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Biodiversity in Pakistan: Key issues

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Abstract. Pakistan is rich in biodiversity, particularly in the arid and semi-arid regions which cover almost 80% of the total land area. A number of animal and plant species are threatened and/or endangered largely due to over-exploitation and loss of natural habitat. Rapid human population growth is increasing pressure on the country's natural resource base. Increased poverty has forced rural people to exploit biodiversity at unsustainable rates. Factors like deforestation, overgrazing, soil erosion, salinity and waterlogging are posing major threats to the remaining biodiversity of the country. The continuing loss of forest habitat, with its associated fauna and flora, will have serious implications for the nation's other natural and agricultural ecosystems. The Protected Areas System was established for *in-situ* conservation of biodiversity and although a number of laws have been framed to conserve various components of biodiversity, they have not been implemented. All efforts to reverse losses and promote diversity are in vain without local participation. The Government of Pakistan prepared the National Conservation Strategy (NCS) in 1992, with biodiversity conservation as an essential component. Pakistan is a signatory to many international initiatives and is making concerted efforts to conserve its biodiversity in all ecological regions. It is proposed that all the stakeholders including the government agencies, local communities and NGOs work together as partners to conserve biodiversity. In this article the present status, threats and challenges faced by biodiversity are highlighted. Proposals are presented for workable strategies that could help conserve and realize sustainable levels of biodiversity.

INTRODUCTION

Pakistan is spread over an area of 882,000 km², lying between 24° and 37° north, 61° and 75° east. It extends some 1,700 km north from the Arabian Sea coast and the mouth of the Indus River to its headwaters in the Hindu Kush and Karakorum ranges of the Himalayan mountains. Pakistan has a coastline of about 1,046 km with 22,820 km² of territorial waters and an Exclusive Economic Zone of about 196,600 km². The country contains three of the world's eight bio-geographic realms (Indo-Malayan, Palearctic, and Afro-Tropical) with their distinct biotas, and spans four of Earth's ten biomes (desert, temperate grassland, tropical seasonal forest and mountain)

(Cox and Moore 1993). Roughly two-thirds of the country is mountainous. Variations in altitude cause many changes in species within short distances. Pakistan encompasses a wide range of terrestrial ecosystems within 12 major vegetative zones. These vegetative zones include:

- the permanent snowfields and cold deserts of the north to the arid subtropical zones of Sindh and Balochistan;
- the dry temperate coniferous forests of inner Himalayas to the tropical deciduous forests of the Himalayan foot hills;
- the steppe forests of Sulaiman range to the thorn forests of Indus plains;
- the swamps and riverine communities of the Indus and its tributaries to the mangrove forests of the Indus delta and Arabian Sea coast (Roberts 1997).

Around 500 wild relatives of cultivated crops have been reported and most of these are found in northern areas of Pakistan (Anwar *et al.* 2005). In addition, a number of distinct agro-ecosystems have been created through the conversion of natural habitats to agricultural use. Pakistan possesses a variety of ecological regions due to its immense latitudinal and altitudinal variations. These regions include the coastal mangrove forests of the Arabian Sea as well as some of the highest mountains in the world, where the western Himalayas, Hindu-Kush and Karakoram ranges meet (GOP 1992).

The country has been divided into nine main agro-ecological zones. About 80% of the country is arid and semi-arid, along with 12% sub-humid and 8% humid, with two distinct seasons (i.e. summer and winter) (GOP 2001). The monsoons bring the major portion of annual rainfall to most of the country. There are also winter rains, which are limited in quantity. Because of its uneven distribution, precipitation is generally inadequate for productive rain-fed agriculture. There are vast areas of arid and semi-arid habitat which host important biodiversity resources in the country. In addition, the Arabian Sea region around the country is rich in phytoplankton and zooplankton (Parnetta 1993).

Map 1. Pakistan



Despite the richness of the biodiversity in the country, many species have gone extinct. Pakistan has attempted to protect its biological resources, though these attempts have not been wholly adequate. First, federal and provincial authorities have made significant attempts to protect biodiversity and natural capital through the establishment of a network of national parks, wildlife sanctuaries, and game reserves. Two national parks have been used to reintroduce previously lost species into former habitats, notably the One-horned Rhino and the Black Buck in Lal Sohanra National Park, and the Cheer Pheasant in the Margalla Hills National Park (Anwar *et al.* 2005).

