

## Chapter 6

# Biodiversity

It is well known that intensive land-use patterns have adverse impacts on biological diversity of habitats. Agriculture, horticulture, man-made forests and uses of land for livestock development that, undoubtedly, have contributed to improvement in the quality of life for man, have, also, reduced biodiversity over time. Urbanisation, industrialisation and inexorably growing demographic pressures have further contributed to this phenomenon.

The Himalayas fall biogeographically into the boreal zone. The NWHRI subzones are Sino-Siberian (Ladakh), alpine, temperate and subtropical. There is considerable heterogeneity in geology, geography, soils and climates that gives rise to many macro- and micro habitats. Both floral and faunal diversity characterises the region. The Himalayan biota reflects several biogeographical influences: palaeartic, Mediterranean, Sino-Japanese, Indo-Malayan and peninsular Indian (Mackinnon and Mackinnon 1986). There is also considerable endemism.

### Fauna

In the country as a whole, of 75,000 species known, 2,500 are fish, 180 amphibians, 2,000 birds and 850 mammals. Of these, 81 species of mammals, 47 of birds, 15 of reptiles, three of amphibians and a large number of butterflies, moths and beetles are listed as endangered (Trivedi and Sudarshan 1994). A separate set of figures for the NWHRI is not available. However, many species in the region are classed as endangered, vulnerable, or rare — including elephant, musk deer, snow leopard, markhor, hangul, the Himalayan tahr, clouded leopard, ibex, flying squirrel, red fox, wild yak, golden langur, swamp deer, brown bear, Himalayan black bear, woolly wolf, Tibetan lynx, tiger, and leopard. Threatened birds include the monal pheasant, snow cock, snow pigeon, chir pheasant, paradise fly catcher, green finch, whistling thrush, red start, red-crowned jay, red-headed tit, Himalayan eagle, Himalayan falcon, Himalayan chakor, Himalayan vulture, spotted folktail, mallard duck, and Western tragopan. Among aquatic forms of

life, many species are under challenge. The golden mahaseer and the snow trout have already become rare. Animal habitats in the NWHRI have shrunk or have been changed to the detriment of many species. Avifauna have been under assault by trappers, poachers, netters, and gun-hunters. The largest volumes of illegal trade involve musk deer, parrots, reptiles, lizards, and large animal skins and bones. Many animal skins and furs fetch extremely high prices.

## Flora

India has 7,000 endemic floral species of which about 3,000 are to be found in the Himalayan regions and Khasi Hills. Khoshoo (1992) states that the 'Himalayan region has been the source of several species of cereals, pulses, fruit, oil-yielding plants, spices, tuberous vegetables, and sugar-yielding plants and their wild relatives. Added to these is a whole range of medicinal and aromatic plants.

Faulty policies on land, agriculture and forestry, grazing, animal husbandry, fishing, wildlife and tourism have resulted in habitat loss leading in turn to the loss of biodiversity. Equally important has been the lack of trained manpower, public awareness and lack of financial support.'

In the NWHRI, diversity has narrowed. Sixty-five species of fern are threatened, common species have become rarer, and rare ones have been eradicated from some areas (Bir 1993). Gaur *et al.* (1993) carried out an extensive survey in the Garhwal Himalayas and listed 32 plant species of vulnerable nature that had not been noted to be so before. Around 98 Himalayan species have been listed as endangered (Trivedi and Sudarshan 1994). Many plants have suffered from over-extraction. Natural recession processes have brought substantial floristic modifications sometimes changing the whole composition of a forest type. One example is the conversion of *banj* (*Quercus*

*incana*) forest into chir pine (*Pinus roxburghii*) forest in which a multi-use species has been supplanted by a coloniser.

The NWHRI has rich floral endemism. There are 125 plant species that have wild relatives covering crops such as cereals, legumes, fruit, vegetables, oilseeds, spices, etc. These cultivars have many possible uses. Floristic variation is enormous. The region is a storehouse of diversity in food, fodder, vegetables, fruit, and medicinal plants growing in valleys, hill terraces, and on mountain tops — mostly under rainfed conditions (Arora 1993).

## Laws, Rules and Conventions

Management of biodiversity is based on international, national and state policies, statutes, regulations, executive orders, treaties, conventions, and other international agreements. In India, the history of such laws goes back to the nineteenth century. The Wild Birds and Animal Protection Act was brought into effect in 1887 but repealed in 1912. The Forest Act 1927 provided for game protection. The Indian Board of Wildlife was established in 1952. In 1972, a specific Wild Life Protection Act was promulgated that regulated and controlled possession, trapping or shooting of wild animals, and their transport for export. Threatened species are absolutely protected and the rest offered graded protection. The 1972 law was amended in 1991 to improve conservation practices. A total ban on the hunting of all wild animals was imposed. Search and arrest powers were given to wildlife officials and punishment for infractions of law enhanced. Wild plants were brought within the definitional purview of wildlife. The Central Government has made it obligatory for state governments to give representation to tribals on the State Wildlife Advisory Boards to ensure that their interests are taken into account. Even a private individual can now file a complaint in a court of law in case of any infraction of the amended wildlife law.

