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USAID/ PAKISTAN TROPICAL FOREST & BIODIVERSITY ASSESSMENT

(FAA 118/119)

JANUARY 2012

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(FAA 118/ 119)

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ACRONYMS

ADS	Automated Directive System
AJK	Azad Jammu and Kashmir
BAP	Biodiversity Action Plan
CBD	Convention on Biological Diversity
CBO	Community Based Organization
CDCS	Country Development Cooperation Strategy
CFR	Code of Federal Regulations
CITES	Convention on the International Trade in Endangered and Threatened Species of Fauna and Flora
CMS	Convention on Migratory Species of Wild Animals
CSO	Civil Society Organization
EIA	Environment Impact Assessment
EU	European Union
FAA	Foreign Assistance Act
FATA	Federally Administered Tribal Areas
GB	Gilgit-Baltistan
GEF	Global Environment Facility
GOP	Government of Pakistan
HEC	Higher Education Commission
HWF	Himalayan Wildlife Foundation
ICT	Islamabad Capital Territory
IEE	Initial Environmental Examination
IQC	Indefinite Quantity Contract
IUCN	International Union for Conservation of Nature and Natural Resources
KP	Khyber-Pakhtunkhwa
MDG	Millennium Development Goal
MACP	Mountain Areas Conservancy Project
MEA	Multilateral Environment Agreement
MEP	medicinal and economic plants
NARC	National Agricultural Research Council
NCCW	National Council for Conservation of Wildlife
NCS	National Conservation Strategy
NEAP	National Environmental Action Plan
NGO	Non-governmental organization
NRM	Natural resources management
NTFP	Non-timber forest product
OAPA	Office of Afghanistan & Pakistan Affairs
PA	Protected area
PARC	Pakistan Agricultural Research Council
PFI	Pakistan Forest Institute
PEPA	Pakistan Environment Protection Agency
PEPA 1997	Pakistan Environment Protection Act 1997
PEPC	Pakistan Environment Protection Council
PEPO	Pakistan Environment Protection Ordinance
PFI	Pakistan Forest Institute
PMNH	Pakistan Museum of Natural History
REDD	Reducing Emissions from Deforestation and Forest Degradation

SME	Subject matter experts
SO	Strategic Objective
SOW	Scope of Work
TES	Threatened, endangered, and rare species
TFCC	Task Force on Climate Change
UN	United Nations
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
USAID	United States Agency for International Development
USG	United States Government
WCS	Wildlife Conservation Society
WCPA	World Commission on Protected Areas
WRRI	Water Resources Research Institute
WWF	World Wildlife Fund
ZSD	Zoological Survey Department

EXECUTIVE SUMMARY

This USAID/Pakistan Country Analysis for Biodiversity and Tropical Forests is being prepared to comply with the Foreign Assistance Act (FAA) Sections 118 and 119, which require that all country plans include:

- An analysis of the actions necessary to conserve tropical forests and biodiversity (discussed in Section 5.3); and
- The extent to which current or proposed USAID actions meet the needs (Section 5.4).

The previous USAID/Pakistan FAA 118/119 Assessment was prepared in 2004. Since that time, there have been considerable changes in the biodiversity sector in Pakistan and in USAID's interests in the country. This report builds on the 2004 assessment and considers recent USAID interest areas; for example, climate change has gained prominence since 2004, and is discussed in this FAA 118/119 Assessment.

The biodiversity of Pakistan is rich and is of global importance. The confluence of three biomes, the Afrotropical, Northern Eurasia, and Himalayan, along with the mountain endemics have produced a complex biodiverse region. Pakistan covers nine major ecological zones, ranging from mangrove forests along the Arabian Sea to the mountains of the western Himalayas, Hindukush, and Karakoram.

Ten of the 18 known mammalian orders are represented in Pakistan, including the world's smallest mammal, the Mediterranean pygmy shrew, as well as the largest mammal in existence today, the blue whale (Roberts, 1977 in Wildlife of Pakistan website). Roberts (1977) reported six endemic mammalian species from Pakistan. The Indus Flyway is one of the most important migratory bird flyways in the world; it encompasses a route from Siberia to various destinations in Pakistan over Karakoram, Hindu Kush, and Sulaiman Ranges along the Indus River down to the delta. Of the seven major flyways in the world, the Indus Flyway is one of the busiest. It is important because of the diverse species and the large number of birds that follow this route. Based on regular counts at different Pakistani wetlands, between 700,000 and 1,200,000 birds arrive in Pakistan through the Indus Flyway every year. The reptiles of Pakistan include five marine turtles, two tortoise, eight fresh water turtles, one crocodile, one gaviel, 98 lizards, and 77 species of snakes (most of which are not poisonous). Of the reptile species present in Pakistan, 13 species are believed to be endemic. Two important species of marine turtles nest on Pakistan's southern beaches—green and olive Ridley turtles, both globally threatened. 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). About 5,700 species of flowering plants have been reported, including both native and introduced species (Nasir and Ali, 1970).

More than 225 significant wetlands sites are on record in the prototype Pakistan Wetlands GIS Database; 19 have been internationally recognized by the Ramsar Convention as being of global importance.

Forests, including scrub and trees on farmlands, cover 4.21 million hectares or 5.2% of the country (GOP, 2011). According to the Forest, fuel wood, and rangelands report 2004 (GOP), 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). 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. Conservation professionals fear 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.

Generally, all game bird (partridges, pheasants, blue peacock) and mammal species in Pakistan are declining. Populations of all fur bearers including gray wolf, black bear, common leopard, cats, foxes, jackal, and terrestrial reptiles including marsh crocodile, snakes, and lizards have been declining due to over-exploitation for skins in internal trade, and exports (in the past). Exceptions to the population decline are some ungulate species (markhor, ibex, urial sheep, and blue sheep), which have been increasing in community managed game areas due to economic incentives agreed to by the provincial and territorial governments. Populations of gray and black partridges have also been increasing in the Private Game Reserves in KPK Province. And populations of snow leopard and brown bear are increasing due to conservation measures.

At present there are about 305 protected areas (PAs, see Annex H) throughout Pakistan; they cover approximately 12% of the total area of Pakistan. Although extensive, only a fraction of this network is adequately protected.

As a result of the 2011 devolution of the subject of environment to the provinces, the responsibilities of policy formulation, law making, and implementation in the biodiversity, tropical forest, and environment sector now completely lie with the provincial governments. Although no single policy and law specifically focuses on natural resources management, the PEPA-1997 and provincial forestry, wildlife, and fisheries acts partly cover various components of natural resources.

This FAA 118/119 Assessment identifies the following as the key threats to biodiversity and tropical forests (discussed in detail in Section 5.1):

- Deforestation
- Habitat loss and fragmentation
- Ineffective management of protected areas
- Depletion of populations of many species
- Degradation of agro-ecosystems
- Climate change
- Unsustainable practices

The FAA 118/119 Assessment Team identified the following indirect threats or root causes of the threats to biodiversity and tropical forests (discussed in Section 5.2):

- Lack of awareness of the importance of biodiversity
- Gaps in knowledge
- Limited resources and institutional capacity
- Rapid population growth
- Poverty
- Weak laws and policies
- Weak law enforcement
- Little incentive for sustainable use of biodiversity

- Agricultural subsidies

In response to these direct and indirect threats, the FAA 118/119 Assessment Team identified “actions necessary to conserve” tropical forests and biological diversity in Pakistan, and the extent to which USAID is meeting those needs (through their Country Development Cooperation Strategy—CDCS and current and future programs). The FAA 118/119 Team developed recommendations based on this analysis, which take into consideration USAID’s strategic and manageable interest and the projects and initiatives of other donors, the Government of Pakistan, and the private sector (these initiatives are described in Annex J). In addition, the FAA 118/119 Team conducted an early stage, strategic level evaluation of the potential impacts to biodiversity and tropical forests of the USAID CDCS sectors.

The FAA 118/119 Team provides recommendations to increase USAID’s contribution to biodiversity and tropical forest conservation in Pakistan; to minimize USAID’s potential impacts on biodiversity and tropical forests; to contribute to climate change mitigation and adaptation; and for inclusion of a sector area (or sub-sector area) that supports biodiversity conservation, since biodiversity and use of natural resources are the backbone of Pakistan’s economy; and support for this sector can mitigate conflict, improve stabilization and security, and contribute to sustainable development. The following is a summary of recommendations that would help USAID increase the extent to which the Agency contributes to biodiversity and tropical forest conservation (These are based on the FAA requirement to identify the extent to which current or proposed USAID actions meet the biodiversity/tropical forest conservation needs). The full set of recommendations is presented in Section 6.

1. In the FATA and KP Stabilization Sector, USAID should consider supporting community-based conservation as part of FATA/KP Sector’s “incremental improvements in governance that help strengthen communities and relations between communities and the government.”
2. As part of FATA and KP Stabilization (“incremental improvements in governance that help strengthen communities and relations between communities and government”), USAID should consider strengthening capacity of government, NGOs, and CBOs to improve natural resource governance.
3. Investments in Water (Economic Growth Sector Area) could help strengthen USAID’s support for “adopting an ecosystem management approach” (an action needed) by targeting their work to important aquatic ecosystems in need of restoration/rehabilitation.
4. To increase USAID’s contribution to conservation education and awareness raising (an action needed), the USAID Education Sector should consider including biodiversity conservation information and messages into teacher training, textbooks, teacher guides, and teaching materials.
5. As a means of increasing USAID’s contribution to conservation education and awareness raising, the Education Sector should incorporate conservation messages into USAID support for Pakistan Children’s Television programming.
6. The Health Sector could more fully address the biodiversity need for family planning (an action needed) by targeting areas for family planning assistance that are of high biodiversity importance and that are at risk from population pressure on natural resources (i.e., buffer zones of protected areas).
7. The Economic Growth Sector could increase USAID’s contribution to action needed #11, implement income generation activities, by targeting areas of high biodiversity that are affected by unsustainable NRM practices.

SECTION I: INTRODUCTION

As stated in the Scope of Work (SOW) for the Pakistan Country Analysis for Biodiversity and Tropical Forests, this assessment is meant to be a targeted report that will address the requirements of Section 118 (Tropical Forests) and Section 119 (Endangered Species) of the Foreign Assistance Act of 1961 (as amended), and Automated Directive System (ADS) 201.3.8.2 Tropical Forests and ADS 201.3.9.2 Biodiversity Analysis for Country Strategic Plans (the ADS spells out the legal requirements of FAAs 118/119). Besides meeting the FAA requirements, the assessment is meant to help USAID/Pakistan understand its comparative advantages and to integrate environmental concerns into the mission's long-term strategic planning process, the Country Development Cooperation Strategy (CDCS).

FAA Sections 118 and 119 require that all country plans include:

- An analysis of the actions necessary to conserve tropical forests and biodiversity (discussed in Section 5.3); and
- The extent to which current or proposed USAID actions meet the needs (Section 5.4).

As described in "FAA 118/119 Best Practices" (Byers, 2005), some missions have chosen to combine the mandatory FAA 118/9 analyses with an early, strategy-level review – a preview into the potential environmental impacts at the strategy phase – which can provide guidance to Strategic Objective (SO) Teams when later preparing Initial Environmental Examinations (IEE) at SO or activity level. This strategy-level review also helps strengthen cross-sectoral linkages." This FAA 118/119 will provide a strategy level, early stage environmental review.

The previous USAID/Pakistan FAA 118/119 Assessment was prepared in 2004. Since that time, there have been considerable changes in the biodiversity sector in Pakistan and in USAID's interests in the country. This report builds on the 2004 assessment and considers recent USAID interest areas; for example, climate change has gained prominence since 2004, and is discussed herein.

SECTION 2: FAA 118/119 Methodology

This FAA 118/119 Assessment was conducted by a two-person team, contracted by Weidemann & Associates under the Raise Plus Indefinite Quantity Contract (IQC). The core team (the “FAA 118/119 Team”) consisted of the following:

- Team Leader/International Senior Natural Resources Management Specialist; and a
- Local Senior Natural Resources Management Specialist.

Biographical sketches of the team members are found in Annex C.

The Team Leader led the Assessment from her home base in the United States, and the Local Specialist worked from his home base in Pakistan. The Team Leader focused on reviewing the current and future USAID/Pakistan program, including its contribution to and potential impacts on biodiversity. The Local Specialist focused on updating the status of biodiversity and tropical forests. Together they identified the key threats to biodiversity (including tropical forests), the root causes of the threats, the **actions needed** to address the threats, and **the extent to which** USAID is addressing the needs. Based on the analyses for the FAA 118/119, the Team identified practical recommendations for USAID to increase their contribution to biodiversity conservation in Pakistan.

The FAA 118/119 Team first prepared a Work Plan that was reviewed and approved by Weidemann & Associates and USAID. The Team also developed interview guidance, which was cleared by USAID, as well. The Team reviewed documents available online and “hard copy” reports available from Pakistan partners and stakeholders (See References listed in Annex A).

From her home base, the Team Leader conducted telephone and e-mail interviews with USAID/Washington and USAID/Pakistan, and with NGOs in Washington that are involved in environmental programs in Pakistan. The Local Specialist held meetings in Pakistan with Government of Pakistan (GOP), USAID/Pakistan staff, and NGO representatives and donors involved in environment/natural resources programs in Pakistan. The Local Specialist also met with the USAID Regional Environmental Advisor (REA)/Asia & OAPA (Office for Afghanistan & Pakistan Affairs), who was also the Acting Mission Environmental Officer (MEO) during the preparation stage of this FAA 118/119 Assessment. Throughout the assignment, the REA provided review and comments to the Team in his capacity as the REA/Asia & OAPA and Acting MEO, USAID/Pakistan. Annex D contains a list of FAA 118/119 contacts.

At the start of the Assessment, the Local Specialist held kick-off meetings with USAID/Pakistan staff. The FAA 118/119 Team then worked virtually for approximately two months, producing a draft of the FAA 118/119 Assessment for USAID review. The FAA 118/119 Team next addressed USAID comments, producing this final FAA 118/119 Assessment, which was submitted to USAID/Pakistan Mission in October 2011.

No field work was conducted for this Assessment. In conjunction with USAID, the FAA 118/119 Team agreed that, due to security concerns and the Local Specialist’s in-depth knowledge of Pakistan’s biodiversity resources, no fieldtrips would be necessary.

2.1 Timing in Relation to the Country Development Cooperation Strategy (CDCS)

USAID/Pakistan is in the process of developing a new CDCS for its assistance program to Pakistan through 2014. This FAA 118/119 was developed early in the CDCS formulation process. At the time the FAA 118/119 Team prepared this Assessment, *Sectoral Working Papers* had been prepared for Energy, Economic Growth (including agriculture and water), Federally Administered Tribal Areas (FATA)/ Khyber-Pakhtunkhwa (KP) Stabilization, and Education and Health (the social sector). These working papers will be the foundation of the USAID/Pakistan CDCS.

The timing of this Assessment is opportune; at this early stage, FAA 118/119 recommendations can easily be considered and integrated into the CDCS. In addition, this FAA 118/119 Assessment will constitute a portion of the Environmental Annex required as part of the Mission's CDCS.

Because the FAA 118/119 was undertaken during this early stage of the CDCS process, it is expected to serve as a useful programming tool to help USAID/Pakistan update its data and assumptions on the status of the environment in Pakistan and better integrate environment concerns into its overall programming.

2.2 Brief Description of USAID/ Pakistan Program

USAID implements its U.S. civilian assistance strategy in Pakistan together with the U.S. Department of State. To prioritize and focus efforts and to streamline implementation and maximize effectiveness, U.S. efforts and resources are focused on the following four priority sectors: 1) energy; 2) economic growth including agriculture and water; 3) stabilization; and 4) the social sector (education and health). Inclusive and effective democratic governance is a crucial focus that cuts across all USG assistance in Pakistan. Climate change is also a cross-cutting area.

USG assistance in Pakistan is focused on strengthening partnerships to build the capacity of local institutions. The USAID Mission accomplishes this by consulting extensively with the GOP on priorities and channeling a portion of USG resources directly through Pakistani institutions, putting in place robust accountability measures to ensure the proper use of funds.

The following is a brief description of USAID/Pakistan's current and future program. The information in this section provides the basis for identifying the extent to which USAID is addressing the biodiversity conservation needs identified by the FAA 118/119 Team (Section 5); and the information is also used to assess potential environmental benefits and impacts (an early stage environmental review at strategy level) of USAID's program (Section 5).

2.3 Ongoing and Future USAID/Pakistan Strategy and Program

The below information on USAID/Pakistan's program (2010-2014) is from the sector-oriented working papers mentioned above, supplemented by documents from the USAID/Pakistan website and a list of current projects supplied by the Mission. The sector papers describe the USG focus for 2010-2014. USAID is already implementing programs in the sectoral areas described below. The sector projects encompass a variety of contracting mechanisms, including Government-to-Government, Memoranda of Understanding, and Implementation Letters.

2.3.1 The Energy Sector

The goal of USG support to the energy sector is to: *Put more megawatts (MWs) on the grid, decrease transmission losses, and increase cost recovery by investing in selected energy infrastructure and supporting GOP reform efforts with technical assistance and new technology.*

The energy program is focused on two thematic areas:

1. *Investing in infrastructure:* The USG supports selected infrastructure projects to help accelerate rehabilitation of existing facilities and the addition of new generating capacity.
2. *Policy Reform:* The USG provides technical assistance to the GOP to support energy sector restructuring and reform, including more effective pricing policies, better targeting of subsidies, and capacity building for key institutions (policy makers, planners, regulators, facility managers, and project implementers). Reforms will help ensure greater efficiency and higher quality customer service, better sector and business management, increased political support for reforms, and eventually full cost recovery leading to sustainability. This assistance is intended to attract public and private sector investment in the sector, including in cleaner energy technologies, e.g., wind power.

The energy program is being implemented in three simultaneous phases:

1. Phase I: Combines power plant repairs and efficiency improvements to increase electrical supplies available to the grid, a program to replace tube well pump motors with more efficient, power saving models, and technical assistance to help reform the power distribution companies so that they become more financially self-sufficient, improve customer service, and enhance the investment climate of the energy sector as a whole.
2. Phase II: Supports completion of two Water and Power Development Authority multipurpose dam projects located in the underdeveloped areas of the Federally-Administered Tribal Areas (FATA) and Gilgit-Baltistan (GB) to store water, improve irrigation, control flooding, and provide water for domestic use.
3. Phase III: Supports high-priority, high-visibility major energy projects (e.g., a major multi-purpose dam such as the Kurram Tangi in North Waziristan or Diamer Basha dam in Khyber-Pakhtunkhwa (KP)-GB), and a number of small energy projects (e.g., Sindh Wind project). Continues and expands technical assistance to develop institutional capacity and to support energy sector reform that will encourage public and private sector investment into fuel and power supply and distribution systems.

Infrastructure projects are chosen based on:

Technical feasibility – Can the proposed intervention contribute significantly to meeting Pakistan’s energy and other vital development needs, while improving the country’s energy security? Does the project use domestic resources or imported? Does the project result in energy diversification?

Cost – Is the cost reasonable? Can the project’s full financing be arranged in a timely fashion?

Overall effect – Is the project high visibility? Is it a high priority for Pakistan? Will the power and other benefits be worth the time and money?

2.3.2 Economic Growth

The USG goal in the Economic Growth Sector is to: *Stimulate broad-based, inclusive economic growth, particularly in the agriculture sector, which will help generate new jobs through projects that support policy*

reform, access to finance for subject matter experts (SMEs), workforce development, increased agriculture productivity, and improved water management.

The USG focuses on four strategic approaches: technical assistance, agricultural assistance, private sector assistance, and support for water programs. Areas of support under each strategic approach are summarized below.

- Technical assistance is closely coordinated with other donors and reform leaders in the federal and provincial governments, and is designed to help the GOP improve policy management and foster private sector growth by:
- Improving financial stability through improved tax policy, budget and expenditure planning, and fiscal discipline at federal and provincial levels.
- Liberalizing trade policy to promote the integration of Pakistan's economy with regional/global economies.
- Improving the regulatory environment for private investment, including in key agricultural subsectors where government subsidies and controls on production and marketing stifle competition.

Agriculture assistance is designed to strengthen and improve:

- Value chains, by improving productivity, processing, cold chain systems, packaging, market linkages, standards, technology, and product diversification in dairy, non-dairy livestock, and horticulture.
- Existing and new farmer organizations by strengthening linkages among farmers, agribusinesses, and business service providers, as well as introducing improved production and processing practices.
- Sanitary and phytosanitary systems, agricultural data collection systems, and market information systems.
- Pakistani research and policy institutions through direct collaboration with U.S. and international institutions on an agreed agenda.

Private sector assistance will help Pakistan's small and medium enterprises become more outward looking, forward thinking, and grow faster by:

- Increasing access to finance by assisting Pakistan's banking sector in agriculture and other sectors, including financing the adoption of newer technologies, improved infrastructure, and upgrades to finance systems.
- Improving technological innovation and management practices in textiles, mining, and agriculture by state-of-the-art technology transfer and the linkage of Pakistani producers into global networks with worldwide marketing and distribution channels.
- Improving access to markets, information, imported technologies, commodities, and equipment.
- Increasing women's economic participation through targeted support to women-run microenterprises and agricultural production.
- Improving workforce development systems operating under private-sector guidance to identify skill gaps and train workers to fill them.

- Supporting business associations, farmers associations, and other civil society institutions to advocate for reform and increase accountability.

Investment in Water Programs is designed to:

- Increase water retention in Pakistan through projects such as the Gomal Zam, Satpara, and other dams to expand irrigation, and link farmers in these areas with livestock and horticulture assistance and higher efficiency water use.
- Strengthen the capacity of Pakistani academic and research institutions to analyze and promote water policies conducive to accelerated agricultural growth and improved food security.
- Help develop a national water resources information system.
- Integrate water management systems into horticulture and livestock development activities, where less water, better used, will lead to significant productivity gains.
- Develop or strengthen local systems, such as water user associations, to better manage water resources.

2.3.3 Federally Administered Tribal Areas (FATA) and Khyber-Pakhtunkhwa (KP) Stabilization

The goal of the USG stabilization program in the FATA and KP is to: *Support the GOP effort through short-term development activities and some longer term infrastructure investments that help make communities in conflict and post-conflict areas inhospitable to insurgents and more supportive of government authorities.*

USAID, in close coordination with the Department of Defense, is supporting the GOP's FATA Sustainable Development Plan to improve government services to FATA citizens. USAID is supporting the plan over a five year period (2007 to 2012), and will continue programs similar to those in the past: community-based projects, livelihood programs in agriculture and micro-enterprise development, vocational training and scholarships, and community health and education.

In 2010, USAID began implementing a major infrastructure development program in South Waziristan. A similar program is planned for North Waziristan.

USAID's programs in the Malakand Division will continue, including the Malakand Reconstruction Program (focused on rebuilding social infrastructure destroyed by insurgents), a Malakand housing compensation program, and activities focused on boosting small businesses and employment opportunities in the area.

Activities during the new strategy period may include investment in small-scale infrastructure, appropriate industries and agriculture, as well as support for incremental improvements in governance that help strengthen communities and relations between communities and the government.

2.3.4 Education

The USG education goal is to: *Increase the number of students that enroll and complete courses in basic primary, secondary, and tertiary education institutions.*

USG activities focus on basic education and higher education. Objectives of the Basic Education Program include:

1. Repair/rebuild schools in vulnerable areas;

2. Ensure sufficient resources for operations and maintenance of these schools;
3. Increase parental and community involvement in schools;
4. Reduce teacher absenteeism in schools in vulnerable areas; and
5. Establish common student performance standards and school report cards.

Provincial basic education programs, starting with Punjab and Sindh, are designed to:

- Assist the provinces with their plans to improve school facilities, including water, electricity, toilets, boundary walls, desks, and textbooks, and consolidate and relocate schools, as appropriate.
- Rehabilitate schools damaged by the 2010 floods.
- Develop effective teacher training, good textbooks, teacher guides, and teaching materials.
- Improve the quality of administration and accountability at the school, district, and provincial levels to ensure schools are functioning and have qualified teachers present.

USAID will support other Basic Education Programs such as:

- Pakistan Children's Television: PCTV aims to increase literacy and numeracy skills, problem-solving abilities, and critical thinking in children. It is designed to increase respect for girls and other marginalized children.
- Pre-Service Teacher Education Program in Pakistan: Pre-STEP helps improve teacher education programs by institutionalizing pre-service teacher education. The program assists new and practicing teachers to gain revised and upgraded teacher qualifications.

Higher Education support involves:

- Support for the Higher Education Commission (HEC): a) establish three centers of excellence, based on U.S. university partnerships in energy, water, and agriculture; b) award 400 scholarships per year to disadvantaged Pakistani students from vulnerable areas to pursue four-year university degrees, and c) support the HEC development budget for facilities and faculty improvement.
- Fulbright Scholarships: The Fulbright Program builds linkages between American and Pakistani academic institutions and promotes Pakistani access to global education and job markets. The 450 scholarships annually will help develop expertise in the areas of public administration, education, health, agriculture, environment, public policy, media, and communications.

2.3.5 Health

The USG goal in the health sector is to:

- Support the GOP to develop the capacity to deliver, with the assistance of NGOs, high quality, cost-effective health interventions to increase contraceptive prevalence; reduce fertility rates; reduce infant mortality; and prevent maternal deaths.

USAID funds are used for monitoring and evaluation, operational costs, communications campaigns and procurement of equipment and lab reagents. The USG supports the GOP's devolution of health services from the federal to the provincial level in the following areas:

- Well-tested health interventions targeting women and children, including immunizations and infectious diseases such as HIV and polio (This aligns with President Obama's Global Health Initiative – improved health impact focusing on women and children through sustainable and integrated health systems.) At the request of the GOP, the USG will provide technical assistance to the federal and provincial governments for defining their appropriate roles and responsibilities under the devolved health system.
- Support to provincial governments in establishing integrated programs for effective and efficient delivery of key services that include healthy timing and spacing of pregnancy, immunization, and maternal health, newborn, and child health interventions. This will strengthen human resource development and logistics management, including procurement of equipment and commodities.
- Signature infrastructure projects including the Lady Willingdon Hospital, Jacobabad District Headquarter Hospital, and the 60-bed fistula/obstetric and gynecological ward at the Jinnah Postgraduate Medical Center. All will serve as tertiary care referral sites for complicated maternal cases.

SECTION 3: COUNTRY OVERVIEW



Figure1: Map of Pakistan
[From Federal Research Division, Library of Congress, Country Profile: Pakistan]

Pakistan's¹ exact size is debated because of its disputed border with India. According to the United Nations (UN), the country (see Figure 1) has a total area of 796,095 square kilometers. This figure, however, does not include the Pakistan-administered portions of Jammu and Kashmir (known as Azad Kashmir and the Northern Areas, at 11,639 square kilometers and 72,520 square kilometers, respectively). These areas are claimed by Pakistan, but because their possession is disputed, they are not included in official land area statistics.

According to the UN-accepted boundaries, Pakistan is the 36th largest nation by total area. Pakistan has a 1,046-kilometre (650 mile) coastline along the Arabian Sea and the Gulf of Oman in the south and is bordered by Afghanistan and Iran in the west, India in the east and China in the far northeast. In the north, Tajikistan lies adjacent to Pakistan but is separated by the narrow Wakhan Corridor.

Oman shares a marine border with Pakistan. Pakistan has an international land border that totals 6,774 km (4,209 mi)—2,430 km (1,510 mi) with Afghanistan, 523 km (325 mi) with China, 2,912 km (1,809 mi) with India and 909 km (565 mi) with Iran. Pakistan lies mostly between latitudes of 23 degrees and 37 degrees north, with a small area just north of 37 degrees, and between longitudes 61 degrees and 78 degrees east with a small area west of 61 degrees.

Pakistan's climate is continental and is characterized by extreme variations of temperature. Winter (January) temperatures range from 68°F along the coast to 4°F in the high mountains (above 460 m). Summer (July) temperatures range from 95°F in the southeastern deserts to 32°F in the high mountains. The southwest monsoon (July–October) provides rainfall of about 40 inches or more in the mountainous northern areas and about six to eight inches on the coast. Rainfall can vary significantly from year to year, and successive periods of flooding and drought are common.

Geologically, Pakistan overlaps with the Indian tectonic plate in its Sindh and Punjab provinces, while Balochistan and most of KP lie within the Eurasian plate, which mainly comprises the Iranian plateau. Gilgit-Baltistan and Azad Kashmir lie mainly in Central Asia along the edge of the Indian plate; these areas are prone to violent earthquakes.

Pakistan is divided into three major geographic areas: the northern highlands, the Indus River plain, and the Balochistan Plateau. The geography of Pakistan is a blend of landscapes varying from plains to deserts, forests, hills, and plateaus from the coastal areas of the Arabian Sea in the south to the mountains of the Karakoram range in the north. The northern highlands of Pakistan contain the Karakoram, Hindu Kush, and

¹ The following is adapted from: Country Profile: Pakistan (February, 2005, Library of Congress, Federal Research Division); <https://www.cia.gov/library/publications/the-world-factbook/geos/pk.html#People>; <http://www.rrcap.unep.org/lc/cd/html/countryrep/pakistan/studyarea.html>, and <http://www.unhcr.org/cgi-bin/txis/vtx/page?page=49e487016>

Pamir mountain ranges, which incorporate some of the world's highest peaks, including K2 (8,611 m or 28,251 ft) and Nanga Parbat (8,126 m or 26,660 ft). The Balochistan Plateau lies to the west, and the Thar Desert is in the east. An expanse of alluvial plains lies in Punjab and Sindh along the Indus River. The Indus River and its tributaries flow through the country from the Kashmir region to the Arabian Sea.

The Indus River (2,749 kilometers within Pakistan) is Pakistan's main river. Its major tributaries are the Chenab (730.6 kilometers), Ravi (680.6 kilometers), Jhelum (611.3 kilometers), and Sutlej (530.6 kilometers). The navigable portions of these rivers are generally small and unconnected as a result of seasonal variations in water flows and the presence of major irrigation structures.

According to official statistics for 2004, the country's total land area is 79.6 million hectares, but only 59.3 million hectares have been surveyed. Out of the surveyed land area, 24.6 million hectares are classified as not available for cultivation, 3.6 million hectares are forest area (see Figure 2, Land Use and Forest Cover map), and 9.2 million hectares are unused but believed to be cultivable. Approximately 22 million hectares are used for cultivation, of which nearly 16 million hectares are actually under agricultural production, with the remainder fallow. About 13.5 million hectares of the land in agriculture are irrigated, and 6.5 million hectares are sown more than once per year. Most cultivable and irrigated land is located in the eastern provinces of Punjab and Sindh around the Indus River and its tributaries. Pakistan has an extensive but inefficient canal system for irrigation, and much of the crop area is rainfed, although precipitation tends to be unevenly distributed throughout the year. More than 40% of the working population is employed in agriculture, yet the per capita amount of agricultural land is declining, and there are significant natural limitations to increasing the quantity of arable land.

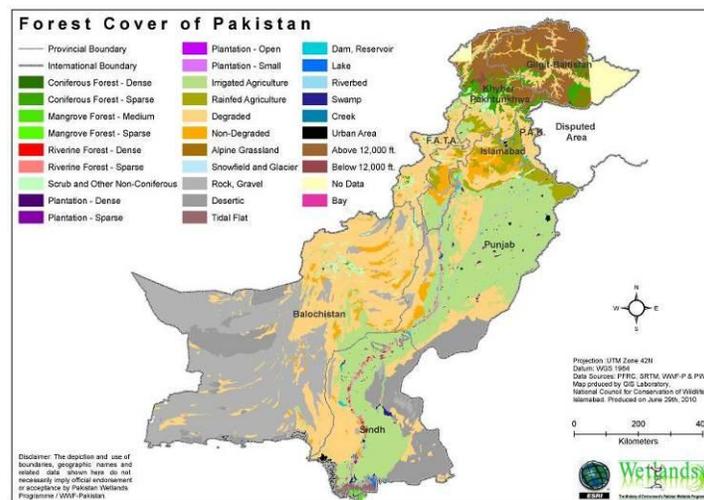


Figure 2: Forest Cover and Land Use Map of Pakistan

About 60% of Pakistan's total land area is classified as unusable for forestry or agriculture because it consists of deserts and mountains. Pakistan's soils are mostly dry and have high concentrations of calcium carbonate and a low content of organic matter. Approximately 75% of Pakistan's soils are composed of six broad soil types: 30.6% mountain/valley—these are patchy soils that are a loamy-gravelly mix; 14.7% rolling/hilly sandy soils; 11.4% loamy-clayey soils; 6.6% rock out-crop and loamy soils, very shallow; 5.8% mainly loamy to partly gravelly soils; 5.2% loamy soils. Pakistan's soils can also be categorized as follows:

1. Indus basin soils: The soils found along the current course of the Indus River are due to alluvial deposits from sediments deposited by the River every spring.

2. **Bongar Soils:** These soils are found in the historic Indus plain and are the best soils for agriculture in the country. Usually they are far from the present-day bed of the Indus River.
3. **Khaddar Soils:** Also found along Pakistan’s rivers, this soil formed when, every year during flood, a new layer of salty clay was deposited.
4. **Indus Delta Soils:** These soils cover the current Indus River Delta. Most of this soil is very clayey and was developed under seasonal floodwaters.
5. **Mountain Soils:** These rocky soils mostly cover the highlands of northern and western areas of Pakistan.
6. **Sandy Desert Soils:** These soils are made by the deposition of sand, layer by layer, year after year, for thousands of years. They are found in the arid and semi-arid areas of Pakistan.

3.1 What is Biodiversity and Why Should We Care About It?

Biodiversity- short for biological diversity- is the variety of life on earth. It includes all genes, species and ecosystems and the ecological process of which they are a part. The concept relates to all life forms on earth; it goes beyond the organisms and includes their genetic make-up, and the ecosystem processes and services of which individual species are a part (e.g., photosynthesis, soil formation, and pollination). The Convention on Biological Diversity (CBD) defines biodiversity by three inter-linked levels—genetic, species, and ecosystem (see text box). Each of these levels is important; change at one level can cause changes at other levels.