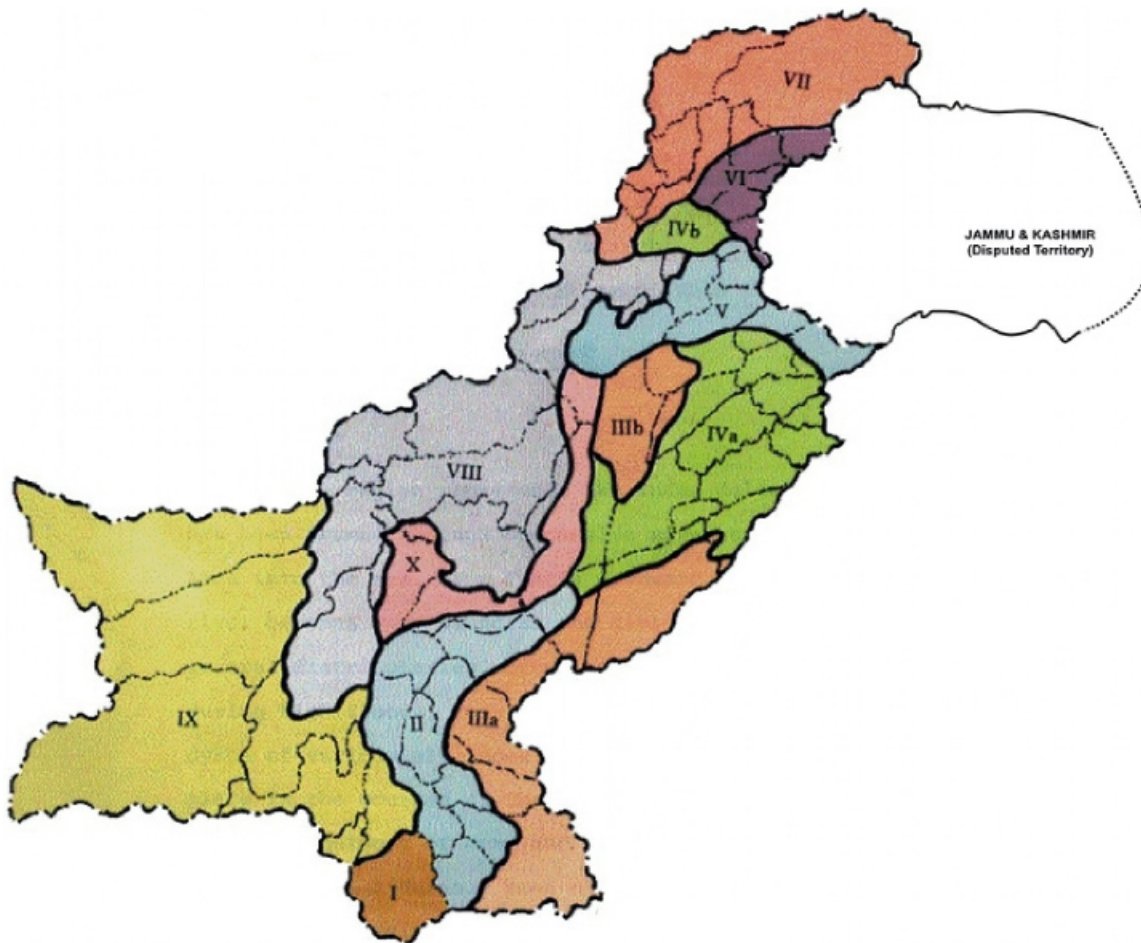
Pakistan is a signatory to virtually all the important international biodiversity agreements. Many programmes have been initiated with the help of NGOs and international donors to reverse biodiversity loss and promote diversity. The country's Biodiversity Action Plan was implemented in 1999. The efforts made by the government can only be fruitful provided that all stake-holders – NGOs, academia, researchers, planners, policy makers, users/consumers/poachers/hunters, civil society, women, youth and the general public – join hands to safeguard its national wealth, Biodiversity. This can

only be done through effective educational and extension programs supported by strong policies and plans.

STATUS OF BIODIVERSITY IN PAKISTAN

The country has relatively low national rates of endemism for some families (about 7 % for flowering plants and reptiles and 3 % for mammals) and higher rates for others (15 % for freshwater fish) (GOP 1999). However the proportion of “restricted range” species is much higher. For many of these species, Pakistan contains the majority of the global population. The number of endemic species and those considered as threatened with extinction is presented in Table 1. However, no consistent analysis of threatened species in Pakistan has been presented so far.

Up to 174 mammal species have been reported in Pakistan (Table 1). There are at least three endemic species and a number of endemic and non-endemic subspecies (Roberts 1997). A high percentage of Pakistan's birds are migratory; over 30% of recorded species are Palaearctic winter visitors (Roberts 1991). The Sulaiman Range, the Hindu-Kush and the Himalayas in NWFP and AJK comprise part of the Western Himalayan Endemic Bird Area. This is a global center of bird endemism with 10 restricted range species found in Pakistan (GOP 1999).



Map 2. Agro-ecological zones of Pakistan.

