

# PAKISTAN

Fourth National Report



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Ministry of Environment

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Front Cover

Chitral National Goal. Photo: NWFP Wildlife Department

*Trichosanthes cucumerina*, a wildflower in Margala Hills National Park. Photo: Himalayan Wildlife Project.

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Barred Owlet, *Glaucidium cuculoides* sitting on a wild fig tree in Margalla Hills National Park.. (Photograph: Mr. Glulam Rausul, Himalayan Wildlife Foundation, Islamabad)

### Acronyms

ABS	Access and Benefit Sharing
ADP	Annual Development Programme
AJKFWD	Azad Jammu & Kashmir Fish and Wildlife Department
BAP	Biodiversity Action Plan
BCS	Baluchistan Conservation Strategy
CBD	Convention on Biological Diversity
CBO	Community Based Organization
CEC	Conservation and Enterprise Committee
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
CKNP	Central Karakorum National Park
DNA	Deoxyribonucleic acid
EE	Environmental Education
EIA	Environmental Impact Assessment
ERWDA	Environmental Research and Wildlife Development Agency
ESA	Environmentally Sensitive Area
FAO	Food and Agriculture Organization of the United Nations
GDD	Growing degree days
GDP	Gross Domestic Product
GEF	Global Environment facility
GIS	Geographical Information System
GoP	Government of Pakistan
GPS	Global Positioning System
HWF	Himalayan Wildlife Foundation
HYV	High Yielding Varieties
ICZM	Integrated Coastal Zone Management
IDDV	Integrated District Development Vision
IEE	Initial Environmental Examination
IUCN	International Union for Conservation of Nature
Km	Kilometer
LAC	Local Advisory Committee
LGO	Local Government Organization
LPG	Liquid Petroleum Gas
M	Meter
MACP	Mountain Areas Conservancy Project
MAF	Million Acre Feet
MFD	Marine Fisheries Department
MSP	Medium Scale Project
NA	Northern Areas
NASSD	Northern Areas Strategy for Sustainable Development
NCS	National Conservation Strategy
NEAP	National Environment Action Plan
NGO	Non Governmental Organization
NOAA	National Oceanic and Atmospheric Administration
NP	National Park
NRM	Natural Resource Management
NTFP	Non Timber Forest Product
NWFP	North West Frontier Province

PA	Protected Area
PAMP	Protected Areas Management Project
PMNH	Pakistan Museum of Natural History
PPEPCA	Pakistan Petroleum Exploration and production Companies Association
PRIF	Pre investment Facility
PSL	Project Snow Leopard
PWGIS	Pakistan Wetlands Geographical Information System
PWP	Pakistan Wetlands Programme
SAARC	South Asian Association for Regional Cooperation
SACEP	South Asia Cooperative Environment Programme
SEA	Strategic Environmental Assessment
SPCS	Sarhad Provincial Conservation Strategy
Sq	Square
SLM	Sustainable Land Management
SMART	Self Monitoring and Reporting
SSSD	Sindh Strategy for Sustainable Development
SUSG CAsia	Sustainable Use Specialist Group for Central Asia
TED	Turtle Excluding Device
UNDP	United National Development Programme
UNEP	United Nations Environment Programme
UNESCO	United Nations Educational, Scientific, and Cultural Organization
UK	United Kingdom
USA	United States of America
VO	Village Organization
WCS	Wildlife Conservation Society
WTO	World Trade Organization
WWF	World Wide Fund for Nature



Orange Oakleaf or Dead Leaf (*Kallima inachus*), a nymphalid butterfly in Margalla Hills National Park (Photograph: Ms. Shadmeena Khanum, Himalayan Wildlife Foundation, Islamabad)

## PREFACE

Pakistan is endowed with a wide variety of ecosystems and habitats and many species of flora. Pakistan is the meeting point of the three out of the six biological regions of the world. Species belonging to the Palaeartic realm occur largely in the uplands; those belonging to the Indo-Malayan realm occur primarily in the Indus plain and the Himalayan foothills. The species with affinities to the Ethiopian region occur in the dry southwest.

The Convention on Biological Diversity (CBD) and related conventions have greatly influenced the policies and programmes in Pakistan. Although Pakistan has a long history of conservation, yet the conservation of whole array of species and genetic diversity never received as much attention as after the CBD. The fourth national report provided a unique opportunity to assess the progress made on the implementation of the CBD and related conventions. While the country has made significant progress, the institutional weaknesses, the lack of human and financial resources, and the major gaps in implementation of 2010 biodiversity targets clearly emerged from the process of fourth national report. The report not only provides us an opportunity to share our experiences with the rest of the world, but also provides with some direction for the future.

Coordination with diverse stakeholders and relevant stakeholders for progress at national and provincial level was particularly a daunting task exacerbated by inadequate capacity of the Biodiversity Secretariat in the Ministry of Environment. Mr. Rizwan Irshad, Technical Officer single handedly spearheaded the whole process under the guidance of a six member National Report Coordination Team. The services rendered by the Team, and contributions made by the members are gratefully acknowledged. Thanks are also due to all those organizations that made valuable contribution towards progress reports on 2010 targets.

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## Executive Summary

### Introduction

Pakistan has a diverse relief and a great variety of landscapes ranging from mangroves in the south to Alpine tundra in the north. The northern highlands include parts of Himalayas, Karakorum and Hindu Kush mountain ranges. The Indus river plains, the center of ancient civilization like Taxila, Harappa and Mohenjo-Daro, now constitute the food basket of Pakistan. There are mountain ranges along the western border with Afghanistan, and sandy deserts along the eastern border with India south of Sutlej River. Over 90% of the country falls in dry and sub humid programme of CBD. However, variations in relief and climate have bestowed Pakistan with rich biodiversity with many ecosystems, habitats and species of global significance. Of the 79.9 million hectares of land area, only 22 million hectare (23%) are available for cultivation of which 18 million are canal irrigated and 4 million support seasonal agriculture based on rain and rainwater harvesting.

### Status, Trends and Threats to Biodiversity

The natural ecosystems of Pakistan have been widely and badly affected by human activity that very few truly natural habitats remain. Nine major ecological zones are recognized in Pakistan. Pakistan has 195 mammal species (including 13 sub-species) of which six are endemic. There are 668 bird species, of which 25 are endangered. The reptile species are 177 in number of which 13 are endemic species. The reptiles include 14 turtles, one crocodile, 90 lizards and 65 species of snakes. There are 22 amphibians of which 9 are endemic. Fresh water fish species are 198 with 29 endemics. So far more than 5000 species of invertebrates have been identified. There are over 5700 species of flowering plants with over 400 species endemic to Pakistan.

Pakistan is rich in indigenous crop diversity with an estimated 3000 taxa and around 500 wild relatives of crops. The civilization of Taxila, Harappa, and Mohenjo-Daro domesticated species such as wheat, eggplant, pigeon pea, and cucumber. Many wild and local cultivars survived up to the era green revolution. However, the agrobiodiversity has suffered serious erosion due to the introduction of higher yielding varieties and use of agrochemicals. The Indian sub-continent was the first to domesticate cattle, water buffalo, and chicken. Pakistan now has two breeds of buffalo, eight of cattle, one yak, 25 goat, 28 sheep, one horse, four camels, and three poultry breeds.

The forest biodiversity includes Alpine tundra, cold conifer, temperate conifer, and warm conifer mixed forests. The vegetation in dry and sub humid lands is comprised of xerophytic shrubs and small trees, grasslands, and steppe. Riverine forests grow along the banks of rivers and mangrove forests are found in Indus delta and along the coast. Pakistan has a long coast line with sandy beaches providing nesting sites for turtles. Corals have recently been discovered along the Baluchistan coast.

The major threats to terrestrial ecosystems are from overgrazing and deforestation due to high population pressure and increasing poverty. The diversion of water for irrigation has adversely impacted the ecology of the mangroves and riparian ecosystems. Game birds and animals are heavily hunted using modern technology and some species are persecuted for their depredation of livestock and crops. The fisheries from inland and marine ecosystems are harvested to the full limit and pressure is growing as the population grows. Pollution and disposal of untreated sewage and industrial effluent in the rivers and sea are major threat to the biodiversity.

### **National Biodiversity Strategies and Action Plan**

Pakistan completed a Biodiversity Action Plan in the year 2000, which became a *de facto* biodiversity policy instrument of the country. The BAP has been a useful document and provided overall guidance and as reference material. However progress on its implementation has been less than satisfactory. The implementation mechanisms were not put in place until 2006 when a Biodiversity Secretariat was established in the Ministry of Environment. The secretariat lacked capacity and resources and failed to develop an effective coordination mechanism for implementation of the BAP at national and provincial levels. However a large number of actions recommended by the BAP have been partially implemented.

The conservation concerns in Pakistan were first addressed in the National Conservation Strategy (NCS) that was approved in 1992. The NCS was followed by the formulation of provincial conservation strategies that have been prepared for all the provinces. The strategies that were completed after the approval of BAP have incorporated many of the actions recommended by the BAP. In addition, district conservation strategies were also prepared for two districts and now integrated district development plans are being prepared in some districts. The district strategies and plans also address the biodiversity conservation issues and poverty –environment nexus.

### **Mainstreaming Biodiversity**

There is increasing awareness among the planners, policy makers about the biodiversity convention. The biodiversity concerns are being gradually addressed in the policies and programs of various sectors. The progress so far has been slow mainly because of lack of adequate capacity and partly because of the fact that many of the concepts are new. The Ministry of Education has incorporated biodiversity concepts in the curricula of all high school grades. The agriculture and livestock policies are being formulated and drafts include biodiversity concerns. The fisheries policy of 2006 calls for sustainable harvest, establishment of protected areas and rehabilitation of marine environments damaged by pollution. Forestry sector has launched large scale projects to rehabilitate the degraded forest ecosystems. The Millennium Development Goals aim at increasing the forestry cover from 4.8 to 6%, and protected areas from 9 to 12% by 2015

### **Progress towards the 2010 Targets**

Pakistan has made reasonable progress on 2010 biodiversity targets. The biodiversity data base in the country is not organized in accordance with the programme of work of the convention and therefore it was difficult to report the progress by thematic areas. Pakistan adopted the global framework of 2010 biodiversity targets and did not set any national targets. Almost all major habitats and ecosystems are included in the protected area system which covers more than 10% of the area of the country. Pakistan received grants from GEF for three large scale projects covering mountains, protected areas, and wetlands. In addition, two medium scale projects for conservation of Juniper ecosystem and species and habitats in dry lands are presently under implementation. Pakistan also received GEF funding for small grants programme for biodiversity and forests.

Conservation status of some endangered and threatened species of fauna (ungulates, endemic reptiles, and brown and black bear) has improved, largely through the efforts of local communities and conservation NGOs. However, there is no systematic plan of work to improve the status of species and their habitats that are listed on the CITES appendices. The population of ungulates has significantly increased in conservation areas managed for trophy hunting by the local communities. The natural resources outside of the protected or community conservation areas are deteriorating rapidly and threaten the integrity of the ecosystems and livelihoods of the people.

However, the good news is that the watershed and soil conservation programmes have made some good progress in controlling soil erosion in the catchment areas of large dams. Progress has been made to make sustainable use of water for irrigation and it includes measures like lining of water courses to reduce conveyance losses, and introduction of drip irrigation.

Pakistan is likely to be seriously affected by climate change and there is growing realization to make adaptations and develop measures to mitigate its impact. However, no serious actions have been planned so far to maintain and enhance resilience of the components of biodiversity to adapt to climate change. The ecosystems are degrading fast and losing their capacity to deliver goods and services to support the local livelihoods. The human scientific and technical capacity for implementation of the convention has somewhat improved over time; however, it has still not reached the threshold level necessary for making significant progress on implementation of the convention.

### **Strategic Plan**

A National Biosafety Centre has been established to facilitate implementation of the Cartagena Protocol. National Biosafety guidelines have been prepared to regulate the genetically modified organism. There is no strategic plan to build adequate capacity for implementation of priority action in the BAP, and to secure resources and technology to implement Cartagena Protocol. There is also no strategic plan for integration of biodiversity into the relevant sectors. The awareness campaigns have improved the understanding of the importance of biodiversity and have led to broader engagement across society in implementation. Significant progress has been made in mobilization of national and international financial resources for implementation of the convention; however there is no strategic plan for meeting the future needs.

### **Plant Conservation Strategy**

Systematic collection and documentation of the flora of Pakistan started in 1968. An annotated catalogue of vascular plants was published in 1970. The flora of Pakistan is available in an electronic data base maintained by the Missouri Botanical gardens (eflor.org). There is no lead institution in Pakistan with a mandate for plant conservation, therefore the country was not able to make and implement a Plant Conservation Strategy. However, many targets of the global plant conservation strategy have been met indirectly under the work plan for protected area.

### **Protected Areas**

Pakistan has designated 23 national parks, 97 game sanctuaries and 104 game reserves covering 9,852,006 hectares of land area. A protected area system review carried out in 2000 and an action plan was prepared. The review revealed that many of the areas did not meet the international criteria for the protected areas. Of the 227 PAs listed at the time, 58 were considered to be satisfying the IUCN criteria whereas 169 PAs were considered to have been established mainly to control hunting. The Plan included elements for filling ecological gaps, securing financial resources, and capacity-building, and addresses policy, legislative and institutional barriers.

The review observed that management of the protected areas was required to be upgraded to conform to the principles of conservation. The follow up on this Action Plan has rather been negligible as far as the re-classification of PAs, up gradation of PAs, and establishment of ESAs is concerned. Progress has however been made in achieving partial targets such as filling ecological gaps, capacity-building, addressing policy, legislative and institutional barriers and to some extent in securing financial resources.

Management of at least six national parks is being integrated into the broader landscape and local communities are actively involved in the planning processes. Site based management planning with key stake holders is a standard procedure. The protected areas are established under the wildlife laws by the provinces. Some provinces have revised their laws to bring them in conformity with the convention and present day management needs. There has been no assessment of the protected areas so far to determine the status of biodiversity and effectiveness of the management.

The best practices developed and tested under the MACP and its PRIF phase is now widely used for conservation and sustainable use. Three national parks and four wetland complexes are included in GEF projects and it is hoped that the best practices and standards for management developed and tested in these national parks would be widely replicated for the management and governance of the protected areas in the country. As yet there are no trans boundary protected areas in the country but negotiation have been going on with China for establishing a trans boundary protected area, but no significant progress has been made so far.

## **Conclusions**

### **Impact of Convention on Improving Conservation and Sustainable Use of Biodiversity**

The biodiversity convention has made significant impact on conservation and sustainable use of biodiversity in Pakistan. The impact of the convention is hard to quantify, however, it can be judged from the positive changes that have occurred. The progress has not been even across the thematic areas and cross cutting issues. Following are some of the significant impacts of the convention:

- Conservation was seen as a responsibility of the government alone but now public and private sector partnerships (local communities, NGOs and corporate sector) are emerging for conservation of biodiversity and environmental rehabilitation.
- The local people were considered as a part of the problem, but now they are being made part of the solution. The capacity of local organizations is being strengthened not only to conserve and make sustainable use of their natural resources, but also to join hands with the government and NGOs for management of the protected areas and community conservation areas.
- The biodiversity considerations have been integrated in the guidelines for environmental impact assessments and proper safeguards are made during the implementation of infrastructure projects to protect important elements of biodiversity.
- Historically, protected areas were seen as a sufficient measure to conserve species, habitats and ecosystems. However, now the canvas of biodiversity conservation has been expanded to include the land- and sea-scape.
- The high yielding varieties of crops, fruit trees, poultry and livestock were seen as the only way forward to meet the growing demand for food. However, importance of the need to conserve the genetic diversity is now being increasingly realized and measure being taken for its conservation.
- Exotic species of flora and fauna were being indiscriminately introduced in the natural habitats. The convention has played an important role in raising awareness about the threats of invasive alien species and introduction of alien species is now being strictly regulated.
- Financial resource allocations for biodiversity, both national and international, and international cooperation has increased many folds after the adoption of the convention.

## Analysis of Lessons Learnt

The progress on implementation of the convention was much better in those thematic areas and cross cutting issues where country had sufficient institutional and human resources, for example, forestry, wildlife and protected areas. The implementation has been slow in more productive sectors like agriculture, livestock and fisheries. The progress remained slow because the thrust in these sectors has always been on self sufficiency in food and increasing exports. Furthermore these sectors lacked proper policies, institutions and human resources to make significant progress in implementing the convention. The actions on new areas, for example, access and benefit sharing, bio-safety, and invasive alien species remains extremely slow because of lack of human resource capacity and absence of relevant institutions to deal with these issues.

## Future Priorities and Capacity Needs

The country has made good progress on 2010 biodiversity targets despite the lack of adequate institutional, human and financial resources. There is need to identify future priorities and take measures to build institutional, financial and human resource capacity for implementation of the convention. The following broad recommendations are made for future priorities under institutions and human resources, and National Biodiversity Programme.

**Institutions and Human Resources:** The capacity of the Biodiversity Secretariat within the Ministry of Environment is weak and needs to be strengthened significantly. The Biodiversity Secretariat needs to have sufficient clout to be able to coordinate implementation of the convention across thematic areas and cross cutting issues. There is need to assess the capacity of Biodiversity Secretariat to make it fully functional and assume a leadership role for implementation of the convention. Among other things, the capacity needs assessment should look into the following:

- The human and financial resource needs of the Biodiversity Secretariat together with an operational framework for implementation of the convention;
- Integration, to create synergy, of the relevant federal institutions of the Ministry of Environment like Biodiversity Secretariat, National Council for Conservation of Wildlife, and Zoological Survey Department.
- Ways and means to coordinate implementation of the convention at national and provincial levels;
- The need of thematic biodiversity working groups to undertake assessments of the biodiversity status, trends and threats; to provide technical backstopping for the implementation of the convention; and measures to support their work.

**National Biodiversity Programme:** Most actions to implement the convention have been *ad hoc* in nature. The true benefits of the convention will only be realized through systematic actions. A few priority areas have been identified and a programme approach is recommended to achieve the best results. The programme objectives should include but not limited to following priority actions:

- Create an enabling environment for implementation of the Convention through policy formulation and appropriate legal instruments.

- Build institutional and human resource capacity for implementation of the conventions with special focus on thematic areas and cross cutting issues where more progress needs to be made.
- Strengthen the protected area system ensuring that at least 10% area of all major ecosystems, habitats, and ecologically sensitive areas are effectively conserved.
- Formulate National Plant Conservation Strategy and develop protocols for sustainable use.
- Document genetic diversity and promote *in situ* conservation of important elements of agrobiodiversity.
- Improve the conservation status of species of flora and fauna threatened with extinction or endangered by trade, hunting or loss of habitat.
- Demonstrate conservation of landscapes to maintain capacity of ecosystems to deliver goods and services and support livelihoods.
- Development of mitigation measure in selected ecosystems to adapt to climate change, and enhance resilience of biodiversity.



Torghar Landscape , Tanshipa Valley Qillasaifullah, Baluchistan. A community managed conservation area Photo: SUSG CAsia, Quetta, Pakistan)

## Chapter I

### Overview of Status, Trends of and Threats to Biodiversity

#### Introduction

Geographically, Pakistan lies between 24° and 37° N latitude and 61° and 75° E longitude. It is bordered by China in the north, Arabian Sea in the south, Iran in the west, Afghanistan in the north-west and India in the east. It is a federation of four provinces: NWFP, Punjab, Sindh and Baluchistan with its capital at Islamabad. The land area of Pakistan is about 796,095 sq km and an estimated population of 170 million (2009), having a population density of 193 persons per sq. km.

Pakistan has a diversified relief and a great variety of landscapes that may be divided into four major geographic areas: the northern highlands; the Indus River plain, the mountain ranges along the western border with Afghanistan, and the Deserts south of the Sutlej River along the eastern border with India. The northern highlands include parts of the Hindu Kush, the Karakoram Range, and the Himalayas. This area includes such famous peaks as K2 (Mount Godwin Austen, at 8,611 meters the second highest peak in the world), and Nanga Parbat (8,126 meters), the twelfth highest.

South of the northern highlands and west of the Indus River plain are the Safed Koh Range along the Afghanistan border and the Suleiman Range and Kirthar Range, which define the western extent of the Sindh province and reach almost to the southern coast. The lower reaches are far more arid than those in the north, and they branch into ranges that run generally to the southwest across the Baluchistan province.

Less than a one-fifth of Pakistan's land area has the potential for intensive agricultural use. Nearly all of the arable land is actively cultivated. Cultivation in the northern mountains, the southern deserts, and the western plateaus is sparse, but the Indus River basin in Punjab and northern Sindh has fertile soil where irrigated agriculture is practiced. Of the 79.6 million hectares land area, only about 22 million hectares (23%) are available for cultivation: 16 million ha irrigated and 3 million ha rain-fed. Forests, both natural and man-made, cover about 5.014% of the country's land area.



#### Biomes of Pakistan

A wide array of ecosystems occur in Pakistan, however, the natural ecological zones of Pakistan have been so drastically modified by human activity that very few truly natural habitats remain. To date, no systematic attempt has been made to define the ecological zones of Pakistan. Roberts (1991) provided an initial classification of natural terrestrial ecosystems. The extent of area in each zone together with corresponding CBD thematic area is given in table 1

A land cover map (map 1) of Pakistan using NOAA satellite imagery was developed in the year 2000. The map shows 20 land use and land cover classes of Pakistan. This is by far the most detailed map of Pakistan that shows distribution of various ecosystems and habitats and provides a sound basis for future work on ecosystems and habitat classification..

S No.	Ecozone/Habitat Type	CBD Thematic Area	Area (ha)	% of total Area
1	Mangrove and littoral	Marine and Coastal	550,186	<1%
2	Tropical thorn forest	Dry lands, Agriculture	38,146,635	43.5%
3	Arid sub-tropical forest	Dry land, Agriculture	30,035,234	34.2%
4	Steppe forest and alpine dry steppe	Mountain	9,305,417	10.6%
5	Dry sclerophyllous and tropical deciduous forest	Dry Sub humid Lands	471,561	<1%
6	Sub-tropical pine forest	Mountain	2,163,320	<1%
7	Dry temperate coniferous	Mountain	1,831,506	<1%
8	Himalayan moist temperate forest	Mountain	1,070,736	<1%
9	Permanent snow, alpine meadows & sub-alpine scrub	Mountain	4,220,152	<1%
	<b>Total</b>		<b>87,794,747</b>	<b>100%</b>

*Source: GIS Lab. WWF Pakistan*

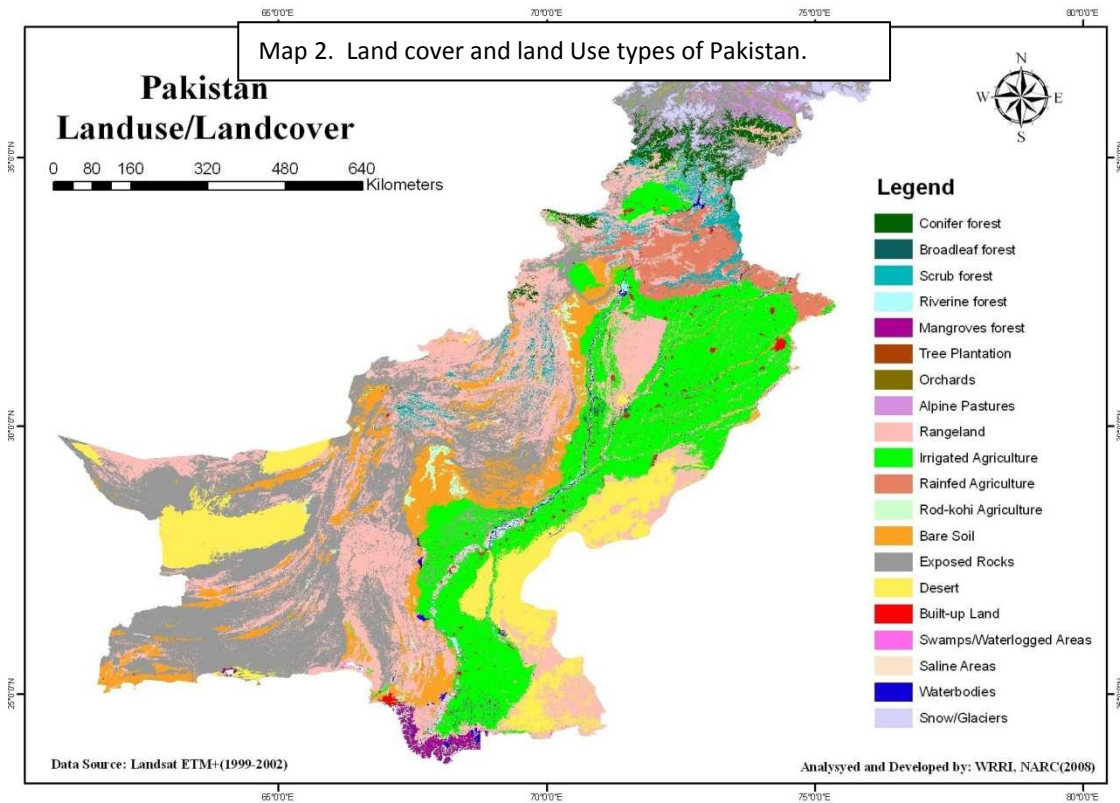
## Status of Biodiversity

The species richness and endemism reported in Biodiversity Action Plan (2000) and the 3<sup>rd</sup> national report of Pakistan to CBD remain the best estimate so far (Table 1). No serious work has been done to evaluate taxonomic and functional diversity, and the amount of genetic variability within species. The species database is not available in a format to lend itself to be readily sorted into the thematic areas of CBD. Therefore an overview of the available information on biodiversity in the country is presented here as an indicator of the biological diversity of the country.

### Fauna

Species belonging to the Palaearctic realm occur largely in the Himalayan and Baluchistan uplands; those belonging to the Indo-Malayan realm occur primarily in the Indus plains including the Thar Desert and the Himalayan foothills. In addition, species with affinities to the Ethiopian region occur in the dry southwest, along the Makran coast and in the Thar Desert (Roberts 1997). Pakistan has relatively low rates of endemism for some species – about 7% for flowering plants and reptiles, and 3% for mammals – but higher for freshwater fish, 15%.





**Table<sup>1</sup> 2. Species Richness and Endemics for Major Plant and Animal Groups**

Taxa	Total Reported in Pakistan	Endemic	Threatened
Mammals	195	6	20
Birds	668	?	25
Reptiles	192	13	6
Amphibians	22	9	1
Fish (freshwater)	198	29	1
Fish (marine)	788	-	5
Echinoderms	25	-	2
Mollusks (Marine)	769	-	8
Crustaceans (Marine)	287	-	6
Annelids (Marine)	101	-	1
Insects	>5000	-	-
Angiosperms	5700	380	?
Gymnosperms	21	-	?
Pteridophytes	189	-	?
Algae	775	20	?
Fungi	>4500	2	?

A high percentage of Pakistan's bird fauna is migratory, with a huge invasion of Palaearctic winter visitors that is, over 30% of recorded species (Roberts 1991). One-third of Pakistan's bird species have Indo-

<sup>1</sup> Source: Third National Report- Pakistan

Malayan affinities, and the remaining Palearctic. Of the latter, about one-third are more specifically Sino-Himalayan in distribution (Roberts 1991). The Suleiman Range, the Hindu Kush, and the Himalayas in the NWFP and Azad Kashmir comprise part of the Western Himalayan Endemic Bird Area; this is a global centre of bird endemism with 10 restricted range species in Pakistan. The Indus Valley wetlands constitute a secondary area of endemism, with one restricted range species.

