

Pakistan

National Biodiversity Strategy and Action Plan

for achieving Aichi Biodiversity Targets and Sustainable Development Goals



Government of Pakistan
2017 - 2030

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List of Acronyms and Abbreviations

ABTs	Aichi Biodiversity Targets
AJK	State of Azad Jammu and Kashmir
BAP	Biodiversity Action Plan
BRC	Bio Resource Research Centre
BWG	Biodiversity Working Group
CAF	Central Asian Flyway
CBD	Convention on Biological Diversity
CBI	City Biodiversity Index
CDR	Carbon Dioxide Removal
CHM	Clearing House Mechanism
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
CMS	Convention on the Conservation of Migratory Species
CoP	Conference of Parties
CRI	Climate Risk Index
DNA	Deoxyribonucleic Acid
ECO	Economic Cooperation Organization
EIA	Environmental Impact Assessment
EPA	Environmental Protection Act
ENERCON	National Energy Conservation Center
FAO	Food and Agriculture Organization
FATA	Federally Administered Tribal Areas
FSMP	Forestry Sector Master Plan
GB	Gilgit-Baltistan
GBO	Global Biodiversity Outlook
GDP	Gross Domestic Product
GEF	Global Environment Facility
GIS	Global Information System
GMO	Genetically Modified Organism
GM	Genetically Modified
HYVs	High Yield Varieties
IBC	Institutional Biosafety Committee
ITPGRFA	International Treaty on Plant Genetic Resources for Food and Agriculture
IUCN	International Union for Conservation of Nature
KP	Khyber Pakhtunkhwa
LMO	Living Modified Organism
MAPs	Medicinal and Aromatic Plants
MDGs	Millennium Development Goals
Mha	Million hectares
MoCC	Ministry of Climate Change
NBC	National Biosafety Committee
NBSAP	National Biodiversity Strategies and Actions Plan
NCS	National Conservation Strategy
NSC	National Steering Committee
NEQS	National Environmental Quality Standards
NIM	National Institute of Management
NRM	Natural Resource Management
NSPP	National School of Public Policy
NSDS	National Sustainable Development Strategy
NTFPs	Non-timber Forest Products
NWCS	National Wetland Conservation Strategy
PA	Protected Area
PARC	Pakistan Agriculture Research Council
PBS	Pakistan Bureau of Statistics
PCRWR	Pakistan Council for Research in Water Resources
PEPA	Pakistan Environment Protection Act
PIPS	Pakistan Institute of Parliamentary Studies
PRSP	Poverty Reduction Strategy Papers
PSCI	Pakistan Sustainable Cotton Initiative

REDD+	Reducing Emissions from Deforestation and Forest Degradation
SAARC	South Asian Association for Regional Cooperation
SBP	Statistical Bureau of Pakistan
SCP	Sustainable Consumption and Production
SDGs	Sustainable Development Goals
STAR	System for Transparent Allocation of Resources
TEV	Total Economic Value
UN	United Nations
UNEP	United Nations Environment Program
UNFCCC	United Nations Framework Convention on Climate Change
UNIDO	United Nations Industrial Development Organization
WAPDA	Water and Power Development Authority
WCS	World Conservation Strategy
WRI	World Resource Institute
WSSD	World Summit on Sustainable Development
WWF	World Wildlife Fund

Executive Summary

Context

Pakistan was among 150 countries that signed the Convention on Biological Diversity (CBD) at the 1992 Rio Earth Summit, and ratified it in 1994. A Biodiversity Action Plan (BAP) of Pakistan was approved by the Pakistan Environment Protection Council in 2000 as a principal instrument for implementing the Convention at the national level (CBD, Article 6) and mainstream the protection of biodiversity in policies and planning of the country.

Conference of the Parties (CBD CoP) regularly reviews the status of biodiversity and continues to set goals to halt its loss at the global level. At the meeting held in 2002, the parties committed to achieve a significant reduction in the current rate of biodiversity loss at global, regional, and national levels by 2010. However a comprehensive overview of the state of biodiversity was assessed in the Global Biodiversity Outlook (GBO3) which is the flagship publication of the CBD and summarizes the latest data on the status and trends of biodiversity. The GBO3 raised alarm by reporting that the 2010 Biodiversity Targets had not been met globally, and biodiversity continued to be eroded. Against this background, the tenth meeting of the COP held in Aichi-Nagoya, Japan in 2010, adopted the Strategic Plan for Biodiversity 2011-2020 with five Strategic Goals as well as 20 “Aichi Biodiversity Targets” (ABTs) to be achieved by 2020.

The United Nations Sustainable Development Summit, held during the 70th Session of the UN General Assembly in September 2015, with over 150 heads of the states formally adopted the 17 Sustainable Development Goals (SDGs) to end poverty, protect the planet, and ensure prosperity for all as part of a new sustainable development agenda (Goal 14-15 specifically cover ATBs)

Pakistan developed its first Biodiversity Action Plan (BAP) in 1999 to implement the 2010 Biodiversity Targets. This document, Pakistan’s second NBSAP 2017-2030, has been prepared in line with ABTs (2011-2020) and Sustainable Development Goals (SDGs) and demonstrates Pakistan’s commitment to implement the objectives of the CBD: conservation of biodiversity, the sustainable use of its components, and fair and equitable sharing of the benefits arising out of the utilisation of genetic resources. The NBSAP identifies legal, institutional, capacity, knowledge and technical gaps in implementing the ABTs and provides recommendations for overcoming these gaps. These include raising awareness and capacity, improving scientific and knowledge capabilities, mainstreaming biodiversity and thereby improving national coordination mechanisms, encouraging cross-sectoral collaboration and adopting a fresh financing strategy. The NBSAP comprises of 74 proposed actions across five strategic goals and 20 ABTs requiring \$74.8 million. The proposed actions are further classified into 31 thematic areas.

The document has been prepared after extensive stakeholder consultations in all provinces of the Country and the draft was presented at a national meeting in Islamabad on November 5th, 2015 and endorsed by all the provinces and territories.

Purpose of this document

The purpose of this document is to:

- Review progress for Pakistan on the Strategic Plan 2010-2020 and Aichi Biodiversity Targets (ABTs)
- Establish national targets in line with ABTs, SDGs: National Biodiversity Strategies and Actions Plan
- Provide recommendations to integrate Pakistan's obligations under the Convention on Biological Diversity (CBD) into its national development and sectoral planning frameworks
- Provide a framework for implementation as well as monitoring and evaluation of the National Biodiversity Strategies and Actions Plan
- Provide a framework for implementation of provincial biodiversity action plans

Valuation of Biodiversity and Ecosystem Services

The biodiversity, or ecosystem services, refers to a set of benefits that fall into three distinct economic categories: (i) 'Goods' (ii) 'Services' (iii) Cultural benefits. Besides these actual benefits, biodiversity plays a significant role as a safety net in our changing world, particularly in the face of climate change, and helps to maintain productive ecosystems.

The valuation of biodiversity and ecosystem services still needs more efforts in the country although the need to improve ecosystem services in the face of increasing natural calamities has attracted the attention of the government. In 2012, the Government of Pakistan approved the National Climate Change Policy and the Climate Change Financing Framework was developed subsequently. The National Forest Policy (NFP 2016) has also been approved in principle by the Council of Common Interests that is the highest constitutional, political and administrative forum of the country.

The Causes and Consequences of Biodiversity Loss

The rapid population growth and consequent pressure on natural resources has caused land degradation, desertification, loss of habitat, and has threatened the survival of many wild species. There is a need of well-defined land reforms and tenure regimen especially in case of forests to halt deforestation and over grazing thus causing ecosystems degradation. The forest areas are now prone to water and wind erosion, depletion of soil fertility, water logging, and increased salinity. Deforestation and degradation in the catchment areas has increased the siltation of dams, reducing their capacity for storage of water for irrigation and power generation. Resource degradation is further exacerbated by increasing scarcity of water, frequent droughts, and the lack of management of land and water resources. Fragmentation and loss of habitat pose a serious threat to biodiversity in all biomes, and consequently many populations of species are now confined to isolated small pockets. In addition, the over-harvesting of fishery resources and use of inappropriate gear has resulted in losses to aquatic biodiversity.

Crop genetic diversity in Pakistan is low because of the use of high-yield varieties (HYVs). This genetic erosion is pronounced in wheat, rice, cotton, sorghum, sugarcane and vegetables, and at the same time, between 75% and 80% of Pakistan's domestic livestock are cross-bred leading to a

gradual loss of the genetic diversity. Consequently, the ability of livestock breeds to adapt to climate change and to tolerate diseases is being significantly reduced. The excessive use of pesticides and fertilizers has disturbed the agro-ecosystem, affected non-target and environment-friendly organisms (including many bird species), induced pest resistance and resurgence, and caused many health problems among the human population.

Environmental pollution is a growing problem in Pakistan and discharge of sewage and industrial effluents into aquatic and marine ecosystems is a major threat to biodiversity and a cause of water-borne diseases.

Climate change is identified as an emerging threat to biodiversity as well as for humans. At the turn of the century, according to the Global Climate Risk Index 2017, Pakistan was listed as one of the ten most vulnerable countries to climate change. Since then, a significant human population has been affected directly by climate-related disasters, and the country's economy has been crippled by devastating and repetitive floods during the last decade.

Constitutional, Legal and Institutional Framework

Pakistan's National Conservation Strategy (NCS) was formulated in 1992 as the first policy framework to encompass biodiversity and conservation. Subsequently, in year 2000, a comprehensive Biodiversity Action Plan (BAP) was prepared, and later, in 2005, the National Environment Policy was adopted to provide an overarching framework for addressing environmental issues.

The National Climate Change Policy (2012) aims at ensuring the climate change mainstreaming in economically and socially vulnerable sectors and to steer Pakistan towards climate resilient development. One of the major objectives of this policy is the conservation of natural resources and long-term sustainability attained via several concrete measures encompassing forestry, biodiversity, and vulnerable ecosystems. Pakistan has also developed a new comprehensive National Forest Policy 2016 that focuses on the expansion of forests, natural habitats and green areas for restoration of ecological functions to maximize economic benefits.

To streamline implementation of the Paris Agreement of Climate Change, Pakistan has enacted Pakistan Climate Change Act 2017. The Act establishes a policy-making Climate Change Council, along with a Climate Change Authority to prepare and supervise the implementation of projects to address climate risks through adaptation and mitigation actions. Article 8 tasks Climate Change Authority to "*formulate guidelines for the protection and conservation of renewable and non-renewable resources, species, habitats, and biodiversity in general which are adversely affected or threatened by climate change*".

The four provinces, Azad Jammu and Kashmir, Gilgit Baltistan (GB), Federally Administered Tribal Areas (FATA) and Islamabad Capital Territory (ICT) have enacted provincial laws for the management of the environment, forests, wildlife, and fisheries. The Pakistan Trade Control of Wild Fauna and Flora Act, 2012 (CITES Act) also extends across the whole country. In addition Access and Benefit Sharing Act has been drafted to facilitate access to genetic resources and their derivatives for environmentally-sound uses.

The Forestry Wing of the Ministry of Climate Change (MoCC) is the national focal point for the CBD. The Directorate of Biodiversity is responsible for coordination with the CBD Secretariat as well as with the national, provincial, regional, local government agencies, and other stakeholders

that are partners in the implementation of obligations under the Convention. The provincial and territorial departments of Forestry, Wildlife, Fisheries, Environment, and Agriculture are responsible for management of these sectors and matters related to biodiversity. The Pakistan Agriculture Research Council (PARC) and the provincial governments have established research stations for the in-situ conservation of important varieties of crops and major indigenous breeds of cattle. In addition to the Government, international conservation organizations like International Union for Conservation of Nature (IUCN) the Worldwide Fund for Nature (WWF), Bio-Resource Research Centre (BRC) and others are playing roles in biodiversity conservation.

Review of Progress on BAP Implementation

The Biodiversity Action Plan (BAP 2000) contained recommendations for ‘immediate actions’ to be taken within a year, ‘short term’ actions to be taken within five years, and ‘longterm actions’ to be taken within ten years. The BAP comprised of 13 components, corresponding to articles of the CBD. The plan included 182 targets, 31 to be undertaken within a year, 81 within five years, and 25 within ten years. In the last 17 years some progress has been achieved in the country especially there is an increased awareness and understanding of biological diversity concerns across the sectors. As compared to the pre BAP era, there are more projects to conserve natural resources including local breeds of crops, diversity of fishes, livestock, and poultry and cereal crops. A review of BAP (2015) revealed that 137 actions proposed in the plan were invariably addressed to some extent. It was noted that the understanding of the cause of biodiversity was high as compared with the period of preparation of BAP when the capacity of the implementing partners was also low.

A transparent and consultative process was adopted ensuring the wide participation of a broad range of stakeholders from government, academia and civil society for the preparation of both the BAP 2000 and the NBSAP. In addition, national and regional level workshops were organized for consultation with a broad range of interest groups. In case of NBSAP, voluntary guidelines to parties proposed by CBD for review of national biodiversity strategies and action plans were followed.

I. NATIONAL BIODIVERSITY STRATEGY AND ACTION PLAN

A need to review and revise the action plan after 20 years was necessitated because of changing policy scenarios, global environmental agenda, changing financial scenarios and possibilities. The same remained the motivation for steering the NBSAP in right direction.

Vision

The guiding vision of the NBSAP is to provide the benefits of biodiversity and ecosystem services to all the segments of society both the current and future generations, in particular the marginalized, the poor, and the vulnerable by restoring and conserving the rich natural biodiversity heritage of Pakistan. There by ensuring equitable sharing of benefits arising from sustainable use of biodiversity.

Goals

The goals of the NBSAP are as follows:

1. To conserve biodiversity at priority sites, including species and genetic diversity. In pursuing this goal, the focus will be on *in-situ* site-specific conservation work, high priority *ex-situ* conservation, combating wildlife trafficking, and illegal timber trade.
2. To mainstream biodiversity as an essential element of human development. This goal aims to increase awareness of how biodiversity and ecosystem goods and services contribute to human wellbeing, sustain development outcomes, and promote integration with key sectors such as agriculture, poverty alleviation, climate change, health, democracy and governance, economic growth, and trade.

Objectives

The objectives of NBSAP are based on the five strategic goals of the ABTs:

1. Address the underlying causes of biodiversity loss by mainstreaming an understanding of biodiversity across government and society;
2. Reduce the direct pressures on biodiversity and promote sustainable use;
3. Improve the status of biodiversity by safeguarding ecosystems, species, and genetic diversity;
4. Enhance the benefits to all from biodiversity and ecosystem services, and;
5. Enhance implementation through participatory planning, knowledge management, and capacity building.

The whole consultative process determined the strategies to achieve the objectives of the NBSAP through the actions cutting across the sectors, in particular biodiversity awareness, mainstreaming, poverty alleviation, environment, and the CBD's major thematic program areas.

Biodiversity Awareness

People remain unaware of the gradual loss of biodiversity and the consequences remain unnoticed. Thus, well-planned and targeted efforts are proposed to create awareness among people through mobilization of media including emerging technologies. The issue and its impact on human life will be effectively highlighted in education at all levels for the youth and the management alike.

Gender, Poverty, and Biodiversity Nexus

The consultative process clearly indicated a need of linking the conservation issues with the economic benefits for the resource users. Common property and open access resources are being over-exploited especially by the landless and small landholders that rely heavily on resources for subsistence. Men, women, and children have a different pattern of the use of natural resources and therefore, their requirements need to be factored into conservation programmes. Thus, biodiversity loss and the lack of access to natural resources near their homes leads to an increase in workload and economic hardships, particularly for women. The consultations however brought the idea of

the opportunity to alleviate poverty by restoring and maintaining the health of ecosystems on which these communities depend.

Mainstreaming Biodiversity

The national consultation realized the need of mainstreaming biodiversity concerns in relevant national policies and plans for sustainable development towards the development agenda. The NBSAP adopted as a policy instrument of the government, approval by the cabinet will act as an effective instrument in achieving the goals of conservation and sustainable use of natural resources across different sectors. It will be aided by a ministerial Biodiversity Roundtable and support of a group of ‘Opinion Leaders’. In addition, mobilization of financial resources is indicated for a substantial and effective implementation of the NBSAP.

Terrestrial Ecosystems, Habitats, and Species

The diverse and discrete vegetation types in Pakistan contain many endemic species of flora, fauna and the wild relatives of crops. Most natural ecosystems, need effective management that otherwise have become open access resources. Approximately 14% of national area enjoys the status of protection of some kind, however, effective management and representation pose serious challenges.

The NBSAP consultations propose strategies to conserve the rich biological diversity of ecosystems including strengthening of institutional and policy frameworks, expansion and effective management of PAs, empowering local communities and improving knowledge and skills related to conservation.

Forest Ecosystems

The forest cover in Pakistan is assessed employing different evaluation criteria and techniques by different agencies. Setting aside the methodologies employed while reporting, the land under forest is relatively small, and the cover is shrinking due to both deforestation and degradation mainly due to poverty, population pressures and lack of fiscal space for strong policy initiatives in protecting the forests.

Considerable efforts are made for the revival of forestry practices, aiming to expand the forest cover through mega tree plantation programmes and strengthening the regulatory & forest protection policy. The Green Pakistan Programme (2017) of the Federal Government, Green Growth Initiative (2014) of the Government of Khyber Pakhtunkhwa, a project on Sustainable Forest Management supported by GEF and Readiness Preparation Proposal RPP funded by FCPF Forest Carbon Partnership facility by WB are some examples. Recent policy developments have led the formulation of new national and provincial REDD+ management arrangements, the most significant is the National Steering Committee (NSC) on REDD+. In addition, Pakistan has committed to participate in the Bonn Challenge, a global effort to improve and restore forest cover. In the consultation meetings while drafting NBSAP, experts and regional users suggested: provision of enabling environment to integrate biodiversity concerns in the forestry sector, signifying ecosystem approach, protecting and restoring forest biodiversity and making plantations biodiversity friendly by increasing indigenous floral diversity. It also aims at enhancing social values, knowledge base and adoption of technologies related with forest biodiversity.

Inland Water Ecosystems

Pakistan is facing an acute water shortage and was considered to reach the ‘water stress line’ in 1990 and might run dry by 2025. Indus and its tributaries originate from the disputed territory of Jammu and Kashmir and Tibet in China and the regional countries compete for water resources for agriculture and power generation. Streams, rivers, natural lakes, and man-made reservoirs are not only sources of water and fish but are also important habitats for migratory species.

Across Pakistan, over 40 protected wetland sites and 19 Ramsar Sites support the conservation efforts. A number of different government agencies manage and control wetlands in their respective spheres of activities including irrigation and hydropower generation, while provincial Fisheries and Wildlife Departments regulate fishing and hunting. The present document proposes some strategies to promote conservation and sustainable use: (1) ‘Sound watershed management practices and climate change mitigation measures in the Indus basin to prevent water shortages in the country’ (2) revision of policy, laws, and regulations to ensure conservation of fish and other aquatic organisms, as well as equitable sharing of benefits; (3) appropriate measures to prevent the spread of invasive species and their eradication from natural waters, and; (4) build capacity of all stake holders to sustainably manage wetlands ensuring equitable sharing of benefits.

Coastal and Marine Ecosystems

The Arabian Sea is a biodiversity rich area, included in Global 200 Priority Ecosystems and some beaches are nesting grounds for globally endangered sea turtles. Anthropogenic activities have contributed to habitat degradation and led to a decline of shrimp and many fish species. The Indus Delta is heavily polluted by a variety of industrial & domestic effluents and nutrients. Gradual upstream diversion of water channels is leading to salt water intrusion and increased salinity in the Delta. The situation is further exacerbated by climate change phenomenon exposing coastal communities to the threat of cyclones due to their lack of resilience. Contrarily, the conservation of biodiversity and improvements in the health of ecosystems can help local communities better adapt to the adverse impacts of climate change.

To sustain marine ecological resources and enable adaptation to climate change the present instrument proposes: (1) Establishment of a network of protected areas and specific conservation measures for the recovery of species populations with declining numbers; (2) Development of the capacity of coastal fishing communities to harvest marine resources in a sustainable manner, and; (3) Improvements in institutional and regulatory frameworks to address challenges to the conservation of marine biodiversity through sustainable use and the equitable sharing of benefits.

Sustainable Agriculture and Agro-biodiversity

Agriculture sector contributes significantly towards GDP, supports employment of a huge rural population and ensures food security for the human population. The diverse agro-climatic conditions, rich indigenous crop diversity and their wild relatives are unique to the country. Northern and western Pakistan is considered as one of the global centres for the origin and diversity of cultivated plants and livestock. However, obsolete agricultural practices and associated chemical pollution, the introduction of high-yield varieties are leading to habitat loss and erosion of local cultivars and livestock breeds.

To address these issues, and achieving ABTs, the document proposes: (1) Principles and practice of sustainable agriculture be incorporated into national policies, laws, investment strategies, education, and extension programmes; (2) Capacity building and awareness raising of all stakeholders be conducted, including farmers, the consumers, researchers, and extension specialists, on the beneficial effects of agro-biodiversity; (3) Models of sustainable agriculture for major crops be developed and promoted; (4) Bio-diversification of agro-ecosystems be restored in time and space through crop rotations, cover crops, inter-cropping, crop and livestock mixtures, and the conservation of pollinators and soil micro fauna, and; (5) The use of transgenic organisms be considered very carefully to ensure that they pose no environmental and health risks over and above the use of current crops and practices.

Sustainable Consumption and Production (SCP)

The Sustainable Consumption and Production (SCP) has a standalone goal within the 2030 Agenda for Sustainable Development requiring the countries to make fundamental changes to the way they consume and produce goods and services (Goal 12 of SDG). Such changes to avoid unsustainable consumption and production require commitment and action from all the partners. Pakistan is in process of developing National Action Plan on SCP to identify key priority areas that are aligned with the Sustainable Development Goals and Pakistan's Vision 2025.

Poorly-regulated economic development, coupled with rapid demographic growth, has placed a pressure on the natural resource base of Pakistan, especially land and water, and has significantly increased levels of local pollution. Large-scale but unregulated harvest of medicinal plants for domestic use and export fall in the domain of the production sector. However, other sectors like coal mining and other industrial extraction, oil exploration, ship breaking, and hydropower projects pose direct and indirect threats to biodiversity.

A number of strategies have been proposed to promote sustainable production and consumption: (1) Making producers and consumers aware of the social costs and environmental consequences of unsustainable consumption and production in order to minimize the ecological footprint of pollution and the degradation of natural resources; (2) Development of sustainable consumption and production patterns for the conservation and sustainable use of biodiversity fostered through business and biodiversity initiatives; and (3) The active pursuit of strategic environmental impact assessments, economic incentives, and law enforcement to achieve the goals of sustainable consumption and production.

Emerging Issues (Biosafety, Geo Engineering, and Synthetic Biology) and Challenges

Use of biotechnology and other genetic techniques used to bring desired characteristics in plants and animals is governed under the Cartagena Protocol on Biosafety to ensure protection of biodiversity. Synthetic biology an emerging science features the 'de novo' synthesis of genetic material as well as an engineering-based approach to develop components, organisms, and products.

Climate engineering (geo-engineering) comprises of an array of technologies and techniques to manipulate global climate and moderate the effects of climate change through methods to absorb and store atmospheric carbon and ways and means that aim to reduce the amount of heat trapped by greenhouse gases by reflecting sunlight back into space.

To date, the knowledge of the risks, benefits, and uncertainties related to GMOs and other technologies as mentioned above are poorly understood. The following strategies are proposed (1) There is a need to increase the national knowledge base regarding synthetic biology and in the meantime precautionary approach must be adopted to handle such issues. (2) National capacity and action will be improved for ensuring an adequate level of protection in the field of the safe transfer including transboundary movement, handling and use of living modified organisms that may have adverse effects on biological diversity and also taking into account risks to human health, and; (3) Feasibility of capture carbon and safe storage will be examined taking into account its possible impacts on biodiversity.

II. IMPLEMENTATION, MONITORING, AND EVALUATION

Implementation, monitoring, and evaluation form an integral component of the NBSAP. Effective implementation will require working with, and building capacity of, the stakeholders at national, provincial, regional and local levels; communicating and reaching out to mainstream biodiversity values in the policy and planning processes; promoting sustainable consumption patterns in people, as well as mobilizing resources for NBSAP implementation.

Implementation of NBSAP

Although efforts will be made to make maximum progress on the ABTs by 2020, yet the work will continue beyond 2020 to achieve ABTs and SDG targets as well as meeting targets of Pakistan Vision 2025. Whereas many actions will be taken at the provincial or regional levels, some cross-cutting themes will be best addressed at the national level. Implementation of ABTs at the provincial and regional level will be through their own Biodiversity Strategies and Action Plans prepared as part of the NBSAP revision process. A Coordination Committee will mediate among Ministries and provinces to facilitate implementation of NBSAP and monitor the progress, assist in removal of bottlenecks if any, and provide guidance for resource mobilisation. Likewise, Steering Committees will be established in provinces for similar actions at provincial levels.

Communication and Outreach Strategy

Avoiding the unintended negative consequences of policy measures on biodiversity necessitate that policymakers have a clear understanding of the values of nature so they can facilitate in mainstreaming biodiversity concerns across the sectors. It involves strengthening the capacities of all the partners in conservation activities through suitable training modules. In addition to training, mass and informal communication resources shall be necessary for raising awareness and mainstreaming biodiversity using new and emerging tools and technologies.

Plan for Resource Mobilization

Many actions proposed in the NBSAP will either neatly fit, or be easily accommodated, into the on-going development plans for relevant sectors at national, provincial, and regional levels. Simultaneously, additional sources of funding will be explored via innovative mechanisms available in the Ministry of Climate Change and other on-going donor projects, for example, the project for REDD⁺ Readiness, and the GEF. In addition, bi-lateral and multilateral donor support

will be solicited to meet the short fall in financial resources available for achieving ABTs in an effective and timely manner.

National Coordination Mechanisms

The Directorate of Biodiversity will have overall responsibility for coordinating the implementation of the NBSAP through its implementing partners in the relevant ministries at the national level, provincial and regional governments, and other conservation organizations. CBD focal points in the provinces will facilitate coordination among various stakeholders and for liaison with the Directorate. The NBSAP also proposes the establishment of steering committees at national and sub-national levels to ensure that necessary administrative and financial support is made available for NBSAP implementation and monitoring.

Clearing-House Mechanism (CHM)

The Government of Pakistan in collaboration with WWF-Pakistan and with the support of GEF and UNEP launched the CHM website on the International Day of Forests on March 7th, 2013. This site contains useful relevant information as well as measures undertaken to conserve the biological diversity. Efforts are needed to keep the website alive and dynamic.

Monitoring and Evaluation

Progress on the implementation of the NBSAP will be monitored on an annual basis via a flexible framework of indicators (Annex 1) reflecting national circumstances and priorities. Monitoring will not only measure progress towards the achievement of ABTs and national targets, but will also help in identification of implementation issues, and in the adaptive management for effective implementation of the NBSAP. An independent mid-term evaluation will also be commissioned, subject to the availability of funds, to review the implementation of the NBSAP and to make recommendations for achieving national targets in an effective and timely manner. The 6th National Report to the CBD will be an evaluation of NBSAP Ensure this is reflected in the main text.

