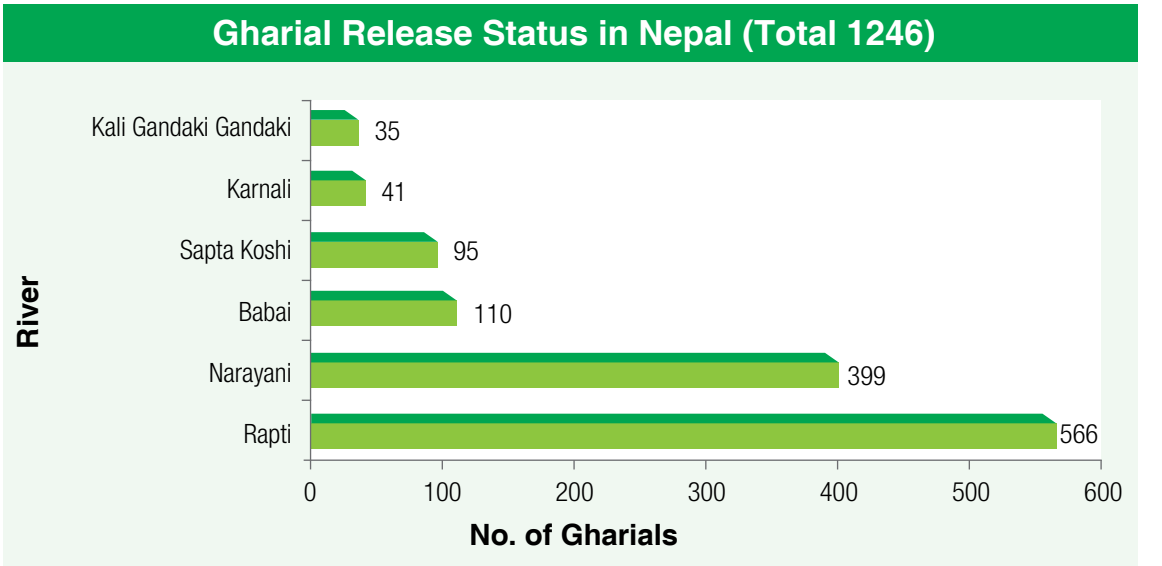
GCBC had 664 Gharials of all age/size classes in 2016. There was a total of 14 adult Gharials of which 12 were females and two were males. Of the two males one was 38 years old (born in 1979). The other male was 33 years old, had both frontal limbs broken and was therefore unable to perform courtship. At the end of 2017, GCBC houses a total of 645 Gharials of which 13 are adults (including one male), 30 sub-adults, 504 Juvenile and 98 hatchlings.

The GCBC first batch of 50 captive bred Gharials was released in Narayani in 1981. Total of 1246 individuals of captive bred Gharials have been released in Narayani, Kaligandaki, Rapti, Koshi, Karnali and Babai rivers from 1981 to April 2017 (Figure 1). In-situ conservation of Gharial crocodile is a major challenge due to uncontrolled fishing, pollution, flood and dam construction.

Turtle conservation and breeding center is also in operation within GCBC complex. Of the total 12 species of turtles recorded in Nepal and nine species recorded in Chitwan National Park, seven species are conserved and bred in the center.

Chitwan National Park Office allocates the budget to manage GCBC. In addition, the center also collects donation from visitors. The donation generated is managed by NTNC in close coordination with the park office. The donation fund is important for providing operational support, paying remuneration of the waged based working staff and construction and maintenance of the physical infrastructures. Currently, the GCBC has one staff quarter cum office building, one information center and three watch towers. A Senior Gamescout and four Gamscouts are working at the center. The Gharial keepers are in waged based and hired as per the requirement of the project. Conservation

Figure 1: Gharial released in different River systems of Nepal (1981-2017)



Officer from Chitwan National Park looks after the overall management.

Vulture Conservation and Breeding Center

Vultures are large sized scavenging birds of group raptors, feeding mostly on the carcasses of dead animals. Vultures play a highly important ecological role through the rapid consumption of animal carcasses. They do safely disposing off dead animals and help in preventing the spread of zoonotic diseases. Nine species of vulture have been recorded in Nepal, namely: White-rumped Vulture, Slender-billed Vulture, Red-headed Vulture, Indian Vulture, Egyptian Vulture, Bearded Vulture, Himalayan Griffon, Cinereous Vulture and Griffon Vulture.

Vulture Conservation and Breeding Center (VCBC) was established in Chitwan National Park in 2008 as an insurance against the continuing decline of Critically Endangered White-rumped Vulture (Gyps bengalensis) and Slender-billed Vulture (Gyps tenuirostris). Covering an area of 6375 square meters VCBC lies adjacent to the Gharial Conservation and Breeding Center. The Center is a collaborative project of Department of National Park and Wildlife Conservation (DNPWC)/Chitwan National Park, National Trust for Nature Conservation (NTNC) and Bird Conservation Nepal (BCN); with support from the Royal Society for the Protection of Birds (RSPB), International Center for Birds of Prey (ICBP) and Zoological Society London (ZSL). The main aim of this center is to breed White-rumped Vultures for release to help restore the wild population for its long-term survival. 60 Chicks of White-rumped Vulture were collected from Nawalparasi, Rupandehi, Kapilbastu, Dang, Kailali, Kanchanpur, Arghakhanchi, Palpa, Syangja and Kaski districts of western Nepal in 2008, 2009, and 2010 from its natural habitats and reared in the breeding center. These vultures kept in this breeding center started to lay the eggs since 2012. It is becoming a successful project as a total of 15 chicks were hatched in the center in last two years.

Six vultures were released into the wild from VCBC in 2017. The release was successfully completed after the six female vultures were first transferred to the release aviary at Vulture Restaurant in Namuna Buffer Zone Community Forest, Pithauli and released in to the wild after assimilation with wild vultures. In April 2018, other 13 captive individuals (5 reared and 8 bred) of White-rumped Vulture were transferred to the release aviary at Pithauli, Nawalparasi. The VCBC currently houses 51 White-rumped Vulture in its two colony aviaries and two holding aviaries.

Currently, the VCBC has a quarantine aviary, a laboratory, two holding aviaries, two colony aviaries, one information center, and one staff quarter cum office building. One veterinary doctor and four keepers are working at the center. Conservation Officer from Chitwan National Park looks after the overall management upon the guidance from Chief Conservation Officer.

Photo: Darren Clark

BIRD CONSERVATION IN NEPAL

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Introduction

Birds have played an integral role in tradition and culture of Nepali people. Religions practiced in Nepal are aligned with the conservation of wild birds: Hindus and Buddhists worship many species of birds as forms of Gods and Goddesses. Religious, cultural and traditional values of Nepali people have always been linked with birds in some way or other. These traditional values and harmonious living with birds have been a long conservation heritage of Nepali people.

Nepal has enjoyed 225 years of recorded scientific ornithological research work. Nepal's total bird list is sharply climbing towards 900 and at present stands at a total of 887 bird species.

Although a landlocked country sharing geographic boundaries and habitats with other neighbouring countries India and China, surprisingly Nepal possesses an endemic species of bird found now where else in the world: Spiny Babbler *Turdoides nipalensis*. It is known as *Kande Bhyakur* which is the literal translation of the bird's English name into Nepali. The species is characterised by the protuberance of spine-like structure at the tip of its wing; therefore the name. It inhabits primarily in the shrubberies and dense thickets close to tall stands of forests in Mahabharat hill ranges from east to west Nepal and is fairly common.

A very high total and even endemic bird, but this diverse avifauna of Nepal is facing some imminent threats. Many of these species are facing enormous pressure resulting from anthropogenic activities . Unless interventions based on sound scientific knowledge are in place on time, some of the birds may disappear altogether from Nepal as the country cannot afford resources to patch up the damage like some of the more developed countries are currently struggling with.

Red List for Birds of Nepal

As many as 41 species recorded in Nepal are listed in IUCN Red List of globally threatened birds, which are as follows:

English Name	Scientific Name	Category	Notes
Pink-headed Duck	*Rhodonessa caryophyllacea*	CR	Probably extinct from the world
Baer's Pochard	*Aythya baeri*	CR	Rare winter visitor in small numbers

Bengal Florican	*Houbaropsis bengalensis*	CR	Breeding resident with some movements not clearly understood
White-rumped Vulture	*Gyps bengalensis*	CR	Formerly abundant now localised fairly common breeding resident
Slender-billed Vulture	*Gyps tenuirostris*	CR	Formerly fairly common now highly localised rare breeding resident
Long-billed Vulture	*Gyps indicus*	CR	Vagrant, recorded less than five times
Red-headed Vulture	*Sarcogyps calvus*	CR	Formerly fairly common now uncommon breeding resident
White-bellied Heron	*Ardea insignis*	CR	Extirpated from Nepal, 1846 last record
Yellow-breasted Bunting	*Emberiza aureola*	CR	Formerly common winter visitor, seen in large numbers; now rare and seen only in small numbers
Lesser Florican	*Sypheotides indicus*	EN	Erratic summer visitor, rare
Black-bellied Tern	*Sterna acuticauda*	EN	Formerly breeding resident in major rivers of Nepal, now breeding only in Koshi in few pairs, rare elsewhere
Greater Adjutant	*Leptoptilos dubius*	EN	Formerly frequent visitor to the southeastern lowland Nepal, now very rare
Egyptian Vulture	*Neophron percnopterus*	EN	Uncommon breeding resident in the east Nepal, fairly common in the western Nepal
Steppe Eagle	*Aquila nipalensis*	EN	Fairly common winter visitor, now reduced numbers compared to the past
Saker Falcon	*Falco cherrug*	EN	Rare winter visitor
Swamp Francolin	*Francolinus gularis*	VU	Breeding resident, confined to two lowland protected areas
Cheer Pheasant	*Catreus wallichi*	VU	Breeding resident, midhills of west Nepal
Common Pochard	*Aythya ferina*	VU	Fairly common to uncommon winter visitor
Long-tailed Duck	*Clangula hyemalis*	VU	Less than five records in Nepal
Rufous-necked Hornbill	*Aceros nipalensis*	VU	Extirpated from Nepal, 1846 last record
Great Slaty Woodpecker	*Mulleripicus pulverulentus*	VU	Breeding resident, west lowlands from Chitwan National Park
Sarus Crane	*Antigone antigone*	VU	Breeding resident, west lowlands from Chitwan National Park, found in farmlands
Black-necked Crane	*Grus nigricollis*	VU	Less than five records in Nepal, possibly breeding in Humla
Wood Snipe	*Gallinago nemoricola*	VU	Now mainly summer breeding visitor, formerly resident
Indian Skimmer	*Rynchops albicollis*	VU	Rare summer visitor
Pallas's Fish-eagle	*Haliaeetus leucoryphus*	VU	Formerly bred, always in small numbers but more reduced in recent years, localised to few areas
Greater Spotted Eagle	*Clanga clanga*	VU	Uncommon winter visitor
Indian Spotted Eagle	*Clanga hastata*	VU	Breeding resident, localised
Eastern Imperial Eagle	*Aquila heliaca*	VU	Rare winter visitor
Lesser Adjutant	*Leptoptilos javanicus*	VU	Fairly common breeding resident, lowlands
Asian Woollyneck	*Ciconia episcopus*	VU	Fairly common breeding resident, lowlands, inner river valleys
Kashmir Flycatcher	*Ficedula subrubra*	VU	Rare passage migrant

White-throated Bushchat	*Saxicola insignis*	VU	Rare winter visitor
Grey-crowned Prinia	*Prinia cinereocapilla*	VU	Breeding resident, mostly in Chitwan valley
Swamp Grass-babbler	*Laticilla cinerascens*	VU	Earlier Nepal Rufous-vented Prina *Prinia rufiventris nipalensis*, only at Koshi Tappu
Bristled Grassbird	*Chaetornis striata*	VU	Fairly common during summer in lowland grasslands
Jerdon's Babbler	*Chrysomma altirostre*	VU	Rare in Chitwan and Suklaphanta grasslands
Black-breasted Parrotbill	*Paradoxornis flavirostris*	VU	Extirpated from Nepal, last recorded in the 19th century
Slender-billed Babbler	*Turdoides longirostris*	VU	Fairly common in Chitwan National Park
Yellow Weaver	*Ploceus megarhynchus*	VU	Fairly common in Suklaphanta National Park
Rustic Bunting	*Emberiza rustica*	VU	Less than five records in Nepal

The most comprehensive work on the birds of Nepal was accomplished under the able leadership of the DNPWC supported by the Zoological Society of London, to find out the status of birds within Nepal. This work culminated with the publication of The Status of Nepal's Birds: The National Red List Series in 2016. More than 3000 bird references with over 3500 pages of information in six volumes were documented. A total of 168 species of birds was identified as nationally threatened with an alarming number - 99 species - Critically Endangered, a worrying figure indicating the need for urgent intervention to halt their decline.

Government framework for bird conservation

The Government of Nepal has for a long time promoted conservation of birds in the country. Danphe Lophophorus impejanus known as Himalayan Monal or Impeyan Pheasant has been aptly chosen as the national bird of Nepal. The Department of National Parks and Wildlife Conservation (DNPWC) was established to look after the wildlife conservation and initially it focused mainly on charismatic large mammals, reptiles and birds, but today it is more balanced in its view and concerned about other taxa and forms of life. There are now 12 national parks, one wildlife reserve, six conservation areas, one hunting reserve and several bufferzones covering over 23% of Nepal land area. Birds are an important and integral part of the DNPWC's planning and conservation approach these days and increasingly they are featured in many of the in-house publications and planning documents.

National Parks and Wildlife Conservation (NPWC) Act 2029 has listed nine species of birds under strict protection. All nine species represent non-passerine families: three birds are from Phasianidae; two from Ciconidae; two from Otidae; and one each from Gruidae and Bucerotidae. At the request of the DNPWC, revised list of the protected animals with 92 bird species were recommended for inclusion at its next revision; but so far no actions have been taken.

Multi-species action plan on vultures have been recently revised and endorsed by the DNPWC. Bengal Florican conservation action plan is the first bird specific action plan prepared by the Department. A pheasant action plan is underway that will include all eight pheasant species of Nepal.

The Department of Forest manages forests of various sizes with the major objective of

sustainable utilization. Recently, under the revised Forest Act, some patches of forests in the lowlands and midhills have been declared as Protected Forests. Examples include the Basanta Corridor Forest that lies within the Terai Arc Landscape in Kailai District and Panchase Hill Forest of Kaski District. The effect of such declaration is yet to be seen but many regard this initiative by the Ministry of Forests and Environment as a positive step for wildlife conservation.

Furthermore Nepal's 10 Ramsar Sites scattered all over the country are also getting significant level of attention for conservation. Nepal became party to the Ramsar Convention in 1987 with Koshi Tappu wetlands as country's first Ramsar site.

Supporting bird conservation in Nepal: Initiatives from non-government sector

Supporting work of the Government are several bird-focused organisations. Studies on birds have contributed greatly to the understanding of their status, distribution and ecology. Several species of birds are better known than ever before in terms of their population and distribution. Bird monitoring has been an integral part of several organizations, and now important contributions come from bird-focused smaller charities. Bird status checklists have been published for several protected areas contributing to the understanding of the current status of bird species in many places.

World Pheasant Association and BirdLife International are the early pioneers of bird studies in Nepal followed by The Peregrine Fund, RSPB, UNDP GEF, Critical Ecosystem Partnership Fund, Van Tienhoven Foundation, US Fish and Wildlife Service, Wildlife Conservation Society, Rufford Small Grants Foundation, Whitley Fund for Nature, Darwin Initiative UKAID, Oriental Bird Club, Taiwan Forestry Bureau, Wetlands International, World Owl Trust, World Wildlife Fund and the Zoological Society of London.