The reptiles of Pakistan include five marine turtles, two tortoise, eight fresh water turtles, one crocodile, one gavia, 98 lizards and 77 species of snakes. Of these, 13 species are believed to be endemic. As with other groups, these are a blend of Palearctic, Indo-Malayan and Ethiopian forms. One genus, the mono specific *Teratolepsis*, is endemic, while another, *Eristicophis*, is near-endemic. The Chagai Desert is of particular interest for reptiles, with six species endemic to Pakistan and a further six species found only here and in bordering parts of Iran. Two important species of marine turtles nest on Pakistan's southern beaches. As Pakistan is a predominantly arid and semi-arid country, it is not surprising that only 22 species of amphibians have been recorded, of which 9 are endemic.

### Invertebrates

So far, more than 5,000 species of invertebrates have been identified in Pakistan including insects (1,000 species of true bugs, 400 species of butterflies and moths, 110 species of flies and 49 species of termites). Other invertebrates include 109 species of marine worms, over 800 species of mollusks (700 marine mollusks, 100 land snails), and 355 species of nematodes. The total number of butterfly species probably exceeds 400, with high rates of endemism in the Satyrids, Lycaenids and Pierids families (PMNH, pers. comm). Butterflies of high altitudes are largely either endemic or are derived from boreal fauna from the west. In the northern mountains alone, 80 species have been recorded, many of which are endemics (Hasan, 1997).

### Flora

About 5,700 species of flowering plants have been reported, including both native and introduced species (Nasir and Ali, 1970). The flora includes elements of six phytogeographic regions - in order of importance, the Mediterranean, Saharo-Sindian, Euro-Siberian, Irano-Turanian, Sino-Japanese and Indian. Ali and Qaiser (1986). The families with the largest numbers of species are the Compositae (649 species), Poaceae (597), Papilionaceae (439), Brassicaceae (250), and Cyperaceae (202). Among the lower plants, there are at least 189 pteridophytes (ferns and their allies), of which 153 are Sino-Japanese elements and 36 Euro-Siberian. Four monotypic genera of flowering plants (*Douepia*, *Suleimania*, *Spirosaris*, and *Wendelboa*) and around 400 species (7.8%) are endemic to Pakistan (R. Akhtar, pers. com.). Most endemics are Irano-Turanian and Sino-Japanese. Almost 80% of Pakistan's endemic flowering plants are confined to the northern and western mountains (Ali and Qaiser 1986). Here, two phytogeographic provinces can be distinguished: the Baluchistan Province and the Western Himalayan Province. The Kashmir Himalayas in particular are identified as a global centre of plant diversity and endemism. Families with more than 20 recorded endemics are Papilionaceae (57 species), Compositae (49), Umbelliferae (34), Poaceae (32) and Brassicaceae (20); 31 of the endemics belong to the genus *Astragalus*, the largest genus in Pakistan with about 134 species (R. Akhtar, pers. com.).

### Agricultural Biodiversity

The agro-ecological diversity of the region that evolved based on the knowledge systems of native farming communities has generally eroded under the influence of modern agriculture. Pakistan's commercially productive agriculture is practised in the arid lands of Indus basin and depends on canal irrigation. In addition, subsistence agriculture based on natural rainfall, rain water harvesting, stream flow, diversion, and by pumping subsoil water is practiced throughout the country. An estimate of extent

of land under three major types of agriculture based on land cover estimates using NOAA satellite imagery are as follows:

Type of Agriculture	Estimated area (000 ha)	Percent of land area
Canal Irrigated	15982.39	19.16
Rain fed	2739.42	3.28
Rain water harvesting	828.05	0.99

Pakistan is rich in indigenous crop diversity with an estimated 3,000 taxa of cultivated plants (in BAP 2000). There are around 500 wild relatives of cultivated crops, most of which are found in the Northern Areas of Pakistan (in BAP 2000). As a matter of fact, northern and western Pakistan comprises one of the world centers on the origin and diversity of cultivated plants. A list of some of the prominent wild relatives of crops in the country is given in appendix 1.

The civilizations of Taxila, Harappa and Mohenjo-Daro domesticated species such as wheat, eggplant, pigeon pea and cucumber, whereas the Gilgit-Baltistan Area became the centre of diversity for several nut fruits. Many wild and local cultivars survived in Pakistan up to the era of the Green Revolution. However, with the introduction of high-yield varieties of food and cash crop, expansion of land for cultivation, deforestation and dam construction, severe threats to wild landraces of cultivated crops have been posed. The principal crops in Pakistan are wheat, rice, maize, barley, pulses, oil seeds, cotton, sugarcane, tobacco, vegetables and fruits (both tropical and temperate).

Recognizing the importance of preserving crop genetic diversity, the country started collecting indigenous plant germplasm in the early 1970s. Today, there are over 15,600 germplasm accessions from more than 40 different crops at the Plant Genetic Resources Institute, National Agricultural Research Center. Over 50% of the germplasm has been evaluated and presented in respective crop catalogues (in BAP 2000). There is no *in-situ* conservation and promotion of cultivation of the wild relatives of these crops.

### Livestock Biodiversity

The Indian subcontinent was one of the first places to domesticate cattle, buffalo and chicken. Pakistan now has two breeds of buffalo, eight of cattle, one of yak, 25 of goat, 28 of sheep, one of horse, four of camel, and three of indigenous poultry. The buffalo breeds Nili-Ravi and Kundi are dairy breeds. Among the cattle, there are two dairy breeds (Sahiwal, Red Sindhi), five draught breeds (Bhagnari, Dhanni, Dajal, Lohani, and Rojhan) and one dual-purpose breed (Tharparkar or Thari). However, pure-bred animals are believed to constitute only 20-25% of the cattle population. Of the sheep breeds, 14 are thin-tailed and 14 fat-tailed. Almost 75-80% of Pakistan's domestic livestock breeds are derivatives of established breeds and the proportion of 'non-descript' livestock to pure stock is on the increase (I. Hussain, pers. com.). Kail breed of sheep is endemic to AJK and is significant race for its wool and adaptation to the local environmental and climatic conditions

### Dry and Sub humid Lands Biodiversity

More than 90 percent of the land of Pakistan falls in dry and sub-humid biomes. Pakistan has some 27.45 million hectares of rangeland which are in advanced stages of land degradation. The degradation has adversely impacted the diversity of flora and changed the vegetative composition. Increased competition for grazing affects wild herbivore populations (rodents, lagomorphs and ungulates) and the reduced prey

base then only support smaller populations of predators. Main issues related to desertification in Pakistan include: water erosion, wind erosion, depletion of soil fertility, deforestation, livestock grazing pressure, loss of biodiversity, water-logging and salinity, drought and flooding. About 11 million hectares are affected by water erosion and 3-5 million hectares by wind erosion. The amount of soil removed by wind is about 28% of total soil loss. Due to deforestation, forest cover is shrinking by 3.1% and woody biomass by 5% annually (7000-9000 ha taken away annually). Free grazing of livestock, aridity and prolonged drought in arid lands have affected the biodiversity in various regions.

Ecologically, there are nine broad vegetation types in Pakistan (Champion et al. 1965). A similar number of biomes, or dominant plant types, were simulated by the BIOME3 model to provide an indication of potential vegetation instead of actual vegetation in the country. The four of the nine vegetation types are represented in the dry and sub-humid lands. In addition, riparian habitats and arid land mangrove forests are two other forest types that are found in the dry lands. Following is a brief description of the vegetation in these zones:

**Xerophytic wood/Scrub.** These are low forests of branchy, thorny, evergreen trees, and shrubs. Their major climatic descriptor is a long dry season tempered in more northerly parts by winter and spring precipitation and to the south by a summer monsoon of variable incidence. The dominant species are *Olea feruginea*, *Acacia modesta*, and *Dedonaea viscosa*.

**Grassland/Arid woodland.** This biome consists of tropical plains and has *Prosopis cineraria*, *Salvadora oleoides*, *Acacia senegal*, *Calligonum polygonoides*, *Zizyphus mauritiana*, and *Tamarix troupi* along with a number of grasses, such as *Eulaliopsis binata*, *Themedia anathera*, *Cenchrus celliaris*, and so forth.

**Steppe/Arid shrubland.** This biome is somewhat similar to the xerophytic wood/scrub biome (see Section 4.6 above). *Olea feruginea*, *Pistacia* spp., *Fraxinus zanthoxyloides*, *Dephne mucronata*, *Astragalus stockii*, *Helliotropium* sp., and *Artemisia* spp. are found in it.

**Desert.** This is the largest type and covers most of the Indus plain, including the major deserts of Thar, Thal, and Cholistan; in total, over 11 million ha in Pakistan. The whole of Sindh, most of Balochistan, the major part of the Punjab and central parts of Gilgi-Baltistan receive less than 250 mm of rainfall in a year. Northern Sindh, southern Punjab, north-western Balochistan and the central parts of Gilgit-Baltistan receive less than 125 mm of rainfall. These deserts have been converted into agricultural land and 103 000 ha tree plantations wherever irrigation water is available.

**Riverine forests grow** in narrow belts along the banks of Indus and its tributaries. They are more commonly found in Sindh and to some extent in the Punjab. Babul (*Acacia nilotica*), Shisham (*Dalbergia sissoo*) and *Tamarax dioica* are the most common species. *Prosopis cineraria*, *Tamarax spp.* and *Populus euphratica* are some other species found in these Forests.

**Mangrove Forests** are located in the Indus delta. However, lack of fresh water has resulted in their stunted growth. *Avecennia marina* is the main species. *Ceriops* and *Rhizophoras* are the other tree species but are gradually disappearing due to increasing salinity and biotic pressures.

## Forest Biodiversity

The forests, scrub and trees on farmlands cover 4.73 million hectares or 5.014% of the country (GoP, 2004). The total area of natural and modified coniferous, scrub, riverine and mangrove forests is less than 3.5 million hectares or 4% of the country. If scrub forests are excluded, the total area of 'tall tree' forest falls to just 2.4 million hectares (2.7%), of which four-fifths (2 million) have 'sparse' cover (patchy forests with less than 50% cover). More specifically, more than half of Pakistan's remaining mangrove forests, more than two-thirds of remaining riverine forests, and more than nine-tenths of remaining coniferous

forests have less than 50% canopy cover. Good quality (greater than 50% cover) 'tall tree' forest in Pakistan covers less than 400,000 hectares. The remaining forests, fragmented and degraded as they are, are rapidly disappearing.

Regional case studies present growing body of evidence of an impending national disaster. In the upland coniferous forests, for example, a systematic study of the Siran area in Hazara Division, NWFP has indicated a 52% decline in forest resources between 1967 and 1992. Similar trends have been observed in some other forest areas of the country. The mangrove forests of the Indus Delta show a similarly dramatic decline. In the last 20 years, mangrove cover has been halved from 2,600 square kilometers in the late 1970s (Pernetta 1993) to 1,300 square kilometers in the mid-1990s. The mangrove ecosystem is largest arid zone mangrove forests of the world; this national heritage is now quickly disappearing (Saifullah, 1997).

It is feared that Pakistan is experiencing the world's second highest rate of deforestation. This destruction is leading to the wholesale disappearance of trees, shrubs and ground flora, together with the vertebrate and invertebrate fauna they normally support. The loss of forest habitat has had a severe impact on Pakistan's biodiversity, and has serious implications for the nation's natural and agro - ecosystems. Unfortunately, the moratorium on timber harvesting in Pakistan following the 1992 floods has not been very effective.

Out of the nine vegetation types of Pakistan (Champion, et al, 1965), five are in the category of tall tree forest and are found in the mountain areas. The following is brief description of their biodiversity:

**Alpine tundra.** This biome is predicted in humid areas that have abundant precipitation (meeting more than 65% of moisture demand) but insufficient number (<350) of growing degree days (GDDs) to support tree growth. It covers fairly flat ground at an altitude of more than 3660 m, which is covered by snow for 5 to 6 month in a year. Naturally occurring grasses in these alpine pastures or meadows are *Festuca*, *Poa*, *Lolium*, *Eragrostis*, *Danthonia*, and *Phleum*, as well as many forbs, such as *Primula*, *Aremons*, *Fritillaria*, and *Gentiana* sp. The grasses and forbs are highly nutritious and are extensively and heavily grazed during summer months by herds of goats, sheep, and horses and are thus being degraded at a fast rate. Wooded tundra also has subalpine mixed forests of *Salix*, *Lonicera*, *Berberis*, *Conosteaster*, *Juniperus*, *Rhododendron*, and *Ephedra*.



Alpine tundra (Photo: Himalayan Wildlife Foundation)

**Cold conifer/Mixed woodland.** This biome contains both the boreal conifer forest/woodland and the boreal deciduous forest/woodland biomes of Prentice et al. (1992) that are dominated by cool temperate conifers *Abies spectabilis*, *Pinus wallichiana*, and *Juniperus recurva*, and evergreen broad-leaved trees *Betula utilis*, *Salix*, *Viburnum*, and *Rhododendron anthopogen* as sporadic single trees, in groups, or in irregular dense stands. They have a humid maritime climate with winter temperature of  $-2$  to  $-15^{\circ}\text{C}$  or even colder ( $>-60^{\circ}\text{C}$ ) with too little precipitation (<75% of demand) and 350 to 1200 GDDs.

**Cold conifer/Mixed forest.** This biome also corresponds to the subalpine forest type and consists of dense forests with species composition, characteristics, and occurrence which are the same as for the cold conifer/mixed woodland biome described above. The trees have a moderate rate of growth in this biome.

**Temperate conifer/Mixed forest.** These are extensive coniferous forests that are similar to north temperate forests in Europe and North America, having commonly more or less pure crops of 2 species and the mixtures of blue pine *Pinus wallichiana* and Deodar *Cedrus deodara*. Winter temperatures are  $> -4^{\circ}\text{C}$  with 1200 GDDs within an altitudinal range of 1800 to 3660 m on moderate to steep slopes. Other species are fir *Abies spectabilis*, spruce *Picea smithiana*, *Pinus gerardiana*, *Juniperus excelsa*, *Quercus dilatata*, *Q. semicarpifolia*, *Populus ciliata*, and *Aesculus indica*. The wood of all species is highly valued as timber. In addition, medicinal plants, mushrooms, and fodder are collected in the forests.

**Warm conifer/Mixed forest.** This biome is dominated mostly by warm temperature evergreen conifer trees of chir pine *Pinus roxburghii* in regions with mean coldest month temperatures of  $5$  to  $15^{\circ}\text{C}$  and with rainfall sufficient to meet more than 65% of the moisture requirement between 1000 and 1800 m elevation.



Fir Forests (Photo: NWFP Wildlife Department)



Blue pine forests (Photo: NWFP Wildlife Department)

### Inland Waters Biodiversity

The inland water resources of Pakistan are dominated by the Indus River System, comprising of the Indus, Jhelum, Chenab, Ravi, and Sutlej, all originating in Western Himalayas, flow from northeast to south and drain into Arabian Sea through the Indus Delta. Kabul River originating in Afghanistan drains into the Indus, near Attock. Other than the Indus River system, there are some small rivers in Baluchistan province such as the Hub River, Gudri River, and the Nal River, all of which drain into the Arabian Sea on the Makran coast. Pakistan has one of the world's largest man-made canal irrigation systems, which consists of a number of large dams, barrages, and a network of irrigation canals and waterways. The three largest dams are the Tarbela, Mangla and Hub.

Pakistan has 198 freshwater fish species, including 15 introduced species. The fish fauna is predominantly south Asian, with some west Asian and high Asian elements. Among these are the nine species of snow trout (sub-family Schizothoracinae) that occur in the rivers of the northern mountains; they are representatives of an ecologically interesting group of fish endemic to snow fed rivers and lakes of the

high Asian region. Species richness is highest in the Indus river system, in the Kirthar range and in the Himalayan foothills, while the river systems of north-east Baluchistan have the highest levels of endemism.

### Recovery of Indus Dolphin Population

The Indus River dolphin (*Platanista minor*) is one of the world's rarest mammals and the second most endangered freshwater river dolphin. Approximately 1,275 specimens of this species exist today in a small fraction of their former range, the lower reaches of the Indus River in Pakistan. However, the population of this species has gradually declined because of various factors, including water pollution, poaching, fragmentation of habitat due to barrages, and dolphin standings in the irrigation canals. Although no authentic data are available, yet it is commonly believed that the numbers have dramatically declined since the construction of the irrigation system in the Indus. Most individuals now remain in a 1,200 km stretch of the Indus River.

In addition to efforts to conserve their habitat, including addressing problems such as river pollution, WWF staff has also been involved in rescue missions when individual dolphins become trapped in canals. WWF also coordinated the largest survey of the species ever in 2001 in collaboration with partners. In 2001 the population was estimated at 1100. The dolphin survey was repeated in 2006 using the same methods as in 2001 and estimated population had increased to 1275. This increase is likely due to population recovery following the ban on dolphin hunting implemented since the early 1970's in the Sindh Dolphin Reserve. Conservation activities by Sindh Wildlife Department and WWF - Pakistan, immigration of dolphins through Guddu barrage from Punjab are also likely to have contributed to the increase. In 2006, the overall abundance of the Indus River dolphin was estimated to be 1400 - 1600.



(Contribution of WWF Pakistan)

A total of 32 fish species and sub-species are known to be endemic to Pakistan. These are not yet recognised as endangered at the national level. However, at least species are threatened due to their great commercial importance and may soon become endangered if steps are not taken to conserve them. One is Tor (*Tor putiptora*), which migrates from the flood plains to the Himalayan foothills for breeding, but the construction of the Mangla and Tarbela Dams has blocked its migration. The other species is Pala (*Tenualosa ilisha*), which requires a 200 km northward run for spawning from the coast in the Indus River. The migration of this fish has been blocked by the construction of barrages and the fish ladders provided for this purpose have proven to be ineffective for migration.

Twenty four taxa, 20 species and four sub species, of amphibian fauna (frog and toad) have been recorded in the inland waters

### Marine and Coastal Biodiversity

Pakistan has a coastline that stretches to over 1050 km, (990 Km measured as a straight line) along the Arabian Sea. The coast of Pakistan consists of sandy beaches that are interrupted by rocky protruding points. The Indus delta located at the head of the Arabian Sea has been found changing its fluvial characteristics due to damming upstream, which has reduced river borne sediments. This has resulted in drying up of the estuaries and has induced sea encroachment further inland.

The information on taxonomic assessment of marine fauna and flora is not readily available. According to the reports available, gastropods dominate the rocky shore fauna followed by decapods crustaceans and polychaete worms. A list of the fauna of the beaches of Pakistan was compiled the Zoological Survey of Pakistan in 1973. There are occurrences of approximately twenty-one intertidal seaweeds. Fifteen green seaweeds and six are brown red marine macro algae are found from sandy shores.

Almost 800 species of marine fish have been recorded in Pakistan's coastal waters; however, no analysis of their population status and distributional range is available. Large pelagics such as the tuna are common in the waters of Baluchistan. The blind Indus dolphin (*Platanista minor*) is a resident of the Indus River and estuary. Palla fish (*Tenalosa ilisha*), which is considered a delicacy, is an anadromous fish that swims up the Indus River to breed.

Major fishing grounds along the coast of Pakistan extend from the Sindh coast stretching from Hub River to the Indian border and Baluchistan coast west of Karachi to the Iranian border. Pakistan is a net exporter of shrimps, lobsters, crabs, mollusks, fish and fishing products. The exports of fish and fishery product fetched US\$ 156.254 million (2003-2004). The commercially important marine fisheries resources of Pakistan are composed of about 350 different species. Some 240 are demersal fish, 50 are small pelagics, 10 are medium sized pelagics and 18 are large pelagics fish in addition, there are 21 species of shrimp, 12 of squid/ cuttlefish/ octopus and five species of lobsters.

In addition, biomass of mesopelagic fish in Pakistan offshore waters is estimated to be about 10 million metric tons, however, technology for its harvesting and utilization has not yet developed. The Pakistan fish and fishery related sector engages one percent of the Pakistan's population. The fishery sector generates one percent of Pakistan GDP earning through export of fishery products overseas.

According to the economic survey for 2003-04 fishery share in the country's GDP though very small contributes substantially to the national income through export earnings. During the period of July March 2003-04, 101,256 m tons valued at Rupees 7.9 billion fish and fishery products were exported to Japan, USA, UK, Germany, Middle East, Sri Lanka, China etc. The total landings for small pelagics, large pelagics, demersal fish and shellfish in 2003 accounted for 566,203 m tons.

The green turtle (*Chelonia mydas*) and the olive ridley turtle (*Lepidochelys olivacea*) are both found in Pakistan. Until recently, they were indiscriminately killed on the Makran coast. Eight species of oysters occur in Pakistan. Squid are abundant, but surprisingly echinoderm populations are very small. Sandy stretches from Karachi (Sindh Coast) to Gadani and up to Jiwani (Baluchistan Coast) are favorite nesting habitats of the marine turtles. Both the green turtles and the Olive Ridley have been declared as endangered species by the International Union for Conservation of Nature and Natural Resources (IUCN). The Sindh Wildlife Management and the World Wide Fund for Nature (WWF) have initiated a protection and research program to conserve the turtles, their eggs and hatchling. The international requirement for protection of turtles has been fulfilled by Pakistan as the shrimp trawlers are required by law to use turtle excluding devices (TED) on the shrimp trawl nets.



**The mangrove ecosystems** are rich in biodiversity. Eight mangrove species are reported along the coast of Pakistan. *Avicennia marina* is the most dominant species, while *Ceriops tagal* and *Rhizophora mucronata* occurs in localized patches. Other species have been reported to have become extinct from the delta due to human activities coupled with adverse physical and environmental conditions. Over 48 species of macro fauna have been reported from mangrove forests along the coast of Pakistan. The fauna consist of several species of crabs, polychaetes, molluscs etc.



Mangrove forests in Indus delta (Photo: IUCN Pakistan)

Approximately 56 Species of birds have been reported from the Sindh coastal waters. The most common are Gullbilled Tern, Oystercatcher, Sand Plover, Golden Plover, Kentish Plover, Sanderling, Dunlin, Marsh Sandpiper, Curlew, Whimbrel etc. Amongst the invertebrates, crustaceans dominate; they include crabs, isopods, carides, juveniles of penaeid shrimps, squilla, amphipods, sergestids, barnacles, etc. Many other animals live on trunk and roots of mangrove which serves as a substrate. Information on and meiofauna of the region is sparse. Certain species of macro fauna are good indicators of environmental health. Baseline information on species and numbers has yet to be established.

**Corals** have recently been discovered along the coast of Baluchistan (Jewani, and Astola Island). Coral communities although not widespread, appear in patches at Astola Island and Gwadar, where a vast fossilized coral reef is present. Soft coral such as seafan (*Gorgonia sp*), and brain coral are also present south of Astola Island. A variety of coelenterates and bryozoans colonies are also found in most parts of the Baluchistan coast.

### Threats to Biodiversity

The main causes of biodiversity loss include activities resulting in the loss and degradation of habitats, over-exploitation of plant and animal species, agricultural intensification, pollution, invasion by introduced species and climate change. There has been no significant change in the threats to biodiversity and an overview of the causes as reported in the BAP (2000).

**Over grazing and deforestation** in all terrestrial biomes of the country is major threat to the loss of biodiversity. The main driving forces are high population growth rate, increasing poverty and wide gap between the supply and demand of the natural resources. The population pressure has increased on the marginal lands for subsistence agriculture. Faulty agricultural practices result in loss of soil due to wind erosion and water erosion. When the land loses fertility, new lands are broken for agriculture and so the process continues unabated.

**The diversion of water for irrigation**, and the drainage of wetlands, is major causes of wetland habitat degradation in Pakistan. The mean quantity of water entering the Indus Basin in Pakistan is 137.2 million

acre-feet (MAF), of which 104 MAF are diverted for canal irrigation. Thus, three-quarters of the water entering the Indus Basin is now diverted and only a quarter reaches the Indus Delta and the Arabian Sea (GoP and IUCN, 1992).

### Coral and Reef Fish Communities Discovered along the Baluchistan Coast of Pakistan

It was widely believed that corals do not occur in Pakistan. A preliminary survey of four areas along the Baluchistan coast of Pakistan found 25 species of scleractinian coral and 77 species of reef fish. Astola Island situated approximately 37 km off the Baluchistan coast stood out for its diversity of corals and fish. This site is unique within Pakistan, and in view of growing pressure from fisheries, commercial and other development, should be considered urgently for establishment as a Marine Protected Area. A project on environmental Education with reference to Coral and Coral Reefs in Marine and Coastal Area at Jiwani, Baluchistan was successfully implemented by Sindh Wildlife Department during the year 2008 with the financial assistance from UNEP through South Asia Co-operative Environment Programme (SACEP).



Coral reef off the northern shore of Astola Island. (Photo: Wera Leujak)  
(Source: <http://undp.org.pk/images/publications>)

**Game bird and animal species** are experiencing population declines due to illegal hunting for sport and meat. Some species are ruthlessly persecuted for their depredations on livestock or agricultural crops.

**Marine fisheries and shrimp catches** have steadily declined in the country (Mallon 1991). The number of boats has risen rapidly; there is a tendency to fish in shallower waters; and there is an increased proportion of young shrimp in the catch (Amjad in BAP, 2000). The introduction of new technology and bigger fishing trawlers has resulted in overexploit the fishery resource. However, the incidental take of marine turtles by commercial shrimp trawlers has declined due to the use of turtle excluding devices.

**Medicinal plants** are indiscriminately harvested from the wild. There are about 40,000–50,000 practitioner of Greco-Arabic and Ayurvedic medicine in the country. Over 200 plant species are used in traditional and folk-medicines. In addition, there is demand for medicinal plants by manufacturers of herbal medicines in the country and abroad. In recent years, there has been a consistent growth in the demand for plant-based drugs and products through the world. This has given rise to unsustainable collection and loss of biodiversity and causing scarcity of a number of valuable medicinal plant species.

**Crop genetic diversity** in the county is also dropping and the principal reason is the development and use of high-yield varieties (HYVs). This genetic erosion is well pronounced in commonly cultivated crops, such as wheat, rice, sorghum, sugarcane and vegetables.

**Pollution** is a growing problem in the country and heavy use of agro chemicals has been a major cause for decline in the populations of useful fauna and flora. Marine pollution, particularly from oil spills has occasionally contaminated many estuaries and the sea.

**Untreated sewage** is disposed off into irrigation systems, streams and rivers in and around large cities. The discharge of sewage and industrial effluent into aquatic and marine ecosystems is rapidly growing. The organic load of sewage depletes oxygen levels in water and indirectly reduces the diversity of animal and plant life. Lahore alone discharges 240 million gallons of sewage per day mainly into the river Ravi (GoP and IUCN 1992). The resultant loss of fish and contamination of potential drinking water has considerable economic and health impacts.

**Industrial pollution** is particularly severe in the industrial centre of Karachi with a population of over 12 million people. About 80% of the total wastewater remains untreated and is discharged into the sea through sewers and rivers, mainly the Lyari and Malir. Many creeks and coastal waters in the Karachi area exhibit eutrophication due to high levels of organic pollution.



Ayubia National Park (Photo: Himalayan Wildlife Foundation, Islamabad)

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## Chapter II

### Current Status of National Biodiversity Strategies and Action Plans

#### Introduction

The Biodiversity Action Plan of Pakistan was completed in the year 2000 and it provides an assessment of the status and trend of the nation's biodiversity, outlines strategic goals and objectives, and identifies a plan of action that includes coordination arrangements and implementation measures. The Biodiversity Action Plan is made up of 13 components which correspond to specific Articles of the CBD: planning and policies; legislation; identification and monitoring; *in-situ* conservation; *ex-situ* conservation; sustainable use; incentive measures; research and training; public education and awareness; environmental impact assessment; access issues; exchange of information; and financial resources. For each component, the issues relevant to Pakistan have been identified and a list of objectives and corresponding actions recommended. The Plan called for greater collaboration between government agencies, local communities and NGOs, and for them to work together as partners in biodiversity conservation.