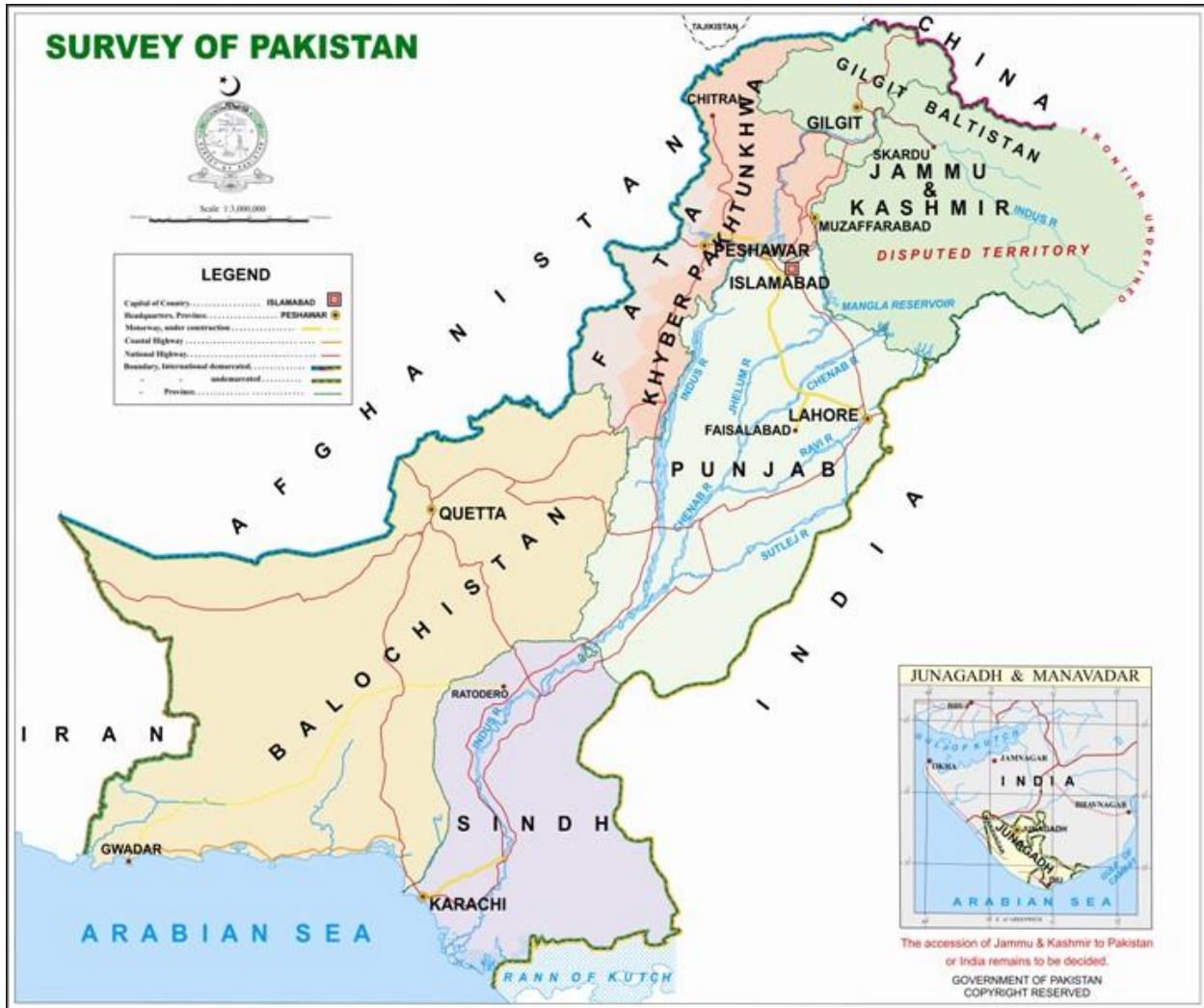


Figure 1: Map of Pakistan

(Source: Survey of Pakistan)

I. INTRODUCTION

1. Context

The World Conservation Strategy (WCS) launched by the IUCN in 1980 provided a blueprint to halt and reverse the rapid deterioration in the condition of living resources on earth and urged the preparation of national conservation strategies to focus attention on priority areas and raise public consciousness. The WCS provided both an intellectual framework and practical guidance for these conservation actions. Pakistan was among the few countries responding to the WCS and in 1992 approved the National Conservation Strategy (NCS). Realizing the need, Pakistan was also among the pioneer countries signing the Convention on Biological Diversity (CBD) at the 1992 Rio Earth Summit, and ratified it in 1994. As an obligation under the Convention, Biodiversity Action Plan was prepared and approved by the Pakistan Environment Protection Council in 2000 as a principal instrument for implementing the Convention at the national level.

The Conference of Parties (CoP VI) to the Convention on Biological Diversity (CBD) in April 2002, committed to achieve a significant reduction in the current rate of biodiversity loss at global, regional, and national levels by 2010 as a contribution to poverty alleviation and to benefit all life forms on Earth. To achieve these 2010 targets, the CoP established seven thematic programmes of work corresponding to some of the major biomes on the planet. These programmes included a vision, guiding principles, potential outputs, and a suggested timetable for implementation of the 2010 targets.

Biological diversity is about more than plants, animals, and microorganisms and their ecosystems – it is about people and our need for food security, medicines, fresh air and water, shelter, and a clean and healthy environment in which to live. (*Convention on Biological Diversity*)

The Global Biodiversity Outlook (GBO 3) commissioned by the Conference of Parties (CoP) reported that 2010 Biodiversity Targets had not been met globally, and biodiversity continued to be eroded with a consequential decline in ecosystem services threatening human well-being. With this background, CBD CoP-10 (2010) adopted the Strategic Plan for Biodiversity 2011-2020 with five Strategic Goals as well as 20 “Aichi Biodiversity Targets” (ABTs) to be achieved by 2020. The five goals are listed below.

- Strategic Goal A: Address the underlying causes of biodiversity loss by mainstreaming biodiversity across government and society
- Strategic Goal B: Reduce the direct pressures on biodiversity and promote sustainable use
- Strategic Goal C: To improve the status of biodiversity by safeguarding ecosystems, species and genetic diversity
- Strategic Goal D: Enhance the benefits to all from biodiversity and ecosystem services
- Strategic Goal E: Enhance implementation through participatory planning, knowledge management and capacity building

The countries party to the Convention agreed to translate ABTs into revised and updated national biodiversity strategies and action plans.

The 70th Session of the UN General Assembly (2015) formally adopted the 17 Sustainable Development Goals (SDGs) to end poverty, protect the planet, and ensure prosperity for all as part of a new sustainable development agenda. Each goal has specific targets to be achieved over the next 15 years. The implementation of Aichi Biodiversity Targets (ABTs) and SDGs are intertwined, mutually supportive and reinforcing. The successful implementation of one will contribute towards the achievement of the other¹.

2. Purpose of National Biodiversity Strategy and Action Plan

Pakistan signed the Convention (CBD) in 1992 and ratified in 1994. Prior to this initiative, recognizing the significance of conservation and sustainable use of biodiversity, the National Conservation Strategy was drafted (1991) and later adopted as national policy in 1992. In same year, GOP developed Forestry Sector Mater Plan (1992) signifying the country's commitment towards the cause of biodiversity conservation. To meet the CBD's obligations under article 6, national reports are regularly submitted to report the progress towards the implementation of the obligations under the Convention including Strategic Plan for Biodiversity 2010-2020 and ABTs.

The status of implementation of the 2010 targets in Pakistan was reviewed in 2009 during the preparation of Fourth National Report, and a review of BAP and ABTs was also carried out in 2014 during preparation of Fifth National Report. It was noted that while some progress had been made on the CBD's Programmes of Work and ABTs, on the whole ecosystems and habitats continued to degrade, ultimately leading to diminished ecosystem services with consequent impacts on the economic well-being, livelihood, and health of the people of Pakistan.

Recognising biodiversity as key to survival of human and the planet, and taking into account the fair role, Pakistan's NBSAP is closely aligned with the global biodiversity agenda and Sustainable Development Goals. The five goals of the Strategic Plan for Biodiversity 2011-2020 remain the guiding principles of NBSAP and twenty national targets are modelled to tune-up with ABTs. Furthermore, 31 key thematic priority actions are identified based on the national priorities and challenges. Overall 74 actions have been identified requiring USD 74.8 million worth of financial resources. Majority of the actions are related to Goal B (26 actions) requiring a big chunk of the finical resources (\$31 Million).

The objectives of this Plan are as follows:

- Review progress for Pakistan on the Strategic Plan 2010-2020 and Aichi Biodiversity Targets (ABTs)
- Establish national targets in line with Aichi Biodiversity Targets (ABTs) and Sustainable Development Goals (SDGs) - National Biodiversity Strategies and Actions Plan
- Provide recommendations to integrate Pakistan's obligations under CBD into its national development and sectoral planning frameworks
- Provide a framework for implementation as well as monitoring and evaluation of the National Biodiversity Strategies and Actions Plan
- Provide a framework for development of provincial biodiversity action plans

3. Valuation of Biodiversity & Ecosystem Services and its Contribution to Human Well-being

The term biodiversity, or ecosystem services, refers to a set of benefits that fall into three distinct economic categories: (i) ‘Goods’ (i.e. products obtained for direct consumption or as inputs for industry, such as resource harvests, and genetic material that contribute to the variety of crops and animal breeding); (ii) ‘Services’ (i.e., recreational and tourism benefits or certain ecological regulatory functions, such as water purification, climate or pollution regulation and erosion control), and; (iii) Cultural benefits (i.e., scientific knowledge, spiritual and religious feelings, and heritage and culture). In addition, biodiversity plays a significant role as a safety net in our changing world, particularly in the face of climate change, and helps to maintain productive ecosystems. Maintaining healthy and productive ecosystems carries immense importance for the poor and vulnerable human populations whose subsistence depends directly upon these ecosystems. The Millennium Ecosystem Assessment (2005)² highlighted the links between ecosystem services and the elements that contribute to human well-being the latter being measured by Total Economic Value (TEV) of the environmental services for communicating the measurable beneficial use of ecosystems services and increasing public awareness and policy maker’s interests in biodiversity conservation.

However, the valuation of biodiversity and ecosystem services received the significance it deserves only after the incidences of natural calamities during the past few years. Approval of the National Policy of Climate Change and the Climate Change Financing Framework is a reflection of the same. The role of Ministry of Environment was reorganized and it was renamed to become a fully-fledged National Ministry of Climate Change to meet the emerging challenges. Recognizing the tangible role of forests, the National Forest Policy has recently been approved (2015) by the Council of Common Interests and it will help in moving to a national forest monitoring mechanism, curb deforestation, mitigate the emission of greenhouse gases and protect biodiversity. The Forest Policy aims to ‘expand the national coverage of forests, protected areas, natural habitats and green areas for restoration of ecological functions and maximizing economic benefits while meeting Pakistan’s obligations to international agreements related to forests.’

4. Causes and Trends of Biodiversity Loss

Land and habitat degradation and desertification are serious issues in Pakistan and the main reasons for losses to agricultural productivity and biodiversity. Causes for loss of biodiversity remain the same as described in the BAP (2000), although anthropogenic pressures have increased due to a rapidly growing population, expansion of the area under human habitation, and poverty. While conservation efforts have created some islands of success, vast areas of the country remain unmanaged resulting in *inter alia*, loss of biodiversity. Habitat degradation and fragmentation in all biomes pose a threat to biodiversity to an extent that only a few corridors remain connected to the network of Protected Areas. Thus, many species are confined to isolated small populations while habitat loss and the over exploitation of selected species for trade, food, and sport, have exacerbated the situation. Lists of endangered mammals, birds, reptiles, fish, and plants are included at the end of this NBSAP as Annexes 2–7.

4.1. Population Growth

A high rate of human population growth in Pakistan and the resulting pressure on natural resources is accelerating the loss of biodiversity and environmental degradation. Pakistan has one of the highest population growth rates in the world, and is the sixth most populated country on Earth. Although the rate of population change has decreased slightly over the last two decades, increasing population puts undue pressure on all the resources, especially the natural resource capital. Most people living in rural areas, outside arable tracts, are heavily dependent on natural ecosystems for fuel, forage, and small timber for construction. In mountainous areas, rapidly increasing population and infrastructure development has increased the incidence of landslides. Breaking of fresh land for agriculture and housing is causing loss of biodiversity and habitat fragmentation.

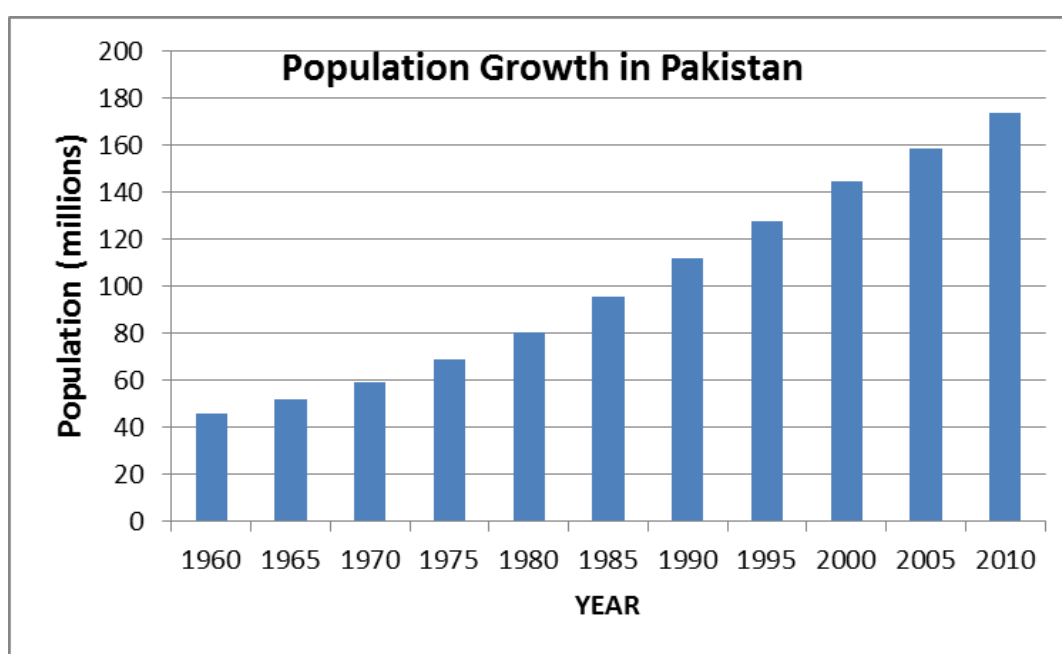


Figure 2: Population growth in Pakistan, 1960 -2010

4.2. Policy, Planning, and Institutional Shortfalls

Ineffective policy and planning frameworks as well as institutional weaknesses remain contributing causes for the loss of biological diversity. The value of biodiversity and ecosystem services, its contribution to the national economy, and potential to alleviate poverty has not been well-integrated into national and local planning or development processes. Consequently, the environment sector, including climate change, biodiversity, forestry, and wildlife remain at low priority. This is illustrated by the budgetary allocations for biodiversity sectors from 2002 to 2013 (Figure 3). More or less similar situation prevails for other NRM sectors including agriculture, livestock and fisheries indicating a dire need to explore opportunities and challenges for the necessary coordinated development strategies that recognise and account for the true value of natural resources, their ecosystem services, and the inherent resource trade-offs between sectors.

Unsustainable resource utilization and the consequent environmental degradation might lead to short-term economic gains but result in a huge national cost in terms of the impacts incurred such as, decrease in quality and quantity of water, diminishing water storage capacity of dams for irrigation and hydropower generation, impact on biological populations. The costs of protecting species and ecosystems from exploitation can become prohibitively expensive especially in the absence of sufficient resources, and the capacity to enforce regulations or other restrictions. Customary community responsibilities for the use of natural resources have weakened with the development of new economic opportunities eroding the need and concern for the sustainable use of these resources. This concern has been further eroded by the disempowerment of local communities, for example by state intervention in the management of community forests.

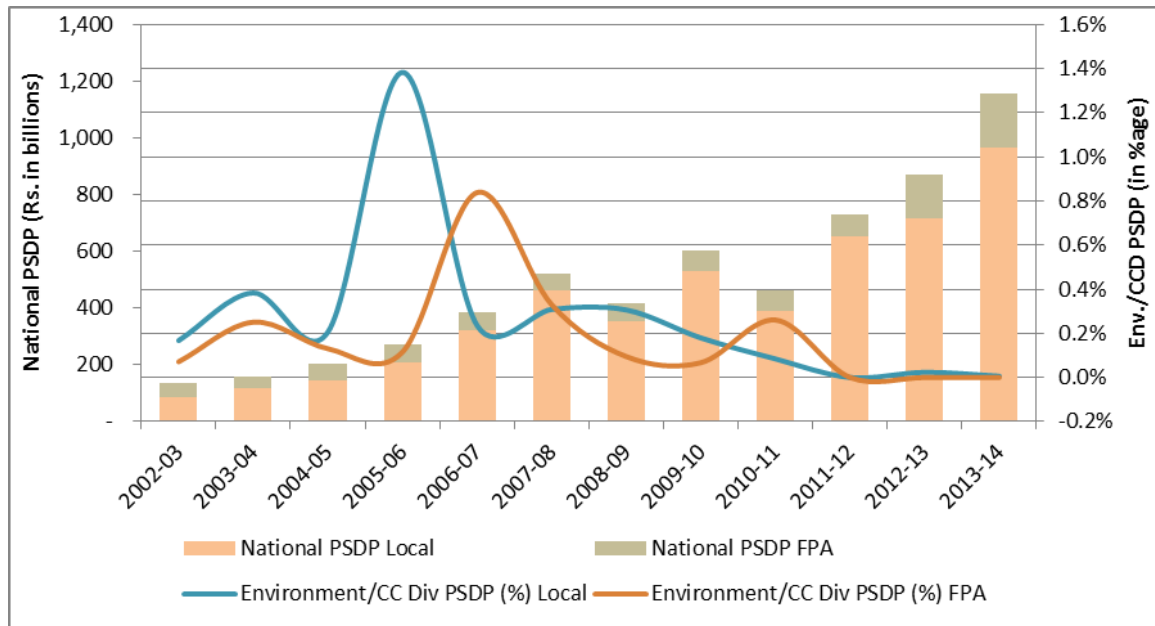


Figure 3: National Public Sector Development (NPSD) Allocations

4.3. Land Use -Degradation and Desertification

Around 80% of the Pakistan’s land area is arid and semi-arid, 12% dry sub-humid, and 8% humid (Figure-4). Agricultural lands occupy nearly 35% of total area while a little over 4% of the total area comprises forested lands. Most of the rural population rely on fragile rain-fed lands prone to desertification, degradation, drought, flood and severe climate change impacts.

Studies have revealed that water and wind erosion, depletion of soil fertility, deforestation, unsustainable livestock grazing, and water logging are the major causes of land degradation in Pakistan³. The situation is further aggravated by water scarcity, frequent droughts, and the lack of a land use plan. It is estimated that water logging affects 11 million hectares across the country, while another five million hectares are affected by salinity and increased sodium content.

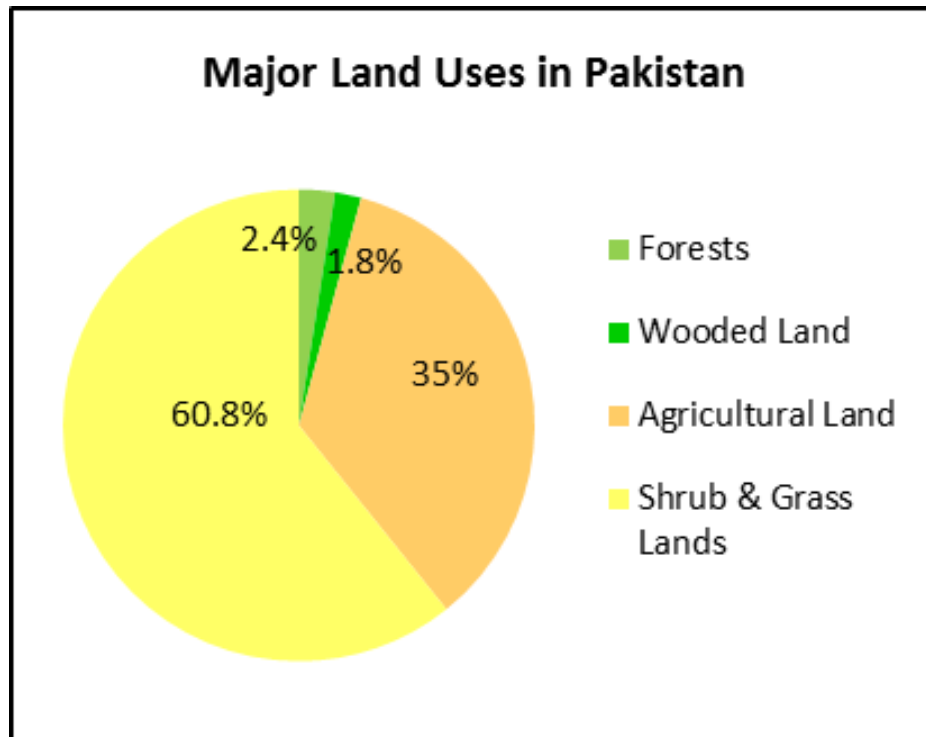


Figure 4: Major Land Uses in Pakistan

Unsustainable land use is a major cause of land degradation and biodiversity loss and thus demanding concerted efforts for systematic land use planning. Some practices contributing towards land degradation and desertification include exploring new land and employing unsustainable agricultural practices especially within the monsoon belt. It accelerates water erosion in the uplands with negative impacts downstream. High rates of soil erosion, for example, have reduced the useful life of the Tarbela and Mangla water reservoirs resulting in shortages of power and irrigation water. Conversion of flood plains to agricultural fields has not only contributed to the loss of valuable wetland habitats, but has also exacerbated the damage caused by floods. Semi-arid lands are subjected to heavy soil erosion, primarily due to anthropogenic (faulty cropping practices, overgrazing, and deforestation) and natural factors (wind and other causes of erosion). Irrigated areas in Pakistan are infested with the twin-menace of water logging and salinity. On the arid Balochistan plateau, water in geological formations is being heavily mined for agriculture. The arid coastal lands and mangrove forests are also under increasing environmental stress because of reduced freshwater flow and pollution caused by discharge of sewage, and industrial effluents.

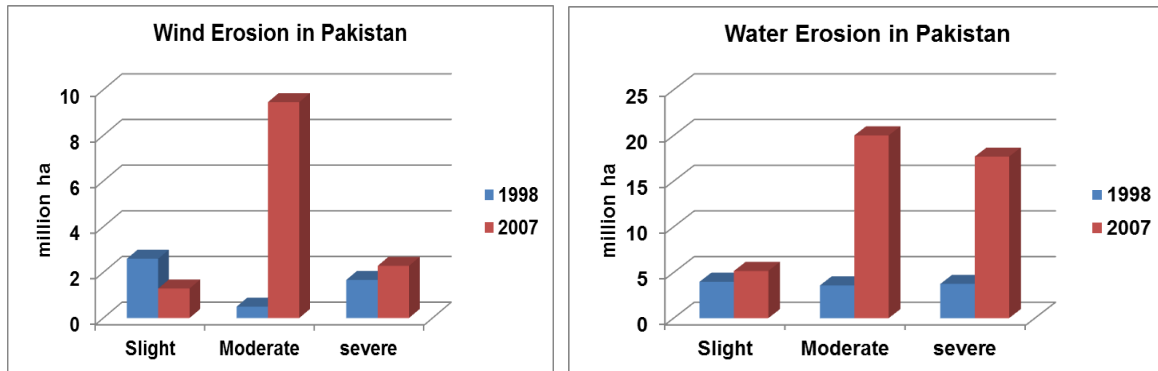


Figure 5: Wind and water erosion across Pakistan between 1998 and 2007.

While some degree of wind and water erosion is part of natural processes, accelerated erosion continues to be a major cause of land degradation and desertification in Pakistan. Water erosion affects lands in high rainfall zones in north eastern Pakistan, and the area affected by water erosion has increased by 27.3% in a period between 1998 and 2007. In contrast, wind erosion is characteristic feature in areas of dry, loose, bare sands or finer materials subject to strong winds. These include the Cholistan, Thal, Chagai, and Kharan sandy deserts, as well as hyper-arid areas of fine silt in western Balochistan. Data shows that the area affected by wind erosion has increased by 17.4% during the same period⁵⁰.

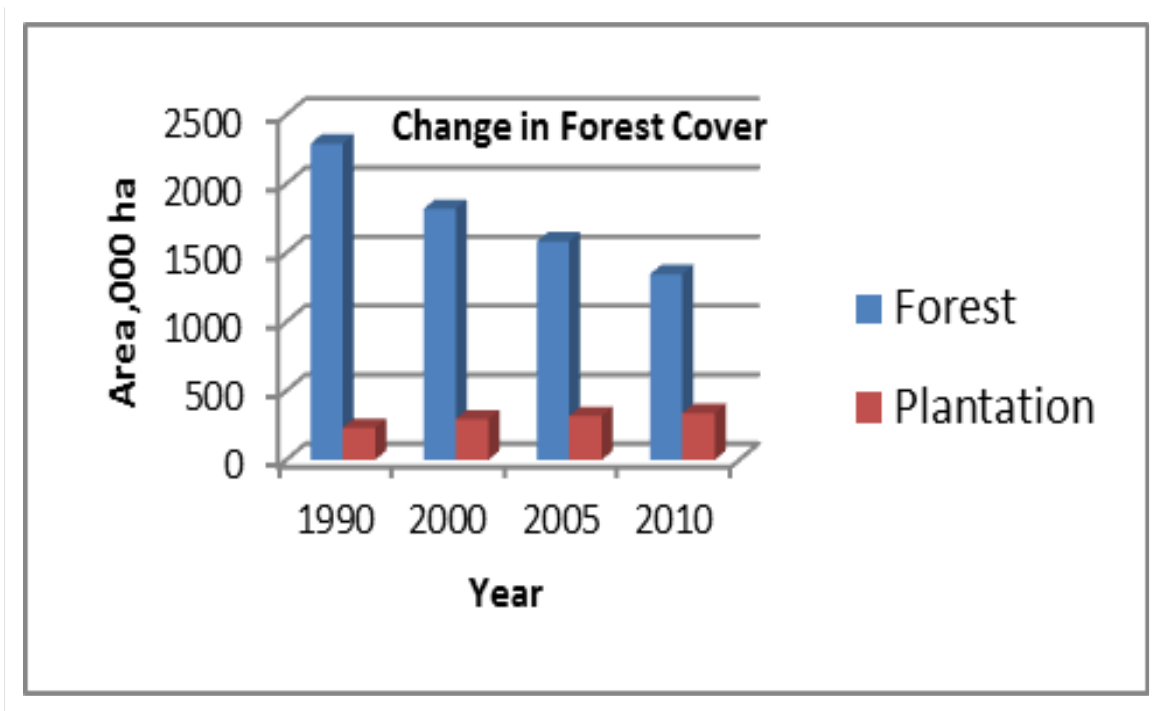


Figure 6: Changes in forest cover across Pakistan between 1990 and 2010.

The areas affected by slight, moderate, and severe wind and water erosion are shown in Figure 5. Areas eroded by major streams along their courses, by waves and tides on the coastal plain, and by snow over glaciated areas are also noteworthy in Pakistan. It has been estimated that by 2007, 2.282 million hectares had been eroded via bank erosion by streams, tides, and glaciers.

