2.7 State of biodiversity in Pakistan

Pakistan has 225 protected areas (PAs) 29 national parks, 99 wildlife sanctuaries, and 96 game reserves. All these protected areas aim towards conservation of biodiversity in the country. The situation of existing biodiversity in Pakistan is explained briefly as under:

- **Flora**

  About 5,500 - 6,000 species of vascular plants have been recorded in Pakistan including both native and introduced species. The flora included elements of the 6 phytogeographic regions. 4 monotypic genera of flowering plants and around 400 (7.8%) species are endemic to Pakistan. Almost 80% of the endemics are found in the northern and western mountains. A checklist of flora of Salt Range is shown in appendix I.

- **Mammals**

  According to the Biodiversity Action Plan of Pakistan, around 174 mammal species have been reported in Pakistan. Out of these, there are at least 3 endemic species and a number of endemic and near endemic sub-species. A checklist of large mammals of Salt Range is shown in appendix II and small mammals in apendix III.

- **Birds**

  668 bird species have been recorded in Pakistan. Out of them, 375 were recorded as breeding. The occurrence of many species at one or the other geographical limits of their range shows the diverse origins of the avifauna. The Sulaiman Range, the HinduKush, and the Himalayas in the KP and Azad Kashmir comprise part of the

Western Himalayan Endemic Bird Area; this is the global centre of bird endemism. The Indus Valley wetlands are the second area of endemism. A checklist of birds of Salt Range is shown in appendix IV.

- **Reptiles/ Amphibians**

There are around 177 species, out of the total 14 species of turtles, 90 of lizards and 65 of snakes have been reported, while 13 species are believed to be endemic. Being a semi arid country, only 22 species of amphibians have been recorded, of which 9 are endemic. (BAP, 2000). A checklist of reptiles and amphibians of Salt Range is shown in appendix V.

- **Fish/ Invertebrates**

Pakistan has 198 native and introduced freshwater fish species, among them 29 are endemic species.

There has been little research on invertebrates of Pakistan. About 5,000 species of invertebrates have been recorded including insects (1,000 species of true bugs, 400 species of butterflies and moths, 110 species of flies and 49 species of termites). Other include 109 species of marine worms, over 800 species of molluscs and 355 species of nematodes. (BAP, 2000). A checklist of fish of Salt Range is shown in appendix VI.

Biological diversity, biotic diversity or biodiversity for short is a term, which is now commonly used to refer to all kinds of life forms on planet earth, e.g., million of plants and animals as well as above and below ground micro-organisms. This is, in fact, species diversity and is usually measured in terms of total number of species within discrete geographical boundaries. But the biodiversity also refers to all kinds of genes which these living species possess and which enable production of new breeds of crop plants and domestic animals and in the wild enable species to adapt to their changing environmental conditions. It includes the complex and unique ecosystems they have built as their living environment. An ecosystem consists of communities of plants and animals and non-living elements of environment (soil, water, air, etc.). It is the end result of four billion years of evolution of all life forms. The exact number of life forms on earth is not known; estimates range from 5 million to 30 million to 50 to 100 million. Of these, only 1.4 to 1.7 million species have been identified and described so far. The tropical forests cover only 14% of the land surface but hold at least 50% of world species, many of them neither named nor studied. In economic terms, biodiversity is a collective resource and strongly related to biotechnology and its utilization by developed and developing countries. The perceived benefits of conservation of biological diversity are large in industrialized countries but small in others. New species and varieties and new uses for known species and varieties are being discovered every day. However, our knowledge of their nature, extent, present and future role in ecosystem development and usefulness for human welfare still remains very limited. The forests all over the world are primary sources of biodiversity and genetic resources and serve as a habitat for these resources. They are an integral and central part of all life support systems on earth.

There is considerable worldwide concern for conservation of biological diversity since 1971, because many species of plants and animals have become extinct or are endangered due to human activities, such as, excessive exploitation of biological resources, pollution, modernization of agriculture changing local culture, and fragmentation and destruction of habitats of different wildlife. This was recognized by the United Nations Conference on Environment and Development (UNCED) held in Brazil in June, 1992. A Biodiversity Convention was approved by the Conference and most countries of the world, including Pakistan, are signatory to it. It was emphasised by the Conference that conservation of biodiversity is key element of forest conservation because forests are habitats and ecosystems in which

different life forms thrive. If forests are cleared or destroyed through over-exploitation, then these life forms become extinct and are lost for ever for any future use. The UN Convention provides for conservation of biological diversity, sustainable use of its components, fair and equitable sharing of the benefits arising out of utilization of genetic resources among all nations of the world, etc. It obliges participating countries to develop national strategies, plans and programmes for this purpose.