Key: I- Indus Delta II - Southern Irrigated Plain III - Sandy Desert (a&b) IV - Northern Irrigated Plain (a&b) V - Barani Lands VI - Wet Mountains VII - Northern Dry Mountains VIII - Western Dry Mountains IX - Dry Western Plateau X - Sulaiman Piedmont. Source: Social Sciences Division & Crop Sciences Division, Pakistan Agricultural Research Council (PARC)



Figures 1-3. 1, Indian Rhino, (courtesy WWF – Pakistan, photographer Y.J. Rey Millet); 2, Black Buck, *Antelope Cervicapra*, (courtesy WWF – Pakistan); 3, Blind Indus dolphin, © EDRC / WWF – Pakistan.

Over 177 species of reptiles are known in Pakistan; Chelonia - 14, Crocodilia - 1, Sauria - 90, and Serpentes - 65. Of these, 13 species are believed to be endemic (Table 1). As with other groups, these are a blend of Palaeartic, Indo-Malayan and Ethiopian forms. One genus, the monospecific *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.

As Pakistan is predominantly an arid and semi-arid country, it is not surprising that only 22 species of amphibians have been recorded, 9 of which are endemic. A number of marine turtle species nest on Pakistan's beaches. Out of 29 endemic fish species, nine are snow trout occurring in northern snow fed rivers (GOP 1999). Eighty species of butterflies have been recorded in the northern mountains, many of which are endemic (Hasan 1997). Almost 80% of Pakistan's endemic flowering plants are confined to the northern and western mountains (Ali and Qaisar 1986; GOP 1999).

Pakistan is rich in indigenous crop diversity, with an estimated 3,000 taxa of cultivated plants. The principal crops are wheat, rice, maize, barley, pulses, oil seeds, cotton, sugar cane, tobacco, vegetables and both tropical and temperate fruits (GOP 1999). The Plant Genetic Resources Institute at Islamabad maintains over 16,899 accessions of more than 40 different crops (Anwar *et al.* 2005).

Two breeds of buffalo, eight of cattle, one of yak, 25 of goat, 28 of sheep, one of horse, 20 of camel, and 3 of indigenous poultry prevail in the country (Usmani and Jasra 1993). Almost 80% of Pakistan's domestic livestock breeds are derivatives of established breeds and the proportion of non-descript livestock to pure is one the increase (GOP 1999).

THREATS TO BIODIVERSITY

Despite the fact that the country is very rich in biodiversity, there remain very severe threats. The following factors can result in the loss of biodiversity: over-grazing; over-harvesting; water-logging and salinization; deforestation; land conversion; soil erosion; desertification; alien invasive species; and chemical pollution. Severe threats to wild landraces of cultivated crops have been posed by the introduction of high yield varieties, agriculture expansion and dam construction, They all contribute to the degradation of biodiversity resources and are briefly discussed below.

DEGRADATION OF FOREST ECOSYSTEMS

Forests in Pakistan cover an area of 4.224 million ha, covering only 4.8 % of the total surveyed area of 87.98 million ha. The percentage of forests in different provinces and territories of course varies. There has been widespread conversion of tropical thorn forests in the Indus plains to agriculture. This has caused habitat loss for many species. At least ten ecosystems of special value for their species-richness and/or unique communities of flora and fauna are threatened with habitat loss and degradation (Table 2). Recently, increased demand for plant-based drugs and products has resulted in scarcity of a number of valuable medicinal plant species (Anwar *et al.* 2005).

Juniper forests of north-central Balochistan are the most extensive remnants of this forest-type in the world. Some trees are over 2500 years old. Also, the Chagai desert in Balochistan has many endemic species adapted to living in the sand. Himalayan moist temperate forests host the endangered Western Tragopan Pheasant, Musk Deer and a number of bird species (Anwar 1996).

Table 1. Species richness and endemics for major plant and animal groups in Pakistan

Species/Group	Total number reported	Endemic	Threatened
Mammals	174	6	20
Birds	668	N/a	25
Reptiles	177	13	6
Amphibians	22	9	1
Fish (freshwater)	198	29	1
Fish (marine)	788	-	5
Echinoderms	25	-	2
Molluscs (marine)	769	-	8
Crustaceans (marine)	287	-	6
Annelids (Marine)	101	-	1
Insects	>5000	--	-
Angiosperms	5700	380	N/a
Gymnosperms	21	-	N/a
Pteridophytes	189	-	N/a
Algae	775	20	N/a
Fungi	>4500	2	N/a

Source: GOP, 1999. Biodiversity Action Plan of Pakistan. Ministry of Environment/ IUCN/ WWF, Islamabad.