Disregarding the techniques and protocols, it is estimated that Pakistan has lost an average of 28000 ha of forest per year which amounts to an average annual deforestation rate of 1.63%⁵². In total, between 1990 and 2010, the country lost 41.3% of its forest cover, or around 946,000 hectares (Figure 6), while plantation area increased by 18.6% over the same period. The total rate of habitat conversion³ for the period between 1990 and 2010 indicates that Pakistan has lost 33.2% of its forest and woodland habitats. The main drivers of deforestation and forest degradation are illegal cutting of trees at various scales of intensity as well as land conversion to accommodate growing human needs.

4.4. Deforestation

The official estimate of forest cover in Pakistan is 5.4%, while forest cover according to assessment by the FAO varies between 2.2% and 2.4%. Other wooded areas occupy another 1.8%. These figures are based on various techniques and classifications used for forestry resource inventory.

4.5. Open Access Resources

More than 50% of the total area of Pakistan is characterized as open access resources, either unmanaged by users or under weak communal control. Tenure and land use rights over these lands vary greatly. These open access resource areas include state lands, vast areas of land of undefined tenure, village *shamlats* (communal lands), and proprietary lands.

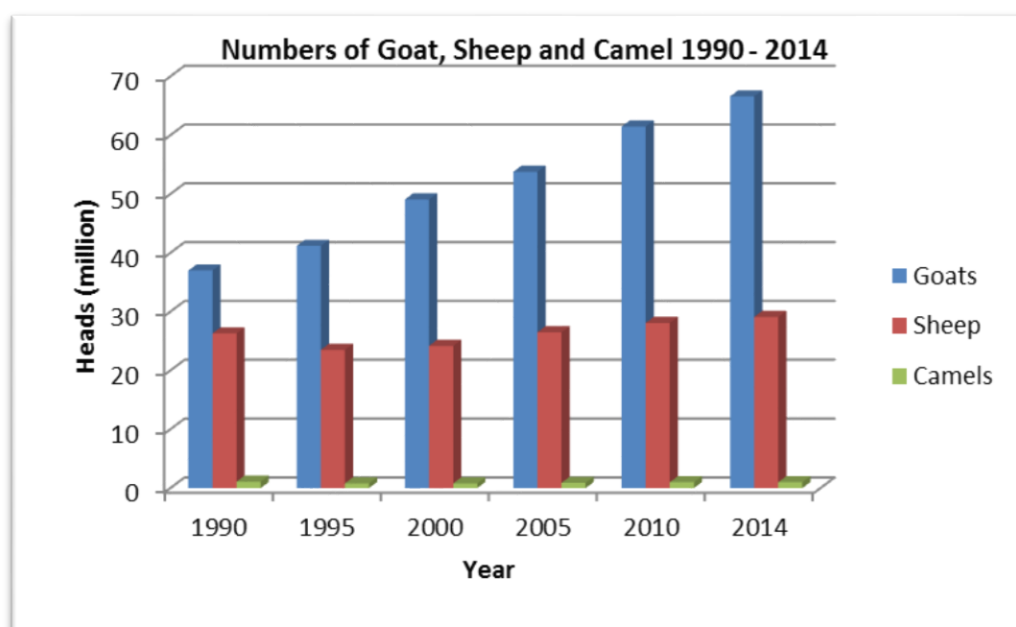


Figure 7: Numbers of goat, sheep, and camels in Pakistan (1990 - 2014)

The areas are used for grazing, forage and fuelwood collection, usually by transhumant pastorals and local communities. Increasing human and livestock populations as well as increased demand for fuel wood in nearby townships are leading to a gradual, yet steady decline in the land quality of these areas.

4.6. Grazing

Most arid and semi-arid land in Pakistan cannot be cultivated or planted because of natural and anthropogenic factors. Except for alpine pastures in the northern mountainous region, most rangelands are arid, receiving less than 300 ml of precipitation per year. Proprietary rights over these lands are often undecided and generally local tribes and communities exercise usufruct rights over these lands and resources are used by local and transhumant pastoral communities.

There is an increase in the population of range livestock between 1990 and 2014⁴. Figure 7 reflects that goats and sheep have increased by 80% and 10.6%, respectively, while the population of camels has remained steady. Although increase in forage production on irrigated lands has been a factor contributing towards an increase in livestock numbers, yet persistent overgrazing has seriously depleted the carrying capacity of the rangelands. There are no recent estimates of this loss of rangeland productivity. However, anecdotal evidence suggests that most rangelands have lost as much as 50% of their potential grazing capacity.

Keeping in mind the importance of livestock to the national economy and in the sustainable management of grazing lands, different models were adopted with limited success. This is because pastoral management requires a diverse set of skills and approaches, as well as organizational setup to deal with people rather than the land.

4.7. Unsustainable Fishing

Pakistan's marine fisheries encompass 1,126 km long coastline between Sir Creek in the east and Jiwani in the west falling in the territorial waters of two provinces, Balochistan and Sindh. Due to an increase in fishing vessels in the last two decades, the fish catch has steadily declined and the size of fish caught is also smaller than normal. In addition, some fish species such as Gallo/ Cat Fish (*Netuma thalassina*) and Kalaki/Indian Mackerel (*Rastrelliger kanagurta*) in Pasni, Balochistan Province, Bako Zardum/Yellow Fin Trevally (*Alepes djedaba*), Paplet/Pomfret (*Pampus argenteus*), and Kalgun/Spotted Mackerel (*Scomberomorus munroi*) in other areas of Balochistan, and Palla (*Tenualosa ilisha*) in Sindh Province have suffered severe population decline. Unsustainable harvesting is the leading cause of decline in fish resources. In addition to damaging fish fauna, new and destructive fishing gear and prolonged fishing periods often also destroy coral reef systems, as well as non-target fish and turtles.

Mangroves in the Indus delta provide habitat and breeding ground for a large variety of fish, crabs, shrimp, and mollusc species, and sustain fisheries. However, mangrove ecosystems in the country are being degraded due to the combination of salt-water intrusion up to 30 km inland and reduced silt and nutrient flows due to upstream dam construction and agriculture. This is one of the main causes for reduction in fish stock in the area. Municipal and industrial waste, effluent and agricultural run-off, and oil spills at ports are all major causes of water pollution leading to degradation of marine ecosystems. For example, it is estimated that around 472 million gallons of

sewerage were being released into the sea on a daily basis⁵ which has been disturbing the marine environment.

4.8. Promotion of High Yield Varieties and Exotic Breeds

Crop genetic diversity is generally low in Pakistan. Even though High Yield Varieties (HYVs) of crops respond better to water and fertilizers, they are a threat to indigenous varieties and land races that have been selected and maintained by farmers for generations. In many cases, hybrid and Genetically Modified (GM) varieties are not adapted to local ecosystem conditions, and therefore require higher inputs of fertilizers and the use of pesticides to get higher yields. This genetic erosion is more pronounced in wheat, rice, cotton, sorghum, sugarcane, and vegetables. Consequently, the ability of these crops to adapt to local environments and climate, and to tolerate diseases remains uncertain. Though cross-breeding can lead to relatively rapid gains in productivity, it can lead to genetic loss as often the parent stock is not maintained. Similarly, domestic livestock in Pakistan is largely cross-bred for improved meat production and this requires continual monitoring via scientific surveys.

4.9. Extensive Use of Agrochemicals

The use of pesticides and fertilizers has increased rapidly in recent years. For example, the consumption of pesticides increased two-fold in the period between 2000 and 2004, but gradually reduced to 73,632 tons in 2010⁶. The widespread and sometimes indiscriminate use of pesticides has disturbed the agro-ecosystem and killed non-target and environment-friendly organisms, increased pest resistance and increased the chances of pest resurgence. This, in turn, has led to the application of higher doses of agrochemicals. Heavy doses of pesticides have reduced the populations of natural pest enemies very significantly in cotton growing areas. Pesticides destroy the natural biotic balance in agricultural soils and reduce the diversity and abundance of invertebrate fauna, rodents, reptiles and amphibians with cascading effects at higher trophic levels. Direct mortality of wildlife, especially birds, following the use of organophosphates has frequently been reported. The increasing presence of pesticides in agricultural runoff has both acute and chronic effects on aquatic fauna. It is estimated that 25% of all pesticides used in Pakistan end up in the sea⁷.

The use of fertilizers is estimated to have almost doubled over the last three decades. The excessive use of nitrogenous fertilizers leads to eutrophication of water channels and wetlands, the spread of aquatic vegetation, and reduced aquatic diversity.

4.10. Pollution

In the context of biodiversity conservation and its very existence, pollution is a growing problem. The discharge of sewage and industrial effluent into aquatic and marine ecosystems is a major threat to aquatic habitat and biodiversity. Petrochemicals, paper and pulp, food processing industry tanneries, oil refineries, textile and sugar industries are major industrial contributors to aquatic pollution⁸. Ten major cities of the country produce 60% of all urban waste water, discharging directly into natural streams and rivers. Indiscriminate and unplanned disposal of industrial effluents, agricultural drainage water, municipal and industrial waste water into rivers, canals and drains is causing deterioration of water quality and eutrophication in the downstream sections, environmental degradation and has impacts on human health. Eutrophication results into

biodiversity loss; decrease in species richness (number of species) and equality (number of individuals in each species).

Significant of coastal pollution is around the Karachi harbour where an estimated 90,000 tons of oil products from vessels and port terminals are dumped every year⁹. High levels of toxic heavy metals have been reported from the coastal waters and sea near Karachi. These are likely to have both acute and chronic toxic effects on human beings, marine biodiversity, and birds. The impacts of these pollutants on commercial fin-fish and shrimp fisheries are likely to be significant.

4.11. **Water Scarcity**

The bulk of Pakistan's farmland is irrigated through a canal system, and some of the land is irrigated through extraction of water from the aquifers. According to research carried out by the Pakistan Council of Research in Water Resources (PCRWR) Pakistan is facing an acute water shortage and touched the 'water stress line' in 1990 and may run dry by 2025. The country is almost water-scarce presently, with an alarming rate of 1,017 cubic meters water available per capita annually, which is dangerously close to 1,000 cubic meters - the threshold of water scarcity. The study predicts that if this trend of depleting water reserves continues at this rate, it is feared that the country will face acute water shortage thus demanding a need to redress the issue or a drought-like situation might emerge. Other sources categorizing the country already the third most water-stressed in the world,¹⁰ even more disturbing factor is the quantity and quality of the groundwater supply.

Three major rivers enter into Pakistan from India, diversion/ blockade of water by the upper riparian countries is a global concern. It is also threat to Pakistan being a lower riparian country. The decreased and regulated flow of water upstream is degrading the ecosystems downstream. Further, Climate Change is also severely affecting the Indus River Basin.

The situation demands a regular exchange of information between the regional countries on water supply, development of hydropower projects as well as research on ecosystems services and climate change.

4.12. **Global Climate Change**

In 2017, Pakistan ranked 7th on the long term Climate Risk Index (CRI) of German watch¹¹. The CRI indicates a level of exposure and vulnerability to extreme events, and serves as a warning in order to be prepared for more frequent and/or more severe climatic events. Recent past has witnessed displacement of huge population due to drought and floods and heavily crippled the economy. Somewhat similar estimates are available that as many as 2.7 million people could be affected annually by river floods in Pakistan by 2030¹².

5. Constitutional, Legal and Institutional Framework

5.1. Biodiversity Legal Framework at Federal level

Constitution of Pakistan (1973): The Constitution of Islamic Republic of Pakistan does not include any direct reference to biodiversity protection. However, the superior courts of Pakistan have interpreted the phrase 'right to life' used in Article 9 of the Constitution and have held that the word 'life' used in this context encompasses the environment in all its dimensions. Thus,

‘environmental pollution and ecology’ was a subject on which both federal and provincial government could legislate, but under the 18th Constitutional Amendment of 2012, this was made the exclusive domain of provincial assemblies. However, the parliament of Pakistan is still empowered to legislate on international treaties, conventions and agreements, international arbitration, national planning and national economic coordination including planning and coordination of scientific and technological research.

Pakistan Environmental Protection Act (PEPA), 1997: The PEPA of 1997 provided the key environmental legislation instrument for the entire country until the 18th Constitutional Amendment transferred the responsibility of environmental legislation and management to the provinces. The PEPA was more focused on environmental protection in general, primarily through controlling pollution, rather than ecosystem-based measures for conservation of biodiversity. Responding to the devolution, by December 2014, all provinces enacted their own provincial Environmental Protection Acts EPAs, so the PEPA is now in force only for the Islamabad Capital Territory, and FATA. National Environmental Quality Standards prepared by PEPA were adopted, and updated where necessary, by the provinces.

Pakistan Trade Control of Wild Fauna and Flora Act, 2012 (CITES Act): Pakistan has been signatory to CITES since 1976, an inter-governmental treaty to ensure that wild fauna and flora in international trade are not exploited unsustainably. CITES establishes an international legal framework together with common procedural mechanisms for the strict control of international commercial trade in species threatened by extinction. Species covered by CITES are listed in three appendices, according to the degree of protection required, and the import and export of wildlife in accordance with the provisions of CITES is controlled by the Ministry of Climate Change, (MoCC), Government of Pakistan, in collaboration with provincial wildlife authorities. For effective implementation of CITES provisions in Pakistan, an exclusive law entitled ‘The Pakistan Trade Control of Wild Fauna and Flora Act, 2012’ was enacted.

This legislation regulates the export, re-export, and import of any specimen included in any Appendix of CITES and fixes punishment for contravention¹³. The law also provides for the establishment of a management authority, represented by all provinces, to enable concessions on scientific and legal grounds. This law has significant implications for the sustainable harvesting of non-timber forest products, especially medicinal and aromatic plants as it not only helps to check unsustainable harvesting practices but also encourages beneficiary communities to make sure that species are conserved and protected with a sustainable-use regime in place.

Pakistan Access to Genetic Resources and Benefit-sharing Act, 2012 (Draft) This legislation, drafted in 2012, intends to facilitate access to genetic resources and their derivatives for environmentally-sound uses, protecting associated traditional knowledge, equitably sharing benefits derived from them, promoting technology transfer and building associated scientific knowledge and technological capacity. The act is a legislative requirement under the International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA) to which Pakistan is a party, and is intended to protect community rights in respect to genetic resources, including: (1) The inalienable right use traditional knowledge in customary ways; (2) The right to regulate access to traditional knowledge, and; (3) The right to share the benefits arising from the utilization of traditional knowledge.¹⁴

Climate Change Act 2017: It outlines the new institutional architecture for climate action. It proposes to establish an independent Pakistan Climate Change Authority which will, under the guidance of a high-powered Pakistan Climate Change Council (chaired by the Prime Minister and with representation from all provinces, including the Chief Ministers), provide a framework for mitigating and adapting to the effects of the changing climate on various sectors of the economy and develop appropriate response strategies. The Bill also establishes a Pakistan Climate Change Fund, managed by a Board. The fund will mobilize resources from both domestic and international sources to support mitigation and adaptation initiatives in the country.

5.2. Provincial Forestry, Wildlife, and Fisheries Laws

All the provincial governments and governments of AJK and GB have provincial laws for the management of forests, fisheries, and wildlife resources in areas under their jurisdiction. Marine fisheries are regulated by the federal government under the Exclusive Fishing Zone (Regulation of Fishing) Act, 1975, as amended in 1993. This extends to the whole of Pakistan and to waters within the exclusive fishery zone beyond territorial waters. It regulates the management of fishing in exclusive economic zone of the country.

5.3. Biodiversity Policy Framework

National Conservation Strategy (1992): The Pakistan NCS (1992) was the first policy framework for biodiversity and conservation and as such had three objectives: (1) Conservation of natural resources; (2) Sustainable development; (c) Improved efficiency in the use and management of resources. Of these, ‘biodiversity conservation’ was one of the fourteen programme areas for priority work action, and the NCS had a central influence in mainstreaming environmental and sustainability dimensions in other policies, plans, and strategies, including Pakistan’s Eighth Five-Year Plan, which borrowed heavily from the NCS in terms of greening its development objectives. The success of NCS prompted interest in developing provincial and local level conservation strategies and since then, all provinces have developed their conservation or sustainable development strategies.

Biodiversity Action Plan(2000): Although biodiversity considerations started receiving attention in national planning processes after the NCS, it was not until 2000 that a comprehensive BAP was prepared for implementation as part of the CBD. The 2000 BAP was approved by the PEPA and thus adopted as the first comprehensive strategic action plan for the country wide conservation of biodiversity. Pakistan’s BAP provides a brief assessment of the status and trend of the nation’s biodiversity, outlines strategic goals and objectives, and identifies a plan of action that includes coordination arrangements and implementation measures. It has 13 components, corresponding to specific articles of the CBD, 25 objectives and proposed 182 actions of which 31 were to be immediately undertaken within a year, 81 within five years, and 25 within ten years.

National Environment Policy (2005): The National Environment Policy provides a guideline for addressing the environmental issues facing Pakistan, particularly pollution of fresh and coastal waters, air pollution, and lack of proper waste management, deforestation, loss of biodiversity, desertification, natural disasters and climate change. It also provided directions for addressing cross-sectoral issues as well as the underlying causes of environmental degradation and conformation with international obligations. The National Environment Policy, while recognizing the goals and objectives of the NCS, National Environmental Action Plan, and other existing

environment related national policies, strategies and action plans, provides broad guidelines for addressing environmental concerns and ensuring effective management of the environmental resources at national, provincial, regional, and local levels.

National Sustainable Development Strategy, 2012 (NSDS): The NSDS envisions the evolution of a just and harmonious society via the promotion of vibrant and equitable economic growth without the over-exploitation of natural resources and the fair distribution of development dividends to all, in particular marginalized, poor, and vulnerable in society and to future generations. The strategy is aligned with the emerging concept of ‘green economy’ as an alternate to the Framework for Economic Growth (2011), prepared by the Planning Commission of Pakistan.

National Climate Change Policy (2012): The National Climate Change Policy, approved by the [Check date/year] Government in 2012 has the overall goal ‘to ensure that climate change is mainstreamed in the economically and socially vulnerable sectors of the economy and to steer Pakistan towards climate resilient development’. One of the major objectives of this policy is conservation of natural resources and long term sustainability further elaborated through specific measures under forestry, biodiversity, and other vulnerable ecosystems. With respect to forestry, the National Climate Change Policy (NCCP) outlines the need to restore and enhance Pakistan’s forest cover under sustainable forest management to ‘withstand present and probable future impacts of climate change.’ Biodiversity-related policy measures include setting national biodiversity indicators and provision of requisite financial resources for implementation of the BAP.

To support the Climate Change Policy, in 2013 the Government prepared a Framework for Implementation of the Climate Change Policy (2014-2030) which lists priority, short-term, medium-term and long-term actions to be implemented in various sectors including forestry.

Draft National Forest Policy (2015): This policy has recently been approved by the Council of Common Interests and aims to establish a national forest monitoring mechanism to curb deforestation, mitigate the emission of greenhouse gases and protect biodiversity. The objective of the Forest Policy is to ‘expand the national coverage of forests, protected areas, natural habitats and green areas for restoration of ecological functions and maximize economic benefits while meeting Pakistan’s obligations to international agreements related to forests.’

In addition to these policies, there are some draft policies that have yet to be approved by the parliament. These include the National Wetlands Policy and National Rangelands Policy. These draft documents provide guiding principles for effective management of wetland and rangelands.

5.4. Biodiversity related Conventions, Declarations and Agreements

The global efforts to conserve the natural environment and its components are coherent with the objectives of the convention. Some of the treaties and conventions already well under implementation, rather gave way to evolution of CBD and defining the goals and objectives of the later. Pakistan is party to the three Rio conventions and CITES, CMS and Ramsar Convention. The activities carried out under these conventions are mutually reinforcing so recognizing a need of a closer cooperation among the governing bodies at national level. Similarly action by relevant agencies in Pakistan for SAARC and ECO affairs are also addressed by the Ministry of Climate Change in a coordinated manner.

5.5. Sustainable Development Goals (SDG)

At the Millennium Summit in September 2000, the world leaders adopted the UN Millennium Declaration, committing their nations to a new global partnership to reduce extreme poverty and setting out a series of time-bound targets. The eight Millennium Development Goals were set to expire by the end of 2015, and therefore the Heads of States met in the United Nations on September 25th 2015, and adopted a new set of sustainable development agenda (SDG) goals to end poverty, protect the planet, and ensure prosperity by 2030. The 17 SDGs have specific targets to achieve over 15 years period 2016 -2030. The following two goals deal specifically with conservation and sustainable use of biodiversity in water and on land:

- SDG 14. Conserve and sustainably use the oceans, seas and marine resources for sustainable development
- SDG 15. Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss.

5.6. Institutional Framework

The Forestry Wing of the Ministry of Climate Change (MoCC) is the national focal point for the CBD. Within the framework, the Directorate of Biodiversity in the office of the Inspector General of Forests is responsible for coordination with the CBD secretariat as well as with the national, provincial, regional, local government agencies, and other stakeholders responsible for implementation of CBD obligations. During the preparation of 5th National Report to CBD meetings were with the provincial and regional governments and other stakeholders and firm linkages were established. Provincial focal points for CBD were designated and a coordination mechanism for engaging the stakeholders in its implementation was established.

At provincial level, the departments of Forestry, Wildlife, Fisheries, Environment, and Agriculture and Livestock are responsible for management of these sectors and all other matters related to biodiversity. More efforts are required for mainstreaming biodiversity concerns in the policy and plans of these sectors and even more awareness of national obligations under CBD needs to be raised at the provincial level. The Pakistan Agriculture Research Council (PARC) has, initiated work on agro-biodiversity and hosts a prominent institution for conservation of plant genetic resources. At provincial levels, field research stations are established for the in-situ conservation of important varieties of crops and major indigenous breeds. Academia are sensitized and research and studies are conducted in the domain of wildlife and biodiversity or allied fields. There are some zoological and botanical gardens but their in-situ conservation potential is not being fully utilized.

In addition to the Government institutions, international conservation organizations like the IUCN, the WWF and BRC play significant role in creating awareness, building capacity, policy development, and jointly implementing biodiversity conservation projects.

6. Review of Progress on BAP Implementation

6.1. Progress on Implementation of BAP (2000):

The Biodiversity Action Plan (2000) had recommendations for ‘immediate actions’ to be taken within a year, ‘short term’ actions to be taken within five years, and ‘long-term actions’ to be taken within ten years. The BAP comprised 13 components, corresponding to articles of the CBD, specifically planning and policies, legislation, identification and monitoring, *in-situ* conservation, *ex-situ* conservation, sustainable use, incentive measures, research and training, public education and awareness, EIA, access issues, exchange of information, and financial resources. The plan included 182 targets, 31 to be undertaken within a year, 81 within five years, and 25 within ten years. Since the adoption of BAP, its implementation has been rather less pronounced. A review of implementation of BAP revealed that in many areas, the action was initiated only partially (Figure 8), the reason being that the targets were too ambitious adopted without considering the financial constraints, lack of human resources and institutional capacity.



Figure 8: Progress on Implementation of the BAP (2000) in 2015.

A slight decrease in, otherwise, current high rate of human population is not likely to contribute in alleviating anthropogenic pressures on biodiversity, deforestation and degradation of ecosystems.

6.2. Biodiversity Scenarios

In current scenario, habitats loss, degradation and defragmentation is likely continue thus lowering of ecological connectivity, natural resources depletion, and loss of agro-biodiversity. However, the recent successful recovery of some of the threatened species of wildlife and vulnerable habitats has created hope that populations of more threatened species will be recovered and that there will be more PAs being managed effectively. A brief overview of scenarios covering different biomes and resource management regimes are presented in this section.

Terrestrial Ecosystems: There is no serious threat of deforestation in areas managed by the government. However, the peripheral areas will continue to get degraded under heavy pressure of grazing and the collection of fuel wood. In areas where tenure rights are not well-defined the habitat degradation is likely to continue. Conversely, recent initiatives have resulted in increased forest cover on private lands through planting the indigenous species and it will increase the areas with high potential for sport hunting.

Aquatic Ecosystems: The fish catch in both inland waters and marine areas will continue to increase, to meet both increasing demands in the country and the growing export market. However, enforcement of laws and regulations to curb the use of harmful fishing methods will improve over time. A number of hydropower projects are currently under construction on rivers in mountainous region and more are planned for the future. These projects are likely to fragment aquatic habitats and have serious impacts on cold water aquatic biodiversity unless appropriate technologies are included in their design to address these threats. Such initiatives will add to the existing habitat resources for fish and other game.

Climate Change: In view of increasing average temperatures, caused by climate change, the natural habitats in the northern mountainous region of Pakistan are likely to shrink, negatively impacting the native species such as snow leopards, brown bears and others that live within a narrow habitat niche. Increases in snow and glacier melt, coupled with extreme climatic events, will adversely impact habitats through increase in intensity and frequency of floods and droughts. The impact of climate change on agriculture is already becoming evident as many farmers particularly in dry land areas have reported changes in the sowing dates and time required for crop maturity.

6.3. Processes for development of Biodiversity Action and Plan (BAP) and National Biodiversity Strategy and Action Plan

A transparent and consultative process was adopted for the preparation of both the BAP (2000) and the NBSAP ensuring the participation of broad range of stakeholders from government, academia and civil society. In addition, national and regional level consultative workshops were organized. In case of NBSAP, voluntary guidelines to parties proposed by CBD for review of national biodiversity strategies and action plans were followed for the revision process. The following is a brief overview of the processes that were applied for the development of the BAP and the NBSAP.

Biodiversity Action and Plan (2000)

The preparation of BAP 2000 was initiated with the formulation of a motivated and skilled Biodiversity Working Group (BWG) to guide the process. In the National inception workshop different thematic groups held consultations with stakeholders and formulate strategies background papers and actions to achieve the objectives of the CBD. The initial draft was reviewed by the BWG, and then circulated widely for peer review. After incorporation of the concerns, draft was finalized by the BWG and submitted for formal approval. The BAP was considered in a meeting of the Pakistan Environmental Protection Council in 2000 and approved.

Finalization of the National Biodiversity Strategy and Action Plan

An initial road map for revision of the NBSAP was shared with the BWG for review: a core group examined the road map and the working papers and the group made suggestions. The revised road map and working papers were shared in consultative meetings with smaller groups comprised of key resource persons, professionals and other stakeholders.

The provincial governments and other partners responsible for implementation of NBSAP in the field were approached though consultative meetings were organized with stakeholders in Karachi, Quetta, Lahore, Peshawar, Muzaffarabad, and Gilgit. Meetings were also held with policy makers

and planners in the provinces, while keeping in view the need of sub-national strategies and action plans for decentralized implementation. Technical support was provided to make the regional strategies for achieving the CBD Strategic Goals, ABTs and SDGs. The NBSAP thus incorporates information from all the regional plans. The draft NBSAP was widely circulated among all stakeholders, key resource persons and members of the BWG for peer review.

II. NATIONAL BIODIVERSITY STRATEGY AND ACTION PLAN

1. Vision

The guiding vision of the NBSAP is to make available the benefits of biodiversity and ecosystem services to all segments of society, in particular the marginalized, poor, and vulnerable and future

Biological diversity - or biodiversity - is the term given to the variety of life on Earth and the natural patterns it forms. The biodiversity we see today is the fruit of billions of years of evolution, shaped by natural processes and, increasingly, by the influence of humans. It forms the web of life of which we are an integral part and upon which we so fully depend (CBD).

generations by restoring and conserving the rich natural biodiversity heritage of Pakistan, and rendering its use sustainable based on the principles of equitable sharing of benefits.

2. Goals

The goals of NBSAP are as follow:

1. To conserve biodiversity at priority sites, including species and genetic diversity. In pursuing this goal, the focus will be on in-situ site-specific conservation work, high priority ex-situ conservation, wildlife trafficking, and illegal timber trade.
2. To mainstream biodiversity as an essential element of human development. This goal aims to increase awareness of how biodiversity and ecosystem goods and services contribute to human wellbeing, sustain development outcomes, and promote integration with key sectors such as agriculture, poverty alleviation, climate change, health, democracy and governance, economic growth, and trade.