The conservation concerns were first addressed in the National Conservation Strategy (NCS) of Pakistan that was approved in March 1992. The NCS became the *de facto* policy of the country for conservation and sustainable development. After the NCS process, a need was felt for provincial conservation strategies and this led to formulation of provincial and a few district conservation strategies and integrated district development plans. The BAP process and recommendations greatly influenced the conservation strategies and district development plans that were developed after 2000. Since these documents also contribute to the implementation of BAP, therefore a brief overview of these strategies and development plans has been included in this Chapter.

#### The Guiding Principles of the BAP

The following principles provided guidance to Pakistan's efforts to conserve and manage its biodiversity:

- Every form of life is unique and warrants respect from humanity.
- Biodiversity is a key indicator of the health of the environment in which we live. We depend on biodiversity for a vast array of goods and services, and should, therefore, accord priority to its conservation, management and sustainable use.
- Conservation of biodiversity is a common concern of all citizens of Pakistan. While governments are accountable for its conservation and management, all the people of Pakistan have stewardship responsibility for the country's natural heritage.
- Biodiversity conservation is an investment that can yield substantial benefits; sharing of which with the local communities can reduce biodiversity losses.
- All sectors that influence biodiversity should help plan its conservation.
- Biodiversity management actions must be based on sound ecological principles, scientifically valid information and local knowledge.
- Natural resources cannot be sustainably managed exclusively by communities or governments.

The government must recognize the interests and rights of local communities, while the communities must recognize that such management is part of a larger political and national interest.

### **Goal and Aims of the BAP**

The overall goal of the Biodiversity Action Plan is to promote the conservation and sustainable use of Pakistan's biodiversity, and the equitable sharing of benefits arising thereof, for the well-being and security of the nation. The major aims of the BAP are:

- To create a policy framework that fosters the sustainable use of biological resources and the maintenance of biodiversity;
- To strengthen and promote national biodiversity conservation programs and develop international and regional cooperation;
- To create conditions and incentives for biodiversity conservation at the local community level;
- To strengthen and apply more broadly the tools and technologies for conserving biodiversity; and
- To strengthen human knowledge, will, and capacity to conserve biodiversity.

The specific objectives to meet the above mentioned broad aims are described in the various sections of the Plan that are organized according to the principal articles of the Convention.

### **Objectives and Priority Actions of the BAP**

**Objective 1: Adopt appropriate policies and plans that promote the conservation and sustainable use of biodiversity and integrate biodiversity conservation measures into sectoral plans and programs.**

#### **Actions Recommended:**

1. Secure high level and multi-sectoral support for its implementation.
2. Prepare and adopt the new wildlife or 'biodiversity' policy, at both the provincial and federal levels.
3. Institutionalize the biodiversity strategy process initiated by the current BAP, at both the national, provincial and local levels.
4. Integrate biodiversity considerations into the Perspective Plans, Five-Year Plans and Annual Development Plans (ADPs), and into relevant sectoral plans, particularly those for wildlife, forestry, fisheries and agriculture.
5. Promote the preparation of provincial conservation strategies with strong elements of biodiversity conservation.

**Objective 2: Develop an effective legal framework for the implementation of the CBD and related conventions.**

#### **Actions Recommended:**

1. Review the 1973 Constitution to make the conservation and sustainable use of biodiversity the concern of the state and its citizens.
2. Review all relevant existing legislation in Pakistan against the obligations under CBD and other biodiversity-related conventions to determine the need for amendments and/or new legislation to meet these obligations.
3. Ensure that the draft wildlife law currently under review embodies the conservation measures suggested by the CBD and other related conventions.
4. Update and rationalize legislation on endangered and exploited flora and fauna in Pakistan, in line with the CBD and according to the specific requirements of CITES (Convention on International Trade

- in Endangered Species of Wild Fauna and Flora), the Bonn Convention (Convention on the Conservation of Migratory Species of Wild Animals) and the other related conventions. Enhance penalties for violations and introduce a system of rewards for compliance
5. Ensure, as far as possible, that reforms in the forestry sector are integrated with reforms in the wildlife arena and that new forestry laws are also framed fully within the context of the CBD and other international conventions.
  6. Finalize detailed rules, regulations and guidelines for the implementation of IEE/EIA under the Pakistan Environmental Protection Act, paying due regard to the need for addressing matters relating to the conservation of biodiversity.
  7. Develop access legislation as a matter of priority to comply with Article 15 (genetic resources), Article 16 (technology) and Article 19 (handling of biotechnology and distribution of its benefits).
  8. Develop guidelines/regulatory measures with regard to bio-safety relating to the development, use, transport and import of living modified organisms.

**Objective 3: Enhance the enforcement of biodiversity-related laws.**

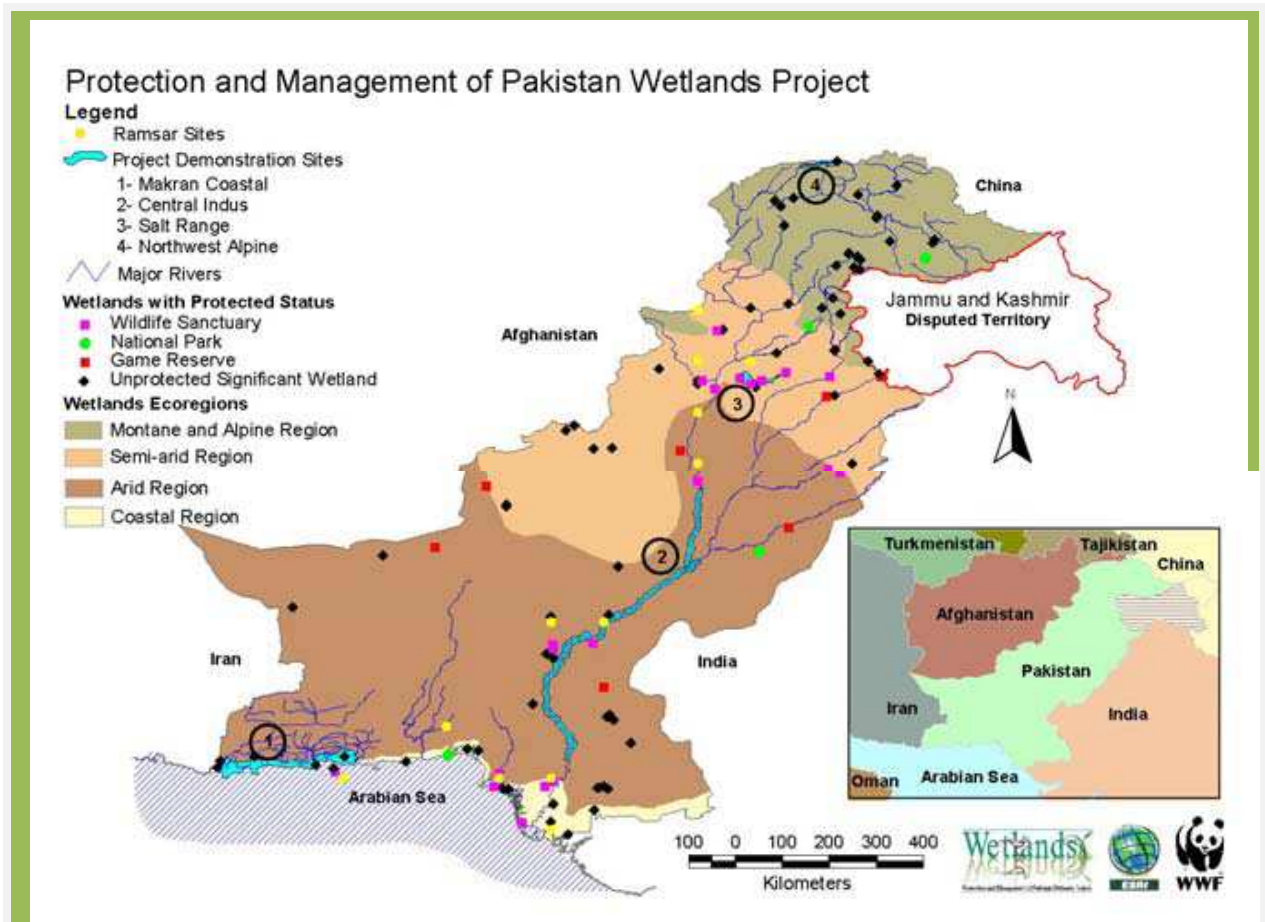
**Actions Recommended:**

1. Improve the effectiveness of existing legal mechanisms by creating greater awareness of conservation regulations and enhancing the capacity of law enforcement agencies including the departments of wildlife, police, customs and quarantine. This should include the provision of training to relevant officers in identifying the species listed in CITES Appendix I and II.
2. Recognize the right of citizens, community-based organizations (CBOs) and NGOs to challenge administrative decisions which they believe has been taken in violation of conservation law.
3. Take immediate remedial measures to protect species that are presently being subject to illegal trade.
4. Take all necessary measures to fulfill the commitments of the agreements already signed under related international conventions.

**Objective 4: Expand and improve the information base on the biodiversity of Pakistan.**

**Actions recommended:**

1. Appoint a national centre (or several provincial centers) to coordinate biodiversity identification and monitoring activities.
2. Identify national priorities for biodiversity conservation, including threatened ecosystems and species, 'hot spots', and zones of endemism (in accordance with Annex 1 of the Convention).
3. Create a national Red Data List of threatened flora and fauna.
4. Advance knowledge of indigenous micro flora for use in biodiversity conservation.
5. Store and catalogue information in computerized databases to be maintained by 'custodian' agencies.
6. Foster the sharing of information on biodiversity among research institutions, government agencies, NGOs and local communities. The incorporation of traditional (local) knowledge with science has great potential for strengthening the information base on biodiversity.



### National Wetlands Inventory of Pakistan

The Pakistan Wetlands Programme (PWP) aims to promote the sustainable conservation of freshwater and marine wetlands and their associated globally important biodiversity in Pakistan. The Program aims to create and implement a National Wetlands Conservation strategy. Sustainable wetland conservation measures will be developed at each of the four demonstration sites, carefully selected to represent conditions in four broad wetland ecological zone of Pakistan including coastal wetland zone, arid wetland zone, semi-arid wetland zone and alpine wetland zone. Pakistan lacked a comprehensive data base on the wetlands. To fill the information gap, a GIS-based Wetlands Inventory (PWGIS) is being developed to serve multiple scientific, decisions making and awareness purposes. In addition to the basic mapping of the wetlands following are some major activities and outputs.

A standardized watershed database of Pakistan has been developed that can also be aggregated with global and regional databases. Watersheds for 150 significant wetlands were delineated with special focus on 19 Ramsar sites. Land cover studies of 28 out of 47 Protected Wetlands have been completed. These studies describe habitats through geographic, physical, and biotic components. Web-GIS application of the inventory has been developed for data entry and interactive visualization.

Courses have been structured to train the government and non government conservation organizations in using GIS, GPS and Remote Sensing, with specific perspective to conserve wildlife and their habitats. So far 75 persons have been trained.

**Objective 5: Develop and institutionalize systems to monitor key elements of biodiversity.****Actions recommended:**

1. Develop and institutionalize regular resource monitoring by the agencies responsible for the conservation and sustainable use of natural resources in Pakistan. Particular attention should be paid to monitoring the status of protected areas and the components of biodiversity identified in Annex 1 of the Convention. Monitoring should also be carried out with the active participation of local communities.
2. Provide periodic assessments e.g. through a State of the Environment report, of key elements of biodiversity and indicators of progress/failure, including resources allocated by government towards biodiversity conservation.

**Objective 6: Strengthen the protected areas system in Pakistan and its contribution to biodiversity conservation.****Actions Recommended**

1. Ensure that legislation providing for protected areas includes: (a) objective criteria for the selection of protected areas; (b) an updated and rationalized system of protected area categories with reference to the international categorization system developed by IUCN, and provide for the establishment of private and community protected areas; (c) provisions for collaborative management systems involving government authorities, NGOs and local communities; and (d) mandatory preparation and implementation of iterative management plans.
2. Carry out a thorough protected areas system review to identify existing gaps. On the basis of the review, prepare a protected areas system plan for Pakistan.
3. Expand Pakistan's protected area system to improve its representativeness, viability and connectivity.
4. Enhance the management of existing protected areas.
5. Restore degraded ecosystems within protected areas and in adjacent lands and corridors.
6. Take measures to control invasive alien species of fauna and flora, and to prevent further introductions.

**Objective 7: Conserve biodiversity outside protected areas.****Actions recommended:**

1. Develop regional conservation programs to integrate conservation activities and protected area management with regional land use planning.
2. Adopt agricultural, forestry, and fishery practices that will enhance the conservation of biodiversity.
3. Enhance the capacity of local communities and NGOs to conserve, manage, and sustainably use biodiversity.
4. Ensure that protected areas and adjacent buffer zones are treated as a single planning unit. Of particular importance in this regard, is to support implementation of an Integrated Coastal Zone Management (ICZM) plan for the entire coast of Pakistan.
5. Ensure that activities in natural habitats outside protected areas are governed by management plans that pay adequate attention to the conservation of biodiversity; identify the most appropriate management authority for buffer zone areas.
6. Ensure that development personnel, land-use planners, aid agencies and the national and provincial planning authorities have access to information about biodiversity. This should include information about the location of biological 'hot spots' and rare and endangered species.



## 7. Promote the conservation of biodiversity on military bases and other land owned or managed by the

**MUSK DEER NATIONAL PARK, KASHMIR**

The fourteen year old (1989-2003) Kashmir conflict between India and Pakistan finally settled down to a cease fire in November 2003. In the summer of 2004, a team of AJF Fisheries and Wildlife Department ( AJKFWD) and the Himalayan Wildlife Foundation (HWF ) drove 13 hours out of Islamabad up the Neelum Valley to the Pakistani Kashmir-Indian Kashmir-Gilgit-Baltistan Area boundary. This area was of significance as in the Gilgit-Baltistan Area of Pakistan there was an existing National Park (Deosai) for the protection of the Himalayan Brown bear since 1992, and we had been suspecting that the bears would be crossing over the mountain passes to forage and reside in these valleys too.

The local population confirmed our guess and informed of the presence not only of brown, but also black bears, snow leopards and musk deer. The forests were well preserved due to road closures and cross border firing on the road down to Muzaffarabad. There was now an urgent need to protect the upper Neelum valley before the government started leasing out the forest for logging contracts. After much effort and numerous high level meetings the Prime Minister of AJK in December 2007, finally signed the declaration of the Musk Deer National Park comprising of 135,000 acres of beautiful coniferous forest, trout filled streams, snow clad mountain peaks and the home range of musk deer, snow leopards and bears.



(Contribution by: Himalayan Wildlife Foundation, Pakistan)

defense agencies.

**Objective 8: Strengthen ex-situ programmes and their contribution to biodiversity conservation.****Actions Recommended:**

1. Develop a national policy on *ex-situ* conservation.
2. Compile a directory of existing *ex situ* conservation initiatives, including herbaria, livestock breeding farms, genome banks, germplasm collections, plant breeding centers, zoological gardens and private collections.
3. Evaluate the scope and effectiveness of existing programmes at conserving key components of Pakistan's biodiversity.
4. Identify priority species and genetic resources in need of further *ex-situ* conservation efforts. This should include an assessment of the need for captive breeding programmes for commercially valuable, threatened species of indigenous wild fauna and medicinal plants.
5. Strengthen the capacity and scope of *ex-situ* conservation programmes through the provision of additional funding, equipment, and training.
6. Promote integration of *ex-situ* conservation efforts among institutions.
7. Ensure that institutions involved in captive breeding of rare species set aside resources for rehabilitation schemes and for protection of natural habitats of those species.
8. Initiate measures to ensure that the collection of genetic resources from the wild does not endanger the survival of remaining wild populations.

**Objective 9: Develop a policy and legal framework to encourage sustainable use of biological resources.****Actions Recommended:**

1. With the adoption of the BAP, formulate policies in the different resource sectors which would promote the sustainable use of biological resources.
2. Review and, where necessary, revise existing laws to ensure that an effective legal framework is in place which: promotes sustainable use; establishes clear rules on jurisdiction and responsibilities among agencies and permitted users; and clarifies rights of ownership to biological resources
3. Introduce legal measures requiring the development of management plans for harvested Species.

**Objective 10: Establish, monitor and regulate sustainable use limits of selected biological resources.****Actions Recommended:**

1. Enhance the capacity of government agencies, research institutions, NGOs and local communities to determine and monitor harvest levels of biological resources.
2. Develop criteria for sustainable use and prioritize the types of uses (subsistence versus commercial) that will be allowed in different areas.
3. Ensure that biological resources are harvested according to scientifically-sound management plans.
4. Take measures to reduce the incidental take of non-target species e.g., marine turtles in the commercial shrimp fishery.

**Objective 11: Protect and encourage community-based biodiversity management systems.****Actions Recommended:**

1. Review and revise the laws relating to ownership and access to natural resources e.g., tenure rights to fuel wood, fodder, wildlife and trees, so as to recognize community property rights and traditional natural resource management systems.
2. Evaluate traditional systems of harvesting biological resources (terrestrial and marine) and disseminate information on practices which promote the sustainable harvesting of these resources.

3. Use traditional land tenure arrangements as a basis for planning and implementing conservation projects that promote sustainable use of biological resources.
4. Promote community-based conservation projects in which sustainable use of natural resources can be demonstrated, for example the UNDP/GEF-funded project maintaining Biodiversity in Pakistan with Rural Community Development.

### Qur'anic Botanical Garden

A Qur'anic Garden was inaugurated at Jamia Usmania in Peshawar, Pakistan on 21<sup>st</sup> August, 2009. The concept of Qur'anic Botanical Gardens was developed by UNESCO based on the scientific and aesthetic concepts contained in the Holy Qur'an.



Pomegranates are a good candidate for a Qur'anic Garden

The proposal is available to any party that would like to establish a Qur'anic Botanical Garden. The garden features are based on the verses (more than 150) that mention the Gardens of Paradise (Jannat al-Firdous) in the Holy Qur'an.

Over the centuries, these meaningful verses have inspired a good number of Islamic gardens, embodying a physical recall of heaven on earth, and have influenced some of the most beautiful landscape architectures all over the world.

The Qur'anic verses describe the basic role of water and shade, as well as plants, walls, gates and pavilions. The gardens would help achieve important objectives in the fields of environmental conservation, scientific research, education and recreation, and will be extremely useful to carry out appropriate training programmes in the field of environmental conservation, as well as to spread the knowledge on the Holy Book.

The Qur'an Botanical Garden will also be a meaningful opportunity in the field of scientific research, in order to study the sophisticated link between biodiversity and ecosystems.

Source: Botanical Gardens Conservation International (<http://www.bgci.org/resources/news/0197/>) and Communications from University of Peshawar

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**Objective 12: Develop mechanisms to incorporate biodiversity values into national accounting and decision-making at different levels.**

**Actions Recommended:**

1. Develop, document and adopt standardized methodologies for economic valuation of biodiversity, tailored to the requirements of individual decision-making agencies.
2. Initiate measures to 'green' the system of national accounts.

**Objective 13: Strengthen inter-sectoral and federal/provincial coordination in biodiversity conservation and management.**

**Actions Recommended:**

1. Create inter-sectoral steering committees to oversee the implementation of the BAP at both the federal and provincial levels.

**Objective 14: Create an integrated system of incentives and disincentives at the national and local level to encourage the conservation and sustainable use of biodiversity.**

**Actions Recommended:**

**Action 14.1** Introduce a system of direct incentives that could include:

- a) the provision of subsidies to encourage farmers to retain local cultivars and crop varieties, And to adopt practices such as integrated pest management, agro - forestry and multi-species cropping;
- b) the provision of subsidies to encourage land owners to manage their properties in ways that are sensitive to biodiversity, or to refrain from changing existing land-uses;
- c) the provision of grants for the protection of threatened species or habitats, and the restoration of degraded lands;
- d) the development of programmes to ensure that local communities receive direct benefits from biodiversity, e.g. through sustainable use activities;
- e) incentives to encourage ex-situ propagation /breeding programmes for traded species of wild plants and animals, in order to reduce the drain on wild populations; and
- f) The provision of incentives for staff (particularly field staff) working in institutions dealing with biodiversity. Possibilities include: upgrading employees to regular functional staff; the provision of
- g) Extra training opportunities; and public recognition for outstanding service.

### **Innovative Insurance Scheme for Depredation Losses to Snow Leopard**

With an initial grant from the Whitley Fund for Nature (UK) in 1999, Project Snow Leopard (PSL) launched an innovative insurance scheme under which farmers receive compensation for verified depredation losses to snow leopard and extra income from ecotourism activities based around the snow leopard and its large prey, the ibex and markhor. In return, farmers provide protection to these species. In 2006, PSL won the Rolex Award for Enterprise (US \$ 50,000) which allowed the project to expand into seven more valleys. In addition to addressing snow leopard-farmers' conflict, PSL is also doing monitoring of snow leopard population using remote cameras and DNA Analysis. PSL has just recently embarked on a yearlong food preference study of the snow leopard over four seasons. Other activities include making livestock corrals predator-proof and provision of small grants to communities for small infrastructure work to act as incentive for the protection of the snow leopard.

PSL has successfully demonstrated the effectiveness of a people's first approach in protecting endangered wildlife such as snow leopards. The case of PSL also demonstrates that nature conservation is inherently tied to political and social forces and project managers and policy makers must look beyond the immediate ecological conditions when designing conservation projects.

(Contribution: Shafqat Hussain, Asstt Professor, Trinity College, Hartford, CT, USA)



**Action 14.2** Introduce a system of indirect incentives to promote the conservation and sustainable utilization of biodiversity that could include:

- a) fiscal incentive measures such as tax exemptions or deductions for the conservation of particular habitats or species; tax reductions for the import of equipment used in conservation programmes; and tax deductions for donations to conservation NGOs;
- b) Service-oriented incentives, designed to link community development programmes with the conservation of biodiversity. For example communities living adjacent to protected areas could be accorded priority for public education programmes and technical assistance in agriculture, forestry and other fields.
- c) Social incentive measures designed to improve the quality of life. These include measures such as the
- d) Clarification of land tenure and the creation of new institutions to manage biodiversity.

**Action 14.3** Introduce a system of disincentives to discourage unsustainable utilization and practices which deplete biodiversity. These could include:

- a) increasing the size of fines for the violation of conservation laws;
- b) revising the tax schedule to penalize undesirable land-use practices;
- c) Using fiscal disincentives e.g. pollution and effluent charges, for activities which are damaging to biodiversity. This could also include the use of a 'polluter pays' policy, requiring developers to take measures to mitigate the environmental damage caused by their activities; and
- d) Promoting and strengthening traditional customs and practices which serve as disincentives to unsustainable use.

**Objective 15: Identify 'perverse' incentives and minimize their impacts on biodiversity.**

**Actions Recommended:**

1. Carry out a comprehensive review of GoP programmes and policies, to identify perverse incentives and suggest measures to ameliorate their impacts.

**Objective 16: Strengthen research on the conservation and sustainable use of biodiversity, particularly indigenous species under threat.**

**Actions Recommended:**

1. Evaluate, institutionalize and strengthen current programmes of research on native biodiversity.
2. Identify gaps and initiate new research programmes in priority areas.
3. Draft, enact and implement legally binding regulations to ensure that overseas institutions carrying out research on indigenous biodiversity are always partnered by a local organization and work in collaboration with Pakistani scientists. The outcome of such research – be it information or specimen types – should be available to local scientists and institutions. Access to the genetic material should be free of charge for the country of origin.

**Objective 17: Strengthen human capacity in biodiversity conservation and management.**

**Actions Recommended:**

1. Assess current capacity and the biodiversity-related training needs of natural resource managers, conservation professionals and other concerned staff, and the extent to which these are currently being fulfilled.
2. Design and implement in-service training courses to address immediate gaps and priority requirements.

3. Enhance existing training programmes in natural resource management, through the provision of funding, staff and equipment. Explore opportunities for ‘twinning arrangements’ with institutions in other countries – universities, botanical gardens, national park authorities and so on.
4. Develop at least one university degree programme in biodiversity and conservation biology particularly as it relates to community-based management of natural resources. Promote the integration of biodiversity themes into other, tertiary-level courses and programmes.
5. Create at least one vocational diploma-level course to train protected area managers.
6. Promote, through grants and other means, post-graduate specialization in biodiversity related fields, e.g. taxonomy.
7. Strengthen the capabilities of NGOs and community institutions to play an effective role in the conservation and management of biodiversity; in particular, initiate training programmes with ‘umbrella NGOs’ that have large networks of community-based organizations and VOs.
8. Integrate biodiversity concerns into the training curricula of rural development and extension staff, particularly in the fields of agriculture, forestry and fisheries.

**Objective 18: Develop a comprehensive strategy for public education and awareness.**

**Actions Recommended:**

1. Develop a strategy on biodiversity conservation and sustainable use within the framework of the environmental education and communication programmes of the NCS and provincial conservation
2. Strategies, and incorporate the actions described in the following sections.

**Objective 19: Use the formal education system to increase awareness about biodiversity and the need for its conservation.**

**Actions Recommended:**

1. Develop national curricula which emphasize biodiversity’s contributions to local and national welfare, emphasize biodiversity’s contributions to the health of ecosystems, and tie ecological, economic and social themes together.
2. As far as possible, develop local curricula directly relevant to students’ local ecological, cultural and economic environment, to supplement the national curricula, and develop co-curricula activities on biodiversity issues of immediate local concern; in particular, develop pilot local curricula for schools in and around protected areas or areas of particular importance for biodiversity.
3. Develop course materials relevant to the conservation and sustainable use of biodiversity. In particular: revise school textbooks according to the proposed curricula revisions; and develop course materials relevant to local curricula and curricula activities.
4. Encourage public-private partnerships in curricula development, the development of co- and extra-curricular activities, and the development of course materials. This should be through partnerships between educational and environmental authorities, between the government and NGOs, and between public and private schools, and international collaboration.

**Objective 20: Use informal channels to increase awareness of biodiversity and the need for its conservation.**

**Actions Recommended:**

1. Develop and promote a comprehensive informal biodiversity education programme, tailored to the particular key audiences and ecological conditions of Pakistan.
2. Develop more focused campaigns designed with a particular goal in mind, such as working with a local community adjacent to a protected area to foster local knowledge related to the PA, and promote understanding of the need for PAs.

3. Encourage the role of the media and in particular of radio, through the establishment of information clearing houses.
4. Make better use of traditional channels; identify key audiences and the most effective traditional channels for each audience. These might include customary community institutions and meeting places.
5. Document the local knowledge and the cultural and religious bases of biodiversity conservation and sustainable use in Pakistan.
6. Exploit the opportunity to link biodiversity themes with community assistance programmes, including primary health care programmes, primary education programmes and agricultural and forestry extension programmes. Integrate biodiversity concerns into the training curricula for rural development extension workers.
7. Encourage the growth of membership groups, including NGOs, school clubs and outdoor groups involved in the conservation and sustainable use of biodiversity.
8. Develop biodiversity interpretive facilities, including field centers, at selected protected areas and interpretive programmes in all botanical gardens, zoos, herbaria, gene banks and natural history museums.
9. Develop locally relevant resource materials on the conservation and sustainable use of biodiversity for the use of agencies developing informal education programmes.
10. Develop affordable, popular, accessible and comprehensive field guides to the birds, animals and flora of Pakistan.
11. Encourage public-private partnerships in the above activities, including partnerships between educational and environmental authorities, between the government and NGOs, and international collaboration.