Table - 2 Critically Threatened Ecosystems in Pakistan

Ecosystem	Characteristics	Significance	Threats
Indus delta and coastal wetlands	Extensive mangroves and mudflats. Inadequate protected area coverage	Rich avian and marine fauna. Diverse mangrove habitat Marine turtle habitat	Reduced freshwater flow from diversions upstream. Cutting mangroves for fuelwood Drainage of coastal wetlands.
Indus River and wetlands	Extensive wetlands	Migratory flyway of global importance. Habitat for Indus River dolphin.	Water diversion/ drainage. Agricultural –intensification. Toxic pollutants.
Chagai desert	A desert of great antiquity	Many endemic and unique species	Proposed mining. Hunting parties from the Gulf
Balochistan juniper forest	Huge and ancient junipers	World's largest extant juniper forest Unique flora and fauna.	Fuelwood cutting and overgrazing. Habitat fragmentation.
Chilghoza forest (Suleiman Range)	Rock outcrops with shallow mountain soils	Important wildlife habitat for several species at risk.	Fuelwood cutting and overgrazing. Illegal hunting.
Balochistan subtropical forests	Mid-altitude forests with sparse canopy but rich associated flora	Very few areas remain. Important wildlife habitat.	Fuelwood cutting and overgrazing.
Balochistan rivers	Not connected with Indus River System	Unique aquatic fauna and flora with high levels of endemism.	Water diversion/ drainage. Over fishing.
Tropical deciduous forests (Himalayan foothills)	Extend from the Margalla Hills NP east to Azad Kashmir.	Perhaps the most floristically rich ecosystems of Pakistan.	Fuelwood cutting and overgrazing
Moist and dry temperate Himalayan forests	Important forest tracts now increasingly fragmented.	Global hot spot for avian diversity. Important wildlife habitat.	Commercial logging. Fuelwood cutting and overgrazing.
Trans-Himalayan alps and plateaus	Spectacular mountain scenery.	Unique flora and fauna; center of endemism.	Fuelwood cutting and overgrazing. Illegal hunting. Unregulated tourism. Habitat fragmentation.

Source: GOP, 1999. Biodiversity Action Plan of Pakistan, Ministry of Environment/IUCN/WWF, Islamabad.

LOSS OF NATURAL HABITAT

Loss of habitat is the principal reason for the high rate of global species extinctions; fragmentation and degradation pose a severe threat in all biomes (UNEP 1995). Pakistan's woody biomass is declining at a rate of 4.6% per year (GOP 1992; Hosier 1993). In the last 20 years, mangrove forest

cover has been halved from 2600 km² in the 1970s to 1300 km² in the mid-1990s. This natural wealth is disappearing at an alarming rate (Saifullah 1997). Mangroves play an economically significant role, providing breeding grounds for shrimp and fish larvae, protection from excessive siltation, and as sanctuaries for migratory birds.



Figures 4-6. 4, Hog Deer © Waseem / WWF – Pakistan; 5, Marbled Teal Duck, © Rab Nawaz / WWF – Pakistan; 6, Western Horned Tragopan Pheasant.

DETERIORATED RANGELANDS

The major cause of degradation of Pakistan’s rangelands and forests is the rapidly increasing domestic livestock population.

Between 1945 and 1986, the number of cattle almost doubled, while the number of buffaloes, sheep and goats more than tripled (GOP/JRC-IUCN 1992). Overall livestock numbers continue to increase at a rate of 2% per year. While much of this increase has been fed by the production of fodder within irrigated areas, persistent over-grazing has reduced forage production in Pakistan’s rangelands to one-third the potential (a loss of almost 50 million tonnes per year), and in some areas to as low as 15% of potential forage production (GOP/JRC 1992). The problem is particularly acute in the province of Balochistan. Similarly, 90% of non-alpine rangelands have been degraded (GOP 1992). Degradation of rangelands greatly reduces the diversity of flora and changes the vegetation composition (GOP 1999).

DEGRADATION OF WATER HABITATS

Fresh water habitats have also been degraded and fragmented due to water diversion. Blockage of the Indus River through dams and barrages is considered to be the most important human-caused threat to biodiversity in the aquatic ecosystems of Pakistan (Ahmad 1997). Changes in habitat quality, while less extreme than habitat loss, also affect plant and animal populations.

Fishing in coastal waters has steadily increased and the valuable shrimp fishery has started to show signs of over-exploitation. There is a larger proportion of young shrimp in the catch (Amjad 1996).

HABITAT FRAGMENTATION

Habitat fragmentation increases the risk of extinction by isolating small pockets of previously connected populations. It has been attributed to the loss of four mammal species from Pakistan including the Tiger, Lion, Swamp Deer and One-horned Rhinoceros (Ahmad 1997)

ILLEGAL AND RUTHLESS HUNTING

Many bird and animal species are experiencing population declines because of illegal hunting for sport, meat, and trade. There is a long and strong tradition of hunting in Pakistan, and the impact of hunters has increased with the spread of modern weapons and greater mobility. Virtually all large mammals have declined in number and in distribution. Currently, some 37 species and 14 subspecies of mammals, 25 species of birds and 10 species of reptiles in Pakistan are internationally threatened (IUCN 1996).