3. Objectives

The objectives of NBSAP are based on the five strategic goals of the ABTs, as follows:

3. Address the underlying causes of biodiversity loss by mainstreaming an understanding of biodiversity across government and society;
4. Reduce the direct pressures on biodiversity and promote sustainable use;
5. Improve the status of biodiversity by safeguarding ecosystems, species, and genetic diversity;
6. Enhance the benefits to all from biodiversity and ecosystem services, and;
7. Enhance implementation through participatory planning, knowledge management, and capacity building.

4. Strategies and Actions

The strategies and actions to achieve the objectives of the NBSAP are organized around cross-cutting issues, in particular biodiversity awareness, mainstreaming, poverty alleviation improving environment and the CBD major thematic program areas which are terrestrial ecosystems, forest

biodiversity, inland and coastal wetlands, coastal lands and marine ecosystems, and agrobiodiversity. The distribution of proposed actions by each of the five strategic goals of ABTs are presented below along with timeline, proposed actions and associated cost estimates. The implementation, monitoring, and evaluation arrangements of the NBSAP are discussed in Part-III of this Plan.

5. Biodiversity Awareness

5.1. Context

Loss of habitat and biodiversity is largely due to the lack of awareness among the users regarding the significance and need for its conservation and sustainable use. Similarly, the importance of biodiversity for human wellbeing generally contrasts with the commonly held worldview of social and economic development. Thus, generating awareness through effective communication is very significant before people can be asked to be a part of the solution. Change takes time, and simply getting the word out is not going to have an impact on biodiversity conservation. Therefore, well planned and targeted efforts will be required to obtain commitment and cooperation from end-users and those who are responsible for determining national policies and plans. It is worth bearing in mind that biodiversity is a relatively new concept for some stakeholders and acceptance of new ideas is always a long process. It is, therefore, important to equip younger generations with the knowledge, science base and technologies relating to biodiversity, its values, functioning, status and trends, and the consequences of its loss.

“New scientific truth does not triumph by convincing its opponents and making them see the light, but rather because its opponents eventually die, and a new generation grows up that is familiar with it.(Max Planck)

Although the BAP recognized a need of a comprehensive strategy for communication and outreach to raise biodiversity awareness, the measures taken to date remained at lower levels of priority. National level knowledge management, outreach, and communication strategies should involve key stakeholders and other important groups as appropriate to provide targeted and comprehensive inputs for holistic and countrywide implementation of the NBSAP. Likewise, communication alone may not be sufficient to achieve the desired results unless linked with economic incentives and supported by legal frameworks, especially when there are economic or structural barriers to overcome.

5.2. Issues and Trends

Reports, memoranda, and other publications are effective tools for communication provided that politicians and decision makers get enough understanding of the issue through other tools of communication including workshops and seminars. It is necessary to ask: Do decision makers have time for this cause? Do they feel the need and desire to be educated? Do they see the relevance of such workshops? Will such workshops even be productive? Experience has shown that rather

reaching all the politicians and decision makers, it is more effective to accept their level of knowledge and interests and concentrate on how best to put biodiversity on their agendas. To gain this cooperation with stakeholders and to place biodiversity high on the agenda, government departments and in other sectors of the society, a range of communication, education and awareness interventions are needed.

The two main modalities: formal and informal communication are practiced: Informal communication takes place at face-to-face meetings, often in informal settings and formal communication involves networking, establishing working relationships, defining common goals, updating knowledge, and influencing decision making processes.

All the members of a stakeholder group are heterogeneous assemblage of ideas and beliefs. Thus demanding to identify the opinion leader/s in each group, involve them in the whole process to avoid to the risk of non-cooperation. Opinion leaders have followers, and are trusted for the value of their information. They have different networks in their own spheres, and have skills and interest to connect with people in a diverse manner. The opinion leaders may not be experts in biodiversity, but their views and beliefs are usually treated with the utmost respect.

5.3. Strategies and Actions

The following strategies will be adopted as part of the NBSAP and actions will be taken to make people and policy makers aware of the values of biodiversity and the steps they can take to conserve and use it sustainably.

Strategies:

1. Mobilize mass media, especially print, audio-visual, and digital social media to create public awareness of the values of biodiversity and consequences of its loss.
2. Introduce knowledge, values, and consequences of the loss of biodiversity in education at all levels, especially schools, colleges, and universities.
3. Educate policy makers, planners, and administrators in development and business sectors through opinion leaders and introducing biodiversity concerns in relevant training academies.

Actions:

1. Awareness days will be organized to commemorate the major environmental themes of national and international importance: biodiversity, desertification and drought, forests, tourism, wetlands and wildlife, etc.(ABT 1)
2. A focus group comprising of ‘opinion leaders’ representing print, audio-visual, and social media will be constituted soon after the adoption of the plan to mobilize the media for raising awareness.(ABT 1)
3. A cadre of environmental journalists will be created to act as ‘biodiversity champions’ for commercial media and make contributions to print media, produce audio messages for radio, and video clips for TV. (ABT 1)
4. The electronic and social media including new and emerging technologies will be used to create awareness as well as to market our rich biodiversity as a heritage that could help attracts tourists and engage young people as stewards for biodiversity conservation. (ABT 1)

5. A task forces comprising of Ministries of Climate Change, Education, Science and Technology, and Food Security, and Higher Education Commission will be constituted by to take steps for inclusion of biodiversity module in curriculum of universities, colleges and schools (ABT 1)
6. A support group comprising of ‘opinion leaders’ from among the policy makers and planners will be constituted to guide the process for increasing the biodiversity knowledge of decision makers and act as a change agent through informal communications. (ABT2)
7. The capacity of National School of Public Policy (NSPP), National Institute of Management (NIM), National Defence College, and PIPS will be built by 2018, to incorporate biodiversity consideration in training courses for decision makers of mid-career and senior managerial levels. (ABT 19)
8. The targets for creating biodiversity awareness will be integrated in the annual and medium term development plans. (ABT 20)
9. Additional financial resources if needed for implementing NBSAP will be mobilized by. (ABT 20)

6. Gender, Poverty, and Biodiversity Nexus

6.1. Context

Majority of population lives in rural areas especially the poor and marginalized communities, many of them are landless or small landholders and rely on goods and services derived from biodiversity and ecosystems for their subsistence. Their livelihood is therefore strongly linked to biodiversity and ecosystem services. The loss of biodiversity enhances the poverty and vulnerability to climate change and other catastrophes.

Since women, men, and children use natural resources differently, gender-sensitive and gender-responsive conservation programmes will be more socially acceptable and sustainable in the long run. In many parts of the country, women and children are responsible for collecting firewood, fodder, and Non-timber Forest Products (NTFPS) hence loss of biodiversity in the neighbourhood will lead to an increased workloads and economic hardships. Projects or programmes that do not take into consideration the needs of rural poor are likely to go counter effective, especially in the vicinity of project areas. The Malakand Social Forestry Project, for example, benefited some users at the expense of those grazing their livestock, collection of fodder and fuel wood. Sustainability of such programmes remains at stake. Lessons learnt from such projects will be utilized in the forthcoming programs and projects.

6.2. Issues and Trends

More than 60% of the area of Pakistan is either open access or comprises of common property resources, the latter usually governed by traditional rules that determine who and when each resource can be used. Such common resources are depleted over time due to over exploitation of resulting in deteriorating ecosystems, livelihood burdens, increased poverty and decreased health and women and children are more affected to their specific role.

Parallel to these challenges, there is an opportunity to alleviate poverty by restoring and maintaining the health of ecosystems on which these communities depend. Examples of common

property, or open access resources that are threatened with over-exploitation and loss of biodiversity include habitats such as mountain ecosystems, range lands, wetlands, coastal areas, and forests. Thus, gender and poverty considerations cut across all thematic areas of biodiversity conservation and will be an integral component of relevant strategies and action plans.

6.3. Strategies and Actions

The following strategies and actions will be adopted as part of the NBSAP and actions will be taken to enable the different segments of the society getting the due share of ecosystem services and benefits:

Strategies and actions:

Mobilize resources while executing the programmes and projects considering:

1. Elements of cooperative management regimes for conservation and sustainable use of natural resources by local and marginalized communities especially the women and other vulnerable groups giving them management authorities as well as their increased responsibility for the management of such resources.
2. Case studies need to be conducted illustrating customary use of biological resources, households participating in traditional activities and consumption of traditional foods.

7. Mainstreaming Biodiversity in National Planning and Policy Processes

7.1. Context

The fate of natural ecosystems depends to a large extent on a wide range of national policies and programmes for economic development or the lack of policies and plans to advance environmental objectives. This is particularly true for the development of roads, urbanization, and industrial development in coastal areas and near inland waters, the diversion of river water for agriculture and the development of water storage dams. Therefore, incorporation of biodiversity values into national accounting and reporting systems is necessary to limit unintended negative consequences of policy decisions on biodiversity. Landless and small landholders rely for their subsistence on goods derived from ecosystems including NTFP. Loss of biodiversity increases the workload of women and children and contributes to poverty. Mainstreaming of biodiversity values in national policies and plans across different sectors therefore depends on the identification, demonstration and use of values in their various forms.

The National Climate Change Policy suggests policy measures to conserve natural resources and protect forests, biodiversity, and other vulnerable ecosystems. Similarly, the Forest Policy provides recommendations for expanding the national coverage of forests, protected areas, natural habitats and green areas for restoration of ecological functions.

7.2. Issues and Trends

Biodiversity values are not well reflected in the current national reporting and accounting systems. This is primarily due to the absence of appropriate valuation of biodiversity, inadequate assessment of impact of biodiversity loss on livelihoods of the poor, and lack of a clear understanding about how restoration of ecosystem goods and services can contribute to poverty alleviation. Therefore,

demonstration of the benefits of investing in conservation and restoration as well as the potential contributions required to meet a wide range of economic and policy objectives will be required before values of biodiversity can be integrated into planning processes, and national accounting and reporting systems. Furthermore, mainstreaming requires a sustained effort, over several years and on several fronts, and must occur regularly within, and across, sectors.

7.3. Strategies and Actions

The following strategies and actions will be adopted and actions taken in order to mainstream biodiversity considerations in national policies, plans, and poverty alleviation programmes:

1. Technical and administrative capacity will be developed for the valuation of biodiversity using low cost tools and methods that, in addition to economic values, recognize social and cultural values;
2. Biodiversity valuation studies shall be undertaken and demonstration projects initiated in ecosystems where people rely heavily on biodiversity for subsistence, and;
3. The NBSAP shall be adopted as a policy document and a stakeholder Biodiversity Round Table established for mainstreaming biodiversity in policies, plans, reporting and accounting systems.

8. Terrestrial Ecosystems, Habitats, and Species

8.1. Context

Pakistan is bestowed with a rich natural heritage of biodiversity due to diverse physiography, soil types, and climate. Terrestrial biomes range from deserts in the south to the mountain ranges of the Himalayas, Karakorum, and Hindu Kush in the north and west. Of the total national land area, 62.7% constitutes wilderness, regions that are neither suitable for agriculture or for commercial forestry. These areas comprise of deserts, arid lands and mountains. While a small percentage of these lands are privately owned, the majority is either communally-owned or state lands with undefined tenure and usufruct rights. There is no management authority for these lands and the predominant land use in these areas is grazing and fuel wood collection. A small percentage of these lands have been declared as game reserves and with the exception of the enforcement of hunting laws, there is no habitat management. Similarly, approximately 5.9 million ha of these lands are designated as rangelands, though lacking effective management⁵⁰.

The ecological health of these ecosystems has not been assessed, yet it can safely be said that these ecosystems are heavily degraded due to ever increasing anthropogenic pressures. These ecosystems make significant contribution to the livelihoods of the landless and poor, making significant contributions to the national economy with a potential for economic development and growth. A 2006 World Bank report estimated a loss of seven billion rupees as a consequence of degradation and deforestation of natural ecosystems. Due to the economic significance of these assets, there is a need of valuation studies of biodiversity to influence investments for restoration of biodiversity and alleviation of poverty¹⁵.

Two terrestrial ecosystems of Pakistan are included in the list of global 200 priority ecosystems of the Millennium Ecosystem Assessment. These ecosystems and their conservation status are shown in Table 1.

Table 1: Terrestrial ecosystems of Pakistan classified as Global 200 Eco-Regions

Global 200 Eco-region	Conservation Status	Representation in PA System
Western Himalayan Temperate Forests	Critical or endangered	Adequate
Tibetan Plateau Steppe	Vulnerable	Adequate

A large number of species of flora and fauna with a restricted range are found in Pakistan. Of the plant species, five monotypic genera (*Douepia*, *Sulaimania*, *Kurramiana*, *Wendelboa*, and *Spiroseris*) and 400 species belonging to 169 genera and 45 families occur in Pakistan¹⁶ restricted to the northern and western mountains. The fauna includes some endemic mammals such as the Balochistan Forest Dormouse, and the Pale Grey Shrew. In addition, the Balochistan Pygmy Jerboa is an example of an endemic genus, while the Woolly Flying Squirrel, *Eupetaurus cinereus*, the sole member of its genus, may exist just in Pakistan. The Punjab Urial has recently been elevated to a full species, while the Chiltan Wild Goat, *Capra aegagrus chiltanensis* is an example of an endemic subspecies.

Pakistan is signatory to the Convention on Migratory Species (CMS) or Bonn Convention, aiming to conserve migratory animal species over the whole of their distribution range. The Siberian Crane *Leucogeranus leucogeranus*, for example, is a critically endangered¹⁷ migratory bird species. For its conservation, the CMS Secretariat developed a Memorandum of Understanding (Siberian Crane MoU) in early 1993 proposing a number of conservation measures and this MoU was signed by Pakistan in 1998. The population of Siberian Crane (Central Asian flocks) that used to visit Pakistan in the winter is now thought to be extirpated. However, a MoU on the Conservation of Migratory Birds of Prey in Africa and Eurasia (Raptor MoU) was concluded under the auspices of CMS in 2008. This is an inter-governmental agreement to conserve migratory birds of prey in the African and Eurasian regions and was signed by Pakistan in 2008.

Though considered as a barrier to the sustained existence of biodiversity, yet, sprawling urban landscape can work as an effective tool for biodiversity conservation. Setting aside patches of protected habitat in the anthropogenic activities will help in creating ecologically responsible development in adjacent areas, as well as meeting the needs of nature. However, high cost of land in urban environments can pose severe challenges.

8.2. Issues and Trends

Habitat mapping has been carried out periodically and the ecosystems of Pakistan are described using different tools and techniques. The natural habitats of Pakistan are grouped into different vegetation types based on technical parameters as well as management objectives, physiognomy

and source of information. Another classification recognizes 17 ecosystems based on NOAA satellite imagery. Many endemic and threatened species of flora and fauna and a large proportion of the wild relatives of crops found in the country underline the need of a comprehensive national assessment of biodiversity, its status and trends across Pakistan. The habitat and ecosystem mapping evolved gradually^{53, 54, 55} These classifications are based on criteria like climatic zones, agro-ecological zones, aridity zones, cropping zones coupled with administrative units with varying degrees of consensus. The context of these classifications and techniques used therein result in somewhat different results however, all signifying the diversity and richness of these habitat types. More recently, based on new and emerging techniques, the area under the geographic coverage of the country is classified to meet the needs of climate change scenarios⁶. The application of Holdridge life zone (HLZ) classification system revealed existence of 26 discrete habitat types in the country.

Since the initiation of establishing a network of PAs in 1974 the numbers of such areas have steadily increased with initial selection made on the basis of sites or species rather than any ecological considerations. The practice continues except in few areas with strict enforcement of wildlife laws and managed under a plan. Some habitats associated with of endangered but high value trophy species are being successfully managed by local people and communities, giving an indication of replication of efforts.

Pastoral Management: Extensive pastoral production covers some 25 percent of the world's land area and produces 10 percent of the meat used for human consumption and supporting about 20 million pastoral households. Pastoral production is split between the extensive enclosed systems that are typical of North America, Australia and parts of South America, and the open access systems of Africa, the Andes, Asia and Siberia,. In Pakistan pastoral grazing is widely practiced in the arid and semi-arid areas. Both long range nomadic pastoralists and short range roaming nomads are abundant but there have been no census on these pastoralists. They are still considered largely the province of "traditional" producers. Recent initiatives have attempted to undermine the traditional grazing systems they developed over centuries and highlighting the newly developed ways, means and technologies.

A large number of research and development projects employed different models and application of North American style range management was one such initiative though unsuccessful. The reason is being wide social, cultural, and land tenure differences. Across Pakistan, pastoral systems differ widely and thus would require different management approaches. Other than agricultural and forest lands which comprise less than 40% of the total area of the country, vast areas of land that are considered 'wasteland' need to be managed to control land degradation and desertification, and to improve ecosystem services and livelihoods via biodiversity conservation, and including the pastoralists into the mainstream range management policies.

Currently the existing forestry, agriculture, and livestock departments are not integrating natural resource management in their plans and programs. Therefore there is a need to establish an independent government agency to manage these lands and valuable biodiversity resources of the country.

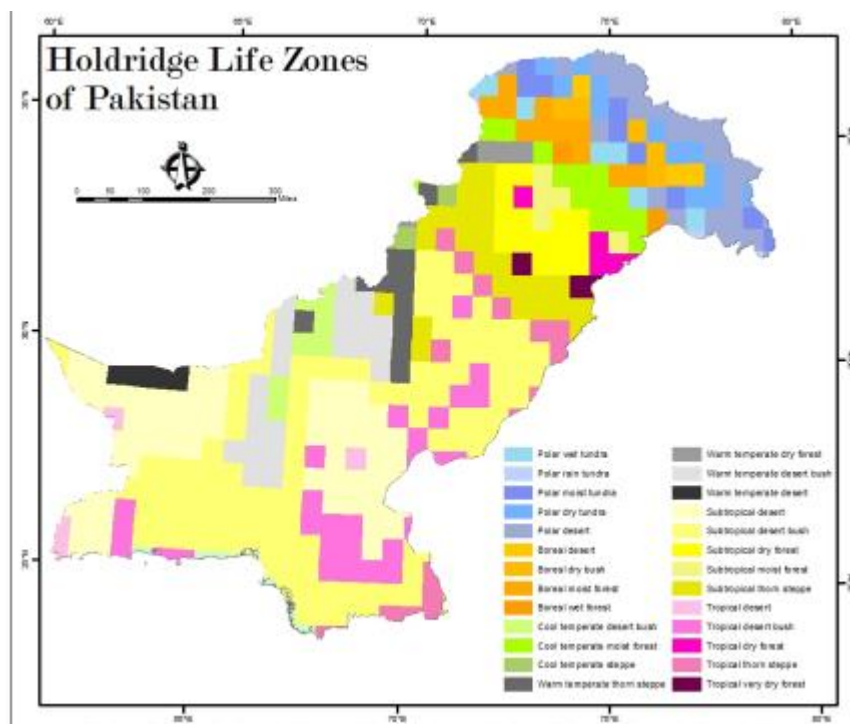


Figure 9: Holdridge Life Zones of Pakistan

Protected Areas (PA): Protected Areas have been established in Pakistan to achieve the goals of conservation ecosystem services and cultural values. These protected Areas include game reserves, wildlife sanctuaries, and national parks spread over approximately 12% of the total area of the country. The protected area system review¹⁸ reported that many protected areas of Pakistan do not meet the established criteria, and a PAs Gap Analysis^{59, 60} revealed many ecological and management gaps, together with the identification of fragmented habitats with few or no ecological corridors or connections between them.

8.3. Strategies and Actions

The following strategies will be adopted and actions will be taken to fill gaps in protected areas and recovery of population of threatened species, implement the CBD programmes of work on protected areas, as well as ABTs.

Strategies:

1. Institutional and regulatory frameworks will be improved and implemented to address new and emerging challenges in line with the objectives of the Convention.
2. Natural habitats will be conserved through the expansion, including establishment of corridors, and the effective management of the network of protected areas integrated with landscapes.
3. Local communities will be empowered and their capacity developed so they can act as custodians of protected areas and landscapes.

4. Knowledge, science base, and technologies relating to biodiversity, its values, functioning, status and trends will be improved. The conservation status of known threatened species will be improved.
5. Pastoralists and nomadic people with the huge potential of maintaining livestock and small ruminants need to be mainstreamed in range management policies and their traditional knowledge should be used to create an enabling environment.

Actions

1. Institutional effectiveness and efficiency will be enhanced to ensure effective management and monitoring of the biodiversity resources. Initiatives with the adoption of NBSAP (ABT 17);
2. A GIS laboratory will be established to assess the health (deforestation) and condition (degradation) of ecosystems and habitats, and maps prepared to identify conservation priorities and opportunities (ABT 19);
3. An ecosystem classification system using agreed international standards, including broad indicators of biodiversity, will be developed. (ABT 19);
4. At least 20% of degraded ecosystems of ecological significance will be restored to combat desertification and demonstrate economic, social, and cultural benefits (ABT 15);
5. A study will be conducted to identify negative incentives and propose positive incentives that will reduce the rate and ultimately halt the degradation and fragmentation of ecosystems (ABT 3);
6. The lists of PAs will be refined to include only those sites that meet the internationally recognized definitions (ABT 11);
7. Management plans will be prepared on priority basis and implemented for effective and equitable management of PAs (annex 3) integrated into the wider landscapes (ABT 11);
8. Local communities will be empowered and their capacity built to both collaborate in the management of PAs as well as establish community conservations areas on common property lands (ABT 11);
9. The PA network will be expanded by 2020 to cover at least 17% of terrestrial area to fill in the gaps in the protected area system (annex 4) and to establish corridors between fragmented habitats of threatened species (ABT 11);
10. Mechanisms will be developed for financial sustainability of PAs (ABT 11);
11. The gap between scientists and conservationists will be bridged to improve knowledge and practice of biodiversity conservation (ABT 19);
12. Recovery plans will be prepared and implemented to improve the conservation status of major threatened species of flora and fauna (Annex 2) in different ecosystems (ABT 12);
13. The directorate of biodiversity, MoCC, in collaboration of other conservation partners will work on eradicating practices counter to the norms of animal wellbeing and ethics.
14. The directorate of biodiversity, MoCC, in collaboration with other partners will put continued efforts for ex-situ conservation;
15. Targets for the conservation of ecosystems, habitats, and species will be integrated in the annual and medium term development plans (ABT 20), and;
16. Additional financial resources, if needed, for implementing NBSAP will be mobilized (ABT 20)

9. Forest Ecosystems

9.1. Context

The forests of Pakistan are grouped into five physiognomic classes, conifers, scrub, riverine, mangroves, and plantations. Natural forests comprise a number of diverse ecosystems, including the Western Himalayan Temperate Forests, one of the global 200 priority ecosystems. In addition, Balochistan hosts the world's second largest compact forest of Juniper (UNESCO 2013; Man and Biosphere Reserve), and is considered a living fossil. While almost all forest ecosystems in Pakistan are threatened, edible pine nut (*Pinus gerardiana*) forests, found primarily in community-controlled areas, are under serious threat of disappearance due to logging by local people as a means of supporting their livelihoods. A wide variety of medicinal plants grow in abundance in the temperate forests of the western Himalayan and Hindukush mountain ranges producing huge amount, for example, 500 tons of medicinal plants are produced in Hazara and Malakand alone. Likewise, 16 tons in the Murree Hills, 38 tons in Azad Kashmir, and about 24 tons in Gilgit-Baltistan are extracted for domestic use and export¹⁹.

The area of different forest types and percent annual change in their cover over five and ten year periods is given in Table2 (PFI, 2004).

Table 2: Change in area of different forest types, 1992 to 2004

Forest Type	Forest Cover(000 ha)			Rate of change %	
	1992	1997	2001	Five Yr.	Ten Yr.
Conifer	1,913	1,479	1,512	4.54(-)	2.09(-)
Scrub	1,191	1,652	1,323	7.74(+)	1.11(+)
Riverine	173	144	150	3.35(-)	1.33(-)
Mangrove	207	159	158	4.64(-)	2.37(-)
Plantation	103	165	174	12.04(+)	6.89(+)
Total Forest	3,587	3,599	3,317	0.06(+)	0.75(-)
Rangeland	28,505	22,645	23,546	4.11(-)	1.74(-)
Total Types	32,092	26,244	26,863	3.64(-)	1.63(-)

Source: Pakistan Forest Institute

9.2. Issues and Trends

Different agencies and institutions have been assessing the forest cover using different yardsticks and have invariably pointed out a decreasing trend of forest cover in the country. Parallel to this trend, social forestry and efforts on linear plantations have proved fruitful and forestry resources assessment in the country has indicated the priority areas of immediate attention.

Forests are small islands in a vast ocean of rapidly growing human population and consequently face a number of threats. In many forests, local communities are entitled to a percentage of shares from the sale of timber and thus they pressurize the government for access to logging. Due to the short supply and growing demand for construction material, timber prices are high and the mafias in collusion with the rights holders indulge in all sorts of tactics, including illegal logging practices. People living near forests also depend on fuel wood for cooking and heating their homes in the winter. Once they run out of fuel wood on their own or communal lands, they turn to the forests for wood extraction. A recent study concluded that 80% of deforestation in KP was due to cutting of trees for fuel²⁰. Overgrazing by cattle also has a negative effect on the forests since the natural regeneration of the seedlings is hampered by trampling and browsing. The magnitude of various threats estimated on a scale of 1 to 10 in different forest types is shown in following figure.

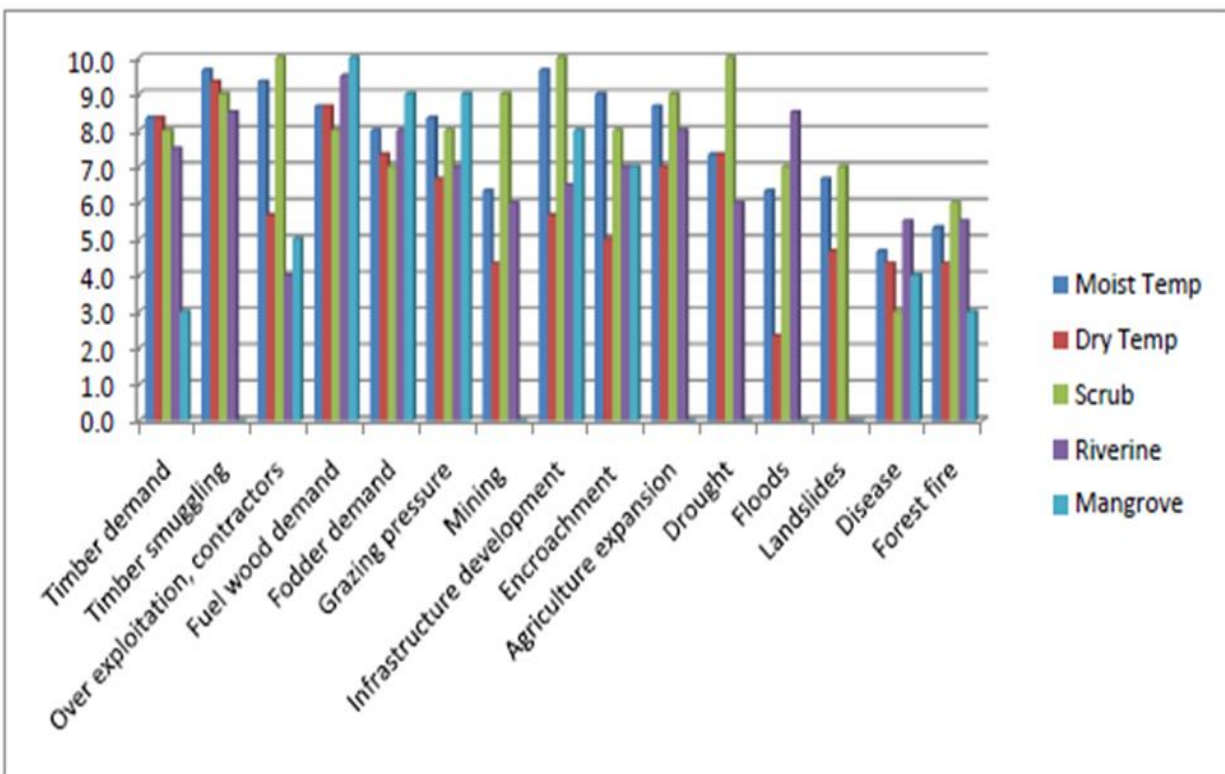


Figure 10: Level of various threats in different forest types (FCPF RFP, MoCC, 2012)

Irrigated plantations and the strips of land along highways and canals are important components of the forestry resources of the country. These plantations have traditionally been made up of pure

stands of one, or a mix of two species of commercial importance, and can play a significant role in promoting conservation of biodiversity.