3.1.1 Why care about biodiversity?

Biodiversity is our natural wealth. Its conservation is important for both economic and ethical reasons. It provides goods and services fundamental to our survival, including clean air, fresh water, medicines, and shelter. It enables us to adapt to changing needs and circumstances. For example, forested ecosystems provide fuels, medicines, construction material, and wildlife habitat; wetlands and riparian areas protect water quality and aquatic life, control flooding, and filter pollutants from water; oceans provide food and regulate climate; and agro-ecosystems produce food. Biodiversity also provides people with recreational, psychological, emotional, and spiritual enjoyment. Some people believe that we should protect and restore biodiversity because of its benefits to mankind, while others believe that it is our moral obligation to care about biodiversity simply because all species have a right to live and have value in nature, whether or not their benefits to humans are obvious to us (Alonso, et. al., 2001).

The Convention on Biological Diversity (CBD) defines biodiversity as “*the variability among living organisms from all sources including inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems*” (CBD, 1992).

Biodiversity provides free of charge services, yet they are worth the equivalent of hundreds of billions of rupees every year, that are crucial to the well-being of Pakistan’s society. These services include clean water, pure air, pollination, soil formation and protection, crop pest control, and the provision of foods, fuel, fibers, and drugs. Genetic diversity in domestic species and their wild relatives enables researchers to develop improved varieties of animals and plants for human needs. Diversity in wild plant species is a major medicinal resource in ‘Yunani Tib’--40% of allopathic drugs were originally made from wild medicinal plants. Diversity in wild species also helps ensure food security. Yet these services are not widely recognized, nor are they properly valued in economic or even social terms.

Conservation of biodiversity also makes good environmental sense. The air we breathe, the water we drink and the soil that supports crop production are all products of the complex interactions that occur among various living organisms on earth. Losing biodiversity is a bit like losing the life support systems that we, and other species, so desperately depend upon.

The conservation of biodiversity is fundamental to achieving sustainable development. It provides flexibility and options for our current and future use of natural resources. Almost 70% of the population in Pakistan lives in rural areas, and a large part of this population depend directly or indirectly on natural resources—less obvious may be the extent to which those living in urban areas rely on biodiversity. Conservation of biodiversity is crucial to the sustainability of sectors as diverse as energy, agriculture, forestry, fisheries, wildlife, industry, health, tourism, commerce, irrigation, and power. Pakistan’s development in the future will continue to depend on the foundation provided by living resources, and conserving biodiversity will ensure this foundation is strong.

3.2 Pakistan’s Biodiversity Resources and Their Status

The biodiversity of Pakistan is rich and is of global importance. The confluence of three biomes, the Afromontane, Northern Eurasia, and Himalayan, along with mountain endemics have produced a complex biodiverse region. Pakistan covers nine major ecological zones, ranging from mangrove forests stretching along the Arabian Sea to the mountains of the western Himalayas, Hindukush, and Karakoram. World Wildlife Fund’s (WWF) Global 200 ranks ecosystems according to the importance of implementing conservation--238 ecoregions have been delineated; five are in Pakistan. The Global 200 ecoregions of Pakistan are:

1. Rann of Kutch flooded grasslands
2. Tibetan Plateau
3. Western Himalayan Temperate Forests
4. Indus Delta Ecosystem
5. Arabian Sea

The Biodiversity Action Plan (2000) and the 4th National Report of Pakistan on CBD (2010) remain the best estimate to-date of species richness and endemism in Pakistan (Table 1). No serious work has been done to evaluate taxonomic and functional diversity, and the amount of genetic variability within species—the most reliable information available for this 118/119 Assessment is much the same as the data available for the previous one. A species database is not available in a format that lends itself to be readily sorted into the thematic areas of the CBD. Therefore, the overview of the available information on biodiversity in the country is presented here as an indicator of the actual biodiversity of the country.

3.2.1 Fauna

Species belonging to the Palaearctic realm occur largely in the Himalayan and Balochistan 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 at 15%.

Table 1: Endemics of the 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	?

Source: 4th National Report- Pakistan

According to <http://www.wildlifeofpakistan.com/MammalsofPakistan/mammalsofPakistanmain.htm>, ten of the 18 known mammalian orders are represented in Pakistan, including the world's smallest mammal, the Mediterranean pygmy shrew, as well as the largest mammal in existence today, the blue whale (Roberts, 1977 in Wildlife of Pakistan website). Roberts (1977) reported six endemic mammalian species from Pakistan. These include yellow desert bat (*Nycticeius pallidus*), woolly flying squirrel (*Eupetaurus cinereus*), pygmy gerboa (*Salpingotus michaelis*), Hotson's long-tailed hamster (*Calomyscus hotsoni*), Murree vole (*Hyperacrius wynnei*) and the Indus river dolphin (*Platanista minor*). There are a number of other endemic or near-endemic subspecies, such as Chiltan markhor (*Capra falconeri chialtanensis*), Suleman markhor (*Capra falconeri jerdoni*), Pakistan sand cat (*Felis margarita scheffeli*), Balochistan bear (*Ursus thibetanus gedrosianus*), and the Punjab urial (*Ovis vignei punjabiensis*). Several species have been described as extremely rare or occurring in very small populations on the borders of Pakistan, and of these, the cheetah (*Acinonyx jubatus*), Indian wild ass (*Equus hemionus khur*), and hangul (*Cervus elaphus hanglu*) are already regarded as being extinct in Pakistan (NCCW, 1978 in Wildlife of Pakistan website). Many other species, such as the Indus dolphin, grey wolf, snow leopard, brown bear, Suleman markhor, lynx, and Marco Polo sheep are among the threatened mammals in Pakistan.

According to <http://pakistaniat.com/2006/11/29/pakistan-birds/>, one of the most important migratory bird routes is from Siberia to various destinations in Pakistan over Karakorum, Hindu Kush, and Suleiman Ranges along the Indus River down to the delta. This pathway is known as International Migratory Bird Route Number 4, and is also called the Green Route or more commonly known as the Indus Flyway. Of the seven major flyways in the world, the Indus Flyway is one of the busiest. It is important because of the diverse species and the large number of birds that follow this route. Based on regular counts at different Pakistani wetlands, between 700,000 and 1,200,000 birds arrive in Pakistan through the Indus Flyway every year. Migratory birds from the North spend winters in different wetlands and deserts of Pakistan, distributed throughout the country, from the high Himalayas to coastal mangroves and mud flats in the Indus Delta. Pakistan has great potential to be a birding destination for local, national, and international tourists.

The Suleiman Range, the Hindu Kush, and the Himalayas in the KP and Azad Kashmir comprise part of the Western Himalayan Endemic Bird Area; this is a global center of bird endemism with ten restricted range species in Pakistan. The Indus Valley wetlands constitute a secondary area of endemism, and provide habitat for one restricted range species, the Indus River dolphin, *Platanista minor*.

The reptiles of Pakistan include five marine turtles, two tortoise, eight fresh water turtles, one crocodile, one gaviel, 98 lizards, and 77 species of snakes (most of which are not poisonous). Of the reptiles species present in Pakistan, 13 species are believed to be endemic. As with other groups, these are a blend of Palaeartic, 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.

The mugger (marsh crocodile) is in danger partially due to over-hunting. The species is now nearly extinct and only occurs in small numbers in Sindh and a few areas in Balochistan (Groombridge, 1988 on Wildlife of Pakistan website). The gharial is in a precarious situation, or may already be extinct; it has only been seen in small numbers between the Sukkur and Guddu barrages. In addition, monitor reptile species are heavily hunted for their skins.

Two important species of marine turtles nest on Pakistan's southern beaches—green and olive Ridley turtles, both globally threatened. As Pakistan is a predominantly arid and semi-arid country, only 22 species of amphibians have been recorded, of which nine are endemic.

3.2.2 Invertebrates

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 alone 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 derive from boreal fauna from the west. In the northern mountains alone, 80 species of butterflies have been recorded, many of which are endemics (Hasan, 1997).

3.2.3 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 to 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.). The Kail breed of sheep is endemic to Azad Jammu and Kashmir (AJK) and is important for its wool and adaptation to the local environmental and climatic conditions.

3.2.4 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*, *Spiroseris*, 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), where two phytogeographic provinces are distinguished: the Balochistan Province and the Western Himalayan Province. The Kashmir Himalayas, in particular, are identified as a global center 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.).

3.2.5 Agricultural biodiversity

The principal crops in Pakistan are wheat, rice, maize, barley, pulses, oil seeds, cotton, sugarcane, tobacco, vegetables, and fruits (both tropical and temperate). Pakistan is rich in indigenous crop diversity with an estimated 3,000 taxa of cultivated plants (BAP, 2000). There are around 500 wild relatives of cultivated crops, most of which are found in the Northern Areas of Pakistan (BAP, 2000). Northern and western Pakistan comprises one of the world centers of the origin and diversity of cultivated plants. The prominent wild relatives of crops in Pakistan are given in Annex E.

The civilizations of Taxila, Harappa, and Mohenjo-Daro domesticated species such as wheat, eggplant, pigeon pea, and cucumber, whereas the GB Area became the center of diversity for several fruits. Many wild and local cultivars survived in Pakistan up to the era of the Green Revolution. However, the introduction of high-yield varieties of food and cash crops, expansion of land for cultivation, deforestation, and dam construction, have threatened wild landraces of cultivated crops.

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 respected crop catalogues (BAP, 2000). However, there is no in-situ conservation and promotion of cultivation of the wild relatives of these crops.

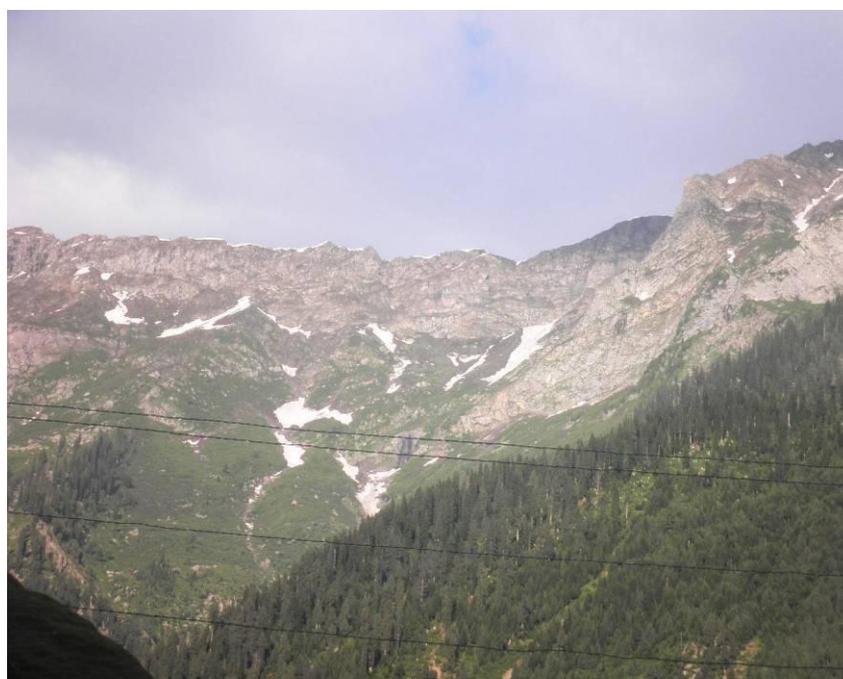
The agro-ecological diversity of the region has been eroding under the influence of modern agriculture. Pakistan’s commercially productive agriculture is practiced in the arid lands of the Indus basin and depends on canal irrigation. In addition, subsistence agriculture based on natural rainfall, rain 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 (National Oceanic and Atmospheric Agency) satellite imagery is shown in Table 2.

Table 2: Types of agriculture based on land cover estimates

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

3.2.6 Rangelands biodiversity

The following information is from the Ministry of Environment (GOP) Report, 2004. Over 52.2 million hectares of land is classified as rangelands. Rangelands are areas which, because of physical limitations such as low and erratic precipitation, rough topography, poor drainage, or cold temperature are unsuited for cultivation, and are more suited for forage production. The native vegetation is predominantly grasses, grass-like plants, forbs, or shrubs suitable for grazing or browsing. Rangelands include; natural grasslands, savannas, deserts, tundra, alpine plants communities, coastal marshes, wet meadows, and introduced plant communities managed as rangelands (see photograph of sub-alpine pasture). Rangelands provide feed for livestock, and are a source of water, recreation, wildlife, and fish habitat. Due to climate change and other biotic factors, desertification of range resources is taking place at an alarming rate, especially in the arid and semiarid zones of the country, which constitute 27.45 million hectares, i.e., 53% of the total area of rangelands. In addition, the degraded state rangelands affects wildlife, as this creates more competition between livestock and wildlife for food.



Sub alpine pasture above tree line © Raed Husseini

3.2.7 Forest biodiversity

The Forest Cover/Land Use map shows the coverage and types of forest in Pakistan (Figure 2). Forests, including scrub and trees on farmlands, cover 4.21 million hectares or 5.2% of the country (GOP, 2011). According to the Forest, fuel wood, and rangelands report 2004 (GOP), 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.

Ecologically, there are nine broad vegetation types in Pakistan (Champion et al., 1965). Four of the nine vegetation types are represented in the dry and sub-humid lands. Riparian habitats and arid land mangrove forests are two other forest types that may be found in the dry lands. The following is a brief description of the nine forest types/vegetation types:

Littoral and Swamp forests: These are gregarious forests of low height which occur along the Arabian Sea around the coast of Karachi and Pasni in Balochistan. The main species is *Avicennia marina* (99%). Other species, such as *Rhizophora* have disappeared over a period of time due to heavy cutting. According to recent estimates, these forests cover an area of 207,000 ha.

Tropical dry deciduous forests: These are forests (see photograph below for an example) of low or moderate height consisting almost entirely of deciduous species. Their canopy is typically light though it may appear fairly dense and complete during the short rainy season. This forest type is limited in Pakistan, but it can be found in the Rawalpindi foothills. It has been adversely affected because it grows in close proximity to habitation or cultivation. The chief tree species are *Lannea* (Kamlai, Kembal) *Bombax ceiba* (Semal), *Sterculia*, *Flacourtia* (Kakoh, Kangu), *Mallotus* (Kamila, Raiuni) and *Acacia catechu* (Kath). Common shrubs found in association with this forest type are *Adhatoda* (Bankar, Basuti, Bansha), *Gymnosporia* (Putaki), and *Indigofera* (Kathi, Kainthi).



Tropical dry deciduous forests near Islamabad By Hamid Marwat

Tropical thorn forests: These are low, open xerophytic forests, in which thorny leguminous species predominate. This type occupies the whole of the Indus Plain except the driest parts. The major tree species are *Prosopis cineraria* (Jhand), *Capparis decidua* (Karir, Karil), *Zizyphus mauritiana* (Ber), *Tamarix aphylla* (Farash) and *Salvadora oleoides* (Pilu, wan). Among these trees are a large number of shrubs of all sizes. Due to the heavy incidence of grazing and other biotic factors, the tree forest climax is very frequently degraded to a very open, low thorny scrub of species such as *Euphorbia* (Thor) and *Zizyphus* (Ber). A pioneer vegetation characteristic of this forest type is developed on inland sand dunes and the semi-deserts of the areas of least rainfall.

On the basis of climax vegetation, the whole Indus Basin plain with the exception of parts of the districts of Sialkot, Gujrat, and Jehlum, consists of tropical thorn forests. Prior to development of irrigation, agriculture, and urbanization, the area extended from the foothills of the Himalayas and low hills in the southwest Punjab plains to the Arabian Sea. The climax species of these forests are *Salvadora oleoides*, *Capparis decidua*,

Tamarix aphylla, and *Prosopis cineraria*, which grow on a wide range of soil textures, from flat deep alluvial soils to heavy clays, loams, and sandy loams. The climate that supports this vegetation type varies from semi-arid (250 to 750 mm rainfall) to arid (less than 250 mm rainfall); the summer temperature can be as high as 50°C.

Sub-tropical broad-leaved evergreen forests: These are xerophytic forests of thorny and small-leaved evergreen species. They occur on the foothills and lower slopes of the Himalayas, the Salt Range, Kalachitta, and the Sulaiman Range. The typical species are *Olea cuspidata* (Kau) and *Acacia modesta* (Phulai); the two species occurring mixed or pure, and the shrub *Dodonaea* (Sanatta) which is particularly abundant in the most degraded areas. Total area of these forests is approximately 1,191,000 ha.

Sub-tropical pine forests: These are open inflammable pine forests sometimes with, but often without, a dry evergreen shrub layer and little or no underwood. This type consists of Chir pine (*Pinus roxburghii*) forests found between 900 m and 1700 m elevation in the Western Himalayas within the range of the southwest summer monsoon. Chir pine is the only pine of these forests though there is a small overlap with *Pinus wallichiana* (Kail, Biar) at the upper limit.

Himalayan moist temperate forests: The evergreen forests of conifers, locally with some oak and deciduous broad-leaved trees, fall in this category (see photograph below for an example). Their undergrowth is rarely dense, and consists of both evergreen and deciduous species. These forests occur between 1500 m and 3000 m elevation in the Western Himalayas except where the rainfall is below about 1000 mm in the inner ranges, especially in the extreme northwest.



Himalayan moist temperate forests heavily populated by local © Bandi Herod

These forests are divided into a lower and an upper zone, where specific species of conifers and/or oaks dominate. In the lower zone, *Cedrus deodara* (Deodar, diar), *Pinus wallichiana*, *Picea smithiana*, and *Abies pindrow* (Partal) are the main conifer species in order of increasing altitude, with *Quercus incana* (rin, rinj) at lower altitudes and *Q. dilatata* above 2130 m. In the upper zone *Abies pindrow* and *Q. semecarpifolia* are the dominant tree species. There may be pockets of deciduous broad-leaved trees, mainly edaphically conditioned, in both the zones. Alder (*Alnus* species) colonizes new gravels and sometimes kail does the same. Degraded forms take the shape of scrub growth and in the higher reaches, parklands and pastures are found that are heavily grazed.

Himalayan dry temperate forests: These are open evergreen forest with open scrub undergrowth. Both coniferous and broad-leaved species are present. This type of forest occurs on the inner ranges throughout their length and is mainly represented in the northwest. Dry zone deodar, *Pinus gerardiana* (Chalghoza)

and/or *Quercus ilex* are the main species. Higher up, blue pine communities occur and in the driest inner tracts, forests of blue pine, *Juniperus macropoda* (Abhal, Shupa, Shur) and some *Picea smithiana* (e.g. in Gilgit) are found locally.

Sub-alpine forests: Evergreen conifers and mainly evergreen broad-leaved trees occur in relatively low open canopy, usually with a deciduous shrubby undergrowth of *Viburnum* (Guch), *Salix* (Willow, Bed), and others. This forest type occurs throughout the Himalayas from about 3,350 m to the timber limit. *Abies spectabilis* and *Betula utilis* (Birch, Bhuj) are the typical tree species. High level blue pine may occur on landslips and as a secondary sere on burnt areas or abandoned clearings. Rhododendrons (Bras, Chahan) occur in the understory but do not form extensive communities as they do in the central and eastern Himalaya. Dwarf junipers are often abundant.

Alpine scrub: This forest type (see photograph below for an example) includes shrub formations 1 m to 2 m high extending 150 m or more above the sub-alpine forests. The characteristic genera are *Salix*, *Lonicera* (Phut), *Berberis* (Sumbul, Sumbule), *Cotoneaster* with *Juniperus*, and occasionally *Rhododendron* or *Ephedra* (Asmania).



Alpine scrub B. Farid Marwat

3.2.8 Status of forest biodiversity

Regional case studies on the status of Pakistan's forests present a 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, KP Province indicates 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 the largest arid zone mangrove forests of the world; this national heritage is now quickly disappearing (Saifullah, 1997).

The 2004 USAID/Pakistan 118/119 Assessment noted that between 1990 and 1995, Pakistan's deforestation rate was 2.9% per year. According to <http://rainforests.mongabay.com/deforestation/archive/Pakistan.htm>, which compiles information from various sources such as State of the World's Forests' reports published by the United Nations Food and Agriculture Organization (FAO), between 1990 and 2000, Pakistan lost an average of 41,100 hectares of forest per year. This amounts to an average annual deforestation rate of 1.63%. Between 2000 and 2005, the rate of forest change increased by 24.4% to 2.02% per annum. In total, between 1990 and 2005, Pakistan lost 24.7% of its forest cover, or around 625,000 hectares. Measuring the total rate of habitat conversion (defined as change in forest area plus change in woodland area minus net plantation expansion) for the 1990-2005 interval, Pakistan lost 14.7% of its forest and woodland habitat.

Conservation professionals fear 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. Although it remains in place today, unfortunately, the moratorium on timber harvesting in Pakistan following the 1992 floods has not been very effective in curbing deforestation.

3.2.9 Inland waters biodiversity

The inland water resources of Pakistan are dominated by the Indus River System, comprising the Indus, Jhelum, Chenab, Ravi, and Sutlej, all originating in the Western Himalayas, flowing from northeast to south, and draining into the Arabian Sea through the Indus Delta (see Figure 3). The Kabul River, originating in Afghanistan, drains into the Indus, near Attock. Other than the Indus River system, there are some small rivers in provinces 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. These irrigation structures help shape the character of Pakistan's aquatic biodiversity. The dams and barrages, as well as Pakistan's main wetlands, including Ramsar sites (see below), are shown on Figure 3.

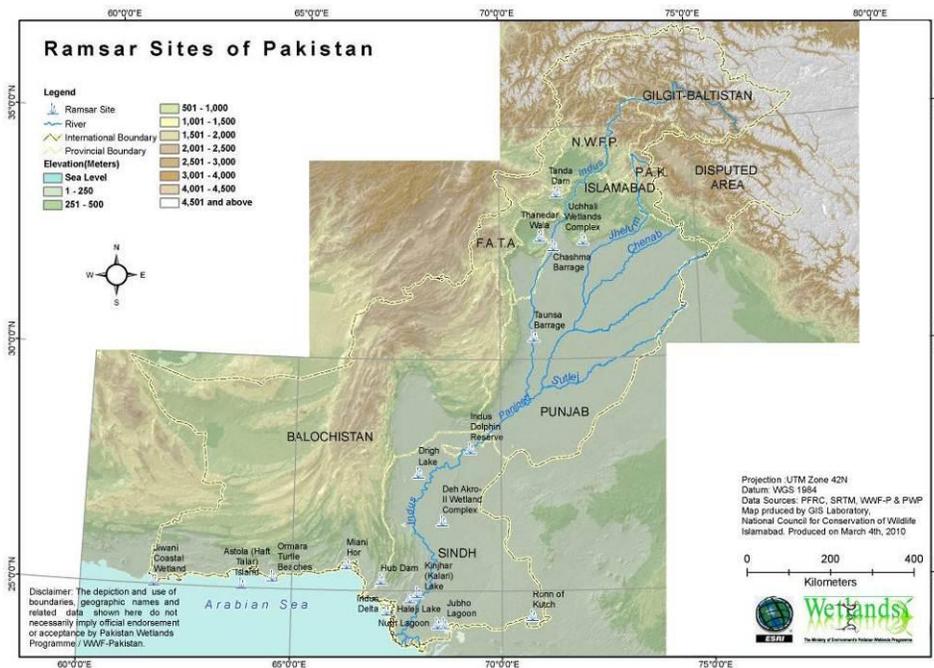


Figure 3: Wetland and Ramsar Sites of Pakistan

According to the 4th National Report on CBD (2010), 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 the northeast have the highest levels of endemism.

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

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

3.2.10 Marine and coastal biodiversity

Pakistan has a coastline that stretches about 1050 km, (990 km measured as a straight line) along the Arabian Sea. The coast of Pakistan consists of sandy beaches, interrupted by rocky protruding points. The fluvial characteristics of the Indus Delta, located at the head of the Arabian Sea, have changed 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.

Detailed information on marine fauna and flora is not readily available. According to the most reliable reports, 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 by the Zoological Survey of Pakistan. There are approximately 21 intertidal seaweeds; and 15 green seaweeds and six brown-red marine macro-algae are found along sandy shores.

Almost 800 species of marine fish have been recorded in Pakistan's coastal waters; however, no analysis of

RECOVERY OF THE 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 animals 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 strandings in the irrigation canals. Although no reliable data are available, 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 the estimated population had increased to 1275. This increase is likely due to population recovery following the ban on dolphin hunting implemented since the early 1970s in the Sindh Dolphin Reserve. Through the conservation activities of the Sindh Wildlife Department and WWF-Pakistan, immigration of dolphins through Guddu barrage from Punjab is also likely to have contributed to the increase. In 2006, the overall abundance of the Indus River dolphin was estimated to be 1400 -1600. (Pakistan's 4th National Report on CBD, 2010)

their population status and distribution is available. 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. In addition, the 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 been developed. Pakistan's main coastal wetlands are shown on Figure 3.

Two marine turtles, the green turtle (*Chelonia mydas*) and the olive Ridley turtle (*Lepidochelys olivacea*), are 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 (Coast) are favorite nesting habitats of the marine turtles. Green and olive Ridley turtles have been declared endangered species by the International Union for Conservation of Nature and Natural Resources (IUCN).

MARINE TURTLE CONSERVATION IN PAKISTAN

Marine turtles are endangered throughout the world. Out of seven marine species, the Green turtle (*Chelonia mydas*) and Olive Ridley (*Lepidochelys olivacea*) are found on the beaches of Pakistan. Pakistan has declared the turtles as protected species and has been actively undertaking research and conservation for the last 30 years. To-date, more than 700,000 hatchlings have been released in the open sea. More than 7000 turtles have been tagged for monitoring their migratory route. A program 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 the Indian Ocean South East Asian Marine Turtle Programme. Educational visits to the area are arranged for school children and campaigns are organized for mass awareness.

Satellite tracking of marine turtles, in collaboration with WWF and the Environmental Research and Wildlife Development Agency (ERWDA)- Abu-Dhabi has helped in understanding habitat use by the turtles (Pakistan's 4th National Report on CBD, 2010)

Pakistan's mangrove ecosystems are rich in biodiversity. Eight mangrove species are reported along the coast of Pakistan. *Avicennia marina* is the most dominant species in these ecosystems, while *Ceriops tagal* and *Rhizophora mucronata* occur in localized patches. Other species are reported to be extinct from the Indus Delta due to human activities coupled with adverse physical and environmental conditions. Over 48 species of macro-fauna have been reported to use mangrove forests along the coast of Pakistan, including several species of crabs, polychaetes, and molluscs. Approximately 56 species of birds have been reported to use the Sindh coastal waters. Baseline information on species and numbers has not yet been established.

Corals have recently been discovered along the coast of 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 coelenterate and bryozoan colonies are also found along most parts of the coast.

3.2.11 Pakistan's Wetlands of Global Importance

Pakistan contains 780,000 hectares of wetlands (http://www.pakistanpaedia.com/land/GEO_8.html), covering 9.7% of the total surface area of Pakistan (Figure 3). More than 225 significant wetlands sites are on record in the prototype Pakistan Wetlands GIS Database; 19 have been internationally recognized by the Ramsar Convention as being of global importance (Table 3).

Table 3: Ramsar Designated Wetlands

Site name	District	Province
<u>Astola (Haft Talar) Island</u>		<u>Balochistan</u>
<u>Chashma Barrage</u>	<u>Mianwali District</u>	<u>Punjab</u>
<u>Deh Akro-II Desert Wetland Complex</u>		<u>Sindh</u>
<u>Drigh Lake</u>		<u>Sindh</u>
<u>Haleji Lake</u>		<u>Sindh</u>
<u>Hub Dam</u>		<u>Sindh, Balochistan</u>
<u>Indus Delta</u>		<u>Sindh</u>
<u>Indus Dolphin Reserve</u>		<u>Sindh</u>
<u>Jiwani Coastal Wetland</u>		<u>Balochistan</u>
<u>Jubho Lagoon</u>	<u>Badin District</u>	<u>Sindh</u>
<u>Kinjhar (Kalri) Lake</u>	<u>Thatta District</u>	<u>Sindh</u>
<u>Miani Hor</u>	<u>Lasbela District</u>	<u>Balochistan</u>
<u>Nurri Lagoon</u>	<u>Badin District</u>	<u>Sindh</u>
<u>Ormara Turtle Beaches</u>		<u>Balochistan</u>
<u>Runn of Kutch</u>		<u>Sindh</u>
<u>Tanda Dam</u>	<u>Kohat District</u>	<u>North-West Frontier Province</u>
<u>Taunsa Barrage</u>	<u>Muzaffargarh District</u>	<u>Punjab</u>
<u>Thanedar Wala</u>	<u>Bannu District</u>	<u>North-West Frontier Province</u>
<u>Uchhali Complex</u>	<u>Khushab District</u>	<u>Punjab</u>

Source: www.pakistanpaedia.com/land/GEO_8.html

3.2.12 Environmental services, economic and cultural values of biodiversity and forests

Biodiversity and forests have a variety of economic and cultural values related to provision of food, fodder, fruit, medicines, timber, fuel-wood, non-timber forest products (NTFP), water, tourism, and recreation. Agricultural and range-livestock biodiversity ensure food security, especially important in developing countries such as Pakistan. Similarly, medicinal plants and animals and NTFPs are highly valued by Pakistan's population, although their economic benefit may not be widely acknowledged. The economic and cultural values of various biodiversity products are discussed below (Annex F and Annex G include information on the ecological and commercial value of specific biodiversity products.)

3.2.13 Food crop, poultry, fish and livestock

Pakistan's economic survey, 2009-10 reported that production of crops contributed a significant amount to Pakistan's GDP. Wheat (25 million tons) contributed 3.1% of GDP; rice (6.8 million tons) contributed 1.4 % of GDP; maize, pulses, and sugarcane (49.4 million tons) contributed 0.8 % of GDP; cotton constituted 1.8% of GDP; and tobacco, as well, plays an important role in earning foreign exchange for Pakistan. Meat and milk contribute 11.4 % to GDP; poultry contributes 23.8% of the total meat production in Pakistan. Fish production stood at 134,000 m. tons in 2009-10 and export of fishery products earned US\$ 236 million. Production of these crops and fisheries require a healthy natural resource base.

Livestock grazing and crop production are also culturally important for Pakistan, which is mainly a rural nation.

3.2.14 Medicinal value

Parts of various plants and animals are used either directly as medicine or processed to add value. Medicinal plants and animals are a source of economic return to local communities and for the country as a whole, when collected and processed for export. In the 1990s, about 50 tons of dried morels (mushrooms) were collected and exported from the northern mountains of Pakistan. Production data of various medicinal plants are given in Annex G.

Natural medicines are also of cultural value and are important for maintaining the health of Pakistan's peoples, especially rural dwellers. Some communities, where access to modern health practitioners and facilities is limited, may rely solely on natural medicines.

3.2.15 Other products

Wood is used in construction and other industries such as furniture making, and as a source of renewable energy. Although the data are old, the Forestry Sector Master Plan (GOP, 1992) reported a total of 496,000 m³ of available timber and 189,000 m³ of available firewood in Pakistan and estimated per capita timber requirements of 0.032 m³ in 2008, 0.034 m³ in 2013, and 0.037 m³ in 2018 (there is no information available about whether these predictions remain accurate). Firewood is consumed by almost 90% of rural and 60% of peri-urban populations as a source of domestic energy and per capita firewood demand is 0.52 m³.

Honey collected from wild beehives is a rich and organic source of nutrition, is also believed to have medicinal uses, and it provides income for forest dwelling communities. Between 55 to 65 tons of honey is collected each year in the country from wild beehives.

Forest dwellers also collect a variety of wild fruits and nuts, both for domestic consumption and for sale. Some of the important ones are roasted seeds of *Pinus gerardiana*, locally known as chalgoza pine which is a very costly dried fruit. A single tree can yield 20 to 40 kilograms of nuts annually. Total production in the country is estimated at 21,000 tons. Walnut (*Juglans regia*) is also a favorite food in Pakistan. Walnut trees grow naturally in the northern and northwestern mountains and they are also cultivated; production is about 20,000 tons per year.

Mazri palm leaves (*Nonnorrhops ritchieana*) are used in a variety of everyday products, including mats, baskets, brooms, trays, hand fans, grain bins, and cordage. Average annual production of raw mazri leaves in Pakistan is 37,315 tons (Amjad and Khan, 1990; Iqbal, 1991). Branches of *Tamarix dioica*, locally known as "lei" are cut for making baskets. Total annual production is approximately 600,000 baskets, consuming 2,000 to 2,500 tons of raw material each year. Silkworm rearing on mulberry leaves obtained from high-trunk trees grown in government plantations and farmlands is an old cottage industry in many rural areas. Total production of dry cocoons in the country is about 245 tons. Soap-nut, known as "retina," is a fruit of a tree (*Sapindus mukrossi*); its outer fruit coating/pericarp contains saponin, which is used as a substitute for soap—it is preferable to regular soap for certain articles such as flannel and silk clothes, and women use it as shampoo. Total production in the country is estimated at 250 tons.

Leaves of the neem tree (*Azadirachta indica*) are used by rural women as insect repellent. Layers of leaves are placed between woolen clothes to keep moths away when in storage. The leaves also protect grain from grain pests during storage.

While only some may be cultivated, all of these products are found in natural ecosystems in Pakistan. Sustainable use and biodiversity/ecosystem conservation is critical for ensuring that these natural products will continue to be available to the population of Pakistan.