SALINITY AND SODICITY OF WATERS AND LANDS

Since a large part of the country is irrigated, much of its water is diverted for irrigation. The average amount of water entering the Indus basin is 137.2 million acre-feet (MAF) out of which 104 MAF, 75%, is diverted (GOP/JRC 1992). Irrigation for agriculture has caused degradation of agro-ecosystems through increasing salinity, sodicity (sodium-rich) and waterlogging in the Indus basin. Irrigation can result in increased salinity and water logging, causing the degradation of agro-ecosystems. Salinity affects 2.1 million hectares in Sindh and 2.6 million hectares in the Punjab (GOP/JRC 1992). Most of the soil affected is of low agricultural potential, however almost 10% of good soil is also affected.

Excessive use of fertilizers

Excessive use of pesticides and fertilizers has disturbed the natural biotic balance in agriculture soils as well as having direct

impact on terrestrial and aquatic fauna. Excessive use of fertilizers pollutes the nearby water bodies and higher doses of nitrogenous fertilizers lead to eutrophication of water channels and wetlands, the spread of aquatic vegetation and reduced aquatic diversity, as in Halezi, Drigh and Patisar lakes (Khursheed 1991).

STRONG POLICIES AND WEAK GOVERNANCE

Weak governance systems, low literacy (i.e. 35 %), and poor infrastructure, all contribute to a lack of effective control over biodiversity use and conservation. The root causes of Pakistan's biodiversity crisis are its rapid population growth (i.e. 2.6 % per annum) and the poverty of its citizens, which minimizes the alternatives to unsustainable natural resource exploitation for meeting basic needs (GOP 1999).

STRATEGIES FOR PROMOTING BIODIVERSITY CONSERVATION

The government of Pakistan attaches great importance to its biodiversity. The National Conservation Strategy (NCS) in 1992 was accepted by the World Bank as a National Environmental Action Plan. There are 14 core programs in the NCS, many of which touch upon biodiversity issues. However, as a whole the document does not provide comprehensive actions specifically related to biodiversity loss and conservation.

The Sarhad and Balochistan Provincial Conservation Strategies have been completed and a strategy for the Northern Areas is under preparation. At least two district-level conservation strategies are also being initiated. These strategies deal with biodiversity much more explicitly at the local level (GOP 1999).

In addition, a Biodiversity Action Plan (BAP) was adopted in 1999 and due recognition has been given to all ecological regions of the country, especially arid and semi-arid regions where there is relatively more pressure on natural resources by the native communities.

All the provinces have adopted conservation strategies to mitigate threats and improve biodiversity conservation. The Sarhad Provincial Conservation Strategy (SPCS) more specifically presents a chapter on biological diversity, parks and protected areas (GONWFP 1997). However, it does not comprehensively address the requirements of the CBD (CBD 1992). The approach of hierarchically nested conservation plans is also found at the local level with the preparation of district conservation strategies in Chitral and Abbottabad. These strategies postdate development of the BAP, and will explicitly address its recommendations relevant to the local context (GOP 1999). Presently existing sectoral policies and plans most pertinent to the conservation and sustainable use of biodiversity relate to wildlife, forestry, fisheries and agriculture (GOP 1999; GOP 2007).

INSTITUTIONAL STRUCTURE FOR BIODIVERSITY CONSERVATION

The Federal Ministry of Environment is the focal point for national concerns related to biodiversity conservation. The provinces have control over most aspects of biodiversity conservation with primary responsibility going to provincial forest and wildlife departments. The office of Inspector General of Forests (within



Figures 7-9. 7, Western Horned Tragopan Pheasant (courtesy Pakistan, WWF - Pakistan, Photographer: Iftikhar Ahmad); 8, Spoon Bill, *Platalea Leucorodia* (courtesy, WWF - Pakistan. Photographer: Mikko Pyhala); 9, Hanuman Langur, *Semnopithecus entellus*.



Figures 10-12. 10, Black-Winged Stilt, *Himantopus Himantopus*, (courtesy WWF - Pakistan, Riihela, Jukka, Photographer); 11, Snow Leopard, ©Martin Harvey / WWF – Canon; 12, Temperate forest.

the Ministry of Environment) oversees all policy coordination, research and education, as well as liaison matters related to forestry, rangelands, and wildlife management.