Many forests have been classified as protected areas under the wildlife laws administered by the Provincial Wildlife Departments of Pakistan. This has created conflict of interest between the two agencies, and so far, there is no mechanism for joint management for such protected areas. Under UN MDGs, Pakistan had made significant contribution to its commitment to increase its forest cover from 4.8% to 6.0% by 2015 and is obliged to report the status of forests in a transparent manner to various international conventions and UN agencies. With this in mind, the government engaged the services of WWF Pakistan to estimate the district wise forest cover using satellite imagery.

According to Pakistan's National Determined Contributions (NDC) document submitted to UNFCCC, contributions of 'Land Use, Land Use Change and Forestry (LULUCF)' sector towards greenhouse gas emissions of the country are merely 2%. However, these emissions are consistently increasing due to deforestation estimated at 27,000 hectares per year. It is anticipated that by 2030, Pakistan's emissions from LULUCF sector will almost triple⁶². Considerable efforts are made for the revival of forestry in the country. These include expanding the forest cover through mega tree plantation programmes such as National Green Pakistan Programme; Billion Tree Tsunami Project in Khyber Pakhtunkhwa; Sustainable Forest Management project funded by United Nations Development Programme (UNDP)/ Global Environment Facility (GEF); strengthening the regulatory & forest protection policy mechanism and implementation of international mechanisms under UNFCCC (United Nations Framework Convention on Climate Change), such as, Reducing Emissions from Deforestation and Forest Degradation (REDD+).

The Green Pakistan Programme is being launched in 2017 by the federal government with support from all the provinces and Azad Jammu and Kashmir, Gilgit-Baltistan (GB), Federally Administered Tribal Areas (FATA). The main objective of the Programme is "to facilitate transition towards environmentally resilient Pakistan by mainstreaming notions of adaptation and mitigation through ecologically targeted initiatives covering afforestation, biodiversity conservation and enabling policy environment." The programme target is to add 100 million indigenous plants including 20% fruit plants all over the country in the next five years. The programme also aims to revive and functionally reorganize wildlife departments at provincial and territorial levels through development of time bound plans, including staff capacity building programs and incentive-driven performance regimes.

The Government of Khyber Pakhtunkhwa (the northern province of Pakistan) launched the "Green Growth Initiative (GGI)" in 2014 as a flag bearer of the clean and green revolution in Pakistan. The GGI aims to (i) increase area of forests by two percent through converting 30,000 hectares of additional land into forests annually, (ii) increase density (area of forests having canopy cover below 50%) of 7% degraded forests by closure against grazing and fire and (iii) establish rules for REDD+ to assign carbon value to forests and institute REDD+ as a tool to promote conservation. Through GGI, the Government of Khyber Pakhtunkhwa launched the "Billion Tree Afforestation" campaign to involve local communities in the sacred pursuit of greening the province.

Recent policy developments have led to the formation of new institutions and governing bodies to address deforestation in the wake of climate change. These include new national and provincial

REDD+ management arrangements, which will influence the development of Pakistan’s National REDD+ Strategy and its implementation framework.

Pakistan has recently secured funding of 9.338 million USD from GEF for a multi-focal area project on Sustainable Forest Management “SFM”. The aim of the project is to secure multiple benefits in high conservation value forests by addressing problems of forest decline, biodiversity loss and greenhouse gas emissions.

The tremendous potential of forest landscape restoration (FLR) has led 40 governments, companies and private associations – including three jurisdictions from Asia – to commit to the Bonn Challenge, a global effort to bring 150 million hectares of deforested and degraded land into restoration by 2020 and 350 million hectares by 2030. In 2016, IUCN, together with the UNEP and FAO, launched The Restoration Initiative (TRI), a project to support 10 countries in Asia and Africa in achieving their restoration objectives. TRI is supported by a US\$ 54 million grant from the GEF, with over US\$ 200 million in co-financing. Myanmar, Pakistan and China are part of TRI and will benefit immensely from the technical expertise it offers.

9.3. Strategies and Actions

The following strategies and actions are proposed to address the issues discussed above, to implement the CBD Programme of Work on Forest Biological Diversity, and to contribute to the implementation of the ABTs 2011 to 2020.

Strategies:

1. An enabling institutional and policy environment will be created to mainstream biodiversity conservation and sustainable use considerations in the forestry sector;
2. Forest biological diversity, including ecosystem services, will be protected and restored through adoption of an ecosystem approach for the management of all forest types;
3. Plantations shall be made biodiversity friendly by increasing floral diversity, and;
4. Knowledge, the science base, and technologies relating to forest biodiversity, its values, functions, status and trends will be improved to prevent loss of forest biodiversity, and mitigation measures adopted including reforms of the rights and concessions of local people.

Actions:

1. A GIS laboratory will be established for the assessment of the health (deforestation) and condition (degradation) of forest ecosystems and maps prepared compatible with remote sensing technologies to identify conservation priorities and opportunities (ABT 19);
2. A forest classification system using agreed international standards including broad indicators of biodiversity will be developed (ABT 19);
3. Representative forest landscapes of special importance for biodiversity will be designated as Forest Biodiversity Reserves and effectively managed (ABT 11);
4. Canal and roadside plantations will be made biodiversity friendly to play a significant role for conservation of the pollinators, avifauna and serving as corridors between fragmented habitats (ABT 11);
5. Suitable ecosystem approaches will be developed after the adoption of NBSAP and piloted in different forest ecosystems; and training workshops held for managers for their application (ABT 7);
6. A GIS lab will be established by 2018 to prepare a baseline and monitor health (deforestation) and condition (degradation) of forests using remote sensing techniques and impact on biodiversity and ecosystem services (ABT 5);
7. At least 25% of all degraded forest ecosystems will be restored by 2020 to improve their resilience and contribution to carbon stocks (ABT 15);
8. Collaborative, or joint, forest management approaches will be piloted in different forest ecosystems to reduce the anthropogenic impacts by improving livelihoods of local people based on sustainable use of components of biodiversity (ABT 7);
9. Forest and forest related policies, laws, and regulations will be reviewed in early phase of NBSAP implementation to provide a sound basis for conservation and sustainable use of forest biological diversity (ABT 7);
10. The code for the preparation of management plans will be revised to incorporate the ecosystem approaches for sustainable management of forests and biodiversity (ABT 7);
11. Landscapes that provide essential services related to water for major dams, and contribute to health, livelihoods, and well-being of local communities will be restored by 2020 and safeguarded (ABT 14);
12. The gap between the scientists and conservationists will be bridged to improve the knowledge and practice of biodiversity conservation (ABT 19);
13. Measures to achieve the targets for conservation of forest biodiversity will be integrated in the annual and medium term development plans (ABT 20), and;
14. Additional financial resources, if needed, for implementing NBSAP will be mobilized soon after the adoption of NBSAPS. (ABT 20).

10. Inland Wetland Ecosystems

10.1. Context

The inland wetland ecosystems of Pakistan comprise streams, rivers, numerous natural lakes, man-made reservoirs, the Indus River delta, and the wetland complexes of the Indus basin. Lakes also include high altitude alpine and glacial freshwater lakes and saltwater lakes in coastal areas. The inland water resources of Pakistan are dominated by the Indus River System, comprising the Indus, Jhelum, Chenab, Ravi, and Sutlej rivers which all originate in the western Himalayas, flow from northeast-to-south, and drain into Arabian Sea through the Indus Delta. The Kabul River, originating in Afghanistan, drains into the Indus, near Attock. In addition to the Indus River system, there are also a number of other small rivers in Balochistan including the Hub, Gudri, and the Nal Rivers, which all drain into the Arabian Sea on the Makran coast.

Pakistan has one of the world's largest man-made canal irrigation systems, comprising a number of large dams, barrages, and a network of irrigation canals and waterways. The following wetland ecosystems of Pakistan are included in the list of global 200 priority ecosystems of the Millennium Ecosystem Assessment (Table 3).

Table 3: The Wetland Ecosystems of Pakistan Included in Global 200 Eco-regions

Global 200 Eco-region	Conservation Status	Representation in PA System
Rann of Kutch Flooded Grasslands	Critical or endangered	Adequate
Indus River Delta	Critical or endangered	Inadequate

Wetlands comprise a continuum of braided and meandering river channels, oxbow lakes, and seasonally flooded depressions in the Indus basin. There is no accurate assessment of the total area of all the wetlands because of the seasonal flooding and drought regimens and the later influences the population of migratory birds as well. The complex between the town of Chashma in the north and the city of Sukkur in the south is estimated to encompass 9,700 km².²¹ Streams and rivers are not only the lifeline of agriculture and hydropower generation, but also provide livelihoods to thousands of people through artisan fisheries, and serves as a refuge for large numbers of wintering migratory birds. Around 225 sites have been identified, and listed, as significant wetland sites, distributed all over Pakistan from the sea coasts in the south to high mountains in the north. The major wetlands of Pakistan are shown in Figure 10.

The conservation and sustainable use of wetlands was first focused through the ‘Pakistan Wetland Programme.’ This GEF supported project focused on creating an enabling environment through establishment of sustainable institutions; enhancing planning and land-use decision-making; development, adoption and implementation of the National Wetlands Policy; enhancing the technical competence of government agencies and communities; raising nationwide wetlands

awareness; and securing the long-term financial sustainability of wetlands conservation initiatives. In response to the need to generate practical, replicable examples of viable wetlands conservation practice in Pakistan, four demonstration sites were established in different development eco-regions, namely the Makran Coastal Wetlands Complex, the Central Indus Wetlands Complex, the Salt Range Wetlands Complex, and the Northern Alpine Wetlands Complex. The Indus Wetland Complex in Sindh also received attention through the WWF programme ‘Indus for All’ which was launched in 2007. The programme addressed the issues of natural resource management, pollution, sea erosion, loss of species, deforestation, hunting of birds and animals, and poverty.

Pakistan has more than 670 species of birds of which one third are water birds, and most of these are migratory species, including geese, ducks, swans, waders, and other water birds. Species that require urgent conservation attention include the Siberian Crane (*Leucogeranus leucogeranus*), the Sarus Crane (*Grus Antigone*), the Dalmatian Pelican, (*Pelicanus crispus*), the Sociable Plover (*Vanellus gregarius*), the Lesser White-fronted Goose (*Anser erythropus*), Pallas’s Fish Eagle (*Haliaeetus leucoryphus*), and vultures. Pakistan has been a signatory to the Ramsar Convention on Wetlands since 1971 and ratified this agreement in 1976. This convention is an intergovernmental treaty for the conservation and sensible use of wetlands. In order to fulfil the obligations of this convention, Pakistan initially designated nine Ramsar sites and, at present, there are 19 wetlands on the Ramsar list (Annex 5). Although, there is no specific legislation for the protection and sensible use of wetlands, Provincial Wildlife Laws provide legal protection to most of these sites. In addition, to enable the conservation and sensible use of wetlands and their resources, a National Wetland Policy has also been developed but has not yet been approved by the Parliament.

The freshwater fish fauna of Pakistan comprises 198 species, including 12 introduced taxa. The fish fauna is predominantly South Asian, with some West Asian and high Asian elements. The fish fauna of the northern areas of Pakistan comprises 20 species and is completely high Asian in makeup restricted mainly to GB province. A major component of the fish fauna, especially warm water fish, is restricted to the Indus plain, which comprises about 140 species. Of these, the genus *Schistura* is restricted to sub-mountain areas while the genus *Triplophysa* is mainly confined to high altitude regions. Snow trout are found in the Himalayas, Hindukush, and Karakoram mountain ranges and are not represented in the Indus plain. Other than sport fishing, fishing rights in inland waters are auctioned every year for the duration of the fishing season, and rainbow and brown trout represent potential threats to the highly specialized local cold water fish fauna. In addition, introduction of Tilapia fish is a real threat to the local fish fauna in warmer waters²².

Aquaculture is a rather recent activity in Pakistan and is still in its infancy; the potential fish fauna to be farmed is rich but only seven warm water species and two cold water species have been cultivated so far on a commercial scale. Trials experimenting with shrimp in culture were carried out in the Indus delta region but did not succeed due to the non-availability of hatchery-produced seed. With the exception of trout culture in KP and GB, virtually all aquaculture currently carried out in Pakistan is pond-based and utilizes various carp species. In the past, most fish farmers stocked their ponds with only indigenous species such as catla (*Catla catla*), rohu (*Labeo rohita*), mrigal (*Cirrhinus mrigala*). More recently, two fast growing invasive species, the grass carp (*Ctenopharyngodon idella*) and silver carp (*Hypophthalmichthys molitrix*), have been introduced to increase the fish yield per unit area. These two species have good economic value, and have

become popular amongst producers as well as consumers. Two species of trout namely brown trout (*Salmo trutta*) and rainbow trout (*Oncorhynchus mykiss*) are also cultured in KP, AJK, and GB.

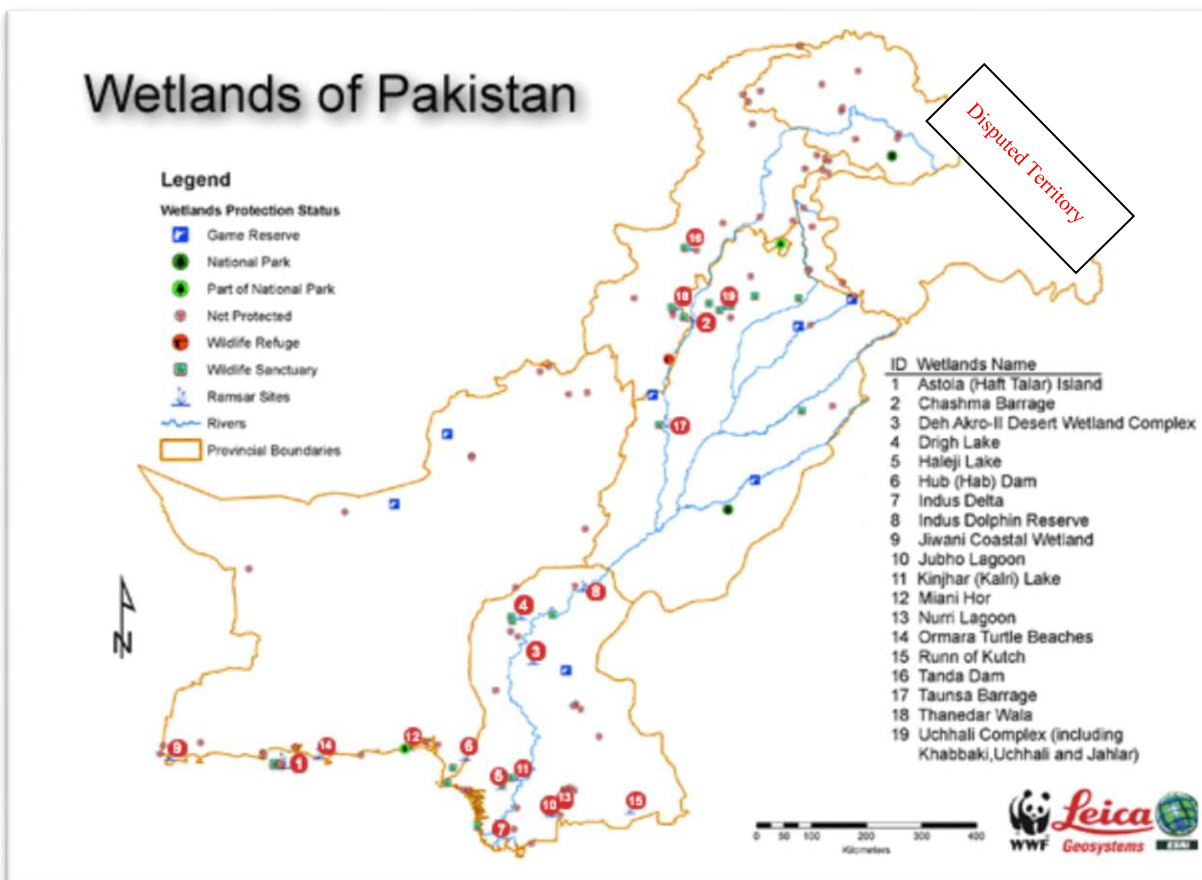


Figure 11: The Major Wetlands of Pakistan.

While many lakes in the highlands are unmanaged, rivers, man-made reservoirs, and canals are primarily managed for irrigation and hydropower generation. Fishing is regulated by the Fisheries Department and hunting is controlled by the various Wildlife Departments. However, there is little coordination between these agencies, and they act independently without much consultation. Apart from overfishing and hunting, the threats to wetland biodiversity include discharge of industrial effluent and municipal waste. In addition, diversion of water for agriculture and construction of hydropower stations have resulted in shrinkage of many wetlands and fragmented habitats. The use of illegal nets, dynamite, and poison fishing are other serious threats to aquatic biodiversity.

10.2. Issue and Trends

Pakistan is a range state of the Central Asian Flyway (CAF) indicating an urgent need for science-based, internationally coordinated conservation measures, ensuring the survival of migratory species and their habitats. Forty-six wetlands in the country have protected status in the form of national parks, wildlife sanctuaries and game reserves. Of these, 15 wetlands of international importance have been designated as Ramsar Sites. The CMS Action Plan (2008) for the CAF provides the basis for the 30 range states to take individual and coordinated region-wide activities

to conserve water birds and their habitats. This agreement covers 175 species of divers, grebes, pelicans, cormorants, herons, storks, ibises, flamingos, geese, cranes, rails, sun grebes, jacanas, crab plovers, oystercatchers, stilts, avocets, pratincoles, plovers, scolopacids, gulls, and terns. Of these 13 species are listed in Appendix I of the CMS.

Pakistan is home to a number of aquatic species of conservation importance. The golden mahseer *Tor putitora*²³, a popular game fish species, is endangered because of overfishing and loss of breeding grounds, while another freshwater species Kashmir Catfish *Glyptothorax kashmirensis*²⁴, found only in the Jhelum River, is critically endangered and is in imminent danger of extirpation. The Indus River dolphin *Platanista gangetica*²⁵, endemic to Pakistan, is under extreme pressure from loss of habitat and overfishing and listed as endangered by the IUCN Red List of Threatened Species. The gharial *Gavialis gangeticus* also found only in the Indus River and its tributaries, is nearly extirpated in Pakistan, while the narrow-headed soft shell turtle *Chitra indica*²⁶ is endangered in the country's rivers.

The NBSAP suggests ways and means for species and habitat conservation, single species action plans, as well as emergency measures. Priority issues for the conservation of migratory water birds and their habitats include improving information on population status, trends, as well as precise migration routes. In addition, it is important to improve the capacity of local agencies and communities to monitor and manage wetlands, while ensuring their sustainable use for the local people. A policy document for the conservation and sustainable use of wetland biodiversity in Pakistan is already prepared and needs ownership and effective implementation. The National Climate Change Policy (2012), however, recognizing the importance of wetlands in maintaining and sustaining regional ecological processes that support globally important biodiversity such as bird migration routes and wintering grounds, has outlined a number of policy measures to protect, sustain and enhance the wetlands.

10.3. Strategies and Actions

While a foundation for the conservation and sustainable use of wetlands biodiversity has been laid, efforts must be continued if we are to achieve fruitful results. The following strategies and actions are designed to implement the CBD programme of Work “Inland Waters Biodiversity” and ABTs.

Strategies:

1. Sound watershed management practices and climate change mitigation measures shall be adopted in the Indus basin to prevent water shortages in the country;
2. Biodiversity considerations shall be included in the policy, legal, and regulatory frameworks to ensure conservation of fish and other aquatic organisms, and equitable sharing of benefits;
3. Appropriate measures shall be taken to prevent the introduction of freshwater invasive species and control their spread to other areas, and where feasible, invasive alien species will be eradicated in habitats of significant biological diversity, and;
4. Build the capacity of relevant stakeholders to sustainably manage fisheries and aquaculture, and ensure equitable sharing of benefits.

Actions

1. The feasibility of an effective cross boundary coordination mechanism between India and Pakistan to protect the watershed values of Indus Basin shall be explored for joint action to combat water scarcity and conserve wetland biodiversity.
2. An effective coordination mechanism will be established for integrated management of water, fish, and wildlife resources of wetlands (ABT 6);
3. Institutional capacity will be strengthened soon after the adoption of NBSAP for effective enforcement of laws, and sustainable management of the wetlands (ABT 17);
4. Biodiversity considerations will be incorporated in fisheries policies, laws and regulations to ensure sustainable use and equitable sharing of benefits (ABT 6);
5. A procedure for sustainable harvest of fish stock will be developed in early phase of NBSAP implementation to minimize impact on threatened species and vulnerable habitats (ABT 6);
6. A baseline survey will be undertaken to assess the biodiversity of key inland wetlands and establish a system to monitor at regular intervals the status of species most in decline (ABT 6);
7. Wetlands protected areas will be established by 2019 covering at least 15% area of wetlands of biodiversity significance and effectively managed together with the surrounding landscapes (ABT 11);
8. Management plans will be prepared and implemented for integrated management of RAMSAR sites (Annex 5) including the surrounding landscapes after the NBSAP is adopted (ABT 11);
9. The spread of alien species will be prevented through appropriate measures to prevent their escape into natural habitats from hatcheries and aquaculture (ABT 9);
10. The impact of alien species in wetlands of biodiversity significance will be assessed and measures taken to control and ultimately eradicate invasive alien species by 2020 (ABT 9);
11. Important wetland habitats of national biodiversity significance together with surrounding landscapes will be co-managed with custodial communities by 2017 through their empowerment and building capacity for conservation and sustainable use (ABT 6);
12. Plans will be prepared and implemented for recovery of depleted freshwater fish species (Annex 2) (ABT 12);
13. The gap between the scientists and conservationists will be bridged to improve the knowledge and practice of biodiversity conservation (ABT 19);
14. The targets for conservation of inland water ecosystems will be integrated in the annual and medium term development plans (ABT 20), and;
15. Additional financial resources, if needed, for implementing NBSAP will be mobilized (ABT 20).

11. Coastal and Marine Ecosystems

11.1. Context

Pakistan’s sea-coast, between Sir Creek in Sindh and Jiwani in Balochistan, measures 1,098 km, with 768km in Balochistan and 330 km in Sindh. Three coastal and marine ecosystems of Pakistan are included in the Global 200 Priority Ecosystems (Table 4). These ecosystems are comprised of the Arabian Sea (Figure 11²⁷), sandy and rocky beach ecosystems, estuaries, coastal lagoons, backwaters, and recently discovered corals in Astola Island. The mangrove vegetation (covering 86,727 ha) is mainly restricted to river estuaries with scattered patches along the coast. Although mangroves play a useful ecological role, their economic value is not well recognized. There are four species of mangroves found in Pakistan, with *Avicennia marina* being the predominant species.

Table 4. Global 200 Eco-regions represented in Pakistan.

Global 200 Eco-region	Conservation Status	Representation in PA System
Rann of Kutch Flooded Grasslands	Critical endangered	or Adequate
Indus River Delta	Critical endangered	or In adequate
Arabian Sea	Critical endangered	or No representation

A 20 km stretch of beach on Hawkes Bay and Sandpit are nesting grounds of the green turtle (*Chelonia mydas*) and the olive ridley turtle (*Lepidochelys olivacea*). In Balochistan, there are three major green turtle nesting sites: Ormara, Astola (Haft Talar) Island (a small, un-inhabited island about 6 km in length) and Jiwani. In addition, a small population of turtles also nests on the beaches of Hingol National Park to the east of Ormara. Nesting and hatching of green turtles takes place all year round, with peak nesting in November and peak hatching in October.

Pakistan is a member country for the Memorandum of Understanding on the Conservation and Management of Marine Turtles and their Habitats of the Indian Ocean and South-East Asia (IOSEA) is an intergovernmental agreement that aims to protect, conserve, replenish and recover sea turtles and their habitats in the Indian Ocean and South-East Asian region, working in partnership with other relevant actors and organizations.

Astola Island was notified as Pakistan’s first marine protected area on 15 June 2017 by the Government of Balochistan. Total protected area with this addition is 12.6% of the total area of the country.

11.2. Issues and Trends

Coastal and marine biodiversity faces numerous threats, some of which require action at national level while others require global action. Marine fisheries are a direct livelihood source for over a million people and encompass more than 125,000 households. There are approximately 15,000 fishing vessels of various sizes ranging from small to medium-sized boats, large launches, and trawlers, engaged in fishing, though using conventional fishing gear. The species exported (with little value addition) are mainly shrimp (65%), Indian mackerel, ribbon-fish, tuna, sole and crab. Sardines are caught as trash fish and converted into chicken feed. There has been a sharp decline in the fish and shrimp catches recently as a result of over-fishing and fishing during the breeding season (June to August).

Two species of sawfish, the knife-tooth and narrow-snout, as well as Pondicherry shark (*Carcharhinus hemiodon*)²⁸ Ganges sharks (*Glyphis gangeticus*)²⁹ longheaded eagle ray (*Aetobatus flagellum*) are endangered in Pakistan. Scalloped hammerhead, squat-headed hammerhead, and broad-fin sharks have been overfished for use in the shark-fin trade, while the blue whale, the largest creature on Earth, is an endangered marine mammal in Pakistan.

Marine turtles in Pakistan face multiple threats, including natural predators, incidental catch, illegal collection of animals and eggs as well as other anthropogenic activities along the nesting sites.³⁰

Excess nutrient input result in eutrophication, anoxic conditions and result in fish kill events. The Indus Delta is heavily polluted by a variety of effluents and oil spills together with clearing of mangrove areas for industrial and agricultural purposes as well as for urban expansion. The development of Gwadar as a port city needs conservation of some small beaches that serve as nesting habitats for the turtles in the locality.



Figure 12: Map showing EES in Arabian Sea.

Ban on fishing as a tool to conserve the species is not a feasible option when the many communities depend on fishing and other related activities for their livelihoods. Therefore, policy measures to address the problem of biodiversity loss must integrate access rights and community based management in the fishery management and conservation plans. The fisher folk usually have the knowledge of the resources and if provided the necessary support can learn to use these resources in a sustainable manner. Some measures include limiting the entry for fish exploitation and regulation of fishing gear, collection of resource rent, and benefit distribution. It also includes addressing the overfishing and by-catch through sustainable fishery practices, setting catch limits on target species, and by catch reduction plans. Marine protected areas that are off limits to fishing and limit local pollution may help raise the resilience of local ecosystems to climate change and ocean acidification. Protected areas can benefit both fisheries and tourism by preserving important spots of marine biodiversity and fish spawning grounds.