**Objective 21: Institutionalize and strengthen EIA procedures for projects, programmes and policies.**

**Actions Recommended:**

1. Finalize detailed rules, regulations and guidelines for the implementation of IEE/EIA under the 1997 Act, to include a checklist of processes and activities which have or are likely to have significant adverse impacts on biodiversity, for example major power and road-building projects .
2. Strengthen institutional capacity to evaluate the environmental impacts of development activities especially in relation to biodiversity. Particular emphasis should be placed on training the Environmental Protection Agency and federal/provincial planning and developing department's staff in biodiversity issues and ensuring that EIAs are also referred to relevant natural resource management institutions for review.
3. Encourage effective public participation in the EIA process. This should include public review of EIA reports and access to information on planned development projects. Data should be made freely available to local communities and NGOs concerning planned development projects impacting on biotic resources in their areas, so that they may play an active and informed role in their own development.
4. Expand the concept of Strategic Environment Assessment (SEA) to address the environmental impacts of programmes and policies such as the National Drainage Programme or agricultural policies that promote the production of monoculture export crops.
5. Review the National Environmental Quality Standards with due consideration to the potential impacts on specific ecosystems, for example the effects of sewage discharge and industrial effluents on aquatic ecosystems.



### Torghar - a Model of Conservation through Sustainable Use

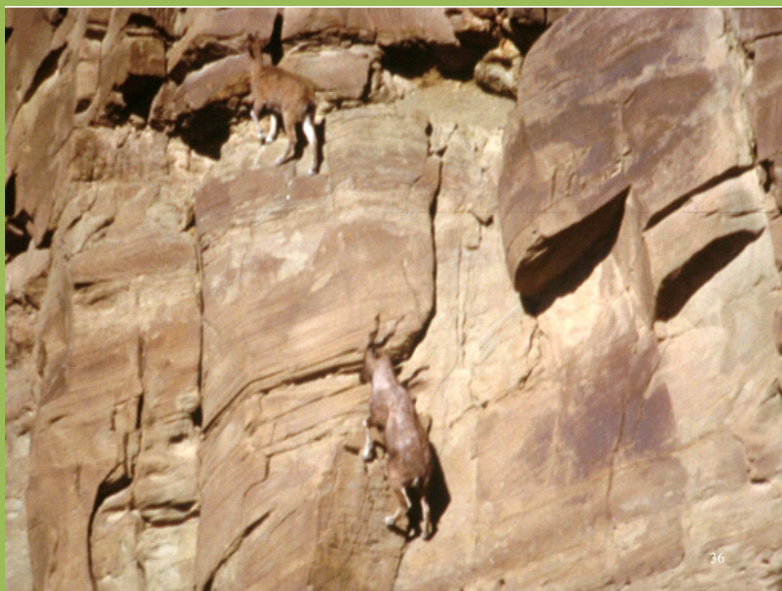
The northeast Baluchistan has long been famous for Suleiman (*Capra falconeri*) a wild goat, and Afghan Urial (*Ovis orientalis cyclceos*) a wild sheep. The abundance of modern weapons (mostly Kalashnikov) and, the ready availability of ammunition, led to indiscriminate hunting and by early 1980s; the populations of Suleiman Markhor and Afghan Urial had become endangered and species like gazelles and leopards had become extinct. Overgrazing and heavy use of wood for fuel and heating had seriously degraded the habitat. A local tribal leader and a film maker while trying to make a documentary on wildlife got concerned with the rapidly dwindling wildlife populations. He initiated discussions with local tribesmen and in collaboration with the United States Fish and Wildlife Service and the Baluchistan Wildlife Department developed a Conservation Plan based on the principles of sustainable use

The tribes, though skeptical, agreed to cooperate and to stop all hunting. Local hunters agreed to become game guards to enforce a strict ban on hunting. The project continued to advance slowly as the years passed and limited trophy hunting was possible in 1986. The income was used for hiring additional game guards to boost conservation and provide livelihoods for local people. The income from hunting also used for improving the agro pastoral livelihoods of local people, and for social development such as health care.

Torghar Conservation Program has emerged as a successful model of biodiversity conservation through sustainable use in Pakistan. The conservation and sustainable use has not only resulted in recovery of populations of Markhor and Urial, but also of the other species of fauna and flora. Small mammals include the pika, *Ochotona rufescens*, and the Afghan mole vole, *Ellobius fuscocapillus*. About 78 bird species have been recorded, many of which breed in the area. The area is rich in reptiles, including the horned viper and the leaf nosed viper.

According to a survey held in December 2005, there are 2540 Markhor and 3145 Urial in the Torghar conservancy. Markhor is listed as protected and is on appendix 1 of CITES. The CITES Conference of the Parties in June 1997 approved a quota of markhor trophies for Pakistan, citing the success of Markhor conservation in community conservation areas. Recognizing the best practices in sustainable hunting around the world, particularly in Torghar, the international council for game and wildlife conservation known as CIC has launched "Markhor Award" during CoP 9 of CBD at Bonn Germany 2008.

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Contribution: Society for Torghar Environment Protection, Quetta)

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**Objective 22: Develop policies and laws to regulate access to genetic resources and promote the equitable sharing of benefits between resource owners and users.**

**Actions Recommended:**

1. Collate baseline data relating to genetic resources and on current practices of access to such resources for academic and commercial purposes.
2. Prepare an existing legal and institutional profile relating to the import, export, and use of genetic resources and traditional knowledge.
3. Formulate a national policy and strategy on genetic resources and access issues through the participation of stakeholders (government agencies, industry, scientific community, ex-situ conservation facilities, relevant NGOs, CBOs and private individuals).
4. Develop an action plan for implementation of priority actions through assigning responsibilities and identifying institutional development needs and designate an appropriate authority to oversee and implement the policy and relevant laws.
5. Develop legislation in support of the national policy.
6. In developing the legal framework described above, assess the desirability of harmonizing this new legislation with similar legislation being developed in the countries of south and southeast Asia to create a common, regional approach to these issues.
7. Countries with similar ecological zones, for example the SAARC (South Asian Association for Regional Cooperation) countries, should harmonize their policies on the import, export and use of genetic resources from the region as a whole.

**Objective 23: Strengthen information management systems on the biodiversity of Pakistan.**

**Actions Recommended:**

1. Establish a national information clearing house on biodiversity collections of Pakistani origin which are currently being held abroad.
2. Enhance the capacity of relevant national and provincial institutions to collect, store, analyze and supply information on biodiversity, through the provision of funding, equipment, staff and training.
3. Establish contact with institutions outside Pakistan, for example the British Natural History Museum to obtain information about those collections of Pakistani origin which are currently being held abroad

**Objective 24: Develop national funding mechanisms to support priority biodiversity conservation and management programmes.**

**Action Recommended:**

1. Re-assess national spending priorities, and consider financial re-allocations from those sectors which currently receive a disproportionate share of the national budget.
2. Re-assess existing expenditure on biodiversity-related activities against the priorities identified in this Biodiversity Action Plan; re-align expenditure to address the most urgent priorities.
3. Establish a task force to look into the possibilities of developing sustainable revenues to support biodiversity.

**Objective 25: Seek increased bilateral and multilateral funding for biodiversity programmes.**

**Actions Recommended:**

1. Create an informal working group of aid agencies and donors on biodiversity conservation and management in Pakistan.

2. Establish a database of agency/ donor development activities and locations to identify areas of possible donor interest.
3. Coordinate donor activities to maximize conservation efforts and resources. Invite donor agencies to assist with priority conservation activities in regions where they already have development programmes.
4. Strengthen national capacity to submit successful proposals to the GEF, through training in project development and proposal preparation using the GEF format.
5. Take steps to strengthen Pakistan's 'voice' at the CBD Conference of Parties.

### **Process through which BAP Prepared**

Preparation of the BAP was been carried out under an agreement between the Government of Pakistan and the World Bank under the Global Environment Facility. IUCN-The World Conservation Union, Pakistan was selected as the lead agency in collaboration with the World Wide Fund for Nature, Pakistan. The process leading up to preparation of the BAP has involved broad participation from government, academia and civil society through national and regional level consultative workshops designed to develop and review the draft document. Additionally, a number of background papers were prepared on sectoral and cross-cutting issues. Periodic supervision of the process was provided by a national Biodiversity Working Group constituted by the Ministry of Environment, Local Government and Rural Development.

### **Overview of the BAP Implementation**

The BAP was approved in the year 2000 but it was not until 2005 that a Biodiversity Secretariat was established in the Ministry of Environment for implementation of BAP. The secretariat comprised of one director and his office support staff. The main responsibilities of the secretariat is to facilitate and coordinate the implementation of the BAP, act as a focal point for the CBD, bilateral and multilateral coordination on biodiversity related issues, arranging financial resources for BAP implementation, and coordination with implementing agencies.

The Biodiversity Secretariat did not make any direct efforts to guide the implementing agencies in planning and implementation of the actions recommended in the BAP. The Biodiversity Secretariat undertook several awareness raising campaigns, promoted environmental education, made contributions strategic planning, policy formulation and in legislative reforms in the relevant sectors. Biodiversity Secretariat is playing an important role in influencing policy and financial decisions. Incorporation of conservation agenda into the forest biological diversity vision 2030 and allocation of funds in five year plan are just two such examples. A Biodiversity Working Group was constituted but it only held two meetings. Capacity and financial constraints did not permit this advisory body to contribute more towards implementation of BAP and working on new and emerging issues. The Group is comprised of 32 members representing all thematic areas of CBD from federal and provincial governments and other related agencies. Biodiversity Steering Committees were constituted in all provinces, however these committees remained dormant.

### **Effectiveness of the BAP**

The BAP has been a very useful document and provided over all guidance and serves as a good reference material on the CBD and priority actions for Pakistan. Five Year Plan (Mid Term Development Framework) contained provisions for availability of funds on implementation of BAP through provincial Governments. A list of federally funded projects, in line with the recommendations of BAP is given in chapter IV under goal 5. The coordination for BAP implementation at national and provincial levels remains weak. There

has been no assessment of the implementation of BAP, therefore, the real effectiveness of the strategy cannot be judged at this point in time.

### **Challenges Faced by the BAP**

The diversity of thematic areas and the cross cutting issues presents many challenges for the implementation of the BAP. Some of the challenges faced include:

- The first challenge is mainstreaming of the BAP in the programs and work plans of the relevant thematic areas. While there is growing awareness about the CBD, biodiversity conservation has not received the attention it deserved and thus there was little or no resource allocation in many thematic areas.
- The second challenge is to reconstitute the Biodiversity Working Group such that it is representative as well as small enough to be efficient and effective.
- The third challenge is to provide leadership and foster institutional arrangements at the national and provincial level.
- The fourth challenge is to mainstream the BAP in all the thematic areas and cross cutting issues of CBD.
- The fifth challenge is to review the PAP and identify national priority actions and mobilize resources for implementation.

### **Obstacles Facing BAP**

A systematic implementation of BAP never really took off due to weak institutional arrangements. Even if the institutional arrangements were in place, BAP implementation would still face some obstacles. The most significant being the lack of adequate human resource capacity both at the national as well as provincial level. Lack of a biodiversity policy and legislation is yet another obstacle. Another challenge is mobilization of financial resources for implementation of the BAP, which to some extent is indirectly linked to the problem of human resource capacity. Yet another obstacle is the deteriorating security situation in some parts of the country. The following actions are recommended to overcome the obstacles:

- The capacity of the Biodiversity Secretariat should to be strengthened both through additional trained manpower and by integrating existing institutions within the Ministry of Environment, for example, National Council for Conservation of Wildlife, The Zoological Survey Department, and the Biodiversity Directorate.
- A National Biodiversity Conservation Programme should be developed and launched to support actions needed to achieve the three objectives of the CBD.
- The Biodiversity Working Group should be replaced with smaller but effective steering committees at national and provincial levels.
- Thematic specialist groups comprising of professionals should be catalyzed and supported to prepare a systematic status, trends of, and threats to biodiversity. The groups should also provide technical guidance for the implementation of the BAP and developing and testing monitoring indicators.
- The Biodiversity Directorate should formulate and implement a ten year plan under the umbrella of the national program to support the implementation of BAP.
- National Biodiversity targets should be fixed for the CBD thematic areas and cross cutting issues, and progress reviewed by the steering committees.

## Linkages of National Actions with the CBD programs of work and cross cutting issues

The institutional arrangements for implementation of the Biodiversity Action Plan remained rather weak, and therefore no priority activities were identified for the country. However many activities have been undertaken that directly contributes to the progress on implementation of the BAP. A matrix showing the actions taken and their linkages to the thematic areas and cross cutting issues is given in the following matrix.

	National Actions	Linkage with BAP
1	Biodiversity consideration is being increasingly gradually incorporated the mid-term development framework and annual development plans of the government, especially those of forestry sector.	Action 1.3
2	Provincial Conservation strategies completed: Baluchistan, Gilgit-Baltistan Area, NWFP, Punjab and Sindh.  District Conservation Strategies: Abbottabad, Chitral.	Action 1.5
3	Revised wildlife laws approved: Azad Jammu and Kashmir,  Laws Revised but not yet notified: Baluchistan, NWFP, Gilgit-Baltistan.	Action 2.3
4	CITES Act drafted and waiting approval of the parliament	Action 2.4
5	Regulations and guidelines for the implementation of EIA being implemented.  Pakistan Environmental Protection Act, 1997.	Actions 2.6
6	Access and benefit sharing legislation drafted, but national and regional consultations not completed.	Actions 2.7
7	Biosafety guidelines prepared	Actions 2.8
8	Customs and border authorities trained in CITES enforcement.	Action 3.1
9	Remedial measures taken to protect species traded illegally.	Action 3.3
10	Commitments under conventions fulfilled.	Action 3.4
11	Gaps in the PA system identified and actions prioritized	Action 4.2
12	Red data list of mammals, freshwater biodiversity completed.	Action 4.3
13	Pakistan Museum of Natural History has established a biodiversity data base.	Action 4.5
14	Criteria for selection and assigning to recognized categories of PAs included in revised legislations.	Action 6.1
15	A preliminary review of PA system completed in 2000.	Action 6.2
16	Several new national parks established: CKNP, Musk Deer, and Saif-ul-Maluk, Kala Chitta National Park, Lulusar National Park, Handras Shandur National Park, Ghamot National Park, Toli Pir National Park, Pir Lasura National Park	Action 6.3
17	Improved management of six national parks: Chitral Gol, Deosai, Hingol, Machiara, Kirthar, Ayubia.  Effective management of 4 wetland complexes; and  Effective management of all community conservation areas.	Action 6.4
18	Degraded forest habitats restoration through a mega project under carbon trading mechanism.	Action 6.5

	Degraded ecosystems being restored in three National Parks: Chitral Gol, Hingol, and Machiara.	
19	Measure to control invasive alien species being undertaken for marine ecosystem.	Action 6.6
20	Fresh water biodiversity enhancement measures initiated at one site; Chashma Barrage. Similar initiatives launched in other areas like conservation of Poonch River in AJK for restoration of habitat and species richness.	Action 7.2
21	Capacity of local communities and NGOs enhanced to conserve, manage, and make sustainable use of Biodiversity: Actions taken under projects: MACP, PAMP, PWP, medium 2 GEF Medium Scale projects, and under GEF small grants programme.	Action 7.3
22	Sustainable development activities in four buffer zones: Chitral Gol, Machiara, CKNP, Musk deer NP, Salt Range.	Action 7.4
23	Conservation and sustainable use plans prepared for all natural habitats managed by the communities for trophy hunting.	Action 7.5
24	Revision of forest laws completed in Baluchistan, NWFP provinces, and Gilgit-Baltistan.	Action 9.2
25	Management plans mandatory for species hunted for trophies.	Action 9.3
26	Enhanced capacity to determine and monitor harvest levels of species harvested for trophies.	Action 10.1
27	Turtle excluding nets for marine fisheries mandatory, and nets to exclude younger fish in fresh water fisheries being promoted.	Action 10.4
28	Community based conservation projects promoted.	Action 11.4
29	Arid land Agriculture University offers degree courses in conservation. Punjab University has initiated a degree program on sustainable mountain areas conservation.	Action 17.4
30	Improved capacity in biodiversity conservation and management through GEF projects and small grants programme.	Action 17.7
31	Ministry of Education has incorporated text about biodiversity conservation in text books for high school students.	Action 19.3
32	Regular awareness campaigns around well managed PAs	Action 20.2
33	Media is facilitated, on ad hoc basis, to visit conservation initiatives and broadcast on their networks	Action 20.3
34	Active partnership among government agencies, NGOs and private sector for awareness raising	Action 20.11
35	EIA guidelines finalized and in use	Action 21.1
36	Strategic environmental assessment project launched by IUCN Pakistan	Action 21. 4
37	Proposal for information clearing house developed by the Ministry of Environment	Action 23.1
38	Endowments funds established for PAs and Mountain Areas Conservation	Action 24.3
39	Active programs to seek bilateral and multilateral funding for biodiversity	Action 25. 1-4

### Monitoring or Reporting System to Assess the Impact of the BAP

The institutional mechanism for implementation of the Biodiversity Action Plan remained weak and implementation also suffered for lack of adequate human and financial resources. Therefore no monitoring and reporting system was developed.

## Future Priorities for Implementation of CBD Objectives in Pakistan

In order to achieve the objectives of the CBD, the following priority action are recommended to fill in the wide gaps and to achieve the objectives of CBD in Pakistan:

1. Strengthen the institutional arrangements, both at national and provincial level for implementation of CBD program of work and cross cutting themes.
2. Prepare a National Biodiversity Program covering CBD thematic areas and cross cutting themes.
3. Prepare a National Plan of Work for the protected areas.
4. Prepare a National Plant Conservation Strategy.
5. Prepare a National Plan of Work for selected NTFPs (flora and fauna) and make implementation arrangements.
6. Prepare a National Plan of Work for restoring populations of selected endangered and threatened species.
7. Develop and run pilot demonstrations for ecosystem management approach and climate change mitigation in selected biomes outside the protected areas system.
8. Develop a monitoring and reporting system to assess progress on implementation of CBD.
9. Develop a GIS biodiversity database and a website.

## Level of Funding (national and international)

Many national projects and programs of the government and NGOs have made contributions to the fulfillment of the objectives of the CBD. Since the implementation of BAP remained weak and there is no monitoring and reporting mechanism, therefore it is not possible to compile data on the national level funding. Pakistan received major support from GEF in the form of pilot, medium scale and full scale projects, and for small grants program along with co financing from bilateral and multilateral agencies, and international conservation organizations. A list of such projects and programs is given in the following matrix.

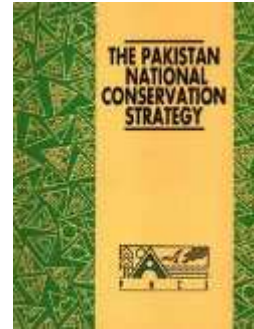
Project	National Funds (\$)	International Funds (\$)	Sources	Time Period
Maintaining Biodiversity in Pakistan with Rural Community Development		2,500,000	GEF Pre – Investment Facility (PRIF)	1996 - 1999
Mountain Areas Conservancy Project	750,000	8,100,000 1,500,000	GEF UNDP Govt of Pakistan	1999 – 2006
Protected Areas Management Project	670,000	10,080,000	GEF Govt of Pakistan	2002 - 2009
Wetlands Project	1,200,000	3,041,350 1,800,000 4,034,000	GEF UNDP RNE	2005 – 2011

Conservation of Species and habitats	STEP 215,000	767,000	GEF	2006 – 2011
	GOB 110,000	100,000	UNDP	
	Chagai Conservation Society 13,000		Govt of Pakistan	
	SUSG 25,000		National NGOs	
Conservation of Juniper Forests		975,000	GEF	2007 – 2011
		150,000	UNDP	
			Government (parallel financing 666,670	
			Private Sector (PKP) 57,000	
			Bilateral 20,000	
		NGO's & CBO's 616,767		
		Private Sector 33,300		
Conservation of Chilghoza Forests		150,000	European Union	2006 – 07
GEF Small Grants Program	153,605	2,219,512	GEF and BP Pakistan	
Mountain and Markets		75,000	GEF	2009 - 2010
		25,000	UNDP	
Enhancing Knowledge and Capacity to Combat Spread of Invasive Alien Species in Pakistan		913,000	GEF	2010- 2013
		867,700	UNDP	



## National Conservation Strategy

The National Conservation Strategy (NCS) approved in March 1992 was a major milestone in Pakistan's environmental history. The NCS has three overriding objectives: conservation of natural resources, sustainable development, and improved efficiency in the use and management of resources. These, in turn, depend on three principles: achieving greater public partnership in development and environment management; merging environment and economics in decision-making; and focusing on durable improvements in the quality of life in Pakistan.



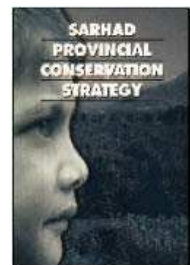
NCS covers fourteen key priority areas for policy formulation and intervention, including protecting watersheds, supporting forestry and plantations, protecting water bodies and sustaining fisheries, conserving biodiversity, increasing energy efficiency, developing and deploying renewable resources, preventing or decreasing pollution, managing urban wastes and preserving the cultural heritage. Approval of NCS led to the development of institutions such as the Environment Section in the Federal Planning and Development Division, and the Sustainable Development Policy Institute.

There is substantive tangible evidence of the Strategy's implementation. This includes the formulation of provincial and district conservation strategies, the establishment of Environment Protection Agencies at the federal and provincial levels and the addition of a regular chapter on the environment in the national five-year plans. (Source: IUCN Pakistan web site <http://www.iucn.pk/ncs.htm>)

The value of a conservation strategy at the national level sparked interest among the provinces to have provincial level conservation strategies as well which led to the preparation and approval of conservation strategies for North West Frontier Province, Baluchistan, Gilgit-Baltistan Area, Sindh. The conservation strategy for Punjab is in final stages of completion. A brief overview of the four provincial conservation strategies follows.

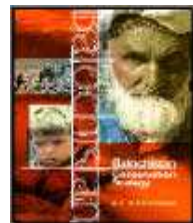
## Sarhad Provincial Conservation Strategy

The Sarhad Provincial Conservation Strategy is a Sustainable Development Action Plan for Pakistan's North West Frontier Province and represents a significant milestone in the effort to implement Pakistan's National Conservation Strategy. Action plans were needed at the provincial level to guide government departments, non-governmental organizations, the private sector, and individual citizens. The SPCS is the first such provincial effort. It was approved by the NWFP Cabinet in June 1996, and implementation is underway. (Source: IUCN Pakistan web site) <http://www.iucn.pk/spcs.htm>



## Baluchistan Conservation Strategy

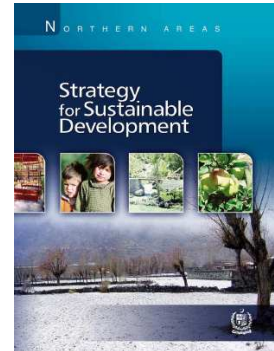
Covering nearly 44% of Pakistan's total geographical area, Baluchistan is the country's largest province. The increased demand for land and fuel wood, has resulted in the clearing of the natural vegetation cover and, consequently, the depletion of native species of plants and animals. Meeting the food needs of a growing population has also led to the prevalence of unsustainable agricultural and grazing practices that pose a severe threat to Baluchistan's natural resource base. To address these and a host of other related issues, efforts were undertaken to develop a comprehensive sustainable development agenda under the title of the Baluchistan Conservation Strategy (BCS).



The main objective of this project was to design and produce a policy framework, which will ensure that environmental concerns are incorporated into development planning. The BCS itself, as well as the processes used for its formulation, addresses the key issues of resource degradation through action planning; raising environmental awareness; building capacity for environmental planning and management; expanding cross sectoral linkages; promoting a consultative culture by involving interest groups and civil society in development planning; and initiating legislative and economic policies conducive to sustainable development.

### Northern Areas Strategy for Sustainable Development

Gilgit-Baltistan (Northern Areas) spread over 72000 sq. km is a rich mix of human and natural resources including cultures, languages, plants, animals and habitats. Around a million people live in this land of high mountain peaks, glaciers, alpine pastures, forests, lakes, plateaus, valleys and rivers. The Northern Areas Strategy for Sustainable Development (NASSD) presents a vision and a strategic framework for economic, social, cultural and ecological well being of the people of Gilgit-Baltistan Area. It provides a road map to improved governance; integrated gender, environment and sustainability; prioritized development needs; and creation of an enabling environment by improving policies and legislation, besides their compliance and enforcement for harnessing potential of sustainable development in all key sectors.



The NASSD is premised on three principles – participation of stakeholders in its formulation and implementation; human and institutional capacity building of stakeholders; and mainstreaming environmental considerations into planning and development processes. (Source: IUCN Pakistan web site) <http://www.iucn.pk/nassd.htm>

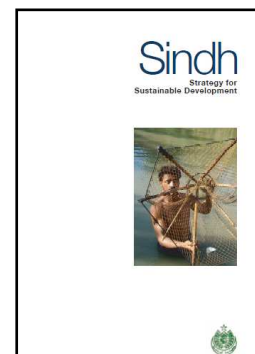
### Sindh Strategy for Sustainable Development

The Sindh Strategy for Sustainable Development (SSSD) proposes a ten year sustainable development agenda for Sindh. Its purpose is to highlight the ecological, economic and social issues of the province and to provide recommendations and strategic actions to address them. The strategy promotes the sustainable use of natural resources to achieve the objectives of poverty alleviation and social development through the participation of the people of Sindh.

The SSSD has been developed in response to the increasing depletion of natural resources and rise in poverty in the province. It is intended to serve as a framework that integrates the issues of both constraints and provides solutions without compromising associated objectives. It advocates good governance as its main theme and recommends institutional capacity building and using the participatory process during decision-making. Implementing these concepts in an integrated and holistic manner will ensure ownership, efficiency, and the sustainability of future projects. It is hoped that the SSSD will not only provide a framework for a prosperous Sindh, but will ultimately result in the diffusion of this prosperity to the whole of Pakistan.

Source: IUCN Pakistan web site)

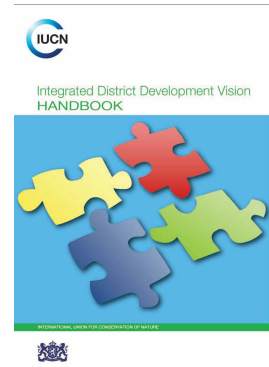
<http://cmsdata.iucn.org/downloads/sssd.pdf>



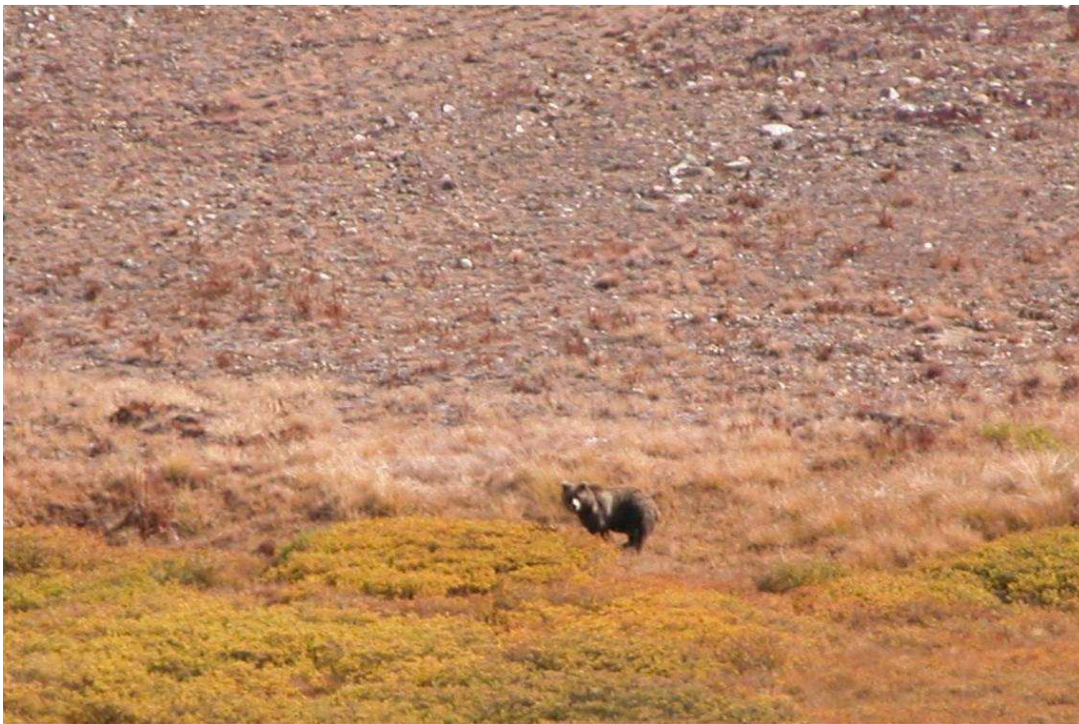
### District Conservation Strategies and Integrated Development Plans

The process of formulation of SPCS, lead to realization among the stakeholders that local level issues, especially at district level, require prioritization and development planning in an integrated manner so that a long term development agenda is available to the local administration for ensuring an equitable and sustainable development.