3.3 Threatened, Endangered and Rare Species and their Protection Status

The threatened, endangered and rare species (TES) of Pakistan are listed (from specific perspectives) in the following documents:

1. IUCN Red Data Book of (globally) Endangered Species
2. Pakistan Red Data Book of Threatened, Endangered and Rare Species (status of the species in the country)
3. Appendices of the Convention on International Trade in Endangered Species of Fauna and Flora or CITES (conservation status impacted or likely to be impacted by international trade) (see Annex I)
4. Appendices of the Convention on Migratory Species of Wild Animals (CMS) or Bonn Convention (conservation status impacted during migration into range states)
5. Schedules of species protected under the four provincial and three territorial wildlife laws against hunting, killing, trapping, internal trading, and export

Generally, all game bird (partridges, pheasants, blue peacock) and mammal species in Pakistan are declining. Houbara bustard, falcons, and gazelle deer suffer from hunting by visiting dignitaries from the Middle East and their advance and post hunt parties. Populations of all fur bearers including gray wolf, black bear,

CONSERVATION OF BROWN AND BLACK BEAR

The Himalayan Wildlife Foundation (HWF) has been actively involved in the conservation of Himalayan Brown Bear in the alpine ecosystem of Deosai Plateau. HWF was the leading actor in declaring Deosai Plateau as a national park. The population of brown bear, which was on the verge of extinction, doubled during 1993 to 2005. 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 will also help conserve Musk Deer as the new national park has been named after musk deer. The Sustainable Use Specialist Group of IUCN for Central Asia is actively taking actions to conserve a remnant population of Asiatic Black Bear in Balochistan.

common leopard, cats, foxes, jackal, and terrestrial reptiles including marsh crocodile, snakes, and lizards have been declining due to over-exploitation—in the past—for skins in internal trade, and exports. Loss of habitat is the other main reason for population declines. Species such as leopard, snow leopard, wolf and black bear are killed because of direct or indirect conflict with human beings including attacks on human beings and livestock (see photo below of a leopard killed because it attacked livestock); and otters and dolphin are killed by fishermen to protect fish stocks.

Exceptions to the population decline are some ungulate species (markhor, ibex, urial sheep, and blue sheep), which have been increasing in community managed game areas due to economic incentives agreed to by the provincial and territorial governments. The populations of gray and black partridges have also been increasing in the Private Game Reserves in KPK Province. And populations of snow leopard and brown bear are increasing due to conservation measures (see text box).

Populations of wintering waterfowl in the wetlands of the Indus Plain, especially in Punjab and Sindh Provinces, are affected by the depleted flow of river water during winter months. Trapping of cranes in large numbers in KPK Province and Northern Balochistan by the crane

hunters of southern KPK during the migration period is a favorite local hobby that is threatening their populations. Drainage of wetlands for cultivation and use of pesticides in paddy fields are other factors that are contributing to the decline in the numbers of waterfowl.

TES of particular social importance in Pakistan are species that are kept as pets. These include ungulates such as gazelle deer, urial, markhor, monkey, and birds e.g., demoiselle crane, common crane, pheasants, black partridge, gray partridge, blue peacock, chakor, quail, Alexandrine parrot, ring neck, and parrots. Many folklore stories spin around Balochistan bear (locally known as *Mum*). One story says that bears were actually human beings (because they can walk on two legs and because of the shape of their footprints). However, due to their sins, god got annoyed with them and converted them into an animal to punish them. Another story says that the male bear will abduct ladies, so the ladies must avoid going alone into forests. It further says that in the past, a lady was taken by a bear. After a few days, when her relative reached the cave, she refused to accompany him back home. She loved the black bear, and wanted to stay with him.

The trophies of ungulates are used extensively by villagers, especially in KPK and Balochistan Provinces to decorate their homes. Hunters and the well-to-do also decorate their drawing rooms with trophies and take pride in these. Black bear and monkey are abused to allure kids for alms and the former is also involved in bear baiting. Game species are important for customary and traditional hunting by communities.

Among the TES of particular economic importance are those exploited for domestic and international trade (see Annex I for the species listed in the Appendices of CITES). These include live specimens as well as their trophies, parts, and products. The species include raptors e.g., saker falcon, peregrine falcon, and houbara bustard, fur bearers, and pets (as mentioned above), musk from musk deer, wild animals of miscellaneous species for sale to zoos and similar facilities, and other fascinating and game species that attract eco-tourists and hunters.

One kind of TES of particular environmental importance is endemic species, which are found in a limited range in Pakistan. These include species of wild goats (e.g., markhor) and wild sheep (e.g., Punjab urial), Indus dolphin, a large number of species of reptiles found in the Ghaghai desert, and more than 400 species of wild plants.

3.3.1 Status of habitat conservation for TES

The 118/119 Team's assessment from interviews, documents, and knowledge of the local situation finds that habitat conservation in Pakistan is inadequate. Although habitats of most of the TES in Pakistan stand designated as Protected Areas (PA) under the wildlife laws of the provinces/Islamabad Capital Territory (ICT), GB, and AJK, only a limited number of PAs actually have and are implementing management plans. The majority of PAs, especially the wildlife sanctuaries and game reserves are "paper PAs"—they exist on paper only, and have little or no management and protection on the ground. Even most of the National Parks (a misnomer since they are designated and managed by the provinces or territories) are yet to be managed scientifically (This is discussed further in Section 4.)

3.3.2 Main pressures on TES and their habitats

The 118/119 Team identified the main pressures on TES and their habitats as follows:

- Over exploitation of game birds and mammals mainly due to illegal hunting by influential persons, trapping for live specimens, and killing for trophy and by the poor for livelihood purposes.
- Indiscriminate use of pesticides and herbicides, especially in the cotton, sugarcane, rice, and tobacco growing areas in the country, mainly impacting on the populations of gray and black partridges, raptors, and waterfowl.

- Rapid increase in human and livestock populations putting pressure on species and habitats through unsustainable use.
- Change in land use (mainly of forests, rangelands, and drainage of wetlands) at large scale for expansion of cultivation, settlements, and communications infrastructure for the rapidly growing human population.
- Deforestation and degradation of forests.
- Changes in intensity and pattern of river flooding due to construction of dams and barrages on the rivers, exacerbated by climate change, resulting in the decline in distribution, growth, and health of mangroves (one of the hotspots of biodiversity in the country) and riverine forests, especially those occurring along the banks of the Indus River in Sindh. This is affecting the populations of waterfowl and fish fauna in mangroves; and hog deer, jungle cat, black partridge and gray partridge and other associated species in riverine forests.
- Back flow of saline sea water into the Indus River up to about 70 km has changed the ecology of the Indus Delta, and is affecting TES that rely on the delta, mainly waterfowl and fish.

Fortunately killing of furbearers (snow leopard, leopard, brown and black bears, grey wolf, foxes, Indian jackal, woolly flying squirrels and otters); and trapping of live animals especially ungulates and houbara bustard for export has declined drastically due to reasonably sound implementation of CITES.

3.3.3 Potential impacts of expected climate change on TES

The Task Force on Climate Change (GOP, 2010) and Draft National Climate Change Policy, 2011 identified potential impacts of expected climate change on TES as:

- Enhanced glacial melting is likely to negatively affect snow leopard, brown bear, and local markhor populations in KPK Province, GB, and AJK.
- High altitude alpine lakes in GB and KPK will experience warming, thereby, affecting fauna that has adapted to cold lake conditions.
- Higher temperatures along with drought and other threats are currently impacting on the endangered Balochistan black bear.
- With abnormally long cycles of drought, dry land dwelling species especially in Balochistan, Sindh, Southern KPK, and Southern Punjab have suffered more than any species.
- Hilsa fish migration from the sea to the Indus River for breeding does not take place during drought years when the river bed remains dry; droughts are expected to become more frequent and persistent under most climate change models.
- The long spells and intensive monsoon rains in 2010 and 2011 caused heavy floods that affected the reptile and aquatic fauna.
- Sea level rise increased sea erosion of mangroves along the Sindh Coast and Balochistan Coast.

3.3.4 Efforts to mitigate pressures and their impacts

The efforts made to mitigate pressures include:

- Updated and improved drafts of wildlife laws of Balochistan, Sindh, and KPK Provinces, GB and AJK, but they have yet to be enacted;
- Progress in developing management plans of some PAs;
- Interest in wetlands conservation has increased--wetlands related surveys and applied research for management has increased;
- Community participation in management of game species to increase their populations and promote sustainable use; and establishment and management of networks of Community Managed Game Areas, especially in KPK and GB, also in areas in Balochistan, Sindh, and Punjab Provinces for this purpose;
- Establishment and management of a wide network of more than 60 Private Game Reserves in KPK;
- The Federal Government completed decentralization of the remaining biodiversity and forestry related functions (the subjects of Forestry and Wildlife were already within the domain of the provinces) to the provinces on 30 June 2011 according to the provisions of the 18th Amendment of the Constitution of Pakistan;
- The federal and provincial governments continue to encourage NGOs to contribute to biodiversity conservation—the GOP implements projects in partnership with NGOs;

According to *Best NRM Practices* by IUCN (2003), and with which the 118/119 Team concurs, islands and models of success have appeared and been established in the country due to these efforts. But these must be scaled up, replicated, and institutionalized to halt and reverse the loss of biodiversity.

SECTION 4: Protected Areas and their Status

The World Commission on Protected Areas (WCPA) defines a PA as “An area of land and/or sea especially dedicated to the protection and maintenance of biological diversity and of natural and associated cultural resources, and managed through legal or other effective means.”

Another less concise global description of PAs is: “National Parks and Nature Reserves of all types are basically areas selected by governments or private organizations for special protection against damage or degradation. They are chosen for their outstanding natural beauty, as areas of scientific interest, or as forming part of a country's cultural heritage, and also to provide facilities for public recreation.”

The establishment and management of PAs with associated conservation, sustainable use, and restoration initiatives in the adjacent land and/or seascape are central to Article 8 on “In-situ Conservation” of the CBD.

PAs are, thus, managed for a variety of reasons that include scientific research, wilderness protection, preservation of species and genetic diversity, maintenance of environmental services, protection of specific natural and cultural features, tourism and recreation, education, sustainable use of resources from natural ecosystems, and the maintenance of cultural and traditional attributes. PAs and protected forests, in particular, and other plant biodiversity rich areas in Pakistan absorb, conserve, purify, and regulate water and conserve soils, especially in the northern watersheds of Pakistan; sequester carbon; and conserve medicinal and economic plants (MEP) and animal biodiversity.

4.1 Categories of Protected Areas

The IUCN recognizes the following categories and sub-categories of PAs. Pakistan’s PAs were created in line with the IUCN system; however, Pakistan has not kept up with more recent revisions to the IUCN categories.

Table 4: IUCN Categories

I:	Nature Reserve
I(a):	Strict nature reserve/wilderness protection area
I(b):	Wilderness area
II:	National Park
III:	Natural monument
IV:	Habitat/Species management area
V:	Protected landscape/seascape
VI:	Managed resource protected area

4.1.1 History of protected areas in Pakistan

Before the enactment of the 18th constitutional amendment in 2010, and the devolution of the Ministry of Environment on 30 June 2011, environmental protection and preservation of ecological systems were included in the concurrent legislation list of Pakistan’s 1973 Constitution. This initiative, together with the formation of an Environment and Urban Affairs Division in 1973, was largely responsible for the promulgation of the Environmental Protection Ordinance of 1983, and the enactment of the Pakistan Environmental Protection Act, 1997, which affords protection to all forms of life and provides for the control of pollution, including the misuse of fertilizers and pesticides.

Modern PA legislation was enacted at the provincial and territorial level through a variety of Acts and Ordinances ranging from the Sindh Wildlife Protection Ordinance in 1972 to the Islamabad (Protection, Preservation, Conservation and Management) Ordinance in 1979. This body of legislation marks the first occasion where a provision was made to protect species and habitats other than those of so-called “game.” The statutes, seven in total (see Table 5), provide for the creation and management of National Parks, Wildlife Sanctuaries, and Game Reserves.

In accordance with Pakistan’s constitution, the Federal Government has delegated the responsibility for the conservation of wildlife at a regional level to the provincial governments and the governments of those territories which are under its control. As a result of this, overall jurisdiction for PAs in Pakistan is, today, vested with the provincial and territorial authorities.

Table 5: Acts and Ordinances of Provincial and Territorial Governments of Pakistan

Sr. #	Province or Territory	Act/Ordinance	Acronym	Proclamation Dates	
				Original	Revision
1	Azad Jammu and Kashmir	Azad Jammu and Kashmir Wildlife Act	AJKWA	1975	--
2		The Wildlife (Protection, Preservation, Conservation and Management) Act	BWA	1974.....	--
3	Islamabad	Islamabad Wildlife (Protection, Preservation, Conservation and Management) Ordinance	IWO	1979.....	--
4	Northern Areas	Northern Areas Wildlife Preservation Act	NAWPA	1975.....	--
5	KP	The KP Wildlife (Protection, Preservation, Conservation and Management) Act	KPPWA	1975.....	--
6	Punjab	The Punjab Wildlife (Protection, Preservation, Conservation and Management Act	PWA	1975.....	1991
7	Sindh	The Sindh Wildlife Protection ordinance	SWO	1972.....	1996

Source: NCCW, Ministry of Science and Technology

At present there are about 305 PAs (Figure 4 and Annex H) throughout Pakistan, which have been documented through recent joint efforts by the GOP and World Wildlife Fund (WWF)-Pakistan (see Table 6 for a summary of these PAs); they cover approximately 12% of the total area of Pakistan.

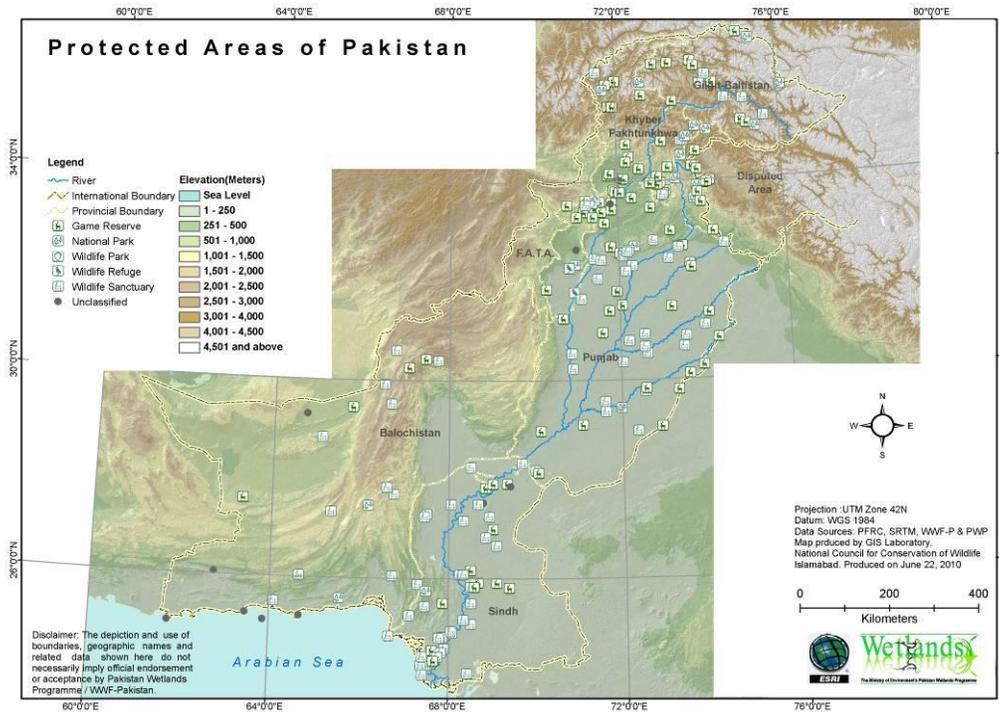


Figure Four: Protected Areas of Pakistan

Although extensive, only a fraction of this network is adequately protected (as mentioned above, most are “paper parks”). Game Reserves, in particular, which are often situated on private property, receive minimal protection due to the lack of legal provisions to control land use. Wildlife Sanctuaries enjoy better protection but, in practice, legal restrictions, other than to prevent hunting, are seldom enforced. Most sanctuaries have been designated in Reserve Forests of commercial value where timber and minor forest products are harvested. Enforcement is better in National Parks. It is evident from Pakistan’s history that PAs have been created somewhat haphazardly in the country, often in the absence of any adequate criteria for their selection, and boundaries have frequently been drawn with little or no ecological understanding.

Table 6: Protected Areas in Pakistan

Classification	Number	Area in hectares and % of total protected areas	
		Hectares	%
National Parks	26	3,140,179	30.5
Wildlife Sanctuaries	104	2,100,548	20.5
Game Reserves	175	5,036,162	49
Totals	305	10,276,889	100

Source: Pakistan Wetland Project (August 2011)

4.2 National Parks

Pakistan's legislation states that, with a view to the protection and preservation of scenery, flora, and fauna in the natural estate, Government may, by notification in the official Gazette, declare any area, which is the property of Government, or over which Government has proprietary rights to be a National Park and may demarcate it in such manner as may be prescribed. A National Park shall be accessible to the public for recreation, and education and research subject to such restrictions as Government may impose. Provision for access roads and construction of rest houses, hostels, and other buildings in National Parks along with amenities for the public may be made and the forest therein shall be managed and forest produce obtained so as not to impair the objective of the establishment of the National Park.

4.3 Wildlife Sanctuaries

A Wildlife Sanctuary is set aside as an undisturbed breeding ground for the protection of wildlife and access to the public shall, except in accordance with rules, be prohibited and no exploitation of the forest therein shall be allowed except for reducing fire hazards, epidemics, or insect attacks, or other natural calamities. Basic data about natural resources, including wildlife, is lacking for most of the 104 sanctuaries. Management plans need to be developed so that they will be managed scientifically. Under the existing wildlife legislation, the wildlife sanctuary category of PA provides the strictest form of protection.

4.4 Game Reserves

In a Game Reserve, hunting and shooting of wild animals is not allowed, except under a special permit, which may specify the maximum number of animals or birds that may be killed or captured and the area and duration for which such permits shall be valid. Game reserves have been established in different ecological zones of the country for the protection and preservation of wildlife species. Resource inventories and research studies on biological/ecological aspects of wildlife species are needed in most of these areas to develop strategies for their better management, including sustainable utilization plans for wildlife.

4.5 Private Reserves

Where Government is satisfied that an area of private land has been dedicated by its owner for the purposes similar to a Game Reserve, it may, by notification in the official Gazette, and on the application of the owner of the area, declare such area to be a Private Reserve. Hunting and shooting of wild animals by any person other than the owner of the area shall not be allowed in a Private Reserve except with the permission of the owner. The owner shall exercise the same powers in the Game Reserves as exercised by an officer under the Wildlife Act. Under the existing legislation, Private Game Reserves may be established in Punjab, KP, AJK, and the Federal territory. As yet, Private Game Reserves have only been established in KP and Punjab.

4.6 Community Controlled Game Reserve

Controlled hunting areas are conservation areas managed jointly by the relevant Government and concerned communities for the conservation of flora and fauna. These must be approved by the relevant government departments in provinces/territories. Trophy/game hunting is managed in these areas by the communities through hunting permits. The proceeds of hunts go to the joint account of the community organizations and funds are spent on communal development activities. A small portion of hunting fees are also paid to the government.

SECTION 5: POLICY AND INSTITUTIONAL FRAMEWORK FOR NATURAL RESOURCES MANAGEMENT

Environmental protection remained on the Federal agenda until its devolution to the provinces on 30 June 2011². A dedicated Federal Ministry of Environment provided the institutional framework for national policies, laws, and international cooperation. As of June 2011, the Ministry of Environment at the Federal Level was abolished. The provincial governments, serving as the actual custodians of natural resources, were primarily responsible for the implementation of policy and laws in their respective jurisdictions. However, they were also responsible for making policy and laws to cover certain areas of natural resources. This 2011 devolution gave provincial governments full responsibility over policy formulation and legislation enactment and implementation. Ministry of Environment staff members have been distributed amongst various Federal and Provincial Ministries. However, the situation remains fluid, and it is still unclear where many institutions and staff that belonged to the MOE will be placed.³

5.1 Policies and Legislation

Pakistan enacted the **Pakistan Environment Protection Act** in 1997, which replaced the **Pakistan Environment Protection Ordinance (PEPO)** of 1983. The 1983 ordinance establishes the Pakistan Environment Protection Council (PEPC) and Pakistan Environment Protection Agency (PEPA). In 1997 PEPA focused on the enforcement of National Environment Quality Standards, Initial Environment Examination (IEE), and Environment Impact Assessment (EIA). The institution delegated powers to national and provincial environmental protection agencies for making rules and regulations, establishing environmental tribunals, reconstituting the PEPC; and the establishment of Environmental Protection Agencies in all the four provinces.

The **Pakistan National Conservation Strategy (NCS)** of 1992 was the sole environmental policy document and tool until 2005, when the first ever **Pakistan Environment Policy** was approved. While the NCS focused on 14 core areas for conservation, the 2005 Environment Policy provided a comprehensive overview of sustainable development based on the three major pillars of social and economic development alongside environmental conservation. In early 2000, the National Environment Action Plan (NEAP) was conceived and implemented in four priority areas: provision of clean air, clean water, solid waste management, and ecosystem management. The NEAP was funded by the United Nations Development Programme (UNDP), but despite significant funding, it failed to have a tangible impact.

² The FAA 118/119 Team discussed the issue of devolution and capacity, and made a decision to avoid assumptions at this early stage; our impression is that it is premature for an accurate assessment and there are currently too many political sensitivities.

³ On 27 October 2011 (as the FAA 118/119 Team was completing this report), the Prime Minister announced the creation of four new federal ministries to absorb leftover departments at the federal level after the devolution of 18 federal ministries to the provinces under the 18th amendment. The PEPC and the PEPA have now been placed in the newly created Ministry of Disaster Management as have been activities involving implementation of environmental agreements with other countries, international agencies, and forums. Among the departments that now come under the Ministry of National Food Security and Research Division are the Pakistan Agricultural Research Council and other federal agriculture research organizations, plant protection-pesticides import and standardization, Pakistan Dairy Development Company, Livestock and Dairy Development Board, and the Fisheries Development Board.

Although no single policy and law specifically focuses on natural resources management, the PEPA-1997 and provincial forestry, wildlife, and fisheries acts partially cover natural resource components. Pakistan prepared a draft Climate Change Policy that still requires approval. This policy is the first step in developing the legal framework for climate change mitigation and adaptation in Pakistan.

5.1.1 Pakistan's Legal Framework: Analysis

The PEPO 1983 helped to provide the legal grounds for the establishment of basic institutions, such as the PEPC and PEPA; however, the actual institutional arrangement was visible only after the promulgation of PEPA-1997. NCS played an important role in serving as an initial policy tool and was replicated in other developing countries. A review revealed that although it created a great deal of awareness about environmental conservation, it failed to achieve its overall objective of conservation in the 14 core areas. The Environment Policy 2005, on the other hand, were never implemented.

EIA, an important provision of PEPA, 1997, is considered mandatory for mega-projects, though most EIAs are prepared to get through the “hurdle” - EIA is not taken seriously by government or project proponents. Nonetheless, EPA staff, despite low capacity, are now trained to monitor EIA and other environmental regulations. Environmental Tribunals (see below) have been established in almost all the provinces for hearing environment related cases. This is a welcome sign and may prove useful in the years to come.

Provincial governments are the real custodian of forest estates and rangelands, though agricultural land mostly belongs to private individuals. Weak governance and complex legal/institutional arrangements have facilitated deforestation and encroachment of forests and rangelands. Forest governance structures are poorly set up to address the threats to forest and rangeland.

Legal and policy aspects of water resources are dealt with by the Ministry of Water and Power; however, sanitation issues were covered by the Ministry of Environment. The Ministry of Environment prepared the Sanitation Policy 2006 aimed at ensuring provision of safe water to citizens, but implementation rests with provincial government and municipalities in Pakistan, and they have been largely ineffective. Per capita water availability has greatly decreased the past thirty years. In addition, the quality of fresh water resources has been deteriorating due to the disposal of untreated chemical, solid, and sewage wastes in water courses. Poor governance and lack of capacity at municipal levels in general, and those of the mega-cities in particular, hampers implementation of sanitation laws and policies. Consequently, Pakistan will not be able to achieve the Millennium Development Goals (MDGs) targets of provision of safe water to the citizens by 2015.

5.1.2 Devolution of environmental authority

With the devolution of Environment to the provinces, the Federal Government has lost control over policy and legislation for environment, biodiversity, and forests. Forest and biodiversity resources are now administered by the provincial forest and wildlife departments. There are provincial acts and laws but these regulations deal primarily with exploitation of forests, fisheries, game animals and birds and have no provision for conservation of non-game species and protection of threatened and endangered plant species. Moreover, they are largely ineffective mainly due to social, economic, and political factors. The principles of sustainable use, incentive measures, and participatory management of natural resources are not included in these laws, except in the recently amended forest act in KPK. There are no provisions for community involvement in conservation of species and management of PAs. Yet, the key to protecting biodiversity in Pakistan lies in the hands of local communities and without winning their support it will be difficult to promote conservation and sustainable use of biodiversity.

Given that many environmental issues are cross-sectoral, there is a need to ensure coordination among the sectors involved. Pakistan has evolved a dual mechanism to achieve this coordination (see below, environmental mainstreaming section for one mechanism). Before devolution of the subject of environment, a high-powered supreme authority, the PEPC, was responsible for approving environmental policy across sectors. Though the PEPC has been retained and placed under the Ministry of Provincial Coordination at Federal level, its responsibilities are no longer clear under the new devolved situation. The PEPC is chaired by the Prime Minister, and consists of the provincial Chief Ministers, relevant Federal ministers and provincial ministers of environment, as well as civil society and private sector representatives. The stature of the PEPC has given significant weight to its decisions, particularly among government agencies. While the PEPC has been successful in adopting environmental policies, such as the NCS, NEAP, and NEP, it has not yet addressed the need to mainstream environmental concerns into the activities of other sectors. In the new devolved scenario and given the importance of environmental mainstreaming for sustainable growth, it would be extremely valuable to establish PEPC's authority in this regard.

5.1.3 Environmental mainstreaming

In addition to PEPC's potential role in environmental mainstreaming, the other key mechanism designed to ensure inter-sectoral coordination for environmental management rests with the Planning Commission. The Planning Commission has established an Environment Section in the Planning and Development Division to address environmental concerns at the policy, planning, project conceptualization, and approval stage of public sector projects, and so may be considered a force for environmental "upstreaming". Provincial planning departments have established corresponding environment sections for environmental screening of project proposals within their jurisdictions. While the establishment of these sections is significant, they lack the capacity and resources to conduct detailed environmental reviews and to engage other ministries in the screening process.

5.1.4 Environment and the Judiciary

When regulatory avenues for environmental enforcement fail, the judicial system is often the only other recourse for resolving environmental problems or disputes. The judiciary can succeed in enforcing policies and reconciling conflicts with powers that the executive branch agencies simply lack. In Pakistan, the judiciary has played an increasingly important role in the enforcement of environmental laws, and should continue to be strengthened through continued support for both judges and advocates. However, intervention by the judiciary can be costly and should be pursued only as a last resort when other administrative remedies are exhausted.

The Supreme Court of Pakistan has considered several cases regarding environmental degradation and protection of the environment. In the landmark case of *Shehla Zia versus WAPDA*, the Supreme Court ruled that "while life is not defined in the Constitution, it does not mean nor can be restricted to only vegetative or animal life or mere existence from conception to death; life includes all such amenities and facilities for which a person born in a free country is entitled to enjoy legally and constitutionally." The Court concluded that the right to a clean environment is a fundamental right of all citizens of Pakistan covered by the right to life and right to dignity under Articles 9 and 14 of the Constitution.

The Supreme Court has also taken an activist role in environmental policy making. In response to a letter from the Karachi Administration Women's Welfare Society, the Court appointed a Commission to look into complaints regarding health hazards in the use of open stormwater drains for the disposal of sewerage and the contamination of water resulting from damaged water and sewage pipes. The Court subsequently directed the implementation of remedial measures including the repair of water and sewage pipes. The High Courts in

the provinces have also intervened and rendered significant policy decisions affecting future environmental management.

5.1.5 Environmental Tribunals

Section 20 of the PEPA 1997 (The act still exists; it was not abolished under the 18th Amendment) authorizes the Federal government to establish as many Environmental Tribunals as it considers necessary and specify the territorial limits or class of cases under which each of them shall exercise jurisdiction. Three Environmental Tribunals have been established - one in Karachi with jurisdiction over the provinces of Sindh and Balochistan, one in Lahore with jurisdiction over the province of Punjab and one in Peshawar with jurisdiction over the province of KPK. Similar to the Supreme Court and Provincial High Court, the Environmental Tribunals are playing an important role in setting and enforcing environmental policy.

Given the increasing role that Environmental Tribunals and Courts will play in the future, they must have an understanding of scientific principles and their application to environmental laws, including the concept of environmental risk and indirect impacts, and linkages between causation and harm. Investment is needed to strengthen the institutional capacity of the Judiciary and Environmental Tribunals.

By establishing a constitutional right to a clean environment and demonstrating a willingness to address matters of environmental policy, the Courts have empowered citizens with legal standing to enforce environmental laws through administrative and judicial proceedings. While this right has been established by the Courts, there are no citizen suit provisions in the enabling environmental statutes. Existing and future laws should explicitly provide for citizen enforcement since public interest advocacy is a powerful force for improvements in environmental management.

5.2 Key Institutions Involved in Biodiversity and Tropical Forest Conservation

5.2.1 Public sector institutions in Pakistan

The public sector institutions in Pakistan with direct and indirect responsibility for conservation and regulating uses of biodiversity are discussed below.

5.2.1.2 Forest & Wildlife Departments in Provinces

Forest & Wildlife Departments in the provinces are headed by a Chief Conservator of Forests, who is mandated to manage government forests, national parks, other PAs, wildlife, and wetland resources of the region. The Department is also responsible for promoting farm forestry, soil conservation, watershed management, and community-based conservation. In Punjab a separate Directorate General has been created for the management of wildlife, while in KP a separate department for wildlife management has been formed. Under the Constitution of Pakistan, forestry is a provincial subject implying that state forestlands belong to provinces and management of forests is in hands of provincial forest departments. Four provinces (Punjab, NWFP, Sindh, and Balochistan) and two territories (AJK and Northern Areas) have forest departments. The immediate field officers are “Divisional Forest Officers (DFO), responsible for regular supervision of field operations, inspections for damage control, fire prevention and control, forest law enforcement, budgeting, accounts and audits. DFOs keep updated information on the status of forests under their control. This information is usually available in the form of forest boundary records, and stock maps. DFOs are required to check boundary integrity for encroachments and to update stock maps. Each DFO is assisted by four to six Range Officers, who are mainly patrolling officers and are

responsible for actual implementation of field operations according to approved management plans and available budgets and apprehension of offenders.

5.2.1.3 Federal and Provincial Planning and Development Departments

In collaboration with the line departments, the Planning and Development Departments in provinces and at Federal level are responsible for preparation of annual and perspective plans for development in Pakistan. All natural resource conservation projects are evaluated and approved by these departments. They also recommend allocation and distribution of funds to various line departments for conservation and development activities. The departments are also responsible for monitoring and implementation of field projects and ensuring sustainability of conservation initiatives.

5.2.1.4 Agriculture Department of Provinces

These departments are responsible for maintaining crop biodiversity in Pakistan and for promoting in-situ and ex-situ conservation of local varieties of crops and fruit trees. Their mandate is to provide extension services to farmers for the development of agriculture and horticulture including provision of seed and fruit plants to farmers. The departments maintain many fruit nurseries across their jurisdictions.

5.2.1.5 Livestock Departments

Livestock Departments are responsible for maintaining livestock diversity, controlling diseases, and providing veterinary services to farmers.

5.2.1.6 Fisheries Departments

Fisheries departments are responsible for managing fisheries resources in the sea, rivers, streams, and lakes of Pakistan. They also have the mandate to promote aquaculture and regulate fishing. The departments maintain a number of fish farms and hatcheries, and provide fingerlings to farmers, and they can play a key role in maintaining fish biodiversity in Pakistan.

5.2.1.7 Pakistan Environmental Protection Agency

The PEPA at Federal and Provincial level is responsible for implementing the PEPA, 1997 in the country. The PEPA also provides technical assistance to the Capital Administration and Development Division.

5.2.1.8 The Pakistan Forest Institute (PFI)

PFI was an attached department to the devolved Ministry of Environment. Under the new arrangement after the promulgation of the 18th Amendment, PFI has been devolved to the Provincial Government of KPK wherein it has been placed under the Environment Department Government of KPK. PFI's mandate is the improvement of the environment and conservation of natural resources of the country by conducting research on various environmental issues and providing training in the specialized fields of forestry and allied disciplines. Objectives of PFI are:

- Conduct research and provide training for conservation and efficient management of natural resources for sustainable development of the forestry sector in the country.
- Collect and disseminate information relating to forests, rangelands, watersheds, and forest product utilization to foresters, environmentalists, NGOs, defense personnel, and farmers.
- Coordinate activities within Pakistan relating to research and development of forests and wood-based industries.

- Advise Provincial, Regional Forest Departments, research organizations, and wood-based industries, farmers, and NGOs on seed collection, nursery raising, planting techniques, wood production, wood seasoning, and wood utilization timber identification and testing.

5.2.1.9 The Pakistan Agricultural Research Council (PARC)

PARC was established in 1981 as an autonomous apex body with the statutory functions of:

- Undertake, aid, promote and coordinate agricultural research
- Expedite utilization of research results
- Establish research establishments
- Train high-level scientific staff
- Generate, acquire, and disseminate agricultural information

5.2.1.10 The National Agricultural Research Center (NARC)

NARC is one of the many attached research centers of PARC; it is the largest agricultural research hub in the country with a wide spectrum of disciplines and levels of research. NARC includes the following institutes and programs:

- Animal Sciences Institute Crop Sciences Institute
- Farm Machinery Institute Horticultural Research Institute
- Rangeland Research Programme Institute of Plant & Environmental Protection
- Institute of Agri, Biotechnology & Genetic Resources Institute of Natural Resources & Environmental Sciences
- Social Sciences Institute Training Institute
- Technology Transfer Institute Water Resources Research Institute
- Scientific Information Farm Operation and Services

5.2.1.11 The Water Resources Research Institute (WRI)

WRI was established in 1991 and is involved in problem-oriented, strategic, operational and inter-disciplinary research in areas of national importance. Main research programs of WRI include:

- Irrigation Water Management
- Water Harvesting and Conservation
- Resource Use Planning
- Management of Hill-torrent Water in Rod-Kohi Areas

5.2.2 Other institutions involved in biodiversity and tropical forest management

Besides universities and their role in biodiversity-related education and Agricultural Research Stations (artificial propagation of medicinal plants and maintaining crop genetic varieties), other main institutions are discussed below.

