Thematic Report on Mountain Ecosystems

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Please provide summary information on the process by which this report has been prepared, including information on the types of stakeholders who have been actively involved in its preparation and on material which was used as a basis for the report.

In compliance with the decision of COP (VII/27) regarding a thematic report on Nepal's mountain biodiversity, the Ministry of Forests and Soil Conservation (MFSC) of His Majesty's Government of Nepal (HMG/Nepal) provided fund and prepared the report in the fiscal year 2004-2005 (July 2004-June2005).

MFSC hired a professor as a consultant to draft the report in February 2005. The consultant held extensive discussions with the country's scientists, experts and officials of concerned organizations. After the completion of the report, MFSC organized a seminar on 14 June 2005 to solicit inputs from various stakeholders representing concerned ministries and departments of HMG/Nepal, the representatives of related NGOs/INGOs, and academic institutions. Freelance academics, scientists and media persons also actively participated in the program. The report is based on the comments, inputs, and suggestions of the participants of the day-long interaction program. It also incorporates the official comments of the Ministry.

Necessary information and data have been used from Nepal Biodiversity Strategy (NBS), which was approved by HMG/Nepal in August 2002. The report has also made use of information from scientific publications and national report on mountain biodiversity prepared by MFSC in June 2005. Emphasis has been given to highlight the country's major ecosystems, the threats faced by the fragile mountain ecosystems, opportunities and conservation efforts, as well as the achievements. The report focuses on prioritized areas that need immediate conservation attention to save the country's mountain biodiversity. Attention has been given to include all these aspects while furnishing the information requested in the questionnaire. Short background information on Nepal has also been included.

Nepal: A mountainous country

Background

Nepal (147, 181sq. km.) is situated on the southern slopes of the central Himalayas. The landlocked country is sandwiched between two Asian giants – China to the north and India to the east, south and west. The country's position in the central Himalaya is that of a transitional zone of interpretation between the eastern and western Himalaya. The hills and high mountains cover around 86 percent of the total land of the country. The remaining 14 percent are flatlands of the Terai. These lowlands are less than 300m in elevation. The altitude varies from some 60m above sea level in the Terai to Sagarmatha (Mr. Everest) at 8,848 m, the highest mountain in the world.

While the average length of the country is 885 km from east to west, the width varies from 145 km to 241 km. The country’s Terai belt is a flat and valuable stretch of fertile agricultural land. It also forms part of the alluvial Gangetic plains. The Terai accounts for about two-third of the country’s total cultivated land and is known as the “Granary of Nepal”. Nepal is basically an agricultural country and contributes 39 percent to the national GDP. Agricultural practice could be seen up to an altitude of 4200m.

Nepal's climate varies from subtropical monsoon in the Terai to arctic tundra in the high Himalaya. Its biodiversity is a reflection of its unique geographical position, and altitudinal and climatic variances. The country's biological richness comprises both the Indo-Malayan and Palaeoarctic realms. It also includes endemic Himalayan flora and fauna.

Despite its biological richness, Nepal faces some of the most serious conservation challenges besetting any nation in the world. The United Nations has classified the country as one of the least developed countries in the world. Due to the country's fragile geological structure soil erosion and landslides are

common phenomenon. Other threats include deforestation, endemic poverty, rapidly growing human population and the subsistence livelihoods of majority of the people living in the fringe areas.

There is uneven distribution of 23.1 million populations (census of 2001) of the country with an annual growth of 2.2 percent in the decade of 1991-2001. Geographically, 7.3 percent of the population lives in the mountains, 44.3 percent in the hilly region, and 48.4 percent in the lowlands. Administratively, the country is divided into five development regions and 75 districts. Nepal is also a rich mosaic of ethnicities. Over 80 percent of the population is Hindu followed by Buddhists and other minority groups. Majority of the ethnic groups live in the hilly region of the country.

The Himalaya in general and Nepal Himalaya in particular contributes significantly to the global biodiversity, largely because of rapid ecological changes at spatial scales, high level of endemism, and the unique ecosystem properties. The altitudinal changes in the Himalayan Mountains are so rapid that a 30-40 km-long transect may include tropical forest as well as alpine scrub or meadows. Considering the area of the country, Nepal has rich and fascinating biological diversity. The Indo Malayan and the Palaearctic realms add to the high level of biodiversity. Nepal is endowed with at least 2.3% of the lichen species, 2.4% of the fungi, 2.6% of algae, 5.1% of bryophytes, 3.4% of pteridophytes, 5.1% of gymnosperms, 2.7% of angiosperms, 1.4% of platyhelminthes, 0.2% of spiders, 2.6% of butterflies and moths, 0.7% of other insects, 1.0% of fishes, 1.0% of amphibians, 1.6% of reptiles, 9.35 of birds and 4.5% of mammals of the world. Not many studies have been conducted on the lower plants, animals and microbes. The number of species may increase significantly with research studies. There are 118 ecosystems with distinct biological communities, and 95 ecosystems are found in the country's mid-hills and the mountains.

The highest numbers of plants occur between 1500 and 2500 m above the mean sea level. Thirty four percent of the biodiversity (plants and animal species) is found in highland (above 3000 m altitude), 63 percent in the midland (1000-3000 m) and 37 percent in the lowlands (below 1000 m). About 420 phanerogamic species are distributed in the areas that lie above 5000 m. The highest altitude at which angiosperm *Christolae himalayayensis* has been found in the world is at an altitude of 6300 m in the Himalaya. The interesting rate of loss of vascular plant species with a change in elevation in the alpine zone of central Nepal (>4000 m elevation) is equal to one species per 20 m of elevation gain - with a predicted complete absence of vascular plants above an elevation of 5700 m.

Five percent of the total area of the country is covered with different types of wetlands. The high altitude glacial lakes are 2323 in number and covers an area of 78.3 km^2 , and some of these are very important because they attract endangered species such as the snow leopard, blue sheep, musk deer etc.