This realization led to IUCN's initiative of district level conservation strategies, initially in Chitral and Abbottabad Districts of NWFP. Government of Pakistan set in motion the local governance system under the Local Government Ordinance (LGO, 2001), which introduced a three-tier system of governance at the district, tehsil and union council level. Synchronizing the concept of district conservation strategies with the need to develop 'crystallized vision for the integrated development of the area' provided under Section 140 (4) of LGO 2001, the sustainable development agenda for the district was realigned as Integrated District Development Vision (IDDV).



IUCN has assisted six districts in developing their IDDDVs and is assisting another five districts for the same. Synthesizing the experience of developing IDDDVs, IUCN has prepared a handbook that outlines the processes and mechanisms required to develop an IDDDV in a particular district. This 'how-to-do' document would be useful for elected representatives, government officials, civil society actors and experts who will be involved in the development of IDDDV. (Source: IUCN Pakistan).



Himalayan Brown Bear in Deosai National Park. (Photo: Himalayan Wildlife Foundation)

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## Chapter III

### Mainstreaming of Biodiversity Considerations

#### Introduction

Pakistan has a long history of integration of biodiversity conservation and sustainable use into relevant sectoral and cross-sectoral plans, programmes and policies. The efforts started with the process of development of National Conservation Strategy in 1992 and gained prominence in 1999 with the initiation of process for the formulation of National Biodiversity Action Plan. The NCS, which has served as the *de facto* environmental policy of Pakistan, describes the environmental situation existing in Pakistan and recommends actions to be taken in 14 core areas, in order to redress the aggravating environmental degradation and to facilitate sustainable utilization of natural resources. The National Environmental Action Plan (NEAP), approved in February 2001, narrows the Government's policy focus on the environment to four core programs: clean air, clean water, waste management and ecosystem management. A comprehensive program has been launched to support implementation of NEAP. The national Environment Policy was approved in 2005.

Despite the continued efforts to arrest environmental degradation, the quality of environment in the country continues to deteriorate resulting in pollution, land degradation, deforestation, water depletion and loss of biodiversity. Furthermore, environmental challenges facing Pakistan have exacerbated over the years owing to a number of factors including high rate of population growth, increased urbanization and growing poverty. Pakistan has signed and ratified almost all the regional and international environmental agreements. However, there has been no serious effort to mainstream biodiversity concerns into the main sectors and cross cutting issues. The biodiversity and environment concerns are gradually finding acceptance in the policies, strategies and action plans of the country. A brief overview of the present situation is presented here.

#### Agriculture

The country lacked a proper agriculture policy for over 62 years, and has now prepared a draft comprehensive 'National Agricultural Policy' with the consensus of various stakeholders. Main challenges to agriculture of Pakistan include ensuring food security for the growing population, high cost of agriculture inputs, water, seeds, fertilizers, and pesticides etc. Other challenges are alleviating rural poverty by increasing farmers' profitability and maintaining sector sustainability, complying with sanitary and phyto-sanitary requirements of new WTO regime, coping with water scarcity, agro-energy crises, environmental degradation and climatic change.

Overall objective of the draft 'Agricultural Policy of Pakistan' is to increase quantity and quality of agricultural production and promote farm profitability and competitiveness. The draft policy focuses on achieving sustainable food security through increasing productivity, encouraging entrepreneurial agriculture and introducing income diversification interventions at the farm level.

#### Livestock

Livestock is a very important component of Pakistan's agriculture sector and accounts for nearly 50 percent of the total value of agricultural production and a significant proportion of export earnings. The country does not have a livestock policy. However, FAO of the United Nations has initiated a project to

assist the Federal Ministry of Food, Agriculture and Livestock (MINFAL) with the preparation of a "National Livestock Policy & Action Plan"

## Fisheries

Fishery plays an important role in the national economy. It is the most important economic activity in the villages and towns along the coast, and in most of the coastal villages and settlements it is the sole source livelihoods. The marine fisheries sector contributes about 57 percent in terms of fish production. Inland fisheries are common in rivers, canals and reservoirs. It is estimated that some 180,000 people are involved in inland fisheries for their livelihoods.

A fisheries and aquaculture development policy and strategy were formulated in Pakistan in the year 2006, and the environmental concerns were fully taken into account in aquaculture development. The policy also takes into account the need to rehabilitate marine aquatic environments damaged by pollution and environmental degradation; promote sustainable management of aquatic resources; and establish protected areas and fish sanctuaries for conservation of fish biodiversity. The policy also supports fisheries conservation in all coastal area management and planning processes through a mechanism for cross-sectoral integration and participatory decision making.

## Forestry and Plantations

The total forest area, including range lands, is 10.5 million ha, of which 1.4 million ha are productive forests. However, the contribution of the forestry sector to the national economy is less than one percent due to ban on forest harvesting. Wood for fuel is produced in the state-owned forest plantations, and private farmlands. The trees and bushes growing on degraded lands are a source of free fuel wood collection for the poor. A study on Household Energy Strategy revealed that the country's consumption of fuel wood is high, with about 79% of all the households using fuel wood for cooking (82%), space heating (7.3%), and water heating (9.8%). Fuel wood is also used in the commercial sector by bakeries, restaurants, in ovens, brick kilns, for tobacco curing, in ceramic products manufacturing, and food processing, etc.

The country lacks a comprehensive forest policy; however, a policy draft has been prepared and awaiting approval of the cabinet. The National Environment Policy calls for sustainable management of natural forests of Pakistan and increased tree cover for safeguarding economic growth and food security in the country. The specific policy recommendations are:

- Finalize the National Forestry Policy.
- Carryout intensive institutional and legal reforms both at the federal and provincial levels to promote good forest governance.
- Promote social forestry and integrated watershed management.
- Promote farm forestry and irrigated plantations.
- Eliminate all sorts of import duties on timber products while taking into account the environmental sensitivities of the neighboring Afghanistan.
- Develop and sustainably manage the riparian forests along with irrigated plantation and tree plantation on farm-lands.
- Develop and implement a strategy and an action plan for protection and rehabilitation of mangrove forests with the participation of communities.
- Preserve unique forests eco-systems and the cultural heritage of people of Pakistan. Provide alternative sources of energy, like piped natural gas, LPG, solar energy and micro-hydel power

stations, to the local inhabitants to reduce the pressure on natural forests, and to substitute firewood in the upland ecosystems.

- Strengthen the existing forestry research and training institutions with adequate infrastructure and technical manpower development.
- Promote sustainable management of rangelands and pastures through preparation and implementation of integrated range management plans.

## Education

The Curriculum Wing of the Ministry of Education and Ministry of Environment under the auspices of NEAP Support Programme designed a project to address the issue of 'lack of environmental awareness and education' in Pakistan. This is regarded as one of the key contributing factors in the rapid environmental degradation that results in poverty. The project will contribute to sustainable development in Pakistan through attitudinal and behavioral changes in students towards environmental conservation. The overall objective of the project is to develop appropriate Environmental Education (EE) concepts for grades one through 10 for incorporation in the formal education system throughout Pakistan. The key achievements of the project are:

- Curriculum for Environmental Studies developed and disseminated for 9<sup>th</sup> and 10<sup>th</sup> grades.
- Environmental Concepts for integration in to the curriculum/ textbooks for grades 1 to 12 in consultation with provinces, developed and ready for dissemination.
- Orientation of textbook authors/ publishers/ subject specialists in Punjab and NWFP provinces.
- Model Textbooks on Environmental Studies for grades 8<sup>th</sup> and 10<sup>th</sup> developed.

## Tourism

Tourism in Pakistan is not a large scale sector, and it plays a moderate role in development of the country. Since 1971, the year in which tourist statistics were first compiled, tourist arrivals have ranged between 122,000 and 494,000. Compared to the volume of international tourism, domestic tourism in Pakistan is fairly large. During 1995, the number of domestic tourists was estimated at 42.8 million. While the economic role of tourism in Pakistan may not be significant, its role in degrading the environment has been found to be very significant, mainly because tourism in Pakistan is concentrated in only a few areas with a high degree of seasonality.

The tourism industry is now considered as an opportunity for conservation and preservation of the environment rather than a threat. The country's first Tourism Master Plan was prepared under the auspices of the United Nations in 1967. It recognized environmental considerations in general terms for tourism development and nature conservation was not given much attention.

In order to check environmental degradation in mountainous areas of Pakistan, two basic mountaineering rules and regulations were framed in 1983 in an effort to control pollution. These are: (a) the expeditions are responsible for leaving camping sites clean of all garbage; and (b) the expeditions and their porters are responsible for damage to the forest or the animals in the areas the expedition has gone to. Since 1988, every international expedition has been required to contribute US \$200 for clean-up operations in the mountainous areas. Since 1991, the expeditions are required to make a cash deposit of US\$ 1,000 to ensure that the expedition observes environmental instructions. Despite these regulations, the pollution

in the high altitude areas has increased in recent years. Recently, the government has constituted a committee to revise the 1990 National Tourism.

### **Conservation and Sustainable Development**

The National Conservation Strategy (NCS) approved in 1992 had three broad objectives: (a) conservation of natural resources, (b) sustainable development and, (c) improved efficiency in the use and management of these resources. The NCS identified fourteen core areas for priority implementation, which led to the design of 68 programs that included various sectors and partners of the society. A review of the NCS in 2002 revealed that awareness raising and institution building were the primary achievements of the Pakistan's National Conservation Strategy (NCS) more so than improvements to the environment and natural resources. Furthermore the NCS resulted in strengthened civil society institutions and their influence.

With the launching of the NCS, a need was felt to have provincial conservation strategies as a means to implement the sustainable development agenda at the provincial level. The North West Frontier Province (NWFP) decided to take the lead on this issue and was soon followed by the government of Baluchistan. NWFP subsequently recognized that their strategy should be devolved further into district strategies as well (initially in Abbottabad and Chitral). At the same time the government in the Gilgit-Baltistan Area also embarked upon developing a strategy there. A recent study has indicated that the initiation of the strategy development process created some lasting impacts. The most significant has been the introduction of a tradition of multi-stakeholder public consultations on sustainable development. Awareness has increased and most stakeholders are pleased with the attitudinal changes gradually taking place. However, sound implementation mechanisms are not in place and consequently the conservation strategies are not achieving the desired results.

### **Cross Cutting Issues**

The cross cutting issues are adequately addressed by the National Environment Policy of Pakistan and its objectives and policy recommendations are:

Population and Environment: To address the population-environment nexuses effectively, the government shall:

- Integrate environmental considerations into population policies and related projects and programs.
- Encourage behavioral change communication to promote environmental friendly consumption patterns.
- Increase public awareness of the problems of unchecked population growth and benefits of small population demand on natural resources.
- Channelize the migration to the intermediate/smaller agri-based towns through provision of necessary infrastructure and support facilities.
- Upgrade living environment in rural settlements in order to generate reverse migration.
- Develop city master plans to ensure development of cities in a planned manner.
- Ensure equitable access to land and other environmental resources.





### Indus for All Programme: Marshalling ideas and efforts to safeguard the Indus Ecoregion

With the introduction of Global-200 in 1997, WWF embarked on a new approach of conserving biological diversity and ecological processes around the world. The approach involved addressing a broader range of issues and partnerships on a larger landscape level. As part of Global-200, the ecoregion conservation journey in Pakistan began with the Indus Ecoregion, which is one of the 238 ecoregions in the world and also one of the 41 Priority Places for the global WWF Network.

The basis for the Indus Ecoregion Programme is a study titled “Root causes of Biodiversity Loss in the Mangrove Ecosystem” conducted in 1999. This was followed by a rigorous consultative process in 2002 and 2004 towards developing the Indus Ecoregion Plan. The first six-year implementation phase of the Indus Ecoregion Programme started in 2006 and is known by the *Indus for All Programme*. Four of the fourteen priority sites represent distinct ecosystems, i.e. coastal, freshwater wetlands, forest and a blend of desert-wetlands ecosystems.

Aimed at conserving the biological diversity of the Indus Ecoregion and improving and diversifying livelihoods of the local communities, the Programme intends to demonstrate participatory natural resource management (NRM) practices in the four priority sites. For this purpose the Programme has received a generous financial support from the Embassy of the Kingdom of the Netherlands.

The Programme has adopted a strong institutional framework. It has established the Indus Ecoregion Steering Committee comprising of stakeholders and government allies from the national and provincial levels, and District Coordination Committees. The Programme has developed socio-economic and NRM plans for priority sites which are being implemented in collaboration with key stakeholders. Programmatic interventions are supported by on-ground action research on poverty-environment linkages and a comprehensive education and awareness drive. The Programme is translating its on-ground interventions into policy relevant formats as well as mainstreaming environmental considerations in important policy and macro-economic planning



documents.

For more information about the Programme log on to [www.foreverindus.org](http://www.foreverindus.org)

Gender and Environment: It will be ensured that all environment related policies, projects and programs are gender sensitive and promote empowerment of women. To this end, the government shall:

- Compile statistics of gender-disaggregated environmental goods and services.
- Ensure effective participation of women in all phases of environmental projects and programs.
- Mainstream gender in all relevant policies and plans.
- Launch targeted interventions to address the environmental issues which impact more adversely women such as indoor air pollution and lack of access to water supply sources.
- Include "gender and environment" in the curricula of education and training programs on environment.

Environment and Local Governance: Effective environmental management at the local level with active participation of all key stakeholders shall be ensured. For this purpose, the government shall:

- Establish nationwide district environment offices and district environment committees.
- Develop and implement district and tehsil level environmental management plans.
- Build capacities of elected district government representatives and local government officials for effective management and participation in environmental governance.
- Devolve necessary powers to local governments to ensure effective environmental management.
- Establish district sustainable development funds.

### **Multilateral Environmental Agreements**

The NEP recommends that government shall continue to play a proactive role to ensure protection of regional and global environment and cooperate with the international community in promotion of sustainable development. In this context, the government shall:

- Effectively participate in regional and international forums to foster cooperation for protection of environment and natural resources.
- Ensure effective implementation of all bilateral, regional and international multilateral agreements, protocols and conventions to which Pakistan is a party, in line with national policies and priorities.
- Develop and implement national strategies and action plans for all multilateral environmental agreements, Johannesburg Plan of Implementation, Millennium Development Goals and Water, Energy, Health, Agriculture, and Biodiversity (WEHAB) framework.

The Ministry of Environment is the focal Ministry for three of the four biodiversity-related conventions - CITES, Convention on Migratory Species, Ramsar and the Rio conventions. The Ministry of science and technology is the focal the World Heritage Convention. The country actively participates in the processes of these conventions and makes sure that biodiversity concerns given full consideration.

### **Millennium Development Goals**

Pakistan has adopted the following targets and indicators for tracking progress towards progress on goal 10 'Ensure environmental sustainability'.

Target. Integrate the principles of sustainable development into country policies and programmes and reverse the loss of environmental resources.

Indicator	Definitions	1990	2015
Forest cover including state-owned and private forest and farmlands	Forest cover including state-owned and private forest and farmlands, as percentage of the total land area	4.8%	6%
Land area protected for the conservation of wildlife	Land area protected as percentage of total land area	9.1%	12%



Zangi Nawar wetland complex, a community conserved wetlands of biodiversity significance in Noshki, Baluchistan (Photo: SUSG CAsia, Quetta, Pakistan)

## Chapter IV

### Conclusions: Progress towards the 2010 Target and Implementation of the Strategic Plan

#### Progress towards the 2010 Targets

#### Goal 1. Conservation of the biological diversity of ecosystems, habitats and biomes.

##### Effective Conservation of Ecological Regions (Target 1.1).

No specific targets were set for effective conservation of ecological regions. However, most of the ecological regions are adequately represented in the protected areas network in Pakistan and are thus being effectively conserved. The natural habitats that are outside the protected areas system are generally degraded under heavy population pressure. This is especially true of the arid lands – the largest ecological region in the country. The food security of pastoral communities dependent on these lands is threatened and they are also most vulnerable people to climate change.

The following projects recently completed or presently under implementation are addressing conservation of biodiversity outside the protected area system:

**Mountain Areas Conservancy Project:** The Mountain Areas Conservancy Project (MACP) was an initiative of the United Nations Development Programme (UNDP), the Government of Pakistan and the Global Environment Facility (GEF). The MACP was designed as a seven-year project, to run from 1999 to 2006, although start-up was delayed until the end of 1999. It followed a pilot, PRIF phase (GEF Pre-Investment Facility) which tested approaches and methodology at a small number of sites in the period 1995-1998. The overall goal of MACP was conservation of nature in the mountains and high valleys of northern Pakistan.

The planned approach was to empower the local village and valley communities to safeguard the natural environment and wildlife at the same time as they develop their local economies and livelihoods based on the sustainable harvest of natural resources. The objective was to make sufficient progress in developing the resource management capability of local communities, government agencies and other development partners, to demonstrate the successful establishment of an initial system of four extensive Mountain Areas Conservancies by 2006 covering 16, 365 square kilometers area inhabited by a population of 231, 000 people, most of whom are dependent on the natural resources. Project budget US\$10.35, duration 1999-2006.

**Pakistan Wetlands Programme:** GEF/UNDP Project, estimated budget \$ 11.792 million, duration 7 years (2005-2011). The purpose of the project is to conserve globally important biodiversity in Pakistan without exacerbating poverty. Immediate objectives are (a) to create and maintain an enabling environment for effective and sustainable conservation of natural wetlands, and (2) to implement sustainable wetlands conservation of four representative sites that will serve as replicable models for subsequent nationwide wetlands conservation initiative.

**Conservation of species and habitats.** The project is premised on the rationale that community based resource management is the most effective way to conserve threatened and endemic habitats and

species. The project seeks to provide incentives for conservation by promoting sustainable resource use regimes that provide access and benefits to local communities, for example, a trophy-hunting programme, regulated trade in reptiles and snake venom, and medicinal plants collection, processing and marketing. The project aims at systematically removing the threats and root causes for biodiversity loss. The expected outcomes are: increased awareness of stakeholders about environmental, economic and social benefits of conservation; an enabling environment for community-based conservation and sustainable use of biodiversity; capacity of communities, local NGOs, and government institutions strengthened for conservation and sustainable use of biodiversity; and livelihoods of local people improved and pressure on habitats reduced. Project budget US\$ 1.23 million, project duration 2006-2011.

**Sustainable Land Management to Combat Desertification in Pakistan Project:** The overall goal of the project is to combat land degradation and desertification in Pakistan to protect and restore ecosystem and essential ecosystem services that are key to reducing poverty. The project will be implemented in two phases, with the first phase focused on creating an enabling environment for SLM and piloting innovation. The second phase drawing lessons learned to deepen the policy and institutional commitment to SLM will be completing demonstration projects that can later be scaled up and replicated. The immediate objective is to strengthen institutional capacity, create an enabling environment, and demonstrate good practices in an effort to help remove key barriers to Sustainable Land Management (SLM). Duration 2 years (2008-2009) Budget USD 4.6 million (UNDP: US\$ 1,292,000, GEF: US\$ 1,990,000)

#### **Protection of Important areas of biodiversity (Target 1.2)**

There are no national targets for protection of important areas of biodiversity. However, most of the important biodiversity areas are covered under the protected area system. A few such areas that were not covered in the PA system or were not being effectively protected are now receiving attention. The prominent examples are:

**Conservation of Endemic Reptiles:** Chagai desert is home to six endemic species of reptiles. These were being unsustainably harvested for export as pets and other uses. A GEF/UNDP medium scale project has initiated program to conserve and develop protocol for a sustainable collection of these reptiles for marketing by the local communities.

**Conservation of Juniper Forest Ecosystems:** IUCN Pakistan is implementing a GEF medium scale project for the conservation of this ecosystem of global biodiversity significance. The project is actively involving local communities and key stake holders in planning and implementation.

**Conservation of Chilghoza Pine Forest Ecosystem:** *Pinus gerardiana* or Chilghoza pine forest ecosystem is yet another threatened ecosystem in Pakistan. Through a UNDP funded grant WWF, Pakistan is trying to develop markets for edible pine nuts, as a means to save the forests. It is expected that the income from pine nuts would not only substitute the income from cutting of trees but would be more profitable and sustainable.

**Conservation of Brown and Black Bear:** Himalayan Wildlife Foundation has been actively involved in the conservation of Himalayan Brown Bear in alpine ecosystem of Deosai Plateau. Through their efforts a new national park has been established in Azad Jammu and Kashmir which will not only extend the home range of brown bear but also bring to fore the conservation of Musk Deer as the National Park has been named after musk deer. Sustainable Use Specialist group of IUCN for Central Asia is actively taking actions to conserve a remnant population of Asiatic Black Bear in Baluchistan.

## **Goal 2. Conservation of Species Diversity**

### Restore, maintain, or reduce the decline of populations of species of selected taxonomic groups (Target 2.1)

There are no national targets to restore, maintain or reduce the decline of species of selected taxonomic groups. However, through effective management of community conservation areas for the purpose of trophy hunting, there are now healthy populations of wild ungulates – Markhor, Urial, and Ibex in many parts of the country. In addition, the decline of reptiles in Chagai desert has been reduced through the work of GEF MSP for conservation of species and habitats.

#### Marine Turtle Conservation in Pakistan

Marine turtles are endangered throughout the world. Out of seven marine species, two Green turtle (*Chelonia mydas*) and Olive Ridley (*Lepidochelys olivacea*) are found on the beaches of Pakistan. Pakistan declared has declared the turtles as protected species and actively undertaking research and conservation for the last 30 years. So far more than 700,000 hatchlings/baby turtles have been released in the open sea. More than 7000 turtles have been tagged for monitoring their migratory route. A programme for captive rearing of hatchlings is being launched to increase the size of hatchlings to reduce mortality on the open beaches. Year 2006 was celebrated as “Year of the Turtle” under Indian Ocean South East Asian Marine Turtle programme. Educational visits to the area are arranged for the school children and campaigns are organized for mass awareness.

Satellite tracking of marine turtles, in collaboration with WWF and Environmental Research and Wildlife Development Agency (ERWDA) Abu-Dhabi has helped in understanding on habitat use by the turtles.

### Improvements in status of threatened species (Target 2.2)

There are 23 mammals, 11 birds, and 13 reptiles which are threatened with extinction and are included in CITES appendix I. There are 30 mammals, 78 birds and 14 reptiles on CITES appendix II, that is the species that are likely to become extinct unless trade is closely controlled. Twenty mammals, two birds and 12 reptiles are included in appendix III – species of which trade is already regulated. The lists of threatened species of fauna of Pakistan on CITES appendix I, II, and III are given in appendices 2-4 respectively. The list of threatened species of flora of Pakistan is in appendix 5. It includes one species in CITES appendix I and 13 species in appendix II. There are no national targets for improvements in the status of the threatened species. There have been no surveys to assess the present status of these species and these continue to be in threatened status.

### Goal 3. Conservation of genetic diversity and maintenance of indigenous and local knowledge.

**Crops:** On farm conservation of crop genetic resources is a difficult task; therefore ex-situ conservation is a preferred option. A small gene bank for short term storage and a laboratory has been established at the National Agriculture Research Center and a program on collection, conservation, and evaluation is under way. The collection on wild relatives of crop plants is limited. However, most wild relatives of crop plants occur in the protected areas and thus by default they are being conserved *in-situ*. There is an increasing recognition of the need to protect indigenous plant varieties and now at provincial level too, gene banks for preservation of native varieties and races of food crops are being established.

### Saving Oriental White-backed Vulture in Pakistan

Vultures play an important role in disposal of carcass in the Indian subcontinent. The vultures also play an integral role in "sky burial" ceremony of Parsi community in which human corpses are left out to be consumed by the raptors. The population of Oriental White Back Vulture (*Gyps benegalensis*) in Pakistan has declined by more than 95 percent in Pakistan and the carcasses rot for days. The cause of vulture mortality has been a mystery until a research study concluded that the vultures die after scavenging carcasses of livestock with diclofenac residues.

An extensive field survey of the white backed vulture in the Punjab and Sindh provinces was conducted in the breeding season (2008-09) which demonstrated that the current population of the white backed vultures in Pakistan is less than 50 birds. A large communal aviary of the critically endangered, white-backed vultures in Changa Manga Forest has a flock of fourteen birds now. Construction of four breeding aviaries has been completed and three breeding pairs have been moved into their individual aviaries. The guinea pigs breeding facility has been set up to provide supplementary food to vultures and awareness activities were conducted with the school located at the field site.



(Contribution: WWF Pakistan)

**Tree species:** The botanical gardens of the universities serve as important areas for conservation of floral diversity. The botanical gardens of Government College University in Lahore, Shah Abdul Latif University in Khairpur, University of Peshawar all have good collections of native tree and shrubs and other important plant species. Recently University of Peshawar has launched the concept of Qur'anic Garden developed by UNESCO in collaboration with the Jamia-Usmania, an institution primarily involved with the religious education. A federally funded project on establishment of Botanical Garden network is a step towards a well defined program for *ex situ* conservation of floral genetic diversity.

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#### Goal 4. Sustainable Use and Consumption.

##### **Biodiversity-based products derived from sources that are sustainably managed, and production areas managed consistent with the conservation of biodiversity (Target 4.1).**

There are no national targets for sustainable management of sources from where biodiversity based products are derived. *In situ* conservation of medicinal plants and their sustainable use was a major component of the Mountain Areas Conservancy Project. The project identified many important areas for conservation of the medicinal plants and made plans for their conservation and sustainable use with the active involvement of local communities. However, the present status of their management and condition is not known. In order to relieve the pressure on natural habitats, conserve the medicinal plants in the wild, and to meet the growing demand of herbal industry, research and development for their cultivation has been going on for some time, but their large scale propagation has not been taken up. Two large producers of herbal medicines - Qarshi and Hamdard have established farms for cultivation of some species, and it is hoped that is helping their conservation in nature.

##### **Unsustainable consumption, of biological resources, or those impacts upon biodiversity, reduced (Target 4.2)**

The country does not allow export of species or their products that are included in the CITES appendix I and II. However, there are no national targets to reduce the unsustainable consumption of biological resources.

##### **No species of wild flora or fauna endangered by international trade (Target 4.3)**

Presently no species of wild flora or fauna is endangered by international trade. Export of wild flora or fauna is strictly controlled under the national laws and regulations. Pakistan has prepared a CITES Act which is in its final stages of approval.

#### Goal 5. Pressures from habitat loss, land use change and degradation, and unsustainable water use, reduced.

The land that is not suitable for cropping or is not reserved for forestry or included in the protected area system is prone to degradation. Most of these lands have an undefined tenure or usufruct rights. Therefore these lands suffer from the tragedy of commons and natural habitats continue to be degraded. The degradation of natural habitats in the catchment areas of large dams started to receive attention when plans for their construction were being prepared. The watershed and soil conservation programs in the catchments of large dams, especially Tarbela and Mangla, have substantially reduced loss of soil through water erosion and improved the natural habitats. The watershed management is also carried out where small and mini dams have been developed in mountainous and sub-mountainous environments, which also helped to recharge groundwater and provide water for wildlife and the migratory birds.