5.2.2.2 NGOs

Several NGOs are active in promoting conservation and sustainable development in Pakistan, including the Aga Khan Rural Support Programme (AKRSP), the World Conservation Union (IUCN), WWF-Pakistan,

Intercooperation, Sungi Development Foundation, Lead Pakistan, the Himalayan Wildlife Foundation (HWF), and Wildlife Conservation Society (WCS). IUCN, WWF, and WCS have played significant roles in introducing conservation of biodiversity with involvement of local communities and they have been active in building capacity of government agencies and rural communities in conservation and sustainable use of biodiversity (However, the concept of community participation in conservation efforts is yet to be incorporated in the existing legislations.) In addition, there are some local NGOs, community-based organizations (CBOs), and Welfare Committees, which have been active in conserving wildlife, fisheries, and forest resources. These initiatives have had varying degrees of success in terms of gaining the support of local communities and maintaining biodiversity. Some of the prominent initiatives/projects are included in Annex J.

Environmental NGOs and CBOs are frequently called on to fill gaps that the GOP is unwilling or unable to fill. For example, the Human Rights Commission of Pakistan has highlighted the deteriorated state of Pakistan's environment, noting that environmental laws have not been implemented and that the Government is turning a blind eye to many issues, such as:

- Water and air pollution problems have not been tackled and trees continue to be cut down by the hundreds, especially for development purposes in urban centers. Around 8,000 trees were uprooted in 2007 for the construction of housing schemes and underpasses in Lahore alone.
- Toxic industrial emissions into the air and water create hazardous conditions for people. Vehicles are responsible for 45% of the environmental pollution. Safe drinking water is still unavailable to a majority of the citizens. As much as 99% of industrial effluent and 92% of urban wastewater is discharged untreated into rivers and the sea. This industrial pollution is not only having an effect on the human population, but also on fish and wildlife.

Several environmental NGOs and CBOs are working on these issues, including violations of air quality standards, biodiversity conservation, and water contamination. Many specialize in facilitating dialog and interactions among local people, government agencies, and the judiciary on issues and concerns that require joint action and participation. Some of the NGOs that are most successful in these areas are AKRSP, IUCN, WWF-Pakistan, Intercooperation, Sungi Development Foundation, Lead Pakistan, HWF, and WCS.

As demonstrated by the overwhelming response to the 2005 earthquake, civil society organizations (CSOs) are active all over Pakistan. Most are local, informal, and unregistered, but more than 50,000 NGOs are registered under different legislative acts. Most NGOs are welfare organizations, while a minority is oriented around the concept of participatory development focusing on education, health, social welfare, human rights, gender, and democracy. A few have explicit missions, such as environmentally sustainable development or rights-based advocacy. The number of apex environmental NGOs in Pakistan under different sub-sectors are shown in Table 7.

Table 7: Apex Environmental NGOs in Pakistan and Areas of Focus

Environmental Sub-sectors and Issues	No. of NGOs
Sustainable forestry	8
Water supply and management	7
Energy efficiency and renewable energy	6
Environmental education	5

Biodiversity and wildlife conservation	4
Sustainable agriculture, marine and coastal resources, fisheries, climate change and ozone depletion, urban environment and development, and environmental impact controls	3
Waste management and adaptation to climate change	2
Air quality and pollution, chemicals management, rangeland management, and desertification	1
Biosafety and quarantine, and noise management	0

Source: ADB 2008: Pakistan Country Environment Analysis

Apart from their own NGO activities, a substantial number of CBOs have partnered with donor-funded environmental projects, created community-level awareness of environmental issues, and implemented successful pilot projects in forestry, biodiversity, sustainable land management, solid waste management, agriculture, irrigation, small physical infrastructure development, and other related sectors.

Constraints of NGOs

NGOs must deal with a number of impediments to the implementation of their programs. One of the main constraints is getting their concerns across to government departments. Because they are often unfamiliar with official procedures, NGOs often find it difficult to coordinate with their public sector counterparts. Other main constraints are:

- Lack of financial support
- Lack of clarity on requirements to get the job done and on NGO versus Government responsibilities
- Few biodiversity/forestry-related activities, primarily due to limited funding for such activities
- Lack of a mechanism for coordination and cooperation with their counterparts in the Government sector
- Inability to generate a common training/awareness program
- Lack of technical expertise and lack of access to data
- Inability to develop programs in conjunction with industries; this is largely related to the lack of technical expertise of NGOs
- Inadequate coordination and cooperation among organizations (public and private sector); overall, there is a lack of information sharing among project implementers
- External technical expertise is not tapped
- Lack of follow-up and monitoring of interventions
- Lack of infrastructure (e.g. monitoring equipment, software, hardware)

5.2.2.3 Bi-lateral and Multi-lateral Donors: Environmental Assistance

Annex J includes a list and details of donor-funded projects; some of the major projects are outlined below (adapted from ADB 2008: Pakistan Country Environment Analysis):

The World Bank has provided support to natural resources management, irrigation and drainage, and biodiversity conservation projects in Pakistan, and achieved a range of results. The Natural Resources Management Project in AJK is generally assessed as having been successful, while drainage projects in Sindh have been controversial because of misalignments, mismanagement, and poor practices in general.

During the recent floods, this drainage project aggravated the situation rather than mitigating it. The World Bank continues to support the Pakistan Poverty Alleviation Fund, through which partner organizations extend microcredit to the poor, especially women. The program incorporates an environmental impact monitoring component.

The EU has provided support to environmental protection and biodiversity conservation projects in KP and Punjab. Significant project components have included capacity building for sustainable resource management and improving the livelihoods of local communities. In addition, the EU has provided assistance for a fisheries project and a number of rural WS & S projects.

The United Nations Development Programme (UNDP) and Global Environmental Facility (GEF) operate a capacity building program with the crosscutting aim of providing sustainable livelihoods. It has supported the formulation of Pakistan's NEAP, the implementation of six community forestry projects, and a biosaline project in salinity-affected and water-logged areas. UNDP's environmental programs and those of its agencies are being harmonized under the vision of "Delivering One UN."

Among Pakistan's bilateral donors, Canada has supported environmental policy development (national, provincial, and district conservation strategies) and provided assistance to strengthen the capacity of (i) non-government agencies such as IUCN in Pakistan and Sustainable Development Policy Institute (SDPI), and (ii) government agencies such as the devolved Ministry of Environment, and the environment section of the Planning and Development Division.

Japan has provided support through projects dealing with irrigation network rehabilitation, watershed management, vehicle emissions control, and urban air quality monitoring. Currently, it provides assistance to the clean air and clean water programs being implemented by the Pakistan Environmental Protection Agency.

The Netherlands has supported social forestry, community-based urban sanitation, and "cleaner production" programs for industries. The latter has catalyzed investment in cleaner production and effluent treatment by conducting environmental audits and demonstrating ways in which to improve eco-efficiency and reduce effluent discharge (thereby cutting down the size and cost of effluent treatment plants). Sixteen industry sectors—including leather, textiles, paper, and sugar—have benefitted from these programs.

Community-based natural resources management (CBNRM) projects have been the most successful projects since they are implemented in collaboration with local communities. AKRSP's Social Forestry Project in Northern Pakistan was a pilot project that proved very successful. Malakand Social Forestry project funded by the Netherlands Government and Siran Social Forestry Project funded by GTZ are other examples of successful forestry projects. These projects proved to be revolutionary for local livelihood and for conserving natural resources. Similarly Mountain Areas Conservancy Project (MACP) of IUCN in GB and KP was instrumental in introducing CBNRM and biodiversity conservation. One result of this project is a trophy hunting program which is now practiced in other areas of Pakistan. In trophy hunting 80% of the share goes to the concerned community. There are many other examples of CBNRM like Torghar Conservation Society, BASDO, Hashar, etc. However, not all CBNRM projects were successful. Some of the unsuccessful projects include the EU-funded Environmental Rehabilitation Project in NWFP and Punjab (1997 to 2003) and the GTZ-funded Kaghan Intensive Forest Management Project. Although these were intended to be participatory, in reality they used a top-down approach and rather than involving local communities, only the Government was involved.

5.3 International Treaties Ratified by Pakistan

The following are the main Multilateral Environment Agreement (MEAs) ratified by the GOP:

1. Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) Pakistan Ratified: 1976
2. Ramsar Convention on Wetlands. Pakistan Ratified: 1976
3. Convention on the Conservation of Migratory Species of Wild Animals (CMS). Pakistan Ratified: 1987
4. Vienna Convention on protection of ozone layer; and
5. Montreal Protocol on ozone layer depleting substances. Pakistan Ratified: 1992
6. UN Convention on Biological Diversity (UNCBD). Pakistan Ratified: 1994.
Nagoya Protocol on Access and Benefit Sharing (ABS) under the convention on Biological Diversity (UNCBD).
7. Basel Convention on the Control of Trans-boundary Movements of Hazardous Wastes and their Disposal. Pakistan Ratified: 1994
8. UN Convention to Combat Desertification (UNCCD). Pakistan Ratified: 1997
9. United Nations Convention Law of Seas (UNCLOS). Pakistan Ratified: 1997
10. Kyoto Protocol to United Nation Framework Convention on Climate Change (UNFCCC). Pakistan Ratified: 2005
11. Rotterdam Convention on the Prior Informed Consent (PIC) Procedure for Certain Hazardous Chemicals and Pesticides in International Trade. Pakistan Ratified: 2005
12. Stockholm Convention on Persistent Organic Pollutants (POPs). Pakistan Ratified: 2008
13. Cartagena Protocol on Bio-Safety (CPB). Pakistan Ratified: 2009
14. United Nations Framework Convention on Climate Change (UNFCCC). Pakistan Ratified: 1994

Pakistan is party to the UNFCCC and Kyoto Protocol and is thus eligible as a developing country for the Clean Development Mechanism, Adaptation Fund, and the Reducing Emissions from Deforestation and Forest Degradation (REDD) funding facility. Pakistan has great potential under REDD to decrease deforestation and enhance carbon stocks in existing forests. The REDD collaborative program has two components: (i) assisting developing countries to prepare and implement national REDD strategies and mechanisms; (ii) supporting the development of normative solutions and standardized approaches based on sound science for a REDD instrument linked with the UNFCCC. The program could help Pakistan to manage REDD processes and facilitate access to financial and technical assistance tailored to Pakistan's specific needs.

Pakistan tried to bring REDD into the mainstream of forestry; after joining the Global REDD Partnership, a REDD focal point and a Steering Committee was established in the then Ministry of Environment at the Federal level. Moreover, Pakistan also initiated a case for joining the World Bank's Forest Carbon Partnership. Pakistan realized that REDD was an effort to create financial value for the carbon stored in

forests, offering incentives to reduce emissions from forest lands, and to invest in low-carbon paths to sustainable development. However, lack of capacity and devolution of the Ministry of Environment to the provinces has posed challenges. Because REDD is more beneficial for the provincial governments and local forest owning communities in terms of direct benefits that they can harness, it is likely that the provincial governments and local communities will support it.

SECTION 6: THREATS TO BIODIVERSITY AND TROPICAL FORESTS

This section presents the major threats facing biodiversity conservation and tropical forests in Pakistan. The threats are broken into key threats—the direct threats happening “on the ground”; and root causes, or the drivers of the key threats. As can be seen from the discussion below, the threats are inter-connected, and the root causes are as well.

The 2004 FAA 118/119 Assessment described “environmental challenges” as the following: loss of habitat; depletion of species, populations, and genetic diversity; and degradation of agricultural ecosystems and domestic genetic diversity. Pollution was highlighted as a major contributor to impacts on biodiversity. The current FAA 118/119 Assessment finds the threats similar (with the addition of deforestation, ineffective management of PAs, climate change, and unsustainable practices, discussed below as direct threats). However, while the threats are similar, they are now more intense than in 2004. As mentioned above, this Assessment provides a detailed discussion of the root causes, absent from the 2004 Assessment.

The FAA 118/119 Team identified the following threats and root causes from document review and interviews. They are described below in order of the most urgent threat to less urgent threats; however, as mentioned, the threats are inter-connected, it is impossible to separate them, and they should all be considered urgent.

6.1 Key threats to biodiversity and tropical forests

6.1.1 Habitat loss and fragmentation

Habitat loss is considered the leading cause of the loss of biodiversity worldwide. In Pakistan, the activities causing habitat loss include commercial logging (not conducted based on technical data and on a sustainable basis), land development, over-grazing, fuel wood collection, construction of roads, and building new settlements. These actions change landscapes, natural water flows, and the species composition in the area where they occur. Fragmentation of habitats is also widespread—the breaking into smaller and smaller patches—sometimes until the system can no longer provide useful habitat. A recent study (2008-2009) conducted by Intercooperation, a Swiss NGO, found that the rate of vegetative cover loss is much higher in hilly terrain than in other parts of Pakistan, mainly due to a high rate of deforestation. With the destruction of the forests and loss of fertile soil, natural habitats of many species are shrinking. Many species, such as the woolly flying squirrel, musk deer, black bear and monal pheasant have become rare in Pakistan. Expert opinion is that deforestation, over-grazing, and resultant habitat fragmentation are some of the key anthropogenic causes that are contributing to habitat loss and degradation in Pakistan.

6.1.2 Unsustainable practices are common and widespread

A realm of poor practices threaten biodiversity and forests: unmanaged livestock grazing, firewood collection (see photo below), over-hunting, practices that increase soil erosion, over-harvesting medicinal

plants, over-use of pesticides, agricultural expansion, introduction of high yielding crops, and cross-breeding of livestock. These are described in detail in Annex K.



Firewood Depot

APP photo by Saeed-ul-Mulk

6.1.3 Deforestation

The total area under forest cover is approximately 4.21 million ha, 5.2% of the total landscape of Pakistan. This includes both coniferous forests and farmland trees (GOP, 2005). Experts believe that at present the area under natural forests is much less than it was ten years ago and it continues to decline due to anthropogenic pressures. The main causes of deforestation are commercial logging and over-exploitation by a growing population for fuel wood, fodder, and local consumption of timber and NTFPs, and unrestricted livestock grazing that prevents regeneration of natural forests. The rate of deforestation is particularly high in natural forests on hilly terrain due to commercial logging operations. This high rate of deforestation is leading to the disappearance of many tree and shrub species, together with the associated fauna. The loss of forest cover from many parts of Pakistan will have a severe impact on forest biodiversity and serious implications for the already fragile mountain ecosystems.

Many forested areas in the mountain landscape of Pakistan protect watersheds that serve millions of people. The loss of forest cover in these areas will have a drastic impact on downstream communities and resources. Similarly, mangroves have been cut for firewood and charcoal, which has seriously degraded these forest ecosystems. This has a negative impact on coastal areas because they are vitally important for maintaining biodiversity and they serve as a natural means of flood control. Forests are also cleared to produce crops—there is now a scarcity of agricultural land, so this practice is expected to continue.

6.1.4 Ineffective management of PAs

Management of PAs, including forests, remains ineffective largely due to lack of resources, shortage of professional staff, and lack of capacity to carry out management operations effectively. Moreover, as discussed in Section 4, the existing wildlife and forestry laws do not provide an adequate framework for the management of these areas. Almost all of these areas are subject to human use to some extent. Indeed, the adjacent communities depend heavily on the resources of these areas, which often directly conflicts with the management objectives of the PAs. Collaborative management regimes—involving local communities in day to day management—are widely regarded as the most effective way to conserve and manage PAs. However, the Forest and Wildlife Preservation Acts throughout Pakistan have no provision for introducing collaborative management. Recently, some areas have been designated as Community Managed Controlled Hunting Areas, but the effectiveness of this designation is limited. There is also a lack of comprehensive management plans for most PAs, and where plans do exist, they are not implemented mainly because of lack

of funds and technical and management shortcomings. Effective implementation of these plans will require considerable staff time and effort, strategic planning, and funding.

6.1.5 Depletion of the populations of many species

The 4th Report on CBD (GOP, 2010) lists 47 species threatened with extinction in Pakistan. Out of these 47 species, 23 are mammals, 11 are birds, and 13 are reptiles. Two species of plants are listed as internationally threatened. Endangered mammals include snow leopard, flare-horned markhor, Marco Polo sheep, Ladakh urial, musk deer, brown bear, and woolly flying squirrel. Moreover, populations of many bird species, such as the snow cock and monal pheasant are severely depleted; this is resulting in local extinctions. Populations of large mammal species in particular are declining: the markhor, Marco Polo sheep, blue sheep, Ladakh urial, musk deer, and Himalayan ibex. These species are prey species of key predators, such as the endangered snow leopard. The main reasons for depletion of their populations are over-hunting and habitat loss. In addition, habitat fragmentation and isolation of small populations are putting increasing pressure on existing populations of these already stressed species. Among medicinal plants, species like Kuth (*Saussuria lappa*) and Karru (*Picrorhiza kurroa*) are severely depleted due to over-harvesting and they are now found only in a few alpine meadows in Astore region.

6.1.6 Climate change

Climate change and associated global warming have threatened Pakistan as flash floods and prolonged droughts are now more common. The floods of 2010 that displaced millions and caused colossal losses to the economy are considered to be caused by irregular weather conditions resulting from global warming. Climate change is likely to have several adverse effects on biodiversity; the most likely, according to the Planning Commission's Task Force on Climate Change (TFCC) report, will be decreased productivity, changes in species composition, reduced forest area, higher flood risks, and unfavorable conditions for biodiversity in general. Climate change effects are already visible, and they are expected to continue:

- A considerable increase is expected in the frequency and intensity of extreme weather events, coupled with erratic monsoon rains causing frequent and intense floods and droughts (as witnessed by the 2010 floods and 2011 rains);
- Increased temperature are expected resulting in enhanced heat- and water-stressed conditions leading to reduced agriculture productivity;
- A further decrease in the already scanty forest cover from too rapid change in climatic conditions to allow natural migration of adversely affected plant species; and
- Increased intrusion of saline water in the Indus delta, adversely affecting coastal agriculture, mangroves and breeding grounds of fish.

6.1.7 Degradation of agro-ecosystems

Agro-ecosystems in Pakistan are degrading due to loss of topsoil, intensive agriculture, increased use of pesticides, introduction of high yield crops, loss of local varieties, loss of local and indigenous knowledge, and climate change. Soil degradation reduces productivity of agricultural land and decreases the capacity of the land to sustain micro-organisms and to retain moisture. Intensive agriculture can reduce diversity of crops--genetic diversity of crops is eroding mainly because of the introduction of genetically uniform varieties and in-field hybridization between exotic and local varieties. The spread of genetically modified varieties makes crops less able to adapt to changing environmental conditions (e.g., a shortage of water) or to perform well in marginal lands. Moreover, high yield crops often require more fertilizer than the local varieties putting a heavy burden on already poor farmers. These practices also encourage over-exploitation of

water resources. The breakdown of traditional grazing systems and pasture management has led to unrestricted grazing, and degradation of many high pastures.

Pakistan has some 27.45 million hectares of rangeland which are in advanced stages of land degradation and desertification. Rangelands are degrading because with removal of vegetation from over-grazing, they are more susceptible to erosion and depletion of soil fertility. 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 supports smaller populations of predators. Free grazing of livestock, aridity and prolonged drought in arid lands has affected the biodiversity of rangelands.

6.2 Indirect threats to biodiversity and forest conservation

The following are the main root causes—the drivers—of the above noted threats to biodiversity and tropical forests. These “trigger” the loss of biodiversity in Pakistan.

6.2.1 Lack of awareness

People in Pakistan are generally aware of their surrounding environment and have knowledge of animal and plant species occurring in their surroundings and adjacent mountains (Virk, 1999). However, they are unaware of the value of these resources and the consequences of the loss of biodiversity and degradation of ecosystems. While Pakistanis may be aware of the types of plants and animals around them, there is very limited knowledge of biodiversity issues (the threats) among the general public, planners, and policy makers, and even those who are responsible for the protection of animal and plant species. Indeed, a good general understanding of biodiversity is required in all sectors of the government to ensure that biodiversity concerns are recognized and integrated in the course of development and implementation of development projects—yet this is lacking.

IUCN, WWF, and a few other NGOs implement programs that create awareness among schoolchildren and the general public about the importance of biodiversity. While in the community controlled hunting areas awareness of the need for biodiversity conservation is quite commendable, overall, these programs have been slow in making an impact mainly because these activities involve only a small section of the population.

6.2.2 Gaps in knowledge

Despite some efforts, the distribution and status of biological diversity in Pakistan remain largely unknown. Only a few localities and national parks have detailed studies. Plant and animal communities over much larger landscapes remained unexplored. Information that is available is in the form of checklists based on limited fieldwork, few of which are recent. Currently, the distribution of mammal and bird species can only be inferred from extrapolations of known range distributions and preferred habitats of most common or charismatic species (Schaller, 1977, Roberts, 1991 & 92, and Roberts, 1997) and to some degree speculation of experts in the field. Even less is known of other vertebrate taxa, such as amphibians, reptiles, and fishes.

The most significant knowledge gaps are about the animal and plant species that inhabit the rugged mountains of Pakistan, and how they are affected by human activities; and the diversity of insects, arthropods, fungi, bacteria, and other soil microorganisms. At present there is no institution in Pakistan responsible for conducting biodiversity inventories and there is no system for monitoring trends in species populations, genetic richness, and habitats. Data are scattered and they are mostly based on secondary information. They are of limited use for effectively planning and managing biodiversity resources. The information that is available on wildlife, fisheries, forests, and agricultural biodiversity is not readily available to those who need it. In part, this is because the institutions and individuals concerned do not widely share the published and unpublished information they possess.

6.2.3 Limited resources and institutional capacity

Agencies responsible for biodiversity resources are under-funded and have limited resources at their disposal. They lack appropriate equipment and transportation necessary to operate. Unfortunately, these agencies have not kept pace with developments in the field of conservation biology. For example, Fisheries and Forestry Departments still consider policing as their main responsibility--little effort is placed on sustainable use of fisheries, forestry, and wildlife resources and on CBNRM and co-management. There are no research sections in these agencies, which could study aspects of biodiversity. Consequently, very little is known about the ecology of plants and animals species or conservation and sustainable use of biodiversity, and therefore, these agencies have limited capacities to effectively plan and manage biodiversity resources .

Some conservation and development organizations such as LEAD Pakistan, SUNGI, AKRSP, IUCN, WWF-Pakistan, and HWF have taken steps promoting conservation and sustainable use of biodiversity. These organizations now assist government agencies in management planning and implementing conservation projects.

6.2.4 Rapid population growth

Rapid growth of human populations and widespread distribution of humans are the most significant reasons for environmental degradation worldwide. Growing human populations increase consumption of natural resources, and as consumption of natural resources grows, we are likely to see loss of biodiversity around the world (Alonso, 2001). The human population in Pakistan has more than doubled over the last 30 years: the population was 81 million people in 1981, 130 million in 1998 (last census), and now it is estimated to be 170 million. This increase has increased demand for land to grow more crops. New lands, including even some marginal and unproductive fields, have been brought under cultivation to meet the needs of the growing population. The conversion of land has forced many species to retreat to remote and less productive locations, consequently reducing their breeding capacity and survival potential.

6.2.5 Poverty

In Pakistan, the majority of people rely on agriculture and livestock production systems for their livelihoods. Therefore, they depend heavily on biodiversity resources, e.g., use of pastures and other agricultural land. Poor people also rely most heavily on firewood collection for their energy needs. They may also rely on hunting wildlife for food. These activities often result in the over-exploitation of resources at the local level. With limited livelihood options owing to lack of skills, opportunities, access to financial resources, and without secure land tenure, poor people have no incentive to invest in sustainable harvest practices. Therefore, the poor may be causing biodiversity degradation and loss, yet they are the group that relies most on healthy biodiversity resources.

6.2.6 Weak laws and policies

Pakistan has developed a fairly complete body of natural resources policies and laws (e.g., forestry, fisheries, and wildlife laws), however, most were adopted well before the concept of biodiversity advanced in the 1980s and 90s. Therefore, these policies and laws are relatively weak and do not encompass the elements needed for biodiversity conservation.

There is no single comprehensive legislation in Pakistan that covers all aspects of biodiversity conservation and management, instead, the natural resources legal framework is piecemeal—there are separate acts that provide protection to certain species of flora and fauna and regulate use of forests, wildlife, and fisheries resources. These laws have not kept pace with changing political, social, economic, and ecological realities, including the need to meet obligations under the international treaties to which Pakistan is a signatory. For example, the existing provisions of these Acts do not provide room for community participation and

collaborative management of PAs. Forest Acts deal primarily with exploitation of forests and do not properly address biodiversity concerns. However, recently, some provincial departments (in KP) have revised their Forest Act to accommodate community participation in the management of forestry resources, but these measures are still inadequate in terms of biodiversity conservation.

6.2.7 Weak law enforcement

Penalties for violators and strict codes against poaching of wild animals have been promulgated. However, enforcement of these laws is weak due to lack of resources, insufficient staff, lack of proper equipment, and non-cooperation of police and other authorities. Moreover, offenders are usually influential people or high-ranking civil officers or even their paid hunters. They are often able to manipulate the system, and get away without prosecution. Protection of forests, wildlife, and fisheries is a task of Guards and Watchers, the lowest ranks in these departments. They have no means of transportation and are woefully underpaid. Thus, they may be intimidated by the higher ranks, and avoid conflict with wealthy and resourceful hunters or timber dealers. Though the situation is improving with the recent drive for involvement of local communities in conservation (establishing forest committees and appointing villagers as Honorary Wildlife Officers), much remains to be done for effective enforcement of the existing laws.

6.2.8 Little incentive for sustainable use of biodiversity

Few incentives and opportunities exist for local communities to benefit from sustainable use of biodiversity. Local communities in Pakistan have no right to ownership of key natural resources--wildlife, most of forestlands, and fisheries. By law, these resources belong to the State, which leaves little incentive for local people to manage and conserve these resources or to make investments that ensure sustainable use. Indeed, the policy of government ownership of wild resources has created incentives for over-exploitation of wild species and in many cases has led to an “open access” situation in which government is unable to control access and over-exploitation. There is a dearth of appropriate strategies for introducing sustainable use measures suited to local ecological and socio-economic conditions. The lack of incentives for farmers to conserve local varieties of crops and native breeds of livestock is also the reason for loss of genetic diversity in agro-biodiversity.

6.2.9 Agricultural subsidies

A root cause of the degradation of local agro-ecosystems is subsidies, including loans to producers, which encourage agricultural intensification and agro-chemical use. The subsidies have filled the gap since market-driven policies and practices are not in place.

6.3 Actions needed to conserve biodiversity and tropical forests

In accordance with FAA Sections 118 “Tropical Forests” and 119 “Endangered Species,” this section provides an analysis of the actions necessary to conserve tropical forests and biodiversity in Pakistan. The 118/119 Assessment Team developed the necessary actions based on a review of available documents, interviews, and knowledge of the local situation in Pakistan; they address the key threats to biodiversity and tropical forests and the root causes of the threats presented in the previous sections. They are presented in order of priority.

Following this section, Section 5.4 shows the extent to which current and future USAID programs meet the needs identified below.

Actions necessary to conserve biodiversity and tropical forests are:

1. *Support community-based conservation and sustainable use programs outside PAs.*

Conservation and sustainable use of biodiversity largely depend on rural communities whose livelihoods are dependent on natural resources. Community-based conservation is recognized worldwide as a viable option for biodiversity conservation. A number of activities are needed for a successful community-based conservation regime:

- Develop a policy and legal framework to encourage community-based conservation and sustainable use of biodiversity resources.
- Devolve resource tenure and management authority to local communities.
- Integrate biodiversity conservation into local development projects.
- Encourage community-based conservation and sustainable use projects (models that can be replicated and/or scaled up).
- Develop mechanisms for regulating sustainable use of biological resources.
- Enhance the capacity of local communities, CBOs, and local NGOs by providing technical assistance and training for implementing biodiversity conservation and sustainable use projects.
- Designate community conservation areas for sustainable use of biodiversity resources.
- Encourage local communities to adopt agricultural, fisheries, and forestry practices that enhance conservation of biodiversity.
- Enhance local awareness about benefits and values of biological resources.

2. *Implement income generation activities, especially in high biodiverse areas and where unsustainable NRM practices are affecting biodiversity.*

As mentioned above, in part, poverty can drive unsustainable practices, such as over-hunting, poor agricultural practices, including converting natural areas to cropland, and unsustainable collection of medicinal plants. Income generation activities that discourage these practices, and that introduce alternatives to “mining” natural resources can relieve some of the pressure on biodiversity. For income generation activities to have a positive impact on biodiversity, specific threats must be targeted; for example, to relieve pressure on medicinal plants, collectors can be linked with markets that are interested in sustainable harvest; to relieve pressure on unsustainable firewood collection, income generation activities that involve alternative energy may be the direction. Income generation projects alone, without regard to the biodiversity threat they are meant to diminish, are unlikely to be successful.

3. *Encourage family planning.*

As mentioned in Section 5.2, Pakistan has a very high population growth rate and this affects use of natural resources and land conversion to agriculture and for development, two of the main causes of the loss of biodiversity. Stabilizing population growth is one of the key efforts that can help address the loss of biodiversity. Population growth in rural and urban areas alike must be addressed, although strategies for addressing urban and rural population growth may differ.

4. *Strengthen the existing Protected Area System.*

Pakistan's PA system needs to be reassessed to determine whether the PAs are serving the purpose for which they were created; and whether they should continue to be part of the system, reclassified, or deleted. Strengthening the PA system and its contribution to biodiversity conservation is one of the objectives of the BAP. This "action needed" is made up of the following discrete activities:

- Develop a comprehensive plan of action to strengthen the existing PA system.
- Develop PA priorities in view of possible climate change impacts.
- Involve local communities and other stakeholders in collaborative management of the PAs.
- Increase the capacity of communities living in or adjacent to PAs to participate in management of these areas through appropriate training and education, and through recognizing local expertise and traditional institutions.
- Re-define PA boundaries based on species range and corridors to optimize viability and connectivity, while also considering the negative or positive effects on the socio-economic condition of the people living in and around the PAs.
- Examine the status of all Game Reserves and re-classify these under IUCN categories.
- Explore the possibility of establishing trans-boundary initiatives with neighboring countries.
- Build capacity of participating Departments in PA management through staff training, sufficient funding, and provision of necessary equipment.
- Share responsibility for managing some PAs in collaboration with NGOs and other interest groups (A precedent for such a management regime already exists in the case of management of Deosai National Park.)
- Develop, in a participatory process, practical management plans for all PAs, and begin to implement management plan activities, as funding allows.

A component of strengthening the current system is to create new PAs in collaboration with local communities. IUCN's 2001 review of Pakistan's PA system noted that the current network is unevenly distributed, created without consideration of ecological criteria, and many of these areas are too small and isolated to be effective for conservation of biodiversity in the long-term. However, establishing more PAs will likely be unacceptable to local communities as they are dependent on natural ecosystems for their livelihood. Therefore, new PAs should be established under categories V and VI to provide corridors and connectivity to the existed PAs—to make the existing system more viable.

5. *Build capacity of government agencies, local NGOs, and CBOs in biodiversity conservation.*

Government, NGOs, and CBOs involved in NRM and biodiversity conservation need technical assistance and financial support to implement community level conservation projects in buffer zones of PAs and in the larger ecological landscape, and to assist the Government to better manage the PA system. In addition, Pakistan conservation professionals need strengthened capacity to design and implement REDD activities. Existing conservation projects in Pakistan have provisions for capacity building of conservation professionals and other stakeholders. These should be tapped and new programs need to be initiated to build capacity of key partners for biodiversity conservation. Priority activities under this "action needed" include:

- Assess current capacity and biodiversity-related training needs of the staff of Forestry, Fisheries, and Agriculture, and of PA managers and staff.
- Explore opportunities for in-service training to address immediate needs and priority requirements.
- Integrate biodiversity concerns and climate change issues into training manuals of agricultural, fisheries, and forestry extension staff.
- Build capacity of local NGOs and CBOs, particularly the larger cluster organizations, to play an effective role for conservation and sustainable use of biological resources.
- Arrange workshops to train field staff of line agencies in biodiversity assessment techniques, particularly in data collection and reporting findings.
- Provide necessary equipment and field gear to PA staff to perform their duties efficiently and effectively.

6. *Develop and improve baseline information on biodiversity*

Pakistan needs a nationwide biodiversity assessment and monitoring system, with a mechanism for sharing information with relevant agencies, conservation NGOs, and other stakeholders. This will help managers, planners, and policy makers to make the best-informed decisions for sound NRM. Presently, the Pakistan Museum of Natural History (PMNH) is establishing a nationwide database on biodiversity. However, there is a concurrent need to conduct a biodiversity assessment at the national level that would identify the ecosystems, species, and genomes for which special conservation measures should be taken. Specific activities needed to establish a biodiversity database are:

- Review existing information and identify gaps in knowledge to establish priorities for biological inventories.
- Solicit support and cooperation from other agencies involved in biodiversity assessments (e.g. international institutions, NGOs, and federal government agencies, such as Zoological Survey Department (ZSD), PMNH, Pakistan Forest Institute (PFI), and National Agricultural Research Council (NARC)).
- Develop a mechanism for information exchange among all government agencies, research institutions, conservation NGOs, and local CBOs active in biodiversity conservation.
- Launch a program for collecting and archiving information on indigenous knowledge pertaining to biodiversity.
- Conduct priority inventories of important taxon groups of plants and animals, as well as crop varieties and livestock breeds.