Skewed research attern

An analysis on the number of bird research projects carried out in Nepal shows these are largely focused on globally threatened species mainly non-passerine species. All major bird studies in the country have been made through support from outside funding agencies, the most important funders named elsewhere in the article. Studies on the globally threatened species in the country have generated useful information for their conservation planning not only at national level but also contributing to global conservation movement.

Research pattern on species is highly skewed towards the international priorities, and this is where financial resources are allocated. In a country like Nepal most researchers/ academicians cannot afford to undertake bird research and conservation work for the love of it. Therefore, the significant amount of financial resources provided by donor agencies is extremely important. However, this has also over-shadowed work that could have been important at national level as well as carrying out good science with plentiful data. Currently there is no funding mechanism at national level that promotes national priorities. Prioritizing species for conservation is an important tool in planning but more or less neglecting birds that are supposedly ‘common or safe' is a great fault in procedure. So, how best can common species be kept common all the time, and resources provided to study them before they become scarcer? It should be remembered that good science often comes from studying a common species, and conclusions drawn can often be applied to scarcer species.

Recommendations

The very high level of poverty and illiteracy in the country are directly linked to environmental

conservation in Nepal. In places where human population is high, coupled with poverty and illiteracy, bird and biodiversity conservation problems are severe. Learning from such lessons, the Government of Nepal should concentrate efforts to uplift the poor to a higher standard of living and provide education for all through the relevant ministries. If recommendations such as outlined here are implemented then conservation of nature in all forms will be easier in the future.

Despite the fact that our country has lost some of the prime bird habitats and few species of birds, there is still some hope that the remaining bird species and their habitats can be adequately conserved. But this will only be possible if the multitude of threats our birds face can be minimized and some eliminated. Here are some achievable and pragmatic recommendations which, if followed, will downgrade the status of many of the currently nationally threatened birds from the National Red List.

DNPWC responsible for managing over 20% of country's land, should have adequate human and financial resources. The Ministry of Forests and Environment should start a scheme to fund bird conservation projects that are important at national level. Nationally threatened species' population and ecology should be studied in a way that it contributes to their conservation, with outcomes that help manage the species. Research, monitoring and conservation of globally threatened species should be continued. The National Parks and Wildlife Conservation Act 2029 needs to be revised with inclusion of species recommended by experts' report.

Habitat conservation, especially relating to wetlands, needs to be actively managed. Wetland and lowland grassland restoration should become priority work under active habitat management schemes. Provide special protection to birds during the breeding season. The laws that outlaw the hunting and trapping of birds should be strictly enforced. The Important Bird and Biodiversity Areas (IBAs), Special Conservation Sites (SCS) should be given due priorities for conservation with appropriate management regimes and mechanism. Rivers and wetland welfare outside protected areas should be regulated by making appropriate legislation sympathetic to wildlife conservation and with sustainable harvesting plan. The proposed Wetland Act may prove to be useful in this regard. Fishing in protected wetlands should be further reduced and large scale fisheries in naturally occurring wetlands should be discouraged. Alternative arrangements should be made for people who actually depend for their livelihoods on fishing in these rivers.

School and University curricula should include bird studies, relating both to common and threatened species. Bird conservation should be promoted through art, literature and culture. Community participation and stewardship are needed so that bird conservation does not become lost battle.

Photo: Hari Basnet

SMALL MAMMALS CONSERVATION IN NEPAL

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Small Mammals Conservation and Research Foundation

Several mountaineering and wildlife expeditions (American, British, Japanese, Czechoslovakian, Yugoslavian, Hungarian and Indian) documented on mammals including and focused small sized mammals since 1960s. But, prioritized conservation of small sized mammals had to wait over 30 years. Since 1990 conservation action on an elegant small sized mammal, the Red Panda came on to the horizon. In 1990, Department of National Parks and Wildlife Conservation (DNPWC) declared Red Panda Conservation Area within the Langtang National Park (LNP) as recommended by First Management Plan of LNP (1976-1980) with certain regulatory means. Nevertheless, listing of ten small sized mammals (Chinese Pangolin, Indian Pangolin, Hispid Hare, Red Panda, Spotted Linsang, Leopard Cat, Eurasian Lynx, Clouded Leopard and Pygmy Hog) in the protected list of mammals by National Parks and Wildlife Conservation Act 2029 B.S. (1973 A.D.) established a legal framework for these species. Unfortunately, conservation of most of these listed species was prioritized never during Species-Level Conservation approach. Also, the need of conservation of small sized mammals was negated in the glory of the conservation of charismatic flagship mega mammalian fauna. The side effects of this resulted not only negligence towards these small sized mammals but also led to the loss of a species, the pygmy hog, and uncertainty of Indian Chevrotain and isolation of Hispid Hare etc. Nepal harbors two endemic mammals which are small-sized mammal species; Nepalese Field Mouse (*Apodemus gurkha*) and Csorba's Mouse-eared Bat (Myotis csorbai). Conservation of these endemic mammals has yet to be prioritized, though preliminary researches on these endemic species are sprouting.

It was neither too late nor too early to initiate the conservation of small mammals in Nepal, Small Mammals Conservation and Research Foundation was established in 2009 with a goal to prioritize research and conservation of small mammal in the country. Understanding the conservation needs of small mammals and realizing the discrimination in conservation strategy and policies for the small sized mammal species, Government of Nepal, in collaboration with conservation partners and stakeholders now has stepped on for the conservation of small mammals in the country with a starter on the Red Panda and Pangolins.

Red Panda Population and Habitat Viability Assessment (PHVA) and Species Conservation Strategy (SCS) Workshop was organized in National Trust For Nature Conservation by Zoo Outreach Organization on 2-6 September 2010. This meeting had recognized 11 subpopulations of Red Panda in Nepal and estimated total population around 317 individuals within the confirmed habitat of 592.39 sq. km. and possible population estimated were 582 individuals within 3244.52 sq. km and additional 2652.13 sq. km. Site

specific Red Panda Conservation Action Plan for Langtang National Park and Buffer zone 2010-2014 was enforced. This Draft of Red Panda Conservation Action Plan for Nepal was submitted to WWF Nepal in June 15, 2012. Government of Nepal has prepared Red Panda Protocol for community based monitoring and conducted first nation-wide Red Panda Survey in 2016. The national survey of Red Panda confirmed the occurrence of the species from 23 districts with three new districts; Bhojpur, Lamjung and Dolpa. This survey also initiated nation-wide genetic level research on Red Panda. WWF Nepal and other partners and stakeholders have been conserving threatened and endangered mammals including Red Panda in Sacred Himalayan Landscape. Trans-boundary conservation of threatened and endangered mammals including Red Panda has been initiated by ICIMOD, TMI and other institutions at Kanchanjunga Lanscape. Hariyo Ban Program is supporting the establishment of a community-based red panda monitoring system in Langtang National Park and Buffer zone. Red Panda Network has been focusing its community based conservation of Red Panda in Panchthar-Ilam-Taplejung Corridor. National Trust for Nature Conservation (NTNC) has been focusing conservation of biodiversity including Red Panda in Gaurishankar Conservation Area. All these projects and programs are undergoing in and outside the protected areas in close collaboration with GoN. On the other hand, Individual level awareness and research has been undertaken in Gaurishankar Conservation Area, Rara National Park, Dhorpatan Hunting Reserve, Langtang National Park and Jajarkot, Bhojpur and Lamjung districts outside the protected areas.

Similarly, Government of Nepal, (Ministry of Forests and Environment) has recently prioritized Pangolin conservation in Nepal. With support from Hariyo Ban Program, GoN has initiated the development of world's first monitoring protocol for pangolin conservation and conducted the first nation-wide survey of Pangolin in 2016. Individual and local NGOs attempts for pangolin research and conservation awareness had been limited to Kathmandu valley, Kavrepalanchowk, Sindhupalchowk, Makawanpur, Gorkha, Taplejung, Sankhuwasabha, Ilam, Dhankuta, Chitwan and Parsa. The national survey revealed the current status, distribution, habitat and threats to pangolin and their habitat. The distribution of pangolin based on the occurrence of burrow and signs were reported from 44 districts throughout Nepal with the occurrence of Chinese Pangolin confirmed from 27 district while of Indian Pangolin from 6 districts in lowlands. Furthermore, Department of National Parks and Wildlife Conservation have just published "National Pangolin Action Plan" for the long term conservation of pangolin in Nepal. ZSL initiated community managed pangolin conservation areas in Makwanpur, capacitated law makers for the law enforcement targeting illegal pangolin trade. However, NTNC has been involved with community-based pangolin conservation projects in Taplejung, Makwanpur, Gorkha etc. SMCRF has also been working in close collaboration with Community Forest User Group for pangolin conservation in Kathmandu Valley. Taudolchhap Community Forest User Group and Rani Community Forest User Group have been involved in release of rescued pangolins since 2008 in Bhaktapur and Makwanpur districts respectively. These both species and their body parts are frequently confiscated within Nepal and its borders. Recently it is confirmed that Nepal has become route for international illegal trade of pangolin and its parts. Government agencies including Central Investigation Bureau (CIB) have been effectively working in close collaboration with stakeholders and partners to curb illegal wildlife trade including these small sized mammals. In

this line, Publication of conservation outreach booklets on fifteen species of wildlife by Hariyo Ban Program included Red Panda and Chinese Pangolin.

Besides, these species, individuals (universities scholars in Nepal and abroad) and local NGO's efforts on research and conservation awareness of a few more small sized mammals such as bats, rodents (squirrels, rats and mice, Himalayan Marmot), lagomorphs (Hares and Pikas), small cats (Fishing Cat, Leopard Cat, Clouded Leopard, Pallas Cat, Rusty-spotted Cat) and small carnivores has been undergoing in and outside the protected areas of Nepal. The small conservation project of these species is focused on diversity, distribution, ecology, education and outreach supported by international funding agencies etc. Conservation genetics, a cutting edge tools has also been deployed for research in small mammals in the recent years.

A publication on small mammals by Pearch (2010) "A review of the biological diversity and distribution of small mammal taxa in the terrestrial eco-regions and protected areas of Nepal" highlighted a need of nation-wide systematic survey of these species. Similarly, "The Status of Nepal's Mammals: The National Red List Series" inform small mammals as the most poorly known groups amongst mammalian fauna in Nepal in terms of current information and research and considers 48% of the total small mammals as Data Deficient (DD) species.

In collaboration with Ministry of Forests and Environment (Then Ministry of Forests and Soil Conservation), Department of National Parks and Wildlife Conservation, Tribhuvan University and SMCRF in support from conservation partners successfully organized first "South Asian Conference on Small Mammals" in Kathmandu, Nepal. Although Government has yet to prioritize most of the small sized mammals, the initiation for Red Panda and Pangolins conservation and full support by Government agencies for the conservation of these species has high hope and future for the conservation of small sized mammals in Nepal.

Small Mammals specifically plays an important role in maintaining and providing ecosystem services but the information in this aspect of these species are not better understood. Hence, conservation of small mammals in the ecosystem-level conservation approach should be prioritized. The Theory of Change of conservation of flagship species in one hand and hopefully conservation of small sized mammals in the other can lead a holistic conservation of wildlife in Nepal. In overall, Nepali researcher's capacity enhanced in collaboration with foreign scientists and institutions and in support from government and non-government agencies and stakeholders to undertake research and conservation activities for the conservation of small sized mammals in the country is an achievement within these 25 years, which needs to be continued in years to come.

Photo: Dipak Lamichhane

EX-SITU CONSERVATION OF PLANTS AND BOTANICAL GARDENS IN NEPAL

Dipak Lamichhane
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Photo: Dipak Lamichhane

Introduction

Conservation of plant diversity outside their natural habitat is *ex-situ* conservation of plants. It is also known as off-site conservation. Article 9 of the Convention on Biological Diversity (CBD) encourages the contracting parties to adopt measures for the *ex-situ* conservation for the purpose of complementing *in-situ* conservation. According to the target 8 of Global Strategy of Plant Conservation (GSPC), 2010-2020, at least 75% of the threatened plant species in *ex-situ* conservation in the country of origin and at least 20% available for recovery and restoration. The primary purpose of *ex-situ* conservation of plants is an insurance policy and largely depends upon the availability of facilities. It has also advantages that easily provides materials for propagation, re-introduction, agronomic improvement, research and education.

The importance of *ex-situ* conservation of plant diversity is increasing in context to Nepal where rich plant diversity are getting lost due to their habitat loss, deforestation and degradation; population growth and poverty; over-exploitation, commercial trade of wild flora both legally and illegally and climate

Botanical Gardens of Nepal

S.No.	Botanical Gardens	Altitude (m)	Area (ha.)	Vegetation zones
1	National Botanical Garden, Godavari, Lalitpur	1515	82	Sub-tropical
2	Mai Pokhari Botanical Garden, Maipokhari, Ilam	2200	9	Temperate
3	Dhanushadham Botanical Garden, Dhanushadham, Dhanusha	100	20.27	Tropical
4	Vrindaban Botanical Garden, Padampokhari, Makawanpur	500	96	Tropical
5	Mountain Botanical Garden, Daman, Makawanpur	2320 m	65	Temperate
6	Tistung Botanical Garden,Tistung, Makawanpur	1700	45	Sub-tropical
7	World Peace Biodiversity Garden, Pokhara, Kaski	775	164	Sub-tropical
8	Dhakeri Botanical Garden, Banke	130	5	Tropical
9	Mulpani Botanical Garden, Kapurkot, Salyan	2000	5.65	Temperate
10	Dhitachaur Botanical Garden, Dhitachaur, Jumla	2500	4.5	Temperate
11	Deoria Botanical Garden, Deoria, Kailali	170	149.5	Tropical
12	Godavari Botanical Garden, Godavari, Kailali	185	100	Tropical
	Total	745.92		

change. There are number of methods of *ex-situ* conservation like botanical gardens, seed gene banks, *in vitro* storage, cryopreservation, etc.

Botanical Gardens Conservation Strategy (1989) defined botanical garden as a garden containing scientifically ordered and maintained collection of plants usually documented and labeled and open to the public for the purposes of recreation, education and research. This definition has been further reduced by Botanic Gardens Conservation International (BGCI) as botanical garden is an institution holding documented collection of living plants for the purpose of scientific research, conservation, display and education. So, botanical gardens are the living museum of plants, conservation centers, education centers and research centers. Botanical gardens are often run by universities or other scientific research organizations and often have associated herbaria and research programmed in plant taxonomy or some other aspects of botanical science. There are more than 2,500 botanical gardens in the world in 150 countries.

Botanical Gardens in Nepal

In Nepal, there are twelve botanical gardens covering an area of 745.92. ha in nine different districts for *in-situ* and *ex-situ* conservation of plant species. These botanical gardens are managed by the Department of Plant Resources (DPR), Ministry of Forests and Environment (MoFE) since 1962.

Roles of Botanical Gardens for *Ex-situ* Conservation

The main roles of botanical gardens for *ex-situ* conservation of plant species are:

- Establishment and maintenance of the facilities for *ex-situ* conservation and research of endemic, rare, endangered, threatened and useful plants,
- Safeguard those populations of plant species which are in danger of genetic deterioration;
- Adopt measures for the recovery and rehabilitation of the threatened species and their introduction into their natural habitats
- Rescue, collection and conservation of specially rare, endangered and threatened plant species,

Photo: Pragyan Pokharel

- Domestication of Medicinal and Aromatic Plants (MAPs),
- Development and Management of different landscapes and thematic gardens for ex-situ conservation like Rhododendron garden, Orchid garden, Ethno-botanical garden, Biodiversity Education Garden, Physic garden, Taxonomic Family garden, Tropical garden, CITES garden, Arboretum, Fern garden, Terrace garden, etc.
- Establishment and management of nurseries for quality planting materials of MAPs and their cultivation through local farmers and forest user groups,
- Creating suitable condition and infrastructure development for ex-situ conservation of plant species in seed gene bank, tropical house, alpine house, etc.
- Study and research on useful plant resources,
- Conservation education and awareness creation,
- Networking and information dissemination,
- Capacity building and Technology transfer.