The country has not only important cultivated and domesticated plant and animal species, but also numerous species that are relatives of the wild species and are useful to plant and animal breeders. Cultivation in Nepal is found up to an altitude of 4200 m due to cold tolerant genes inherent in these crops species. The International Rice Research Institute (IRRI) has confirmed that *Jumli Marsh*" (paddy cultivated in the hilly district of Jumla) is one of the most cold tolerant varieties of paddy found in the world. Likewise, the genetic diversity of agricultural and horticultural crops is very impressive. It is estimated that Nepal has over 500 landraces of paddy, out of which one fifth is aromatic and fine paddy landraces. Mustang district is one of the driest and cold regions in Nepal. Triticale *(Triticum x Secale hybrid*) not only grows well in Mustang but it is produced at the scale of much 1 t of grain and over 30 t of leafy straw. Mountainous areas of the country have some indigenous breeds of animals and some of these are threatened. *Lulu* and *Achhame* cattle are faced with extinction and pure *siri* has become scarce. The country's Yak population is also decreasing while pigmy hog *Pudke bandel* is believed to be on the verge of extinct.

The mountain diversity is not only impressive but also important from the point of high endemism. There

are 342 endemic plants and 160 endemic animal species in Nepal. About 53 percent of the total number of endemic angiosperm species is from the high altitude region of the country. Similarly, eight out of twenty endemic breeds of livestock are from the alpine species.

In a nutshell, Nepal's mountains are the source of medicine, timber, fodder, ornamentals, fuel and industrial raw materials. It also serves as the repository of water resources.

Mountain Ecosystems

1. What is the relative priority your country accords to the conservation and sustainable use of biological diversity in mountain ecosystems?					
a) High	X (further comments below)	b) Medium		c) Low	
2. How does your country assess the resources available for conservation and sustainable use of biological diversity in mountain ecosystems, both domestic and international?					
a) Good		b) Adequate		c) Limiting	X (further comments below)	d) Severely limiting	
3. Has your country requested financial assistance from GEF for funding the activities for conservation and sustainable use of biological diversity in mountain ecosystems?					
a) no					
b) yes, please provide details					X (further comments below)

Assessment, Identification and Monitoring

4. Has your country undertaken any assessment of direct and underlying causes of degradation and loss of biological diversity of mountain ecosystems?	
a) no, please specify the reasons	
b) yes, please specify major threats and their relative importance, as well as gaps	X (further comments below)
c) If yes, please specify the measures your country has taken to control the causes of loss of mountain biodiversity	X (further comments below)
5. Has your country identified taxonomic needs for conservation and sustainable use of biological diversity of mountain ecosystems?	
a) no, please specify the reasons	
b) yes, please specify	X (further comments below)
6. Has your country made any assessment of the vulnerability or fragility of the mountains in your country?	
a) no, please specify the reasons	
b) yes, please specify the results and observed impacts on mountain biodiversity	X - Please refer # 4b above. The need for vulnerability assessment has been realised. However, some studies have been carried out on the loss of soil, which has direct bearing on biodiversity.
7. Has your country made any assessment important for conservation of biological diversity of mountain ecosystems at the genetic, species and ecosystem levels? (You may wish to use the Annex I of the Convention for categories of biodiversity important for conservation)	

a) no, please specify the reasons	
b) yes, some assessments or monitoring undertaken (please specify)	X (further comments below)
c) yes, comprehensive assessments or monitoring programmes undertaken (please specify where results can be found, and opportunities and obstacles, if any)	

Regulatory and Information System and Action Plan

8. Has your country developed regulations, policies and programs for conservation and sustainable use of biological diversity in mountain ecosystems?	
a) no	
b) yes, please specify sectors	X (further comments below)
9. Has your country applied the ecosystem approach (adopted at COP 5) in the conservation and sustainable use of biological diversity in mountain ecosystems?	
a) no	
b) yes, please provide some cases or examples	X - Nepal has laid importance to ecosystem approach in the management of the country's protected areas and forests since the last two decades. Ecosystem approach has been adopted since the past few years, which is compatible with the spirit laid down in the decision of the COP. Emphasis has also been given to conserve and manage specific ecosystems such as grasslands ecosystem for deer and rhinoceros in the lowland protected areas, and high altitude grasslands and bushes for other animals.
10. Does your national biodiversity strategy and action plan cover mountain biological diversity?	
a) no, please specify why	
b) yes, please give some information on the strategy and plan, in particular on mountain biodiversity	X – The Nepal Biodiversity Strategy endorsed by the government in 2002 underlines mountain biodiversity as a separate programme. It points out the need for developing a separate national mountain policy to lay down principles for the management of mountain biodiversity. It also stresses the need for developing proper legislation as a part of integrated management to effectively address the bio-geographical, economic and cultural realities of mountain

	domains. Moreover, it states that the invaluable knowledge of the mountain people is essential for the conservation of mountain biodiversity.
11. Has your country disseminated the relevant information concerning management practices, plans and programmes for conservation and sustainable use of components of biological diversity in mountain ecosystems?	
a) no	
b) yes, please provide details where information can be retrieved concerning management practices, plans and programmes	X (further comments below)

Cooperation

12. Has your country undertaken any collaboration with other Parties for conservation and sustainable use of biological diversity in mountain ecosystems at the regional level or within a range of mountains?	
a) no	
b) yes, please specify the objectives of this collaboration and achievements	X - HMG/Nepal and several national NGOs have undertaken biodiversity conservation programmes with the support of Parties from developed countries. The International Centre for Integrated Mountain Development (ICIMOD) with its Headquarters in Kathmandu has been involved in the dissemination of technology and information on mountain development issues. The focus that is centred on conservation aspects and sustainable use of biodiversity has been limited to national jurisdiction.
13. Has your country signed or ratified any regional or international treaty concerning mountains?	
a) no	X - Nepal is a member of the International Centre for Integrated Mountain Development (ICIMOD), and has joined sustainable mountain development partnership programme.
b) yes, please specify which treaty and provide as much as possible a report on the progress in the implementation of the treaties, including any major constraints in the implementation of the treaties	