Honorary wildlife wardens are required to be appointed in all districts. The message of the law is that effective wildlife protection needs public involvement, public acceptance, and public participation.

### Protection Programmes

Wildlife protection has concerned the international community since the late 1940s. In 1979, India began preliminary work. After the Minsk Conference on Biospheres in 1983, an action plan was drawn up and 13 potential biosphere reserves were identified. Three biosphere reserves were set up in the Himalayan region, of which one, at Nanda Devi, is located in the NWHRI. In 1973, India became a signatory to the Convention of International Trade in Endangered Species of Wild Fauna and Flora. In the course of time, the Botanical Survey of India set up Germplasm and Gene Sanctuaries. A National Bureau of Plant Genetic Resources was established under the Indian Council of Agricultural Research with a network of 10 centres, three of which are located in the NWHRI. There is also the National Facility of Plant Tissue Culture Repository. At both these facilities, the number of seed and tissue samples exceeds 150,000.

### Biosphere Reserves, National Parks and Sanctuaries

India has 80 national parks and 441 sanctuaries, covering 4.5 per cent of its land mass. The percentage is higher for the Himalayan region as a whole (about 8.5 per cent according to Rodgers and Panwar

1988). For the NWHRI, protected areas (biosphere reserves, national parks and sanctuaries) cover an area of 27,202 sq.km., that is, 8.2 per cent of the landmass (Table 14).

Wildlife populations are found in areas where their basic needs—shelter, reproduction, food, water, and movement—are satisfied. It is against this background that protected areas have been set up in India in the form of sanctuaries, parks and biosphere reserves. National parks have legal status and are created exclusively for conservation of wildlife (faunal and floral) in their natural environment. Human settlements are not allowed. Grazing and forestry operations are prohibited. Tourism is controlled. Management is essentially compensatory and improving in nature. Sanctuaries also enjoy legal status with strong but not exclusively wildlife-oriented management. Grazing is restricted and subordinated to the requirements of wildlife. Tourism may exist. Sanctuaries may be upgraded to national parks.

The concept of biosphere reserves is claimed to be a significant step towards the conservation and sustainable management of unique and representative ecosystems. In it, the approach is broadened to include man as an integral part of the environment. A system of zoning is adopted to achieve multiple objectives. Unique and undisturbed ecosystems are given full protection by including them in the core zone. The buffer zone—a sufficiently large surrounding area—permits human activity at a level at which the renewability of basic life-sup-

**Table 14: Protected Areas in the NWHRI**

State/hill region	National parks		Wildlife sanctuaries	
	Number	Area (sq.km.)	Number	Area (sq.km.)
Jammu and Kashmir	4	3810	16	10,164
Himachal Pradesh	2	1295	29	4577
Uttar Pradesh hills*	6	4920	6	2436
Total	12	10,025	51	17,177
Note:* In Uttar Pradesh hills, Nanda Devi National Park became a biosphere reserve in 1988 with a core zone of 625 sq.km and a buffer zone of 1,612 sq.km.				

port systems is not undermined. Even in some national parks, core-buffer management is adopted, e.g., Corbett National Park in the Uttar Pradesh hills. Extension buffering and social buffering can both be used. People-orientation is a basic tenet of biosphere management.

### **Impact of Protected Areas on People**

Conservation of biodiversity involves protection, control, regulation, and some restrictions on access. In a country or region where demographic pressures are intense, human needs also have to be addressed. The issue of conservation, therefore, becomes complex and often contentious. An apparently simple issue of protecting wild animals and plants becomes a conflict: human rights versus the protection of animals and forests, the exclusion of all humans from protected areas versus the possibility of human coexistence with wildlife, and exclusive state control versus increased local participation in protected area management. Some wilderness management examples from the NWHRI can be used to draw lessons on how conflicts between stakeholders have arisen and how they might be addressed.

#### ***Nanda Devi Biosphere (Uttar Pradesh Hills)***

This high-altitude biosphere is located in the districts of Chamoli, Almora, and Pithoragarh in the Uttar Pradesh hills. The Rishiganga basin, which forms the core zone of the reserve, was declared a sanctuary in 1939. In 1982, it was upgraded and became a national park. Then, under the UN's Man and Biosphere Programme, it became a biosphere reserve in 1988 (it is also listed as a World Heritage Site). Its core area is 624 sq.km., while the buffer zone is 1,612 sq.km. It has about 600 plant species, and 18 species of mammals, of which seven are endangered. There are about 200 bird species, eight of which are endangered.