7. *Adopt an ecosystem management approach.*

Ecosystem management, “the integrated management of ecological systems and human activities to maintain or enhance the health and integrity of an ecosystem including ecosystem function and structure” (Piroet et al., 2000) –versus single species conservation and management—is recognized worldwide as the most effective method for conserving biodiversity. Pakistan could benefit from this approach, but to apply it, an ecological land classification system is needed, which will provide the foundation for ecosystem-based management and planning. In addition, due to potential impacts from climate change, adaptation measures need to be

integrated into the ecosystem approach. Priority activities that are part of adopting the ecosystem management approach are:

- Develop an ecological land classification system.
- Integrate climate change adaptation measures into the system.
- Build capacity of the line agencies in ecosystem-based management of biological resources.
- Implement model projects that can be scaled-up and replicated.

8. *Develop enabling policies and legislation for biodiversity conservation.*

Existing sectoral policies and legislation need to be reviewed to identify gaps; as a follow-up to this, appropriate policies and an effective legal framework for promoting conservation and sustainable use of biodiversity must be developed. There is also a need to integrate biodiversity concerns into sectoral plans and programs. In addition, enabling legislation is needed for Pakistan to take advantage of REDD. Priority activities that make up this “action needed” are:

- Review all NRM-related sectoral policies and laws.
- Identify areas where new legislation or major enhancements to existing legislation are needed for fulfilling commitments under the CBD and other MEAs; for conserving threatened and endangered species and habitats; for managing alien, invasive species; for participating in REDD; and for regulating and managing sustainable use of biological resources.
- Prepare a national biodiversity policy (by focusing on wildlife, forestry, fisheries, agriculture, and tourism sectors).
- Revise the Biodiversity Strategy and Action Plan.
- Take measures for integrating biodiversity concerns into sectoral and cross-sectoral plans.
- Improve the effectiveness of existing laws by creating awareness of conservation regulations and by stricter law enforcement.
- Devolve aspects of NRM authority to local communities and empower them to enforce regulations of existing biodiversity-related legislation.

9. *Introduce incentive measures that support conservation and sustainable use of biodiversity.*

There is a critical need to pursue innovative approaches to prevent further loss of biological diversity in Pakistan. Though regulatory approaches are essential, on their own, they are insufficient. Article 11 of the CBD requires that incentive measures be adopted to promote conservation and sustainable use of biodiversity, and stresses that these incentives should be economically and socially sound. The use of economic instruments and non-fiscal incentives such as social, institutional, and service-oriented incentives are now considered an important tool for the conservation of biological diversity. Some initiatives are already underway; for example, the GEF/UNDP-funded Mountain Areas Conservancy Project (MACP) implemented in GB has a provision for adopting incentive measures to gain support of local communities. But there is a need to build on these initiatives. Implementation of this “action needed” will contribute to Objective 14 of the BAP. The priority activities under this “action needed” are:

- Identify and expand existing and potential economic instruments and other incentives which encourage biodiversity conservation.
- Provide grants for the protection of threatened species and their habitat, and restoration of degraded watersheds.
- Encourage *ex-situ* cultivation of MEPs to reduce pressure on wild populations and to provide income for individuals and communities.
- Introduce a system of indirect incentives (fiscal, social, and service-oriented) to encourage conservation and sustainable use of biodiversity.
- Increase capacity in REDD and climate change adaptation measures to take advantage of the incentive mechanisms of REDD.
- Identify and progressively remove incentives that discourage biodiversity conservation.
- Investigate and institute innovative mechanisms for raising funds for biodiversity conservation, e.g., local conservation funds, regional trust funds, royalties, levies, and fees for environmental services.
- Enhance the capacity of line agencies and conservation NGOs to implement an incentive measures approach for conservation of biological resources.

10. *Launch conservation education and awareness raising programs.*

If national and provincial efforts to conserve biological diversity are to succeed, policy makers, planners, communities, and individuals must understand and appreciate the value of biodiversity, and the causes of its decline. They should also understand the potential effects that climate change could have on biodiversity and livelihoods. Given the low literacy rate in many parts of Pakistan, informal education is a vital component of conservation education and awareness raising. In addition, there is a need to include biodiversity-related topics in the teaching curriculum from primary school to college levels. This will contribute to implementation of Objectives 18 and 19 of the BAP and will require the following priority activities:

- Develop and implement a strategy and action plan for public education and awareness about the conservation and sustainable use of biodiversity in Pakistan by targeting politicians, decision makers, businesspeople, school teachers, students, and rural and urban communities.
- Integrate biodiversity conservation and sustainable use themes into training programs for school teachers.
- Encourage both print and electronic media to distribute information on biodiversity conservation issues through their publications and programs.
- Strengthen coordination among those involved in biodiversity awareness/education, including government departments, educational institutions, conservation NGOs, CBOs, and other local interest groups.
- Encourage organizations engaged in research, management, and protection of biodiversity, including potential climate change impacts and adaptation mechanisms, to publicize their work, and to disseminate information about biodiversity and benefits of its conservation.

11. *Encourage ex-situ conservation.*

Ex-situ conservation or the conservation of biodiversity outside natural habitats, such as in zoos, botanic gardens, and gene banks, can be complementary to *in-situ* efforts, while providing opportunities for research especially on rare and threatened species. The CBD recommends taking *ex-situ* measures to safeguard against extinction. Presently, very limited work is being done in Pakistan on *ex-situ* conservation of TES of flora and fauna. There is a great opportunity for government agencies, NGOs, and local communities to support initiatives for *ex-situ* conservation of threatened species of medicinal plants, such as Kuth (*Saussuria lappa*) and Karru (*Picrorhiza kurroa*). This would also contribute to implementation of Objective 8 of the BAP. Activities that are part of this “action needed” are:

- Identify priority species of wild plants and animals as well as local cultivars that need to be conserved through *ex-situ* efforts (taking into account potential effects of climate change).
- Conduct feasibility studies for captive breeding programs for endangered animal and plant species for the recovery and restoration of their populations (taking into account potential effects of climate change).
- Encourage government agencies (e.g. NARC), NGOs, and CBOs to initiate *ex-situ* conservation measures for indigenous plant genetic resources, local livestock breeds, and horticultural varieties.
- Facilitate establishment of a seed bank and germplasm collection program for local fruit trees and medicinal plants by the Agriculture departments in provinces.
- Regulate and manage the collection of biological resources from natural habitats for *ex-situ* conservation to minimize threats to ecosystems and *in-situ* populations.

6.4 The Extent to Which USAID is Addressing the Actions Needed

The description of USAID’s current and future program in Section 1 is used to determine the extent to which USAID is addressing the actions needed (Section 5.3). The items in bold in Table 7, column 2 are “entry points” for USAID; they are areas where USAID can increase the extent to which the Agency meets the biodiversity conservation needs within the proposed USAID strategy and within USAID’s comparative advantages and interests. Recommendations in 6.1 are based on these entry points. The third column shows the main donors and initiatives; for information on biodiversity and other environmental initiatives, see Annex J.

Table 8: Extent to Which USAID Actions Meet the Conservation Needs

Actions Needed (from Section 5.3)	The extent to which USAID’s current/proposed actions meet the needs	Current/planned initiatives of GOP, NGOs, donors-other than USAID (see Annex J for details)
I. Support community-based conservation and sustainable use programs outside PAs	USAID is indirectly and partially addressing this need by providing alternative energy sources that could relieve the pressure on wood use for fuel. Provision of alternative sources of energy is expected to decrease the pressure on forests, and thereby, will indirectly have a positive effect on conservation and sustainable use.	UNDP through NGOs, WCS

<p>2. Implement income generation activities, especially in high biodiverse areas and where unsustainable NRM practices are affecting biodiversity.</p>	<p>Under the EG sector area, USAID is encouraging private sector investment; strengthening value chains; and improving access to markets—these activities which are meant to generate income can partially address the need. However, as mentioned, income generation must target particular biodiversity threats if it is to have a positive impact on biodiversity.</p>	<p>UNDP, Intercooperation Pakistan, EC, EKN,ADB</p>
<p>3. Encourage family planning</p>	<p>Under the health sector area, USAID is addressing this need through: support to provincial governments in establishing integrated programs for effective and efficient delivery of key services that include healthy timing and spacing of pregnancy, immunization, and maternal health, newborn, and child health interventions. To more fully address this need, the Health Program could target areas of high biodiversity that are being affected by population pressure.</p>	<p>GOP</p>
<p>4. Strengthen the existing Protected Area System</p>	<p>USAID is not addressing this need.</p>	<p>GOP</p>
<p>5. Build capacity of government agencies, local NGOs, and CBOs for biodiversity conservation.</p>	<p>USAID is not addressing this need.</p> <p>In the FATA & KP stabilization sector, USAID’s support for “incremental improvements in governance that help strengthen communities and relations between communities and the government” could help build capacity for biodiversity conservation (including climate change); however, currently, biodiversity stakeholders and initiatives are not targeted to receive support under this sector area.</p>	<p>UNDP, WCS, WWF, IUCN, LEAD Pakistan</p>
<p>6. Develop and improve baseline information on biodiversity</p>	<p>USAID is partially addressing this need in the Investments in Water program (Economic Growth) by helping develop a national water resources information system. Although this activity will develop an information system for irrigation water users, the platform could be used to develop baseline biodiversity information, however, currently, this action is not within USAID’s strategic areas.</p>	<p>UNDP, WCS WWF,IUCN</p>
<p>7. Adopt an</p>	<p>USAID is partially addressing this need in the Investments in Water</p>	<p>UNDP,IUCN,WWF</p>

ecosystem management approach	program (Economic Growth) by helping develop a national water resources information system. Although this activity will develop an information system for irrigation water users, the platform could be used to develop baseline biodiversity information, however, currently, this action is not within USAID's strategic areas.	
8. Develop enabling policies and legislation for biodiversity conservation	USAID is not addressing this need.	UNEP, IUCN
9. Introduce incentive measures that support conservation and sustainable use of biodiversity	USAID's support for Investment in Water Program for developing or strengthening local systems, such as water user associations, to better manage water resources could provide incentives for sustainable use of water, and thereby indirectly could contribute to this need. Interventions that directly affect biodiversity conservation do not fit within this sector area.	UNDP, GOP
10. Launch conservation education and awareness raising programs	USAID is minimally addressing this need by providing Fulbright Scholarships in (among several others) the environment field. The education sector area could strengthen USAID's contribution to this need by integrating biodiversity conservation messages into its basic education program.	WF, Coca Cola Foundation, Barclays Bank
11. Encourage ex-situ conservation	USAID is not addressing this need.	GOP, Provincial Governments through legislation and enabling environment

6.5 Assessment of USAID's Potential Threats to Biodiversity, Tropical Forests, and the Environment

The description of USAID's current and future program in Section 1 is used as the basis for the following assessment of USAID's potential impact on biodiversity, tropical forests, and the environment in general. Both positive and negative effects of the USAID program are considered.

USAID/Pakistan has consistently and thoroughly implemented 22 CFR 216, USAID's Environmental Compliance Procedures. The following assessment is—as stated in Section 1—an assessment at the early

stage, during strategy preparation. As such, it provides a broad-brush assessment to highlight potential issues the Mission will need to address during project development.

6.5.1 The Energy Sector

Both of USAID's thematic areas in the Energy Sector, *Investing in Infrastructure* and *Policy Reform*, could affect biodiversity, tropical forests, and the environment. *Investing in Infrastructure* has the potential for the most direct threats, many of them potentially significant. *Policy Reform* has the potential for indirect threats, also many of which may be significant, they may be more far-reaching than infrastructure project impacts, and less predictable, and they may only become obvious over a long period of time. Both thematic areas have the potential to result in positive, as well as negative environmental effects.

Current infrastructure projects include: Gomal Zam Dam Multipurpose Project (hydroelectric power, flood control, and irrigation); Satpara Dam Multipurpose Project (power provision, irrigation, and provision of drinking water); Tarbela Dam Hydroelectric Power Station (power generation); Jamshoro, Muzaffargarh, and Guddu Thermal Power Station (power generation); and Tubewell Efficiency Improvement Program (will significantly reduce power use for irrigation water pumping). Other energy infrastructure projects will be supported during the new CDCS period.

Whether rehabilitation or new construction, investments in energy infrastructure could have major effects on biodiversity and on the environment in general. Some of the effects will occur at the site of the infrastructure project, for example, areas that were previously dry land may be under water once a dam is operational—this could affect the human environment as well as the natural environment. Agricultural land may be flooded and no longer be available for crop production—this could have consequences for the natural and human environment; besides the direct effects to the environment, it could indirectly result in more land conversion to agricultural production. Wetlands at the dam site may be inundated and may no longer serve as nurseries for fish, and feeding and nesting areas for wildlife. Also, environmental impacts typical of any large-scale construction project are possible at the site of construction work and beyond during the construction phase; there may also be ramifications once construction is completed if best practices and mitigation measures are not in place during construction.

Beyond the immediate construction area, energy infrastructure projects may alter the hydrology of the watershed. This could result in decreased flow downstream, with less water available for downstream uses (including ecosystem uses); alternatively, there could be higher flow at times, and this may wipe out fish nursery areas, damage cropland, and cause other areas to flood. Also, large canals leading away from the dams can restrict animal movements and obstruct their feeding and breeding sites. In general, construction or rehabilitation of dams can result in major impacts to the human and natural environment, and can have significant effects on biodiversity—fisheries in particular could be at risk when hydrology of rivers is altered. USAID is required to evaluate these impacts in accordance with 22 CFR 216, and to identify and mitigate impacts.

Positive effects may also result from energy infrastructure projects. Improvements in power generation could decrease the demand on the use of wood for energy, and this could help curb deforestation. Greenhouse gas emissions would be expected to decrease with the availability of more hydropower. These positive effects would also be considered in USAID environmental compliance documentation.

Policy reforms that favor renewable energy would have some positive effects—mainly for pollution and climate change, and possibly for land use. However, there are also potential negative effects, often less obvious, but that USAID/Pakistan should assess prior to supporting the reforms. Typical examples are policy reforms that favor wind generation and solar power, where large areas of land are converted to these uses and/or where generators/windmills are poorly placed and affect wildlife, especially avian species.

USAID/Pakistan should be well-informed of the potential for environmental impacts, and biodiversity effects from Policy Reform interventions, and should consider these prior to supporting the reforms.

6.5.2 Economic Growth

The Economic Growth Office will support technical assistance, agriculture assistance, private sector assistance, and water programs.

Similar to policy reform interventions (above), technical assistance may appear to have no direct environmental effects, however over the long-term, effects may become apparent. In accordance with 22 CFR 216, a categorical exclusion may be granted for technical assistance and training provided there are no direct environmental impacts. The Mission should however, be cognizant that technical assistance in such areas as liberalizing trade policy and improving the regulatory environment for private investment may have direct effects, and appropriate environmental safeguards should be incorporated into technical assistance programs.

Agriculture assistance may result in conversion of land to agriculture, increased use of pesticides and chemical fertilizers, and may have other less predictable effects. However, implementing improved agricultural production practices may result in the conversion of less land to agriculture, i.e., intensification of agriculture rather than expansion. Intensification, of course, has potential environmental impacts, as well, including possible environmental contamination and risks to human health from unsafe use of pesticides and fertilizers. Whether the interventions have positive or negative environmental effects will largely depend on the safeguards that are integrated into the agriculture assistance projects.

Private sector assistance, including increasing access to financing, improving technological innovation, and improving access to markets could result in increased production and demand for products, and depending on the value chain and the processing method, environmental impacts could result, and biodiversity could be affected. Mitigation/best practices are often available to minimize impacts. These may include incorporating cleaner technology measures, implementing sustainable harvesting practices, and incorporating environmental criteria into credit application reviews to ensure environmentally unsound enterprises and activities are denied funding.

Investment in Water Programs would be expected to have positive and negative effects on the environment and possibly on biodiversity. Expansion of land under irrigation could convert natural ecosystems to cropland and could result in salinization of soils. However, promoting on-farm integrated water management systems would result in more efficient use of water, which would make more water available for other uses, including ecosystem uses.

USAID's Economic Growth Program could have positive and negative environmental impacts and could affect biodiversity both positively and negatively. Appropriate environmental analysis will be needed, including identification of practicable mitigation measures and monitoring to ensure that unexpected impacts are not resulting.

6.5.3 Federally Administered Tribal Areas (FATA) and Khyber-Pakhtunkhwa (KP) Stabilization

USAID will continue programs similar to those supported in the past: community-based projects, livelihood programs in agriculture and micro-enterprise development, vocational training and scholarships, and community health and education. These types of programs are also supported under other sector areas, and the concerns, impacts, and mitigation will be similar to those described above (energy and economic growth) and below (education and health).

Activities during the new strategy period may include investment in small-scale infrastructure, appropriate industries and agriculture, and support for incremental improvements in governance. Support for small-scale infrastructure could have environmental effects—not necessarily commensurate with their scale, i.e., significant impacts can result from small-scale projects. Appropriate environmental review and mitigation will be needed based on the location and type of small-scale infrastructure to be rehabilitated or constructed.

Improvements in governance could have positive effects on the environment if USAID supports environmental governance activities, i.e., greater transparency in environmental decision making; public participation in environmental assessment; and strengthening NGO/oversight of environmental agencies. Otherwise, improvements in governance are unlikely to have positive or negative effects on the environment and biodiversity, in particular.

6.5.4 Education

The Basic Education Program will repair schools, and as with any infrastructure construction or repair project, environmental impacts may result and there may be impacts on biodiversity. For construction of buildings, environmentally sound siting and best engineering practices can mitigate most—or all—potential impacts.

The Basic Education Program could have positive effects on biodiversity. Positive effects would be expected if, for example, environmental messages are incorporated into Pakistan Children’s Television programming and if teachers are educated in environmental conservation and are able to pass this knowledge to schoolchildren.

The Higher Education Program could have indirect positive environmental effects if more Pakistanis are training in environmental fields.

6.5.5 Health

USAID/Pakistan’s Health Program could benefit the environment by stabilizing population growth, one of the main root causes of the loss of biodiversity.

The Health Program will not be providing funds for the procurement of pharmaceuticals or vaccines for the HIV, polio or TB programs. USAID assistance will not directly result in the production of healthcare waste including expired/unused pharmaceuticals. However, USAID’s Health Program could have a positive effect on the environment, including biodiversity, by assisting Pakistan to identify appropriate medical waste disposal measures and strengthening pharmaceutical distribution systems (including provisions for dealing with expired and unused drugs). Even where USAID support will not result in medical waste generation, this could be a proactive safety measure, which is too often considered after environmental impacts result.

As above, infrastructure projects could have environmental impacts and could affect biodiversity, and appropriate environmental review and mitigation will be needed.

SECTION 7: RECOMMENDATIONS

The following recommendations are based on the findings of this FAA 118/119 Assessment and take into account USAID's comparative advantage, strategic interests, the GOP's biodiversity, forestry, and climate change interests, and current and future initiatives in these areas. However, USAID should consult widely with other stakeholders prior to adopting any of the following recommendations (Sections 6.1-6.4). Although they are not required to be implemented, if implemented, the recommendations would strengthen USAID's support for biodiversity and tropical forest conservation and environmental protection, and many of them are key to ensuring sustainable development. Recommendations in Sections 6.3 and 6.4 are presented in order of priority.

7.1 Recommendations to Increase the “Extent to Which” USAID is Addressing Biodiversity Conservation/ Tropical Forest Needs

These recommendations derive from the findings in Section 5.4 and are intended to increase the extent to which USAID is addressing the biodiversity/tropical forest needs (“actions needed”) identified in Section 5.3. They take into account current and planned projects and initiatives of the GOP and other donors, as well as USAID's comparative advantage and strategic interests in Pakistan. Since USAID/Pakistan has no biodiversity-related focus area, the recommendations are linkages between other USAID sector areas to biodiversity.

1. In the FATA and KP Stabilization Sector, USAID should consider supporting community-based conservation (action needed #2) as part of FATA/KP Sector's “incremental improvements in governance that help strengthen communities and relations between communities and the government.” Governance building through community based conservation management can reach into distant rural areas that depend on natural resources for their livelihoods, and that because of their isolation do not otherwise have connections with government agencies. Thus community-based conservation can increase Government linkages with rural communities. Models for community-based conservation exist within Pakistan and the region (WCS's work in Afghanistan), and have been successful in bringing government and communities together to work towards conservation and sustainable use, serving as a model for working together in other sectors. (This could help contribute to “Rehabilitation of degraded rangelands with involvement of local communities” an as-yet unfunded project in the GOP's five-year plan).
2. As part of FATA and KP Stabilization (“incremental improvements in governance that help strengthen communities and relations between communities and government”), USAID should consider strengthening capacity of government, NGOs, and CBOs to improve natural resource governance. This would help increase USAID's contribution to “build capacity of government agencies, local NGOs, and CBOs for biodiversity conservation”-action needed #4. And would indirectly support action needed #2.
3. Investments in Water (Economic Growth Sector Area) could help strengthen USAID's support for “adopting an ecosystem management approach,”-action needed #5--by targeting their work to important aquatic ecosystems in need of restoration/rehabilitation. While healthy aquatic ecosystems are critical for wildlife, this is also in line with the USAID Investments in Water program, since restoring degraded aquatic ecosystems would improve “water management systems” and would result in better use of water. By restoring degraded aquatic ecosystems, they would once again provide water filtration, flood control, and irrigation water services to the human population, and thereby contribute to the Investments in Water program objectives. (This would also contribute to the Convention on Biological Diversity Strategic Plan 2011-2020, Strategic goal D: Enhance the

benefits to all from biodiversity and ecosystem services; Target 14: By 2020 ecosystems that provide essential services, including services related to water...are restored and safeguarded....” and could contribute to “Rehabilitation of Riverine, Irrigated, and Mangroves Forests” an as-yet unfunded GOP project in the Government’s five-year plan).

4. To increase USAID’s contribution to conservation education and awareness raising, the USAID Education Sector should consider including biodiversity conservation information and messages into teacher training, textbooks, teacher guides, and teaching materials. While this does not have to involve inclusion in the curriculum of specific conservation education subjects, conservation messages can easily be integrated into other subject areas.
5. As a means of increasing USAID’s contribution to conservation education and awareness raising, action needed #9, the Education Sector should incorporate conservation messages into USAID support for Pakistan Children’s Television programming. Conservation messages can be integrated into literacy and numeracy, problem-solving, and critical thinking concepts, and into programs aiming to increase respect for vulnerable groups.
6. The Health Sector could more fully address the biodiversity need for family planning (action needed #10) by targeting areas for family planning assistance that are of high biodiversity importance and that are at risk from population pressure on natural resources (i.e., buffer zones of protected areas).
7. The Economic Growth Sector could increase USAID’s contribution to action needed #11, implement income generation activities, especially in areas of high biodiversity that are affected by unsustainable NRM practices. To do this, the EG Sector should identify threats to biodiversity and implement income generation activities that are aimed specifically at minimizing those threats. For example, if medicinal plants are being overharvested because of poor collection and processing practices, USAID could support a sustainable harvest plan and improved processing operations that more efficiently use the medicinal plants, and could link the enterprise to “green” [conservation/sustainable use] buyers.
8. USAID could focus on natural forestry restoration as it is a vital part of biodiversity and forms an important habitat for threatened and endangered species. It also creates a source of products for local income generation and a key asset for maintaining water quality and quantity.

7.2 Recommendations Based on the Early Stage, Strategic-Level Environmental Review

The following recommendations are early stage, strategic-level mitigation measures that the FAA 118/119 Team recommends to minimize potential threats to biodiversity and tropical forests from the USAID CDCS and current and future programs, as described in Section 5.5. In the past, USAID/Pakistan has consistently and thoroughly implemented USAID’s Environmental Compliance Procedures; environmental compliance practices during the new CDCS period should be modelled on USAID/Pakistan’s previous compliance efforts.

1. Energy Sector

- a) As required by 22 CFR 216, conduct a thorough environmental review to ensure that significant impacts will not result from USAID support of energy infrastructure projects. Rehabilitation, as well as construction, may have significant impacts, and they may occur at the location of the construction or a distance away; they may occur at the time of construction or they may only become visible in the long-term. Therefore, construction, operation, and close-out phases

should be evaluated, and short, medium, and long-term, direct and indirect, and cumulative environmental effects should all be evaluated and mitigated, as appropriate.

b) The Energy Sector should consider adding “environmental impact potential” to technical feasibility, cost, and overall effect, as one criterion upon which infrastructure projects will be chosen.

c) Prior to providing support for rehabilitation or construction of energy infrastructure, the Energy Sector should be aware of the important wetlands and waterways of Pakistan and the ecological functions and environmental services they provide; and the potential of infrastructure projects to alter the hydrology of these ecosystems. This may require detailed studies involving local and international experts. Project design and contracting should be flexible to take this need into account.

c) Prior to implementing support for policy reforms, the Energy Sector should be aware that some policy reforms may have environmental impacts that should be evaluated and mitigated in USAID environmental compliance documentation. For example, support for policy reforms that favor renewable energy should also include appropriate environmental review requirements since renewable energy can have significant adverse environmental impacts; this should be the case even though USAID is supporting policy reforms and not the actual infrastructure development.

2. Economic Growth

a) Prior to supporting technical assistance, the Economic Growth Sector should be aware that some technical assistance can have significant environmental consequences (i.e., technical assistance can have significant indirect consequences), and should be evaluated and mitigated in USAID environmental compliance documentation.

b) Support for Agriculture Assistance should ensure that potential impacts of pesticides, fertilizers, and support for improved agricultural production could have environmental consequences and health risks, which should be evaluated in an IEE or an EA, as appropriate.

c) Particular attention should be paid to the potential for agricultural expansion and encroachment into natural/unoccupied land that provides valuable ecosystem services. The Economic Growth Sector should ensure that agricultural expansion is monitored and mitigated.

d) Investment in Water Programs should ensure that a thorough evaluation is conducted that evaluates and mitigates potential impacts of irrigation scheme construction and rehabilitation. Potential impacts of concern are withdrawing of water and the effects on downstream users (including the ecosystem); salinization of soils; and expansion of land under agriculture (encroachment into unoccupied land that provides valuable ecosystem services).

3. FATA and KP Stabilization

Agriculture, construction, and other activities planned under this sector area could have environmental impacts as described for the other sectors, and appropriate environmental review and mitigation will be required.

4. Education

Construction or rehabilitation of schools could result in adverse environmental impacts that will need to be evaluated and mitigated as required by USAID’s Environmental Compliance Procedures.

5. Health

Although USAID assistance will not directly result in the production of healthcare waste including expired/unused pharmaceuticals, USAID's Health Program could have a positive effect on the environment, including biodiversity, by assisting Pakistan to identify appropriate medical waste disposal measures and strengthening pharmaceutical distribution systems (including provisions for dealing with expired and unused drugs).

7.3 Recommendations for Integrating Climate Change into the USAID CDCS and USAID Programs

Climate change is a cross-cutting area in the CDCS, is a key area of interest for USAID and Pakistan, and has the potential to significantly impact Pakistan's biodiversity and affect the livelihoods of Pakistan's people. Therefore, the FAA 118/119 Team provides the following recommendations, in order of priority, to support climate change adaptation and mitigation.

1. As part of the cross-cutting area of climate change, USAID should consider strengthening the capacity of GOP, NGOs, and CBOs so they are "REDD-ready," i.e., so they have the skills and knowledge needed to participate in, design, and benefit from REDD activities. (This could help contribute to "Climate Change Research & Development Project," an as-yet unfunded project in the GOP's five-year plan). REDD can also be a source of alternative income generation activities.
2. Given the potential impacts of climate change in Pakistan, USAID should integrate climate change adaptation activities into their portfolio, in particular, into USAID Economic Growth (agriculture, water) and FATA and KP Stabilization Sector interventions. Climate change integration should first be at the CDCS phase to ensure that it then feeds into USAID programs.
3. USAID should consider supporting climate change analyses (modeling and scenario-building to support adaptive management planning) as part of disaster management and prevention (i.e., flood control). These analyses could then also be used in assessing the PA system and revising boundaries in line with climate change predictions; and to help implement the ecosystem approach in biodiversity conservation and PA management.
4. USAID should consider assisting Pakistan to achieve Target 15 of the Strategic Plan for Biodiversity (under the Convention for Biological Diversity), which pertains to climate change adaptation and mitigation: Strategic goal D: "Enhance the benefits to all from biodiversity and ecosystem services," Target 15, "By 2020, ecosystem resilience and the contribution of biodiversity to carbon stocks has been enhanced, through conservation and restoration, including restoration of at least 15 percent of degraded ecosystems, thereby contributing to climate change mitigation and adaptation and to combating desertification." USAID support to achieve this goal could be provided in a variety of ways, and is in line with USAID's Economic Growth Sector and FATA and KP Stabilization Sector—with climate change as a cross-cutting area. (This could help contribute to "Rehabilitation of Riverine, Irrigated, and Mangroves Forests" and "Rehabilitation of degraded rangelands with involvement of local communities," both unfunded under the GOP five-year plan.)

7.4 Recommendations for Supporting Biodiversity/Tropical Forest Conservation

Since the USAID CDCS is in the early stage of development, the FAA 118/119 Team is providing the following recommendations to USAID to encourage the inclusion of a biodiversity focus area in the CDCS. The following biodiversity conservation recommendations, in order of priority, could contribute to USAID's Economic Growth Sector Area, USAID's FATA and KP Stabilization Sector Area, or could be included in a stand-alone or cross-cutting biodiversity/environment sector area.

1. USAID should consider supporting community-based conservation. This would contribute to improved governance and rule of law, stabilization and security. It would also be in line with the CBD Strategic Plan 2011-2020, Target 18, which states that, "By 2020, traditional knowledge, innovations and practices of indigenous and local communities relevant for the conservation and sustainable use of biodiversity, and their customary use of biological resources, are respected, subject to national legislation and relevant international obligations...."

As described in Section 5.3, one of the "actions needed" to conserve biodiversity in Pakistan is "community-based conservation and sustainable use programs outside PAs." That action is made up of discrete activities that USAID could support to move community-based conservation forward in Pakistan. (This could help contribute to the GOP's "Rehabilitation of degraded rangelands with involvement of local communities.")

2. An alternative approach for supporting community-based conservation/sustainable use would be to support current initiatives in this area that have been successful, replicate them, and scale-up. Initiatives such as WCS's Afghanistan program or various UNDP programs that support community-based conservation and sustainable use provide successful models.
3. Given that Pakistan's population is dependent on a healthy natural resource base: rangeland, aquatic ecosystems, and natural resource-based products, such as medicinal plants and mushrooms, yet key information is lacking about most ecosystems, USAID should consider supporting current efforts to develop a biodiversity information system. This would help build capacity, encourage knowledge sharing, could help monitor effects of climate change, could assist Pakistan in becoming REDD-ready, and would be the basis for future biodiversity/tropical forest conservation programs, as well as contributing to the CBD Strategic Plan. (This would help contribute to "Establishment of National Institute of Biodiversity and Ecosystem Sciences," which is an unfunded activity in the GOP's five-year plan.
4. USAID should consider expanding its geographical focus to include Gilgit-Baltistan (GB) and should consider supporting community-based natural resources management (CBNRM) linked to improved livelihoods and good governance. Given the strategic importance of this area and the high biodiversity importance, community-based conservation initiatives aimed at improving livelihoods through improved natural resources management could provide a "big bang for USAID's buck." A relatively small amount of funding in this stable area, bordering insecure regions, could have a significant effect on biodiversity conservation and on livelihoods. While promoting stability and security, a community conservation and livelihood project in GB would also help stabilize and conserve biodiversity in KPK and FATA since many species (snow leopard, Marco Polo sheep, ibex, markhor, and many others) frequently migrate between GB and KPK and even cross borders to Afghanistan, China, and Central Asian States. A CBNRM project in this region, incorporating good governance and improved livelihoods, could help ensure safe wildlife corridors; secure corridors are one important component for biodiversity conservation in Pakistan.

ANNEXES

Annex A: References

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Annex B: SOW for the FAA 118/119 Assessment

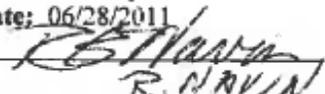
**Agricultural Knowledge and Program Support Task Order
STATEMENT OF WORK – Pakistan Country Analysis for Biodiversity and
Tropical Forests
WORK ASSIGNMENT: 14**

Statement of Work Number: 14

**Complete Title: Pakistan Country Analysis for Biodiversity and Tropical
Forests**

Short Title: Pak-Bio Analysis

Begin Work Date: 06/28/2011

**Approved:  July 11, 2011
R. NARVIN**

1. PURPOSE

The purpose of this task is to conduct revised country biodiversity and tropical forests analyses for Pakistan. The original work was conducted in-house as a desk study in 2004.

The proposed analyses will address the requirements of Section 118 (Tropical Forests); and 119, Biodiversity Analysis of the Foreign Assistance Act of 1961 (as amended), ADS 201.3.8.2, Tropical Forests, and ADS 201.3.9.2, biodiversity analysis for country strategic plans. The analysis is mandatory for the strategic planning process of USAID Mission Strategy.

This analysis is required by Sections 118(e) and 119(d) of the Foreign Assistance Act of 1961, as amended, and may not be waived, modified, or eliminated.

2. BACKGROUND

This Work Assignment falls under the Agriculture Knowledge and Program Support (AKPS) Task Order under the Raise Plus IQC. Under AKPS Weidemann Associates, Inc. has performed thirteen work assignments of varying length and budgets. This SOW follows Work Assignment 12 under this Task Order which provide support for Pakistan Agricultural Strategy Design.

3. OBJECTIVES

Develop a targeted report that will address the requirements of Section 118 (Tropical Forests); and 119, Biodiversity Analysis of the Foreign Assistance Act of 1961 (as amended), ADS 201.3.8.2, Tropical Forests, and ADS 201.3.9.2, biodiversity analysis for country strategic plans. In addition, this assignment will work to assist the Mission in completing its part of the USG CAS.