Climate change threatens the coastal communities in Pakistan due to sea water rise and lack of resilience to cyclones. The measures aiming at sustainable fisheries practices and others in brown sector will help in facing the vulnerability to climate change.

In addition to climate change, progressive upstream diversion of Indus waters and the gradual depletion of freshwater discharges and accompanying reduction in silt load is increasing salinity in the Indus delta. A decline in fresh water discharge from Indus was observed from 49 trillion gallons to 0.24 trillion gallons in 2006 since 1947. In the absence of a considerable volume of such flows there is no decelerating factor to check sea intrusion and it is estimated that the sea has intruded 54 km upstream along the main course of the River Indus, Sindh³¹.

11.3. Strategies and Actions

Conservation and sustainable use of resources in marine and coastal areas is recognized well by the government and the conservation agencies. Declaration of first marine protected area is a step towards achieving the goals and targets under CBD and other obligations. The various conservation initiatives on turtles, mangroves, the wetlands and programs like Indus for All (WWF) and Mangroves for the Future (IUCN) laid the foundation for conservation and sustainable use of wetlands biodiversity in the country. However, there is a need to scale up efforts to prevent loss of biodiversity and considering the livelihood of poor and marginalized populations. The following strategies and actions are designed to implement the CBD programme of Work “Inland Waters Biodiversity” and Aichi Biodiversity Targets.

Strategies

1. A network of protected areas shall be established and specific conservation measures taken for recovery of populations of species most in decline to enhance the resilience of marine biodiversity to climate change; Astola Island as first Marine Protected Area is a significant step towards implementation of ABTs.
2. The capacity of coastal fishing communities will be developed to harvest marine organisms in a sustainable manner, and;
3. The institutional and regulatory frameworks will be improved to address the challenges of the 21st century for conservation of marine biodiversity, through sustainable use and equitable sharing of benefits;

Actions:

1. Laws, regulations, and policies shall be updated or drafted by incorporating biodiversity concerns and effective management of marine biodiversity on sound ecological principles and to prevent threat of extinction of utilized species(ABT 6);
2. The capacity of fisheries departments will be strengthened by 2017 to ensure compliance with laws and regulations for harvesting fish and invertebrates within sustainable harvest limits (ABT 19);
3. An assessment of stocks and limits of sustainable harvest levels of major species will be determined and measures proposed for enforcement (ABT 6);
4. The population of known threatened marine species particularly of those in most decline (Annex 2) shall be monitored regularly starting 2017 and remedial measures taken to improve and sustain their population (ABT 12);
5. Pilot projects will be launched after the adoption of NBSAP to develop and test approaches for organizing, empowering, and building capacity of coastal communities to sustainably harvest fish and invertebrate stocks (ABT 6);
6. Protected areas covering at least 10% of the marine area of biodiversity significance will be established and managed effectively as seascapes for conservation and sustainable use(ABT 11);
7. Management plans for mangrove forests will be prepared based on ecosystem approach and implemented by 2018(ABT 5);
8. A pilot project will be launched during the early phase of NBSAP implementation for the restoration of at least 7,000 ha of degraded mangrove ecosystems jointly with the custodial communities on sustainable use principles and equitable sharing of benefits (ABT 5);
9. Climate Change Adaptation Plans will be prepared by 2018 for the coastal areas and capacity of coastal communities developed to cope with the impacts of climate change(ABT 10);
10. The number of operating fleets will be capped at 7,000 by 2020 to prevent over exploitation of marine fish and invertebrate resources(ABT 6);
11. The fishing boats will be modified by 2020 to improve the outdated fishing methods (ABT 6);
12. The gap between the scientists and conservationists will be bridged to improve the knowledge and practice of biodiversity conservation (ABT 19);
13. The targets for conservation of coastal areas and marine ecosystems will be integrated in the annual and medium term development plans. This will include the establishment of Marine Protected Areas (ABT 20), and;
14. Additional financial resources, if needed, for implementing NBSAP will be mobilized (ABT 20).

12. Sustainable Agriculture and Agrobiodiversity

12.1. Context

The agricultural sector is a vital source of economic growth for Pakistan contributing approximately 22% to the country's GDP, accounting for over 60% of exports, and employing more than 60% of the rural labour force. Crops, including fruit, vegetables, and livestock, contribute in almost equal proportions to the economy. Out of the 79.61 mha total area of Pakistan, about 22 mha is cultivated, of which 75.5% is under irrigation, and the remainder is dryland agriculture. Dryland agriculture is synonymous with rain fed (barani) conditions, where land holdings are small and often fragmented. Dryland rainfall (125–1000 mm) is bimodal, mainly (~60%) monsoonal and highly erratic. Rain fed areas are sub-humid (>500 mm), semi-arid (300–500 mm), and arid (<300 mm)³².

The main crops of irrigated agriculture are cotton, wheat, rice, sugarcane, fruits, and vegetables, in addition to milk, beef, mutton, and eggs. Dryland crops include wheat, chickpea, sorghum, millet, barley, maize, lentil, peanut, rapeseed-mustard, and guar seed. A significant majority of the farmers hold less than two hectares of land, which constitutes 22% of total cultivated area. Almost all of the irrigated areas are cultivated with high yielding varieties with a heavy input of agro-chemicals and conventional irrigation practices. Such agricultural practices causing a shortage of canal water, water logging and salinity, depletion of aquifers and deterioration of water quality downstream. Due to Green Revolution endemic varieties of crops vanished and new varieties were introduced to increase the yield per acre, the new varieties which were dependent on large amount of water increase the yield per acre but produced environmental problems like water logging and salinity. The loss of endemic crop was actually the loss of biological diversity. Similarly due to Green Revolution, the use of insecticides and endemic crop loss has adversely affected the population of pollinating insects. Despite growth in agricultural productivity, there is a net import of agricultural commodities worth about US\$2 billion.

Pakistan has diverse agro-climatic conditions and a good natural resource base for agriculture. It is rich in indigenous crop diversity with an estimated 3,000 different cultivated plants and around 500 wild relatives of cultivated crops. Northern and western Pakistan comprises one of the world centres on the origin and diversity of cultivated plants³³. Many wild and local cultivars survived in Pakistan up to the era of the Green Revolution.

Livestock is a source of livelihood at the rural level, helping to reduce disparity in income, and provides security in case of any crop failure thus plays a role in poverty alleviation and to uplift the socio-economic conditions of rural masses. Livestock contribution to agriculture value added stood at 55.9% while it contributed 11.8% to the national GDP during 2013-14³⁴.

Pakistan livestock includes cattle, buffalo, sheep, goat, camels, horses, asses and mules. 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, Azakheli, and Kundi are dairy breeds. Among the cattle, there are three dairy breeds (Sahiwal, Red Sindhi, and Cholistani), five draught breeds (Bhagnari, Dhanni, Dajal, Achi, Gibrali, Lohani, and Rojhan) and one dual-purpose breed (Tharparkar or Thari). The pure-bred animals are believed to constitute only 20-25% of the cattle population. Of the sheep breeds, 14 are thick-tailed and 14 thin-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.

12.2. **Issues and Trends**

The focus of agricultural policies in Pakistan has been on maximising yields of crops and the production of dairy and meat. Agricultural technologies that ensured a 'green revolution' during the past few decades have had a high ecological cost, contributed towards pollution, and resulted in loss of biodiversity. To improve environmental health and make agriculture sustainable, attention is being paid to the development of high productivities of plants and animals, using their natural adaptive potentials, with a minimal disturbance of the environment. There was a shift of the focus from agro-ecosystems to a crop culture. Important elements of agro-ecosystems like pollinators, soils microorganisms and predators of crop pests received little or no attention. Indiscriminate application of chemicals and loss of floral diversity has adversely affected the population of pollinating insects. Consequently, the yields of crops, vegetables and fruits dependent on pollination have declined in many parts in Pakistan³⁵. Bee-keeping is well developed in some parts of country, and needs further efforts to its adoption as natural pollinating agent.

The freshwater resources of the country are based on snow and glacier melt and monsoon rains, and are highly sensitive to climate change. Western rivers of Indus Basin are source of 104 MAF (million acre feet) water for agriculture and around 35 MAF outflows to the sea. A large useable groundwater aquifer adds to the water for agriculture use. This natural reservoir, is largely recharged from the surface flows and rains and is being exploited heavily and particularly in some hyper-arid areas³⁶. Freshwater resources have shrunk from about 5,000 m³ per capita to less than 1,500 m³ per capita and water availability is expected to decline below 1,000 m³ by 2035³⁷. More than 90% of the water is used for agriculture and water shortages coupled with global warming poses a serious threat to the food security of the country and livelihoods of people employed in this sector. The best water management practices and optimum use of agro-chemicals needs to be promoted for major crops to make agriculture sustainable and environment friendly. The Pakistan Sustainable Cotton Initiative (PSCI) has successfully demonstrated best water management practice and significantly reduced applications of pesticides and fertilisers in cotton production without significantly affecting yields³⁸.

The impact of climate change is likely to have more impact in mountains and arid regions where rain fed agriculture is practised. Farmers and pastoralists have always had to cope with variability in the weather, but climate change will produce more permanent shifts in temperature and precipitation and we should be ready to adapt to new conditions.

12.3. **Strategies and Actions**

To address these issues, contribute to the CBD programme of work on agro-biodiversity, and implement the ABTs 2010-2020, the following strategies are proposed.

Strategies:

1. The principles and practices of sustainable and biodiverse agriculture research and development will be incorporated into national policies, laws, investment strategies, education, and extension programmes;

2. Capacity building and awareness raising of all stakeholders, including farmers, the consumers, researchers, and extension specialists, on the beneficial effects of agro-biodiversity;
3. Models of sustainable agriculture for major crops shall be developed and promoted particularly by managing organic matter, enhancing soil biotic activity, minimizing water losses and use of agro-chemicals;
4. The bio diversification of agro ecosystems will be restored in time and space through crop rotations, cover crops, intercropping, crop/livestock mixtures, conservation of pollinators, and soil biodiversity, and;
5. The use of transgenic organisms would be considered very carefully to ensure that they pose no environmental and health risks or at least no more than the use of current crops and practices.

Actions:

1. The considerations of sustainable agriculture, bio diversification of agro ecosystems, conservation of pollinators and soil biodiversity, wise use of transgenic organisms, and climate change will be incorporated in agriculture policies and plans by 2017 (ABT 13);
2. Sustainable agriculture and bio diversification of agro ecosystems shall be integrated in the educational and extension programmes of agriculture and animal sciences(ABT 7);
3. The gaps in the *in-situ* and *ex-situ* conservation of the agro biodiversity will be assessed during the early phase of NBSAP implementation and measures taken to fill the gaps (ABT13);
4. Models of sustainable production of major crops with minimum external inputs and wise use of water shall be developed, tested, and demonstrated on farms by 2020(ABT 7);
5. The diversity of local varieties and land races of crops, fruits, and breeds of livestock and poultry and local knowledge of their management will be documented and incentive measures tested for on-farm conservation by 2018(ABT 18);
6. Important local varieties, land races and breeds will be improved by 2020 through selection for resistance to disease, drought tolerance, and for increased production(ABT 13);
7. Pilot on-farm models of biodiverse agro-ecosystems will be established in major agro-ecological zones(ABT 7);
8. Models of bio diversification of agro-ecosystems will be developed, tested, and demonstrated in major agro-ecological zones by 2020(ABT 7);
9. Appropriate legislative and regulatory measures will be adopted by 2018 for the prevention, early detection, rapid response and control of invasive species(ABT 9);
10. The gap between the scientists and conservationists will be bridged to improve the knowledge and practice of biodiversity conservation (ABT 19);
11. The targets for conservation of agrobiodiversity will be integrated in the annual and medium term development plans(ABT 20), and;
12. Additional financial resources will be mobilized to meet any shortfall for fully achieving the targets (ABT 20).

13. Sustainable Production and Consumption**13.1. Context**

The Oslo Symposium in 1994 defined Sustainable Consumption and Production (SCP) as ‘the use of services and related products, which respond to basic needs and bring a better quality of life while minimizing the use of natural resources and toxic materials as well as the emissions of waste and pollutants over the life cycle of the service or product so as not to jeopardize the needs of further generations’. The concept of SCP was later recognized in the Johannesburg Plan of Implementation, adopted in 2002 at the WSSD. To ensure sustainable consumption and production

patterns is also aim of goal 2 of the 2030 Agenda for Sustainable Development. This agreement requires countries to make fundamental changes in the way that our societies produce and consume goods and services and encourages implementation of the 10-Year Framework of Programmes on SCP. The change in patterns of unsustainable consumption and production requires commitment and action of the government, the business sector, non-state actors and individuals.

13.2. Trends and Issues

Productive Sector: The productive sector of Pakistan is dominated by the textile, edible oil, sugar, fertilizer, cement, chemical and leather industries. These sectors indirectly impact biodiversity through air pollution, and discharge of industrial waste in open land spaces, or in the water bodies. Coal mining and other industrial mining and oil exploration industries, the ship-breaking industry, and hydropower projects pose direct and indirect threats to biodiversity. Growing cement industries in the habitat of Punjab Urial in Salt Range pose a threat to the survival of this endemic ungulate species.

Loosely regulated economic development, coupled with increasing population has put acute pressure on the country's natural resource base, particularly land and water, and significantly increased levels of local pollution.

Timber and Trade in Species: Pakistan has a small natural forest cover and consequently prices of construction timber are very high which fuels illegal logging. According to Forest assessment surveys conducted by Faith country has lost more than half of its original 4.4% forest cover in the last 50 years. Fortunately, plantations and increasing trend to plant trees on farm boundaries has taken a lot of pressure off the natural forests. Many species of flora and fauna are collected for trade such as *mazri* (*Nannorrhops ritchiana*) for mats and baskets, medicinal plants, morels and turtles for food, etc. Extraction of economic non-woody plants is highly unregulated and adversely impacts the health and condition of habitats and threatens species with extinction. Some of the species included in CITES Appendix 1 are smuggled out of the country.

There is a growing and unsustainable extraction of some natural resources from the ecosystems both to meet the subsistence needs and meet the market demand. This includes heavy dependence on firewood, fresh and salt water fisheries, and range livestock for meat. Sustainable extraction of these natural resources requires educating consumers, local communities, as well as policy makers on the ecological cost and environmental consequences of over exploitation of resources.

Urban Biodiversity: The CBD CoP IX recognized the role of cities, city governments and local authorities in the implementation of NBSAPs. A City Biodiversity Index (CBI) has been designed as a tool for self-assessment and monitoring urban biodiversity which is comprised of three components, that is: (i) native biodiversity in the city, (ii) ecosystem services provided by native biodiversity in the city, and (iii) governance and management of native biodiversity in the city. Islamabad with its green blocks, should take the lead in developing a CBI.

The National Energy Conservation Centre (ENERCON) has been mandated to implement the 10 year framework on SCP focusing on public sector buildings, guidelines for urban planning and certification and labelling. The ENERCON work plan needs to include land use policy and conservation and sustainable use of ecosystems. The Pakistan EPA is responsible for enforcement of PEPA (1997), approving EIAs, IEEs, and establishment of environment laboratories. Pak-EPA was mandated to prepare or revise, and establish the NEQS with approval of the PEPC, and take

measures for the prevention of pollution, protection of the environment, and sustainable development. PEPA contained provisions for conservation and sustainable use of biodiversity, and considerations were integrated in the EIA and IEE guidelines. However, after the 18th amendment in the constitution, the functions of Pak-EPA were delegated to the provinces.

13.3. Strategies and Actions

To promote sustainable consumption and production patterns for the conservation and sustainable use of biodiversity, the following strategies and actions will be taken.

1. The awareness of producers and consumers of the social cost and environmental consequences of unsustainable production and consumption will be raised to minimize the ecological foot print of pollution and degradation of natural resources;
2. Sustainable consumption and production patterns for the conservation and sustainable use of biodiversity, both in the public and the private sector, will be fostered through business and biodiversity initiatives, and procurement policies that are in line with the objectives of the CBD will be promoted;
3. Strategic environmental impact assessment, economic incentives and enforcement of the laws and regulations shall be actively pursued to achieve the goals of sustainable production and consumption, and;
4. The urban parks and green corridors along highways and canals shall be made biodiversity friendly.

14. Synthetic Biology – challenges and opportunities from a biodiversity perspective

Synthetic Biology is an emerging field that is set to revolutionize the global life sciences and biotechnology landscape. Synthetic biology aims “*to design and engineer biologically based parts (DNA), novel devices (circuits) and systems (organisms) as well as redesigning existing, natural biological systems*”.

Building on recent developments in different techniques and methodologies in biosciences and by applying key principles from engineering disciplines, the nascent industry aims to reboot what has traditionally been known as genetic engineering and biotechnology.

Organisms developed through synthetic biology currently fall within the scope of traditional biotechnology-based Living Modified Organisms (LMOs) and GMOs.

Key developments that have led to the emergence of synthetic biology include:

- Increasing power and exponentially decreasing cost of DNA sequencing technologies,
- Substantially decreasing costs of DNA synthesis, or the ‘writing’ or ‘printing’ of DNA molecules,
- The cross-pollination of ideas, concepts and principles of seemingly disparate fields,
- Synthetic Biology has been a significant focus in the National Bio economy Blueprint, and has also been dedicated funds in several initiatives especially in energy.
- New opportunities and challenges for establishing research institutions.

- Opening of funding program for Synthetic Biology and has forecasting ‘Next steps in Synthetic Biology’ report for its future strategy.
- Strategic shift towards investments in life sciences and into cutting-edge areas of biomedicine.
- IT interface of life sciences for developing next-generation platforms for synthetic biology.

The shifts in government policies and corporate strategies are testament to the opportunity that lies ahead in synthetic biology. The global economic activity is already estimated to be at USD 1.6 billion and is estimated to grow at a compound rate of a 44.2 percent to about USD 38.7 billion by 2020 with direct impact on sectors including, and not restricted to, medicine, agriculture, livestock, energy and the chemical industries.

The seemingly overlapping technologies have discrete boundaries as well and in terms of products, there are two types of living organisms engineered through synthetic biology:

- 1) Those which are intended for use within the laboratory or industrial setting; the end-product in this case is a specific protein or a biological compound which is then shipped. Classic examples of these *cell factories* are the bacterium *Escherichia coli* and the yeast, *Saccharomyces cerevisiae*.
- 2) The second type is engineered cells or organisms which are meant for environmental release. Here the engineered cell or organism itself is the product. Risk assessment, standard procedures and regulations in this regard are very vague and very tricky.

14.1. Trends and Issues

Globally, we have already seen synthetic biology products out there in the market and some might turn into interesting case study for the principle of access and benefit sharing.

From a biodiversity and conservation perspective, there is an emerging discourse on the interplay of conservation and synthetic biology and whether both disciplines undermine each other’s efforts or whether there can be a mutually beneficial alliance. Several arguments are being made in support and against this idea. Firstly, the question of unintended outcomes, especially horizontal gene transfer, which means that synthetic genes (and therefore traits) may transfer from engineered organisms to wild type ones in nature, which although exposed to the *forces of natural selection*, may become invasive disturbing the ecosystem and resulting in biodiversity loss. Secondly, the threat posed by private ownership of engineered organisms and their products to the principle of access and benefit sharing and by extension, the livelihood of subsistence farmers and low-income communities. This is something that has been observed in the ‘biotechnology’ era and has led to major socio-economic problems. The ownership of diverse biological traits and the biodiversity in general, is a special concern from a perspective of a developing country, like Pakistan. Another concern is related to land-use policies and the potential increase in demand for land, particularly with applications like biofuel production that demand high volumes of sugar from sugarcane fields, or use microalgae and other cultivated plants ultimately posing a risk to biodiversity.

On the other hand, it can also be argued that horizontal gene transfer is a concern for engineered organisms meant for environmental release only which can be guarded by following a precautionary principle and an exhaustive case-by-case risk assessment and mitigation process. Also, that fact that synthetic biology by nature (of its low cost and broader dissemination) is democratic and has been propagated far and wide means that the open culture might be challenging

for companies which intend to capture the intellectual property. As already mentioned, synthetic biology methods are more accurate and specific compared to traditional biotechnology which decreases the chance of unwanted and unintended effects.

This gives rise to another potential approach to the problem which is to use synthetic biology as a tool and carefully deploying it to address problems faced in conservation. There are already attempts being made to bring back extinct species like the woolly mammoth and the passenger pigeon for example – a process commonly known as de-extinction. Synthetic biology can also be used to address other major issues like the threat from invasive species to biodiversity and the recovering of lost habitats through bioremediation.

Both sides of the argument for and against the use of engineered organisms and/or their products need an unbiased, evidence-based discourse particularly in a local context, looking at local realities, culture and ethical values. Decisions taken after an honest discourse such as this would then lead to more informed and contextualised decisions in the best interest of not just our flora and fauna but also human life. This will also ensure that we do not miss out on the potential economic revolution emerging technologies like synthetic biology bring with them which is also crucial for the socio-economic development of the country.

In Pakistan, there has been a recent appearance of research and educational activities in the field of synthetic biology. The outcome and activities included in the domain of health and environment.

In Pakistan, biosafety rules titled ‘Pakistan Biosafety Rules, 2005’ were made under the Pakistan Environmental Protection Act, 1997, and National Biosafety Guidelines were also issued in 2005. The Biosafety Rules and Guidelines recommended setting up (a) Institutional Biosafety Committee (IBC), (b) Technical Advisory Committee (TAC), and National Biosafety Committee (NBC). All institutions, both public and private involved in research and development in Biotechnology, are required to establish IBC, which is responsible for giving clearance for initiating research according to the Biosafety Guidelines. Up till now, nearly 40 IBCs belonging to both private and public sector have been registered with the NBC. A National Biosafety Centre was established at the federal government level.

14.2. **Strategies and Actions**

The following strategy and actions are proposed to address the interface of synthetic biology, biodiversity and conservation in Pakistan.

Strategy:

1. Develop a national position by curating an unbiased, discourse at the interface of synthetic biology, biodiversity and conservation on provincial and national levels.
2. Review regulations related to biosafety and strengthen implementation.
3. Bring transparency and openness to all decisions, particularly to GM food/crops in the best interest of the public.
4. Use technology to protect the biodiversity including bio-surveillance and cataloguing of DNA sequence of all our species beginning with the exotic ones.

Actions:

1. Create a working paper with all ‘big questions’ relating to synthetic biology and biodiversity and biosafety and hold a series of provincial roundtables (atleast 3) with all stakeholders. This should be followed by consultative roundtables at the Federal level to reach a consensus on key questions of especially in relation to the safety and ethics of synthetic biology and conservation.
2. Constitute an Advisory Committee that meets annually to review Pakistan’s latest position based and in response to latest developments in the fast-paced field of synthetic biology and also the evolving discourse in the country.
3. Review and strengthen regulations following a precautionary principle. This should cover safe transfer including transboundary movement, environmental release, through assessment of GM crops
4. Bring transparency and openness down to the grassroots in the use of LMOs and GMOs. This should include making all documents and decision publicly available online.
5. Introduce labelling of seed with all pros and cons for farmers in local languages and labelling of food items derived from GM crops for consumers (ABT17).
6. Review the Pakistan Biosafety Rules in light of all developments in the technology and strengthen implementation of IBCs, TACs and NBC.
7. Introduce bio-surveillance and develop capacity on provincial and national levels, especially using the next-generation DNA sequencing methods, which are exponentially developing and becoming cost-effective, for biosafety purposes, disease outbreak detection and the movement of timber and exotic species.
8. Use next-generation DNA sequencing methods to catalogue the biodiversity of Pakistan and strengthen the germplasm storage capacity at the provincial and national level.
9. An efficient regulatory, administrative and monitoring framework will be established for the implementation of the Cartagena Protocol (ABT 17).

III. IMPLEMENTATION, MONITORING, AND EVALUATION

15. Introduction

Implementation of the NBSAP is not only our international obligation but also a national need of preserving natural heritage, ecological integrity of the environment, and well-being of our people. Similarly, it is imperative to implement the NBSAP to meet the targets of biodiversity protection and conservation. Effective implementation will require working with, and building capacity of, the stakeholders at national, provincial, regional and local levels; communicating and reaching out to mainstream biodiversity values in the policy and planning processes; promoting sustainable consumption patterns in people, as well as mobilizing resources for NBSAP implementation.

16. Implementation of NBSAP

A matrix of ABTs showing proposed national actions, timelines, and funds required and the agency responsible for implementation and monitoring indicators is given in Annex 1. The proposed timeline is rather ambitious but an effort will be made to make maximum progress on the ABTs by 2020. Work on implementation of NBSAP, however, will continue beyond 2020 to achieve SDG targets as well as meeting targets of Pakistan Vision 2025. Whereas many actions will be taken at the provincial or regional levels, there will be some cross-cutting themes that will be best addressed at the national level. Implementation of ABTs at the provincial and regional level will be through their own Biodiversity Strategies and Action Plans prepared as part of the NBSAP revision process.

A Coordination Committee will be set up at the national level for coordination among Ministries, facilitate implementation of NBSAP in different federating units, monitor progress, assist in removal of bottlenecks if any, and provide guidance for resource mobilisation. Similarly, Steering Committees will be established in every federating unit for coordination among different sectors, to facilitate cross-sectoral integration, monitor progress on implementation, and help in resource mobilization.

During the process of consultation with the stakeholders, it was realised that most there is a general lack understanding of biodiversity and its values. Therefore, building their capacity for implementation of the NBSAP will be crucial for achieving the results. This will first require strengthening the capacity of the Biodiversity Directorate in the Ministry of Climate Change, MoCC, which will in turn build capacity of other stakeholders. A series of thematic workshops will be held to increase their knowledge of biodiversity, exchange experiences, enhance their understanding of the NBSAP, and train them in the use of relevant tools and mechanisms. The workshops will provide an opportunity for the stakeholders to identify ways and means of overcoming challenges in the implementation of NBSAP.

17. Communication and Outreach Strategy

Pakistan is the sixth most populous country in the world, faced with the challenge of meeting the basic socio-economic needs of its people and building basic physical infrastructure to cope with the needs of a growing population. Considering the limitations of financial resources and pressing needs for investments in socio-economic sectors, investments in biodiversity are likely to remain

a low priority. However, in order to minimize the unintended negative consequences of policy decisions on biodiversity, it is important for decision makers to have a clear understanding of the values of nature so they can create an enabling environment to mainstream biodiversity protection. To facilitate this, suitable training modules will be developed and introduced in the training programmes for senior policy makers, planners and parliamentarians at the National School of Public Policy (NSPP), the National Institute of Management NIM, and the Pakistan Institute of Parliamentary Studies (PIPS).

In addition to the above, communication resources will be mobilized to raise awareness regarding biodiversity and its importance. A cadre of environmental journalists will be trained who can then act as ‘biodiversity champions’ for print media as well as radio and television. To facilitate exchange of ideas among policy makers, planners and politicians, focus group discussions will be organized. These policy makers will be encouraged to spread the message of biodiversity conservation in both formal and informal settings.

18. Plan for Resource Mobilization

Many actions of the NBSAP to achieve Aichi Biodiversity Targets will either neatly fit in or will be accommodated in the existing development budget of various biodiversity related sectors at the national, provincial and regional levels. Simultaneously, additional sources of funding will be explored through innovative mechanisms available in the MoCC, and other on-going donor projects, for example, project for REDD⁺ Readiness, and the STAR allocation under the GEF. Opportunities will also be explored to tap funds available under Green Climate Fund (GCF) in coordination with Climate Finance Unit at MOCC, particularly for actions under the climate change theme. In addition, bilateral and multilateral donor support shall be solicited to meet the shortfall in the financial resources for achieving the ABTs in an effective and timely manner.