Major Programs and Activities

The major programs implemented in the botanical gardens of Nepal for *ex-situ* conservation are plant study and research programme; herbs development programme, plant conservation and garden development programme and President Chure-Terai-Madhesh programme.

The major activities under these programs are :

- Implementation of five years management plant of each botanical garden,
- Production of plantlets of MAPs and other useful plants and their commercial farming
- Collection and conservation of germ plasm of endemic, rare, endangered, threatened and other useful plants (For example: In National Botanical Garden (NBG) Godavari, Lalitpur *ex-situ* conserved endemic plant is *Hypericum cordifolium*; Rare plant is *Alstonia scholaris* and endangered plant is *Podocarpus neriifolius*. Similarly, among 860 total plant species conserved in NBG 395 plant species are *ex-situ* conserved. These *ex-situ* conserved plant species

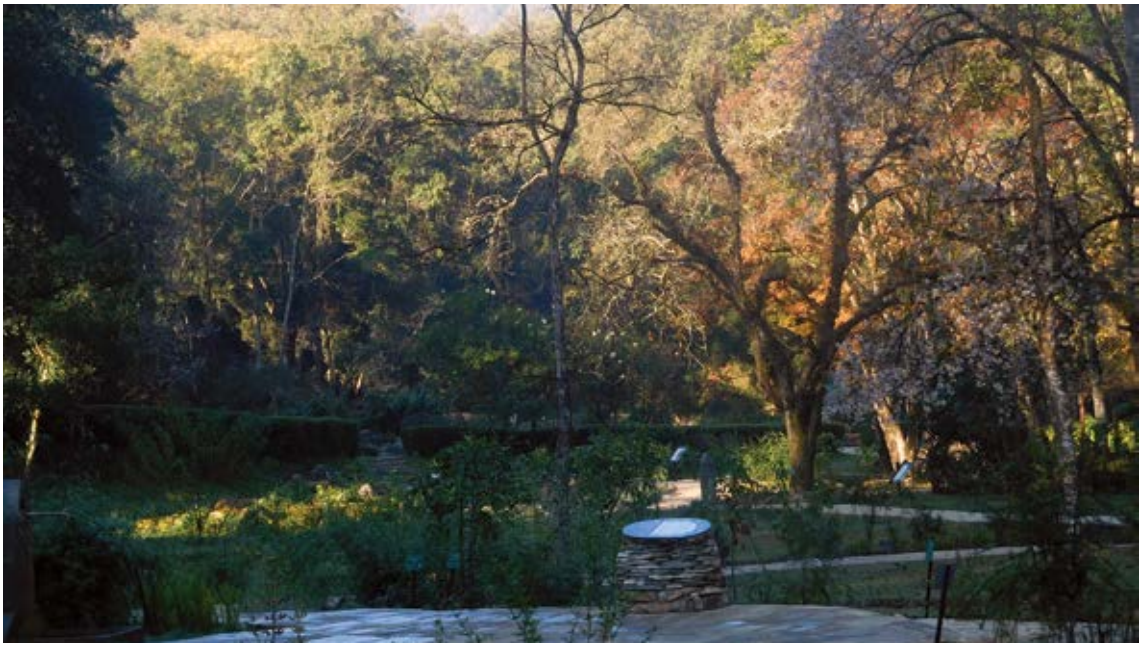

Photo: Dipak Lamichhane

includes endemic, rare, endangered, threatened, medicinal and other useful plant species.
- Collection and conservation of germ plasm of plant species in different landscapes and thematic gardens like Rhododendron garden, Orchid garden, Ethno-botanical garden, Physic garden, Taxonomic Family garden, Tropical garden, CITES garden, Fern garden, Terrace garden, etc.
- Arboretum and educational garden management,
- Establishment of demo plots of MAPs,
- Domestication and agro-technology development of prioritized MAPs,
- Study and research on indigenous ornamental plants and MAPs,
- Conservation education and information sharing.

Existing policies and legal provisions

The existing policies, strategies, action plans and legal provisions for *ex-situ* conservation and botanical gardens are :

Forest Policy (FP), 2071: The policy has focused on *in-situ* and *ex-situ* conservation of rare, endangered and threatened plant species.

Nepal Biodiversity Strategy (NBS), 2002: The strategy has emphasized to establishing new botanical gardens.

Nepal National Biodiversity Strategy and Action Plan (NBSAP), 2014-2020 :

Strategy: Enhancing conservation of species and genetic diversity.

Action plans: i) Strengthening conservation of threatened and rare plant species through network of botanical gardens and other means; and,

ii) Establishment of a gene bank to conserve genetic resources of wild flora by 2019.

Forestry Sector Strategy (FSS), 2016-25 : There will be 20 botanical gardens established with better coverage in all physiographic regions by 2025.

Environment Protection Rules (EPR), 2054 : For the establishment of new botanical garden having an area more than 10 hectors, Initial Environmental Examination (IEE) is mandatory.
Problems

Major Problems

The main problems in *ex-situ* conservation and botanical gardens are :

Legal instrument: No separate legal provision (Plant Resources Act) for *ex-situ* conservation and the management of botanical gardens,

Institutional Development: Lack of national and international networking between the botanical gardens for technology transfer and capacity building.

Financial Resources: Poor funding for study and research, human resources development.
Infrastructure Development: Poor and traditional type of infrastructures (shade houses, glass houses, etc.) as well as there is no facilities of seed gene bank and automatic/ high-tech green houses .

Human Resources: Lack of trained and skilled human resources.

Others: Over grazing and disputes with the local people in water sources in some botanical gardens.

Way forward

The way forward for the *ex-situ* conservation and overall development of botanical gardens of Nepal are :

- Need of Plant Resources Act for strengthening and systematic management of botanical gardens,
- Effective implementation of management plan of all botanical gardens for *ex-situ* conservation,
- Establish network of botanical gardens nationally and internationally for capacity building and technology transfer,
- Priority in scientific study and research work; and,
- Infrastructure and human resources development.

Photo: Hari Basnet

WATERSHED MANAGEMENT: CONTRIBUTING TOWARDS BIODIVERSITY CONSERVATION

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Photo: Amit Poudyal

Soil and water (key components of a watershed) are the principle natural resources of Nepal and are the ultimate source of people's livelihood and wellbeing. About 68% of the people still depend on these natural resource as they are enjoying combined and subsistence farming system basically in Hills and Mountain watersheds. However, sustainability of these resources has been a major concern. Watershed degradation in general and accelerated soil erosion combined with mass movement in particular is a major challenge for sustainability of these resources. Natural factors such as fragile geology, extremities in topography, high seismic activities and climate change (extremities in climate- erratic rainfall, change in rainfall pattern/intensity and global warming) with anthropogenic activities such as population pressure, improper land use practices are pushing accelerated soil erosion, landslides, flooding, sedimentation and desertification. The consequences are reduced biological productivity and carrying capacity of land, reduced, agricultural land per

capita, reduced production of food, fodder and other agricultural as well as forest products (shortages of food, fodder, firewood and other wood), drying up of springs, water bodies and consequently the loss of biodiversity.

Conservation of soil and water resources to address above mentioned issues is essential, which contributes in the livelihood improvement of the watershed resources dependent people and biodiversity conservation. Department of Soil Conservation and Watershed Management (DSCWM) has been planning, implementing and monitoring soil conservation and watershed management programs/activities based on the principles of integrated watershed management to address the issues. Holistic management of land, water and vegetation within hydrologically defined boundary is considered as integrated watershed management (IWM). The goal of IWM defined by DSCWM is to contribute to the livelihood and well-being of the people through sustainable watershed management of the river basins and the purpose is to increase the productivity and utility of land and water to prolong the services of the development infrastructures leading towards livelihood improvement on an equitable and sustainable basis through integrated soil conservation and watershed management. Major program/ interventions recommended to achieve the goal are: Disaster Risk Reduction and Natural Hazards Management, Sustainable Land Management, Water and Sediment Management, Development Infrastructure Protection and Climate Change Adaptation. These programs are contributing in biodiversity conservation directly or indirectly.

Major achievements towards biodiversity conservation

Major soil and water conservation activities includes degraded land rehabilitation, conservation plantation, water source protection, conservation pond construction, run off harvesting dam construction, on farm conservation, fruit tree plantation and fodder/ grass plantation. Degraded land rehabilitation refers to the vegetative and structural measures applied in degraded lands including forests, barren lands and graveled and sandy riverbeds. These activities minimize surface soil erosion, encourage infiltration and enhance the biodiversity in the degraded land. A total of 16050.69 hector degraded land have been rehabilitated through district soil conservation offices till now which has promoted greenery and added biodiversity. These activities have contributed in habitat conservation in some critical areas and promoted indigenous flora and fauna. A case study carried out by DSCWM on degraded land rehabilitation revealed that flora and fauna species has increased in the rehabilitated degraded lands eg, in Borrow Pit (Kulekhani, Makwanpur), Pipaltar (Nuwakot) and Subbakuna (surkhet). River/stream bank protection has been implemented under disaster risk reduction and natural hazards management basically in chure and bhavar area of the country. About 4645.35 hector land have been reclaimed and promoted greenery through bioengineering stream/river bank protection in Chure and Bhavar area of the country. Farmers are growing cash crops like water melon, cucumbers in some rehabilitated land thus contributing in livelihood of the people. These activities have protected land from further degradation. Implementation of soil conservation and watershed management interventions/activities have contributed in biodiversity conservation; however study is yet to be carried out in this regard.

Landslides and gully formation are the most common and mainly water induced hazards in Nepal due to fragile geology, rugged topography and extreme rainfall in monsoon season. DSCWM has been implementing landslide/gully treatment activities. Landslide/

gully treatment refers to the vegetative and structural measures applied in landslide as well as in gully area and their catchment area. A total of 6596 numbers of gullies and landslides have been treated rehabilitating about 3298 hector vulnerable lands. Treatment of landslides and gully prevents the further degradation of land and promote greenery hence biodiversity.

Construction of development infrastructures like rural roads without considering the environmental impact and appropriate conservation measures has been serious concern in Nepal. DSCWM is trying to address the issue to some extent through road slope stabilization applying bioengineering techniques. Both vegetative and structural measures are applied above and below the roads for its sustainability. About 570.65 hector land have been rehabilitated under these activities which has promoted greenery enriching biodiversity and reestablishing the land.

Besides, DSCWM has been implementing on-farm conservation activities to conserve soil and water and improve production through various measures. The major sub-activities include plantation of trees, shrubs, grasses or herbs on marginal lands or unused lands, erosion control measures such as micro-gully plugging, contour wattling, strip plantation and others. About 5221 hector lands has been conserved from these activities which is directly contributing on biodiversity conservation.

Water management, mainly construction of conservation ponds and wetland management is also integral part of integrated watershed management. 2563 ponds and 19 wetlands so far has been constructed/managed by DSCWM till now. Wetlands are considered as fertile lands for agriculture and rich from the point of view of biological diversity.

Conclusion

Watershed has been considered as the management unit for conservation and utilization of natural resource such as land, forest, water and the people depend on it. Integrated management of all these resources in the watershed can ensure the sustainable development. The achievements so far made by DSCWM seems contributing towards the sustainable land conservation and biodiversity conservation to some extent. Sustainability of the physical development infrastructure such as hydro-power, drinking water, irrigation, and road need to be linked with integrated watershed management perspective and should be guided by federal, state and local government policies.

Photo: Yadav Uprety

INDIGENOUS PEOPLES AND LOCAL COMMUNITIES

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Photo: Kamal Kumar Rai

Introduction

For Indigenous Peoples and Local Communities (IPLCs), the Mother Earth is alive and sacred since ancestral time. They have taken care of resources and it should be preserved for all coming generations. More over 900 million indigenous peoples and local communities reside in the World. Nepal is the country with lingual and ethnic diversity. More than 38 percent indigenous and local communities are living in different parts of the country. The indigenous peoples and local communities of Nepal have their own traditions, way of life, language, culture, traditional occupations, folklore, traditional cultural expressions, customs, religious and spiritual practices. They are living in harmony with nature, land, water, mountains, lakes, wetlands, sacred sites, etc. They have traditional knowledge associated with biological and other natural resources, which is symbiotically and historically associated with nature and resources.

Kirat indigenous peoples are called "*Sila Putra*", the ancient people of the country. Kirat histories are in oral. The Kirat regime was in

Photo: Kamal Kumar Rai

600 B.C. in Kingdom of Nepal, 32 Kirat kings for 1000 years with spiritual power of rule. The Kirat era now 5078 celebrate *Yaletung Chandi Purnima* to worship nature "*Uvaoli* and *Udhauli*". Kirat land is the ancestral territory of Kirat indigenous peoples. Out of 32 different mother dialogues only 27 are in practiced. Language is the identities, tangible and intangible culture, traditional, sacred, secret knowledge, religious, spiritual, folklore and customary systems associate to lands, territories and resources. FIKA Nepal is taking care of the ancestral identities of the Kirats.

IPLCs and Convention, Nepal

Our country is rich in biological diversity having diverse indigenous peoples and local communities. Nepal is one of country in the world that IPLCs and other communities have contributed over 24.4 percent of lands for biodiversity conservation.

IPLCs are the stewards of nature, biodiversity, water and culture in the world. Because of their traditional knowledge, practices, innovation, traditions, traditional occupations, traditional way of life, tangible and intangible bio culture practices, traditional cultural expression, they have developed adequate management system for biodiversity conservation, customary sustainable uses, religious and spiritual relation and harmony with nature. This is duly recognized and respected on the objective of Convention on Biological Diversity.

It is now 14 years of IPLC volunteerism to CBD Focal Ministry with visioning to engagement and self inclusion on the

process of provision and objectives of Convention in national level via ABS and Nagoya Protocol. Kirat associations such as Bahing, Kulung, Lohorung, Chamling, Nachiring and Samarung involved on the ABS draft in between 2004 to 2007 with consulting with other Nepalese Indigenous Nationalities including Nepal Federation of Indigenous Nationalities, Nepal Federation of Woman Indigenous Nationalities and Nepal Foundation Development of Indigenous Nationalities. NGO-FONIN followed up the ABS till 2015 and now FIKA Nepal is volunteering on the behalf of Nepalese IPLCs, by coordinating with CBD National Focal Point on the finalization of ABS draft bill, considering the objective of convention and international standard human rights of indigenous peoples.

Conclusion

FIKA IPLCs Nepal has started on National Action of Plan on traditional knowledge in accordance with the CBD 8(j) in the Focal Ministry.

With the theme, '25 Years of Convention on Biological Diversity: Safguarding Life on Earth', IPLCs Nepal has planned to celebrate within communities and alliance with CBD national focal ministry.

IPLCs are aware of the risks, challenges and impacts; we therefore have proposal to ensure Free, Prior and Informed Consent, full and effective participation and to respect the human rights of non-contacted Indigenous Peoples before developing projects that will destroy the nature.

TRADITIONAL KNOWLEDGE AND BIODIVERSITY CONSERVATION

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Conceptual context

Traditional knowledge is defined as a "cumulative body of knowledge, practice, and belief, evolving by adaptive processes and handed down through generations by cultural transmission, about the relationship of living beings (including humans) with one another and with their environment". Although there are some differences among them, terms such as traditional knowledge, indigenous knowledge, traditional ecological knowledge, traditional ecological knowledge and wisdom, traditional environmental knowledge, local ecological knowledge, etc., are often used interchangeably depending on the context. Traditional ecological knowledge is the predominant term used among conservationists and resource managers, as it includes the qualifier "ecological", accounts for the interplay between organisms and their environment, and is not restricted to indigenous peoples alone. This kind of knowledge comes from a range of sources and is a dynamic mix of past tradition and present innovation accumulated through trial and error over many years. It is place-based, geographically specific, and largely dependent on local social mechanisms, and therefore it varies within and between societies.