The development projects implemented in the last five years have helped to reduce the habitat loss, land use changes and degradation and unsustainable water use in the country. The most successful programme launched at the national level was "National Programme for Improvement of Watercourses" at a cost of Rs. 66 billion to improve 80,000 watercourses in the country, which resulted in saving of 20-30% in conveyance losses, reduced water logging and salinity and ensured equitable distribution of water. Around 60% watercourses have been improved through active participation of water users' association.

The other Programme is the National Water Conservation and Productivity Enhancement using High Efficiency Irrigation Systems in Pakistan at a cost of Rs. 18 billion. This project has just started and drip and sprinkler irrigation systems have been installed on 3000 acres, whereas the target is over 220,000 acres.



Reducing the degradation and loss of natural habitats is an integral component of the rural support programs in Pakistan. In addition it was also the focus of a large number of development projects, a few of the important recently completed and on-going projects are:

	Project Name	Capital Cost
1	Coastal Areas/Dry Land Biodiversity & Survey Management.	39.540
2	Environmental Rehabilitation and Poverty Reduction through Participatory Watershed Management in Tarbela Reservoir Catchment Area	532.500
3	Implementation of Management Plan for Ayubia National Park, Distt. Abbotabad	72.710
4	Rehabilitation of Rangelands in Pothwar Tract of Punjab through Participation of Local Communities.	24.802
5	Environmental Rehabilitation Through Improvement/ Promotion of Indigenous Tree Species in South AJK	39.000
6	AJK Poverty Reduction Project Through Participatory Watershed Development	474.900
7	Rehabilitation of Denuded Forest Areas Through Sowing and Planting and Development of Farm/Social Forestry with Community Participation in Gilgit-Baltistan Area	125.000
8	Conservation and Rehabilitation of Indus Delta Mangroves for Sustainable Management	39.400
10	Development of Forestry Sector Resources for Carbon Sequestration in AJK	14287.833
14	Multi Sectoral Mega Project for Conservation of Juniper Forests	1098.486
15	Establish of Pakistan Botanic Gardens Network Secretariat in Government Collage University Lahore	36.836
	<b>TOTAL</b>	<b>16771.007</b>

#### **Goal 7. Address challenges to biodiversity from climate change and pollution.**

##### **Maintain and enhance resilience of the components of biodiversity to adapt to climate change (Target 7.1)**

Adaptations to climate change and mitigation measures are under active consideration of the government. The issue of climate impact on crop biodiversity was discussed in a recently held national workshop on the issue. National year of Environment (2009) invited experts from agriculture sector from across the country to draw the attention of focal Ministry on the issue. Sporadic efforts were made to reduce the emission of green house gases from dairy sector and now, the program is being proposed for establishment of community managed Bio-Gas plants on as well as on commercial basis. A proposal is also under considered whereby new cattle farms would be required to incorporate biogas plants and fermented manure production for agriculture.

Conservation of local races of crops that have potential of climate change resistance is under active consideration of Federal Seed Certification and Registration Department. The project proposes conservation of land races and promotion of Good Agriculture Practices.

### **Reduce pollution and its impacts on biodiversity (Target 7.2)**

Preventing and abating pollution are two of the fourteen core program areas of the National Conservation Strategy (NCS) of Pakistan. The 1997 Pakistan Environmental Protection Act provides for the protection of the environment, pollution control and the promotion of sustainable development. The self-monitoring and reporting (SMART) program for the industrial sector across the country was formally launched by the Minister of Environment in March 2006. The self-monitoring and reporting guidelines were developed through a long and exhaustive series of consultations and roundtable discussions among all stakeholders, including representatives from the government, industry, NGOs, civil society organizations, universities and research and development institutions.

Under the self-monitoring and reporting program, industries in Pakistan are made responsible for systematically monitoring their environmental performance and periodically reporting the data to provincial Environmental Protection Agencies. It is expected that entrepreneurs who are well aware of their social and legal responsibilities will respond adequately to this new system which does not involve any role for environment inspectors. The self-monitoring and reporting system takes into account the interests and resources of both the public and industry. On one hand, it saves considerable money, time and efforts of the government and on the other, it involves industry in evaluating environmental performance, leading to pollution controls measures.

Karachi Port Trust (KPT), Karachi Local Government and Sindh Wildlife Department have plans for controlling pollution through different projects. KPT has established an Environmental Protection Department that has mandate of monitoring and controlling pollution related with shipping industry. A marine Pollution Contingency Plan has also prepared after the experience of Tasman Spirit incidence.

### **Goal 8. Maintain capacity of ecosystems to deliver goods and services and support livelihoods.**

Maintenance of the capacity of ecosystems to deliver goods and services and support livelihoods is one of the major objectives for the management of national system of forests and the protected areas. In addition restoration of degraded ecosystems to improve the ecosystem goods and services receives a high priority in allocation of national financial resources. The list of projects presently under implementation along with their capital cost is given under goal 5.

### **Goal 9. Maintain socio-cultural diversity of indigenous and local communities.**

There has been no serious effort to document the diversity of indigenous communities, their traditional knowledge, innovations, and practices. However, the indigenous and local communities have complete freedom to maintain their socio-cultural diversity.

Efforts on preservation of Sacred Sites are integrated in the development planning of new projects. Many religious, social and cultural practices are conservation friendly. Shrines and sacred sites spread all over the Salt Range are proving a mechanism of conservation of natural forests and wild fauna and flora in the surrounding areas. Lush forests around Tilla Jogian, a stable population of peacock around the shrine of Kallar Kahar are just two such examples. Rights of people to practice their religious rituals in the protected areas are well acknowledged. Shah Norani shrine in Hingol National park is one such example.

## Goal 10. Ensure the fair and equitable sharing of benefits arising out of the use of genetic resources.

There has been no commercial utilization of the genetic resources of Pakistan in the context of ABS. At present lack of legislation has led to unrestricted exploration and exploitation of genetic resources. Such incidences are not documented and not regulated. There is an increasing recognition of a need for legislation on ABS. To ensure equitable sharing of benefits out of utilization of biological resources, there is an increasing pressure at regional level where SAARC member countries are under pressure to have mutually supportive legislation on ABS. Similarly, ECO member countries on the western side are also considering ABS regulations as a significant tool for conservation and sustainable use of genetic resources. However, provincial Governments have expressed some concerns on the draft regulation of ABS. More consultations will be made to have an agreed text for promulgation as national law.

### Mangrove Rehabilitation of degraded Mangrove Ecosystems

Mangroves ecosystem of Pakistan is important natural resource, critical for fisheries and natural barrier to various disastrous threats. Baluchistan has a large coastal area and is exposed to tidal action with risks of Tsunami and Hurricanes. An important natural resource, critical for fisheries and natural barrier to various disastrous threats, the mangroves had been fast disappearing due to anthropogenic activities. IUCN Pakistan has been actively involved in the conservation and management of mangroves from 1997. So far about 6.5 million seedlings and a network of container plants nurseries have been established under mangrove rehabilitation programme. Some species (*Rhizophora mucronata*, *Ceriops tagal*, *Aegiceras corniculatum*) along with *Avicennia marina* have been reintroduced to bring genetic variation and vibrant sustainability of the plants and larger ecosystem. Some virgin estuarine areas have created new world records for high growth rates of these mangroves. Efforts are underway to rehabilitate and regenerate mangrove forests all along the coastline in Baluchistan. In this regards, IUCN has been working with various partners and stakeholders.



2 years old *Rhizophora* plantation in Jiwani. (Contribution: IUCN, Pakistan)

On similar lines, WWF is also implementing a mangrove rehabilitation program with close collaboration of local communities. Furthermore, Sindh Forest and Wildlife Department have huge mangrove afforestation activities under federally funded PSDP funded projects and ADPs. More over on July 15<sup>th</sup> 2009, Pakistan has set a new Guinness World Record by tree planting by local communities at Keti Bandar, District Thatta Sindh. The effort was organized by MoE in collaboration with its other partners. During this effort three hundred planters from the local community planted 541,176 propagules of mangroves on 796 acres on an island in Indus Delta.

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**Goal 11. Parties have improved financial, human, scientific, technical and technological capacity to implement the Convention.**

The human, scientific, technical and financial capacity has partially improved during the last decade. However, a lot more needs to be done in these areas to make significant progress towards achieving the objectives of the CBD.

**Implementation of the Strategic Plan**

**Goal 2. Parties have improved financial, human, scientific, technical, and technological capacity to implement the Convention (Goal 2)**

Country has adequate capacity for implementation of priority actions in national biodiversity strategy and action plans (Target 2.1).

Country lacks adequate capacity for the implementation of priority actions in the national biodiversity action plan.

Sufficient resources available to implement the three objectives of the Convention (Target 2.2)

Lack of adequate human resource capacity and weak institutional arrangements for implementation of the BAP have been a major constraint in raising financial resources needed for priority activities under the BAP.

Increased resources and technology transfer available to implement the Cartagena Protocol on Biosafety (Target 2.3)

The limited resources are available for the implementation of the Cartagena Protocol on Biosafety. A National Biosafety Centre had been established in Pakistan Environmental Protection Agency, Ministry of Environment that will provide leadership for the implementation of CPB in the country. Pakistan had developed, notified, and implemented the Biosafety regulations to regulate the Genetically Modified Organisms (GMOs) and their products related activities in the country. The Centre had been able to develop the international liaison with the south Korea, UNEP, and GEF. The Centre lacks the sufficient funds to carryout the planned activities.

Country has adequate capacity to implement the Cartagena Protocol on Biosafety (Target 2.4)

Pakistan has adequate capacity to implement the CPB. The least required setup had been established for the implementation of Biosafety Regulations developed and notified in the shape of National Biosafety Centre as a project. The centre has gotten the committees notified and encouraged the established of 30 Institutional Biosafety Committees in academic, R&D institutions, Seed companies (private & international) within the short period of three and a half years time periods and got National Biosafety Committee's approval on the recommendations of Technical Advisory Committee for the fifty four (54) submitted GMOs related cases by different applicants. There is a need to further improve the technical and managerial capacity of the centre to enhance the quality and quantity of the regulating, monitoring and evaluation, and also the risk assessment and risk management of GMOs and their products related activities.

Technical and scientific cooperation is making a significant contribution to building capacity (Target 2.5)

A proposal for technical cooperation with South Korea has been under consideration but not yet agreed upon. There is need for more initiatives to increase technical and scientific cooperation for building

capacity. However, the technical assistance is arranged on need basis and primarily procured through technical assistance component in the donor funded projects.

**Goal 3.** National biodiversity strategies and action plans and the integration of biodiversity concerns into relevant sectors serve as an effective framework for the implementation of the objectives of the Convention.

Country has a regulatory framework in place and functioning to implement the Cartagena Protocol on Biosafety (Target 3.2)

The country has developed its Biosafety laws and established Biosafety guidelines. However, the process of implementation of legislation is in its infancy.

Biodiversity concerns are being integrated into relevant national sectoral and cross-sectoral plans, programs and policies (Target 3.3).

Biodiversity concerns are being slowly integrated into relevant national sectoral and cross-sectoral policies and plans. There have been no proactive efforts to accomplish this but it happens during the consultation process when sectoral and cross sectoral programs and policies are revised or formulated. All Federal Ministries have established focal offices for environmental concerns. Though with limited success, nature conservation is acknowledged through their interest in tree planting campaigns.

The priorities in national biodiversity strategies and action plans are being actively implemented, as a means to achieve national implementation of the Convention, and as a significant contribution towards the global biodiversity agenda (Target 3.4)

Weak institutional arrangements and lack of adequate capacity is major cause for slow progress on implementation of BAP. While some contributions have been made towards the global biodiversity agenda, yet a lot more remains to be done.

**Goal 4.** There is a better understanding of the importance of biodiversity and of the Convention, and this has led to broader engagement across society in implementation.

Communication, education, and public awareness strategy implemented and promotion of public participation in support of the Convention (Target 4.1).

The Biodiversity Action Plan contains recommendations on communications, education and public awareness. Actions are taken on the recommendations only on an *ad hoc* basis as there is no programme of work for implementation of the BAP. While many such activities are project based, some activities like annual biodiversity, desertification, water, wetlands, tree plantation and ozone days are celebrated nationally.

Biosafety is promoted and public awareness, education and participation in support of the Protocol facilitated (Target 4.2).

There has been no significant progress on public awareness, education or participation in support of the Biosafety Protocol.

Local communities are effectively involved in implementation and in the processes of the Convention (Target 4.3).

Community participation is well integrated in all of the conservation and sustainable development programs of the country.

Key actors and stakeholders, including the private sector, are engaged in partnership to implement the Convention and are integrating biodiversity concerns into their relevant sectoral and cross-sectoral plans, programs and policies (Target 4.4)

The World Conservation Union (IUCN) and World Wide Fund for Nature (WWF) have major presence in Pakistan and are key actors and stakeholders in the implementation of the Convention. Other smaller and more focused stakeholders include Himalayan Wildlife Foundation, Society for Torghar Environment Protection. Shell, Attock Oil, and Association of Petroleum and Oil Exploration companies. They are all making valuable contributions for conservation of biodiversity. Corporate Sector is invited in tree planting and afforestation activities across the country. Pakistan Tobacco has a regular program of annual tree planting activity and has established a nursery promoting indigenous tree varieties.

### **Mobilizing Financial and Technical Resources**

Pakistan is recipient of four full scale GEF projects, two medium scale projects and two small grants program, one for biodiversity and the other for forests. Many bilateral and multilateral donor agencies are providing financial resources for the implementation of the convention. Pakistan has also established a Mountain Areas Conservancy Fund and a Protected Areas Management Fund with seed money from GEF funded projects. Government of Pakistan is obliged to co-finance these endowment funds on equal basis.

### **Conclusions**

#### **Impact of Convention on Improving Conservation and Sustainable Use of Biodiversity**

The biodiversity conservation convention has made significant impact on conservation and sustainable use of biodiversity in Pakistan. There is a growing realization among the policy makers and planners about the need to conserve biodiversity and preserving the integrity of the ecosystems for livelihoods and sustainable development. The impact of the convention is hard to quantify, however, it can be assessed from the positive changes that have occurred. The progress has not been even across the thematic areas and cross cutting issues. Following are some of the significant impacts of the convention:

- Conservation was seen as a responsibility of the government alone but now public and private sector partnerships (local communities, NGOs and corporate sector) are emerging for conservation of biodiversity and environmental rehabilitation.
- The local people were considered as a part of the problem, but now they are being made part of the solution. The capacity of local organizations is being strengthened not only to conserve and make sustainable use of their natural resources, but also to join hands with the government and NGOs for management of the protected areas and community conservation areas.
- The biodiversity considerations have been integrated in the guidelines for environmental impact assessments and proper safeguards are made during the implementation of infrastructure projects to protect important elements of biodiversity.
- Historically, establishment of protected areas were seen as a sufficient measure to conserve species, habitats and ecosystems. The canvass of biodiversity conservation has now been expanded to include the land- and sea-scape.

- The high yielding varieties of crops, fruit trees, poultry and livestock were seen as the only way forward to meet the growing demand for food. The importance of the need to conserve the genetic diversity is now being increasingly realized and measure being taken for its conservation.
- Exotic species of flora and fauna were being indiscriminately introduced in the natural habitats. The convention has played an important role in raising awareness about the threats of invasive alien species and introduction of alien species is now being strictly regulated.
- Financial resource allocations for biodiversity, both national and international, and international cooperation has increased after the adoption of the convention.

### Analysis of Lessons Learnt

Implementation of the conventions was not uniform across the thematic areas and cross cutting themes. The progress was much better in those thematic areas and cross cutting issues where country had sufficient institutional and human resources, for example, forestry, wildlife and protected areas. The implementation has been slow in more productive sectors like agriculture, livestock and fisheries. The progress remained slow because the thrust in these sectors has always been on self sufficiency in food and increasing exports. Furthermore these sectors lacked proper policies, institutions and human resources to make significant progress in implementing the convention. The actions on new areas, for example, access and benefit sharing, bio-safety, and invasive alien species remains extremely slow because of lack of human resource capacity and absence of relevant institutions to deal with these issues.

### Future Priorities and Capacity Needs

The country has made good progress on 2010 biodiversity targets despite the lack of adequate institutional, human and financial resources. The country has now reached the basic threshold level and ready to make up for slow progress in the past. It does however need to identify priorities and take measures to build institutional, financial and human resource capacity for implementation of the convention. Based on the review of progress on the 2010 biodiversity targets, following broad recommendations are made under two headings: institutions and human resources, and National Biodiversity Programme.

**Institutions and Human Resources:** The capacity of the Biodiversity Secretariat within the Ministry of Environment is weak and needs to be strengthened significantly. The Biodiversity Secretariat needs to have sufficient clout to be able to coordinate implementation of the convention across thematic areas and cross cutting issues. There is need to assess the capacity of Biodiversity Secretariat to make it fully functional and assume a leadership role for implementation of the convention. Among other things, the capacity needs assessment should look into the following:

- The human and financial resource needs of the Biodiversity Secretariat together with an operational framework for implementation of the convention;
- Integration, to create synergy, of the relevant federal institutions of the Ministry of Environment like Biodiversity Secretariat, National Council for Conservation of Wildlife, and Zoological Survey Department.
- Ways and means for effective implementation of the convention at national and provincial levels;
- The need for thematic biodiversity working groups to undertake assessments of the biodiversity status, trends and threats; to provide technical backstopping for the implementation of the convention; and measures to support their work.

**National Biodiversity Programme:** Most actions to implement the convention have been rather *ad hoc* in nature. The true benefits of the convention will only be realized through a systematic approach. A few priority areas and a programme approach is recommended to make good progress. The programme objectives should include but not limited to following priority actions:

- Create an enabling environment for implementation of the convention through policy formulation and appropriate legal instruments.
- Build institutional and human resource capacity for implementation of the conventions with special focus on thematic areas and cross cutting issues where more progress needs to be made.
- Strengthen the protected area system ensuring that at least 10% area of all major ecosystems, habitats, and ecologically sensitive areas are effectively conserved.
- Formulate a National Plant Conservation Strategy and develop protocols for sustainable use.
- Document genetic diversity and promote *in situ* conservation of important elements of agrobiodiversity.
- Improve the conservation status of species of flora and fauna threatened with extinction or endangered by trade, hunting or loss of habitat.
- Demonstrate conservation of landscapes to maintain capacity of ecosystems to deliver goods and services and support livelihoods.
- Development of mitigation measure in selected ecosystems to adapt to climate change, and enhance resilience of biodiversity.



Musk Deer National Park, Azad Jammu and Kashmir (Photo: Himalayan Wildlife Foundation, Islamabad, Pakistan)



### Information concerning reporting Party and preparation of national report

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<b>SUBMISSION</b>	
Signature of officer responsible for submitting national report	
Date of submission	

## B. Process of preparation of national report

### Progress Reports of Relevant Sectors

The biodiversity focal points in relevant ministries and other organizations were requested to report progress on the 2010 biodiversity targets. The organizations which submitted reports are too many to be listed individually. However, just to give an overview, the organizations which responded are lumped together into following groups: The reports received from the following agencies were reviewed and incorporated in the national report:

- Departments (Baluchistan, Punjab, Gilgit-Baltistan) Agriculture
- Departments (AJK, Baluchistan, Punjab, NWFP, Sindh) Wildlife and Parks
- (Punjab, Baluchistan) Fisheries Departments
- (AJK, Gilgit-Baltistan, Punjab, Baluchistan) Forestry Departments
- Department (NWFP) Environment
- AJK Livestock Department (
- (Forest, Agriculture, Arid Zone) Research Institutes
- Natural History Pakistan Museum of
- Certification and Registration Department, Islamabad Federal Seed
- Department, Islamabad Zoological Survey
- Universities (Peshawar, Rawalpindi, Khairpur, Lahore, Hamdard, Islamabad)
- NGOS (CABI, IUCN, WWF)

### Provincial Consultations

The North West Frontier Province and Azad Jammu and Kashmir organized provincial level multi-stakeholder consultations to review progress on 21010 biodiversity targets. The reports of these consultative meetings were used for the national report.

### Thematic Reports

National consultants for the thematic areas were identified and requested to prepare reports on implementation of 2010 biodiversity targets relevant to their thematic areas:

- Plant Conservation Strategy
- Programme of Work on Protected Areas
- Inland, Marine and Coastal Biodiversity
- Forest Biodiversity
- Dry and Humid Lands Biodiversity

- Agricultural Biodiversity
- Mountain Biodiversity

The reports of these consultants were shared with the relevant stakeholders who were invited to a national consultative workshop. The stakeholders discussed these reports in breakaway groups and made presentations in a plenary session at the end of the workshop.

### **National Consultative Workshop**

A national consultative workshop was organized in Islamabad on November 14, 2009. The participants, over 60 in number, representing key stakeholders, professionals, NGOs, government organizations, research institutions, and universities participated in the workshop. The objective of the workshop and the format of the 4<sup>th</sup> national report were shared with them. After the plenary, the participants held discussions in breakaway groups, and presented their group reports in the concluding plenary. A list of the participants of the workshop is included here.

### **Literature Review**

1. Pakistan's 1<sup>st</sup> National Report to CBD (1998-99)
2. Pakistan's 2<sup>nd</sup> National Report to CBD (2002)
3. Pakistan's 3<sup>rd</sup> National Report (2007)
4. Agricultural Statistics of Pakistan, and R&D Annual reports,
5. Biodiversity Action Plan,
6. Economic Survey of Pakistan,
7. Outcomes of IUCN' workshop on Protected areas and recommendations on Invasive Alien Species
8. IUCN Pakistan and WWF Pakistan reports, especially the conservation projects reports and Scientific Committee papers
9. Action Plan on Desertification and reports to UNCCD
10. Official documents and reports of Biodiversity Directorate
11. National, Provincial and District Conservation Strategies
12. Population census reports of Pakistan
13. State of Environment Reports (Draft)
14. Biodiversity of Pakistan: Status trends and threats (2008) published by Biodiversity Directorate Ministry of Environment, Government of Pakistan
15. Project Documents executed in Biodiversity sector in the country
16. Mid Term Development Framework
17. Pakistan Poverty Alleviation Strategy paper
18. Planning documents of the Planning Commission
19. Pakistan Environment Policy 2005
20. Pakistan Sanitation Policy
21. Draft Five Year Plan 2010-2015
22. Forest Biodiversity Vision 2030
23. Criteria and Indicators for Protected Areas

24. Legal and policy reforms study for the Protected Areas
25. Public Sector Development Project documents

In addition, all relevant materials posted on the internet were reviewed and key informants personally consulted and solicited their contributions.

### List of Participants of National Consultative Workshop

1	Iftexhar Ahmad, Deputy. Director	Fisheries, Lahore
2	Dr. Khalid Mahmood,	Pakistan Museum of Natural History, Islamabad
3	Dr. Muhammad Ibrar Shinwari	Pakistan Museum of Natural History, Islamabad
4	Dr. Abdur Rashid, Professor	Peshawar University
5	Ashiq Ahmad Khan, Advisor	WWF, Peshawar
6	Abdul Wahab, Director	Zoological Survey Department, Islamabad
7	Dr. Amjad Tahir Virk	Ministry of Environment, Islamabad
8	Mr. Tariq Nazir, Director	Ministry of Environment, Islamabad
9	Mr. Zafeer Saqib, Lecturer	International Islamic University
10	Mr. Khawar Parvez Awan, Dy Director	Fisheries, Hyderabad
11	Mr. Zafar Ullah Bhatti Dy Director	Fisheries, Islamabad
12	Mirza Muhammad Azam	Zoological Survey Department, Islamabad
14	Mr. Mehrban Ali Boolin	Zoological Survey Department, Islamabad
14	Raja Muhammad Javed , Deputy. Director	Wildlife, Rawalpindi
15	Dr. Raaja M. Dilpazir Khan, Planning Officer	Animal Husbandry, AJK
16	Dr. Fehmida Firdous, Deputy Conservator	Wildlife, Karachi
17	Mr. Afzaar Ahmad Naseem, Deputy director	National Biosafety Center, Islamabad
18	Dr. Abdul Aleem Chaudhry, Wildlife Biologist	Lahore
19	Malik Muhammad Khan, Forester	Rawalpindi
20	Muhammad Boota Sarwar, Director General	Seed Certification, Islamabad
21	Dr. Aftab Saeed, Director	Hamdard Research Institute of Unani Medicine, Karachi
22	Mrs. Mehnaz Ajmal, Coordinator	The Network for Consumer Protection, Islamabad
23	Dr. Shahzad Jehangir , Forester	Ministry of Environment, Islamabad
24	Mr. Manzoor Ali Bozdar Deputy Director	Integrated Pest Control Organization, Islamabad
25	Dr. Nasim Akhtar, Scientist	Pakistan Agriculture Research Institute, Islamabad
26	Mr. Easar Awan, Environmental Education	Beacon House School, Islamabad
27	Mr. Ali Gohar Hunzai, Environmental Education	Beacon House School, Islamabad
28	Mr. Fayyaz Rasool Deputy Manager	Marine Environment Unit, KP, Karachi
29	Mr. Hakim Shah, Director	Pakistan Forest Institute, Peshawar
30	Dr. Ejaz Ahmad, Deputy. Director General	WW, Pakistan
31	Mr. Mayoora Khan Program Manager.	Wildlife Conservation Society, Gilgit
32	Dr. Ghulam Akbar, Director	WWF, Pakistan

33	Dr. Maqsood Anwar, Associate Professor	Wildlife Management, Arid Zone University, Rawalpindi
34	Mr. Saeed-uz-Zaman Chief Conservator of Forests	Wildlife Department, Peshawar
35	Muhammad Ali Dy. Conservator Wildlife,	Wildlife Department, Chitral
36	Malik Shahid Hussain,	Attock Refinery Limited, Rawalpindi.
37	Dr. G. Raza Bhatti, Director	, Shah Latif University, Khairpur
38	Mr. Tariq Menmood Khan	Morgah Biodiversity Project Attock Refinery Limited
39	Raja Attaullah Khan, NRM Specialist	Agency for Barani Area Development, Rawalpindi
40	M. Ajmal Khan, Professor	University of Karachi
41	Dr. Zabtah Khan Shinwari, Professor,	Quaid-e-Azam University
42	Mr. Naeem Iftikhar, Project Manager	Machiara National Park, Muzaffrabad
43	Ms. Amara Jabeen	International Islamic University, Islamabad
44	Ms. Rizwana Kousar, Environmental Education	Ministry of Environment, Islamabad.
45	Mrs. Najma Shaheen Environmental Education	Ministry of Environment, Islamabad
46	Mr. Saqib Mehmood, Forester	Punjab Forest, Rawalpindi
47	Mr. Tanveer Haider Coordinator	Protected Area Management Project, Islamabad
48	Mr. Abdul Latif Rao, Protected Areas Consultant	Islamabad
49	M. Ali Imam, Tourism Consultant	Islamabad
50	Dr. M Afzal, Chief Scientist-	Pakistan Agricultural Research Council, Islamabad
51	Dr. Muhammad Mumtaz Malik, Wildlife Biologist	Peshawar
52	Mr. Umeed Khalid, Conservator Wildlife	Ministry of Environment, Islamabad
53	Dr. M. Iqbal Chordhary, Professor	H.E.J. Research Institute of Chemistry, University of Karachi.
54	Syed A. Raza Asif	Ministry of Environment, Islamabad.

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### Global Plant Conservation Strategy

**Target 1:** A widely accessible working list of known plant species, as a step towards a complete world flora.

At the time of the establishment of Pakistan in 1947, the Herbarium of Gordon College, Rawalpindi was the best herbarium. It was established by the efforts of Dr. R. R. Stewart and when he retired in 1960, the herbarium had a rich heritage of 60000 specimens. The work systematic collection and documentation of the flora of Pakistan was started in 1968. The first fascicle of the flora was published in 1970. An "Annotated Catalogue of Vascular Plants of West Pakistan and Kashmir" was published by Dr Stewart in 1972. This was intended as a preliminary checklist of the plants of the region and a guide to the developing *Flora of Pakistan* project.