4. TEAM

The team will consist of the following positions: Biodiversity and Tropical Forest Expert and Local Technical Expert. The Team will be led by the Biodiversity and Tropical Forest Expert. Position qualifications are provided below:

- **International Technical Expert (1 person):** Senior Level Natural Resource Management Specialist with post-graduate qualifications in biology, zoology, forestry or closely related field in natural resource management or natural resource economics. The consultant will have demonstrated experience in FAA 118/119 work with USAID, and adequate background in biodiversity and natural resource conservation. Knowledge of USAID Strategic Planning process related to Biodiversity (FAA 119) and knowledge of 22 CFR 216 is also desirable. Demonstrated expertise in assessing development programs for impacts on environment and ecosystems and of environmental impact assessments. Experience in the region and in Pakistan desirable.
- **Local Technical Expert (1 person):** Senior Level Natural Resource Management Specialist with demonstrated experience in Pakistan environmental law, policy and legal frameworks governing environmental management in Pakistan and the analysis of relevant policies. Good contacts within the Pakistan government agencies, NGOs, international donors, and private sector is preferred.

5. APPROACH

The WAI consultant will work in the US to interview and meet with all needed parties prior to reaching out to Pakistani experts, organizations and institutions. The Pakistani consultant will work in Pakistan to arrange all needed interviews and assignments. The Pakistani consultant will contribute technical expertise as required. The consultant will then return to the US to complete the required reports.

6. TASKS

Biodiversity and Tropical Forests Expert

A) Data Collection:

1. Prior to departure, the Biodiversity Consultant will get acquainted with already existing background information about Pakistan including the 2004 Biodiversity Analysis, Environmental Performance Reports, the National Environmental Action Programs (NEAPs) and the Biodiversity Strategy Action Plan (BSAP) and other relevant host country and/or donor environmental reviews specific to the country's natural resources, ecological and biological specificities, current status of environment and biodiversity, climate change and sustainable landscapes, and institutional organization. The Expert should become knowledgeable about key stakeholders and donors in environment and biodiversity as well as legislation related to the environment and biodiversity, and other relevant information required for the country analysis. Principal donors include the WB, KFW, ADB, SIDA, UNDP etc.
2. Prior to departure, the consultant shall hold meetings with the BEO/OAPA and Country Desk Officer, and other pertinent USAID Washington Technical Staff to gather relevant information on regional programs and Agency environmental regulations. In addition, meetings shall also be held with relevant USG Agencies active in Pakistan.
3. Prior to departure, the consultant shall hold meetings with non-government organizations suggested by USAID/Pakistan, and the BEO/OAPA. Face to face meetings are

preferable though teleconferencing is possible. This includes input from the REA/Asia & OAPA based in Almaty.

4. The consultant should, prior to his/her arrival, consult with Mission personnel to identify stakeholders and local officials with whom he/she wishes to conduct the interviews and identify priority site visits.
5. Develop a questionnaire to solicit background information and facilitate the BA preparation process.
6. Upon arrival in Pakistan, the Consultant under the direction of the MEO/DMEO, USAID/Pakistan will hold meetings with the USAID Mission to obtain detailed information about the programs, objectives, and goals under the Missions current and planned strategy. The Consultant and Director, Program Resource Management (PRM,) USAID/Pakistan will discuss the planned activities required for the analysis as well as the approach that the Consultant will take during the performance on the ground.
7. The Consultant will hold meetings, agreed with the PRM, USAID/Pakistan, with the relevant local government institutions, agencies and Ministries. The Consultant will gather information, recommendations and experiences about past and planned activities from the local officials and persons directly involved in biodiversity issues. The Consultant will gather detailed information about changes in the country's specificities, such as protected areas and endangered species since the 2004 report.
8. The Consultant will hold meetings with other international donors, agencies and NGOs involved in environmental programs in Pakistan and become well informed about ongoing and planned activities by other donors and agencies.

B) Analysis:

Based upon the review of documents, interviews, and site visits, summarize the status of biodiversity in Pakistan.

1. The Consultant will summarize the social, economic, institutional, legal, and policy context for their use and conservation, including actions currently being taken by government, other donors, NGOs, and the private sector.
2. Identify the key direct and indirect threats to biodiversity.
3. Identify the actions necessary to conserve and sustainably manage natural resources and biodiversity in Pakistan in the current context based on analysis of Government, Donor, and NGO responses to meet these needs.
4. Prepare a report on the status of biodiversity conservation efforts in Pakistan and implications for USAID or other donor programming and environmental monitoring, and

provide a set of recommendations, which shall define the actions for USAID/Pakistan to consider ensuring biodiversity protection and sustainability.

C) Report:

Prepare a report describing the analysis and conclusions. This report shall clearly meet the legal requirement of FAA Sec 118 and 119.

Local Technical Expert

1. Identify contacts in Islamabad for the Biodiversity and Tropical Forest Expert to speak with and arrange meetings and visits.
2. Provide technical input as needed throughout process.
3. Assist in procuring documents and other needed research materials as needed.

7. ESTIMATED LEVEL OF EFFORT

It is preferred that this project be completed in Pakistan, however, given the current political situation and the realities involved with procuring the necessary documentation to travel to the country it is acceptable to carry out this project remotely. If the consultant is not able to travel to Pakistan it is anticipated that the Biodiversity and Tropical Forest Expert will spend a cumulative of 20 days LOE working on this project. This is to include 4 days researching and preparation for the assignment, 12 days conducting interviews and meetings both in DC and remotely through conference calls, e-mail and Skype, and four days to write the report and edit it to USAID standards. If the consultant is able to travel to Pakistan than it is anticipated that the consultant will spend a cumulative 40 days of LOE with 5 days being dedicated to prep work, 30 towards research and meeting in Pakistan and an additional 5 days upon return to the US to write the report and edit it to USAID standards.

The work of the Local Technical Expert is also contingent upon the Biodiversity and Tropical Forest consultant procuring a visa. If the Biodiversity and Tropical Forest Expert is unable to procure a visa then the anticipated LOE for the Local Expert is expected to be 15 days of LOE to be performed in assistance of the foreign expert. If the foreign expert is able to get a visa then it is anticipated that the local expert will receive 20 days of LOE.

8. PERIOD OF PERFORMANCE

Work will begin on/about August 1st and end on/about Sept 20th, 2011.

9. DELIVERABLES

The primary deliverable under this task order is a Biodiversity Analysis Report for USAID/Pakistan that examines the tropical forests, biodiversity, natural resource management, and other related environmental issues and identifies contributions and/or potential contributions

to meet identified conservation needs by the Mission's proposed strategy. Per FAA, Sec. 118 and 119(d), the analysis must clearly address the following:

- A. A summary of the actions necessary to achieve conservation and sustainable management of tropical forests; and
- B. The extent to which the actions proposed meets the identified needs. In addition;
 - a. The actions necessary in that country to conserve biological diversity; and
 - b. The extent to which the actions proposed for support by the Agency meet the needs thus identified.

A secondary deliverable will be produced to support the Mission in completing its part of the USG CAS. Once identified and available, the Team and/or Team Leader will review the Objectives and Priority Goals identified through the CAS process and provide summaries for the needs identified in the FAA 119 analysis and state how these needs will be addressed in the chosen objective.

Annex C: Team Biographical Sketches

Karen Menczer – International Technical Expert, Biodiversity & Tropical Forests

Ms. Menczer has an M.S. degree in Ecology and has done course work for a PhD in Ecology with fieldwork in the Galapagos Islands. From 1991-1997, she was a Natural Resources Advisor and Assistant Bureau Environmental Advisor in USAID/Latin America and Caribbean Bureau. From 1997-2002 she lived in Uganda, and worked first as a Natural Resources Advisor and Mission Environmental Officer at USAID/Uganda, and then as an independent consultant. Subsequently, she lived and worked as an independent natural resources consultant in Jamaica, Botswana, and Ghana. Ms. Menczer has been team leader or participated on teams for USAID FAA 118/119 Assessments in: Mexico, Paraguay, Honduras, Uganda (for two 118/119s), Malawi, Ghana, Sudan, Macedonia, Armenia, and Cyprus. She mainly works on USAID Regulation 216, Environmental Threats and Opportunities Assessments (FAA 118/119s), and USAID project design, implementation, monitoring, and project evaluation.

Hamid Marwat – Local Technical Expert, Biodiversity & Tropical Forests

Mr. Marwat currently holds the position of Specialist, Biodiversity Chief, Forestry & Wildlife Section of Planning & Development Division, Government of Pakistan at Islamabad. Mr. Marwat's educational background is in forestry and biodiversity conservation, NRM, remote sensing, and GIS. Additionally, he has taken numerous training courses abroad in community development, biodiversity, protected areas and forest inventory/assessment, environmental impact assessment, and organizational management. Mr. Marwat has expertise in the planning and management of different types of natural resources in varied ecologies. He is also skilled in strategic planning for natural resource management, development planning, monitoring and evaluation, donor relations, and human resources management. Mr. Marwat started his career in 1988 as a professional forester with the Forest Department of the Government of Khyber Pakhtunkhwa Province (KPK) Pakistan. In his 23 years of professional experience, he worked on different assignments including forest protection/conservation and management in KPK, forest resource inventory applying remote sensing and GIS, brown bear conservation in Deosai National Park with rural communities, and he is an expert NRM/Environment with IUCN Pakistan. Mr. Marwat was the pioneer in working on modern techniques, such as GIS and RS in forest management and planning. In recognition of his services in GIS, GTZ (German aid) granted him a special award for pursuing his M.Sc in NRM with specialization in GIS and RS at ITC the Netherlands. Over the years, he has authored several papers and publications on biodiversity conservation, natural resource management, environment, etc.

Annex D: List of Contacts

#	Name	Title	Department	Contact Detail			
				Address	Tel	Fax	Email
1	Mr. Javed Mahmood	Secretary	Ministry of Planning and Development	P Block- Pak Secretariat, Islamabad, Pakistan	9212831	9202704	
2	Dr. Aurangzeb	Chief Environment	Planning Commission of Pakistan	Room 412, 4th Floor Chughtaie Plaza, Planning Commission Near Geo Building- Islamabad	9219396	9210225	
3	Mr. Masood Lohar	National Coordinator SGP	UNDP	House No: 25-26, Bagh-e-Irum, Near Muhammadi Town, Qasimabad, Hyderabad, Sindh	022-2103046	222103047	masood.lohar@undp.org
4	Dr. Muhammad Mohsin Iqbal	Head	(Agri & Cord) Section	Global Impact Study Centre, Islamabad. National Center for Physics NCP Complex Shahdra Road, Quaid e Azim University Campus Islamabad	2077300 Ext: 457		mohsin.iqbal@gcisc.org.pk
5	Mr. Mumtaz SHAH	Deputy Secretary, WB/IDB	EAD	Economic Affairs Division, Room 416.. Block C, Islamabad	9202020	9202417	
6	Mr. Shehzad Hasan Shigri	Director	Environmental Protection Agency (EPA) GB.	EPA, Gilgit-Baltistan			
7	Mr. Muhammad Bashir Khan	Director	Environmental Protection Agency (EPA) AJK.	AJK EPA , Block no 5, Secretariat Muzaffarabad, AJK			

8	Dr. Mohammad Bashir Khan	Director General	Environmental Protection Agency (EPA) KP.	Government of KPK, Peshawar		
9	Mr. Mir Hussain Ali	Secretary	Environment & Alternative Energy Department, Sindh		021-35070871	021-35070872
10	Dr. Muhammad Saqib	Secretary	Environment, Balochistan	Civil Sect, Block 7, 2 nd Floor, Room 22, Government of Baluchistan, Quetta	081-9202421	081-9203268
11	Mr. Mr. Faridullah Khan	Managing Director	ENERCON.	2nd Floor G5/2	9206001	9202657
12	Syed Mahmood Nasir	Inspector General Forests	Planning Division	Forestry Wing, Ministry of Planning, Islamabad.		
13	Mr. Abdul Qadir Rafique	Assistant Country Director	UNDP	4th Floor, Serne Office Complex, G-5 Islamabad	8355641	abdul.qadir@undp.org
14	Mr. Muhammad Ahmad	Programme Coordinator-GEF	UNIDO, Islamabad.			
15	Syed Muhammad Ali	Assistant Representative	FAO	P.O.Box: 1476, NARC Premises, Park Road, Chak Shehzad, Islamabad	9255491-3	mohammad.ali@fao.org
16	Mr. Aman Ullah	National Programme Coordinator	UNDP			
17	Mr. Javaid Afzal	Senior Environment Specialist	World Bank, Islamabad.	Environment & Water Resources Unit (SASDI) World Bank Resident Mission Islamabad-Pakistan	9090161 & 9090186	jafzal@worldbank.org

18	Asif S. Khan	Director General, EPA	Capital Administration Development Division	051-926-7621 0333-519-2556	dg@environment.gov.pk
19	Ashiq Ahmad Khan	Advisor	WWF, Peshawar		ashiqahmad@gmail.com
20	Abdul Wahab,	Director	Zoological Survey Department, Islamabad	Ministry of Science & Technology, Islamabad	
21	Dr. Amjad Tahir Virk	National Coordinator SGP	National Coordinator SLMP Project, Islamabad	P&D Division Islamabad	
22	Dr. Abdul Aleem Chaudhry,	Retired Wildlife Biologist	Lahore		
23	Dr. Shahzad Jehangir , Forester	DIG Forest	P & D Division, Islamabad		
24	Mr. Ali Gohar Hunzai,	Environmental Education	Beacon House School, Islamabad		
25	Mr. Hakim Shah	Director	Pakistan Forest Institute, Peshawar		
26	Dr. Ejaz Ahmad,	Deputy. Director General	WW, Islamabad Pakistan		eahmad@wwf.org.pk
27	Dr. Ghulam Akbar,	Director	WWF, Islamabad Pakistan		akbarwwf@yahoo.com
28	Mr. Mubarak Ali Shah	Chief Conservator of Forests	Wildlife Department, Peshawar		
29	Raja Attaullah Khan,	NRM Specialist	Agency for Barani Area Development,		

Rawalpindi						
30	Dr. M Afzal, Chief Scientist-	Chief Scientist-	Pakistan Agricultural Research Council, Islamabad			
31	Dr. Muhammad Mumtaz Malik, Wildlife Biologist	Wildlife Biologist	Forest Offices, Shami Road Peshawar		0300- 9590821	malik.mumtaz47@gmail.com
32	Mr. Umeed Khalid, Conservator Wildlife NCCW	Conservator Wildlife NCCW	Ministry of Science & Technology, Islamabad			
33	Naem Ashraf Raja	Director Biodiversity	P& D Division, Islamabad	ENERCON Building, G-5/2 Islamabad	051- 9245596 0333-520- 1089	051-9245598 naemashrafraja@yahoo.com
34	Jawad Ali Khan	Director General Environment	P& D Division, Islamabad	Local Government Building, G- 5/2 Islamabad	051- 9245528, 0300-515- 1805	dgmoenv@gmail.com
35	Mr Arshad Gill	Programme Officer	SDC Islamabad	SDC Office, F-6/1 Islamabad		arshad.gill@sdc.net
36	Mr. Hamid Sarfraz	Program Coordinator	IUCN	IUCN Pakistan Islamabad Office	051 2271027- 034	hamid.sarfraz@iucn.org
37	Dr Rehana Siddiqui	Director Climate Change and Environment al Economics	PIDE University, Islamabad	PIDE University, Islamabad	051- 9248078	

38	Andrei Barannik	Regional Environmental Advisor/Asia & OAPA, Acting MEO, USAID Pakistan	USAID/OAPA	abarrannik@usaid.gov
39	John Morgan	Program Officer	USAID/Pakistan	jmorgan@usaid.gov
40	Saqib Ali Khan	PRM	USAID/Pakistan	SaAKhan@usaid.gov
41	Mahmood Hussain	PRM	USAID/Pakistan	mhussain@usaid.gov
42	Larry Dolan	Education Officer	USAID/Pakistan	ldolan@usaid.gov
43	Carrie Abendroth	Agriculture Officer	USAID/Pakistan	cabendroth@usaid.gov
44	Rosario Calderon	Energy Officer	USAID/Pakistan	rcalderon@usaid.gov
45	Al Merkel	Mission Environmental Officer/Agriculture Officer	USAID/Pakistan	amerkel@usaid.gov
46	Virginia Morgan	Development, Outreach, & Communications	USAID/Pakistan	vmorgan@usaid.gov
47	Steven Majors	Deputy Program Officer	USAID/Pakistan	smajors@usaid.gov
48	Jeffrey Bakken	Desk Officer	USAID/OAPA	jbakken@usaid.gov

49	Gordon Weynand	Bureau Environmental Officer	USAID/OAPA/TS	gweynand@usaid.gov
50	Mary Melnyk	Biodiversity Advisor	USAID/ME/TS	mmelnyk@usaid.gov
51	Peter Zahler	Deputy Director, WCS Asia Program	Wildlife Conservation Society	pzahler@wcs.org

Annex E: 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
	<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
	<i>Hordeum murinum</i>	KP, 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
	<i>Brassica deflexa</i>	Western part of North
Wild relatives of kenaf	<i>Hibiscus caesius</i>	North Punjab, KP, Kashmir
	<i>Hibiscus micranthus</i>	Sindh and
	<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
Wild cherry	<i>Cerranus rechingeri</i>	North Balochistan
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

Annex F: Environmental Value/ Benefits of Mature Standing Trees

S. No.	Products and services	Annual production (quantity)	Value of the product/ service or replacement cost (US \$)	Annual value of a standing tree (US \$)
1	Production of oxygen and absorption of Carbon dioxide	4.6 tones oxygen 6.3 tones of carbon dioxide	Mechanical extraction of such products will cost 120/year	120.00
2	Organic material and fodder	55.00 kg.	Equivalent to fodder is 150/year	150.00
3	Retain water as mini reservoir and reduce runoff	30000 liters	Building such a mini water reservoir may cost 106/year	106.00
4	Lower plants and insects production that helps in decomposition. Humus and green manure production.	Bacteria = 40 kg Fungi & algae = 40 kg Earthworms = 16 kg Other insects = 3kg	Synthesis of these products will cost 177, 133 and 118/year	177.00 133.00 118.00
5	Balance of nature due to its care and maintenance by tree	Saving of the cost of keeping natural balance and limitation of pests	Artificially such natural balance may cost 2130/Ha	2.13
6	Absorption of dust pollution, detoxification of air and biological monitoring	1-Dust absorption = 700 kg 2-Air Detoxification 3-Biological monitoring	Annual values of these services are estimated at 150,14 &150/year	150.00 14.00 150.00
7	Deodorizes air	Deodorants cost per day and per annum	Manufacture of such product may cost 1/day	365.00
8	Supply of water for irrigation and drinking Prevention of runoff of rain water	1-Retention of ground water table for irrigation & drinking purposes 2-Prevention of rain water runoff	Supply of per Ha irrigation and drinking water may cost 3500 and preventive steps for such runoff cost 1000/year	3.50 1.00

9	Tree protective function against wind and water erosion	1-Wind and water erosion control measure 2-Replacement cost of landslides and avalanches 3-Embankments & lakes stabilization	Mechanical measures to protect wind and water erosion may cost 2/year, Concrete retaining walls & embankments may cost 145 and 1/year	2.00 145.00 1.00
10	Maintenance of land value	Land value stabilization	Mechanical land stabilization cost may be 71/year	71.00
Total				1708.63

Source: Khurshid, 2000, *Forest Management Dynamics in the Siran Watershed of the Western Himalayas Region of Pakistan: a Forestry Resources Policy perspective*. Doctoral Dissertation Published by the Asian Institute of Technology, Bangkok, Thailand.

Annex G: Commercially Important Medicinal Plants Collected from Forests in Pakistan

Name	Botanical name	Part used	Estimated quantities extracted annually (tons)	Price (Rs/kg)	Export potential; comments
Mushk-e-Bala	<i>Valeriana wallichii</i>	Roots	300-400	40-50	About 150 tons exported to Hong Kong and Germany @Rs. 40-50 per kg.
Persoshan (maiden hair fern)	<i>Adiantum capillus</i>	Whole plant	100-125	6-8	About 15-20 tons exported to Germany each year. Extraction can be increased up to 1,000 tons per year.
Anjabar	<i>Polygonum amplexicule</i>	Roots	40	10	-
Unab	<i>Zizyphus vulgaris</i>	Fruits	30-40	10-12	-
Hub-al-as (Munru)	<i>Myrtus communis</i>	Fruits and leaves	40-45	40	-
Banafsha	<i>Viola serpens</i>	Flowers	30	100-240	Up to 200 tons can be collected easily
		Leaves	40	15	
Suranjan-e-Telkh	<i>Colchicum luteum</i>	Corms	12	60	Entire quantity is exported to Germany, South Africa, France and Bulgaria
		Seeds	2	125-150	
Ban Kakri	<i>Podophyllum emodi</i>	Rhizomes and roots	30-60	40-45	Exported to Belgium
Kamila	<i>Mallotus philippensis</i>	Fruits	4-5	40-50	-
Mamekh	<i>Paeonia emodi</i>	Rhizomes	18	22	-
Afsantine	<i>Artemisia maritima</i>	Leaves/ shoots	100-150	15	-
Ajwain	<i>Carum copticum</i>	Seeds	200	15	-
Chiraita	<i>Swertia chirata</i>	Twigs	30	28	-
Wirch	<i>Acorus calamus</i>	Roots	10	24	-
Darhald or Meda Chob	<i>Berberis lycium</i>	Wood Roots	600	10	-
			120	14	
Khurasani	<i>Hyocyamus niger</i>	Seeds	2	20	-
Ajwain Khaksir	<i>Sisymbrium irio</i>	Seeds	50	10	-
Ajwain	<i>Carum copticum</i>	Seeds	200	15	-
Zeera Siah	<i>Carum carvi</i>	Seeds	10	160-180	-
Bermi Booti	<i>Centella asiatica</i>	Whole plant	12	32	-
Meetha Teela or sufaid Mori	<i>Aconitum chasmanthum</i>	Roots	4	25	-

Atis	<i>Aconitum heterophyllum</i>	Roots	2	250	-
Kaniz (Yam)	<i>Dioscorea deltoidea</i>	Rhizome	230	16	Kurram Chemical purchases it @Rs 4-5 per kg. Also reported to be exported to Japan
Angoor shefa (Belladonna)	<i>Atropa acuminata</i>	Whole plant	10	12	-
Barg-u; Azra (Foxglove)	<i>Digitalis purpurea</i>	Whole plant	10	10	-
Bhaikar	<i>Adhatoda vasica</i>	Leaves	20	5	-
Bhang	<i>Cannabis sativa</i>	Whole plant	20	10	-
Panir Dodi	<i>Withania coagulans</i>	Fruit	125	5	-
Asgand	<i>Withania sominifera</i>	Roots	32	35	-
Amaltas	<i>Cassia fistula</i>	Pods	150	15	-
Baid Mushk	<i>Salix alba</i>	Bark	10	18	-
Jangli piaz Scilla	<i>Urginea indica</i>	Bulbs	6	30	-
Indrayan (Colocynth)	<i>Citrulus colocynthus</i>	Fruits	12	9	-
Asmania	<i>Ephedra nebrodensis</i>	Twigs	780	43	-

Source: Iqbal, 1991 and Khan, 1985

Annex H: Protected Areas of Pakistan

Sr. No	Name	Govt Classification	IUCN_ CAT	N_Year	PROV_NAME	DIST_NAME	TEHS_NAME	POINT_X	POINT_Y
1	Adenzai	Community Game Reserve		0	Khyber Pakhtunkhwa	Lower Dir	Temergara	72.04872	34.71838
2	Alam Gang	Community Game Reserve		0	Khyber Pakhtunkhwa	Kohat	Kohat	71.44463	33.38209
3	Amluk Banr1	Community Game Reserve		0	Khyber Pakhtunkhwa	Buner	Daggar	72.23425	34.53564
4	Amluk Banr2	Community Game Reserve		0	Khyber Pakhtunkhwa	Swat	Matta	72.39514	34.89899
5	Arkari	Community Game Reserve		0	Khyber Pakhtunkhwa	Chitral	Chitral	71.67666	36.20413
6	Babar	Community Game Reserve		0	Khyber Pakhtunkhwa	D. I. Khan	Kulachi	70.39005	31.48894
7	Baga hills	Community Game Reserve		0	Khyber Pakhtunkhwa	Swabi	Swabi	72.44562	34.27596
8	Banda Lakkana	Community Game Reserve		0	Khyber Pakhtunkhwa	Karak	Karak	71.29707	33.20964
9	Barh	Community Game Reserve		0	Khyber Pakhtunkhwa	Swat	Swat	72.56398	35.52213
10	Battal	Community Game Reserve		0	Khyber Pakhtunkhwa	Mansehra	Mansehra	73.14917	34.58869
11	Begusht	Community Game Reserve		0	Khyber Pakhtunkhwa	Chitral	Chitral	71.51038	35.90327
12	Besak	Community Game Reserve		0	Khyber Pakhtunkhwa	Swabi	Swabi	72.63683	34.07231
13	Bhan	Community Game Reserve		0	Khyber Pakhtunkhwa	Swat	Swat	72.56398	35.52213
14	Dad Manpithai	Community Game Reserve		0	Khyber Pakhtunkhwa	Swat	Swat	72.47552	34.96413
15	Dara Tang Mouza Chowki jand	Community Game Reserve		0	Khyber Pakhtunkhwa	Lakki Marwat	Lakki Marwat	71.16183	32.61043
16	Darwazai Banda	Community Game Reserve		0	Khyber Pakhtunkhwa	Kohat	Kohat	71.44463	33.38013
17	Dewan Shah	Community Game Reserve		0	Khyber Pakhtunkhwa	D. I. Khan	Kulachi	70.30019	32.07988

		Reserve			Pakhtunkhwa				
18	Dhandidal Khel	Community Game Reserve		0	Khyber Pakhtunkhwa	Karak	Karak	71.38860	33.24709
19	Dheran Pattay	Community Game Reserve		0	Khyber Pakhtunkhwa	Swat	Matta	72.39956	34.91239
20	Dowro/Algada	Community Game Reserve		0	Khyber Pakhtunkhwa	Kohat	Kohat	71.24784	33.60553
21	Drish Khel	Community Game Reserve		0	Khyber Pakhtunkhwa	Karak	Banda Daud Shah	70.95258	33.20795
22	Garu Amankot	Community Game Reserve		0	Khyber Pakhtunkhwa	Mardan	Mardan	72.36504	34.37282
23	Garyalla Karmar	Community Game Reserve		0	Khyber Pakhtunkhwa	Mardan	Mardan	72.26848	34.26285
24	Gehrait	Community Game Reserve		0	Khyber Pakhtunkhwa	Chitral	Chitral	71.81075	35.64321
25	Goleen Gol	Community Game Reserve		0	Khyber Pakhtunkhwa	Chitral	Chitral	71.98373	35.93717
26	Gurlangi	Community Game Reserve		0	Khyber Pakhtunkhwa	Kohat	Kohat	71.17457	33.38514
27	Hussianzai	Community Game Reserve		0	Khyber Pakhtunkhwa	D. I. Khan	Kulachi	70.67003	32.20486
28	Jatta Ismail Khel	Community Game Reserve		0	Khyber Pakhtunkhwa	Karak	Banda Daud Shah	71.27972	33.33414
29	Kaighah Nullah	Community Game Reserve		0	Khyber Pakhtunkhwa	Kohistan	Pattan	72.84668	35.19849
30	Kamar	Community Game Reserve		0	Khyber Pakhtunkhwa	Karak	Takhat Nasrati	70.98488	33.04147
31	Kanra Cheenah	Community Game Reserve		0	Khyber Pakhtunkhwa	Hangu	Hangu	70.70509	33.40224
32	Khanori	Community Game Reserve		0	Khyber Pakhtunkhwa	Malakand PA	Swat Rani Zai	71.65792	34.50891
33	Kohi Barmool	Community Game Reserve		0	Khyber Pakhtunkhwa	Mardan	Mardan	72.11361	34.49207
34	Kohi Dara	Community Game Reserve		0	Khyber Pakhtunkhwa	Mardan	Mardan	72.32397	34.36554
35	Madaklasht	Community Game Reserve		0	Khyber Pakhtunkhwa	Chitral	Chitral	72.02950	35.77820
36	Mahal Kalu	Community Game Reserve		0	Khyber Pakhtunkhwa	Mardan	Takht Bhai	71.96957	34.42976

37	Mankial	Community Game Reserve		0	Khyber Pakhtunkhwa	Swat	Swat	72.61686	35.32699
38	Manur	Community Game Reserve		0	Khyber Pakhtunkhwa	Chitral	Chitral	71.55255	35.96694
39	Michen Khel	Community Game Reserve		0	Khyber Pakhtunkhwa	D. I. Khan	Kulachi	70.38267	31.68687
40	Mohib Banda	Community Game Reserve		0	Khyber Pakhtunkhwa	Nowshera	Nowshera	71.78776	34.05424
41	Nanser Kuhay	Community Game Reserve		0	Khyber Pakhtunkhwa	Buner	Daggar	72.25091	34.49447
42	Palsala Dhanaka	Community Game Reserve		0	Khyber Pakhtunkhwa	Mansehra	Mansehra	73.14917	34.58869
43	Pungi Banda	Community Game Reserve		0	Khyber Pakhtunkhwa	Hangu	Hangu	70.82880	33.42104
44	Punjpir	Community Game Reserve		0	Khyber Pakhtunkhwa	Swabi	Swabi	72.48108	34.09451
45	Rakh Sarkar Mouza Momin Mughala Khel	Community Game Reserve		0	Khyber Pakhtunkhwa	Bannu	Bannu	70.76944	32.89194
46	Shamshukai	Community Game Reserve		0	Khyber Pakhtunkhwa	Karak	Karak	71.40203	33.13533
47	Shehzadi Banda	Community Game Reserve		0	Khyber Pakhtunkhwa	Kohat	Kohat	71.42887	33.31449
48	Sheikh Sultan	Community Game Reserve		0	Khyber Pakhtunkhwa	Tank	Tank	70.26920	32.11862
49	Sheikh Sultan	Community Game Reserve		0	Khyber Pakhtunkhwa	Tank	Tank	70.26921	32.12055
50	Shewa Karmar	Community Game Reserve		0	Khyber Pakhtunkhwa	Swabi	Swabi	72.28344	34.25438
51	Sigram	Community Game Reserve		0	Khyber Pakhtunkhwa	Swat	Swat	72.35899	34.86942
52	Sori Malandri	Community Game Reserve		0	Khyber Pakhtunkhwa	Mardan	Mardan	72.34466	34.40131
53	Sumari Bala	Community Game Reserve		0	Khyber Pakhtunkhwa	Kohat	Kohat	71.17447	33.46565
54	Takwara(Hathala)	Community Game Reserve		0	Khyber Pakhtunkhwa	D. I. Khan	Kulachi	70.62789	32.14497
55	Tang Banr	Community Game Reserve		0	Khyber Pakhtunkhwa	Swat	Matta	72.38067	34.91044

56	Tangi Darra	Community Game Reserve		0	Khyber Pakhtunkhwa	Lower Dir	Temergara	71.84427	34.82831
57	Thath Solhan	Community Game Reserve		0	Khyber Pakhtunkhwa	D. I. Khan	D. I. Khan	70.77224	31.51320
58	Tooshi Shasha	Community Game Reserve		0	Khyber Pakhtunkhwa	Chitral	Chitral	71.80678	35.91992
59	Totalai	Community Game Reserve		0	Khyber Pakhtunkhwa	Malakand PA	Swat Rani Zai	71.72696	34.56544
60	Ustarzai Payan	Community Game Reserve		0	Khyber Pakhtunkhwa	Kohat	Kohat	71.24784	33.60553
61	Village Musabad Gandhi Khan Khel	Community Game Reserve		0	Khyber Pakhtunkhwa	Lakki Marwat	Lakki Marwat	70.70636	32.74330
62	Village Paher Khel Thall	Community Game Reserve		0	Khyber Pakhtunkhwa	Lakki Marwat	Lakki Marwat	70.87527	32.64880
63	Abbasia	Game Reserve	IV	0	Punjab	Rahim Yar Khan	Liaquat Pur	71.07812	29.09894
64	Askor Nullah	Game Reserve	Unassigned	1975	Gilgit-Baltistan	Diamir	Astore	75.06670	35.16670
65	Bagra	Game Reserve		0	Khyber Pakhtunkhwa	Haripur	Haripur	73.07462	33.97789
66	Balyamin	Game Reserve		0	Khyber Pakhtunkhwa	Hangu	Hangu	70.90886	33.50686
67	Bhon Fazil_?	Game Reserve	IV	0	Punjab	Gujranwala	Wazirabad	73.70805	32.25291
68	Bhono	Game Reserve	IV	0	Punjab	Lahore	Lahore City	74.08448	31.33397
69	Chashi/Bawaster	Game Reserve	Unassigned	1975	Gilgit-Baltistan	Ghizer	Gupis/Yasin	72.93213	36.35291
70	Chaupalia_?	Game Reserve	Ia	0	Punjab	Bahawalnagar	Minchinabad	73.59210	30.11134
71	Daluana	Game Reserve	Unassigned	1965	Punjab			0.00000	0.00000
72	Danyor Nallah	Game Reserve	Unassigned	1975	Gilgit-Baltistan	Gilgit	Gilgit	74.40000	35.95000
73	Darmalak	Game Reserve		0	Khyber Pakhtunkhwa	Kohat	Kohat	71.25636	33.41243
74	Daulana	Game Reserve	V	0	Punjab	Jhang	Jhang	72.05496	31.51216
75	Deh Jangisar	Game Reserve	III	0	Sindh	Thatta	Ghorabari	67.66683	24.33346
76	Deh Jangisar	Game Reserve	IV	1965	Sindh	Thatta	Mirpur Sakro	67.50000	24.41670