Although the potential contribution of traditional knowledge was recognized in the early 1970s, it was the Brundtland Commission, the Convention on Biological Diversity, the Forest Principles, and Agenda 21 that brought to the public eye the importance of traditional knowledge. The Convention on Biological Diversity, the Forest Principles, and Agenda 21 have placed a clear demand and provided guidance to the international community for the incorporation of traditional knowledge in various activities. Principle 22 of the Rio Declaration on Environment and Development states that: "indigenous people and their communities and other local communities have a vital role in environmental management and development because of their knowledge and traditional practices. States should recognize and duly support their identity, culture and interests and enable their effective participation in the achievement of sustainable development". Since then, international and national agencies throughout the world are actively involved in promoting and facilitating the documentation and use of traditional knowledge in resource management and other development activities.

More and more, traditional knowledge has received increasing attention from researchers

over the past few decades, particularly with regards to sustainable natural resources management and biodiversity conservation. Indigenous People and Local Communities (IPLCs) are a source of this valuable knowledge. These people are not only knowledgeable about the use of particular plant or animal species but also possess considerable knowledge about the ecological processes. It is for this reason that scientists are finding value in collaborating with these populations. Consequently, the contribution of traditional knowledge in various fields has been growing, and traditional knowledge is maturing as a science. It is particularly appropriate for adaptive management, as traditional practices acknowledge that environmental conditions are always changing, requiring societies to respond. Incorporating traditional knowledge into decision making also ensures that projects are not only ecologically sound, but also economically viable and socially acceptable. It is said that science often tries to solve problems in an analytical way by breaking them into parts, whereas traditional knowledge is usually holistic in nature and based on personal observations following trial and error, an approach capable of dealing with complex social and ecological issues over the long term.

Nepal's context

Traditional knowledge has been recognized in national biodiversity conservation strategies. However, proper acknowledgement, recognition and use of this knowledge remain challenging. IPLCs of various parts of the country have long been interacting with nature and using plant and animal resources for diverse purposes, mostly in a sustainable manner. They use plants or their products mainly as medicines, vegetables, edible oil, dye, timber, fibre, and fodder. Animals or their parts have mainly been used as medicines, furs, skins, source of wool, etc. There are reported cases that in places where IPLCs have depended on local environments for the provision of a variety of resources, they have developed a stake in conserving, and in some cases, enhancing biodiversity. Sacred landscape, forests and groves are patches of vegetation traditionally protected by local communities which form excellent examples of *in situ* biodiversity conservation. Therefore, it is important that the value of the knowledge-practice-belief complex of IPLCs relating to conservation of biodiversity is fully recognized if ecosystems and biodiversity are to be managed sustainably.

Moreover, customary practices and institutions based on knowledge-practice-belief system of managing rangelands are other apparent examples in Nepal. The rotational grazing system, transhumance, and locally developed resource governance system are some of the examples of how people have developed a resources management system that would help sustain the resource base while also meeting the demand of the local communities. Traditional resources governance systems have been found to be well developed and effective, and have for centuries played an important role in biodiversity conservation. For example, in Byas of Darchula district, the communities decide a date in the last week of September (full moon time) for harvesting grasses and herbs. Harvesting restrictions are imposed to ensure that people obtain adequate fodder in times of scarcity (especially in winter season) in a fair and equitable way and the resource are conserved. Every year Kulung community of Sankhuwasabha collect Allo from forest starting on first day of Mangsir (mid-November) and spend a week in the forest for collecting Allo. The spirit of these practices is to control the over exploitation and conserve all components of biodiversity including genetic and ecosystem. Recent studies in Nepal on animal behavior have also integrated traditional knowledge in different

ways but there is hesitation from the scientific community to clearly acknowledge that they used traditional knowledge. This knowledge can provide unexpected new information for researchers, and show new opportunities and ways for professionals even for conserving rare and threatened species. Several such successful examples can be found throughout the country.

Way forward

IPLCs use both the descriptive and the normative aspects of the concept of biodiversity. They have nurtured, enhanced, sustained, and conserved biodiversity in various ways. They have tried to restore productivity and biodiversity of degraded lands through various mechanisms over the years. International scientific community is looking for using multiple knowledge system in conservation and therefore traditional knowledge has received increasing recognition. It is now widely used in forest landscape restoration, wildlife management, and climate change research, among others, which have direct implication on biodiversity conservation meaning that traditional knowledge is not only about use of medicinal plants as perceived in Nepal.

Traditional knowledge is transdisciplinary and should be respected, preserved and documented. To make such efforts more effective, experts in different fields need to work in collaboration. Successful conservation depends on the effective coordination of science and traditional knowledge, which should be considered to be on an equal footing and treated as complementary to each other. Cultural sensitivity, intellectual property rights, and ethical issues should be properly addressed for research partnerships to be fruitful.

In the context of access and benefit sharing regimes under Convention on Biological Diversity and Nagoya Protocol due recognition should be given to traditional knowledge and its holders. If this can happen, more effective integration of traditional knowledge into the visioning, planning, overall decision making and implementation of biodiversity conservation strategies is possible.

Photo: Amit Poudyal

CURRENT STATUS OF WETLANDS IN NEPAL

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Photo: Hari Basnet

Definition

Generally wetland means land area that permanently or seasonally saturated with water. According to Ramsar Convention, there are 41 types of wetlands, which can found around the globe but in Nepalese context only 6 types of wetlands namely river, lakes, pond, reservoir, marginal swamps and irrigated paddy fields are defined.

Wetlands are considered the most biologically diverse ecosystems. They host wide range of plants and animals. Except Antarctica all continents have wetlands. Amazon River basin is the largest wetland in the world. Around 9% of the total areas is covered by wetland in the world but in Nepalese context wetland cover small areas compare to other parts of the world. In Nepal, wetland covers approximately 5.57%, which are categorically river 48.2%, lakes 0.6%, reservoirs 0.2%, pond 0.9 %, marginal swamps 1.5% and irrigated field 48.6%. But only lakes inventory with biological and social information is completed in Nepal in the last couple of years. Wetlands are classified with type such as freshwater, brackish or saltwater. In Nepal, only freshwater or Himalayan wetlands can be found.

Importance

Wetlands are important to maintain ecosystem services to local communities in many ways. In detail the services are summarized into major four heads:

a. provisioning services (food, fuel, fresh water and genetic resources), wetlands are sources of food, fuel, fresh water and genetic resources. We obtain most of food from wetland such as fish, frog, insects and many more.

b. supporting services (primary production of habitat water and nutrient cycling, soil formation and retention), Wetland are sources of primary production for aquatic habitat and good site for nutrient cycles.

c. cultural services (Spiritual and religious values, educational and inspiration, recreation and aesthetic value and ecotourism). Most of the civilization started from Wetland or water bodies. Even today our daily religious practices related with wetland. It is center for recreation and ecotourism.

d. regulatory services (pollination, invasive retention, climate regulation, water purification, natural hazard control, pest and diseases control).Wetland regulate many natural phenomenon and control disaster and water purification.

International commitments

Nepal is signatory to various biodiversity conservation international treaties and conventions. Ramsar Convention 1971, United Nation (UN) Convention on Biological Diversity 1992, UN Framework Convention on Climate Change 1992, UN Convention to Combat Desertification 1992 and many more conventions and treaties are related with biodiversity conservation.

As a signatory of Ramsar Convention Nepal has declared 10 Ramsar sites till date. The Government of Nepal has planned to declare 14 Ramsar sites by 2020, which is more than the committed number.

National intiatives

Based on national interest and international commitments, Nepal has developed policies, acts, regulations and directives and the formation of relevant committees. The Constitution of Nepal 2015 (Appendix V) has stated that it is a subject matters of federal government. Thus, government has formulated Nature Conservation National Strategic Framework for Sustainable Development 2015-2030, Wetland Policy 2013, and Forest Policy 2015, similarly some acts such as National Parks and Wildlife Conservation Act, 1973, Forest Act 1993, Environment Protection Act 1997, Self Government and Watershed Act 1982, Electricity Act 1992, Water Resource Act 1992 are major acts that contributed the wetland resources in Nepal.

Now a days, the wetlands of Nepal are facing number of problems. Especially lakes has facing siltation, encroachment, invasive species, biodiversity losses, over exploitation, disaster, environmental pollution and inadequate knowledge and poor committed on conservation that accelerate the lake degradation. Lake Phewa in Pokhara is one of the best examples to facing all types of problems. Local initiation to fight against the problems are continues.

Currently Nepal wetlands are less priority area and less number of conservation programs are launching compared to other biodiversity conservation programs even though some local communities initiated some sustainable conservation programs. In 2007 Nepal Government has established National Lake Conservation and Development Committee

(NLCDC). It is milestone of wetland conservation even though adequate conservation programs are not fully in function. Another one is formulation of wetland policy and formation of National Wetland Committee in 2013 is two good steps for wetland conservation. Updating the information, coordination among the stakeholders, revisiting formed policy and regular meetings are major function the committee.

In Nepalese context, lakes cover very small portion or less than one percent in term of area. But it is important for many socio-cultural as well as biodiversity conservation. NLCDC has started some lake conservation program by preparation of strategy plan and inventory of Lakes. In the beginning the aerial survey of lake completed in 2009 and recorded 5,358 lakes in Nepal. Based on this data, NLCDC and Department of Forest (DOF) had conducted verification of lakes field. The survey has set broader standard format such as below 3000 m and bigger than one hector in sizes as well as lakes core and basin areas also demarcated during the survey which is completed in five phases through out the country. It is completed in 2015 and the surveyed out of 75 district only 62 districts holds lakes.

According to photo survey in 2009 out of 5,358 lakes only 3131 (60%) found in below 2999 m and the remaining 2,227 (40%) are above 3000 m. Based on this data in field survey only 485 lakes are recorded below 3000 m and bigger than one hector size. The larger numbers of lake are recorded in Tarai districts especially in Kailali (48), Kanchanpur and Rupandedhi (29), Kapilbastu (24), Nawalparashi and Danusha (23), Jhapa (20), Kaski (17) and Sirah (13). In contrast number lakes less in Mahabharat range except Kaski district hold (17). It is very less number of lakes (15.5%) compare to aerial photo survey in 2009. In the field survey proved that number lakes dramatically decreased. There are many reasons for reduction of lakes number. It may be reduced due to lake size for survey, climate change impact, degradation of lakes and many more reasons last couple of years.

Regarding the status of lakes out of 485, only 97 lakes are in good condition the rest lake (80%) are in degrading state. Lake aging or disappearing is natural process. It is kind of ecological success but accelerating rate of disappearing lakes is serious issue. Natural or climate change and anthropogenic factors are two major accelerating agents for lake degradation and disappearing process.

Wetlands are important site for conservation of biodiversity. It is considered as major site for biological diversity of all ecosystems, serving home to a wide range of plants and animals. Alaramic rate of degradation of lake is sign of danger for biodiversity conservation. There is urgent need of collective efforts to conserve wetlands. An effective and timely action is needed for the conservation of wetlands.

Photo: Laxmi Dutta Bhatta

LANDSCAPE CONSERVATION APPROACH AND BIODIVERSITY CONSERVATION IN NEPAL

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The Convention on Biological Diversity (CBD) emphasizes and advocates for ''landscape and ecosystem approach" for conservation, that implies coordination and collaboration among actors responsible for various land use management, irrespective of their jurisdictional and administrative boundaries. While Sustainable Development Goals (SDG, goal 15) of the United Nations, stress on biodiversity, forests, rangelands and deserts, ensuring the conservation, restoration and inter alia, sustainable use of terrestrial ecosystems, Nepal reiterates its commitment towards SDGs and Aichi target under CBD while reflecting those commitments through National Biodiversity Strategy and Action Plan (NBSAP). Nepal has achieved significant positive results in its conservation efforts, through a number of conducive policies and institutional arrangements, ensuring community engagement and benefit sharing, shifting from top down measures to ''landscape level approach" in nature and species conservation, developing corridors and bottlenecks to connect large protected area network. However, the inter-ministerial collaboration, both horizontal and vertical, remains still an issue to achieve greater impact of landscape level conservation. With recent state restructuring process, the challenge may remain more, as this needs strong coordination among all three levels of government system in the country, irrespective of their jurisdictional and administrative boundaries.

Understanding Landscape conservation approach

The ''Landscape conservation approach" is an evolving process, and discussed in recent years, particularly in 1990s. However, the concept evolved from the basic principles Carl Troll's 'landscape ecology' in 1939. The concept has two basic dimensions, a) species do not know physical boundary but they have right to exist and proliferate, and b) need to consider both human and physical geography at scale. This is the basic reason, where global contemporary discussions and scientific understanding to manage living organisms and species beyond their ''protected" boundaries. This resulted the landscape level conservation approach, considering biodiversity conservation, both at species and ecosystem level, beyond the defined habitat such as protected areas. However, the landscape conservation approach is still evolving, and do not have a well-defined definition, and varied in different context.

Biodiversity status in Nepal

Sandwiched between Tibetan plateau and Gangetic plains, Nepal offers many niche climate with its very high altitudinal variation within short geographical distance. This specific location harbors rich faunal and floral diversity in the country. Within very few kilometers of aerial distance, one can enjoy subtropical Sal forest to upper temperate Rhododendron, supporting habitat of Rhino to

Red panda, respectively. In less than 0.1% of global land area, Nepal is home to 9.3% (852) of global bird species. Floral diversity in the country represents 2.3% (465) of lichens, 5.1% of bryophytes (853) and 2.7% of angiosperms (5,856) of global population. More than 181 mammal species (4.5% of global species) and 2.6 % of moths and butterflies are recorded in the country. We are still exploring new species. Our scientists recently found new species under Asteraceae family in western Himalaya and named as Saussurea ramchaudharyi.

Nepal's journey: From Species, Localized efforts to Transboundary Landscape Conservation

Global efforts on biodiversity conservation is considered formally initiated in the United states when Yellowstone national park was declared in 1872, which is also considered as world's first protected area aiming to conserve faunal species in their designated habitat. Nepal follows this path after 100 years when it declared (Royal) Chitwan National Park (CNP), the first protected area in the country, aiming to conserve mega species like Rhino and Tiger. Although, declaration of CNP can be discussed as formal attempt to biodiversity conservation, Nepal initiated such efforts before the date, such as Gaida gasti (Rhino patrol). Nepal's first national code, Muluki Ain 1852/53, also provisioned for conservation efforts such maintaining forest cover in water source, protection of water catchment areas, though, these provisions were not directly towards biodiversity conservation, as such. Until 1990s, Nepal's biodiversity conservation efforts were particularly based on the principles of specific habitat conservation within the specified boundaries. Declaration of Annapurna Conservation Area (ACA) in 1986 was based on holistic conservation while ensuring community participation to conservation. The ACAP model is well in line with present landscape approach, considering human landscape together with the ecological processes.

Nepal has already started to explore conservation beyond the protected areas system before the UN Convention on Biological Diversity in Rio, 1992, learning from rapid habitat degradation, and fragmentation. While Nepal signed CBD, this has been instrumental to adopt landscape approach, considering human landscape in biodiversity conservation. Immediately after Nepal signed CBD, integrating human landscape in ecosystem was attempted in Nepal's Makalu Barun National Park and Conservation Area (MBNPCA). The conservation area was later declared as buffer zone, making consistence and in line with buffer zone management regulation. The concept of buffer zones around the protected areas, ensuring community participation, and also ensuring benefits to these communities from the protected areas was fully internalized by the state law and policies. The buffer zone management regulation significantly contributed in biodiversity conservation, and conservation of mega and keystone species. The corridors and bottlenecks management, connecting protected area system was introduced in Terai Arc Landscape (TAL), encircling 11 protected areas in Nepal and India. Combination of buffer zone concept, and later corridors and bottlenecks is towards adopting landscape approach to conservation in early 2000s. Increase in population of mega species like Rhino in Chitwan, Tiger in various protected areas of Terai, are significant achievements from the implementation of this approach, while also benefiting to communities.