The National Council for the Conservation of Wildlife (NCCW), an attached department of the Ministry of Environment, formulates and coordinates wildlife policy and plans at the federal level, in addition to dealing with international conventions concerned with wildlife species and other relevant matters. Existing wildlife policies relate mainly to fauna, and not flora, and to game animals rather than non-game species. The

Zoological Survey Department is responsible for conducting surveys of fauna in different eco-regions and also maintains records of specimens. The Pakistan Forest Institute is playing a pivotal role in forestry education and research at the national as well as regional levels. The provincial Forestry, Wildlife and Fisheries departments are responsible for the management of wild lands, both within and outside protected areas. These wild lands include areas not under cultivation, and not managed for natural resources (GOP 1999; GOP 2007).

The Pakistan Environmental Protection Agency (PEPA) is an attached agency of the Ministry of Environment established under the Pakistan Environmental Protection Act of 1997. PEPA has the responsibility of executing, enforcing and regulating protection of the environment in the country. PEPA is also the focal point and approving authority for Initial Environmental Examinations (IEEs) and Environmental Impact Assessments (EIAs). The agency is supported by provincial EPAs (GOP 1999; GOP 2007).

ROLE OF RESEARCH INSTITUTIONS

A number of federal and provincial institutions are engaged in conducting research in various aspects of biodiversity. These include Zoological Survey Department, Pakistan Museum of Natural History, Pakistan Agricultural Research Council, Pakistan Forest Institute, Punjab Forestry Research Institute, Provincial Agriculture, Fisheries and Livestock Research institutes and universities. New research programs in priority areas related to the conservation, management and sustainable use of biodiversity are required. There is also a need to develop biodiversity monitoring programs and establish database centers at federal and provincial levels.

ROLE OF NGOS

The most notable international NGOs working in the field of biodiversity conservation are WWF and IUCN. A number of local NGOs are also working in various fields of environmental protection and biodiversity conservation. Most of them work in close collaboration with local community-based organizations in the conservation of biodiversity. NGOs are particularly prominent in the mountainous areas of northern Pakistan, where the Aga Khan Rural Support Program (AKRSP) introduced community mobilization and organization. Basic social infrastructure to develop community-based conservation programs is provided through several conservation NGOs. The Mountain Areas Conservancy Project, a large-scale biodiversity conservation initiative funded by GEF/UNDP, has been developed largely based on the work done by AKRSP in the northern mountain region (Anwar and Shank 2000).

PROTECTED AREAS

The Government of Pakistan has taken a number of steps for the protection and conservation of biodiversity including the national protected areas system (see Table 3). This includes national parks, wildlife sanctuaries and game reserves, and covers an area of 9.17 million hectares (10.4 % of total land area) (GOP 1999). However, most of these protected areas (PAs) were designated through legislation in the 1960s and 1970s and are too small and isolated to be effective. Also, not all the country's biodiversity

is currently represented or protected in the existing system of PAs. This is partly due to the fact that the dominant selection criteria for many of the PAs was based upon species, as opposed to habitat or biodiversity (IUCN 2000).

ADOPTED FROM THE GOVERNMENT OF PAKISTAN (GOP 1999).

Furthermore, most of the ecological zones, including many of the critically threatened ecosystems, are not adequately represented within the protected area system. Wildlife sanctuaries provide greater protection than national parks, while game reserves afford no protection to habitat but merely regulate hunting. The three categories of protected areas are inadequate for contemporary needs. Most of the remaining unprotected areas of biodiversity significance are currently used and managed by local communities in one way or the other (GOP 1999).

There are a number of gaps in the management of PAs in Pakistan (GOP 1999). Existing wildlife laws do not provide adequate framework for management, and have no provision for wildlife departments to manage adjacent areas. Most of the PAs in Pakistan lack comprehensive management plans and where they do exist, they are not fully implemented. Provincial wildlife departments are not well equipped with trained staff to manage the PAs effectively. Very little progress has been made in collaborative management regimes and local communities rarely have any role in PA management (Anwar *et al.* 2005).

POOR LEGISLATION AND WEAK IMPLEMENTATION OF LAWS

A wide range of laws to conserve different components of biodiversity, including forests, fisheries and wildlife are already in place. These laws are implemented by the provinces in their relevant areas and by the Capital Development Authority (CDA) in federal capital areas. Wildlife, parks, forestry, freshwater and near-shore fisheries are under provincial jurisdiction, covered by various acts and ordinances. Provincial Wildlife Boards have been set up in some provinces to provide policy for supervision of wildlife conservation and management. A serious weakness in the law regarding conservation of species is that it deals with animal species with no provision for protection of plant species or habitats. The laws need to be amended in this regard and to include

provisions of international conventions dealing with wildlife and biodiversity to which Pakistan is a signatory (Anwar *et al.* 2005).