Relevant thematic areas and cross-cutting issues

14. Has your country taken account of mountain ecosystems while implementing thematic programmes of work on agricultural; inland waters; forest; and dry and sub-humid lands biological diversity?	
a) no	
b) yes – but in only one or two thematic programmes of work	X (further comments below)
c) yes, included in all programmes of work	
d) if yes, please specify details	
15. Has your country taken any measures to ensure that the tourism in mountains is sustainable?	
a) no , please specify why	
b) yes, but in early stages of development (please specify the reasons)	X (further comments below)
c) in advanced stages of development (please specify the reasons)	
d) relatively comprehensive measures being implemented (please specify the reasons)	
16. Has your country taken any measures to protect the traditional knowledge, innovations and practices of indigenous and local communities for conservation and sustainable use of biological diversity in mountain ecosystems?	
a) no	
b) not relevant	
c) yes, but in early stages of policy or programme development	X (further comments below)
d) yes, in advanced stages of development	
e) some programmes being implemented	
f) comprehensive programmes being implemented	
17. Has your country developed any programmes for the protection of natural and cultural heritages in the mountains?	
a) no	
b) yes, please provide some information in the programmes	X - The natural and cultural heritages of the protected areas are being conserved properly. Likewise, the mountain communities have also been traditionally preserving their religious and cultural heritages. There are several ongoing programmes for the conservation of soil, water, and forests. Cultural and religious sites are managed locally and local people also develop and implement programmes for the preservation of

	such sites. For its natural characteristics the Sagarmatha (Mt. Everest) National Park has been declared a World Heritage Site and its conservation measures are in compatible with the spirit of the World Heritage Convention. Protection of natural and cultural heritage has always been a priority and the government is mobilising its resources for this purpose both in the mountains and the lowlands.
18. Has your country established protected areas in mountains?	
a) no	
b) yes, please specify the percentage of mountains under protected areas out of total mountain areas in your country	X - Protected areas in Nepal include national parks, wildlife reserves, conservation areas, hunting reserve and the buffer zones. These buffer zones have been established in and around national parks and wildlife reserves. Out of the 16 protected areas of Nepal (see Annex 2), 11 are located in the mountains (see Annex 3). The protected areas in the mountains are rich in species diversity (see Annex 4). Out of the 118 ecosystems identified so far, about 80 ecosystems are found in the protected areas.
19. Has your country undertaken any activities to celebrate the International Year of Mountains and Eco-tourism?	
a) no	
b) yes, please specify	X (further comments below)

Case-studies

Please provide case-studies made by your country in conservation and sustainable use of biological diversity in mountain ecosystems.

Revenue sharing: A perennial source of biodiversity conservation

Three decades of protected area management system has increased the number of endangered wild animals and enhanced the conservation of the country's unique natural and cultural heritage. Although the strict law enforcement practices of the early years presupposed local people's role in species and ecosystem conservation, the National Parks and Wildlife Conservation Act (1973) and its Regulations regulated resource utilisation in the protected areas. The system restricted local people's traditional use of natural resources and there was no direct benefit to the communities. It eventually resulted in misunderstanding and conflict between park and the people, especially over the use natural resource.

In view of emerging problems and the growing realization about the need for participatory involvement of local people in conservation, generating income to address local livelihood issues, and promoting sustainable management and utilisation of forest resources of the adjacent areas, HMG/Nepal introduced an innovative management system by establishing buffer zone in and around the protected areas and sharing revenue earned by national parks with local inhabitants. This provision was made in the fourth amendment of the National Parks and Wildlife Conservation (NPWC) Act (1973) in 1993. According to the provision, the buffer zones are entitled to receive 30 to 50 percent of the total annual revenue generated by the protected areas. A case of Langtang National Park has been given below to illustrate an example of conservation and sustainable use of mountain biodiversity with a view to share information with the Parties.

The Langtang National Park (LNP) with an area of 1710 km^2 was declared in 1976 to conserve endangered species such as the musk deer, red panda, snow leopard and their habitats including the watersheds of Trishuli River, mountain pastures, and local cultural heritage. The other objective was to promote sustainable mountain tourism to benefit local people and improve their living conditions. The national park is located about 40 km north of Kathmandu, the capital of Nepal, and spread over three mountain districts of Rasuwa, Nuwakot and Sindhupalchowk. The two major river basins of the national park are that of river Indrawati in the east and river Trishuli in the west.

According to the provision of the NPWC Act, the buffer zone of the national park was declared in 1998. The government has been ploughing back 50 percent of the total revenue earned by the park to the buffer zone for community development activities. The buffer zone covers an area of 420 km^2 and adjoins three districts mentioned above with 34 Village Development Committees (VDCs). Since 1998, the Buffer Zone Management Committee (BZMC) has mobilised a total of 14.1 million (1US$ = Rs. 71.00) as of October 2005 for biodiversity conservation and programmes related to socio-economic development of the buffer zone communities. Apart from government support, the legal provision also encourages conservation partners to complement the park's efforts. And a number of national and international NGOs have joined hands with the national park and buffer zone management council for community development activities.

HMG/Nepal has implemented the Tourism for Rural Poverty Alleviation Programme (TRPAP) with the grant assistance of UNDP, SNV-Nepal and DfID in 2003. Local bodies such as the District Development Committee (DDC) and the Village Development Committees (VDCs) also share costs and benefits for community development activities in the buffer zone. Apart from the support of the Agro-forestry Foundation, local NGOs and community-based organisations (CBOs) have joined hands for the implementation of species conservation and community development programmes. The major programmes include habitat conservation and pastureland

management; conservation and management of high altitude wetlands; promotion of alternative energy, conservation of forests through religious etchings, and promotion of sustainable tourism and management. The other activities are centred on conservation education and environmental awareness; income generation; gender mainstreaming, and capacity enhancement of local communities. The regulation requires the buffer zone committee to spend the amount to five headings: 30 percent for conservation, 30 percent for community development, 20 percent for pro-poor income generation activities, 10 percent for conservation education and awareness, and the remaining 10 percent for administrative expenses.