Despite about 24% of Nepal's area under protected area system, which is far more than global average of 10%, this may not be adequate to address threat to biodiversity. Besides, establishing and managing such large scale protected areas is expensive in

countries like Nepal. Important dimension is human landscapes, and landscape required for human welfare such as waterscape, agriculture landscape, if not considered, part and parcel of overall management approach, is not effective to sustainability of these resources. The reason, Nepal shifted to landscape approach to address these challenges, as also envisioned in its National Biodiversity Strategy 2002, later succeeded by National Biodiversity Strategy and Action Plan 2014. These sectoral policies, together with National development plans, also emphasized the need of landscape approach to conservation for human welfare. Under the directions of these plans, and policies, Nepal has already declared large area under landscape management. The Kailash Sacred Landscape, Kanchanjunga landscape, Terai Arc Landscape, Chitwan-Annapurna Landscape, Sacred Himalayan Landscape are already declared. The Western Mountain Landscape is under consideration. With these functional landscapes, Nepal's policy to enhance transboundary cooperation among adjoining countries, such as China and India in Kailash sacred landscape, India and Bhutan in Kanchanjunga landscape, and India in Terai Arc landscape, not only helps to strengthen capacity of stakeholders, but instrumental in bilateral cooperation in combating illegal trade, and wildlife crime. Recently, Government of Nepal has accessed the Nagoya protocol on access and benefit sharing (ABS) under the CBD. At the meantime, Nepal is developing ABS bill, if comes into force as parliamentary Act, will be an important milestone in landscape approach to conserve genetic and biodiversity resource while ensuring benefits to local communities.

Conclusion

Landscape level approach provides ample opportunities, not only in conserving Nepal's valuable biodiversity resources, but also opens for bilateral cooperation with neighboring countries to combat wildlife crime, and illegal trade. Strong collaboration among various institutions, both vertical and horizontal, is prerequisite. As envisioned in Nepal's biodiversity strategy and action plan, holistic approach within identified landscape would optimize resources use, and thus contribute to sustainability. Nepal has already entered into decentralized federal structure, which also provides opportunities to effective participation of local governments and communities. However, benefit sharing of these resources would be an issue. In order to achieve Nepal's commitment to Aichi target, and also sustainable development goals, landscape would be an appropriate approach and effective development solutions to address conservation and development challenges of the country. Strengthening bilateral relationship, and transboundary cooperation between the neighboring countries, not only helps strengthening capacity of Nepali stakeholders and implementing agencies, but also suffice for collective global commitments.

Photo: Amit Poudyal

LEASEHOLD FORESTRY: ITS CONTRIBUTION TO BIODIVERSITY CONSERVATION AND RESTORATION OF LAND DEGRADATION

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Photo: Hari Basnet

Introduction

The Leasehold Forestry (LHF), primarily pro-poor support, is one of a successful community based integrated forestry regime in Nepal. It aims to reduce the rural poverty and improve the environmental amenities through forestry sector intervention. The open access degraded forestland is legally leased to the poorest group (about one ha to two ha per household) for 40 years for first time and could be renewed the lease up to 80 years with majority usufruct right. This programme began in 1992 as a project and ended as a programme in 2014 with the name of Hills Leasehold Forestry and Forage Development Project (HLFFDP) to Leasehold Forestry and Livestock Development Programme (LFLP), which is being continued by the government of Nepal. In 25 years, 72,198 households have been grouped into 7463 are managing 43,631.35 ha forest land in 39 districts. This paper provides a brief overview of leasehold forestry program and its contribution towards biodiversity conservation, land degradation

management and climate change mitigation potentials.

Biodiversity conservation to rural livelihoods support

The LHF has contributed, not only for land restoration, to conserve the carbon and biodiversity through restoring the degraded land into a productive field with sustainable management and institutional set up. The programme has generated a generous support to conserve and develop the biodiversity sector enriched through degraded land management with various ways.

Local species promotion is one of the key achievements. Local Khari goat species is being conserved through the programme including plant diversity maintain in the forest areas. Meantime, forage supply system support is contributing to maintain forage diversity for landslide protection (*Leucaena* spp, *Thysanolaena maxima,* Stylo, Jointvetch, Napier, Mulato), fodder production (Napier Mott and CO_3, *Sterile setaria, Leucaena* , Forage peanut, Common Stylo, Paspalum), Hedgerows (*Leucaena, Morus alba*) for sustainable land management, conservation of the species and displacement of invasive species.

The species richness increased from 70 species in a plot to 130 species after seven years and from 30 species in a new plot to 90 in number of species after ten-year period respectively. Importantly, life sustaining support species composition of fuel-wood, fodder, timber, fruits and multipurpose species have been recorded 59%, 14%, 13%, 11% and 3% respectively.

Majority of the abandoned land and degraded forests were with invasive species such as Lantana and Eupatorium. After managing from the leasehold groups/households the land areas have been changed into other valuable species, means free of invasive species. The Table shows promising results in the leasehold plot.

Changes observed in the leasehold plot

Category	District	Leasehold Plot	Control Plot
Wildlife/Birds species			
Wild animals	Chitwan	Leopard, Monkey, Dumsi, Rabbit, Wild cat, Jackal, Deer, Wild Boar	Rabbit and Jackal
Birds	Gorkha	Titra, Kalij, Himalayan Bulbul, Latokosero, Crow, Koili, Bhangera and Phista	Bhangera and Phista
Forest/Non Timber Forest Products/Fodder/Forage species			
Regenerated species	Panchthar	Schima wallichii, Castanopsis spp. Quercus incana, Taxus baccata, Alnus nepalensis, Rhododendron arboreum	Open scattered weeds/ invasive species
	Makwanpur	5680 counted No/ha	4820/ha
Non Timber Forest Products (NTFPs)	Gorkha	Majhito, Titepati, Nundhiki, Kurilo, Tejpat, Amala, Asuro, Tulasi, Pani Amala, Machhino, Chutro, Patpate, Lokta	Titepati, Unyu, Angeri
Fodder species	Dadeldhura	Morus alba, Melia azaderach, Ficus semicordata, Leaucaena sp., Bauhinia sp., Prunus cerasoides, Anogeisus sp. etc	Morus alba, Prunus cerasoides and Bhatmase.
Forest cover changes (%)	Panchthar and Dadeldhura	60 to 70	10

Source: Impact of Leasehold Forestry on Livelihoods and Forest Management, FAO, 2014.

Environmental services and climate change mitigation potentials from leasehold forestry

Nepal's leasehold forestry program has had a significant positive environmental impact and communities. Degraded forest is leased for 40 years to groups of poor households for their exclusive use. Vegetation cover increases from 32% in new sites to 90% after seven years. Fodder and forest products are harvested where little or none were produced before. In most sites there is rapid natural regeneration and ultimately it has great contribution towards the increment of biodiversity.

It has been revealed that different environmental services had been enhanced positively after the Leasehold Forestry Programme. Majority of the LFUGs reported increase in the overall green vegetation, area under forest, tree, and pole, movement of birds (94%,) plant diversity and richness (86%) improved varieties of Forest species (78%), increased wildlife movement (76%), increased number of the trees in the farmland (78%). Similarly control of forest fires was reported by 60 % of the LFUGs and control of landslips by 45% of them. Between 2003 and 2008, a significant increase in household income was observed that can be directly attributed to the Leasehold Forestry and Livestock Program. Together with Forest Product, revenue from the sale of goats accounted for 46 percent of income growth.

Land degradation restoration

In the leased forest land, Broom grass (*Thysanolaena maxima*) or Tiger grass plantation in the shifting cultivation areas in Tanahu, Chitwan, Palpa, Nawalparasi, Gorkha and Makwanpur has supported to grow and conserve the other intended tree species to upgrade the biodiversity of the areas through planting *Cinnamomum tamala, Michelia champaca* including several fodder species after conservation from grazing and forest fire.

In Devghat-9 in Tanahu, deer and monkey sightings were observed much after regenerating the sites. It has provided shelter a number of birds' habitat including invertebrates that are 'playing a great role in pollination, seed dispersal and maintaining soil quality and nutrients flow for maintaining ecosystem processes and forest resilience.

Climate change mitigation potentials

The deforestation issue has been at the center of international environmental debate for years. Despite national and international efforts to halted forestation, it continues at a rate of about 13 million hectares (ha) per year. The figure is alarming, at 14.6 million ha per year. Deforestation not only causes loss of carbon, but also results in loss of biodiversity, disturbed water regulation and destruction of livelihoods of a large number of the world's poorest. Deforestation is the second single Greenhouse gas (GHG) source, behind energy production, responsible for about a quarter of anthropogenic GHG emissions. From the various literatures it has been identified that forests have a paramount role in lowering the net GHG emissions to the atmosphere. Therefore leasehold forestry program play pivotal role in the productivity, accumulation of terrestrial carbon pools and land management regimes. The carbon value of the inventory depicted that it had good carbon sequestration from leasehold forest plots. A significant amount of carbon is sequestrated in 22 districts, on average 4.6 Ton CO_2 per year/ha (FAO, EX-ACT analysis). Carbon stock management under the land use system management in an abandon and marginalized land through leasehold forestry program is an important strategy to address climate change issues and also a cost–effective and practical solution to climate change mitigation and sustainable development. The modality of the programme was extended through Western Upland Poverty Alleviation Project

Shifting cultivation at Jhirubas, Palpa (Before Leasehold forestry project)

Photo: Pashupati Nath Koirala

in ten districts in Mid-western high mountain districts, Livelihoods and Forestry Programme (LFP), Multi-Stakeholder Forestry Programme (MSFP) and Biodiversity Sector Programme for Siwaliks and Terai (BISEP-ST) areas. The Leasehold forestry has become a tested model of success for reducing poverty and improving the environment.

Though the programme has been considered environmental friendly for land restoration and management, a few issues in local species promotion, awareness in the local endemic species and participatory action research are needed to be considered from the very beginning of the leasehold program. Furthermore, the forage program serves as an interface between the animal and plant production programs and soil management and plant nutrition. However there is less focus on adaptation of forage plants to particular niches within production systems. Similarly it has been considered that forage production is limited with little or no cost and should compete with food crops.

Therefore, it is necessary to better understanding of forage plantation systems, adoption of new techniques and site suitability and soil test management. Thus the paper aims to explore the contribution of the bio-diversity conservation and management for sustainable land resource management in one aspect whereas it also explains about the few gaps identified as research and design areas of forage plantation during the program implementation.

Conclusion

The approach of improvement to environmental services through biodiversity conservation, maintenance and restoration of land degradation, climate change mitigation potentials and generating benefits through the leasehold forestry programme has been a successful model in the country. However, the contribution has not much been spelled coherency with global conservation regime

Amriso cultivation at Leaseland, Jhirubas, Palpa

Photo: Pashupati Nath Koirala

such as United Nations Convention for Combat Desertification (UNCCD), United Nations Framework Convention for Climate Change (UNFCCC) and Convention of Biological Diversity (CBD). In conclusion, it has developed a key insight and robust connection between the livelihoods generators and the ecological promotion supporters through leasehold forestry programme in the country.

Photo: Amit Poudyal

POLICY REFORM ON FOREST USE FOR NON FOREST PURPOSES

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Forest clearance

The Ministry of Forests and Environment is responsible for the conservation and development of forestry sector in Nepal. The Ministry has two separate departments to fulfil its responsibilities related to forestry sector. The Department of Forests manages them under the provisions of the Forest Act 1993, and the Department of National Parks and Wildlife Conservation manages them under the National Parks and Wildlife Conservation Act 1973. According to their jurisdiction, both the departments have ownership of forest land in their territory. However, the processes of seeking forest clearance are different.

showing the process of seeking forest clearance in two different territory

Acts	Enabling provisions on Forest / Protected Areas Clearance
National Parks and Wildlife Conservation Act, 1973	Clause 6. Operation of services within national park or reserve: (1) Government of Nepal may, in the utmost interest of the national park, reserve or conservation area, make arrangements for operating hotels, lodges, public transport services or similar other services or facilities by itself or through other parties by entering into a contract by following the prescribed procedure. (2) No person shall operate services or facilities of any kind within the national park, reserve or conservation area without entering into a contract under the Sub-Section (1). Forest Act, 1993 68. Power to use
Forest Act, 1993	Clause 68. Power to use the Forest: (1) Not withstanding anything contained in this Act, in case there is no alternative except to use the Forest Area for the implementation of the plan having national priority and if there shall be no significant adverse effect in the environment while conducting such plan, Government of Nepal may give assent to use any part of the Government Managed Forest, Community Forest, Lease hold Forest or Religious Forest for the implementation of such plan. (2) In case any damage is to be occurred to any person or community while giving assent to use the Forest pursuant to Sub-section (1), Government of Nepal shall have to make proper arrangements in this regard.

The above table clearly shows the ambiguities while diverting forest of protected area for non-forestry purposes. In order to obtain forest land under the Forest Act, developer has to convince the government that the infrastructural project should be a national priority project and no alternative areas are available for the proposed project other than using forest, and it does not cause significant negative impacts on the environment.

The handing over of the forest area to development projects legally began with the enactment of the Forest Act, 1993. As a result, forest conversion for non-forestry purposes increased sharply until 2005. The

increasing demand of forest clearance was due to easier and quicker process in obtaining required amount of forest land without any resistance from the government and the local people. Furthermore, there was no need of IEE and EIA to convert forest land to non-forestry purposes.

Introduction of guidelines

To address the growing needs of forest clearance, the Ministry of Forests and Soil Conservation introduced the Forest clearance Guidelines 2007. This Guidelines has systematized the forest hand over process to some extent but the demand of forest land for lesser important project could not be discouraged. In order to discourage the tendency of asking the forest areas even for the projects of lesser importance, the government has introduced the provision of compensatory land for the forest area handed over to the developer in 2010. Following the provision of land to land policy, the demand for forest land for lesser important non-forestry purposes has reduced. However, many developer blames that there is no specific policy or legislative support in swapping areas and planting trees but it is being done on ad hoc basis until the forest clearance guideline 2017 is came under implementation.

At present, there are two governmental policies procedures for handing over forestland for infrastructure projects. The first one is “Forest conversion for nationally priority project” 2017 which deals with the forestland under the jurisdiction of Forest Department while the second one was infrastructure construction and operating working procedures for the forest land inside protected areas, 2009. Both these procedures set numerous conditions for obtaining forestlands. The conditions are taught to the developer and reluctant to divert forest for non-forestry uses but it provides safeguard towards the Forest Policy of maintaining 40 percent land cover under forest.

The present condition is not to let forest go unless at least an equivalent area, preferably of similar ecotype, are added somewhere else in the country. The developer may be permitted to use the forest land for making a permanent structure if it compensates the government with an equivalent substitute land being used for making permanent structure, preferably in the similar ecotype situation. In addition, the developers are required to plant 25 times the number of trees felled in the leased forest land. However, for the hydropower projects, the number has been reduced to 2 meanwhile keeping in view the ongoing energy crisis in the country in 2015 but now developer required to plant 25 times the number of trees felled. Additionally, the developer will have to manage and protect the planted forest for five years. If they cannot do this by themselves, they can deposit money required for plantation and protection of plantation sites for five years to the district forest office.

Developers’ demands

There is a growing resentment from developers against the existing requirements of procuring equivalent private land in the similar ecological zone, planting trees on that land, and managing and protecting the site for five years have create several problems to them. The Investment Board Nepal (IBN) and several other government agencies associated with the development sectors have expressed that the current forest clearance guidelines should be revised to accept cash compensation for the use of forest or park lands for non-forest purposes.

The provision of 1:25 plantation might not be difficult for smaller projects, but for the bigger projects that could be a difficult proposition. In response to national energy crisis in 2015, the tree planting ratio has been reduced to

1:2 but now it has been abolished after the amendment of guidelines in 2017. The forestry sector has to rethink and address the issue being raised by the developer regarding land to land compensation policy and a large volume of plantation requirement for a mega project through a policy reform.