To date 217 issues [Mostly each issue represents one family, but some bigger families are being published part-wise] based on the description of 1376 genera and 4733 species of plants of Pakistan, spread over 6806 printed pages have already been published. Work on four families, is yet to be completed.

The Pakistan Database, is available both electronically (eflora.com) and as a published volume. Each element of the *Flora* treatments – family descriptions, notes, and keys; generic descriptions, synonymies, notes, distribution, and keys; and species names, place of publication, types, synonymies, notes, indigenous uses, distribution, phenology, cited specimens, and illustrations – are included in this interactive database. The users are able to search the database using a variety of queries. More than half of all species in the *Flora of Pakistan* are illustrated, and these drawings and photographs have been scanned and made available electronically.

The specimens cited in the *Flora of Pakistan*, which include full available label data, are arranged according to a grid system rather than by province or district. Each grid unit corresponds to a "square" measuring 2° on each side. As a result, every cited specimen can be mapped to within 1° accuracy by using the central point in each grid unit. Eventually it is intend to have coordinates for all localities in Pakistan, but until that system is in place, a geographical basis for the database is being used.

The main database is housed at the Missouri Botanical Garden at "eflora.com". As soon as the University of Karachi has the capability to host the site, a mirror site will be installed there, making the information much more readily available in Pakistan and the surrounding region.

**Target 2:** A preliminary assessment of the conservation status of all known plant species, at national, regional and international levels.

There has not been any assessment of the conservation status of all known plant species in the country. However 14 species of the flora of Pakistan are included in CITES appendix I and II (Chapter IV). The Pakistan Museum of Natural History and the National Herbarium at the National Agricultural Research Council (Islamabad) are mandated to undertake surveys of flora and fauna in the country; however, no standard reporting format exists on the status and trends on species. The main constraint in implementing the Global Strategy for Plant Conservation in Pakistan is the absence of a national institution with the mandate to conserve plant species in the country. There is little no coordination



among research and educational institutions in the country and most develop their research plans in isolation.

### Conservation of Chilghoza Forest Ecosystem

The Chilghoza (*Pinus gerardiana*), also known as the Chilghoza Pine is native to the north-western Himalaya in eastern Afghanistan, Pakistan, and northwest India, growing at elevations between 1800-3350 m. This species is listed as lower risk, near threatened. The ecosystem is not only a unique and its conservation is essential for integrity of the ecosystem. Due to lack of awareness and to fulfil economic needs, the local communities are indulging in indiscriminate logging. At the current rate of deforestation, the forest is likely to disappear in a decade. The timber of Chilghoza pine is of low grade, whereas its nuts are of greater value. The harvest from one tree equals the timber value of a tree in a good seed year. The indigenous



communities are unaware of this and further for lack of a well established marketing channel, they are unable get a fair price. For the last two decades, WWF - Pakistan has been working with communities for the conservation of this unique ecosystem. WWF Pakistan has started a program to raise awareness, build local capacity for sustainable harvest of pine nuts, value added processing, and developing marketing linkages.

(Contribution: WWF Pakistan)

**Target 3:** Development of models with protocols for plant conservation and sustainable use.

There are no models with protocols for plant conservation and sustainable use in Pakistan. Harvest of two commercially harvested plant species (*Ephedra sp.*, and *Nanorhops sp*) is regulated under the rules made under the Forest Act.

**Target 4:** At least 10% of each of the world's ecological regions effectively conserved.

The ecological regions of the country are conserved through the network of the protected areas covering 11.21 % (9,852,006 ha) area out of 87,892,224 ha, the total land area of Pakistan.

### Conservation of Juniper Forest Ecosystems

The Mainstreaming Biodiversity Conservation into Production System in Juniper Forest Ecosystem Project, Ziarat, is a Global Environment Facility (GEF), United Nations Development Programme (UNDP) funded project. International Union for Conservation of Nature and Natural Resources (IUCN) is implementing the project in close collaboration with the Baluchistan Forest and Wildlife Department. Project is operational since April, 2007 in five valleys of Ziarat district namely. Project was conceived to conserve the old age forests of *Juniper excelsa* growing in Ziarat district. Main purpose of the project is to modify existing production systems prevalent in the area in a manner to make them biodiversity friendly so that the Junipers along with the associate flora and fauna could be conserved.

The overall goal is “to conserve biodiversity in the Juniper forest ecosystem and improve livelihoods of the local communities”. The project is following a strategy of integrated natural resource management through community participation. The project has two precise outcomes: (a) Economically, ecologically and socially sustainable utilization of Juniper Forest Ecosystem is operational at selected valleys, and (b) mechanisms for replicating the sustainable utilization regimes across the entire Juniper Forest Ecosystems of Baluchistan, and further disseminating project successes.



**Target 5:** Protection of 50% of the most important areas for plant diversity assured.

There has not been any assessment of the important areas for plant diversity in the country. However, the protected areas system in the country covers most ecosystems and habitats, and thus indirectly conservation of more than 50% of the important areas for plant diversity is assured.

**Target 6:** At least 30% of production lands managed consistent with the conservation of plant diversity.

The country has only four percent of its area under productive forests, and these lands are managed consistent with the conservation of plant diversity. Approximately 23% area of the country is under intensive agriculture mostly with high yielding varieties with little or no cultivation of indigenous varieties. Leaving aside 11% area under the protected area system, the land use of the remaining 62% of the lands is predominantly grazing and these lands are in advanced stages of degradation.

**Target 7:** 60% of the world's threatened species conserved *in situ*.

There are 14 species on the list of CITES appendix I and II, *Saussurea costus* (Falc.) Lipsch is on CITES appendix I of the most endangered species. The remaining thirteen species are on appendix II – species threatened with extinction unless trade is closely controlled. The country does not allow export of any species on appendix I and II of the CITES.

**Target 8:** 60% of threatened plant species in accessible ex-situ collections, preferably in the country of origin and 10% of them included in recovery and restoration programmes.

There has been no systematic work on assessing the conservation status of plant species in Pakistan, except the list of species on CITES appendix I and II. Consequently there is no program of work on *ex situ* collection of the threatened plant species in the country.

A number of botanical gardens and herbaria have been established in various Universities of Pakistan (University of Karachi, Shah Abdul Latif University Khairpur, Hamdard University, Quid e Azam University Islamabad, etc) and Government Departments (Pakistan Forest Institute, Karakorum Agriculture Institute for Gilgit-Baltistan Area, etc) for *ex-situ* conservation.

**Target 9:** 70% of the genetic diversity of crops and other major socio-economically valuable plant species conserved and associated indigenous and local knowledge maintained.

A small gene bank for short term storage, mainly agricultural crops, and a laboratory has been established at the National Agriculture Research Center and a program on collection, conservation, and evaluation is under way. The collection on wild relatives of crop plants is limited.

**Target 10:** Management plans in place of at least 100 major alien species that threaten plants, plant communities and associated habitats and ecosystems.

There is no program of work for the major alien plant species in Pakistan.

**Target 11:** No species of wild flora endangered by international trade.

The international trade is regulated under the CITES and export of species on CITES list is not allowed. The harvesting and trade in medicinal and aromatic plants for use within the country is not regulated, and there is no evidence that any species of the wild flora is threatened due to national or international trade.

**Target 12:** 30% of plant-based products derived from sources that are sustainably managed.

There is no program of work for *in situ* conservation or sustainable management of sources for the plant based products. However, under the GEF Mountain Areas Conservancy Project, local level plans were

developed and capacity of local communities developed to conserve and make sustainable use of areas of the natural habitats for conservation of medicinal plants. Furthermore research and development on farm cultivation of medicinal plants is an on-going process. Two big manufacturers of herbal remedies in the country – Hamdard and Qarshi have developed farms for the cultivation of a few plants that they need in large quantities.

**Target 13:** The decline of plant resources, and associated indigenous and local knowledge, innovations and practices that support sustainable livelihoods, local food security and health care, halted.

Historical records in the form of district gazetteers and other documents are in the archives and systematic efforts will be required to research, and document the local knowledge and innovations that supported sustainable livelihoods and health care. Some indigenous and local knowledge and health care still survives and practiced in remote areas.

**Target 14:** The importance of plant diversity and the need for its conservation incorporated into communication, educational and public-awareness programmes.

The national days on biodiversity, environment, earth, and tree plantation are celebrated and on these occasions, the print and audio and video media plays an important role on raising public awareness. In addition, public rallies and “walks” are organized and events are organized in the schools.

**Target 15:** The number of trained people working with appropriate facilities in plant conservation increased, according to national needs, to achieve the targets of this strategy.

There is no strategy in place in the country for strengthening the national capacity in plant conservation. However, recently the Ministry of Education launched a program to build the capacity of the botanical gardens of the country to play an active role *in ex situ* conservation.

**Target 16:** Networks for plants conservation activities established or strengthened at national, regional and international levels.

There is an informal network of plant scientists in the country. However there is a need to establish a network to promote plant conservation in Pakistan. Such a group could be catalyzed under the IUCN Species Survival Commission.



*Pistacia khinjuk* (Wild Pistachio) in Torghar, Qillasaifullah, Balochistan. (Photo: SUSG CAsia, Quetta)

### Natural Resource Management for Improved Livelihoods in Northern Pakistan

In order to demonstrate the contribution of healthy ecosystems and natural resources on reducing poverty and improving livelihoods as well as to forge partnerships at the local level for taking the work forward. The demonstration included:

1. Sustainable harvest and equitable benefit sharing of edible pine nut seeds
2. Equitable distribution of scarce water from crops
3. Environment friendly mining
4. Sustainable community forest management and benefit sharing
5. Adoption of livelihood approaches to warm water fisheries
6. Benefitting community from cold water fisheries
7. Linking rural communities and NTFPs
8. Improving women's livelihoods through mushroom farming

The projects carried out baselines studies covering socioeconomic parameters demography, natural resource status, tenure, rights, and equity and benefit distribution and use patterns. To validate the results, assessment studies and joint evaluations were conducted. The findings confirmed that most model projects delivered positive tangible results.

Project outcomes can be conveniently divided into exercising natural resource ownership and use rights, increasing incomes and improving livelihoods, providing women with natural resource management and livelihood opportunities, involving the marginalized and poor, influencing changes in policy and legislation and assessing sustainability of natural resource use and management.

These lessons suggest that NRM initiatives can only be sustained in the presence of linkages between poverty and equity with economic development and sustainable management of natural resources. Adopting approaches that address community needs and help them realize conservation benefits, enhance community acceptance of external interventions, involve all stakeholder groups, including local activists as well as the marginalized and poor, in the design, planning, implementation, monitoring and evaluation of interventions, adapt formal planning and management tools for village-based institutions and tailor initiatives to match existing models of society play a pivotal role in creating an environment in which communities can participate proactively in the development process and successfully implement initiatives

(Contribution of IUCN Pakistan)

### Central Karakorum National Park Gilgit-Baltistan

**Brief introduction:** The CKNP is Pakistan's largest Protected Area, covering over 10,000km<sup>2</sup> and its Buffer zone is 7441 Sq KMs. It was officially notified as National Park in 1993. Most of the area of CKNP has fragmented, fragile and challenging ecosystems. The park is characterized by heavy glaciations, with glaciers combining to form the largest and most extensive glacial systems outside the Polar Regions. Some of the famous glaciers are Baltoro-which provides access route to K-2 and is about 60 km long, Hisper Biafo and Panama. Some famous world's highest peaks including K-2 (2<sup>nd</sup> highest peak of the world), Broad peak, Gasha brum and Masha brum are lying within the boundaries of CKNP. The park area is rich and unique in terms of ethnic, cultural and biological diversity with a wide range of development opportunities.

The Park is comprised of 17 valleys, and each valley has its own access road system up to an elevation of 10,000 ft ASL. The road infrastructure has increased tourist influx, trade and communication during the recent past. This area is considered as the biggest and famous tourist hot destination of the country. The Central Karakorum area is one of the last great unexplored areas of Pakistan, where biodiversity is now being evaluated systematically for the better Protected Area management in future. There are four main ecosystems in CKNP: Mountain dry temperate coniferous, Mountain dry temperate broad leaved, Sub Alpine and dry scrub forests.

Seventeen valleys (watersheds) covering an area of 19,197 Km<sup>2</sup> were classified into 13 Land Cover Classes. The area provides habitat for important eight large mammal species like Markhor, Himalayan ibex, Ladakh Urial, Himalayan wolf, Snow leopard, Himalayan brown bear, Himalayan lynx and Musk deer. Rare birds of the CKNP include snow partridge, golden eagle, alpine accentor and mountain finch. The key threats to avifauna are habitat destruction, degradation, change in land use, use of pesticides and hunting. Before 9/11 incident, around 4000 trekkers visit this locality every year, which gives an average of 25000 to 30000 people livelihood to park gateway communities. The estimated number of porters per trekker is 3-4 and 10-15 per mountaineer. This shows diversity of job opportunities for local inhabitants related to tourism industry.



Community resource meeting in the buffer zone of Central Careworn N. P

(Photo: J. Maher, Wildlife Conservation Society)

## The Program of Work on Protected Areas

### National Systems of Protected Areas (Target 1.1)

There is no master plan for the protected area system in Pakistan. However, a rapid protected area system review was undertaken and an Action Plan prepared in March 2000. The Plan included elements for filling ecological gaps, securing financial resources, and capacity-building, and addresses policy, legislative and institutional barriers. The overall goal for Pakistan's *Protected Area System* was developed as 'To protect representative samples of Pakistan's full range of biodiversity, and help maintain ecosystems, and associated cultural heritage, for the sustainable benefit of present and future generations.'

Specific objectives for three kinds of Protected Areas (PAs) viz., National Parks, Wildlife Sanctuaries and Game Reserves, were developed. Listed PAs were re-classified according to international standards and IUCN categories assigned to them. Of the 227 PAs listed at the time 58 were considered to be satisfying the IUCN criteria whereas 169 PAs were considered to have been established mainly to control hunting. The management of these areas is required to be upgraded to conform to the principles of conservation. Simultaneously *Environmentally Significant Areas (ESAs)* that required immediate attention for conservation.

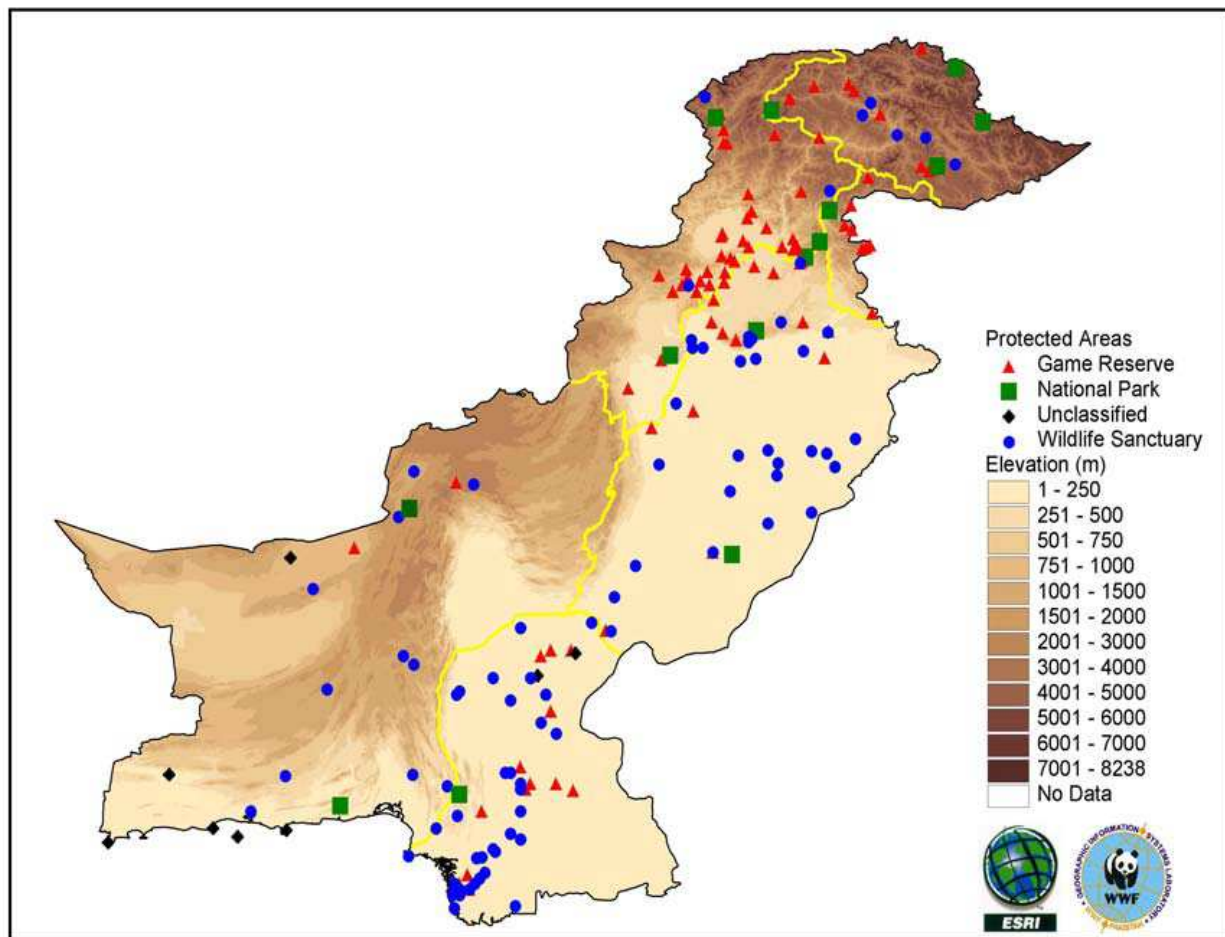
The follow up on this Action Plan has rather been insignificant as far as the re-classification of PAs, up gradation of PAs, and establishment of ESAs is concerned. Progress has however been made in achieving partial targets such as filling ecological gaps, capacity-building, addressing policy, legislative and institutional barriers and to some extent in securing financial resources.

The definitions of "comprehensive", "ecologically representative" and effectively managed have not been developed so far. The number of PAs in three of the major classifications along with their area is shown in table 1 and their distribution on elevation map of Pakistan is shown in figure1.

Table 1. Listed Protected Areas of Pakistan

Classification	Number	% of designated Protected Areas	Hectare and % of country's Land Surface	
			Hectares	%
National Parks	23	5.29	2845420	28.9
Wildlife sanctuaries	97	42.29	1,970,424	20.0
Game reserves	104	42.29	5,036,162	51.1
<b>Totals</b>	<b>224</b>	<b>100</b>	<b>9,852,006</b>	<b>100</b>

Figure. 1: Protected Areas of Pakistan



There has been a significant increase in the extent of PAs since the first PA was established in 1972. The number of Protected Areas since 1998 has almost remained the same however the area protected and its status of protection has been upgraded. Coverage of ecological regions (target 10%), however has not been equitable. Except for marine ecosystems, most other major ecosystems are covered in the protected area system of Pakistan. However, because of the great diversity in habitats, some habitats are not covered by the PAs. The information on ESAs not included in the protected area system is available in the protected area review of 2000. In general, the representation of coastal areas is rather low and the dry and sub-humid lands are over represented in the PA system.

#### Regional Systems of Protected Areas (Target 1.1)

No regional network of protected areas has been established so far. However, the coastal and marine protected areas in the Arabian Sea bordering Pakistan, India, and Iran are good candidates for regional protected Areas.

#### Integration of Protected Areas into Broader land seascapes (Target 1.2)



There has been significant progress to integrate the protected areas into the broader landscape. Most of the protected areas are surrounded by agro-pastoral communities who have historically dependent on the natural habitats for some of their subsistence needs such as of fuel wood, forage, and grazing animals. One mangrove ecosystem has seen reduction in biotic pressure due to changes in the life styles local the local communities and similar changes are taking place around other PAs as well. Where the communities still rely heavily on the natural habitats surrounding the PAs, collaborative natural resource management practices are being promoted to achieve the objectives of connectivity through integration of PAs into broader landscape. Serious efforts to reduce anthropogenic pressure on the natural habitats in and around the PAs have been made in at least seven of the 24 PAs that are being integrated into the broader landscape. However, the initiatives are rather new and it is too early to assess the impact of these measures.

### **Trans boundary Protected Areas (Target 1.3)**

At present, there are no trans-boundary protected areas in Pakistan. However, preliminary discussions have been held between Sinkiang Academy of Sciences and Worldwide Fund for nature Pakistan for the establishment of a trans-boundary protected area in Northern Pakistan, and adjoining areas of China and the neighbouring Central Asian states.

The potential for establishment of regional corridors for migratory birds under the Convention on Migratory Species (Bonn Convention) has not been utilised so far. Furthermore, are no plans are under consideration for .for action in the near term.

### **Site-based Protected Area Planning and Management (Target 1.4)**

Protected area planning and management has until recently been the job of professionals alone. However, the site based consultations involving protected area functionaries, local stakeholders, and researchers is now being increasingly adopted. Eleven National Parks out of 23 have management plans in place. Most of these management plans were prepared in the recent past and employed participatory approach for planning. In general most of the PAs so far declared have partially achieved the conservation objectives. In general most of the PAs have partially achieved the conservation objectives. A comprehensive review has however not been undertaken and thus it is difficult to report on their effectiveness.

### **Prevention and Mitigation of the negative Impacts of Key Threats (Target 1. 5)**

The key threats to PAs include: illegal use of natural resources, habitat degradation and in some cases even the habitat loss, lack of stakeholders' participation, weak enforcement of legislation, lack of capacity, lack of awareness, poverty and environment nexus, and financial constraints.

Some of the measures taken to address the threats include: Strengthening the enforcement of legislation, stakeholders participation, awareness campaigns and collaboration among the Government/s, NGOs and donors.

Control and enforcement mechanisms adopted include: good governance, legislation enforcement with the help of communities, human resource development and through outreach programs. A number of awareness raising events have been organized at places in and around biodiversity hotspots.

No key threat has been mitigated completely, partial successes have however been achieved to mitigate all the threats. This varies from site to site and threat to threat. Generalization in this case is rather difficult.

### **Equity and Benefit Sharing (Target 2.1)**

The PAs in Pakistan are solely managed for conservation purpose and consumptive uses of the protected areas. The non consumptive use like tourism is also negligible and therefore there are no economic out of the protected areas management that can be shared. Economic and socio-cultural costs of protected areas for indigenous and local communities were assessed in at least 10 National Parks and are being addressed through sustainable development and livelihoods improvement in the buffer zones.

The protected areas in Pakistan are generally established on state lands where there are no indigenous or local communities within the protected area itself. However, the communities living around the protected areas have always depended on the protected areas for some of their subsistence needs. While these needs of the local communities were always ignored in planning and management of the PAs in the past, the economic and socio-cultural costs of PAs are now being increasingly taken into consideration. The protected areas are presently being managed under the wildlife laws that were made in early 1970s. These laws are now under revision, and participatory approaches are being incorporated.

### **Involvement of Indigenous and Local Communities and Relevant Stakeholders (Target 2.2)**

The local communities and relevant stakeholders were until recently neither consulted nor involved in planning and management of the PAs are now being increasingly involved. This is true of almost all of the national parks. The initial consultative meetings are held in the villages all around the protected areas and villagers are invited to nominate representatives who would work closely with the functionaries during the planning process and report back to them on any issues of concern to them. During the planning process, the functionaries and the local communities agree on the structure and functions of the joint committees for management.

The collaborative approaches for planning and management of the protected areas have not yet been integrated into the formal policy and legal instruments but provisions have been made in the drafts under revision. There has been no formal assessment of the effectiveness of participatory or collaborative management. However, informal evidence suggests that these approaches are working well for now.

There is no protected area that is being managed by indigenous or local communities. However, more than 30 areas across the country are now being managed as community conservation areas for the main objective of trophy hunting.

### **Enabling policy, institutional and socio-economic environment (Target 3.1)**

There are no appropriate institutions and legal instruments for the establishment and management of the protected areas in Pakistan. The establishment and management of protected areas is done under the wildlife acts of the provinces. However, a large number of the cases, the state forests have been designated as protected areas and continue to be managed for dual purpose by two separate agencies for two different purposes which are not desirable.

The main impediment to the establishment of the new protected areas is that local communities have usufruct rights over the lands and depend on these lands for their livelihoods and there are no viable alternatives to compensate the communities for lost livelihoods.

There has been no national level study to assess the benefits of the protected areas. There are limited economic opportunities and markets for protected areas goods services. No serious effort has been made to develop the protected areas products and services.

### **Capacity for the planning, establishment and management of protected areas (Target 3.2)**

An exclusive capacity needs assessment for the protected areas has not yet been undertaken. However, a recent National Self Capacity Assessment touches on the need for capacity development for the protected area management as well.

There is no institution in the country which has capacity to provide education or training in the field of protected area management. There has been no documentation of the knowledge and experiences on protected area management. There are no regular capacity building programs in the country for the management of protected areas. However, a number of project based short training courses have been organized on specific topics such as wildlife surveys, GIS, participatory approaches, etc. In addition a number of trainings have been given to the local communities for value added marketing of NTFPs from the protected areas. There is a general lack of proper technical knowledge for the management of the PAs and most managers have education in forestry.

### **Development and transfer appropriate technologies for protected areas (Target 3.3).**

A GEF pilot project for biodiversity conservation with community development in northern Pakistan developed methodologies for participatory approaches, conservation planning at valley level, and sustainable use for trophy hunting. These methodologies are being widely replicated in all of the community conservation areas. The lessons learnt laid the foundation GEF "Mountain Areas Conservancy Project" the "Protected Areas Management Project", "Pakistan Wetlands le of medium scale GEF projects. The appropriate technologies developed and applied in these projects will slowly find their way into the future management of the PAS.

Use of Geographic Information System (GIS) and Geographic Positioning System (GPS) is now widely used to collect the base data on natural resources, land use classification, Cadastral data, animal populations, evaluation of the habitat and habitat use. Modern scientific tools are also being used to record data on animal populations and the habitat use.

One important use of GIS is the Boundary Demarcation and subsequently re-notification of PAs. Almost all the PAs have been notified based on empirical description of the boundaries that led to disputes among different agencies and private individuals. GIS is being effectively used to remedy the embarrassing situation/s.

At least 10 PAs, the plans of which have been written have benefited from the technological innovation; 15 PAs (including Wildlife Sanctuaries National Parks and Game Reserves) have been taken up as Pilot Areas for boundary notification and re-notification.

### **Financial Sustainability of Protected Areas (Target 3.4).**

### Raising Awareness for Conservation of Endemic Reptiles

Sustainable Use Specialist Group of IUCN for Central Asia (SUSG CAsia) is implementing a GEF Medium Scale project 'Conservation of Species and Habitats' in Noshki area of Baluchistan desert which is home of six endemic reptiles. These reptiles were being captured agents of traders in Karachi for export as pets. The local people detested these reptile sand were rather happy that these were being captured and taken away. Therefore the first job of the project was to raise awareness of local communities about the biodiversity values of these reptiles so that they would stop illegal trade. In order to aware the community about the importance of flora, fauna and other natural resources of the Chagai desert ecosystem, table calendars, car stickers and fact



Noshki: a walk through the local hazar with a banner attracts attention to the message

sheets were printed and distributed. Nature Clubs are functional and activities like debates, art competition and exposure visits were undertaken accordingly. Talks in local languages about biodiversity conservation were televised on PTV Bolan. Articles, features and interviews regarding biodiversity conservation and sustainable use were printed in different news papers i.e. Daily Jung, Asap, Zamana etc. Three Students from Nature Club Noshki, sponsored for 6th National Conservation Meet. 2007, Islamabad and exposure visits of the protected areas of NWFP and Sindh were also organized for the hunters and the representatives of Chagai Conservation Society. As a consequence of awareness raising, local people are now enforcing strict protection and protecting the habitat of these endemic reptiles. The project is working on developing a science based and community managed sustainable trade of these endemic reptiles.