77	Deh Khalifa	Game Reserve	IV	1965	Sindh	Thatta	Ghorabari	67.66670	24.33330
78	Deh Sahib Saman	Game Reserve	IV	0	Sindh	Sanghar	Tando Adam	68.58000	25.82972
79	Dhoda	Game Reserve		0	Khyber Pakhtunkhwa	Kohat	Kohat	71.48806	33.47922
80	Diljabba-Domeli	Game Reserve	Unassigned	1972	Punjab	Jhelum	Sohawa	73.23527	32.99688
81	Dosu Forest	Game Reserve	IV	1973	Sindh	Shikarpur	Lakhi	68.83330	27.83330
82	Drosh Gol	Game Reserve		0	Khyber Pakhtunkhwa	Chitral	Chitral	71.79513	35.56017
83	Gat Wala	Game Reserve	V	0	Punjab	Faisalabad	Faisalabad Sadar	73.21066	31.47058
84	Gehrait Gol	Game Reserve		0	Khyber Pakhtunkhwa	Chitral	Chitral	71.76152	35.58638
85	Ghurzandi	Game Reserve		0	Khyber Pakhtunkhwa	Kohat	Kohat	71.17456	33.38316
86	Gogi	Game Reserve	Unassigned	1962		Kharan	Mashkhel	63.33117	27.55974
87	Goleen Gol	Game Reserve		0	Khyber Pakhtunkhwa	Chitral	Chitral	72.18093	36.03021
88	Hala	Game Reserve	IV	1965	Sindh	Sanghar	Tando Adam	68.66670	25.91670
89	Head Islam/Chak Kotora	Game Reserve	III	0	Punjab	Bahawalnagar	Chishtian	72.56978	29.83007
90	Head Qadirabad	Game Reserve	Unassigned	1995	Punjab	Gujranwala	Wazirabad	73.68994	32.32463
91	Hillan	Game Reserve	Unassigned	1982	AJ&K	Bagh	Haveli	74.23330	33.98330
92	Indo-Pak Border-I	Game Reserve	III	0	Punjab	Kasur	Kasur	74.29331	30.82439
93	Indo-Pak Border-II	Game Reserve	III	0	Punjab	Bahawalnagar	Minchinabad	73.93059	30.28166
94	Indo-Pak Border-III	Game Reserve	III	0	Punjab	Bahawalnagar	Bahawalnagar	73.32288	29.79686
95	Indo-Pak Border-IV	Game Reserve	III	0	Punjab	Bahawalnagar	Fortabbas	72.91068	29.05906
96	Indus River	Game Reserve		0	Khyber Pakhtunkhwa	D. I. Khan	D. I. Khan	70.92434	31.80439
97	Indus River # 2	Game Reserve	IV	1974	Sindh	Sukkur	Pano Aqil	69.00000	27.91670
98	Islamabad	Game Reserve	Unassigned	1980	Islamabad	Islamabad	Islamabad	73.08330	33.71670

			gned						
99	Jabbar	Game Reserve		0	Khyber Pakhtunkhwa	Kohat	Kohat	71.87143	33.54808
100	kachai Marai	Game Reserve		0	Khyber Pakhtunkhwa	Kohat	Kohat	71.15233	33.63207
101	Kalinjar	Game Reserve		0	Khyber Pakhtunkhwa	Haripur	Haripur	72.87951	34.16714
102	Kamrani	Game Reserve		0	Khyber Pakhtunkhwa	Lower Dir	Temergara	71.81388	34.78859
103	Kathar	Game Reserve	Unassi gned	1978	Islamabad	Islamabad	Islamabad	73.11670	33.75000
104	Kazinag	Game Reserve	IV	0	AJ&K	Poonch	Hajira	73.92754	33.75947
105	Kheri Murat	Game Reserve	Unassi gned	1964	Punjab	Attock	Fateh Jang	72.77830	33.46331
106	Khipro Forest	Game Reserve	IV	0	Sindh	Sanghar	Khipro	69.36670	25.81670
107	Kilik/Mintaka	Game Reserve	Unassi gned	1975	Gilgit-Baltistan	Gilgit	Hunza	75.06670	36.93330
108	Killan	Game Reserve	III	0	AJ&K	Kotli	Kotli	73.99854	33.55649
109	kingar Gali	Game Reserve		0	Khyber Pakhtunkhwa	Buner	Daggar	72.24121	34.51102
110	Kot Sabzal	Game Reserve	Unassi gned	1978	Punjab	Rajanpur	Rojhan	70.10843	28.97886
111	Mahodand (Kalam)	Game Reserve	VIII	1994	Khyber Pakhtunkhwa	Swat	Swat	72.63542	35.73066
112	Makhnial	Game Reserve		0	Khyber Pakhtunkhwa	Mansehra	Bala Kot	73.52705	34.79968
113	Mando Dero	Game Reserve	IV	1972	Sindh	Ghotki	Ghotki	69.33330	27.91670
114	Mang	Game Reserve		0	Khyber Pakhtunkhwa	Haripur	Haripur	72.94629	33.91476
115	Maraiwan	Game Reserve	VIII	1984	Khyber Pakhtunkhwa			0.00000	0.00000
116	Marchungee	Game Reserve		0	Khyber Pakhtunkhwa	Kohat	Kohat	71.58230	33.42853
117	Maroba	Game Reserve		0	Khyber Pakhtunkhwa	Nowshera	Nowshera	71.93816	33.79342
118	Mirpur Sakro	Game Reserve	IV	1965	Sindh	Thatta	Mirpur Sakro	67.63330	24.55000

119	Moji	Game Reserve	Unassigned	1982	AJ&K	Muzaffarabad	Hattian	73.81670	34.28330
120	Mori Said Ali	Game Reserve	Unassigned	1982	AJ&K	Bagh	Haveli	74.10000	33.93330
121	Namal Lake	Game Reserve	Unassigned	1970	Punjab	Mianwali	Mianwali	71.80509	32.68792
122	Nar/Ghoro Nallah	Game Reserve	Unassigned	1975	Gilgit-Baltistan	Baltistan	Skardu	75.20000	35.10000
123	Nara	Game Reserve	IV	1962	Sindh	Khairpur	Nara	69.00000	27.00000
124	Nazbar Nallah	Game Reserve	Unassigned	1975	Gilgit-Baltistan	Ghizer	Gupis/Yasin	73.31670	36.36670
125	Nizam Pur	Game Reserve		0	Khyber Pakhtunkhwa	Nowshera	Nowshera	72.03291	33.80155
126	Pai Forest	Game Reserve	IV	1976	Sindh	Sanghar	Shahdadpur	68.50000	26.16670
127	Pakora	Game Reserve	Unassigned	1975	Gilgit-Baltistan	Ghizer	Punial/Ishkoman	73.88330	36.40000
128	Phala/Kuthnar	Game Reserve	Unassigned	1982	AJ&K	Bagh	Haveli	74.16670	33.95000
129	Pind Hashim Khan	Game Reserve		0	Khyber Pakhtunkhwa	Haripur	Haripur	73.01422	34.05175
130	Puritgol&chinar	Game Reserve		0	Khyber Pakhtunkhwa	Chitral	Chitral	71.86821	35.58638
131	Qalandar Abad	Game Reserve		0	Khyber Pakhtunkhwa	Abbottabad	Abbottabad	73.24142	34.26542
132	Qazi Nag	Game Reserve	Unassigned	1982	AJ&K	Muzaffarabad	Hattian	73.93330	34.21670
133	Rahri Bungalow_?	Game Reserve	Ia	0	Punjab	Rahim Yar Khan	Sadiqabad	70.04304	28.13603
134	Rakh Sardaran	Game Reserve		0	Khyber Pakhtunkhwa	Haripur	Haripur	72.79195	33.94929
135	Rakh Sardaran	Game Reserve		0	Khyber Pakhtunkhwa	Haripur	Haripur	72.79195	33.94929
136	Rakh Topi	Game Reserve		0	Khyber Pakhtunkhwa	Kohat	Kohat	71.70377	33.19606
137	Rasool Barrage	Game Reserve	IV	1974	Punjab	Mandi Bahauddin	Mandi Bahauddin	73.52407	32.68502
138	Resi,Toi Banda	Game Reserve		0	Khyber Pakhtunkhwa	Kohat	Kohat	71.80201	33.40946

139	Sahib Samo	Game Reserve	IV	1966	Sindh	Sanghar	Tando Adam	68.58330	25.83330
140	Salkhala	Game Reserve	IV	1982	AJ&K	Neelum	Athmuqam	73.91670	34.58330
141	Sewagalai	Game Reserve		0	Khyber Pakhtunkhwa	Swat	Swat	72.21161	34.75443
142	Shamshtoo	Game Reserve		0	Khyber Pakhtunkhwa	Nowshera	Nowshera	71.81054	33.88226
143	Shawaki Chukhtoo	Game Reserve		0	Khyber Pakhtunkhwa	Karak	Banda Daud Shah	71.34058	33.28895
144	Sherqillah	Game Reserve	Unassigned	1975	Gilgit-Baltistan	Ghizer	Punial/Ishkoman	73.96670	36.30000
145	Shinawari	Game Reserve		0	Khyber Pakhtunkhwa	Hangu	Hangu	70.80153	33.52267
146	Surjan, Sumbak, Eri and	Game Reserve	IV	1976	Sindh	Dadu	Thano Bula Khan	67.86670	25.50000
147	Tando Mitha Khan	Game Reserve	IV	1976	Sindh	Sanghar	Sanghar	69.08330	25.91670
148	Tangir	Game Reserve	Unassigned	1975	Gilgit-Baltistan	Diamir	Darel/Tangir	73.40000	35.60000
149	Teri,Isak kumara	Game Reserve		0	Khyber Pakhtunkhwa	Karak	Banda Daud Shah	71.03049	33.33452
150	Thal-I	Game Reserve	Unassigned	1978	Punjab	Khushab	Noorpur	71.93638	31.79314
151	Thanedarwala	Game Reserve		0	Khyber Pakhtunkhwa	Karak	Banda Daud Shah	71.03049	33.33452
152	Tooshi Gol	Game Reserve		0	Khyber Pakhtunkhwa	Chitral	Chitral	71.81862	35.97586
153	Totalai	Game Reserve		0	Khyber Pakhtunkhwa	Buner	Daggar	72.49674	34.19088
154	Ucchali Lake	Game Reserve	Unassigned	1986	Punjab	Khushab	Khushab	72.02532	32.55861
155	Wam	Game Reserve	Unassigned	1962		Ziarat	Ziarat	67.45000	30.43330
156	Zangi Nawar	Game Reserve	Unassigned	1982		Chagai	Nushki	65.78330	29.45000
157	Zarkani	Game Reserve		0	Khyber Pakhtunkhwa	D. I. Khan	Kulachi	70.26346	31.81675
158	Zawarkhan	Game Reserve	IV	0		Quetta	Quetta	67.06428	30.25988
159	Ayubia	National Park		0	Khyber	Abbottabad	Abbottabad	73.41271	34.03208

					Pakhtunkhwa				
160	Broghil	National Park			Khyber Pakhtunkhwa	Chitral		73.37057	36.81920
161	Central Karakoram	National Park	Unassigned	1995	Gilgit-Baltistan	Baltistan	Shigar	76.08330	35.83330
162	Chinji	National Park	II	1987	Punjab	Chakwal	Tala Gang	72.37794	32.69237
163	Chitral Gol	National Park		0	Khyber Pakhtunkhwa	Chitral	Chitral	71.70350	35.89176
164	Deosai Plains	National Park	Unassigned	1993	Gilgit-Baltistan	Baltistan	Skardu	75.41327	35.02144
165	Ghamot	National Park	Unassigned	2004	AJ&K	Neelum	Athmuqam	74.20000	35.00000
166	Handrap Shandhoor	National Park	Unassigned	1993	Gilgit-Baltistan	Ghizer	Gupis/Yasin	72.61670	36.00000
167	Hazar Ganji-Chiltan	National Park	IV	0		Khuzdar	Naal	66.16667	27.46667
168	Hingol	National Park	II	1997		Awaran	Awaran	65.55000	25.58330
169	Kala Chitta	National Park	Unassigned	1983	Punjab	Attock	Attock	72.3333	33.6667
170	Khunjerab	National Park	II	1975	Gilgit-Baltistan	Gilgit	Hunza	75.36205	36.80158
171	Kirthar	National Park	II	1974	Sindh	Dadu	Thano Bula Khan	67.50000	25.75000
172	Lal Suhanra	National Park	V	1972	Punjab	Bahawalpur	Khairpur Tamewali	71.98507	29.43936
173	Lulusar&Dodipath	National Park		2005	Khyber Pakhtunkhwa	Mansehra	Bala Kot	73.92821	35.08193
174	Machiara	National Park	Unassigned	1996	AJ&K	Muzaffarabad	Muzaffarabad	73.56670	34.50000
175	Margalla Hills	National Park	V	1980	Islamabad	Islamabad	Islamabad	73.16670	33.80000
176	Muree Kotli Satian	National Park			Punjab			73.48161	33.83521
177	Musk Deer Gorez	National Park		0	AJ&K			0.00000	0.00000
178	Pir Lasorha	National Park		2005	AJ&K	Sudhnoti	Pallandari	73.84822	33.63097
179	Poonch River	National Park			AJ&K			73.84775	33.43835
180	SaifulMaluk	National Park		0	Khyber Pakhtunkhwa	Mansehra	Bala Kot	73.70416	34.86336

181	Shiekh Badin	National Park		2005	Khyber Pakhtunkhwa	Lakki Marwat	Lakki Marwat	70.80024	32.30004
182	Toli Pir	National Park		2005	AJ&K	Poonch	Rawalakot	73.91788	33.88430
183	Deva Batala	National Park	Unassigned	1982	AJ&K	Bhimber	Barnala	74.2667	32.9667
184	Karumbar	National Park		2011	Gilgit-Baltistan	Ghizer	ishkoman	73.854209	36.852807
185	Darban Kalan	Private Game Reserve		0	Khyber Pakhtunkhwa	D. I. Khan	Kulachi	70.23073	31.74400
186	Dhok Dheri	Private Game Reserve		0	Khyber Pakhtunkhwa	Kohat	Kohat	71.85268	33.43057
187	Dhok Loharan	Private Game Reserve		0	Khyber Pakhtunkhwa	Kohat	Kohat	71.83661	33.42414
188	Drabo Kach	Private Game Reserve		0	Khyber Pakhtunkhwa	Kohat	Kohat	71.67615	33.35343
189	Hatala	Private Game Reserve		0	Khyber Pakhtunkhwa	D. I. Khan	Kulachi	70.36349	32.05226
190	Jhandar Abdul Sattar	Private Game Reserve		0	Khyber Pakhtunkhwa	D. I. Khan	Kulachi	70.32729	31.63000
191	Kalabagh Game Reserve	Private Game Reserve	Unassigned	1966	Punjab	Mianwali	Mianwali	71.71808	32.91289
192	Musazai	Private Game Reserve		0	Khyber Pakhtunkhwa	D. I. Khan	Kulachi	70.36349	31.68499
193	Rakh Malik Banaras Khan	Private Game Reserve		0	Khyber Pakhtunkhwa	Haripur	Haripur	72.89061	33.92856
194	Rakh Nadir Khan	Private Game Reserve		0	Khyber Pakhtunkhwa	Haripur	Haripur	72.90928	33.96208
195	Rakh Rifaqat Shah	Private Game Reserve		0	Khyber Pakhtunkhwa	Haripur	Haripur	72.85849	34.13690
196	Rakh Raja Gustasap Khan	Private Game Reserve		0	Khyber Pakhtunkhwa	Haripur	Haripur	72.99894	34.02687
197	Rakh Saeed Taj Muhammad	Private Game Reserve		0	Khyber Pakhtunkhwa	Haripur	Haripur	72.98397	34.04626
198	Rakh Sultan Mohammad Khan	Private Game Reserve		0	Khyber Pakhtunkhwa	Haripur	Haripur	72.94663	34.15184
199	Rakh Syed Ali Shah	Private Game Reserve		0	Khyber Pakhtunkhwa	Haripur	Haripur	72.98896	34.01812
200	Rakh Tiyal	Private Game Reserve		0	Khyber Pakhtunkhwa	Abbottabad	Abbottabad	73.14467	33.91906

201	Sharqi Baizai Mian Khan	Private Game Reserve		0	Khyber Pakhtunkhwa	Mardan	Mardan	72.36504	34.37481
202	Astola Island	Wildlife Sanctuary	Unassigned	0		Gwadar	Pasni	63.86670	25.11670
203	Kandar Dam	Wildlife Sanctuary	VIII	1976	Khyber Pakhtunkhwa	Kohat	Kohat	71.82274	33.55192
204	Kheshki Reservoir	Wildlife Sanctuary	VIII	1976	Khyber Pakhtunkhwa	Nowshera	Nowshera	72.02929	34.02505
205	Malugul Dhand	Wildlife Sanctuary	VIII	1976	Khyber Pakhtunkhwa	Lakki Marwat	Lakki Marwat	70.98001	32.63689
206	Cherat	Wildlife Sanctuary		0	Khyber Pakhtunkhwa	Nowshera	Nowshera	71.91221	33.82718
207	Kotal	Wildlife Sanctuary		0	Khyber Pakhtunkhwa	Kohat	Kohat	71.43140	33.63965
208	Manglot	Wildlife Sanctuary		0	Khyber Pakhtunkhwa	Nowshera	Nowshera	71.98432	33.74733
209	Tanda	Wildlife Sanctuary		0	Khyber Pakhtunkhwa	Kohat	Kohat	71.39133	33.57449
210	Togh Mangara	Wildlife Sanctuary		0	Khyber Pakhtunkhwa	Kohat	Kohat	71.58569	33.59608
211	D.I. Khan Waterfowl	Wildlife Sanctuary		0	Khyber Pakhtunkhwa	D. I. Khan	D. I. Khan	70.93304	31.78162
212	Lakki Crane Refuge	Wildlife Sanctuary		0	Khyber Pakhtunkhwa	Lakki Marwat	Lakki Marwat	71.12302	32.61951
213	Agram Basti	Wildlife Sanctuary		0	Khyber Pakhtunkhwa	Chitral	Chitral	71.56504	36.28223
214	Astore	Wildlife Sanctuary	IV	1975	Gilgit-Baltistan	Diamir	Astore	74.66670	35.63330
215	Bahawalpur Plantation/Bahawalpur	Wildlife Sanctuary	Unassigned	1978	Punjab	Bahawalpur	Bahawalpur	71.61755	29.36566
216	Bajwat	Wildlife Sanctuary	III	0	Punjab	Sialkot	Sialkot	74.51082	32.71226
217	Baltistan	Wildlife Sanctuary	IV	1975	Gilgit-Baltistan	Baltistan	Skardu	75.13330	35.60000
218	Bhagat Reserve Forest	Wildlife Sanctuary	Unassigned	1990	Punjab	Toba Tek Singh	Toba Tek Singh	72.55869	30.91624
219	Bhakkar Forest Plantatio	Wildlife Sanctuary	Unassigned	1986	Punjab	Bhakkar	Bhakkar	71.08425	31.63702
220	Bijoro Chach	Wildlife Sanctuary	IV	1977	Sindh	Thatta	Thatta	67.91670	24.58330

221	Boraka	Wildlife Sanctuary		0	Khyber Pakhtunkhwa	Kohat	Kohat	71.23061	33.53242
222	Bund Khush Dil Khan	Wildlife Sanctuary	Unassigned	1983		Killa Abdullah	Gulistan	66.75000	30.60000
223	Buzi-Makola	Wildlife Sanctuary	IV	1972		Gwadar	Pasni	64.08330	25.50000
224	Chak Kotora Reserve Fore	Wildlife Sanctuary	Unassigned	1990	Punjab	Bahawalpur	Hasilpur	72.53968	29.76089
225	Changa Manga Plantation	Wildlife Sanctuary	Unassigned	1986	Punjab	Kasur	Chunian	73.98330	31.08330
226	Chashma Barrage	Wildlife Sanctuary	IV	1974	Punjab	Mianwali	Piplan	71.39854	32.44494
227	Chichawatni Forest Plant	Wildlife Sanctuary	Unassigned	1986	Punjab	Sahiwal	Chichawatni	72.62096	30.53178
228	Cholistan-I	Wildlife Sanctuary	IV	1981	Punjab	Bahawalpur	Yazman	72.35082	28.97804
229	Chorani	Wildlife Sanctuary	IV	1972		Khuzdar	Khuzdar	66.75000	27.70000
230	Chumbi-Surla	Wildlife Sanctuary	IV	1978	Punjab	Chakwal	Chakwal	72.82654	32.79969
231	Cut Munarki Chach	Wildlife Sanctuary	IV	1977	Sindh	Thatta	Ghorabari	67.50000	24.25000
232	Daphar Reserve Forest	Wildlife Sanctuary		0	Punjab			73.33455	32.19521
233	Deh Akro-II	Wildlife Sanctuary	IV	1988	Sindh	Khairpur	Nara	68.83330	26.83330
234	Depalpur Plantation	Wildlife Sanctuary	Unassigned	1986	Punjab	Okara	Okara	73.47701	30.66129
235	Dhoung Block	Wildlife Sanctuary	IV	1977	Sindh	Jacobabad	Thul	68.50000	28.25000
236	Dograyon Lake	Wildlife Sanctuary	IV	1978	Sindh			0.00000	0.00000
237	Drigh Lake	Wildlife Sanctuary	IV	1972	Sindh	Dadu	Mehar	67.50000	27.30000
238	Dureji	Wildlife Sanctuary	IV	1972		Lasbela	Dureji	67.30000	25.88330
239	Fateh Major Forest Plant	Wildlife Sanctuary	Unassigned	1986	Punjab			0.00000	0.00000
240	Ghandak Dhoro	Wildlife Sanctuary	IV	1977	Punjab	Rahim Yar Khan	Sadiqabad	69.66670	28.33330
241	Gulle Kohri	Wildlife Sanctuary	IV	1977	Sindh	Thatta	Ghorabari	67.50000	24.33330
242	Gulsher Dhand	Wildlife Sanctuary	IV	1977	Sindh	Sanghar	Shahdadpur	68.50000	25.91670
243	Gut Raisani	Wildlife Sanctuary	IV	1983				0.00000	0.00000

244	Hadero Lake	Wildlife Sanctuary	IV	1977	Sindh	Thatta	Thatta	67.86670	24.81670
245	Haleji Lake	Wildlife Sanctuary	IV	1977	Sindh	Thatta	Thatta	67.78330	24.80000
246	Hamoli Reserve Forest	Wildlife Sanctuary	Unassigned	1990	Punjab			0.00000	0.00000
247	Hawks Bay/Sandspit Beach	Wildlife Sanctuary	IV	1977	Sindh	Karachi West	Karachi West	66.66670	24.83330
248	Hilaya	Wildlife Sanctuary	IV	1977	Sindh	Thatta	Thatta	68.08330	24.90000
249	Hub Dam	Wildlife Sanctuary	IV	1974	Sindh	Malir	Malir	67.11670	25.25000
250	Islamabad2	Wildlife Sanctuary	IV	1980	Islamabad	Islamabad	Islamabad	73.08330	33.71670
251	Jahlar Lake	Wildlife Sanctuary	Unassigned	1993	Punjab	Khushab	Khushab	72.08260	32.49922
252	Jalalpur Sharif Forest	Wildlife Sanctuary	Unassigned	1986	Punjab	Jhelum	Pind Dadan Khan	73.41212	32.66873
253	Jauharabad Reserve Fores	Wildlife Sanctuary	Unassigned	1990	Punjab	Khushab	Khushab	72.31007	32.30027
254	Kachua	Wildlife Sanctuary	III	0				0.00000	0.00000
255	Kamalia Plantation	Wildlife Sanctuary	Unassigned	1971	Punjab	Toba Tek Singh	Kamalia	72.55981	30.66449
256	Kargah	Wildlife Sanctuary	IV	1975	Gilgit-Baltistan	Gilgit	Gilgit	74.10000	35.93330
257	Keti Bunder North	Wildlife Sanctuary	IV	1977	Sindh	Thatta	Ghorabari	67.38330	24.25000
258	Khabbeke Lake	Wildlife Sanctuary	IV	1967	Punjab	Khushab	Khushab	72.23330	32.61670
259	Khadi	Wildlife Sanctuary	IV	1977	Sindh	Hyderabad	Tando Muhammad Khan	68.50000	25.08330
260	Khanewal Plantation	Wildlife Sanctuary	Unassigned	1986	Punjab	Khanewal	Khanewal	72.03617	30.35775
261	Kharar Lake	Wildlife Sanctuary	IV	1971	Punjab	Okara	Okara	73.53383	30.87110
262	Khat Dhoro	Wildlife Sanctuary	IV	1977	Sindh	Khairpur	Khairpur	68.66670	27.50000
263	Khurkhera	Wildlife Sanctuary	IV	1972		Lasbela	Bela	66.73330	26.05000
264	Kinjhar (Kalri) Lake	Wildlife Sanctuary	IV	1977	Sindh	Thatta	Thatta	68.05000	24.93330
265	Koh-e-Geish	Wildlife Sanctuary	IV	1969				0.00000	0.00000

266	Koh-I-Surkho	Wildlife Sanctuary	Unassigned	1999		Mastung	Mastung	66.66670	29.52330
267	Kolwah Kap	Wildlife Sanctuary	IV	1972		Awaran	Awaran	64.65000	26.03330
268	Kot Dinghano	Wildlife Sanctuary	IV	1977	Sindh	Nawabshah	Sakrand	68.25000	26.08330
269	Kotla Issan Reserve Fore	Wildlife Sanctuary	Unassigned	1990	Punjab	Muzaffargarh	Kot Addu	70.86596	30.23051
270	Kundal Rakh	Wildlife Sanctuary	Unassigned	1986	Punjab	Jhelum	Pind Dadan Khan	73.41818	32.65087
271	Kundian Plantation	Wildlife Sanctuary	Unassigned	1986	Punjab	Mianwali	Piplan	71.56916	32.41799
272	Lakhat	Wildlife Sanctuary	IV	1977	Sindh	Nawabshah	Sakrand	68.33330	26.08330
273	Lakhi	Wildlife Sanctuary	V	0				0.00000	0.00000
274	Langh (Lungh) Lake	Wildlife Sanctuary	IV	1977	Sindh	Larkana	Kambar Ali Khan	68.05000	27.50000
275	Lohi Bher Forest	Wildlife Sanctuary	Unassigned	1993	Islamabad	Islamabad	Islamabad	73.08330	33.71670
276	Mahal Kohistan	Wildlife Sanctuary	IV	1972	Sindh	Dadu	Thano Bula Khan	67.46670	25.43330
277	Majiran	Wildlife Sanctuary	IV	1977	Sindh	Thatta	Thatta	68.33330	25.16670
278	Manshi	Wildlife Sanctuary		0	Khyber Pakhtunkhwa	Mansehra	Bala Kot	73.32118	34.47815
279	Marho Kohri	Wildlife Sanctuary	IV	1977	Sindh	Thatta	Mirpur Sakro	67.41670	24.41670
280	Maslakh	Wildlife Sanctuary	IV	1968		Quetta	Panjpai Sub-Tehsil	66.50000	29.91670
281	Miani Dhand	Wildlife Sanctuary	IV	1977	Sindh	Hyderabad	Matiari	68.50000	25.50000
282	Miranpur Reserve Forest	Wildlife Sanctuary	Unassigned	1990	Punjab	Lodhran	Lodhran	71.60929	29.57068
283	Mitha Tiwana Plantation	Wildlife Sanctuary	Unassigned	1986	Punjab	Khushab	Khushab	72.15299	32.19093
284	Mohahat Dero	Wildlife Sanctuary	IV	1977	Sindh	Naushahro Feroze	Kandiaro	68.33330	27.16670
285	Munarki	Wildlife Sanctuary	IV	1977	Sindh	Thatta	Ghorabari	67.66670	24.33330
286	Naltar	Wildlife Sanctuary	IV	1975	Gilgit-Baltistan	Gilgit	Gilgit	74.23330	36.11670
287	Nara Desert	Wildlife Sanctuary	IV	1980	Sindh	Khairpur	Nara	69.08330	26.66670

288	Norang	Wildlife Sanctuary	IV	1977	Sindh	Thatta	Ghorabari	67.83330	24.50000
289	Raghai Rakhshan	Wildlife Sanctuary	IV	1971		Kharan	Rakhshan (Besima)	65.33330	27.33330
290	Rakh Ghulaman	Wildlife Sanctuary	Unassigned	1989	Punjab	Bhakkar	Kalur Kot	71.47957	32.04511
291	Ras Koh	Wildlife Sanctuary	IV	1962		Chagai	Dalbandin	65.10000	28.83330
292	Runn of Kutch	Wildlife Sanctuary	IV	1980	Sindh	Thatta	Jati	68.41670	24.08330
293	Sadnai	Wildlife Sanctuary	IV	1977	Sindh	Thatta	Ghorabari	67.75000	24.41670
294	Samno Dhand	Wildlife Sanctuary	IV	1977	Sindh	Sanghar	Tando Adam	68.50000	25.83330
295	Sasnamana	Wildlife Sanctuary	III	0				0.00000	0.00000
296	Satpara	Wildlife Sanctuary	IV	1975	Gilgit-Baltistan	Baltistan	Skardu	75.62909	35.22990
297	Shah Lanko	Wildlife Sanctuary	IV	1978	Sindh	Dadu	Khairpur Nathan Shah	67.45000	27.25000
298	Shashan	Wildlife Sanctuary	IV	1972		Khuzdar	Khuzdar	66.58330	27.83330
299	Shorkot Forest Plantation	Wildlife Sanctuary	Unassigned	1986	Punjab	Jhang	Shorkot	72.19982	30.78735
300	Sodhi	Wildlife Sanctuary	IV	1983	Punjab	Khushab	Khushab	72.19952	32.58069
301	Takkar	Wildlife Sanctuary	IV	1968	Sindh	Sukkur	Salehpat	68.91670	27.25000
302	Taunsa Barrage	Wildlife Sanctuary	IV	1972	Punjab	Muzaffargarh	Kot Addu	70.83937	30.53716
303	Tehra Plantation	Wildlife Sanctuary	Unassigned	1978	Punjab			0.00000	0.00000
304	Walhar Reserve Forest	Wildlife Sanctuary	Unassigned	1990	Punjab	Rahim Yar Khan	Sadiqabad	69.98294	28.18654
305	Ziarat Juniper	Wildlife Sanctuary	IV	1971		Ziarat	Ziarat	67.73330	30.40000

Annex I: Species of Fauna of Pakistan listed in CITES Appendices

Species of Fauna of Pakistan Threatened with Extinction due to International Trade (CITES Appendix-I Species)						
Mammals			Birds		Reptiles	
S.No	Common Name	Scientific Name	Common Name	Scientific Name	Common Name	Scientific Name
1.	Kashmir Grey Langur	<i>Semnopithecus ajax</i>	Imperial Eagle	<i>Aquila heliaca</i>	Indian Roofed Turtle	<i>Kachuga tecta tecta</i>
2.	Hanuman/Common Langur	<i>Semnopithecus entellus</i>	White-tailed Eagle	<i>Haliaeetus albicilla</i>	Green Turtle	<i>Chelonia mydas</i>
3.	Indus Dolphin	<i>Platanista minor</i>	Laggaer Falcon	<i>Falco jugger</i>	Hawksbill Turtle	<i>Eretmochelys imbricata</i>
4.	Chinese White Dolphin	<i>Sousa chinensis</i>	Barbary Falcon	<i>Falco pelegrinoides</i>	Olive Ridley Turtle	<i>Lepidochelys olivacea</i>
5.	Finless Porpoise	<i>Neophocaena phocaenoides</i>	Peregrine Falcon	<i>Falco peregrines</i>	Leatherback Turtle	<i>Dermochelys coriacea</i>
6.	Bryde's Whale	<i>Balaenoptera edeni</i>	Cheer Pheasant	<i>Catreus wallichii</i>	Indian Softshell Turtle	<i>Aspideretes gangeticus</i>
7.	Blue Whale	<i>Balaenoptera musculus</i>	Tragopan Pheasant	<i>Tragopan Melanocephalus</i>	Marsh Crocodile	<i>Crocodylus palustris</i>
8.	Finback Whale	<i>Balaenoptera physalus</i>	Siberian Crane	<i>Grus leucogeranus</i>	Gharial	<i>Gavialis gangeticus</i>
9.	Humpback Whale	<i>Megaptera novaeangliae</i>	Great Indian Bustard	<i>Ardeotis nigriceps</i>	Indian Monitor Lizard	<i>Varanus bengalensis</i>
10.	Asiatic Black Bear	<i>Ursus thibetanus</i>	Houbara Bustard	<i>Chlamydotis macqueenii</i>	Yellow Monitor	<i>Varanus flavescens</i>
11.	Balochistan Bear	<i>Ursus thibetanus (gedrosianus)</i>	Dalmatian Pelican	<i>Pelecanus crispus</i>	Trancaspian Desert Monitor	<i>Varanus griseus</i>
12.	Common Otter	<i>Lutra lutra</i>			Indian Peacock Softshell Turtle	<i>Aspideretes hurum</i>
13.	Common Leopard	<i>Panthera pardus</i>			Spotted Pond Turtle	<i>Geoclemys hamiltonii</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 duvauceli</i> <i>i</i>				
19.	Chiltan Markhor	<i>Capra falconeri</i> <i>(chialtanensis)</i>				
20.	Suleiman Markhor	<i>Capra falconeri</i> <i>(jerdoni)</i>				
21.	Kabul Markhor	<i>Capra falconeri</i> <i>(megaceros)</i>				
22.	Grey Goral	<i>Naemorhedus goral</i> <i>l</i>				
23.	Morcopolo Sheep	<i>Ovis ammon polii</i>				

Species of fauna of Pakistan Likely to Become Extinct due to International Trade (CITES Appendix II Species)