The Pakistan Environmental Protection Ordinance of 1983 was the first relevant comprehensive federal legislation targeting environmental protection and conservation as a whole. This was replaced by the Pakistan Environmental Protection Act in 1997. The Act addresses biodiversity conservation in the country primarily through its environmental assessment screening process for proposed development projects. These processes include Initial Environment Examinations (IEEs) and Environment Impact Assessments (EIAs) and do address some biodiversity considerations. However, there is little expertise available at federal and provincial levels and a lack of resources to effectively undertake IEEs or EIAs (Anwar *et al.* 2005).

NEED FOR COMPREHENSIVE PLANS AND STRONG POLICIES

A Forestry Sector Master Plan, developed in 1992, focuses on programs such as soil conservation, watershed development, wood production, biodiversity conservation and institutional strengthening.

Similarly, a Forest Sector Policy for Pakistan has also been prepared by the Forestry Wing, Ministry of Environment. It takes a comprehensive approach to the forest sector and integrates forests, rangelands, watersheds and wildlife.

Pakistan's Agricultural Policy addresses a number of issues relevant to the CBD, including increasing primary production, reducing land degradation, improving irrigation and drainage, improving soil management, and expanding integrated pest management. It does not, however, adequately address the issue of agro-biodiversity *per se*.

Fisheries policy focuses on aquaculture and makes no reference to conserving indigenous aquatic biodiversity (GOP 1999).

The Eighth five-year plan, which was formulated after the approval of NCS in 1992 (7 National Development Plans preceded this date), identifies the environment as a critical issue. Conservation of natural resources and protection of environment are included in plan objectives. It also mentions the expansion and management of protected areas, *ex-situ* measures for plant

Table 3: Protected Areas in Pakistan

Region/ Province	National Parks	Wildlife Sanctuaries	Game Reserves	Un-classified	Total PAs	Area Protected	
						(hectares)	(%)
Azad Jammu & Kashmir	1	0	8	0	9	51,998	3.91
Balochistan	2	14	8	7	31	1,837,704	5.29
Punjab	2	37	19	0	58	3,315,803	16.14
NWFP	3	6	38	5	52	470,675	6.30
Sindh	1	35	14	4	52	1,307,575	9.27
Federal Territory	1	1	1	0	3	94,186	100
Northern Areas	4	5	9	0	18	2,092,180	2.97
Total	14	98	97	16	225	9,170,121	10.4

Adopted from the Government of Pakistan (GOP 1999).

conservation and conservation of endangered species. However, it does not fully address the conservation and sustainable use of biodiversity in the scope of CBD (Anwar *et al.* 2005).

All stakeholders must ensure that provisions of the Biodiversity Action Plan are integrated into the forthcoming five-year plan and into both the federal and provincial annual development plans as well (GOP 1999).

NATIONAL ACTION PLAN TO COMBAT DESERTIFICATION

Pakistan is party to the UN Convention to Combat Desertification (UNCCD) since 1997 and prepared a National Action Plan to Combat Desertification (NAP), launched in 2002. NAP addresses biodiversity conservation as a secondary issue but habitat loss and degradation are major threats to the conservation of biodiversity in Pakistan. NAP will specifically address land degradation and desertification problems, which will be of great significance in the rehabilitation of natural vegetation, especially in arid and semi-arid regions (GOP 2001; Anwar *et al.* 2005).

RECOMMENDATIONS

Pakistan was among the first nations to sign the CBD in 1992, and ratified by the Cabinet in 1994. Article 6 of the Convention calls for parties to develop national strategies, plans or programs for the conservation and sustainable use of biological diversity and integrate as far as possible the conservation and sustainable use of biological diversity into relevant sectoral or cross-sectoral plans, programs and policies (CBD 1992; Anwar *et al.* 2005).

To fulfill its obligation under CBD, Pakistan started the process of developing a Biodiversity Action Plan in 1993. Initial discussions about a national response to the CBD were held between the GOP and the World Bank in 1993. A proposal was developed by an *ad hoc* Biodiversity Conservation Coordination Group formed under the Ministry of Environment. In July 1996, funds were provided by the Global Environmental Facility (GEF) through the World Bank to develop the BAP along with a proposal for a protected areas initiative. BAP preparation was therefore linked with the planning of the Protected Areas Management Project (PAMP).

The BAP integrated three processes called for by the CBD: country study; national strategy; and an action plan. The BAP provides a brief assessment of the status and trends of biodiversity, outlines strategic goals and objectives, and identifies a plan of action. Actions will speak louder than words in the carrying out of these objectives.

PRIMARY ROLE OF THE MINISTRY OF ENVIRONMENT

The Ministry of Environment is the national focal point for the CBD, overseeing the BAP implementation process. The BAP proposes a Biodiversity Steering Committee at the federal level, chaired by the Minister for Environment and including representatives from relevant federal ministries and departments, provinces and NGOs. Since most implementation measures will take place at the provincial level, the BAP also allows for Provincial Steering Committees. The respective provincial ministers for

forests, fisheries and wildlife will chair these committees, which will include representatives of relevant departments, NGOs and community organizations. These fora will provide a strong coordination among all stakeholders to work for the conservation of biodiversity in the country (GOP 1999).