Policy reform

This is a right time to review and reform the policy, this is because the government is working on the formulation of federal forest policy and laws. The MoFE should be mild towards the projects implemented under the BOOT model while addressing the forest clearance issue. The federal forest policy should acknowledge a cash compensation provision to forest use for non-forestry purposes. It is further required a legal provision to establishing necessary framework of mechanism that require for acquiring land and undertaking replacement planting.

A standard norm is requiring accessing the Net Present Value of forest eco-system services being lost by the conversation of forest to non-forest purposes. Furthermore, guideline should clarity, about how much should be charged to the developer and where to make payments for planting trees and managing and protecting the tree plantation sites. The federal forest law must provide a price determination mechanism, and also the procedure for flow of the paid price straight to the plantation body. Similarly, the provision for a land bank and an authority responsible for plantation management could be an alternative to resolve the hassle of developer and to maintain forest cover in the country side. The plantation body should be recognised by federal law for planting, maintaining and protecting sites for all replacement planting on lands received as compensation. The objective of plantation is to maintain the level of forest cover that the country has at present. Planted forests will be established through planting and/or through deliberate seeding of native or introduced species. This is done either through afforestation or by reforestation of previously forested land.

Photo: Amit Poudyal

TRANSBOUNDARY COOPERATION IN BIODIVERSITY CONSERVATION

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Photo: Amit Poudyal

Introduction

Nepal is a landlocked country and is surrounded by India in east, south and west, and by China in north. Therefore, Nepal's biodiversity has also been shared with the two neighboring countries along the bordering areas. Most of the biodiversity hotspots and protected areas of Nepal are located along the international boundaries with China and India and represent mainly two ecoregions- Alpine Shrubs and Meadows in the mountains and *Tarai-Duar* Savannas and Grassland in the lowland *Tarai*. Nepal, India and China are the parties of the Convention of Biological Diversity (CBD) 1992 and therefore have common but differentiated responsibilities in biodiversity conservation and sustainable development. As the biodiversity is of common concern of humankind, the countries has sovereign right over its conservation and utilization as per precautionary and do-no-harm principles. The transboundary cooperation mainly aims to reduce the loss of biodiversity associated with deforestation and forest degradation, and to assist neighboring countries to set aside and manage protected areas crossing the borders. Since the biodiversity is better managed in an ecosystem and landscape level, the transboundary cooperation between nations can be a key to achieve the desired outcomes of the conservation efforts at global and regional levels.

Photo: Dhananjaya Lamichhane

Major achievements

Nepal has a good experience in transboundary conservation and management of its rich biodiversity by virtue of landscape level conservation systems that go beyond the border. There are a number of landscape level conservation programs across the country which extend beyond the political and administrative boundary and focus on short-term and long-term activities in line with the principles of sustainable development. These landscapes, for instance, Terai Arc Landscape (TAL) encompass the important protected areas of Nepal and India along the border that has contiguous forests and grasslands. Similarly, Sacred Himalaya Landscape is extended across Nepal-China border of Nepal whereas Kailash Sacred Landscape and Kanchenjungha Landscape are being managed as tri-national conservation initiative between Nepal, China and India. The two countries, Nepal and India, have regularly held the high-level meeting and field-level meetings since 1990s, and those meetings have been very instrumental in fostering wildlife and biodiversity conservation and curbing wildlife trade in the border regions. Recently, a 2-day transboundary meeting between Nepal and India was held during 24-25 September 2017 in Kathmandu Nepal organized by Government of Nepal, Ministry of Forests and Environment. Delegates from the Ministry of Environment, Forest and Climate Change of India government and other national and International conservation partners were present in that important event. Bilateral cooperation with india is constantly making headway towards restoring critical corridors and connectivity for wildlife movements, curbing illegal wildlife trade and smuggling, rescuing orphan and stranded wildlife, and joint surveillence and monitoring along the borders and river basin areas.

Likewise, Nepal-China Bilateral transboundary meeting was recently being held in October 2017 in Kathmandu, which worked on, among others, preparing a Cooperative Conservation Service Agreement on Greater One-horned Rhinoceros for promoting the cooperative conservation on Rhinos between China and Nepal, enhancing the long-term survival of this species, as well as implementing the Memorandum of Understanding (MoU) for donating two pairs of Greater One-horned Rhinoceros (*Rhinoceros unicornis*) signed by State Forestry Administration of the People`s Republic of China and Ministry of Forests and Environment of Nepal on April of 2017, based upon the previous MoU signed by Nepal and China in 2010. The rhinos are being planned for translocation from Nepal's Chitwan National Park to China's Guangdong Chimelong Safari

Park and Shanghai Wild Animal Park, as the two parks were visited and studied by a joint expert official team from the both countries for their suitability and adaptability to the newly translocated rhinos. Cooperation with China in the recent years has been very helpful in biodiversity conservation especially throgh information sharing and needful actions against smuggling of wildlife organs, and timber and non-timber forest products.

Moreover, Nepal has been involved in a number of global as well as regional networks and forums for biodiversity conservation such as South Asia Wildlife Enforcement Network (SAWEN), Global Snow Leopard and Ecosystem Protection Program (GSLEP) and Global Tiger Forum (GTF). The SAWEN which was officially launched in January, 2011 in Paro Bhutan is an inter-governmental wildlife law enforcement support body of South Asian countries namely - Afghanistan, Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan and Sri Lanka. From the Secretariat based in Kathmandu, Nepal, SAWEN operates its activities in promoting regional cooperation to combat wildlife crime in South Asia and focuses on policy harmonization; institutional capacity strengthening through knowledge and intelligence sharing; and collaboration with regional and international partners to enhance wildlife law enforcement in the member countries. It is now a legitimate intergovernmental organization with endorsement of the SAWEN Statute by five countries namely Sri Lanka, India, Nepal, Pakistan and Bangladesh. Whereas, GSLEP is a joint initiative by all 12 snow leopard range countries, international organizations, civil society and the private sector aimed at long-term survival of the snow leopard in its natural ecosystem. It was launched following the adoption of the *Bishkek Declaration* at the Global Forum on snow leopard conservation held in October 2013. It seeks to address high-mountain development issues using the conservation of the charismatic and endangered snow leopard as a flagship. The second GSLEP Steering Committee meeting was held on 20th of January 2017 in Kathmandu, Nepal. Prior to the Steering Committee meeting, a two days Management Planning Stocktaking Workshop was also held on 17th and 18th January 2017 in Kathmandu. Nepal is also a GTF member country and actively contributing to achieving its objectives that aim to highlight the rationale for tiger preservation, provide leadership and utilize a common approach throughout the world in order to safeguard the survival of the tiger, its prey and its habitat.

Conclusion and ways forward

The transboundary cooperation has been very promising in biodiversity conservation at global, regional and national levels. Countries joining their hands together have paved the way to make the consolidated contributions in achieving the objectives of Convention on Biological Diversity, the Biodiversity Decade, the Aichi targets and the Sustainable Development Goals as well. Such cooperation could also be applied in forest areas and biodiversity hotspots outside the protected areas of Nepal. While focusing on conservation of mega species of wildlife, conservation of plant biodiversity should not be lagged behind. Policy harmonization, institutional strengthening, and awareness raising and capacity building of local-level actors like government officials as well as local people are crucial for effective cooperation. Adaptive management approach in landscape management could be applied through sharing of knowledge, skills and technology transfer among the stakeholders. Building upon the experiences and achievements of the successful 25 years of Convention on Biological Diversity, it should strive for safeguarding the all forms of life on earth.

Photo: Ramesh Bhusal

ROLE OF MEDIA IN BIODIVERSITY CONSERVATION

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Photo: NEFEJ

Media helps to shape the public perception and attitudes toward any issue and conservation is not an exception in Nepal. Where does conservation issue stand in the mainstream mass media of Nepal? Does the media is playing its role as effectively as expected? These are some of the questions often raised when it comes to the role of the media in Nepal's relatively successful conservation efforts that yielded some good results. One simple answer of the question is 'yes' but it's hard to say to what degree media helped to achieve this success. But there is ample of ways media can claim its role was significant.

Like Nepal's political system, the media has also undergone drastic changes in the past few decades. From state owned to private, terrestrial to satellite, print to online, broadcast to podcast and finally one to many, Nepal's media growth has been phenomenal in quantity but there is still a long way to go when it comes to the quality of content produced. With over 100 television stations, more than 600 radio stations and several hundred newspapers

and magazines, Nepal is rich in the number of media outlets it has but politics has dominate over other issues. Environmental issues have hardly been mainstreamed but over the time there has been increase on the coverage of issues like wildlife or forest conservation.

The state media was meant to lionize the deeds of the rulers in pre-democracy era pre-1990 but with the phenomenal growth of the media in past three decades a diversification of issues is what we can see currently. Development of the media has a much longer history than conservation efforts in Nepal but by the time aggressive efforts on protecting flora and fauna started after 1950's, major changes in the media landscape also occurred. The first printing press arrived in Nepal in 1850 and the first newspaper started publishing in 1901 with landmark years of the first IBM computer introduction in 1971 in the country. The Radio broadcast system was initiated in 1951 as Radio Nepal, Nepal television in 1984 and the Internet era started in 1994. While all the state owned media outlets were busy pleasing state machineries, there was hardly a healthy criticism of government's policies and actions in pre-1990's. With restoration of democracy in 1990 there was a boom in private media from where media started to act aggressively.

Interestingly, Nepal has a different evolution of environmental media compared to several other countries in South Asia. Before the restoration of democracy in 1990, a group of journalists formed a forum called the 'Nepal Forum of Environmental Communicators' in 1986 as a private company because other laws weren't conducive to establishing any non-governmental organizations and a journalist's association was merely a distant dream. Later in 1990, the forum was registered as Nepal Forum of Environmental Journalists (NEFEJ)—a non-governmental organization with focus to lead mass media programmes on news about environmental development and media advocacy. Issues like conservation, environmental problems hardly used to receive attention of mainstream media. As both, multi party democracy and private media growth was at pace, social issues were not of larger concern in a media community that was completely dominated by political affairs. NEFEJ played critical role in providing a platform for journalists to discuss environmental issues as well as train hundreds of journalists across the country and sensitized them on the importance of issues like conservation.

In 1997, NEFEJ in partnership with few other organizations was successful to establish South Asia's first community radio 'Radio Sagarmatha'. It opened avenues for private/community radio broadcasting in the country. This landmark success opened the opportunity to communicate issues at local level and decentralized power of media at local level. Community radios across the country were instrumental to aware people on issues like conservation. As Radio Sagarmatha had a special focus on the environment and development, most of the radio stations established thereafter across the country followed its program formats and also had an idea of issues that needs to be prioritized.

One of the most important things that the NEFEJ did was to sensitize journalists across the country on issues like conservation and produce a new generation of journalists who have new ideas and interests on covering these issues. One of the very first television programs focused on the environment and development called 'Ankhijhyaal' was started in 1994 and still continuing. Likewise, several mainstream media have also played instrumental role in brining out issues of several endangered species, acted as a forum to discuss why it matters and have brought issues related to public. This bridged the communication gap

between communities and policymakers. It brought the voices of voiceless people at community level who otherwise wouldn't have their say in policymaking process.

The Nepali media has been quite friendly and active in carrying out dialogue on conservation issues but it lacks regular follow-ups and in-depth reporting on pointing out the gaps in the country's conservation efforts or policies. Coverage of issues related to conservation has been often limited to a few mega species and forests, but overall the reporting of biodiversity and ecosystems is still lacking. By in-large Nepali mainstream media was successful to inform people at greater extent but yet a serious debate on how the country should move towards sustainable development where conservation is a component is still lacking. While pro-developmental slogans reiterated by politicians could amuse people that have become a regular information diet for Nepalese every morning, there has been very less done to move toward environmental friendly development in the country.

More voices are needed to keep track of the development and keep it focused in the right direction. More questions need to be asked on whether the government is following through with promises made by signing more than thirty environmental and conservation related international treaties and agreements or deviated its move while implementing developmental projects in the ground. Media plays a crucial role in raising critical issues and informing communities and policy makers that can have positive impacts to bring sustainable development as a result but there is need to increase in coverage of environmental related issues to better inform policy makers. As media reporting has been more concentrated into few mega species there is urgency to talk about ecosystems, climate change, rivers and aquatic animals. Rivers are being dredged rampantly for the sake of economic growth in the name of sand and boulders, which has severely impacted Nepal's aquatic lives, but there has been significantly less reporting done by Nepal's media.

Nepal's media has played a critical role to achieve what is at present but with the new federal system in place and mega projects in pipeline there is urgency to do more in future. With government's plan to carry out developmental works aggressively, two giant economies India and China vying for investments, there will be tremendous pressure on natural resources thus severe impacts on rich biodiversity. Not only wildlife, all aspects of biodiversity should be fit in Nepal's media frame unlike a few species or chunks of forests in the past. The new system could be opportunity for all play their role and build happy and healthy country instead of developed country. Nepali media's have that ability but should have better commitment toward these issues.

Photo: Sagar Rimal

BIO-FINANCE AND BIODIVERSITY IN NEPAL

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Introduction

The theory of Himalayan environmental degradation (1968) brought Nepal in the international attention. Since then, Nepal has been consistently making strenuous efforts to manage the Himalayan environmental crisis effectively and efficiently. Two key events of 1973- the establishment of Chitwan National Park and handover of forest management authority to the Thokarpa Village of Sindhupalchok mark the historical milestones of Nepalese conservation effort that has been following till now. Over the four decades, Nepal's journey of biodiversity conservation has achieved series of notable successes; 23.23% of the land is conserved as protected areas (20) and almost the similar size of forest area is under community management. Almost half of the population has been organized into 20,000 forest users groups that are directly involved in various community-based forest management and biodiversity conservation activities, recognizing itself as probably the largest conservation movement in the world.

There is a general predisposition within the conservation society that extreme poverty and biodiversity hotspots are co-located, and ecosystem services contribute up to 90 percent of the so-called GDP of the poor. Poverty ensues when a link between ecosystem services and human-wellbeing breaks or damages. Therefore, wise use of resources and efficient conservation initiatives in biodiversity rich low-income economies like Nepal is eminent. In accordance to this, Nepal attempts to demonstrate its active commitment to manage its biodiversity for prosperity in the spirit of international agreements including Convention of Biological Diversity (CBD).

National Biodiversity Strategy and Action Plan (NBSAP) 2014-2020, provides a strategic framework for the conservation of Nepal's biodiversity. It is the principal instrument for implementing the CBD strategic plan at local level. Funding was a major constraint for implementing Nepal Biodiversity Strategy (2002) and same fate can be repeated for implementation of NBSAP too. The estimated total cost of the NBSAP implementation is USD 673 million (NPR 67,268 million). It is estimated that only 55% of the total budget can be covered through government funding and rest is anticipated to be fulfilled through contributions from Donors (25%), I/NGO (10%), Private sector (2%) and another source (8%).

Biodiversity finance in Nepal

It can be envisioned that biodiversity finance may help to both raise and manage capital as well as provide financial incentives for sustainable biodiversity management. On the other hand, it may also focus on improving cost-effective conservation approach, which allocates resources efficiently. Traditionally, domestic public budget is the main source of funding with a share of around 50 percent of the total conservation expenditure. Similarly, around a tenth of total biodiversity finance is shared by fund flows from developed yet relatively biodiversity poor countries to biodiversity rich but low-income economies. Another approach is to create market for ecosystem services and attract private

investment to biodiversity conservation.

In Nepal, low input from the government towards biodiversity conservation is not unusual considering its estimated contribution to national economy. The forestry sector covering 44.74% of the total area contributes only 3.5 percent of the total Gross Domestic Product (GDP). This figure looks horrible demonstrating that our nature conservation efforts derive extremely low productivity. But conservation activities are not designed to contribute directly to the conventional GDP. In the meantime, forestry sector has time and again experienced very discouraging actions from decision-makers, who have constantly ignored biodiversity conservation. The most recent one being the allocation of a mere 1.7 percent of the total budget (FY 2017/18) for the then Ministry of Forest and Soil Conservation, which is also responsible for biodiversity conservation amongst others.