These activities have brought positive changes in the attitude and traditional practices of local communities. For example, one of the major festivals in the area is the celebration of *Lhosar*, the new year of the indigenous local people. Every year, each household and monastery of the area used to cut a pine tree and erects a pole to put a flag on it as a symbol of the New Year. For this purpose, a total of 8,000 pole-sized green pine trees used to be cut down every year. Since that the growth of trees in the mountains is rather slow due to harsh environmental conditions, the buffer zone user groups decided to use iron pipes instead of poles to save the trees. The local communities have also adopted fuel saving stoves in their households and in the tourism related activities.

The buffer zone programme has benefited about 55 thousands people of 13 thousand households within the national park. In short, the establishment of buffer zone and benefit sharing have been very effective in bringing local people to the mainstream of biodiversity conservation by improving their socio-economic conditions. Nepal considers the programme as a perennial source of funding for mountain biodiversity conservation. The buffer zone programme has been replicated in other protected areas also.

Further comments

As a mountainous country, Nepal underscores the need for expanding its activities on biodiversity conservation. Despite a well-established network of protected areas in the mountainous parts of the country, there is always pressure from infrastructure development. The government feels that there is a need for creating awareness not only in local communities but also to work in conjunction with our development partners whose works have impacted mountain biodiversity and ecosystems.

In view of the nature of threats, challenges and pressures, Nepal has identified some priority areas to meet the objectives of the Convention: They are *to*:

- Conserve endemic and threatened species;
- Promote sustainable use of biodiversity to reduce poverty and ensure food security;
- Strengthen the involvement of indigenous and local communities in the conservation and sustainable use of biodiversity;
- Identify specific ecosystems in the mid-hills for the protection of biodiversity;
- Build capacity and develop institutions to implement national strategies, document biodiversity including traditional knowledge, skills and practices, conduct research activities and network institutions;
- Establish botanical garden, zoo and seed bank for *ex situ* conservation;
- Institutionalise biodiversity monitoring and promote regular and systematic field-based taxonomic and ecological survey;
- Educate the public to emphasize the role of biodiversity;
- Integrate policies on biodiversity conservation into national agenda;
- Enact necessary legislation and initiate progress on market incentives;
- Strengthen synergies and collaboration with UNFCCC, UNCCD and WTO, and other

international organisations related to species conservation; and,
- improve environmental governance and increase financial resources.

Nepal believes that the priority areas will be the building blocks for expanding biodiversity conservation activities in the mountains in the true spirit of the Convention.

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RE 1a), 2c), 3b)

The conservation of biological diversity is an integrated part of Nepal's national policy. The constitution of the Kingdom of Nepal has outlined the importance of biodiversity and sustainable use of natural resources. The tenth five-year plan (2003-2007) also underlines the importance of biodiversity conservation and the sustainable use of natural resources for poverty alleviation. Apart from signing several international conventions and treaties, Nepal is committed to biodiversity conservation and has set aside over 19 percent of the country's land as protected areas. The country works with a network of nine national parks, three wildlife reserves, three conservation areas and one hunting reserve including the eight buffer zones of national parks and wildlife reserves. Eleven of the protected areas lie in mid-hills and high mountains.

The mid-hills have the greatest diversity of ecosystems (52) and species in the country. Nearly 32 percent the country's forests occur in the mid-hills. There are 38 major ecosystems in the mountains, and while they are relatively less diverse in flora and fauna compared to the mid-hills and lowlands because of harsh environmental conditions, they are nevertheless characterized by a large number of endemic species.

Several national and international non-governmental organizations are engaged in conserving the country's biodiversity. Likewise, donors have been providing support to run several integrated conservation and development programs and projects both in mountains and the lowlands. One of the ongoing projects launched in the mountain as well as the lowlands is the UNDP funded Participatory Conservation Program (PCP), which is a follow-up of the Park People Program. The other programs launched with the support of WWF include the Kangchenjunga Conservation Area Project, Northern Mountains Conservation Project and the Sagarmatha Community Agro-forestry Project. All these projects have been launched in the mid-hills and high mountains of the country. HMG/Nepal has also joined hands with partner organizations and envisioned the Sacred Himalayan Landscape for conservation.

HMG/Nepal implemented the GEF funded Biodiversity Conservation Project in the mid to late 1990s for the conservation of mountain biodiversity, particularly in the Makalu-Barun National Park and Conservation Area, which lies the high mountains. This funding was instrumental in preparing Nepal's Biodiversity Strategy, which was endorsed by the government in 2002.

The King Mahendra Trust for Nature Conservation (KMTNC), a national NGO, has implemented Upper Mustang Biodiversity Conservation Project in the Annapurna Conservation Area (Annex 1) which also falls in the high mountains. It has also implemented the Tiger-Rhino Conservation Project in the Royal Chitwan National Park.

The GEF/UNDP funded Small Grant Programme was implemented by Nepal Forum of Environmental Journalists, an NGO, in the mid-1990s. The programme still continues and is administered by UNDP. It provides support to local initiatives in the areas of GEF funding, including biodiversity conservation. Several NGOs have received funding through the

GEF/UNDP Small Grant Programme. During the period of 1998-2005, the GEF/UNDP Small Grant Project received a total of US$ 1.8 million. Out of which US$ 0.881 million was spent on projects relating to biodiversity conservation. For the year 2005, the Programme has received a total of US$ 0.6 million and the funding on biodiversity conservation will be made on the basis of proposal submitted by local NGOs.