The preservation of endangered species and unique ecosystems is a national as well as international responsibility for all countries of the world. The reasons for the conservation of biological diversity are many. All plants and animals have numerous benefits for the human beings in the form of food, medicine and industrial raw materials and have potential to generate many more benefits in future. Wild plant resources are indispensable for developing new agricultural and medicinal varieties and products. In the industrialized countries, some 40% of all medical prescription drugs have been derived from natural sources or prepared with the help of chemical blue prints provided by nature. This is the case when only 5,000 of 250,000 flowering plants of the world have been analysed so far for their pharmacological properties. The scope for use of additional plant species in future is much higher. On the other hand, it is estimated by the World Health Organization that 80% of people in the developing countries rely on traditional medicines for their primary health care which are generally based on wild plants and animals. Wild animals have economical, commercial, scientific, psychological, aesthetic and recreational values. Natural ecosystems attract tourists seeking recreation which help in the development of local and national economies. Tourists bring in valuable foreign exchange and their demand for guides, craft goods, accommodation and services creates employment in rural areas.

Biodiversity also helps in the provision of an array of essential services to humanity viz., modifying climatic extremes, keeping the air clean, degrading wastes, absorbing and breaking down pollutants, recycling nutrients, creating and ameliorating soil, controlling diseases, regulating hydrological cycles, and preserving the species critical to pollination, pest control, gene flow, cross fertilization, and maintenance of evolutionary processes. Diversity of the plants and animals also has an intrinsic value independent of its value for humanity. Many species of wild animals and plants, and the ecosystems of which they are integral parts, are a source of irreplaceable wonder, spirituality, and inspiration to humanity.

Biodiversity is however, being lost continuously following habitat fragmentation and destruction from clearing and burning forests, draining and

filling of wetlands, destroying coastal areas for development, and converting natural ecosystems for agriculture, industry and human settlement. Other causes of biodiversity loss include the over-exploitation of plants and animals, invasion by introduced species, air and water pollution, industrial affluents and the prospects of climatic change. The current threat to biodiversity is the consequence of a complex variety of underlying social, economic, political, and cultural forces and trends operating on local, national and international scales. The tropical forests are receiving maximum attention for prevention of global warming due to deforestation and for conservation of their very rich biological diversity, in all international fora. Conservationists believe that a minimum of 50,000 invertebrate species per year, nearly 140 per day, are condemned to extinction by the destruction of tropical forests. Large creatures, as well as, small are vanishing. Deforestation is responsible for extinction of at least one species of bird, mammal, or plant every day.

Species extinction is also a natural process. But the current rate of their extinction through human activities is 1000 to 10,000 times more than that by natural process. The IUCN/WWF/UNEP World Conservation Monitoring Centre, Cambridge, UK, maintains a data base on the world's threatened species. Its 1988 data is reproduced below:

Life forms/living organisms	Number of species known	Globally rare or threatened species
Plants	250,000	19,077
Fish	19,000	596
Amphibians	4,184	54
Reptiles	6,300	186
Invertebrates	1,000,000	2,125
Birds	9,040	1,073
Mammals	4,000	555

According to a recent IUCN report, out of total 4,600 mammal species, 1,096 are threatened and one third of primate 275 species are at risk. Worldwide, a total of 5,205 species fall within one of three endangered categories; including 11 percent of bird species, 20 percent of reptiles, 25% amphibians and 34 % of fish (most of fresh water). 44 percent of crocodile species are endangered.

Biodiversity loss may also be considered as energy loss. Photosynthetically fixed energy supports the great diversity of species that inhabit the world's ecosystems. Globally, natural terrestrial ecosystems fixed

about 2800×10^{13} J of energy per year (net) prior to significant human impacts. In recent years, humans have diverted or prevented about 20 to 30% of this energy from flowing through natural ecosystems by maintaining croplands (15%) and urban areas (1.8%) and by grazing livestock (2.3%). Habitat degradation, mainly in the form of *desertification*, has also caused a reduction (4%). Energy flow can be related to numbers of species with species-energy curves; these show the relations between species richness and the total energy flow in different regions, and are similar to species-area curves. By extrapolating back along a species-energy curve, the observed reduction in natural energy flow to human activity can be used to make a quantitative prediction of species endangerment. Given 20 to 30% reduction energy and a species-energy exponent (z) between 0.10 and 0.20, the endangerment is predicted of 2 to 7% of the world's terrestrial species. Projections to the year 2000 indicate that 3 to 9% of the world's species may be extinct or endangered by that time. These estimates are probably conservative.

The basic cause of habitat destruction, and the accompanying loss of biodiversity is the population growth. It is estimated that a combination of population increase and growth in real economic demand has resulted into doubling of the demand for natural resources every 12 years. The process of economic development itself widens inequality and may force the poor to depend heavily on natural resources. On the other hand, the development models followed, in most instances, have been incompatible with sustainable use of natural resources. This is of fundamental importance in Asia, where 50 percent of the world's population is supported on 13 percent of the world's land area, and where 60 million people are added every year to further aggravate the already deteriorating situation. However, the question of providing assistance to the developing countries for conserving biodiversity is being discussed in developed countries. It is now argued on the basis of economic rationale of cost benefit that, industrialized countries can realize gains from trade by financing conservation of biodiversity in tropical developing countries.