(Contribution: Sustainable Use Specialist Group, Central Asia, Quetta, Pakistan)

Financial sustainability in terms of ecological and financial costs and benefits of PAs has not been determined for any of the PAs so far. A trust fund has been established and capitalized under the Protected Areas Management Project. The fund is not yet in operation, and it is expected that in future

this fund will provide funds for better management of the PAs. Other than this Fund, here are no other mechanisms in place to secure the cost on management and offset the ecological costs.

The national funding for the management of PAs is mainly in the form of staff salaries and other operational costs. The funding for conservation planning, and other capital expenses is rare. Major funding for the three protected areas came from a GEF project. Another GEF project catalyzed the establishment of community conservation areas. Some help has also been provided by the Asian Development Bank and European Commission for management planning and enabling activities. A summary of the funding sources and their level is provided in Chapter II.

There is no PAs financing strategy in Pakistan, therefore the PAs do not figure into the national strategies for poverty reduction. However, the poverty reduction strategies are cognizant of the poverty - environment nexus and sustainable development ranks high on the development programs of the government and NGOs. The national and provincial conservation strategies and Integrated District Development Action Plans all aim at conservation of biodiversity and sustainable use of natural resources and sustainable development.

### **Communication, Education and Public awareness (Target 3.5).**

Awareness campaigns about environment and forests are regularly organized twice a year in Pakistan. In addition targeted awareness campaigns are integral components of the conservation projects. These events are organized in collaboration with community based organizations, local NGOs, the government agencies and the Media. In addition national campaigns are organized on international and national days for the environment, biodiversity, food, wetlands, ozone, desertification, and tree plantation day days.

Awareness materials like posters, calendars, brochures have been developed IUCN, WWF, GEF projects and parathion activities are routinely conducted. Conservation of mangrove forests and their rehabilitation feature with prominence in awareness campaigns. Pakistan's successful effort on Guinness World Record on planting Maximum Trees in a Single Day has resulted in far more awareness than other tree plantation campaigns.

Techniques used to raise public awareness include: media presentations, community meetings, corner meetings, official meetings emphasizing on the benefits accruing from PAs for the benefit of the indigenous people and local communities.

### **Minimum Standards and Best practices (Target 4.1)**

**Selection of Protected Areas:** Central Karakorum National Park (CKNP) is the only example of a recently selected protected area. The other recent additions to the list protected areas were primarily state owned and managed forests that were elevated protected areas status because of their significance for biodiversity conservation. The selection of CKNP process was guided by a multi stakeholder committee and wide consultations with the custodian communities. The boundaries of the park were also discussed with the custodian communities to ensure that their livelihoods are not adversely affected.

**Site Management:** The three protected areas included in the Protected Areas Management Project have strong elements of community participation. Conservation and Enterprise Committees (CEC) were formed by the project through the intermediation of locally-active NGOs. Where Village Organizations already existed, the CECs can be subgroups of these organizations. CECs consist of representatives from local communities and enter into formal agreement with the government. The CEC provide a decision-making mechanism for the participatory planning and implementation of management and development interventions under the project.

**Governance:** At each PA included in the GEF project, a Local Advisory Committee (LAC) was formed during project preparation and maintained through the project implementation period of 5 years and beyond. At implementation, each LAC had representatives of the project management, the local communities, local government, NGOs and related rural support agencies. The LAC's role is to ensure the integration of project activities in the overall strategies and activities of development in the three project areas. It will

liaise with other governmental agencies and other agencies active in the area to coordinate project implementation.

Although local communities have or no direct role in the governance of the protected areas, their participation in planning and management has raised their awareness of the rights and obligations. Further it has broken the communication barriers between them and functionaries. The increased awareness and improved interaction among stakeholders has improved the governance of the PAs included in the project.

#### **Evaluation of the Management Effectiveness (Target 4.2).**

There is no process in place to review and evaluated the effectiveness of protected area management.

#### **Boundary Demarcation and Re-notification of Protected Areas Project**

The protected areas are facing numerous management problems among which lack of precise boundary demarcation is a major issue. This leads to encroachments, inter-departmental conflicts, PA Management and Community conflicts and intrusion of un-wanted developmental activities in such ecologically sensitive sites. Currently available information about PA boundaries is only in the form of notifications and sketch maps. WWF – P in collaboration with Pakistan Petroleum Exploration & Production Companies Association (PPEPCA) and Ministry of Environment has initiated a program for boundary demarcation and renotification of protected areas. In the two year period (2007 - 2009) WWF – P is delineating boundaries of seven PAs with geographical details. These are:

1. Margallah Hills National Park.
2. Khunjerab National Park.
3. Machiara National Park.
4. Kathar Game Reserve.
5. Ayubia National Park.
6. Hingol National Park.
7. Kirthar Protected Area Complex

The demarcation of six protected areas has been completed and Ayubia National Park has been re-notified by the Government. Notification process for other PAs is in process. This is the first ever GIS based notification format with Geographic Coordinates. Renotification of other protected areas is in process

Contribution: WWF Pakistan)

#### **Assess and Monitor Protected Area Status and Trends (Target 4.3)**

**Status of Protected Areas:** Seventeen indicators for monitoring effective PA management have been developed by the Ministry Of Environment. However, no assessments of the protected areas have so far been undertaken.

**Change in Area:** In 1997, the protected areas covered 9.01 million hectares while present there are 9.852 million hectares under protected areas. National Parks is the most important and prominent category of the PAs. In 1997, there were 12 national parks while today there number stands at 23. Except for the addition of Central Karakorum National Park, the increase is mainly due to change in the status of existing PAs or changes in their boundaries.

**General Trends:** There is more awareness about the ecological and socio-economic benefits and their role in conserving the cultural heritage and the biodiversity.

#### **Contribution of Scientific Knowledge (Target 4.4).**

A number of university students have undertaken research in the protected areas on matters related to the conservation and management of biodiversity resources. However, there contributions have not included in any data base and thus not readily accessible. However, common scientific knowledge is applied to determination of population status, habitat assessment, and for studies on habitat - species interactions, human - livestock, human - wildlife and wildlife-livestock conflicts. These studies are also in the form of project reports and not included in any central data base. The above mentioned project or site based studies are used to adjust and improve the management of the protected areas. However there are no case studies or other forms of documentation on their effectiveness for the management.



*Astragalus stockii* (Shenalo in Brahvi), Noshki, Baluchistan. (Photo: SUSG CASia, Quetta)





### Leo the Snow Leopard

In a unique partnership between the Pakistan Government, U.S. State Department, and international conservation groups, a highly endangered orphaned snow leopard cub that was captured from Naltar in Gilgit-Baltistan was loaned from Pakistan to the Wildlife Conservation Society's (WCS) Bronx Zoo, USA. The Bronx Zoo is the world leader in captive snow leopard care, having bred more than 90 snow leopards in captivity, and was the first zoo to exhibit these big cats in 1903. Snow leopards are among the world's most endangered big cats with an estimated 3,500 -7,000 remaining in the wild, restricted to remote mountains of Central Asia. The total population in Pakistan is estimated to be between 200 and 300 animals, although their secretive nature and high-mountain habitat makes accurate counts nearly impossible.

The male snow leopard cub, estimated to be 13 months old at the time of transfer, was initially discovered at a very young age by a local shepherd in 2006; its mother had apparently been killed. The cub could not be released into the wild, as it was denied the opportunity to learn hunting skills from its parent. The combined efforts of the Pakistan Government agencies, WWF-Pakistan, and IUCN-Pakistan helped to find a temporary home for the cub, named Leo by its keeper, until a longer-term home could be found.

The cub will remain at the Bronx Zoo, which leads the world in breeding and care of snow leopards, until an appropriate facility can be constructed in Pakistan. Leo has been paired with a female of similar age, and expectations are that breeding will occur in the near future – the first “wild blood” to enter the captive snow leopard population in many years, which will help to improve genetic variability. In the meantime, Leo acts as an “ambassador” for Pakistan, with over a million visitors from around the world each year stopping at his exhibit to learn about Pakistan and its globally important biodiversity.



Story and Photo by J. Maher, Wildlife Conservation Society, USA

## Appendix 1

## Wild Relatives of Crop Plants in Pakistan

Common Name	Scientific Name	Distribution in Pakistan
Wild relative of wheat	<i>Aegilops squarrossus</i>	Mountain areas of Northern Pakistan
	<i>Aegilops triuncialis</i>	Mountain areas of Northern Pakistan
Wild relative of wheat	<i>Elymus borianum</i>	Endemic to Swat
	<i>Elymus kuramensis</i>	Endemic to Kurram
	<i>Elymus nodosus</i>	Kurram
	<i>Elymus stewarti</i>	Endemic to Kashmir
	<i>Elymus longe aristatus</i>	High alpine areas of Hindukush Himalayas and Karakorum
	<i>Elymus russelii</i>	Endemic to Karakorum
	<i>Elymus jacquemontii</i>	Endemic to Kashmir
Wild relatives of barley	<i>Hordeum bogdanii</i>	Karakorum, Ziarat, and Harboi Range
	<i>Hordeum spontaneum</i>	North Balochistan
	<i>Hordeum murinum</i>	NWFP, Murree Hills
	<i>Oryza coarctata</i>	Indus Delta
	<i>Sorghum nitidum</i>	Hazara and Murree Hill tract
	<i>Sorghum halepense</i>	Common weed throughout the country
Wild relatives of millet	<i>Pennisetum flaccidum</i>	High alpine slopes of Karakorum, Himalayas, Hindukush
Wild relative of cotton	<i>Gossypium stocksii</i>	South Sindh
Wild relatives of mustard	<i>Brassica junacea</i>	Western area of Balochistan
	<i>Brassica deflexa</i>	Western part of North Balochistan
Wild relatives of kenaf	<i>Hibiscus caesius</i>	North Punjab, NWFP, Kashmir
	<i>Hibiscus micranthus</i>	Sindh and Balochistan
	<i>Hibiscus lobatus</i>	Salt Range, Kurram Valley, Sindh
Wild relatives of chick pea	<i>Cicer macranthum</i>	Hindukush, -Himalayas,-Karakorum
	<i>Cicer microphyllum</i>	Hindukush, -Himalayas,-Karakorum

Wild relatives of bean	<i>Vigna spp</i>	
Wild relatives of fruits	<i>Pyrus pashia</i>	Temperate Himalayas
	<i>Mallus chitralensis</i>	Chitral
	<i>Prunus prostrate</i>	Temperate Himalayas
Wild almond	<i>Amygdalus brahuicus</i>	North Baluchistan
Wild cherry	<i>Cerranus rechingeri</i>	North Baluchistan
Wild relatives of grapes	<i>Vitis jacquemontii</i>	Himalayas
Pomegranate	<i>Punica granatum</i>	Foothill Himalayas
Wild relative of olive	<i>Olea ferruginea</i>	Lower hills of North Pakistan

## Appendix 2

## Species of Fauna of Pakistan Threatened with Extinction (CITES Appendix I)

## Mammals

	Common Names	Scientific Names
1.	Kashmir Grey Langur	<i>Semnopithecus ajax</i>
2.	Hanuman / Common Langur	<i>Semnopithecus entellus</i>
3.	Indus Dolphin	<i>Platanista minor</i>
4.	Chinese White Dolphin	<i>Sousa chinensis</i>
5.	Finless Porpoise	<i>Neophocaena phocaenoides</i>
6.	Bryde's Whale	<i>Balaenoptera edeni</i>
7.	Blue Whale	<i>Balaenoptera musculus</i>
8.	Finback Whale	<i>Balaenoptera physalus</i>
9.	Humpback Whale	<i>Megaptera novaeangliae</i>
10.	Asiatic Black Bear	<i>Ursus thibetanus</i>
11.	Balochistan Bear	<i>Ursus thibetanus (gedrosianus)</i>
12.	Common Otter	<i>Lutra lutra</i>
13.	Common Leopard	<i>Panthera pardus</i>
14.	Leopard Cat	<i>Prionailurus bengalensis</i>
15.	Snow Leopard	<i>Uncia uncia</i>
16.	Musk Deer	<i>Moschus cupreus</i>
17.	Hog Deer	<i>Axis porcinus</i>
18.	Swamp Deer / Barasingha	<i>Rucervus duvaucelii</i>
19.	Chiltan Markhor	<i>Capra falconeri (chialtanensis)</i>
20.	Suleiman Markhor	<i>Capra falconeri (jerdoni)</i>
21.	Kabul Markhor	<i>Capra falconeri (megaceros)</i>

22.	Grey Goral	<i>Naemorhedus goral</i>
23.	Morcopolo Sheep	<i>Ovis ammon polii</i>

**Birds**

	<b>Common Names</b>	<b>Scientific Names</b>
1.	Imperial Eagle	<i>Aquila heliaca</i>
2.	White-tailed Eagle	<i>Haliaeetus albicilla</i>
3.	Laggaer Falcon	<i>Falco jugger</i>
4.	Barbary Falcon	<i>Falco pelegrinoides</i>
5.	Peregrine Falcon	<i>Falco peregrinus</i>
6.	Cheer Pheasant	<i>Catreus wallichii</i>
7.	Tragopan Pheasant	<i>Tragopan melanocephalus</i>
8.	Siberian Crane	<i>Grus leucogeranus</i>
9.	Great Indian Bustard	<i>Ardeotis nigriceps</i>
10.	Houbara Bustard	<i>Chlamydotis macqueenii</i>
11.	Dalmatian Pelican	<i>Pelecanus crispus</i>

**Reptiles**

	<b>Common Names</b>	<b>Scientific Names</b>
1.	Spotted Pond Turtle	<i>Geoclemys hamiltonii</i>
2.	Indian Roofed Turtle	<i>Kachuga tecta tecta</i>
3.	Green Turtle	<i>Chelonia mydas</i>
4.	Hawksbill Turtle	<i>Eretmochelys imbricata</i>
5.	Olive Ridley Turtle	<i>Lepidochelys olivacea</i>
6.	Leatherback Turtle	<i>Dermochelys coriacea</i>
7.	Indian Softshell Turtle	<i>Aspideretes gangeticus</i>

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8.	Marsh Crocodile	<i>Crocodylus palustris</i>
9.	Gharial	<i>Gavialis gangeticus</i>
10.	Indian Monitor Lizard	<i>Varanus bengalensis</i>
11.	Yellow Monitor	<i>Varanus flavescens</i>
12.	Trancaspian Desert Monitor	<i>Varanus griseus</i>
13.	Indian Peacock Softshell Turtle	<i>Aspideretes hurum</i>

### Species of fauna of Pakistan Likely to Become Extinct (CITES Appendix II)

#### Mammals

	Common Names	Scientific Names
1.	Rehsus monkey	<i>Macaca mulatta</i>
2.	Indian Pangolin	<i>Manis crassicaudata</i>
3.	Cuvier's Beaked Whale	<i>Ziphius cavirostris</i>
4.	Pygmy Sperm Whale	<i>Kogia breviceps</i>
5.	Dwarf Sperm Whale	<i>Kogia sima</i>
6.	Long-beaked Common Dolphin	<i>Delphinus capensis</i>
7.	Melon-headed Whale	<i>Peponocephala electra</i>
8.	False Killer Whale	<i>Pseudorca crassidens</i>
9.	Pantropical Spotted Dolphin	<i>Stenella attenuate</i>
10.	Spinner Dolphin	<i>Stenella longirostris</i>
11.	Indian Ocean Bottlenose Dolphin	<i>Tursiops aduncus</i>
12.	Common Bottlenose Dolphin	<i>Tursiops truncates</i>
13.	Grey Wolf	<i>Canis lupus</i>
14.	Indian Wolf	<i>Canis lupus (pallipes)</i>
15.	Dhole / Asiatic Wild Dog	<i>Cuon alpinus</i>
16.	Blandford's Fox	<i>Vulpes cana</i>
17.	Himalayan Brown Bear	<i>Ursus arctos (isabellinus)</i>
18.	Smooth-coated Otter	<i>Lutrogale perspicillata</i>
19.	Brown Bear	<i>Ursus arctos</i>
20.	Caracal	<i>Caracal caracal</i>
21.	Jungle Cat	<i>Felis chaus</i>
22.	Pallas' Cat	<i>Felis manul</i>

23.	Sand Cat	<i>Felis margarita</i>
24.	Wild Cat	<i>Felis silvestris</i>
25.	Eurasian Lynx	<i>Lynx lynx</i>
26.	Fishing Cat	<i>Prionailurus viverrinus</i>
27.	Wild Ass	<i>Equus hemionus</i>
28.	Afghan Urial	<i>Ovis vignei (cycloceros)</i>
29.	Punjab Urial	<i>Ovis vignei (punjabiensis)</i>
30.	Ladakh Urial	<i>Ovis vignei (vignei)</i>

### Birds

	Common Names	Scientific Names
1.	Black Stork	<i>Ciconia nigra</i>
2.	Common Spoonbill	<i>Platalea leucorodia</i>
3.	Lesser Flamingo	<i>Phoeniconaias minor</i>
4.	Greater Flamingo	<i>Phoenicopterus ruber</i>
5.	White-headed Duck	<i>Oxyura leucocephala</i>
6.	Comb Duck	<i>Sarkidiornis melanotos</i>
7.	Osprey	<i>Pandion haliaetus</i>
8.	Shikra	<i>Accipiter badius</i>
9.	Goshawk	<i>Accipiter gentiles</i>
10.	Eurasian Sparrow-hawk	<i>Accipiter nisus</i>
11.	Besra	<i>Accipiter virgatus</i>
12.	Eurasian Black Vulture	<i>Aegypius monachus</i>
13.	Golden Eagle	<i>Aquila chrysaetos</i>
14.	Greaten Spotted Eagle	<i>Aquila clanga</i>
15.	Steppe Eagle	<i>Aquila nipalensis</i>



16.	Lesser Spotted Eagle	<i>Aquila pomarina</i>
17.	Tawny Eagle	<i>Aquila rapax</i>
18.	White-eyed Buzzard	<i>Butastur teesa</i>
19.	Common Buzzard	<i>Buteo buteo</i>
20.	Long-legged Buzzard	<i>Buteo rufinus</i>
21.	Short-toed Eagle	<i>Circaetus gallicus</i>
22.	Marsh Harrier	<i>Circus aeruginosus</i>
23.	Hen Harrier	<i>Circus cyaneus</i>
24.	Pallid Harrier	<i>Circus macrourus</i>
25.	Pied Harrier	<i>Circus melanoleucos</i>
26.	Monlagu's Harrier	<i>Circus pygargus</i>
27.	Black Winged Kite	<i>Elanus caeruleus</i>
28.	Lammergeier / Bearded Vulture	<i>Gypaetus barbatus</i>
29.	White-rumped Vulture	<i>Gyps bengalensis</i>
30.	Griffon Vulture	<i>Gyps fulvus</i>
31.	Himalayan Griffon Vulture	<i>Gyps himalayensis</i>
32.	Long-billed Vulture	<i>Gyps indicus</i>
33.	Pallas Fish Eagle	<i>Haliaeetus leucoryphus</i>
34.	Brahminy Kite	<i>Haliastur Indus</i>
35.	Booted Eagle	<i>Hieraaetus pennatus</i>
36.	Black Eagle	<i>Ictinaetus malayensis</i>
37.	Black Kite	<i>Milvus migrans</i>
38.	Egyptian Vulture	<i>Neophron percnopterus</i>
39.	Oriental Honey Buzzard	<i>Pernis ptilorhynchus</i>
40.	Red-headed Vulture	<i>Sarcogyps calvus</i>
41.	Crested Serpent Eagle	<i>Spilornis cheela</i>

42.	Hawk-eagle	<i>Spizaetus nipalensis</i>
43.	Amur Falcon	<i>Falco amurensis</i>
44.	Saker Falcon	<i>Falco cherrug</i>
45.	Red-necked Falcon	<i>Falco chicquera</i>
46.	Merlin	<i>Falco columbarius</i>
47.	Sooty Falcon	<i>Falco concolor</i>
48.	Lesser Kestrel	<i>Falco naumanni</i>
49.	Eurasian Hobby	<i>Falco subbuteo</i>
50.	Common Kestrel	<i>Falco tinnunculus</i>
51.	Demoiselle Crane	<i>Anthropoides virgo</i>
52.	Sarus Crane	<i>Grus antigone</i>
53.	Eurasian Crane	<i>Grus grus</i>
54.	Great Bustard	<i>Otis tarda</i>
55.	Little Bustard	<i>Tetrax tetrax</i>
56.	Lesser Florican	<i>Psittacula cyanocephala</i>
57.	Alexandrine Parakeet	<i>Psittacula eupatria</i>
58.	Slaty-headed Parakeet	<i>Psittacula himalayana</i>
59.	Barn Owl	<i>Tyto alba</i>
60.	Short-eared Owl	<i>Asio flammeus</i>
61.	Long-eared Owl	<i>Asio otus</i>
62.	Spotted Owl	<i>Athene brama</i>
63.	Little Owl	<i>Athene noctua</i>
64.	Eurasian Eagle Owl	<i>Bubo bubo</i>
65.	Dusky Eagle Owl	<i>Bubo coromandus</i>
66.	Collard Owlet	<i>Glaucidium brodiei</i>
67.	Asian Barred Owlet	<i>Glaucidium cuculoides</i>

68.	Brown Fish Owlet	<i>Ketupa zeylonensis</i>
69.	Snowy Owl	<i>Nyctea scandiaca</i>
70.	Indian Scops Owl	<i>Otus bakkamoena</i>
71.	Pallid Scops Owl	<i>Otus brucei</i>
72.	Common Scops Owl	<i>Otus scops</i>
73.	Mountain Scops Owl	<i>Otus spilocephalus</i>
74.	Oriental Scops Owl	<i>Otus sunia</i>
75.	Tawny Owl	<i>Strix aluco</i>
76.	Mottled Woody Owl	<i>Strix ocellata</i>
77.	Red-billed Leiothrix	<i>Leiothrix lutea</i>
78.	Green Avadavat	<i>Amandava Formosa</i>

### Reptiles

S. #	Common Names	Scientific Names
1.	Indian Star Tortoise	<i>Geochelone elegans</i>
2.	Afghan Tortoise	<i>Testudo horsfieldii</i>
3.	Brown River Turtle	<i>Kachuga smithii</i>
4.	Indian Narrow-headed Softshell Turtle	<i>Chitra indica</i>
5.	Indus Mud Turtle	<i>Lissemys punctata andersoni</i>
6.	Spiny-tailed Lizard	<i>Uromastyx hardwickii</i>
7.	Indian Chameleon	<i>Chamaeleo zeylanicus</i>
8.	Indian Python	<i>Python molurus (molurus)</i>
9.	Indian Sand Boa	<i>Eryx johnii</i>
10.	Tartary Sand Boa	<i>Eryx tataricus</i>
11.	Rough-scaled Sand Boa	<i>Gongylophis conicus</i>
12.	Dhaman / Oriental Rat Snake	<i>Ptyas mucosus</i>

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13.	Indian Cobra	<i>Naja naja</i>
14.	Central Asian Cobra	<i>Naja oxiana</i>

### Species of Fauna of Pakistan with regulated International Trade (CITES Appendix III)

#### Mammals

	Common Names	Scientific Names
1.	Long Tailed Marmot	<i>Marmota caudate</i>
2.	Himalayan Marmot	<i>Marmota himalayana</i>
3.	Golden Jackal	<i>Canis aureus</i>
4.	Indian Fox	<i>Vulpes bengalensis</i>
5.	Red Fox	<i>Vulpes vulpes</i>
6.	Hill Fox	<i>Vulpes vulpes (griffithi)</i>
7.	Tibetan Red Fox	<i>Vulpes vulpes (montana)</i>
8.	Desert Fox	<i>Vulpes vulpes (pusilla)</i>
9.	Pine Martin	<i>Martes flavigula</i>
10.	Beach Martin	<i>Martes foina</i>
11.	Mountain Weasel	<i>Mustela altaica</i>
12.	Short-tailed Weasel	<i>Mustela erminea</i>
13.	Himalayan Weasel	<i>Mustela sibirica</i>
14.	Himalayan Palm Civet	<i>Paguma larvata</i>
15.	Asian Palm Civet	<i>Paradoxurus hermaphroditus</i>
16.	Small Indian Civet	<i>Viverricula indica</i>
17.	Indian Grey Mongoose	<i>Herpestes edwardsi</i>
18.	Small Indian Mongoose	<i>Herpestes javanicus</i>
19.	Hangul / Kashmir Deer	<i>Cervus elaphus (hanglu)</i>
20.	Black Buck	<i>Antelope cervicapra</i>

**Reptiles**

	<b>Common Names</b>	<b>Scientific Names</b>
1.	Russell's Viper	<i>Daboia russelii</i>
2.	Asiatic Water Snake	<i>Xenochrophis piscator</i>

**Birds**

	<b>Common Names</b>	<b>Scientific Names</b>
1.	Northern Pintail	<i>Anas acuta</i>
2.	Northern Shoveler / Shoveler	<i>Anas clypeata</i>
3.	Common Teal	<i>Anas crecca</i>
4.	Eurasian Wigeon / Wigeon	<i>Anas Penelope</i>
5.	Goliath Heron	<i>Ardea goliath</i>
6.	Ferruginous Duck / White-eyed Pochard	<i>Aythya nyroca</i>
7.	Cattle Egret	<i>Bubulcus ibis</i>
8.	Rock Dove / Blue Rock Pigeon	<i>Columba livia</i>
9.	Fulvous Tree Duck	<i>Dendrocygna bicolor</i>
10.	Rose-ringed Parakeet	<i>Psittacula krameri</i>
11.	Laughing Dove	<i>Streptopelia senegalensis</i>
12.	Turtle Dove	<i>Streptopelia turtur</i>

## Appendix 5

## Species of Pakistan Flora on Cites Appendices

	Scientific and Common Names	Habit	CITES Appendix
1.	<i>Saussurea costus</i> (Falc.) Lipsch. Synonym: <i>Saussurea lappa</i> costus root.	Herb	I
2.	<i>Coeloglossum viride</i> (L.) Hartm. Syn: <i>Coeloglossum purpureum</i> , <i>Habenaria viridis</i> , <i>Orchis viridis</i> Frog Orchid.	Herb	II
3.	<i>Cyathea chinensis</i> Copel. Syn: <i>Cyathea brunoniana</i>	Tree Fern	II
4.	<i>Cyathea gigantean</i> (Wallich ex Hook. 1844) Holttum 1935	Tree Fern	II
5.	<i>Eulophia hormusii</i> Duthie	Herb	II
6.	<i>Euphorbia caducifolia</i> Haines	Shrub	II
7.	<i>Euphorbia tirucalli</i> L. Syn: <i>Euphorbia geayi</i> , <i>E. laro</i> , <i>E. media</i> , <i>E. Bagshawei</i> , <i>E. rhipsaloides</i> , <i>E. scoparia</i> , <i>E. Suareziana</i> , <i>E. tirucalli rhipsaloides</i> , <i>Tirucallia tirucalli</i> , <i>Ththymalus tirucalli</i> .	Shrub	II
8.	<i>Gastrodia orobanchoides</i> (Falc.) Benth.	Herb	II
9.	<i>Habenaria edgeworthii</i> Hook.f. ex Collett	Herb	II
10.	<i>Listera ovata</i> (L.) R.Br. / Common Twayblade	Herb	II
11.	<i>Neottia inayatii</i> (Duthie) P.Beauv.	Herb	II
12.	<i>Neottia listeroides</i> Lindley	Herb	II
13.	<i>Rauvolfia serpentine</i> Benth. Ex Kurz Snake-root, devil-pepper	Herb	II
14.	<i>Taxus wallichiana</i> Zucc, Syn: <i>Taxus beccaa wallichiana</i> Himalayan yew,	Tree	II