RE 4b)

There have been sporadic studies to assess the underlying causes of degradation and their impacts on mountain biodiversity. Studies conducted during the preparation of the Nepal Biodiversity Strategy and in the course of preparation of this report have identified the following direct and underlying cause of degradation and the ensuing impacts on mountain biodiversity. They are:

- **Habitat destruction**: Due to the biotic pressure exerted by human and livestock population, the forests have been converted to shrub-lands. Habitat loss is the primary threat to the majority of vertebrate species in the mountains. The floristic composition has also altered.
- **Over exploitation**: Biological resources such as fuelwood, animals as source of protein, and a variety of plants and wildlife are used to meet the growing demands of the mountain people. The Himalayan species are overexploited and/or poached for illegal trade. Some species are already faced with the threat of extinction.
- **Climate change**: Nepal prepared the (First) Initial National Communication (INC) for the Conference of the Parties of the UN Framework Convention on Climate Change (UNFCCC) in 2004 with the support of GEF-UNEP. The first INC report mentions that a total of 14,778 Gg of carbon dioxide (CO_2) has been removed from land use changes and forestry (due to changes in forests and other woody biomass stocks, and abandonment of managed lands), out of the total emission of CO_2 (24,525 Gg) in 1994/94. It predicts that global warming would cause forest damage and forests would move towards the polar region with changes in their composition and possible extinction of species. It also mentions that tropical wet forests and warm temperate rain forests would disappear, and the cool temperate vegetation would turn into warm temperate vegetation under double CO_2 condition. Out of the 39 forest types categorised by Holdridge model and the incremental scenario (2^0C temperature rise and 20 percent increase in precipitation), vegetation pattern would differ and only 15 types of forests will remain under the existing CO_2 ($1xCO_2$) condition, and 12 types of forests under $2xCO_2$ condition.
- **Invasive Alien Species:** Over 100 non-native plant species have been identified and some of the species such as Eupatorium adenophorum, Lantana camara, Bidens pilosa, Amaranthus viridis and A. Spinosus have caused the change in vegetation composition of the fallowland and agro-ecosystems. Alien species would be one of the major threats in future, and forests and agricultural fields are likely to face the threat of such invasion.
- **Loss of Pollinators**: On the basis of a number of studies, there will be a decline in the yield of insect pollinated crops due to inadequate number of certain pollinators. The major reasons behind the decline in pollinators are loss of habitat, introduction of new species, pollution caused by pesticides, disease and pests, climate change etc.
- **Environmental Degradation**: External factors such as pollution, pesticide, and climate change. have altered the biological communities. Studies reveal that the number of species in the Bagmati River has declined from 54 to 7 within a span of a decade largely due to discharge of untreated effluents, especially in the urban areas of Kathmandu Valley. Studies also state that effects of air pollution have shortened the flowering period of roadside shrubs of Kathmandu, the capital city of Nepal. Garbage management has become a problem in popular trekking routes in the mountainous region. The Sagarmatha (Mt. Everest) Pollution Control Committee, which is a local NGO, removed 213 tonnes of garbage (1802 tonnes of disposable and 32 tonnes of non-disposable wastes) in 1998-

99 from the trekking routes. Landslides, floods, forest fire and over-grazing have also exerted negative impact on the mountain biodiversity.

- **Loss of Genetic Variability**: Some studies have shown that rare species are lacking genetic variability. The population of wild animals in the mountains is too low and this may eventually lead to local extinction. Monoculture cultivation of improved varieties has also reduced genetic diversity of local and indigenous crops. Local landraces have either disappeared or are on the brink of extinction owing to replacement by the so-called high-yielding varieties. However, the importance and values of indigenous breeds/strains are yet to be established and evaluated.

In a nutshell, major threats include the change in ecosystem characteristics and species composition, loss of habitat, deforestation, overgrazing in rangelands, overexploitation, and poaching, inadequate attention to sustain the mountains, inappropriate farming system, and the loss and/or erosion of genetic resources for various use values.

RE 4c)

Major causes of loss and/or degradation of mountain biodiversity are:

1) Low level of awareness on the importance of biodiversity conservation and its benefits to mountain people
2) Pressure exerted by rapidly growing population and subsistence livelihoods
3) Inadequate planning and insufficient institutional, administrative and management capacities
4) Lack of integrated planning and biodiversity conservation programmes
5) Inadequate data and information for planning and implementation of management modalities
6) Inadequate implementation of existing policies, strategies and programmes for biodiversity conservation

In order to address direct as well as the underlying causes of degradation of biological diversity, the following measures have been taken with local people's participatory involvement in conservation.

***a) In-situ* conservation (wild biodiversity)**: Nepal has set aside around 19.4 percent of the country's land as protected areas for *in-situ* conservation of biodiversity. Out of a total of 16 protected areas (national parks, wildlife reserves, conservation areas, hunting reserve, and buffer zones), 14 are being managed by the Department of National Parks and Wildlife Conservation of HMG/Nepal. Two conservation areas - Annapurna and Manaslu conservation areas are managed by the King Mahendra Trust for Nature Conservation (KMTNC), a national NGO. The list of protected areas is given in Annex 2. The government has launched species and ecosystem conservation programmes within the protected areas, while community development programmes have been implemented in the surrounding buffer zones. Most of the activities within the conservation areas have been linked with the issues of people's livelihood. Management plans have been developed and implemented with the objectives of conserving flora, fauna and soil conservation. These plans emphasise socio-economic development of local people and are aimed to preserve local religious and cultural heritage, and promote eco-tourism to benefit local communities. The planned activities are aimed to:

- Provide technical support for the formation of user groups, formulate plan for sustainable use of forests, and conduct training on scientific forest management for sustainable utilization of forest resources;
- Conduct Trainers' Training on income generating activities, and train and encourage user

groups for regular monitoring of forests and avoid and/or minimize conflicts related to the traditional practice of using forests and pastureland;

- set up anti-poaching units to Initiate joint patrolling by park staff and members of user groups;
- Provide support to conduct survey and identify important traditional grazing lands;
- Form new herder user groups and consult old herder user groups to motivate them to practice rotational grazing;
- Support and encourage local communities to plant fodder trees and cultivate grass on degraded community forest and private land for stall-feeding;
- Prepare inventory on the condition of rangelands to fix rotational grazing and close grazing on the deteriorated pasturelands to improve forage productivity;
- Encourage and provide support to cultivate ecologically suitable crops that are least damaged by wildlife, and provide subsidy to pay premium for crop resources.
- Implement community development and income generating activities; and
- Institutionalize effective monitoring system for mountaineering and trekking activities.