19. National Coordination Mechanisms

The MoCC shall have the overall responsibility for coordinating the implementation of the NBSAP through its Directorate of Biodiversity. The implementing partners will be the relevant ministries at the national level, the provincial and regional governments and major international conservation organizations like IUCN, BRC, SLF and WWF. Because of the diversity of sub-sectors at provincial and regional level, the Planning and Development or its designated Department shall be a focal point for the CBD to coordinate among various stakeholders and act as a liaison with the MoCC. For the purpose of coordination with the implementing partners a Steering Committee shall be established as follows:

- | | |
|--|--------------|
| ▪ Secretary, Ministry of Climate Change | Chair |
| ▪ Inspector General of Forests | Deputy Chair |
| ▪ Secretary, Ministry of Food Security | Member |
| ▪ Secretary, Planning and Development, Punjab | Member |
| ▪ Secretary, Planning and Development, Sindh | Member |
| ▪ Secretary, Planning and Development, KPK | Member |
| ▪ Secretary, Planning and Development, Balochistan | Member |
| ▪ Secretary, Planning and Development, AJK | Member |
| ▪ Secretary, Planning and Development, GB | Member |

▪ Secretary, Planning and Development, FATA	Member
▪ Secretary, Planning Commission	Member
▪ Provincial Secretary, Wildlife, Forest, Environment, Agriculture	Member
▪ Chief Environment and Energy, UNDP	Member
▪ IUCN Pakistan	Member
▪ WWF	Member
▪ BRC	Member
▪ Director, Biodiversity, MoCC	Secretary

The Steering Committee shall meet at least once every year and its functions shall include but not be limited to the following:

- Suggest ways and means to ensure that biodiversity considerations are integrated into the policy and planning processes, and design of poverty alleviation programmes.
- Ensure that the financial needs implementation of NBSAP receive due consideration during the process of allocation of funds;
- Provide guidance to the stakeholders for effective implementation of the NBSAP;
- Review the plans and progress of stakeholders for implementation of the NBSAP;
- Provide guidance and assistance in securing additional sources of funds from bilateral and multilateral donors for implementation of the NBSAP, and;
- Deliberate on all emerging issues related to conservation, sustainable use of biodiversity and equitable sharing of benefits, and provide appropriate advice to the government for policy decisions.

20. Clearing-House Mechanism

The CHM website contains useful relevant information as well as data about the measures undertaken to conserve the biological diversity. Efforts are needed to keep the website alive and dynamic.

21. Monitoring and Evaluation

The progress on the implementation of the NBSAP shall be monitored on an annual basis through a flexible framework of indicators keeping in view the national circumstances and priorities. A framework based on an indicative list of indicators contained in the annex to the CBD decision XI/3 is given in Annex1. The monitoring will not only measure progress towards the achievement of NBSAPs and national targets, but also help in identification of implementation issues, and in adaptive management for its effective implementation. Subject to availability of funds, an independent mid-term evaluation shall be commissioned in 2020, to review the implementation of NBSAP and make recommendations for achieving national targets by 2030 in an effective and timely manner. Final evaluation of NBSAP will be undertaken in 2030. The monitoring and evaluation reports will be presented to the National Steering Committee and Provincial Coordination Committees for their help in overcoming the obstacles in successful achievement of the targets. The reports will also form a basis for national and international reporting obligations and guide the national planning process. The monitoring and evaluation mechanism will be established within the first year of the adoption of the NBSAP.

Annex1:Matrix showing NBSAP targets and Indicators for Monitoring

Thematic Area	Actions	Target date	Cost	Target	Responsible Agency	Indicators for Monitoring
<i>Strategic Goal A: Address the underlying causes of biodiversity loss by mainstreaming biodiversity across government and society.</i>						
Target 1:By 2020, at the latest, people are aware of the values of biodiversity and the steps they can take to conserve and use it sustainably.						
Awareness	1.1. Awareness days will be organized to commemorate following major environmental themes of national and international importance: biodiversity, desertification and drought, forests, tourism, wetlands, wildlife, etc.	2017–2020	\$3.5	Six awareness days	MoCC in collaboration with federating units	<ul style="list-style-type: none"> • Trends in awareness and attitudes. • Trends in public engagement with biodiversity
Awareness	1.2. A focus group comprising of ‘opinion leaders’ representing print, audio-visual, and social media will be constituted to mobilize the media for raising awareness.	2018	\$0.5	Quarterly meetings	MoCC	Trends in communication programmes and actions

Awareness	1.3. A cadre of environmental journalists will be created to act as ‘biodiversity champions’ for commercial media and make contributions to print media, produce audio messages for radio, and video clips for TV.	2018	\$2.0	12 articles in print media	MoCC	Trends in communication programmes and actions
				12 radio messages		
				6 video clips for TV		
Awareness	1.4. Electronic media like a high quality website, and emerging tools and techniques will be used to create awareness as well as to market our rich biodiversity as a heritage that could help attracts tourists and engage young people as stewards for biodiversity conservation.	2018	\$0.1	Regular contributions of news and views	MoCC	Trends in use of social media for conservation of biodiversity
Awareness	1.5. A task forces comprising of Ministries of Climate Change, Education, Science and Technology, and Food Security, and Higher Education Commission will be constituted to take steps for inclusion of biodiversity module in curriculum of	2018-2019	\$1.0	Quarterly meetings	MoCC	Trends in inclusion of biodiversity modules in curriculum.

universities, colleges and schools.					
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Target 2: By 2020, at the latest, biodiversity values have been integrated into national and local development and poverty reduction strategies and planning processes and are being incorporated into national accounting, as appropriate, and reporting systems.

Mainstreaming Biodiversity	2.1. A support group comprising of ‘opinion leaders’ from among the policy makers and planners will be constituted to guide the process for increasing the biodiversity knowledge of decision makers and act as a change agent through informal communications.	2018-2019	\$0.25	Two retreats per year for five years	MoCC	Trends in incorporating natural resource, biodiversity, and ecosystem service values into national policy and planning processes.
	2.2. Low cost tools and methods for valuation of biodiversity will be developed soon after the adoption of NBSAP that in addition to economic value	2018	\$0.1	Seven ecosystems	MoCC	Trends in guidelines and applications of economic appraisal tools.

	recognize the social and cultural values.					
Mainstreaming Biodiversity	2.3. Valuation studies will be undertaken in major ecosystems to influence policy makers and planners for mainstreaming biodiversity in national planning and development processes.	2018	\$0.5	At least six studies	All the provinces, Azad Jammu and Kashmir, Gilgit Baltistan (GB) and Federally Administered Tribal Areas (FATA)	Trends in integration of biodiversity and ecosystem service values into sectoral and development policies.
Mainstreaming Biodiversity	2.4. Biodiversity will be incorporated in national accounting and reporting systems.	2020	\$0.12	Biodiversity incorporated in the national accounting and reporting systems.	MoCC and Statistical Bureau of Pakistan	Trends in incorporating natural resource, biodiversity, and ecosystem service values into national accounting systems.
Mainstreaming Biodiversity	2.5. A Biodiversity Round Table will be constituted for integration of biodiversity considerations in national policies and plans.	2018-2020	\$0.05	Biodiversity integrated in national policies and planning process.	Planning Commission and Ministries of Climate Change, Food Security, Science and Technology, Culture and Tourism.	Trends in policies considering biodiversity and ecosystem services in environmental impact assessment and strategic environmental assessment

Target 3: By 2020, at the latest, incentives, including subsidies, harmful to biodiversity are eliminated, phased out or reformed in order to minimize or avoid negative impacts, and positive incentives for the conservation and sustainable use of biodiversity are developed and applied, consistent and in harmony with the Convention and other relevant international obligations, taking into account national socioeconomic conditions.

Natural Ecosystems

<p>A study will be conducted to identify negative incentives and propose positive incentives that will reduce and ultimately halt the degradation and fragmentation of ecosystems.</p>	<p>2018</p>	<p>\$0.25</p>	<p>Ten studies</p>	<p>All the provinces, Azad Jammu and Kashmir, Gilgit Baltistan (GB) and Federally Administered Tribal Areas (FATA)</p>	<p>Trends in identification, assessment and establishment and strengthening of incentives that reward positive contribution to biodiversity and ecosystem services and penalize adverse impacts.</p>
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Target 4: By 2020, at the latest, Governments, business and stakeholders at all levels have taken steps to achieve or have implemented plans for sustainable production and consumption and have kept the impacts of use of natural resources well within safe ecological limits.

Sustainable Production and Consumption

<p>4.1. A work plan for sustainable production and consumption of biodiversity will be prepared by 2016 and implemented within the Ten-Year Framework of Programmes on Sustainable Consumption and Production.</p>	<p>2018</p>	<p>\$0.125</p>	<p>Work Plan</p>	<p>MoCC, ENERCON and EPA</p>	<p>Trends in extent to which biodiversity and ecosystem service values are incorporated Ten-Year framework.</p>
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Urban Biodiversity	4.2. A demonstration project to develop and test a Biodiversity Index will be launched in major cities to assess and monitor urban biodiversity.	2018	\$0.1	Islamabad, Peshawar Lahore, Karachi, Quetta, Gilgit, Muzaffarabad	Municipal Authorities	Trends in biodiversity of cities
Trade in Species	4.3. Rules under the Pakistan Trade Control of Wild Fauna and Flora Act will be made and policy guidelines issued for trade in species of flora and fauna to prevent extinction of the threatened species.	2018	\$0.065		MoCC	Trends in population and extinction risk of utilized species, including species in trade
Sustainable Production and Consumption	4.4. The government institutions, academia, business sector and other non-state actors will act individually and severally to strictly adhere to precautionary principle for protecting biological diversity from the potential risks posed by genetically modified organisms resulting from modern biotechnology.	2020	\$0.125	Government agencies; Academia; NGOs	All the provinces, Azad Jammu and Kashmir, Gilgit Baltistan (GB) and Federally Administered Tribal Areas (FATA)	Trends in coordination among stakeholders; Trends in information sharing

Strategic Goal B: Reduce the direct pressures on biodiversity and promote sustainable use.

Target 5: By 2020, the rate of loss of all natural habitats, including forests, is at least halved and where feasible brought close to zero, and degradation and fragmentation is significantly reduced.

Mangrove Ecosystems	5.1. Management plans for mangrove forests will be prepared based on ecosystem approach and implemented.	2018	\$0.25	Management Plans	Balochistan and Sindh	Trends in condition and vulnerability of ecosystems
Mangrove Ecosystems	5.2. A pilot project will be launched for restoration of at least 7,000 ha of degraded mangrove ecosystems jointly with the custodial communities on sustainable use principles and equitable sharing of benefits.	2018	\$1.5	7,000 ha	Balochistan and Sindh	Trends in condition and vulnerability of mangroves.

Target 6: By 2020 all fish and invertebrate stocks and aquatic plants are managed and harvested sustainably, legally and applying ecosystem based approaches, so that overfishing is avoided, recovery plans and measures are in place for all depleted species, fisheries have no significant adverse impacts on threatened species and vulnerable ecosystems and the impacts of fisheries on stocks, species and ecosystems are within safe ecological limits.

Inland Fisheries	6.1. An effective coordination mechanism will be established for integrated management of water, fish, and wildlife resources of wetlands.	2018	\$0.15	Coordination Committees comprising of all stakeholders	All the provinces, Azad Jammu and Kashmir, Gilgit Baltistan (GB) and Federally Administered Tribal Areas (FATA)	Trends in coordination and cooperation among various agencies
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Inland Fisheries	6.2. Biodiversity considerations will be incorporated in fisheries policies, laws and regulations to ensure sustainable use and equitable sharing of benefits.	2018	\$0.1	Updated fisheries policies, laws and regulations	All the provinces, Azad Jammu and Kashmir, Gilgit Baltistan (GB) and Federally Administered Tribal Areas (FATA)	Trends in up-take of biodiversity considerations in policies, laws, and regulations
Inland Fisheries	6.3. A baseline survey will be undertaken to assess the biodiversity of key inland wetlands and establish a system to monitor at regular intervals .the status of species most in decline.	2018	\$0.5		All the provinces, Azad Jammu and Kashmir, Gilgit Baltistan (GB) and Federally Administered Tribal Areas (FATA)	Trends in extinction risk of target and bycatch aquatic species
Inland Fisheries	6.4 A procedure for sustainable harvest of fish stock will be developed and implemented to minimize impact on threatened species and vulnerable habitats.	2018	0.06	Standard operating procedure	All the provinces, Azad Jammu and Kashmir, Gilgit Baltistan (GB) and Federally Administered Tribal Areas (FATA)	Trends in proportion of utilized stocks outside safe biological limits.
Inland Fisheries	6.5. Important wetland habitats of national biodiversity significance together with surrounding landscapes will be co-managed with custodial communities through their	2018	\$1.5	Six wetland sites	All the provinces, Azad Jammu and Kashmir, Gilgit Baltistan (GB) and Federally Administered Tribal Areas (FATA)	Trends in capacity and empowerment of fishing communities.

	empowerment and building capacity for conservation and sustainable use.					
Marine Fisheries	6.6. Laws, regulations, and policies shall be updated or drafted by 2016 incorporating biodiversity concerns and effective management of marine biodiversity on sound ecological principles and to prevent threat of extinction of utilized species.	2018	\$0.02	Updated policies, laws and regulations	Balochistan and Sindh	Trends in up-take of biodiversity considerations in policies, laws, and regulations.
Marine Fisheries	6.7. Pilot projects will be launched to develop and test approaches for organizing, empowering, and building capacity of coastal communities to sustainably harvest all fish and invertebrate stocks.	2018	\$0.6	At least 6 pilot test sites	Balochistan and Sindh	Trends in capacity and empowerment of fishing communities.
Coastal and Marine	6.8. The number of operating fleets will be capped to prevent over	2020	\$0.0	7,000 fleets	Balochistan 3,000 fleets; Sindh 4,000 fleets	Trends in fishing effort capacity.

	exploitation of marine fish and invertebrate resources.					
Coastal and	6.9. The fishing boats will be modified to improve the outdated fishing methods.	2020	1.0	At least 2000 boats	Balochistan 1,000 boats; Sindh 1,000 boats	Trends in proportion of depleted target and bycatch species with recovery plans.
Marine Fisheries	6.10. An assessment of stocks and limits of sustainable harvest levels of major species will be determined and strictly enforced.	2018	0.05	Two sites	Balochistan and Sindh	Trends in proportion of utilized stocks outside safe biological limits.
Target 7: By 2020 areas under agriculture, aquaculture and forestry are managed sustainably, ensuring conservation of biodiversity.						
Forestry	7.1. Suitable ecosystem approaches will be developed after the adoption of NBSAP and piloted in different forest ecosystems; and training workshops held for managers for their application.	2018	\$0.3	At least six pilot sites	All the provinces, Azad Jammu and Kashmir, Gilgit Baltistan (GB) and Federally Administered Tribal Areas (FATA)	Trends in forests under ecosystem management.

Forestry	7.2. Collaborative or joint forest management approaches will be piloted in different forest ecosystems to reduce the anthropogenic impacts by improving livelihoods of local people based on sustainable use of components of biodiversity.	2018	\$1.0	At least 6 pilot sites	All the provinces, Azad Jammu and Kashmir, Gilgit Baltistan (GB) and Federally Administered Tribal Areas (FATA)	<ul style="list-style-type: none"> • Trends in anthropogenic impacts on forest ecosystems; • Trends in forest based livelihoods; • Trends in proportion of products derived from sustainable sources
	7.3. Forest and forest related policies, laws and regulations will be drafted by 2018 to provide a sound basis for conservation and sustainable use of forest biological diversity.	2018	\$0.1	Policies and laws	All the provinces, Azad Jammu and Kashmir, Gilgit Baltistan (GB) and Federally Administered Tribal Areas (FATA)	Trends in uptake of biodiversity considerations in forest and forest related policies, laws, and regulations.
Forestry	7.4. The Code for the preparation of management plans will be revised by 2018 to incorporate the ecosystem approaches for sustainable management of forests and biodiversity.	2018	\$0.3	Revised working plan code	All the provinces, Azad Jammu and Kashmir, Gilgit Baltistan (GB) and Federally Administered Tribal Areas (FATA)	Trends in use of revised code for preparation of working Plan.
Agro biodiversity	7.5. Models of sustainable production of major crops with minimum external inputs and wise use of water shall be developed, tested,	2018	\$0.5	Cotton, sugarcane, rice, and wheat.	All the provinces, Azad Jammu and Kashmir, Gilgit Baltistan (GB) and	Trends in area of aquaculture ecosystems under sustainable management.

	and demonstrated on farms by 2020.				Federally Administered Tribal Areas	
Agriculture	7.6. Sustainable agriculture and bio-diversification of agro ecosystems will be integrated in the extension programmes of agriculture.	2018	\$0.3	Brochures on sustainable agriculture	All the provinces, Azad Jammu and Kashmir, Gilgit Baltistan (GB) and Federally Administered Tribal Areas (FATA)	Trends in uptake of sustainable agriculture in agriculture extension.
Agriculture	7.7. Pilot on-farm models of bio diverse agro ecosystems will be established in major agro-ecological zones.	2020	\$0.5	At least 15 biodiverse farms in operation	All provinces (12 sites); AJK and GB (3 sites)	Trends in number of farms practicing biodiverse agriculture.
Target 8: By 2020, pollution, including from excess nutrients, has been brought to levels that are not detrimental to ecosystem function and biodiversity.						
Sustainable Development	8.1. A five-year work plan will be prepared and implemented to bring water pollution of the ecologically significant wetland ecosystems within safe.	2020	\$1.5	Reduction in water pollution to safe limits	All the provinces, Azad Jammu and Kashmir, Gilgit Baltistan (GB) and Federally Administered Tribal Areas (FATA)	Trends in proportion of wastewater discharged after treatment.
Sustainable Development	8.2. Independent third party reviews of strategic environmental impact assessment studies will be	2018-2020	\$0.0	All EIAs	Federal EPA; All provincial EPAs; EPAs of AJK and GB	Trends in appraisal of EIA reports.

	mandatory for all public and private sector economic development projects.					
Sustainable Development	8.3. Dialogue will be initiated with businesses and government agencies to develop plans for controlling pollution and provide incentives for implementing the plans.	2018	\$1.5	Business groups; NGOs	All the provinces, Azad Jammu and Kashmir, Gilgit Baltistan (GB) and Federally Administered Tribal Areas (FATA)	Trends in pollution deposition rate.
Target 9: By 2020, invasive alien species and pathways are identified and prioritized, priority species are controlled or eradicated, and measures are in place to manage pathways to prevent their introduction and establishment.						
Fisheries	9.1. The spread of alien species will be controlled through appropriate measures to prevent escape into natural habitats from hatcheries and aquaculture.	2018	\$0.2	Prevention	All the provinces, Azad Jammu and Kashmir, Gilgit Baltistan (GB) and Federally Administered Tribal Areas (FATA)	Trends in number of invasive alien species.
Fisheries	9.2. The impact of alien species in wetlands of biodiversity significance will be assessed and measures taken to control and ultimately eradicate invasive alien species.	2020	\$0.2	Control	All the provinces, Azad Jammu and Kashmir, Gilgit Baltistan (GB) and Federally Administered Tribal Areas (FATA)	Trends in the impact of invasive alien species on extinction risk trends.

Agriculture	9.3. Appropriate legislative and regulatory measures will be drafted to prevention early detection, rapid response and control of invasive species.	2018	\$0.1	Law and readiness	All the provinces, Azad Jammu and Kashmir, Gilgit Baltistan (GB) and Federally Administered Tribal Areas (FATA)	Trends in policy responses, legislation and management plans to control and prevent spread of invasive alien species.
Target 10: By 2015, the multiple anthropogenic pressures on coral reefs, and other vulnerable ecosystems impacted by climate change or ocean acidification are minimized, so as to maintain their integrity and functioning.						
Climate Change	Climate Change Adaptation Plans will be prepared by 2018 for the coastal areas and capacity of coastal communities developed to cope with the impacts of climate change.	2018	0.1	Planning and readiness	Balochistan and Sindh	Trends in pressures, pollution, climate change, and over exploitation.
<i>Strategic Goal C: To improve the status of biodiversity by safeguarding ecosystems, species and genetic diversity.</i>						
Target 11: By 2020, at least 17 per cent of terrestrial and inland water, and 10 per cent of coastal and marine areas, especially areas of particular importance for biodiversity and ecosystem services, are conserved through effectively and equitably managed, ecologically representative and well connected systems of protected areas and other effective area-based conservation measures, and integrated into the wider landscapes and seascapes.						
Protected Areas	11.1. The lists of protected areas will be refined to include only those sites that meet the internationally recognized definition.	2018	\$0.1	Redefined provincial and National Lists of PAs	MoCC; All the provinces, Azad Jammu and Kashmir, Gilgit Baltistan (GB) and Federally Administered Tribal Areas (FATA)	Trends in representative coverage of protected areas of terrestrial, marine and inland water systems.

Protected Areas	11.2. Management plans will be prepared and implemented for effective and equitable management of protected area (Annex 3) integrated into the wider landscapes	2017 – 2020	\$2.0	Management plans prepared and Implemented	All the provinces, Azad Jammu and Kashmir, Gilgit Baltistan (GB) and Federally Administered Tribal Areas (FATA)	Trends in effective and equitable management of the PAs
Protected Areas	11.3. The protected areas network will be expanded to cover at least 17% of terrestrial area to fill in the gaps in the protected area system (Annex 4) and to establish corridors between fragmented habitats of threatened species.	2020	\$2.0	New PAs	All the provinces, Azad Jammu and Kashmir, Gilgit Baltistan (GB) and Federally Administered Tribal Areas (FATA)	Trends in ecosystem and habitats condition and management effectiveness
Protected Areas	11.4. Mechanisms will be developed and put in place to ensure the financial sustainability of the protected areas.	2018	\$1.0	Private-Public partnerships	All the provinces, Azad Jammu and Kashmir, Gilgit Baltistan (GB) and Federally Administered Tribal Areas (FATA)	Trends in representative coverage of protected areas of terrestrial ecosystems and habitats.
Protected Areas	11. 5. Representative forest landscapes of special importance for biodiversity will be designated as Forest Biodiversity Reserves and effectively managed.	2018	\$0.30	At least 15 Forest Biodiversity Reserves	All the provinces, Azad Jammu and Kashmir, Gilgit Baltistan (GB) and Federally Administered Tribal Areas (FATA)	Trends in protected area condition and/or management effectiveness including more equitable management.

Protected Areas	11.6. Wetlands protected areas will be established covering at least 15% area of wetlands of biodiversity significance and effectively managed together with the surrounding landscapes.	2019	\$0.15	At least 12 wetland area added to the Protected Areas network	All provinces (12); AJK and GB (3)	Trends in representative coverage of protected areas of forest ecosystems.
	11.7.RAMSAR sites (Annex 5) and surrounding landscapes will be effectively managed under plans through local community organizations.	2017	\$0.45	At least 15 sites managed	All the provinces, Azad Jammu and Kashmir, Gilgit Baltistan (GB) and Federally Administered Tribal Areas (FATA)	Trends in increase in pollinators and avifauna diversity.
	11.8. Protected areas covering at least 10% of the marine area of biodiversity significance will be established and managed effectively as seascapes for conservation and sustainable use.	2018	\$0.5	3 Marine PAs	Sindh and Balochistan	Trends in representative coverage of protected areas of inland water systems.
Target 12:By 2020 the extinction of known threatened species has been prevented and their conservation status, particularly of those most in decline, has been improved and sustained.						
Species Conservation	12.1 Recovery plans will be prepared and implementation to improve the conservation status of major threatened species of	2018	\$1.2	Species of fauna in Annex 2	All the provinces, Azad Jammu and Kashmir, Gilgit Baltistan (GB) and Federally Administered Tribal Areas (FATA)	Trends in population of selected species.

	fauna (annex 2) in different ecosystems.					
Species Conservation	12. 2. Recovery plans will be prepared and implementation to improve the conservation status of major threatened species of flora (annex 2) in different ecosystems.	2018	\$0.5	Species of flora in Annex 2	All the provinces, Azad Jammu and Kashmir, Gilgit Baltistan (GB) and Federally Administered Tribal Areas (FATA)	Trends in population of selected species.
Species Conservation	12.3. Plans will be prepared and implemented for recovery of depleted freshwater fish species (annex 2).	2017	\$0.6	Species of fresh water fish in Annex 2	All the provinces, Azad Jammu and Kashmir, Gilgit Baltistan (GB) and Federally Administered Tribal Areas (FATA)	Trends in extinction risk of target and bycatch aquatic species.
Species Conservation	12.4. The population of known threatened marine species particularly of those in most decline state (annex 2) shall be monitored regularly and remedial measures taken to improve and sustain their population.	2016 – 2020	\$0.5	Species of marine fauna in Annex 2	Balochistan and Sindh	Trends in trade of species.

Target 13: By 2020, the genetic diversity of cultivated plants and farmed and domesticated animals and of wild relatives, including other socio-economically as well as culturally valuable species is maintained, and strategies have been developed and implemented for minimizing genetic erosion and safeguarding their genetic diversity.

- Trends in genetic diversity of cultivated plants, and farmed and domesticated animals and their wild relatives.
- Trends in genetic diversity of selected species.
- Trends in number of effective policy mechanisms implemented to reduce genetic erosion and safeguard genetic diversity related to plant and animal genetic resources.

Agro biodiversity	13.1. The considerations of sustainable agriculture, bio diversification of agro ecosystems, conservation of pollinators and soil biodiversity, wise use of transgenic organisms, and climate change will be incorporated in agriculture policies and plans.	2018	\$0.15	Revision of policies and plans	Ministry of Food Security; All the provinces, Azad Jammu and Kashmir, Gilgit Baltistan (GB) and Federally Administered Tribal Areas (FATA)	Trends in number of effective policy mechanisms implemented to reduce genetic erosion and safeguard genetic diversity related to plant and animal genetic resources.
Agro biodiversity	13. 2. The gaps in the <i>in-situ</i> and <i>ex-situ</i> conservation of the agro biodiversity will be assessed and measures taken to fill the gaps.	2018	\$0.75	At least 6 field stations and 6 farms established for <i>in situ</i> conservation.	Pakistan Agriculture Research Council; All the provinces, Azad Jammu and Kashmir, Gilgit Baltistan (GB) and Federally Administered Tribal Areas (FATA)	Trends in genetic diversity of cultivated plants, and farmed and domesticated animals and their wild.

Agro biodiversity	13.3. Important local varieties, land races and breeds will be improved by 2020 through selection for resistance to disease, drought tolerance, and for increased production.	2020	\$0.4	Local varieties of cotton, rice, sugarcane, and wheat.	PARC	Trends in genetic diversity of selected species
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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, and contribute to health, livelihoods and well-being, are restored and safeguarded, taking into account the needs of women, indigenous and local communities, and the poor and vulnerable.

Ecosystems Services	Landscapes that provide essential services related to water for major dams, and contribute to health; livelihoods and well-being of local communities will be restored and safeguarded.	2020	6.0	At least six ecosystems	AJK, Khyber Pakhtunkhwa, Punjab, Balochistan.	Trends in benefits that humans derive from selected ecosystem services
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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 per cent of degraded ecosystems, thereby contributing to climate change mitigation and adaptation and to combating desertification.