While the core zone has no habitation, 17 villages are located in the buffer zone and are inhabited by 2,385 people (1991 census) and 7,404 head of cattle. The villagers practise marginal subsistence agriculture, rear cattle for milk, and sheep for wool. Management activities in the reserve include database preparation, ecorestoration, ecodevelopment, protection, education, awareness training programmes, and introduction of improved stoves and solar lights. Emphasis is on active participation of local people, sustainable agriculture and allied activities, development of cottage industries, cultivation of medicinal plants, apiculture, and eco-friendly tourism. However, the project/people interface has started to sour. According to recent press reports, the residents of Lata, Reni and other villages have initiated a campaign for restoration of their traditional rights and privileges. The biosphere concept is based squarely on the premise of people's involvement in management and protection functions. While the core zone has to be a natural, undisturbed, or minimally disturbed area, the buffer is a multiple-use area where people can carry out their traditional occupations. Reports of simmering protest are a sign that mutuality between people and wilderness has not evolved, although a decade has passed since the reserve came into being.

#### ***Great Himalayan National Park (Himachal Pradesh)***

This park covers 765 sq.km. and is located in Kullu district of Himachal Pradesh. Its vegetational diversity is complemented by its faunal diversity, and many species are threatened. Pastures provide forage for sheep and goats. Under a system of grazing runs, flocks are sent to the area by turns from May to October. Seasonal vegetation includes about 50 species of medicinal plants that are commercially important. Villagers also collect mushrooms.

In 1984, the park was notified; a ten-year management plan was prepared in 1987. Although grazing and foraging are not permitted in national parks, it has not been possible to stop it here (Baviskar 1998). Village communities are hostile to restrictions. It has not been possible to bring about participatory management of resources because it appears that affected people feel that they have been treated as 'objects of social engineering' rather than 'sharing, caring' actors. Hence, the flouting of laws.

### ***Rajaji National Park (Uttar Pradesh Hills)***

This national park (notified in 1985) includes three former sanctuaries: Rajaji, Motichur, and Chilla. The park falls in the districts of Dehradun, Hardwar, Bijnor, and Pauri Garhwal. Spread over 820 sq.km., it has a rich ecosystem comprised of forest types such as riverine, broad-leaved mixed stands, chir pine, scrubland, and grassy pastureland. It protects 23 species of mammals and 315 of avifauna, many of which are threatened. There are 56 village *panchayat*(s) adjoining the park. There are also four *taungya* villages and over 500 resident Gujjar (nomad) families.

The Gujjar have long been transhumant dwellers of the area. According to the Chief Wildlife Warden, 150 of these families have been relocated outside the park, following a decision made by the Supreme Court in 1997.

Residents within the park and people living in nearby villages consider that they have traditional rights and concessions related to grazing, fuelwood, fodder, babbar grass, timber, grass for thatch-making, and access to water. The national park has given rise to conflict between park authorities, affected communities, and some NGOs. Reconciliation of stakeholders' interests still remains an unachieved task. Conflict continues with

political overtones, protests by the affected communities, and voices raised by NGOs.

The situation in and around Rajaji National Park is not singular or unique. It is found in and around many sanctuaries and national parks in the country and in the NWHRI to varying degrees. In 1993, social activists and institutions from all over India met in Dehradun at a workshop to discuss protected areas and community issues. They produced the Doon Declaration on People and Parks. The declaration asked the Central Government to take steps to ensure that conservation of flora and fauna in the country is based upon clear recognition of the customary rights of local people, including nomads, living inside and immediately around these natural resource areas. It further urged that the Wildlife Protection Law should be modified to conform with the stated objectives of the National Forest Policy 1988 which, unambiguously, recognises the rights of tribals, nomads, and forest dwellers.

This is a typical dilemma that accompanies the exercise of choices and trade-offs between conservation and development. Communities have to be convinced that protection and development can go together, but that it needs discipline, education, and decision-making partnerships. In the larger interest of the country, protection areas are required. If this affects access of some people, suitable, viable, and acceptable compensatory measures and alternatives must be provided to ensure that the communities affected are fully protected. The following are steps that need to be taken in this context.

- Develop reliable databases of protected areas and update them.
- Improve management practices by providing skilled manpower, technology, and resources.
- Take people on board by adopting a

joint protected area management policy as has been done in the case of forests.

- Launch intensive awareness and educational programmes for both managers of protected areas and the 'partner' communities.

It is a combination of participatory management approaches, use of science and technology, and social mobilisation that can address serious ecological concerns that have to be the focus of any effective biodiversity protection policy.