A notable point is that there are ecological limits to economic growth. Effective biodiversity conservation improves the carrying capacity of an ecosystem and creates more space for economic growth. Hence, measuring economic progress in terms of nature protection may put conservation in the priority list. This means our accounting system should depreciate resource depletion and count pollution costs against growth. Unless, the value of services provided by ecosystem, which is not traded in the conventional market, is well understood or appreciated; likelihood of overlooking conservation programs will continue to swell.

Nepal's thriving economy and recent administrative restructuring have created both opportunities and challenges for biodiversity conservation. For instance, rapidly growing infrastructure development projects like Hulaki Road, Fast Track, international airport, hydropower projects and Irrigation Canal projects are threatening the functionality of corridors and protected areas. Many wild species have been killed in road accidents. Making infrastructures conservation and environment friendly requires additional costs. On the other hand, better conservation may generate disservice in the form of human-wildlife conflicts currently on the rise, increasing the conservation cost. Therefore, conservation strategy and plan should be complemented by a strong financial strategy to secure long-term funding.

Establishing trust funds may help to secure long-term and stable source of funding. There are more than 50 conservation trust funds around the world to finance nature conservation. But in our case the National Biodiversity Trust Fund, which was envisaged by Nepal Biodiversity Strategy (2002) as the main source of funding for the National Biodiversity Coordination Committee and National Biodiversity Unit could not be established.

Despite such challenging stories, Nepal has an example of self-financing protected area management modality in Annapurna Conservation Area. The conservation area does not receive regular financial support from the government but has been authorized to collect entry fees from visitors. The resulting revenue is directly utilized for its management through activities that protect natural and cultural heritage and educate to sustain the economy and social benefits of tourism. In addition, Nepal continues to practice redistribution of a certain portion of revenues from protected areas to their buffer-zone communities for enhancing biodiversity conservation. Similarly, Forest User Groups are involved in forest management and conservation voluntarily with rights to use forest resources following the constant capital rule. This means use not more than mean annual increment.

BIOFIN

UNDP has initiated a new global partnership called Biodiversity Finance Initiative (BIOFIN), in response to the 10th Conference of the Parties, which supports countries to enhance their financial management for biodiversity and

ecosystems. The ultimate idea of BIOFIN is to improve conservation outcomes using finance and economics assessing information on current expenditure and financing needs and develop resource mobilization strategies. It aims to address the biodiversity finance challenge in a comprehensive manner. Currently 30 countries are participating in BIOFIN and Nepal is going to join the initiative soon.

BIOFIN Initiative has developed a robust methodology to develop the Biodiversity Finance Plan (BFP), which is based on three different assessment stages. The first step is "Policy and Institutional Review", which assesses enabling environment for biodiversity finance and identifies stakeholders. This is followed by "The Biodiversity Expenditure Review" which analyses trend in public and private expenditure in biodiversity conservation and projection of future expenditure. This is supported by "The Financial Needs Assessment", which estimates the cost of NBSAP implementation and assesses the financial gap between estimated and projected expenditures. The BFP thus prepared will prioritize solutions to close the financing gap, optimize current and future investments, and develop business cases for the best options. Several BIOFIN solutions have been identified and practiced in BIOFIN countries including Wetland Banking, Nutrient Trading, Biosafety fee, Voluntary Climate Financing, Dept-for-Nature Swaps, Disaster Risk Insurance, and Ecological Fiscal Transfers.

While discussing about the plan, primary concern should be on how it can successfully be implemented. Since, BIOFIN facilitates coordination between conservation partners and stakeholders, their involvement in BFP preparation process can build a sense of ownership. This can be crucial for smooth implementation of BFP. Institutionalization of the BFP and integration of financial solutions into national planning cycle requires strong political commitments, therefore Ministry of Forests and Environment in coordination with the Ministry of Finance must take lead in this initiation.

Conclusion

Conservation goals can only be achieved in the presence of a long term and stable financial source for implementing conservation activities. Nepal's unique but complex characteristics in terms of strong social and ecological linkages, and growing economic activities seeks for an appropriate Sustainable Financial Model for Biodiversity Conservation. This should however consider several aspects. First the connection between ecosystem and human welfare should be understood and appreciated. Well-functioning ecosystem can provide more space for economic growth. Second, efforts to diversify conservation funding sources should be intensified. This means, it has to strengthen traditional sources while creating market for ecosystem services. These markets could be both voluntary and compliance. Payment for Ecosystem Services (PES) scheme can be an appropriate strategy to increase biodiversity finance, particularly from domestic source. Reducing Emission through Deforestation and Forest Degradation (REDD+) could be another opportunity to attract international funds. Besides market approach, encouraging private sector to invest in biodiversity conservation as a part of their corporate social responsibility may help to add up fund.

In this context, BIOFIN Initiative may contribute to develop an appropriate financial plan for the implementation of NBSAP. Since, the financial plan is based on the assessment of enabling environment, account of expenditures and assessment of financial needs, it provides a robust mechanism to improve conservation outcomes. In addition to securing conservation funds, it also contributes to make conservation efforts cost-effective and enhance cooperation among conservation partners and stakeholders. Effecting implementation of the BFP can be heralded as better biodiversity conservation.

Photo: Amit Poudyal

ROLE OF PRIVATE SECTOR IN BIODIVERSITY CONSERVATION IN NEPAL

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Photo: Sagar Giri

Background

Conservation of biodiversity through sustainable use of resources and equitable benefit sharing is one of the major concerns in Nepal. International Partnership for the Satoyama Initiative (IPSI) promotes collaboration in the conservation and restoration of sustainable human-influenced natural environments through broader global recognition of their value. This initiative is a partnership made up of 184-member organizations dedicated to working together to realize societies in harmony with nature and is considered very relevant to enrich biodiversity and resource-dependent people in Nepal. The initiative has considered private sector as one of the key sectors responsible for biodiversity conservation and its economic use. The role of private sector in conserving biodiversity is crucial particularly in developing countries like Nepal, where majority of the population depend on natural resources for their livelihoods; thus, involvement of private sector in commercialization of natural resources is needed for economic transformation of the country. However, as the private sector is often

being criticized for excessive exploitation of natural resources leading to their degradation and generating negative externalities for maximizing their profits, it will be a difficult call to balance their role with biodiversity conservation. Nevertheless, there are several examples where private sector is actively involved in biodiversity conservation and economic development.

Conservation through forest-based enterprises

Conservation perhaps cannot be sustainable without economic incentives. People may not be interested on conserving the resources without knowing what tangible benefits they get from the conservation. Enterprise-oriented conservation approach not only improves the livelihoods of the low-income households but also protects biodiversity. For instance, invasive species, such as *Lantana camara* and *Eupatorium spp* are one of the major threats to biodiversity across Nepal. These species are replacing endemic species in a level of extinction. Contrary to common misconception of taking such species as an invasive, this resource has been used to produce bio-briquette that has contributed not only to conserving biodiversity but also in supporting the local livelihoods. Here, it is worthy to mention the bio-briquette enterprises operating in Shikre of Sidhupalchok district, where the communities, in a partnership with a private sector, are producing and selling bio-briquettes. Bio-Briquettes are a promising source of alternative energy with a proven record of their effectiveness to increase earnings for the poor, reduce health risks for women and children, maintain carbon pool in forests, and reduce the propagation of invasive alien species.

Conservation through *ex situ* management

Plantation of trees and cultivation of Medicinal and Aromatic Plants (MAPs) in private land also have significantly reduced pressure on forests in Nepal. For instance, community forest user groups are encouraging their members to plant fodder trees in their private land so that the household not only gets fodder but also fuelwoods from the branches while harvesting fodder. This in return has helped to conserve forest. For example, timur (*Zanthoxylum armatum*) was almost a neglected species with only limited domestic use until early 2000. Communities were not interested to conserve this species, and people used to cut and destroy the plant because of its thorny branched. When MAPs exporters explored its international markets, the product started to sell in a good price. The product which had a price of NRs 85 per kilo in Nepalgunj market in 2010 escalated to above NRs 1,000 per kilo in 2018. As a result, communities are planting timur in their private land and there is a huge demand of timur seedling, particularly in province 5 and 6 of Nepal. This is just one example to show that private sectors, in collaboration with community, can conserve biodiversity and boost local economy.

A study conducted by Multi-stakeholder Forestry Programme in Nepal has estimated that the forest-based industries can generate more than NRs 87 billion creating more than 400,000 sustainable full time equivalent jobs under the conservative scenario. In an optimistic scenario, this can be projected to NRs 370 billion creating about 1.4 million jobs. This comes along with transparent and traceable value chain, which is unfortunately lacking in most of the cases. Maintaining transparency and traceability of the value chain not only supports in managing the forest sustainably but also ensures fair distribution of the benefits across the value chain actors.

Conservation through ecotourism

The rich biodiversity associated with forest ecosystem gives Nepal a comparative

advantage in terms of quality ecotourism resources. Nepal's protected areas cover a total of 34,185.62 km^2, which is over 23% of the total geographical area of the country, and these are the prime attraction for tourists (both domestic and international) in the country. The protected areas provide a variety of ecotourism products but the inflow of tourists to different protected areas is not the same. Protected areas, such as Chitwan National Park and Annapurna Conservation Area, receive about 85% of the total tourist arrival in the country. One of the reasons is that other protected areas are far less explored. In addition, such a skewed distribution of tourist is perhaps influenced by the presence or absence of private sector. In above mentioned areas, private sector has invested a lot in hospitality industries in the form of hostels, resorts, home stay and tracking services which created enabling environment for tourists to visit those areas. As a result of increased number of tourists, the state is also earning revenue from different sources. For instance, Chitwan National Parks earned NRs 246.91 million in the fiscal year 2014-15, which is reinvested for the conservation of the national park. Likewise, Baghmara and Kankali community forests in Chitwan district are other examples where communities are earning from ecotourism and reinvesting in forest conservation. The Baghmara forest is a replanted and regenerated forest area forming a buffer zone adjacent to the Chitwan National Park. It is offering different eco-tourism activities, such as bird watching, elephant safari, nature walk, and canoeing. The community earned NRs 65.2 million in 2013. This earning is an incentive for the community from their efforts of conserving the nature.

Ways forward

For the conservation of biodiversity, sustainable and commercial use of the resources is important where people get incentive from the conservation. Involvement of responsible private sector is necessary for commercialization. The government should encourage private sector to invest in less explored areas by creating enabling environment in terms of favorable policies, such as tax incentive for certain period, subsidies to minimize their risk, and developing infrastructure like roads. Furthermore, the provincial and local governments can play key role on it. Nevertheless, the government's role to enforce private sector to maintain traceability of their supply chain by developing standards or enforcing international standards cannot be ignored.

Photo: Amit Poudyal

सामुदायिक वन र जैविक विविधता : नीतिगत अवसर र सम्भावनाहरु

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पृष्ठभूमि

जैविक विविधतासम्बन्धी विषय अन्तर्राष्ट्रिय सार्वजनिक नीति तथा कानूनको क्षेत्रभित्र पर्ने भएपनि जैविक विविधताको संरक्षण, दिगो उपयोग र यसबाट प्राप्त लाभको बाँडफाँडसम्बन्धी विषयहरू राष्ट्रिय कानूनका साथै आदिवासी जनजाति र स्थानीय समुदायको प्रथाजनित अभ्यासबाट पनि निर्देशित भएका हुन्छन्। त्यसैले जैविक विविधताको विषयमा राज्य र आदिवासी एवं स्थानीय समुदायको भूमिका, अधिकार र दायित्व निर्धारण गर्दा जैविक विविधतासम्बन्धी आदिवासी र स्थानीय समुदायका प्रथाजनित अभ्यास र अधिकारको सम्मान गर्नुपर्ने हुन्छ। विश्वका सबै देशहरूले आफनो देशको जैविक विविधतासम्बन्धी नीति तथा कानून र कार्यक्रमको तर्जुमा र कार्यान्वयन गर्दा सदीयौंदेखि नै समुदायका प्रथाजनित अभ्यास र अधिकारलाई आत्मसात गर्दै आएका छन्।

जैविक विविधता सबै मानव समुदायको चासो र सरोकारको विषयभित्र पर्ने भएपनि यसमाथि राष्ट्रिय सार्वभौमसत्ता सहित आदिवासी र स्थानीय समुदायको अधिकार पनि निहित रहेको हुन्छ। त्यसैले जैविक विविधताको विषयमा तर्जुमा भएका अन्तर्राष्ट्रिय कानून तथा मापदण्डहरू, विभिन्न देशहरूका बीचमा भएका अन्तरदेशीय तथा क्षेत्रीय सन्धि सम्झौताहरू र राष्ट्रिय नीति तथा कानून तर्जुमा र कार्यान्वयनमा आदिवासी र स्थानीय समुदायलाई अभिन्न अंग मान्नुपर्ने हुन्छ। सोही अनुरूप तर्जुमा गरिने नीति तथा कानून र योजनाहरूले नै जैविक विविधतामाथि आदिवासी र स्थानीय समुदायको अधिकार स्थापना गरी विभिन्न अवसरहरू सिर्जना गरिएको हुन्छ। यस लेखमा सामुदायिक वनमा जैविक विविधताको विकासका साथै यस्ता जैविक विविधताको सदुपयोगमा स्थानीय समुदायलाई प्राप्त नीतिगत र कानूनी अवसरहरूको संक्षिप्त समिक्षा गर्दै विद्यमान सवालहरू सम्बोधनका लागि केही सुझावहरू प्रस्तुत गरिएको छ।

उद्देश्य

यो लेखको मुख्य उद्धेश्य सामुदायिक वनका माध्यमबाट जैविक विविधताको संरक्षण, दिगो उपयोग र लाभको बाँडफाँडका लागि विद्यमान राष्ट्रिय तथा अन्तर्राष्ट्रिय नीति र कानूनमा गरिएका व्यवस्थाहरूको सवल पक्षका साथै कमी कमजोरीहरूको समिक्षा गर्दै प्राप्त अवसर र चुनौतिहरूको उजागर गर्नु र विद्यमान चुनौति सम्बोधनका उपायहरू प्रस्ताव गर्नु रहेको छ।

जैविक विविधता संरक्षणमा सामुदायिक वनको योगदान

नेपालमा सामुदायिक वनको सफलता र यसको योगदानको विषयमा गरिएका प्राय सबै अध्ययनहरूले सामुदायिक वनको एउटा मुख्य उपलब्धीको रूपमा जैविक विविधताको संरक्षण र वृद्धिलाई नै औल्याएका छन्। सामुदायिक वन व्यवस्थापनको एउटा मुख्य उद्धेश्य जैविक विविधता संरक्षण गर्नु रहेकोले सामुदायिक वनको शुरुआत् सँगसँगै पारिस्थितिकीय विविधता, वनस्पति विविधता र आनुवंशिक विविधताको विकास भएको कुरा स्वयं सरकारी प्रतिवेदनहरूले पुष्टि गरेका छन्। सरकारको तर्फबाट जैविक विविधता महासन्धिको सचिवालयमा पेश गरिदै आएका राष्ट्रिय सञ्चार प्रतिवेदनहरूमा सामुदायिक वनका माध्यमबाट जैविक विविधताको संरक्षणमा उल्लेखनीय योगदान पुगेको र जैविक विविधताको वृद्धिमा पनि योगदान पुगेको कुरा अभिलेखित गरिदै आएको छ।