In-situ conservation of wild plants and animals has been promoted both within and outside the protected areas such as the government, community and leasehold forests.

***b) In situ* Conservation of Agricultural Crops**: Emphasis has been given to cultivate locally adapted varieties (landraces) of crops, and preserve genetic variability. The other activities are aimed to identify and conserve threatened species, strengthen monitoring system for genetic resources, and establish national database for indigenous livestock. The activities also aim to promote participatory plant breeding programmes, conserve primitive landraces of crop species, and encourage participatory selection to identify farmer-preferred varieties and landraces that are suitable for specific ecological zones. One of the major ongoing programmes is focused on conserving landraces in a seed bank and strengthening storage facilities. The establishment of gene banks is deemed essential.

***c) Ex-situ* Conservation**: There is *ex-situ* conservation of 31 species of mammals, 53 species of birds, and 16 species of reptile in the country's central zoo. Apart from the Royal Botanical Garden of Godavari and the Mountain Botanical Garden of Daman conservatories have been established to ensure *ex-situ* conservation of wild flora of the country.

***d*) Information Management**: There is inadequate technical information on flora and fauna of the country. HMG/Nepal is making efforts to update the Biodiversity Profiles prepared in 1995. The publication of a database of the country's flora and Flora is being planned. A database of the medicinal and aromatic plants has been prepared by the Central Department of Botany of Tribhuvan University in collaboration with the Edinburgh Botanical Garden of the U.K. and the Ethnobotanical Society of Nepal. The International Centre of Integrated Mountain Development (ICIMOD) is also planning to prepare a database of the biodiversity of the protected areas of Nepal. The Ministry of Forests and Soil Conservation in collaboration with national and international NGOs has started the process of documenting the country's biodiversity. The documentation of biological resources used by 30 communities was completed in May 2005.

***e)* Education and Research**: Nepal has incorporated environmental education in the curriculum of primary to tertiary levels of education. The academic institutions offer plant and animal sciences in higher education. Topics on biodiversity have been included in the curriculum of environmental science and management studies, particularly at the graduate and post-graduate levels. The importance of biodiversity conservation has also been incorporated in the non-formal education programmes.

The research studies carried out by academic and research institutions such as the Tribhuvan

University, the Kathmandu University and affiliated institutions as well as the Royal Nepal Academy of Science and Technology (RONAST), Nepal Agriculture Research Council (NARC) and the Department of Plant Resources of HMG/Nepal are focused on research and the generation of technology. For instance, the Central Department of Botany of Tribhuvan University has been implementing research projects on the structure and functions of mountain biodiversity (plant-water relations of Himalayan trees). The Department has already produced six doctoral theses on biodiversity in the last few years.

f) Community Participation: Different modalities have been adopted for biodiversity conservation in Nepal. The major one being people's participatory involvement and stewardship in conservation. The national parks and wildlife reserves are managed by the government while the conservation areas are managed with the active and effective participation of local people. The same method has been adopted for the management of sections of national forests, which are handed over to local community users groups and leaseholders for conservation, development, management and sustainable use of natural resources, including biodiversity. The user group management models are working very well and local users have made exemplary contribution to resource management.

One of the reasons behind the effectiveness of community participation is benefit sharing. Thirty to 50 percent of the revenue earned by concerned national parks and wildlife reserves are ploughed back to local communities for community development works. In forests outside the protected areas, community users utilise all financial benefits from the sustainable use of forests. The lesson Nepal has leaned is that people's participation is crucial to biodiversity conservation. Farming communities in the mountains are engaged in conserving local landraces of crops and also do participate in government's effort for crop improvement.

g) Policy and Legislation: There are several policies and legislative measures regarding the conservation, sustainable use, and sharing of benefit from the country's biological resources. The Important policies and strategies include The Forest Policy (1991 and 2000), Agriculture Perspective Plan (1995), Agriculture Policy (2004), Herbs and Non-timber Forest Products (NTFP) Development Policy (2004), Wildlife Farming, Breeding, and Research Working Policy (2003), and the Wetland Policy (2003). Likewise, other policies and strategies are Mountain Development Policy (2002), Sustainable Development Agenda for Nepal (2003), Nepal Biodiversity Strategy (2002), Water Resources Strategy (2002), and the periodical policies incorporated in the present Tenth Plan (2002-2007). They complement to meet the three objective of the Convention on Biological Diversity.

Similarly, the important legislations include Forest Act (1993) and its Regulations (1995), Environment Protection Act (1996) and its Regulations (1997), Water Resources Act (1992) and its Regulations (1993), Soil Conservation and Watershed Management Act (1982) and its Regulations (1985), National Parks and Wildlife Conservation Act (1973) and National Parks and Wildlife Protection Regulations (1974), Wildlife Reserve Regulations (1977), Himali National Parks Regulations (1980), Buffer Zone Management Regulations (1996), Conservation Area Management Regulations (1996), and Government Management of Conservation Area Regulations (2000). The regulations include the King Mahendra Trust for Nature Conservation Act (1982) and its Regulations (1985), Aquatic Life Protection Act (1961), Seed Act (1989) and its Regulations (1998), Livestock Development Act (1999) and its Regulations (2000), and Local Self-Governance Act (1999) and its Regulations (2000). Nepal has also implemented guidelines and manuals such as National Environmental Impact Assessment (EIA) Guidelines (1993), EIA Guidelines for Forestry Sector (1995), Buffer Zone Management Guidelines (1999), Review Guidelines for IEE (Initial Environmental Examination) and EIA reports of the Forestry Sector (2003), Collaborative Forest Management Manual

(2003), IEE Manual for Forestry Sector (2004) etc.

h) Institutional Development: For the effective implementation of the policies, legislations and other provision, HMG/Nepal has set up a network of offices. For instance, the Ministry of Forests and Soil Conservation, which works as the focal point for the Convention on Biological Diversity, has 5 regional forestry directorates and 5 regional training centres, 5 departments, 74 district forest offices, 55 district soil conservation offices, 16 offices of protected areas, and 7 offices of district plant resource with over 9,000 staff all over the country. The Ministry of Agriculture and Cooperatives, which is the key stakeholder for agro-biodiversity, also has 5 regional agriculture directorates, 5 regional training centres, 3 departments, district agriculture and livestock offices in all 75 districts, NARC, as well as crop, livestock, and fishery centres. Governmental organizations such as the Ministry of Environment, Science and Technology also contribute to biodiversity conservation. Moreover, a number of academic institutions and NGOs are conducting research on biological diversity.