PROBLEMS ASSOCIATED WITH THE IMPLEMENTATION OF POLICIES

Anwar and Shank (2000) identified the following primary challenges in implementing biodiversity related policy and plans such as the BAP:

- lack of funding;
- weak capacity of government departments (lack of individual capacity and incentives for performance);
- lack of awareness of environmental issues on the part of decision-makers and civil society;
- weak governance (slow decision-making processes, inability to conceptualize policy, and lack of distinction between public and private interests).

There is a need to address these problems on a priority basis by the Ministry of Environment, possibly through the creation of a biodiversity secretariat.

DEVELOPMENT OF LINKAGES AMONG ALL ENVIRONMENTAL RELATED CONVENTIONS

A dire need exists to establish strong linkages between implementation of the CBD, UNCCD, UN Framework Convention on Climate Change (UNFCCC) and other relevant conventions such as the Convention on Migratory Species (CMS), the Convention on Wetlands (RAMSAR) and the Convention on International Trade in Endangered Species (CITES) etc. National focal points for these conventions should be interlinked through modern communication tools, and biodiversity conservation among these conventions should be understood and documented. Frequent exchange of information between secretariats of these conventions will further strengthen the linkages and will be useful in a number of action areas including biodiversity conservation (Anwar *et al.* 2005).

In addition, many factors like institutional, technical and managerial complexities aggravate the problem. Presented below are the most critical issues and steps to address the issues associated with biodiversity conservation in Pakistan (Anwar and Shank 2000):

- Formulate an effective policy and enact institutional reforms to carry them out;
- Integrate biodiversity conservation measures into sectoral initiatives;
- Create better understanding of all aspects of biodiversity and create effective means for ensuring their sustainable use;
- Develop community-based biodiversity management systems;
- Develop and institutionalize systems to monitor key elements of biodiversity and better implement existing plans.

CUSTOM STRATEGIES FOR BIODIVERSITY CONSERVATION IN PAKISTAN

With the biodiversity scenario of Pakistan in mind - The

authors recommend the following actions which may also be applicable elsewhere (Anwar et al. 2005).

- Pakistan has already undertaken a considerable amount of work already to generate biodiversity specific documents like the NCS and BAP. However, the implementation phase has unfortunately met with a little or no success.

The findings of these documents need to be properly disseminated at various levels (i.e. decision, policy, implementation and grass roots participation). Appropriate presentation of these documents is required, e.g. Executive Summaries and briefings for top-level government officials, technical sessions for mid-level policy makers/planners/implementers and NGO's. Eventually biodiversity must be presented as an economic subject relevant to all levels rather than as an incentive package.

- Once biodiversity issues are successfully identified and addressed appropriately, all public departments dealing with biodiversity in one or the other way must be enlisted. Biodiversity concerns/issues related to each department can be segregated, and individual solutions suggested. Finally, each department should prepare its annual action plan duly incorporating its biodiversity concerns. This could become an annual scheduled activity.
- Top level decision-makers of the country have to be sensitized to biodiversity issues. After all, biodiversity is linked with food security, social security and the security of the country as a whole. This would require appropriate sensitization packages.
- There are not very many biodiversity trained professionals in Pakistan. Hence, in real terms, there is always a communication gap between national and international fora like CBD, UNCCD, UNFCCC etc. Capacity building of concerned departments is urgently needed.
- There is a need for a National Biodiversity Council (NBC) with objectively defined national and international mandates (Anwar et al. 2005).

BIODIVERSITY AT THE NATIONAL LEVEL

Keeping in mind the importance of the subject and the threatening situation, it seems logical to maintain a liaison with all international commitments regarding biodiversity conservation. The newly established organization (NBC) must focus on technical, financial, human resource development (HRD) and communication aspects. This organization should be able to serve all aspects of biodiversity: development of human resources; policy reforms and legislation; sensitization especially at policy and mid-level; and assist all concerned public departments/agencies in education and implementing biodiversity programs, issues and policies (Anwar et al. 2005). Biodiversity conservation can be achieved with the help of able and efficient extension educators, by creating public awareness and through the participation of all the stakeholders including women and youth. Laws are there but they have not been implemented in their true spirit. Enforcement of

conservation laws need to be implemented for all residents of this great country and for the Earth as a whole. Otherwise, all the efforts made so far will come to no end. The wealth and gift of nature needs to be protected, for once it is gone, the loss will be irreversible. This wealth belongs to the coming generations, and we owe it to them to preserve it.

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