Species of fauna of Pakistan Likely to Become Extinct due to International Trade (CITES Appendix II Species)						
Mammals			Birds		Reptiles	
S. No	Common Names	Scientific Names	Common Names	Scientific Names	Common Names	Scientific Names
1.	Rehsus monkey	<i>Macaca mulatta</i>	Black Stork	<i>Ciconia nigra</i>	Indian Star Tortoise	<i>Geochelone elegans</i>
2.	Indian Pangolin	<i>Manis crassicaudata</i>	Common Spoonbill	<i>Platalea leucorodia</i>	Afghan Tortoise	<i>Testudo horsfieldii</i>
3.	Cuvier's Beaked Whale	<i>Ziphius cavirostris</i>	Lesser Flamingo	<i>Phoeniconaias Minor</i>	Brown River Turtle	<i>Kachuga smithii</i>
4.	Pygmy Sperm Whale	<i>Kogia breviceps</i>	Greater Flamingo	<i>Phoenicopterus Ruber</i>	Indian Narrow-headed Softshell Turtle	<i>Chitra indica</i>
5.	Dwarf Sperm Whale	<i>Kogia sima</i>	White-headed Duck	<i>Oxyura leucocephala</i>	Indus Mud Turtle	<i>Lissemys punctata andersoni</i>
6.	Long-beaked Common Dolphin	<i>Delphinus capensis</i>	Comb Duck	<i>Sarkidiornis Melanotos</i>	Spiny-tailed Lizard	<i>Uromastix hardwickii</i>
7.	Melon-headed Whale	<i>Peponocephala electra</i>	Osprey	<i>Pandion haliaetus</i>	Indian Chameleon	<i>Chamaeleo zeylanicus</i>
8.	False Killer Whale	<i>Pseudorca crassidens</i>	Shikra	<i>Accipiter badius</i>	Indian Python	<i>Python molurus (molurus)</i>
9.	Pantropical Spotted Dolphin	<i>Stenella attenuate</i>	Goshawk	<i>Accipiter gentiles</i>	Indian Sand Boa	<i>Eryx johnii</i>
10.	Spinner Dolphin	<i>Stenella longirostris</i>	Eurasian Sparrow-hawk	<i>Accipiter nisus</i>	Tartary Sand Boa	<i>Eryx tataricus</i>
11.	Indian Ocean Bottlenose Dolphin	<i>Tursiops aduncus</i>	Besra	<i>Accipiter virgatus</i>	Rough-scaled Sand Boa	<i>Gongylophis conicus</i>
12.	Common Bottlenose Dolphin	<i>Tursiops truncates</i>	Eurasian Black Vulture	<i>Aegyptius monachus</i>	Dhaman / Oriental Rat Snake	<i>Ptyas mucosus</i>

13.	Grey Wolf	<i>Canis lupus</i>	Golden Eagle	<i>Aquila chrysaetos</i>	Indian Cobra	<i>Naja naja</i>
14.	Indian Wolf	<i>Canis lupus (pallipes)</i>	Greaten Spotted Eagle	<i>Aquila clanga</i>	Central Asian Cobra	<i>Naja oxiana</i>
15.	Dhole / Asiatic Wild Dog	<i>Cuon alpines</i>	Steppe Eagle	<i>Aquila nipalensis</i>		
16.	Blandford's Fox	<i>Vulpes cana</i>	Lesser Spotted Eagle	<i>Aquila pomarina</i>		
17.	Himalayan Brown Bear	<i>Ursus arctos (isabellinus)</i>	Tawny Eagle	<i>Aquila rapax</i>		
18.	Smooth-coated Otter	<i>Lutrogale perspicillata</i>	White-eyed Buzzard	<i>Butastur teesa</i>		
19.	Brown Bear	<i>Ursus arctos</i>	Common Buzzard	<i>Buteo buteo</i>		
20.	Caracal	<i>Caracal caracal</i>	Long-legged Buzzard	<i>Buteo rufinus</i>		
21.	Jungle Cat	<i>Felis chaus</i>	Short-toed Eagle	<i>Circaetus gallicus</i>		
22.	Pallas' Cat	<i>Felis manul</i>	Marsh Harrier	<i>Circus aeruginosus</i>		
23.	Sand Cat	<i>Felis margarita</i>	Hen Harrier	<i>Circus cyaneus</i>		
24.	Wild Cat	<i>Felis silvestris</i>	Pallid Harrier	<i>Circus macrourus</i>		
25.	Eurasian Lynx	<i>Lynx lynx</i>	Pied Harrier	<i>Circus melanoleucos</i>		
26.	Fishing Cat	<i>Prionailurus viverrinus</i>	Monlagu's Harrier	<i>Circus pygargus</i>		
27.	Wild Ass	<i>Equus hemionus</i>	Black Winged Kite	<i>Elanus caeruleus</i>		
28.	Afghan Urial	<i>Ovis vignei (cycloceros)</i>	Lammergeier / Bearded Vulture	<i>Gypaetus barbatus</i>		
29.	Punjab Urial	<i>Ovis vignei (punjabiensis)</i>	White-rumped Vulture	<i>Gyps bengalensis</i>		

30.	Ladakh Urial	<i>Ovis vignei (vignei)</i>	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>		

Species of Fauna of Pakistan for Regulated International Trade (CITES Appendix III Species)

S.No	Mammals		Birds		Reptiles	
	Common Name	Scientific Name	Common Name	Scientific Name	Common Name	Scientific Name
1.	Long Tailed Marmot	<i>Marmota caudate</i>	Northern Pintail	<i>Anas acuta</i>	Russell's Viper	<i>Daboia russelii</i>
2.	Himalayan Marmot	<i>Marmota himalayana</i>	Northern Shoveler / Shoveler	<i>Anas clypeata</i>	Asiatic Water Snake	<i>Xenochrophis piscator</i>
3.	Golden Jackal	<i>Canis aureus</i>	Common Teal	<i>Anas crecca</i>		
4.	Indian Fox	<i>Vulpes bengalensis</i>	Eurasian Wigeon / Wigeon	<i>Anas Penelope</i>		
5.	Red Fox	<i>Vulpes vulpes</i>	Goliath Heron	<i>Ardea goliath</i>		
6.	Hill Fox	<i>Vulpes vulpes (griffithi)</i>	Ferruginous Duck / White-eyed Pochard	<i>Aythya nyroca</i>		
7.	Tibetan Red Fox	<i>Vulpes vulpes (montana)</i>	Cattle Egret	<i>Bubulcus ibis</i>		
8.	Desert Fox	<i>Vulpes vulpes (pusilla)</i>	Rock Dove / Blue Rock Pigeon	<i>Columba livia</i>		
9.	Pine Martin	<i>Martes flavigula</i>	Fulvous Tree Duck	<i>Dendrocygna bicolor</i>		
10.	Beach Martin	<i>Martes foina</i>	Rose-ringed Parakeet	<i>Psittacula krameri</i>		
11.	Mountain Weasel	<i>Mustela altaica</i>	Laughing Dove	<i>Streptspelia senegalensis</i>		
12.	Short-tailed Weasel	<i>Mustela erminea</i>	Turtle Dove	<i>Streptopelia turtur</i>		
13.	Himalayan Weasel	<i>Mustela sibirica</i>				
14.	Himalayan Palm	<i>Paguma larvata</i>				

	Civet					
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>Antilope cervicapra</i>				

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
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Annex J: Projects/Initiatives in Environment/Biodiversity Conservation in Pakistan

Biodiversity related projects of UNDP, Pakistan: In some cases UNDP is funding WWF and IUCN, and the projects below are duplicated on the WWF and IUCN lists.

43887054

1. Protection and Management of Pakistan Wetlands Project

Project Duration: July 2005 – June 2012
Total Budget: US\$ 14,792,000
Implementing Partner (s) Ministry of Planning & Development and WWF-Pakistan

The Pakistan Wetlands Project (PWP) aims to promote the sustainable conservation of freshwater and marine wetlands and their associated globally important biodiversity in Pakistan. The Project strategy is based on two sub-sets of objectives. The first will provide the required policy, institutional, technical and financial framework and generate positive public support essential for the mainstreaming of wetlands conservation. The second involves the design and implementation of sustainable, participatory management plans for four independent Demonstration Sites, each chosen to be representative of a broad eco-region in Pakistan. It includes specific mechanisms to secure financial sustainability and enhanced replication and proliferation of viable wetlands management interventions in a nation-wide, on-going wetlands conservation initiative.

2. Conservation of Habitats and Species of Global Significance in Arid and Semi-Arid Ecosystems in Balochistan

Project Duration: January 2004 – June 2012
Total Budget: US\$ 1,461,317
Implementing Partner (s) Balochistan Forest and Wildlife Department and Sustainable Use Specialist Group (SUSG)

The objective of the project is to conserve the critically endangered habitats and species of global significance in selected arid and semi-arid ecosystems of Balochistan by reducing pressure on resources and promoting sustainable use of biodiversity. The project will promote community based conservation efforts.

3. Conservation of Balochistan Junipers through Community Participation

Project Duration: June 2007 – June 2011
Total Budget: US\$ 2,518,737
Implementing Partner (s) Balochistan Forest and Wildlife Department and IUCN- Pakistan

The project will assist in conserving the juniper forest ecosystem covering an area of about 100,000 hectares in the Ziarat and Zarghoon Hill Ranges in Balochistan. These forests contain unique fauna and flora, having Sino-Himalayan, central Asian, Iranian and Turkish affinities. The resource is of global significance and represents one of the largest remaining tracts of Juniper forest in the world. The juniper forests are a strong candidate for designation as a protected area and a World Heritage Site.

4. Sustainable Land Management to Combat Desertification in Pakistan

Project Duration: January 2008 – December 2011
Total Budget: US\$ 4,600,000
Implementing Partner (s) Office of the Inspector General Forests, Ministry of Planning & Development

The overall goal of the project is to combat land degradation in Pakistan in order to protect and restore ecosystems and essential ecosystem services that are key to reducing poverty. The principal objectives are to strengthen institutional capacity, create an enabling environment and demonstrate good practices-all in an effort to help remove key barriers to Sustainable Land Management (SLM). The project will depend on the strong commitment of Government of Pakistan and the involvement of key stakeholders, in particular those at the community level. The project will be implemented in two phases, with the first phase focused on creating an enabling environment for SLM and piloting innovations, and the second phase drawing lessons learned to deepen the policy and institutional commitment to SLM and completing demonstration projects that can later be scaled up and replicated.

5. National Environmental Information Management System (NEIMS)

Project Duration:	December 2005 – November 2011
Total Budget:	US\$ 2,205,000
Implementing Partner (s)	Ministry of Planning & Development

National Environmental Information Management System (NEIMS): The overall objective of the project is to contribute to promotion of sustainable development through building the national capacity in developing, managing and utilizing environmental information for informed decision-making. The specific objectives of the project include:

1. To review and analyze the current situation of environmental data/information management in Pakistan.
2. To establish an appropriate institutional and technical framework for NEIMS Pakistan;
3. To develop sectoral and inter-sectoral database of existing environmental information in the country.
4. To establish functional National Environmental Information System; and
5. To build and strengthen the capacities of key organizations involved in establishment and sustainable operations of NEIMS.

6. GEF Small Grants Programme:

Project Duration:	August 1993 – Ongoing
Total Budget:	US\$ 8,810,000
Implementing Partner (s)	NGOs/ CBOs

The program was launched in Pakistan in August 1993 subsequent to a process of consultations and preparatory activities which were commenced in February 1993 between the government of Pakistan, NGOs and UNDP. The program is implemented by UNDP Pakistan on behalf of UNOPS and GEF. From its pilot phase to date has successfully implemented 176 projects covering all GEF focal areas including Biodiversity, Climate Change, International Waters and Land Degradation. Some of the projects attracted international attention by receiving international awards including Ashden, Alcan Prize and UN Habitat Award.

National Steering Committee is comprised of the representatives of Government, NGOs and academic institutions, and is chiefly responsible for the strategic decisions regarding the program. It approves the projects to NGOs, focusing on five thematic areas of GEF;

- Biodiversity Conservation
- Climate Change Mitigation
- Sustainable Land Management
- International Waters
- Persistent Organic Pollutants (POPs)

GEF SGP works with local community based organizations, NGOs and community groups to conserve environment. It has developed a strong social base at the ground level in various areas across Pakistan. In most of the cases it has become the face of UNDP at grass root level.

7. One UN Joint Programme, Joint Programme Component 3 (Integrated Natural Resource Management):

Project Duration: August 2011 – December 2012
Total Budget: US\$ 3,500,000
Implementing Partner (s) Provincial Forest and Wildlife of all Provinces

The Government of Pakistan and the UN and development assistance partners have implemented substantial projects that have been successful on the ground in finding solutions to environmental issues. It would be additionally valuable if these projects were able to work together in a more concerted fashion, to apply a common philosophy and comparable methodologies, to exchange lessons, and contribute to the systematic implementation of policy. Most importantly, each project should contribute to building and strengthening a durable, functional system, the so-called “enabling environment” that is needed to sustain and scale-up successful initiatives; this work in particular needs to be done through projects being implemented in concert.

The overall goal of the proposed programme is to support environmentally-sustainable and socially-equitable development in Pakistan. The programme will support a comprehensive country-wide initiative for sustainable development, with two main programme components: the first, to build and strengthen the institutions and system that will enable all regions of Pakistan to move towards development that is environmentally sustainable and socially equitable; and the second, to support the achievement of sustainable development on the ground, in a series of regional demonstration areas. The programme outcomes will be secure and safe living and work environments for all people, with priority attention directed towards the poorest, marginalized and most vulnerable groups; combined with strengthened natural resource management for sustainable land, water and biodiversity; and environmentally-sustainable agriculture, green industries, energy, urban development and economic activities.

The UN system as a whole will employ a combination of modalities to implement the programme: priority tasks will be to convene the broad collaborative approach and partnerships that will be required to achieve sustainable development; to advocate and advise on effective actions by others, in line with the triple goals of poverty reduction, social equity and environmental sustainability; to facilitate change, primarily through support for local systemic capacity development; and to provide technical assistance incisively and selectively where it will have maximum impact. The aim will be to gain maximum coherence and efficiency by all agencies using a common delivery strategy and combined basic services such as policy advice, capacity building and training. The total budget of this programme is yet to be determined.

8. Grass Root Level Initiative Programme (GRIP):

Project Duration: September 2010 – December 2012
Total Budget: US\$ 2,000,000
Implementing Partner (s) Civil Society Organizations

Grass Roots Initiatives Programme (GRIP) is aligned with the UN Joint Programme Component on Natural Resources Management that provides the framework for conservation and sustainable use of natural resources. The key contribution of GRIP is to support the local communities, civil society organizations and local government institutions in managing for improved natural resources that includes forestry and rangelands. As such, the programme is to constitute local implementation of priority national environment and conservation policies.

The overall goal of GRIP is to contribute to improvement of the livelihoods of local communities through sustainable management of watersheds, water resources, energy conservation, capacity building and related environmental problems. It would also take into account certain characteristics which would enhance and broaden the scope and impact of the over all objective including; innovation interventions for the village communities, entrepreneurial orientation by combining the improvement of watersheds or tackling of local environmental problems with the improvements of livelihoods, notably the generation of benefits in cash or in-kind, gender mainstreaming, awareness raising, interface management in building up and managing various stakeholders, the local government agencies and the private sector, community contributions.

GRIP will also address main challenges of MDG Goal 7 that are mentioned in the Pakistan Millennium Development Goal Report. Specifically, these are to do with scarce forest resources degraded due to ever increasing pressure on trees, shrubs and rangelands for firewood and timber etc., as well as natural resource degradation that is further contributing to erosion in the capacities of important water reservoirs, due to heavy deposition of silt. As such, the programme will assist Government of Pakistan in meeting the Millennium Development Goals (MDGs) by contributing towards

achieving environmental sustainability and integrating the principles of sustainable development at local levels. Inter-alia the proposed programme contributes towards the current UNDAF for its outcome on environmental sustainability.

9. Mountain and Markets: Biodiversity and Business in Northern Pakistan:

Project Duration:	September 2011 – December 2014
Total Budget:	US\$ 4,000,000
Implementing Partner (s)	Gilgit Baltistan and Khyber Pukhtoonkhwa Governments and Civil Society Organizations

The project aims to fill gaps by focusing on the market based instrument to generate biodiversity conservation benefits, as a long-term solution to environmental degradation and biodiversity loss in the northern mountain of Pakistan lies partly with developing market-based incentives for sustainable resource use. Building on the achievement of MACP, the project will assist local community organizations in development of viable conservation enterprises that are well integrated with national and international markets for green products and services. This approach will demonstrate sustainable incentives that allow local stakeholders from short-term resource exploitation to long-term guardianship.

The project build some of the work and results of the operationally completed GEF/Government of Pakistan/UNDP Mountain Area Conservancy Project (MACP), which introduced a more inclusive conservation approach in Northern Pakistan through community empowerment and participatory conservation planning. It will also complement the ongoing GEF/World Bank Protected Area Management Project (PAMP), which is focusing on two national parks in Northern Pakistan and the GEF /UNDP Pakistan Wetlands Programme, which also has two field sites. The project will also benefit from GEF/GoP/UNDP MSPs in Balochistan, as well as link with recently approved GEF/GOP/UNDP MSP on “Promotion of Energy Efficient Cooking, Heating and Housing Technologies” which intends to curb degradation of forests in Northern Areas and Chitral. The project will also closely tie with initiatives of partner organizations such as IUCN, WWF and AKRSP.

WWF – Pakistan Ongoing Conservation Projects – June, 2011 (Some of these are duplicated above under UNDP, where UNDP is the funder and WWF is the implementer.)

Sr. No	Project Title	Donors
Forests		
1.	Improving sub-watershed management and environmental awareness around Ayubia National Park (G200 - Western Himalayas) - Phase 2	The Coca-Cola Foundation
2.	Participatory Management and Development of CKNP	Government of Gilgit – Baltistan
3.	Social, Economic and Environmental Development (SEED) Project in CKNP Area (Gilgit - Baltistan)	Social, Economic and Environmental Development (SEED) Project under Pakistan Italian Debt for Development Swap Agreement
4.	Plantation of Jatropha and Mangroves at District Thatta, Sindh	American Electric Supply (AES)
5.	District-wise Forest Cover Assessment of Pakistan	Government of Pakistan, International Centre for Integrated Mountain Development (ICIMOD) and WWF – Pakistan
6.	Land Cover change Analysis of selected Hindukush and Himalayan (HKH) Region in Pakistan	Government of Pakistan, International Centre for Integrated Mountain Development (ICIMOD) and WWF – Pakistan
Freshwater		

Sr. No	Project Title	Donors
7.	Protection and Management of Pakistan Wetlands Programme	Global Environment Facility (GEF), United Nations Development Programme (UNDP), EKN, WWF Network, Pakistan Poverty Alleviation Fund (PPAF)
8.	Indus for All Programme	The Embassy of the Kingdom of the Netherlands (EKN)
9.	Conservation of Indus River Dolphin by Improving Agriculture Resources Use in the Lower Indus Basin in Pakistan.	WWF - Switzerland
Market Transformation		
10.	Pakistan Sustainable Cotton Initiative, including Chenab	WWF - Sweden, IKEA, Chenab Ltd
11.	Pakistan Sustainable Cotton Initiative-II, (PSCI-II)	WWF - Sweden, IKEA
12.	Better Cotton Fast Track Fund (BCFTF)	The Dutch Sustainable Trade Initiative (IDH), Rabobank, Interchurch organization for Development Cooperation (ICCO), WWF – Netherlands
13.	Assessment of Environmental and Social Impacts of Cotton BMPs in Pakistan	WWF – Switzerland
Species		
14.	Gyps Vulture Restoration Project	Hawk Conservancy Trust, Punjab Wildlife and Parks Department
15.	Gyps Vulture Restoration Project-Population Survey of Vulture Species	National Birds of Prey Trust
16.	Snow Leopard Conservation Programme	Snow Leopard Trust (SLT)
17.	Conservation of the 2 nd largest sub-population of Indus River Dolphin	WWF – Sweden
18.	Conservation of Cetaceans in North Arabian Sea, along the Balochistan Coast, Pakistan	Department of the Environment, Water, Heritage and the Arts Australian Antarctic Division
Climate Change		
19.	Building Capacity on Climate Change Adaptation in Coastal Areas of Pakistan	European Commission (EC)
Other		
20.	Indus for All Programme Partnership Fund	Embassy of the Kingdom of the Netherlands (EKN)
21.	Contract for Transferring the Green Office Concept within the WWF Network	WWF - Finland, WWF - Pakistan
22.	Pakistan Environmental Reporting Awards	Association of Chartered Certified Accountants (ACCA) Pakistan, WWF – Pakistan
23.	Flood Eco Assessment	WWF Network

Sr. No	Project Title	Donors
24.	Emergency Support to Southern Sindh	International Relief and Development (IRD)
25.	Providing Clean Drinking Water to the Flood Affectees in Sindh	Planning and Development (P&D) Government of Sindh

Source: Programme Development Department.

IUCN Projects in Pakistan (see UNDP list, many are duplicated there since UNDP is the funder, IUCN is the implementer).

Current Portfolio

Project	Donor	Budget	Period
Balochistan Partnerships for Sustainable Development	EKN	US\$ 5.56 m	2007-13
National Impact Assessment Programme	EKN	US\$ 4.08 m	2009-14
Juniper Conservation Project	GEF/UNDP	US\$ 1.76 m	2007-12
Murree Biodiversity Park	Govt of Punjab	US\$ 930 k	2010-12
Sindh Coastal Community Development Project	ADB	Rs. 635 k	2008-12
Mangroves for the Future	MFF-Sec	US\$ 323 k	2010-12
Strengthening Environmental Adjudication	ADB	US\$ 215 k	2011-13
ABS Law & Traditional Knowledge	UNEP	US\$ 154 k	2011-12
Revitalising Karez System in Balochistan	WANI2	US\$ 41 k	2011-12
Punjab Sustainable Development Strategy	Govt of Punjab	US\$ 31 k	2010-11
Clean Air Initiative	ADB-CAI	US\$ 13 k	2010-11
Mangrove plantation and community education	Barclays Bank	US\$ 10 k	2010-11

Pipeline Projects

Project	Donor	Budget	Period
Mangroves & sea intrusion	Govt of Sindh	US\$ 8.28 m	7 years
Pakistan Sustainable Transport Project	GEF/UNDP	US\$ 1.72 m	5 years
Mountains and Markets	GEF/UNDP	US\$ 698 k	5 years
People & Protected Areas Programme	UNESCO	US\$ 122 k	2 years

Intercooperation Pakistan

S#	Project	Duration	Donor	Partners	Status
1	Livelihoods Programme (LP)	48 months	SDC	Govt. line agencies and NGOs	On going
2	Integrated Natural Resource Management Project (INRMP)	72 months	SDC	Khyber Pakhtunkhwa Forests, Agriculture and Livestock Departments	On going Starting in September
3	Water for Livelihoods (W4L)	20 months	SDC	Govt. line agencies and NGOs	Starting in September
4	Improving food security and strengthening DRR through CfW initiative in Chail	6 months	SDC-HA, WFP	Local NGOs	On going
5	Support to poor milk producers and milk value chain	18 months	EU	Plan International, Millak Foods	

Annual budgetary allocations for Biodiversity & Forestry Projects in 2011-12 by the Federal and provincial governments

Province/Territory	Forest		Wildlife		Fisheries		Other (Environment, Sericulture, CDA in Sindh, etc)		Total	
	No of projects	cost (Rs million)	No of projects	cost (Rs million)	No of projects	cost (Rs million)	No of projects	cost (Rs million)	No of projects	cost (Rs million)
Federal Government	4	90							4	90
Punjab	18	470.00	12	395.00	6	370.00	12	350.00	48	1585.00
Sindh	15	463.175	6	155.095	12	915.103	9	279.035	42	1812.408
KPK	46	433.89	13	182.751	2	400.00			61	1016.64
Balochistan	2	20.00	0	0	9	393.08	0	0	11	413.08
FATA	28	770.75	0	0	7	17.392	10	31.966	45	820.108
Gilgit Baltistan	4	28.00	4	15.00					8	43.00
AJ&K	14	239.50	2	40.00					16	279.50
		2515.31				2095.57				
	131	8	37	787.846	36	9	31	661.001	235	6059.744

Note: Before devolution of the subject of Environment to provinces in 2011 under the 18th constitutional amendment, Federal Government's Public Sector Development Programme had annual allocations amounting to Rs.2500 million. There were 40 projects under implementation, which fell in the brown, green and capacity building components/sub sectors of environment such as: mass awareness, environmental education and environment protection, preparation of land use plan; forestry; biodiversity; watershed management, environmental monitoring; capacity building of environmental institutions; natural disaster early warning and mitigation; improvement of urban environment; Clean Drinking Water for All etc. Many projects including forestry, watershed management and biodiversity projects in Tarbela Watersheds were supported to reduce sediment load, create employment opportunities, alleviate poverty, conserve the natural resources and rehabilitate the degraded land resources through nurseries and plantations, construction of check dams, soil conservation, establishment of community organizations, terracing, etc. Various tree planting projects were under implementation. Now these have been devolved to provinces and the above table shows allocation for various sectors of biodiversity.

Donor-funded Hydro Power and Dam Projects Funded by ADB, WB, GCC, China, Germany, France, etc			
			Rupees in millions
S.No.	Name of Project	Total Cost	Foreign Component
1	Satpara Multipurpose Dam	4480.00	555.00
2	Gomal Zam Dam	12829.00	4964.00
3	Kurram Tangi Dam, North Waziristan, Khyber Pakhtun Khwa	17205.00	5368.00
4	Nai Gaj Dam, Dadu Sindh (China)	16924.00	415.00
5	CRBC 1st Lift cum Gravity Project D.I.Khan	61067.00	21426.00
6	Golan Gol Hydro Power Project, Chitral, Khyber Pakhtun Khwa (Kuwait)	7035.00	2638.00
7	Khan-Khawar Hydro Power Project, Shangla, Besham, Khyber Pakhtun Khwa (Abu Dhabi Fund)	8301.00	3728.00
8	Allai Khawar Hydro Power Project, Batagram, Besham, Khyber Pakhtun Khwa (Abu Dhabi Fund)	8578.00	3454.00
9	Dubir Khawar Hydro Power Project, Kohistan, Khyber Pakhtun Khwa (Abu Dhabi Fund)	16324.00	8256.00
10	Jinnah Hydro Power Project, Mianwali, Punjab	13547.00	6608.00
11	Neelum Jhelum Hydropower Project, AJK (Saudi Arabia)	84502.00	46668.00
12	Bunji Hydro Power Project	2089.00	233.00
13	Dasu Hydro Power Project, Kohistan, Khyber Pakhtun Khwa	797.00	100.00
14	Keyal Khawar Hydro Power Project, Khyber Pakhtun Khwa (Germany)	7067.00	3032.00
15	Chor Nallah HPP Kohistan, Khyber Pakhtun Khwa	197.00	114.00
16	Spat Gah Hydro Power Project Kohistan, Khyber Pakhtun Khwa	178.00	95.00
17	Construction of Diamer Basha Dam Project Lot 1 to 5 (4500 MW)	834205.00	312943.00
18	Rehabilitation of Jaban Hydro Electric Power Station (France)	3754.00	1649.00
19	Pattan Hydropower Project Gilgit Baltistan (2800 MW)	731.00	258.00
20	Tarbela Fourth Extension Hydel Project	79475.00	73100.00
Note: The above projects are at different stages of completion			

Proposed Projects: the below projects are GOP priorities that have not yet received funding.

1	Establishment of National Institute of Biodiversity and Ecosystem Sciences
2	Improvement in Protected Areas Management
3	Restoration of Populations of Critically Endangered Wildlife Species
4	National Biodiversity Assessment and Development of Database
5	Climate Change Research & Development Project
6	Climate Change & Disaster risk management Centres
7	Rehabilitation of Riverine, Irrigated, and Mangroves Forests
8	Rehabilitation of degraded rangelands with involvement of local communities
9	Impact of Climate Change on biodiversity
10	Integrated Watershed Management in Pakistan
11	Afforestation through Farmers
12	Establishment of National Desertification Control Fund
13	National Center of Excellence in Biodiversity, Forestry & Environmental Education
14	Research Grants and Research Journal
15	Establishment of a System of Integrated Economic and Environmental Accounting in Pakistan

Annex K: Unsustainable and Poor Natural Resource Practices (Threats)

The following unsustainable and poor natural resources practices will intensify Pakistan's rates of habitat loss, habitat degradation, and wildlife exploitation.

Degradation of pastures/rangelands (un-managed grazing)

Rangelands are important not only for livestock-rearing by local communities, but they are important for watershed and biodiversity protection, as well. Rangelands of Pakistan are under stress and some of them are heavily degraded (Dr. Fazil Bari, pers. comm.) mainly due to over-grazing as a result of overstocking and repeated grazing of the same pasture without rotation. Over-grazing reduces the diversity of flora and fauna, and changes species composition, by removing palatable species. It also increases competition between domestic stock and wild herbivores (ungulates and rodents), thus reducing the prey base of many predators (IUCN/WCMC, 1991).

Firewood collection

The majority of households use firewood for cooking and space heating. Firewood collection is common in Pakistan. To meet their energy needs, local inhabitants are forced to clear indigenous vegetation, which constitutes the cheapest and the most accessible source of energy. The main source of firewood is the natural forests. With increasing demand, the mountain slopes near human settlements are now devoid of vegetation. The slopes once covered with scattered patches of pine trees and juniper woodlands are now taken over by shrubby vegetation (Virk, 1999). However, in some big cities the trend is slowly reversing due to the availability of alternative energy sources, such as natural gas, electricity, and LPG, thus taking some pressure off natural forests. Some projects have introduced fuel-efficient stoves to reduce consumption of firewood. The impact of such interventions is yet to be studied.

Over-hunting

Indiscriminate hunting is believed to be the major cause of population decline of many species of birds and animals, particularly of ungulates, which are hunted for trophies, skin, and meat. Species declining due to over-hunting include markhor, urial, Marco Polo sheep, and Himalayan ibex (for meat and trophies), and musk deer (for scent pods) and brown and black bears (for fat and body parts). Some species are ruthlessly persecuted for their depredation on livestock, for example snow leopard and wolf. A number of game birds (e.g., snow cock and chukar partridge) and waterfowl are hunted for meat, while pheasants are hunted for feathers. Falcons are trapped and sold for the falconry trade. The impact of hunting has increased further with the spread of modern firearms and greater mobility due to new roads, which allow professional and paid hunters to operate in remote areas, previously difficult to access. Over-hunting poses a serious threat to many wildlife species, and therefore to the biodiversity of Pakistan.

Soil erosion (including landslides and avalanches)

Vegetation holds soil in place, and the large-scale removal of vegetation (for firewood collection, timber harvesting, agricultural expansion, and construction activities) leaves soil vulnerable to water erosion, and makes land unstable and susceptible to land sliding and avalanches. Water erosion washes away topsoil, increases sediment in streams and rivers, and results in degradation of both terrestrial and aquatic habitats. The loss of soil means loss of microorganisms, plant diversity, and associated animal species. In addition, many large mammals—already in a vulnerable state—become victims of avalanches. Carcasses of ibex, snow leopard, and black bears have been observed near the sites of avalanches (Marwat, personal observations).

Over-harvesting of medicinal plants

Pakistan has high medicinal plant diversity. However, the demand for plant-based drugs and products is high, as well, resulting in large-scale extraction of medicinal plants and degradation of their natural habitats. As a result, a number of valuable medicinal plant species have been eliminated from the wild. Many species, such as kuth, karru, bankakri, malathi, and hing have been over-exploited by collectors and local traders, they are now on the endangered species list. If appropriate measures are not taken, some of these species may be lost forever.

Over-use of pesticides

Pesticides are commonly used in Pakistan. Most pesticides are expensive, which forces farmers to use cheaper chemicals with greater environmental consequences. Although under the law, sale of environmentally hazardous pesticides are banned, some unauthorized pesticides are still available. The increased use of pesticide sprays on fruit trees and vegetables can result in spray drift, with unintended consequences, i.e., areas that were not sprayed, may be affected by the pesticide, as the pesticide drifts, in the wind, into adjacent areas. Also, unsafe use of pesticides can result in soil and water contamination. Non-target (potentially beneficial) insect species, e.g., bees, birds, fish, wildlife (as well as humans) may be affected. The effects of pesticide use on biodiversity are expected to increase in the future, as markets open up, and more pesticides become available, and as farmers need to use more pesticide to produce for markets.

Agricultural expansion/intensification

As available land becomes scarce, landowners are clamoring to increase landholdings. Conversion of unoccupied land to crop land removes habitat that wildlife rely on, and has a negative impact on the local flora. This has caused many species to retreat to remote and unproductive locations.

Agricultural intensification is another cause of biodiversity loss. The spread of commercial agriculture (in part due to agricultural subsidies) encourages monocultures and continuous cultivation of the same crop without allowing fields to rest. To maintain production, farmers must use chemical fertilizers and pesticides, which, when used unsafely, pollute agro-ecosystems, streams and rivers, and (as mentioned above), have other far-reaching effects. Intensification can lead to the loss of traditional, highly variable local crop varieties. Loss of traditional varieties means loss of valuable genes, which have resistance to local pests and diseases and adapted to withstand local stresses.

Introduction of high yielding crops

Introduction of high yielding varieties (HYVs) is one of the main causes of the loss of crop genetic diversity. They pose threats to indigenous crop varieties and often reduce agro-biodiversity. Agriculture Departments in Pakistan have introduced HYVs of wheat, maize, rice, sugarcane, cotton, and fruit trees, and most are now commonly grown. As a result, traditionally grown indigenous varieties may be lost, along with their contribution to genetic diversity.

Crossbreeding of livestock

Loss of livestock biodiversity is caused by the replacement of the native breeds with exotic breeds. This process is accelerated by crossbreeding exotic breeds with native breeds of sheep, goats, and cattle, as the repeated crossbreeding leads to erosion of genetic diversity. Livestock Departments often encourage crossbreeding, without regard to the negative impact on the local breeds.