In order to provide policy guidance and ensure coordination between and among concerned organizations, HMG/Nepal has constituted National Biodiversity Coordination Committee (NBCC) and Herbs and Non-Timber Forest Products (NTFPs) Coordination Committee under the chairmanship of the Honourable Minister for Forests and Soil Conservation. Similarly, District Biodiversity Conservation Committees have been constituted in 10 out of the 75 districts of Nepal. Such committees will be formed in the remaining districts as well. Five more thematic sub-committees regarding (a) forest biodiversity including protected areas, (b) agricultural biodiversity, (c) sustainable use of biological resources, (d) genetic resources, and (e) bio-security) have also been formed to assist the NBCC in specific areas. Multi-stakeholders are involved in all these initiatives.

i) Biodiversity and Environmental Assessment: HMG/Nepal is endeavouring to conserve biodiversity by carrying out environmental assessment in accordance with the spirit of the Article 14 of the Convention on Biological Diversity. Efforts have been made to include concerns for biodiversity right from the scoping exercise to environmental auditing. The government has also made policy decisions to promote the inclusion of site-specific details on biodiversity for any project that is required to undergo environmental assessment. In the case when impact avoidance and minimisation measures get exhausted, HMG/Nepal could provide forest areas with the condition that the proponent agrees to plant 25 saplings for each tree cut down, manages the allocated area for 5 years, and hands that over to communities and/or the local forestry organisations in its own cost. In view and the spirit of maintaining 40 percent of the total area of the country under forest cover, HMG/Nepal does not normally give away forest land for non-forestry purposes. Compensatory measures are being worked out for priority projects which have no alternatives but to use forest areas. These recent initiatives have contributed in bringing development partners to the mainstream of biodiversity conservation.

RE 5b)

Although there has not been any specific works to identify taxonomic needs for the conservation and sustainable use of biodiversity, a few activities are focused on the exploration and identification of plants. The staff members of the Department of Plant Resources, the Central Department of Botany of Tribhuvan University, and RONAST have, with the support of Royal Botanical Garden, Edinburgh, U.K., implemented the Darwin Initiative Project to contribute to the preparation of NEPAL Flora and strengthen the institutional base for plant taxonomy, particularly the herbarium collection. The project will provide training to 18 Nepalese scientists on the techniques of data recording and collection of plant specimen, as well as on the assessment of conservation status, using the new IUCN categories. The training will also impart modern herbarium techniques for the collection, management, documentation and utilisation of biodiversity. The project is expected to impart fundamental skills to enable Nepali scientists to

generate taxonomic information, and assess conservation status including that of plant species. It is also expected to contribute to the realization of the objectives of the Global Taxonomy Initiative (GTI) and the Global Strategy for Plant Conservation (GSPC). To identify the needs and to build capacity on taxonomy, the Department of Plant Resources is collaborating with the IUCN Regional Office.

RE 7b)

Some studies had been conducted to find out the status of flora and fauna, wildlife habitats, and the need for the conservation of ecosystems and species before the establishment of protected areas. The management plans developed for the conservation of such protected areas also include assessment of threats and challenges for biodiversity conservation. The assessment of the status of plant species will be carried out shortly as a part of the Darwin Initiative Project scheduled to be implemented by RONAST.

Although target monitoring has been institutionalised, performance and impact monitoring is yet to be internalised and institutionalised. The King Mahendra Trust for Nature Conservation in collaboration with UNEP, WCMC and Darwin Initiative has prepared a guideline for biodiversity assessment and protected area monitoring in early 2005. This field-tested guideline will provide a basis for mainstreaming biodiversity assessment and monitoring within and outside the protected areas in the days to come. Biodiversity monitoring has also been initiated in selected protected areas of lowlands such as Royal Bardiya National Park with the active participation of the local communities. These initiatives are expected to enhance knowledge and skill for future assessment and monitoring works.

The Nepal Biodiversity Strategy (2002) emphasizes the monitoring of habitats, ground conditions, status of indicator species, benefit sharing, as well as the management and physical parameters in all ecosystems. The documentation of biological resources and traditional knowledge at the community level has been started to set a benchmark at the national level, and assess the status and trend at the species level. By the end of June 2005, such documentation was completed in about 30 village development committees.

RE 8b)

A number of plans, policies, and programmes have been formulated for the conservation and sustainable use of biodiversity. As Nepal is a mountainous country, emphasis has been given to make the plans, policies and programmes mountain-friendly. After the celebration of the Mountain Year in 2002, HMG/Nepal has formulated a mountain specific development policy which focuses on the conservation and sustainable use of biodiversity. The list of policies and legislations are given in 4c above. Similarly, to protect the endangered snow leopard within and outside the protected areas, the government endorsed the Snow Leopard Action Plan in early 2005. In accordance with the spirit of the Nepal Biodiversity Strategy (2002), Nepal is moving towards the preparation and implementation of the species action plans for protected and the endangered species.

The agriculture policy (2004) has given due priority to *in situ* conservation of agro-biodiversity. Most of the forests outside the protected areas are managed by local communities and the participatory management is based on operation plans to promote the conservation and sustainable use of biological resources.

RE 11 b)

According to the Constitution of the Kingdom of Nepal, the information on biodiversity falls in

the public domain. The governmental organizations, NGOs and community-based organisations engaged in biodiversity conservation are required to publish and disseminate information about their management practices and also to put the information in their respective websites for easy public access. Most of the ongoing projects bring out their publications about their activities and achievements for dissemination. Moreover, the Ministry of Forests and Soil Conservation and the Ministry of Agriculture and Cooperatives along with the network of offices under the ministries situated all over the country also regularly publish and disseminate bulletins and newsletters, air radio programmes and telecast television programme. For instance, the Terai and Siwaliks Biodiversity Sector Programme implemented with the support of SNV airs weekly radio programme on the importance of biodiversity conservation through local FM radios. Similarly, apart from bringing out regular publications, the Department of Agriculture, Department of Forests, and the Department of National Parks and Wildlife Conservation also use radio and television programmes to promote biodiversity conservation.