सामुदायिक वनले वनस्पति विविधताका साथै वन्यजन्तुको वासस्थान संरक्षणमा योगदान गरेको कारण वन्यजन्तुको संख्यामा उल्लेख्य वृद्धि भएको छ भन्ने कुरा पनि सार्वजनिक रूपमा नै पुष्टि भएको छ। यद्यपि, वनस्पति र वन्यजन्तुको वृद्धिमा सामुदायिक वनले पुऱ्याएको योगदानको राष्ट्रिय अभिलेख भने तयार हुन सकेको छैन। सामुदायिक वनमा संरक्षण र वृद्धि भएको जैविक विविधताले खासगरी पर्यापर्यटनको विकासमा मद्धत गरी स्थानीय स्तरमा रोजगारी र आयआर्जनका अवशरहरू समेत सिर्जना गरेको छ, जसले गर्दा स्थानीय समुदायमा सामुदायिक वनमा जैविक विविधताको संरक्षण गर्ने उत्पेरणा समेत जाग्दै आएको छ। त्यसैले सामुदायिक वन, जैविक विविधता सरक्षण र रोजगारी तथा आय आर्जनका बीच अन्तरसम्बन्ध कायम गर्ने नीतिगत वातावरण सिर्जना गर्नु आवश्यक हुन्छ।

नीतिगत र कानूनी अवसरहरू

१ जैविक विविधतासम्बन्धी अन्तर्राष्ट्रिय कानूनहरूमा सामुदायिक अधिकार

जैविक विविधतासम्बन्धी मुख्य अन्तर्राष्ट्रिय कानूनको रूपमा रहेको जैविक विविधता महासन्धि १९९२ र अन्य विभिन्न कानूनहरूमा जैविक विविधतामा स्थानीय समुदायको अधिकारका बारेमा मुख्य रूपमा निम्न व्यवस्थाहरू गरिएको छ :

जैविक विविधतासम्बन्धी मुख्य अन्तर्राष्ट्रिय कानून	स्थानीय समुदायको अधिकारसम्बन्धी व्यवस्थाहरू
जैविक विविधता महासन्धि १९९२ र आनुवंशिक स्रोतमा पहुँच र यसको उपयोगबाट प्राप्त लाभको निष्पक्ष र समन्यायिक बाँडफाँड सम्बन्धी अभिसन्धि २०१०	• आदिवासी जनजाति र स्थानीय समुदायको जैविक विविधता सम्बन्धी परम्परागत ज्ञानको संरक्षणमा राज्यले सघाउनु पर्ने। • जैविक विविधता प्राप्त लाभको समन्यायिक बाँडफाँडमा आदिवासी र स्थानीय समुदायलाई संलग्न गराउनु पर्ने। • आदिवासी र स्थानीय समुदायमा जैविक विविधता महासन्धिका व्यवस्थाहरू बारेमा क्षमता विकास गर्नुपर्ने। • आदिवासी र स्थानीय समुदायको परम्परागत ज्ञानमा पहुँच प्रदान गर्नुभन्दा पहिला पूर्वसूचित सहमति लिनुपर्ने।
सङ्कटापन्न जंगली वनस्पती तथा जीवजन्तुका प्रजातीको अन्तर्राष्ट्रिय व्यापार सम्बन्धी महासन्धि १९७३	• सङ्कटापन्न जंगली वनस्पती तथा जीवजन्तुका प्रजातीको अन्तर्राष्ट्रिय व्यापार सम्बन्धी राष्ट्रिय नीति तथा कानून र योजना तर्जुमा गर्दा स्थानीय समुदायलाई संलग्न गराउनु पर्ने।
जलपंक्षी बसोवास जस्ता अन्तर्राष्ट्रिय महत्वका सिमसारसम्बन्धी महासन्धि १९७१	• सिमसार नीति तथा कानूनको तर्जुमा र कार्यान्वयनमा स्थानीय समुदायलाई संलग्न गराउँदै सिमसार सम्बन्धी आदिवासी र स्थानीय समुदायको परम्परागत ज्ञान, अभ्यास र सीपको सम्वर्द्धन गर्नुपर्ने।
विश्व सांस्कृतिक तथा प्राकृतिक सम्पदा संरक्षण सम्बन्धी महासन्धि १९७२	• प्राकृतिक सम्पदाहरूको संरक्षण र सोबाट प्राप्त लाभको बाँडफाँडमा स्थानीय समुदायलाई हिस्सेदार बनाउनु पर्ने। • प्राकृतिक सम्पदा संरक्षण क्षेत्रहरूको घोषणा र व्यवस्थापन गर्दा प्रभावित स्थानीय समुदायसँग पूर्वसूचित सहमति लिनुपर्ने।

माथि उल्लिखित अन्तर्राष्ट्रिय कानूनमा गरिएका यी समुदायमुखी कानूनी व्यवस्थाहरूलाई व्यवहारिक रूप दिई कार्यान्वयन गर्नका लागि जैविक विविधतासम्बन्धी राष्ट्रिय नीति तथा कानूनमा पनि सोही अनुसारका व्यवस्थाहरू गर्नुपर्ने हुन्छ।

२ जैविक विविधतामा सामुदायिक अधिकारसम्बन्धी संबैधानिक व्यवस्था

नेपालको संविधानमा मौलिक हकको रूपमा स्वच्छ वातावरणमा बाच्न पाउने नागरिकको हक, परम्परागत बीउमाथिको किसानको अधिकार र वातावरण एवं विकासका बीच सन्तुलन कायम गर्न भूमि व्यवस्थापन गर्ने जस्ता व्यवस्था गरिएको भएपनि यी अधिकारहरूको अभ्यासका लागि पनि सामुदायिक रूपमा जैविक विविधताको संरक्षण भएको हुनुपर्दछ। संबैधानिक नीतिको रूपमा जैविक विविधताको संरक्षण, संवर्धन र दिगो उपयोग गर्ने र जैविक विविधतामाथि नकारात्मक असर पर्न नदिने राज्यको दायित्व हुने व्यवस्था गरिएको छ र राज्यले यी दायित्वहरू पुरा गर्नको लागि सामुदायिक वन उपभोक्ता समूह लगायतका स्थानीय समुदायको सहयोग लिनु पर्ने हुन्छ। त्यसैगरी संबैधानिक रूपमा गरिएको राज्यशक्तिको बाँडफाँडसम्बन्धी व्यवस्थामा जैविक विविधताको संरक्षण गर्ने अधिकार तीन वटै तहका सरकारहरूका बीच बाँडफाँड गरिएको छ र यस्तो अधिकारको अभ्यास गर्दा तीनवटै तहका सरकारहरूले स्थानीय समुदायको भूमिकालाई विर्सिएर जैविक विविधताको संरक्षण हुन सक्दैन। त्यसैले सरकारहरूलाई जैविक विविधतासम्बन्धी आफ्नो अधिकारको सदुपयोगका लागि पनि सामुदायिक वनले उल्लेखनीय रूपमा सघाउन सक्दछ।

३ जैविक विविधतामा सामुदायिक अधिकारसम्बन्धी कानूनी व्यवस्थाहरू

वनसम्बन्धी कानून : वन ऐन २०४९ र वन नियमावली २०५१ मा गरिएका व्यवस्थाहरू अनुसार सामुदायिक वन उपभोक्ता समूहले आफ्नो वन व्यवस्थापन योजनामा वातावरणीय सेवाको रूपमा रहेको जैविक विविधता संरक्षण सम्बन्धी व्यवस्था गरी त्यस्तो सेवाको उपयोग गर्न सक्दछन्। जैविक विविधतालाई वनसम्बन्धी कानूनमा एउटा मुख्य वातावरणीय सेवाको रूपमा परिभाषित् गरिएको छ, जसको व्यवस्थापनलाई सामुदायिक वनको अभिन्न अंगको रूपमा वन व्यवस्थापन योजनामा सामावेश गरी यसबाट जैविक विविधताको विशेषता अनुसार फाइदा लिन सकिने अवशरहरू रहेका छन्।

स्थानीय सरकार सञ्चालनसम्बन्धी कानून : स्थानीय सरकार सञ्चालन ऐन २०७४ मा जैविक विविधता संरक्षणका लागि स्थानीय सरकारलाई कैयौ जिम्मेवारी, अधिकार र दायित्वहरू प्रदान गरिएको छ। स्थानीय सरकारले पनि जैविक विविधता संरक्षण आफै एक्लैले गर्न नसक्ने भएकोले सामुदायिक वनलाई मुख्य आधार बनाउँदै जैविक विविधता संरक्षण गर्न सक्दछन्। सामुदायिक वनहरूले जैविक विविधतालाई पर्यापर्यटन विकासको एक मुख्य आधार बनाएको हुनाले स्थानीय सरकारको पर्यापर्यटन योजनाको कार्यान्वयनका लागि पनि जैविक विविधता सरक्षण गर्ने सामुदायिक वन उपभोक्ता समूहले स्थानीय सरकारसँग सहकार्य गर्ने अवशर प्राप्त गर्न सक्दछन्।

संरक्षित क्षेत्रको जैविक विविधता संरक्षणमा सामुदायिक वनको योगदान

: खासगरी मध्यवर्ति क्षेत्र र संरक्षण क्षेत्रहरूमा रहेको जैविक विविधता संरक्षण र यसको सदुपयोगमा सामुदायिक वन उपभोक्ता समूहहरूको उल्लेखनीय योगदान रहेको छ, किनकी मध्यवर्ति क्षेत्र र संरक्षण क्षेत्रको कानूनमा सामुदायिक वनका माध्यमबाट नै जैविक विविधता संरक्षण र सदुपयोग गर्ने कुरालाई मान्यता प्रदान गरिएको छ। संरक्षण क्षेत्र र मध्यवर्ति क्षेत्रको जैविक विविधता संरक्षणको एक मुख्य आधार सामुदायिक वन नै भएकोले संरक्षित क्षेत्रसम्बन्धी सरकारी निकाय र सामुदायिक वन उपभोक्ता समूहका बीचको सहकार्य आवश्यक हुन्छ। त्यस्तै संरक्षित क्षेत्रहरूमा हुने वन्यजन्तुको चोरी शिकारी नियन्त्रणमा सामुदायिक वनले मुख्य योगदान गर्ने भएकोले संरक्षित क्षेत्रहरूले सामुदायिक वनलाई एउटा अवसरको रूपमा लिई सहयोगी समुदायको रूपमा सहकार्य गर्न सक्दछन्।

४ सामुदायिक वन विकास मार्गदर्शनहरूमा जैविक विविधता :

सामुदायिक वन विकास कार्यक्रमको मार्गदर्शन २०७१, सामुदायिक वन स्रोत सर्वेक्षण मार्गदर्शन, सामुदायिक वनको काठ दाउरा संकलन तथा विक्री वितरण निर्देशिका २०७२, खोटो संकलन निर्देशिका, जडिबुटी तथा गैरकाष्ठ वन पैदावार सर्वेक्षण मार्गदर्शन आदि विभिन्न दस्तावेजहरूमा सामुदायिक वनका वन व्यवस्थापन योजनाहरूमा जैविक विविधता संरक्षणका लागि विभिन्न व्यवस्थाहरू गर्ने सकिने प्रावधानहरू समावेश गरिएको छ। यी विभिन्न व्यवस्थाहरूका आधारमा सामुदायिक वन उपभोक्ता समूहहरूले जैविक विविधताको संरक्षण, सदुपयोग र लाभको बाँडफाँडका लागि विभिन्न व्यवस्थाहरू गरी सोको कार्यान्वयन गर्न सक्दछन्। त्यसैले प्राय सबै सामुदायिक वन उपभोक्ता समूहले कुनै न कुनै रूपमा आफनो वन व्यवस्थापन योजनामा जैविक विविधताको संरक्षण र सदुपयोगका लागि विभिन्न व्यवस्थाहरू गरी सोको कार्यान्वयन गर्दै आएका छन्।

५ जैविक विविधता रणनीति तथा कार्ययोजना :

नेपालको जैविक विविधता रणनीति र कार्ययोजनाले संरक्षित क्षेत्र भन्दा बाहिरको जैविक विविधता संरक्षण र सदुपयोगका लागि सामुदायिक वनलाई नै मुख्य आधार मान्ने रणनीति र कार्ययोजना बनाएको छ। त्यसैले यस रणनीतिका आधारमा संरक्षित क्षेत्रभन्दा बाहिर रहेका वनहरूमा जैविक विविधता संरक्षण र सदुपयोगका लागि सबै तहका सरकार र सम्बन्धित निकायहरूले सामुदायिक वनलाई मुख्य आधार बनाउने गरी योजना तर्जुमा र स्रोत साधनको विनियोजन गर्नुपर्ने हुन्छ।

विद्यमान चुनौतिहरू र सम्बोधनका लागि सुझावहरू

- नेपालका वन तथा जैविक विविधतासम्बन्धी प्राय सबै नीति तथा कानूनमा जैविक विविधता संरक्षण र सदुपयोगका लागि सामुदायिक वनलाई नै मुख्य आधार बनाउने भनिए पनि सामुदायिक वनका व्यवस्थापन योजनामा जैविक विविधतासम्बन्धी व्यवस्थाहरू समावेश गर्नका लागि आधारमूत तथ्यांक तयारी गर्नमा प्रयाप्त सहयोग प्राप्त हुन सकेको छैन। त्यसैले सामुदायिक वनका व्यावस्थापन योजना तर्जुमा र कार्यान्वयन गर्दा जैविक विविधतासम्बन्धी आधारभूत विवरण समावेश गर्न र सोको सदुपयोगका लागि योजना तर्जुमा गर्न सहयोग र स्रोत साधन उपलब्ध हुनु पर्दछ।
- सामुदायिक वनमा संरक्षण गरिएका कतिपय वनस्पतिहरूको संकलन र सदुपयोगमा प्रतिबन्ध लगाइएको छ, जसले गर्दा संकलन र सदुपयोग गर्न प्रतिवन्ध लगाइएका जैविक विविधता संरक्षण गर्नमा कम उत्साह हुने गरेको छ। त्यसैले कुनै जैविक विविधता सोको महत्वका आधारमा संकलन तथा सदुपयोगमा प्रतिवन्ध लगाउने भएमा त्यस्तो जैविक विविधता संरक्षण गरे वापत सामुदायिक वनलाई उत्प्रेरणाको रूपमा निश्चित् क्षतिपूर्ति उपलब्ध गराउने व्यवस्था गर्नुपर्ने हुन्छ।
- विभिन्न कानूनहरूका बीचमा जैविक विविधतामाथिको स्वामित्व कसको हुने भन्ने बारेमा रहेको विवादले पनि जैविक विविधता संरक्षणमा प्रभाव पर्दै आएको छ, त्यसैले जैविक विविधता जसले संरक्षण गरेको छ, सो उपरको स्वामित्व पनि संरक्षणकर्तामा नै हुने व्यवस्था गरिएमा मात्र सामुदायिक उपभोक्ता समूहप्रति न्याय हुन जान्छ।
- सामुदायिक वनमा खासगरी जन्यजन्तुको वासस्थान संरक्षण हुने भएकोले प्राणीजन्य विविधताको रूपमा वन्यजन्तुको व्यापक वृद्धि भएको छ। वनको क्षमताले थेग्न नसक्ने र मानव वन्यजन्तु द्धन्द्ध बढने गरी वृद्धि भएको वन्यजन्तुको व्यवस्थापनमा लागि पालन, शिकार र विक्री वितरणका लागि प्रतिबन्ध नलगाइएका वन्यजन्तुहरूको पालन, शिकार र विक्री वितरण गर्ने अनुमति प्रदान गरिएमा वन्यजन्तुको दिगो व्यवस्थापन हुन सक्नेछ।
- जैविक विविधतालाई एउटा महत्वपूर्ण वातावरणीय सेवाको रूपमा परिभाषित गरिएकोले यस्तो सेवा व्यवस्थापन गरी सो बाट पर्यापयटनको विकास गरी रोजगारी र आय आर्जन बढाउने अवशर सिर्जना गर्ने क्रममा देखा परेका नीतिगत सवाल सम्बोधन गरिएमा स्थानीय समुदायमा जैविक विविधतालाई समृद्धि तथा सम्मुनतिसँग जोडेर लैजान सकिन्छ।

Photo: Amit Poudyal

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