RE 14 b)

Nepal has started the conservation of wild biological diversity in different ecosystems through a network of protected areas. Biodiversity conservation has been promoted in the forests managed by the government, or by the community forest user groups or leaseholders. The government has also initiated the process of documenting biodiversity. The documentation of biodiversity along with the traditional knowledge, skill and practice of 30 communities has already been completed. Similarly, initiative has been taken in the agriculture sector to conserve the genetic resources along with the documentation of biodiversity. Some programmes are ready for the conservation of wetland biodiversity. The Water Resources Strategy (2002) also focuses on biodiversity conservation of the inland water and its objectives will be complemented by water resources programmes and projects. However, the information on biodiversity of dry and sub-humid land is inadequate, and the management prescriptions are yet to be implemented in the true spirit of the Convention.

RE 15 b)

About 70 percent of the tourists coming to Nepal visit the mountainous areas of the country. The earnings from trekking and mountaineering can improve the living conditions of mountain people. In order to reduce the use firewood as energy in popular trekking routes, the government has been promoting the use of kerosene, micro-hydro power and solar energy as alternative source of energy. Tourism policies emphasize sustainable mountain development. Natural resource conservation has been one of the priorities in popular tourist destinations. Mountain people have realised that only clean and healthy environment would attract more tourists. Mountain people have also developed awareness of the importance of good sanitation system. The Nepal Tourism Board and other organisations working in the field of sustainable mountain tourism have developed and implemented code of conduct to preserve natural and cultural heritage of the mountains.

In recent years, Nepal has made efforts to integrate biodiversity conservation with tourism development. The country also emphasizes sustainable management of tourist destinations. There has also been a growing awareness on the need for conserving mountain ecosystems such as agriculture, forests and wetlands. Efforts have been made to avoid pressure on natural resources in tourist destinations by diversifying it.

RE 16c)

Nepal realises the contribution of local people's traditional knowledge, skills and practices for conservation and sustainable use of biodiversity. HMG/Nepal is in the process of finalising the

Access and Benefit Sharing Bill and Regulations, which has provisions for the protection of traditional knowledge, skills, techniques and practices of local and indigenous communities for the conservation of biological resources, particularly the genetic resources. The Bill also has provisions for Prior Informed Consent (PIC) before documenting such knowledge, skills and practices. In collaboration with national NGOs, HMG/Nepal has documented the biodiversity used by 30 communities, which also includes information, *inter alia*, on their traditional knowledge, skills and practices. The National Wetland Policy (2003) also emphasises on the need to document such information to protect and utilise them for the conservation of wetlands and wetlands biodiversity. It is a priority of the government to document biological resources and associated traditional knowledge.

RE 19 b)

Nepal celebrated the year 2002 as the International Year of Mountains. HMG/Nepal, in collaboration with several partner organizations, launched several programs including the declaration of Shivapuri as a National Park and establishing High Altitude Botanical Garden at Daman. Both of them fall in Central Nepal.

Apart from celebrating the Year and enunciating national policy and programmes for the conservation of mountains, several activities with regard to the celebrations were carried out during year such as the launching of International Year of Mountains; mobilization of the media to promote mountain development, and the declaration of buffer zone around the protected areas. The awareness and promotion activities included poetry recitation, essay competition, seminar and symposiums, celebration of Wildlife Week and Plant Day, bringing out of new postal stamps on mountains, and training program on cultural heritage conservation. The concerned government organizations also took part in the Global Mountain Summit and other programmes dealing with integration mountain issues. The chronology of major events is given in Annex 5.

The Year 2002 was instrumental in creating awareness at different levels about the urgent need for the implementation of conservation programs in the mountains. Nepal celebrated the First International Mountain Day in 2003. His Royal Highness Crown Prince Paras Bir Bikram Shah Dev graciously inaugurated the main program and an exhibition on mountains. Her Royal Highness Princess Himani Rajya Laxmi Devi Shah also graced the inaugural ceremony and the exhibition. HRH Crown Prince distributed the Mountain Development prizes to institutions and individuals for their outstanding contribution to the conservation of mountain ecosystems. The award was set up after the celebrations of the International Year of Mountains 2002 to recognise the outstanding works of institutions and individuals for mountain development, including biodiversity conservation.

Similarly, the country's Natural History Museum and the International Mountain Museum also contributed significantly to promote the need for the conservation of Nepal's mountain biodiversity through education and awareness programs. The Natural History Museum is affiliated with Tribhuvan University, while the Mountain Museum was established with the support of the Nepal Mountaineering Association, HMG/Nepal, and several partner INGOs.

The Ministry of Forests and Soil Conservation celebrated the International Mountain Day in the premises of the International Mountain Museum, at Pokhara in west Nepal. The then Rt. Honourable Prime Minister Sher Bahadur Deoba inaugurated the program and awarded the Mountain Development Prize to a number of institutions and individuals working at the grassroots level for their contribution in the field of nature conservation.

The government has been celebrating the International Biodiversity Day, Wildlife Week, Plant Resources Day, Soil Conservation Day and the Paddy Day to generate public awareness. The Ministry of Agriculture and Cooperatives also organizes Biodiversity Fair every year. These activities have enhanced public awareness about the importance of biodiversity conservation at different levels. Nepal also celebrated the International Year of Eco-Tourism in 2002 by organizing various activities. Most of these activities were jointly organised during the celebrations of the International Year of Mountains. With regard to the environmental problems in the mountains, the Ministry of Environment, Science and Technology published the State of the Environment Report on Ecotourism on the occasion of the World Environment Day 2003 The Ministry was previously called the Ministry of Population and Environment.

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