Desertification	15.1. At least 20% of the degraded ecosystems of ecological significance will be restored to combat desertification and to	2018	\$2.5	At least four pastoral management projects	Balochistan	Trends in area of degraded ecosystems restored or being restored
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	demonstrate economic, social and cultural benefits.					
Climate Change	15.2. At least 25 percent of all degraded forest ecosystems will be restored to improve their resilience and contribution to carbon stocks.	2020	\$3.0	At least 60,000 ha restored	All the provinces, Azad Jammu and Kashmir, Gilgit Baltistan (GB) and Federally Administered Tribal Areas (FATA)	Status and trends in extent and condition of habitats that provide carbon storage.
Target 16. By 2015, the Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization is in force and operational, consistent with national legislation.						
Biodiversity	16.1. The Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization will be ratified by 2016.	Already achieved	0.10		MoCC	Trends in legislative, administrative or policy measures and institutional structures in place for implementing the Nagoya Protocol.
	16.2. The draft ABS Act of Pakistan will be revised after thorough consultation with federating units by 2018.	2018	0.5		MoCC	Trends in legislative, administrative or policy measures and institutional structures in place for implementing the Nagoya Protocol.

Biosafety	17.4. An efficient regulatory, administrative and monitoring framework will be established for the implementation of the Cartagena Protocol.	2020	\$0.15	Capacity for regulation of biosafety	MoCC	Trends in implementation of Cartagena protocol
	17.5 A ten year national biosafety frameworks will be established for the implementation, coordination, and monitoring of the Protocol, including mechanisms to make science-based risk assessments and ensuring transparency in the development and use of LMOs	2020	\$0.10	Ten year National Biosafety framework	Ministries of Climate Change, Science and Technology, and Education	Trends in implementation of the 10-year framework.
<p>Target 18: By 2020, the 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, and fully integrated and reflected in the implementation of the Convention with the full and effective participation of indigenous and local communities, at all relevant levels.</p>						
Agro Biodiversity	The diversity of local varieties and land races of crops, fruits, and breeds of livestock and poultry and local knowledge of their management will be documented by 2018 and	2018	\$1.0	Documentation of Agro-biodiversity	PARC; All the provinces, Azad Jammu and Kashmir, Gilgit Baltistan (GB) and Federally	Trends in farming with traditional knowledge and use of local varieties and breeds.

	incentive measures tested for on-farm conservation.				Administered Tribal Areas (FATA)	
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Target 19: By 2020, knowledge, the science base and technologies relating to biodiversity, its values, functioning, status and trends, and the consequences of its loss, are improved, widely shared and transferred, and applied.

Transboundary Cooperation	19. 1. A cross boundary coordination mechanism between India and Pakistan will be developed .to protect the watershed values of Indus Basin shall to combat water scarcity and conserve wetland biodiversity.	2020	\$0.25	Transboundary Cooperation	MoCC	Progress on transboundary cooperation between Pakistan and India for management of Indus basin.
	19.2. A GIS lab will be established for assessing health (deforestation) and condition (degradation) of forests, ecosystems and habitats and maps prepare compatible with remote sensing technologies to identify conservation priorities and opportunities.	2018	\$0.75	GIS System; Mapping	All the provinces, Azad Jammu and Kashmir, Gilgit Baltistan (GB) and Federally Administered Tribal Areas (FATA)	Mapping and assessment of ecosystems report Number of habitat and species inventories

Knowledge	19.3. A forest and ecosystem classification system using agreed international standards including broad indicators of biodiversity will be developed.	2018	\$0.25	Classification of forests, ecosystems and habitats classification	All the provinces, Azad Jammu and Kashmir, Gilgit Baltistan (GB) and Federally Administered Tribal Areas (FATA)	Forest, ecosystem and habitat classification and mapping report Number of forests, habitat and species inventories.
	19.4. The gap between the scientists and conservationists will be bridged to improve the knowledge and practice of biodiversity conservation.	2020	\$025	Knowledge sharing	Ministries of Climate Change, Science and Technology, and Education	Trends in interaction between scientists and conservationists.
	19.5. The capacity of National School of Public Policy (NSPP), National Institute of Management (NIM), National Defense College, and Pakistan Institute of Parliamentary Studies (PIPS) will be built to incorporate biodiversity consideration in training courses for decision makers of mid-career and senior managerial level.	2018	\$0.05	Biodiversity lessons incorporated in training courses of 3 institutes	Ministry of Climate Change	Trends in incorporating natural resource, biodiversity, and ecosystem service values into training courses.

Target 20: By 2020, at the latest, the mobilization of financial resources for effectively implementing the Strategic Plan for Biodiversity 2011-2020 from all sources, and in accordance with the consolidated and agreed process in the Strategy for

Resource Mobilization should increase substantially from the current levels. This target will be subject to changes contingent to resource needs assessments to be developed and reported by Parties.

Financial Mechanism	20.1. The targets for creating biodiversity awareness will be integrated in the annual and medium term development plans.	2020	\$0.0	Annual Plans	Planning Commission, federating units
Financial Mechanism	20.2. Additional financial resources if needed for implementing NBSAP will be mobilized to meet.	2018	\$0.25	Project Portfolio	Office of Inspector General of Forests, All relevant sectors in federating units

Annex 2: Mammalian species of conservation concern to be recovered under NBSAP

Sr.	Common Name	Scientific Name	Distribution
1.	Snow Leopard	<i>Panthera uncia</i>	AJK, KP, GB
2.	Common Leopard	<i>Panthera pardus</i>	AJK, KP, Balochistan, Punjab
3.	Brown Bear	<i>Ursus arctos isabellinus</i>	AJK, KP, GB
4.	Himalayan Black Bear	<i>Ursus thibetanus thibetanus</i>	AJK, KP,
5.	Balochistan Black Bear	<i>Ursus thibetanus gedrosianus</i>	Balochistan
6.	Grey langur	<i>Semnopithecus ajax</i>	AJK
7.	Striped Hyaena	<i>Hyaena hyaena</i>	Balochistan, KP, Sindh
8.	Himalayan Lynx	<i>Felis lynx</i>	GB
9.	Tibetan Wolf	<i>Canis lupus Chanco</i>	Balochistan, GB, AJK, KP
10.	Indian Wolf	<i>Canis lupus pallipes</i>	Across the country
11.	Indian Wild Ass	<i>Equus hemionus khur</i>	Sindh
12.	Wild ass / Kiang	<i>Equus hemionus kiang</i>	GB
13.	Red / Desert Lynx	<i>Caracal caracal</i>	Balochistan, Sindh, Punjab
14.	Sand Cat	<i>Felis margarita</i>	Balochistan
15.	Blanford's Fox or King Fox	<i>Vulpes cana</i>	Punjab, Sindh, Balochistan, KP
16.	Indian Wild Dog or Dhole	<i>Cuonal pinus</i>	GB, AJK
17.	Wooly Flying Squirrel	<i>Eupetaurus cinereus</i>	AJK, GB
18.	Kashmir Flying Squirrel	<i>Eoglaucmys fimbriatus</i>	AJK, GB
19.	Indian Giant Flying Squirrel	<i>Petaurista petaurista</i>	KP, AJK, Punjab
20.	Eurassian Otter	<i>Lutra lutra</i>	AJK, KP < GB

21.	Smooth-coated Otter	<i>Lutrogale perspicillata</i>	Punjab, Sindh
22.	Indus Dolphin	<i>Platanista gangetica minor</i>	Punjab, Sindh
23.	Fishing Cat	<i>Prionailurus viverrinus</i>	Sindh, Punjab
24.	Pallas' Cat or Steppe Cat	<i>Otocolobus manul</i>	KP, GB, Balochistan
25.	Indian Pangolin	<i>Manis crassicaudata</i>	Punjab, Sindh
26.	Asiatic Pygmy / Tibetan Shrew	<i>Sorex thibetanus</i>	AJK, GB, KP
27.	Gilgit Tube-nosed Bat	<i>Murinatu binaris</i>	GB, KP, AJK
28.	Long-fingered Bat (extra-limital)	<i>Myotis longipes</i>	AJK, KP
29.	Leisler's Noctule or Hairy-armed Bat	<i>Nyctalus leisleri</i>	KP, Punjab, AJK
30.	Mountain Noctule	<i>Nyctalus montanus</i>	KP, AJK
31.	Blasius' or Peters' Horseshoe Bat	<i>Rhinolophus blasii</i>	AJK, Punjab, KP
32.	Blyth's Horseshoe Bat	<i>Rhinolophus lepidus</i>	AJK, Punjab, KP
33.	Big-eared Horseshoe bat	<i>Rhinolophus macrotis</i>	AJK, Punjab, KP
34.	Least Mouse-tailed Bat	<i>Rhinopoma muscatellum</i>	Balochistan
35.	Yellow Desert Bat	<i>Scotoecus pallidus</i>	Punjab, Sindh, AJK
36.	Rhesus Macaque	<i>Macaca mulatta mulatta</i>	Punjab, KP, AJK, GB
37.	Ratel or Honey Badger	<i>Mellivora capensis</i>	Sindh, Punjab, Balochistan
38.	Cape Hare	<i>Lepus capensis</i>	KP, GB, AJK, Balochistan, Punjab
39.	Himalayan Wood Mouse or Field Mouse	<i>Apodemus rusiges</i> (syn: <i>sylvaticus</i>)	GB, KP, AJK, Balochistan, Punjab
40.	Quetta or Afghan Mole Vole	<i>Ellobius fuscocapillus</i>	KP, Balochistan

41.	Cheesman's Gerbil	<i>Gerbillus cheesmani</i>	Balochistan
42.	Indian Hairy-footed Gerbil	<i>Gerbillus leadowi</i>	Sindh, Punjab
43.	Balochistan Gerbil	<i>Gerbillus nanus</i>	Balochistan
44.	Himalayan Marmot	<i>Marmota himalayana</i>	GB (Deosai)
45.	Great Gerbil or Giant Day Jird	<i>Rhombomys opimus</i>	Balochistan

Annex 3: Game Animals

1.	Afghan Urial	<i>Ovis vignei cycloceros</i>	Balochistan
2.	Kabal Markhor	<i>Capra falconeri jerdoni</i>	Balochistan, KP
3.	SulemainMarkhor	<i>Capra falconeri megaceros</i>	Balochistan,
4.	Astor Markhor	<i>Capra falconeri falconeri</i>	GB
5.	Kashmir Markhor	<i>Capra falconeri</i>	AJK
6.	Chiltanwild Goat	<i>Capra aegagrus chiltanensis</i>	Balochistan
7.	Marco Polo's Sheep	<i>Ovis ammon polii</i>	GB, KP
8.	LadakhUrial	<i>Ovis vignei vignei</i>	GB
9.	Blue sheep	<i>Pseudois nayaur</i>	GB
10.	Sindh Ibex	<i>Capra aegagrus</i>	Sindh, Balochistan
11.	GoiteredGazelle	<i>Gazella subgutturosa</i>	Balochistan
12.	Chinkara	<i>Gazella bennettii</i>	AJK, Balochistan, KP, Punjab, Sindh
13.	Blackbuck	<i>Antelope cervicapra</i>	Punjab,
14.	Blue Bull / Nilgai	<i>Boselaphus tragocamelus</i>	AJK, Punjab, Sindh
15.	Punjab Urial	<i>Ovis vignei punjabiensis</i>	Punjab
16.	Hog deer	<i>Axis porcinus</i>	Punjab, Sindh
17.	Flare-horned Markhor	<i>Capra falconeri</i>	AJK, KP
18.	Himalayan Musk Deer	<i>Moschus chrysogastor</i>	AJK, KP, Gb
19.	Barking deer / Muntjak	<i>Muntiacus muntjac</i>	AJK, Punjab
20.	Himalayan Goral	<i>Nemoredus goral</i>	AJK, KP

Annex 4: Bird species of conservation concern to be recovered under NBSAP

Sr.	Common Name	Scientific Name	Distribution
1.	Chir Pheasant	<i>Catreus wallichii</i>	AJK
2.	Western Tragopan Pheasant	<i>Tragopan melanocephalus</i>	AJK, KP
3.	Snow Partridge	<i>Lerwa lerwa</i>	GB
4.	Red Jungle Fowl	<i>Gallus gallus</i>	AJK
5.	Great Indian Bustard	<i>Ardeotis nigriceps</i>	Punjab
6.	Houbara Bustard	<i>Chlamydotis undulate macqueenii</i>	Balochistan Punjab, Sindh, KP
7.	Demoiselle Crane	<i>Anthropoides virgo</i>	Balochistan, Punjab, Sindh, KP
8.	Common Crane	<i>Grus grus</i>	Balochistan, Sindh, KP
9.	Sarus Crane	<i>Grus Antigone</i>	Sindh
10.	White-headed Duck	<i>Oxyura leucocephala</i>	Punjab, Sindh
11.	Kalij pheasant	<i>Lophura leucomelana</i>	Punjab, KP, AJK
12.	White-backed Vulture	<i>Gyps bengalensis</i>	Punjab, Sindh
13.	Longbilled Vulture	<i>Gyps indicus</i>	Sindh
14.	Indian Black Vulture	<i>Sarcogyps calvus</i>	Sindh, Punjab
15.	Egyptian Vulture	<i>Neophron percnopterus</i>	Sindh, Punjab, Balochistan
16.	Slender-billed Vulture	<i>G. tenuirostris.</i>	Sindh, Punjab
17.	Himalayan snowcock,	<i>Tetraogallus himalayensis</i>	GB, AJK
18.	Chukar	<i>Alectoris chukar</i>	Balochistan, KP, Punjab, Sindh

19.	See-see Partridge	<i>Ammoperdix griseogularis</i>	Punjab, Sindh, KP, Balochistan
20.	Black Francolin	<i>Fracolinus francolinus</i>	Punjab, Sindh, KP, Balochistan
21.	Grey Francolin	<i>Fracolinus pondicerianus</i>	Punjab, Sindh, KP, Balochistan
22.	Common Quail	<i>Coturnix coturnix</i>	Native
23.	Rain Quail	<i>Coturnix coromandelica</i>	Native
24.	Jungle Bush-quail	<i>Perdicula asiatica</i>	Native
25.	KoklassPheasant	<i>Pucrasia macrolopha</i>	GB, KP,AJK, Punjab
26.	Himalayan Monal	<i>Lophophorus impejanus</i>	GB, KP,AJK
27.	Indian Peafowl	<i>Pavo cristatus</i>	AJK, Punjab, Sindh
28.	Eastern Imperial Eagle	<i>Aquila heliacal</i>	Native (Non-breeding)
29.	White-tailed Eagle	<i>Haliaeetus albicilla</i>	Native (Non-breeding)
30.	Laggar Falcon	<i>Falco jugger</i>	Native resident
31.	Barbary Falcon	<i>Falco pelegrinoides</i>	Native
32.	Peregrine Falcon	<i>Falco peregrinus</i>	Native resident
33.	Gyr Falcon	<i>Falco rusticolus</i>	Winter visitor
34.	Siberian Crane	<i>Grus leucogeranus</i>	Possibly extinct
35.	Cinereous Vulture	<i>Aegyptius monachus</i>	Native
36.	Greater Spotted Eagle	<i>Aquila clanga</i>	Native non-breeding
37.	Indian Spotted Eagle	<i>Aquila hastate</i>	Native resident
38.	Pallid Harrier	<i>Circus macrourus</i>	Native non-breeding
39.	Bearded Vulture	<i>Gypaetus barbatus</i>	Native resident

40.	Pallas's Fish-eagle	<i>Haliaeetus leucoryphus</i>	Native resident
41.	Saker Falcon	<i>Falco cherrug</i>	Native non-breeding
42.	Red-necked Falcon	<i>Falco chicquera</i>	Native non-breeding
43.	Sooty Falcon	<i>Falco concolor</i>	Native breeding
44.	Little Bustard	<i>Tetrax tetrax</i>	Native non-breeding
45.	Lesser Flamingo	<i>Phoeniconaias minor</i>	Native
46.	Alexandrine Parakeet	<i>Psittacula eupatria</i>	Native resident
47.	Green Avadavat	<i>Amandava Formosa</i>	Extinct Possibly
48.	Falcated Duck	<i>Anas falcate</i>	Native non-breeding
49.	Oriental Darter	<i>Anhinga melanogaster</i>	Native resident
50.	Lesser White-fronted Goose	<i>Anser erythropus</i>	Native
51.	Baer's Pochard	<i>Aythya baeri</i>	Possibly extinct
52.	Ferruginous Duck	<i>Aythya nyroca</i>	Native
53.	Long-billed Bush Warbler	<i>Bradypterus major</i>	Native resident (Summer Breeding)
54.	Jouanin's Petrel	<i>Bulweria fallax</i>	Native resident
55.	Great Knot	<i>Calidris tenuirostris</i>	Native non-breeding
56.	Bristled Grass Warbler	<i>Chaetornis striata</i>	Native breeding
57.	Pale-backed Pigeon	<i>Columba eversmanni</i>	Native non-breeding
58.	European Roller	<i>Coracias garrulous</i>	Native breeding
59.	Yellow-breasted Bunting	<i>Emberiza aureola</i>	Native non-breeding
60.	Black-necked Stork	<i>Ephippiorhynchus asiaticus</i>	Native resident

61.	Laggar Falcon	<i>Falco jugger</i>	Native resident
62.	Kashmir Flycatcher	<i>Ficedula subrubra</i>	Summer breeding (winter record)
63.	Wood Snipe	<i>Gallinago nemoricola</i>	Possibly extinct
64.	Yellow-rumped Honeyguide	<i>Indicator xanthonotus</i>	Native resident
65.	Greater Adjutant	<i>Leptoptilos dubius</i>	Extinct
66.	Black-tailed Godwit	<i>Limosa limosa</i>	Native non-breeding
67.	Marbled Teal	<i>Marmaronetta angustirostris</i>	Native resident
68.	Velvet Scoter	<i>Melanitta fusca</i>	Native
69.	Painted Stork	<i>Mycteria leucocephala</i>	Native non-breeding
70.	Eurasian Curlew	<i>Numenius arquata</i>	Native non-breeding
71.	Tytler's Leaf Warbler	<i>Phylloscopus tytleri</i>	Summer breeding
72.	Long-tailed Prinia	<i>Prinia burnesii</i>	Native resident
73.	Grey-capped Prinia	<i>Prinia cinereocapilla</i>	Native
74.	Indian Skimmer	<i>Rynchops albicollis</i>	Native breeding
75.	Stoliczka's Whin-chat	<i>Saxicola macrorhynchus</i>	Possible Extinct
76.	Black-bellied Tern	<i>Sterna acuticauda</i> <i>Sterna melanogaster</i>	Native resident
77.	River Tern	<i>Sterna aurantia</i>	Native resident
78.	Black-headed Ibis	<i>Threskiornis melanocephalus</i>	Native resident

Annex 5: Reptiles and amphibians of conservation concern to be recovered under NBSAP

The conservation status of the majority of the reptilian and amphibian fauna of the country has not been evaluated in particular with regard to 25 endemic reptile and three amphibian species.

Sr.	Common Name	Scientific Name	Distribution
1.	Indian Python	<i>Python molurus</i>	AJK, Punjab
2.	Marsh Crocodile	<i>Crocodylus palustris</i>	Balochistan, Sindh
3.	Gavial / Gharial	<i>Gavialis gangeticus</i>	Punjab (extinct in wild), Sindh
4.	Narrow-headed Softshell	<i>Chitra indica</i>	Punjab, Sindh, KP,
5.	Spotted Mud Turtle	<i>Geoclemys hamiltonii</i>	Punjab, Sindh
6.	Crowned River Turtle	<i>Hardella thurjii</i>	Punjab, Sindh
7.	Afghan Tortoise	<i>Testudo horsfieldii</i>	KP, Balochistan
8.	Sindh Star Tortoise	<i>Geochelone elegans</i>	Sindh
9.	Brown River turtle	<i>Kachuga smithii</i>	Punjab, Sindh
10.	Sawback Turtle	<i>Kachuga tecta tecta</i>	Punjab, Sindh
11.	Indian Softshell	<i>Aspideretes gangeticus</i>	Punjab, Sindh, KP
12.	Peacock Softshell	<i>Aspideretes hurum</i>	Punjab, Sindh, KP
13.	Indian Flapshell	<i>Lissemys punctate andersoni</i>	Punjab, Sindh, KP
14.	Tibetan Frog	<i>Nanorana pleskei</i>	

Annex6: Fish species of conservation concern to be recovered under NBSAP

Sr.	Common Name	Scientific Name	Distribution
1.	Golden Mahasheer	<i>Tor putitora</i>	AJK, KP, Punjab, Balochistan
2.	Snow Carp	Group of species	AJK, KP, Gb
3.	Kashmir Catfish	<i>Glyptothorax kashmirensis</i>	AJK
4.	Butter Catfish	<i>Ompok bimaculatus</i>	KP, Punjab, Sindh
5.	Pabdah Catfish	<i>Ompok pabda</i>	AJK, KP, Balochistan, Punjab, Sindh
6.	Freshwater Shark/Malli	<i>Wallago attu</i>	AJK, Balochistan, KP, Sindh, Punjab
7.	Gangetic Ailia	<i>Ailia coila</i>	Punjab, Sindh
8.	Humped Featherback	<i>Chitala chitala</i>	Punjab, Sindh
9.	Gangetic Goonch	<i>Bagarius bagarius</i>	Punjab, Sindh
10.	Himalayan Snow Trout	<i>Schizothorax plagiostomus</i>	AJK, GB, KP, Punjab, Balochistan
11.	Common Carp	<i>Cyprinus carpio</i>	AJK, GB, KP, Punjab, Balochistan
12.	Zebrafish	<i>Danio rerio</i>	KP, Punjab, Sindh
13.	Bengala Barb	<i>Megarasbora elonga</i>	KP, Punjab, Sindh
14.	Ladakh Snow trout	<i>Schizopygopsis stoliczkai</i>	GB, KP
15.	Stoliczka Triplophysaloach	<i>Triplophysa stoliczkai</i>	GB (Deosai plateau)
16.	Whiptail Catfish	<i>Sisorr abdoporus</i>	Punjab, Sindh
17.	Gangetic Leaf fish	<i>Nandus nandus</i>	Punjab, Sindh
18.	Chameleon Fish	<i>Badis badis</i>	Punjab, Sindh
19.	Gangetic Mud Eel	<i>Monopterus cuchia</i>	Punjab, Sindh
20.	One-stripe Spiny Eel	<i>Macrognathus aculeatus</i>	Punjab, Sindh

Annex 7: Marine species of conservation concern to be recovered under NBSAP

Sr.	Common Name	Scientific Name	Distribution
1.	Green Sea Turtle	<i>Cheloniemydas japonica</i>	Balochistan, Sindh
2.	Hawksbill	<i>Eretmochelys imbricate bissa</i>	Balochistan, Sindh
3.	Olive Ridley Turtle	<i>Lepidochelys olivacea olivacea</i>	Balochistan, Sindh
4.	Loggerhead Turtle	<i>Caretta caretta gigas</i>	Balochistan, Sindh
5.	Leatherback	<i>Dermochelyscoriascea</i>	Balochistan, Sindh
6.	Yellowfin Tuna	<i>Thunnusalbacares</i>	Balochistan, Sindh
7.	Corals	<i>All species</i>	Balochistan, Sindh
8.	Knife tooth Sawfish	<i>Anoxypristis cuspidate</i>	Balochistan, Sindh
9.	NarrowsnoutSawfish	<i>Pristiszijsron</i>	Balochistan, Sindh
10.	PondicheryShark	<i>Carcharhinushemiodon</i>	Balochistan, Sindh
11.	Ganges Shark	<i>Glyphisgangeticus</i>	Balochistan, Sindh
12.	Scalloped hammerheadShark	<i>Sphyrna lewini</i>	Balochistan, Sindh
13.	Squat-headed Hammerhead Shark	<i>Sphyrna mokarran</i>	Balochistan, Sindh
14.	BroadfinShark	<i>Lamiopsistemminckii</i>	Balochistan, Sindh
15.	Longheaded Eagle Ray	<i>Aetobatus flagellum</i>	Balochistan, Sindh
16.	Great Blue Whale	<i>Balaenoptera musculus</i>	Balochistan, Sindh
17.	Little Indian Porpoise or Black Finless Porpoise	<i>Neophocaena phocaenoides</i>	Balochistan, Sindh
18.	Indian Humpback Dolphin	<i>Sousa chinensis</i>	Balochistan, Sindh

Annex 8: Plant species of conservation concern to be recovered under NBSAP

Sr.	Common Name	Scientific Name	Distribution
1.	Indian Maple	<i>Acer caesium</i>	AJK, KP,
2.	Nepalese Alder	<i>Alnusne palensis</i>	AJK, KP
3.	Alder, Sharol	<i>Alnus nitida</i>	AJK, KP
4.	Himalayan Yew	<i>Taxus wallichiana</i>	AJK, KP, GB,
5.	Juniper	<i>Juniperus excelsia</i>	Balochistan
6.	Chilghoza	<i>Pinus gerardiana</i>	Balochistan, GB
7.	Indian snakeroot	<i>Rauwolfia serpentine</i>	AJK, KP
8.	Costus, Kuth	<i>Saussurea costus</i>	AJK, KP, GB
9.	Kutki	<i>Picrorhiza kurroa</i>	AJK, KP, GB
10.	Nag Chhatri	<i>Trillium govanianum</i>	AJK, Gb
11.	Marsh orchid or Spotted Orchid	<i>Dactylorhiza graggeriana</i>	AJK, GB
12.	Marsh orchid or Spotted Orchid	<i>Dactylorhiza hatagirea</i>	AJK, GB
13.	Aconite, Atees	<i>Aconitum heterophyllum</i>	AJK, KP, GB
14.	Primrose	<i>Primula sp.</i>	AJK, KP, GB
15.	Himalayan Mayapple	<i>Podophyllum hexandrum</i>	AJK, KP, GB
16.	Gugul	<i>Commiphora wightii</i>	Sindh
17.	Mazri	<i>Nannorrhops ritchiana</i>	Balochistan, KP, Punjab
18.	Bakau	<i>Rhizophora mucronata</i>	Sindh

Annex9: List of PAs (National Parks) in need of effective management plans

Sr.	PA	Location	Status
1.	Margalla Hills NP	Islamabad	Not implemented
2.	Machiara NP	Azad Jammu and Kashmir	Under implementation
3.	Ghamot NP	Azad Jammu and Kashmir	Lacks management plan
4.	Pir Lasorha NP	Azad Jammu and Kashmir	Lacks management plan
5.	Toli Pir NP	Azad Jammu and Kashmir	Lacks management plan
6.	Gurez Musk Deer NP	Azad Jammu and Kashmir	Lacks management plan
7.	Deva Vatala NP	Azad Jammu and Kashmir	Lacks management plan
8.	Poonch River Mahsheer NP	Azad Jammu and Kashmir	Lacks management plan
9.	Chiltan-Hazargangi NP	Balochistan	Not implemented
10.	Hingol NP	Balochistan	Under implementation
11.	Khunjerab NP	Gilgit-Baltistan	Under implementation
12.	Deosai NP	Gilgit-Baltistan	Not implemented
13.	Central Karakorum NP	Gilgit-Baltistan	Under finalization
14.	Hunderab-Shandoor NP	Gilgit-Baltistan	Lacks management plan
15.	Karabhar NP	Gilgit-Baltistan	Lacks management plan
16.	Ayubia NP	Khyber Pakhtunkhwa	Under implementation
17.	ChitralGol NP	Khyber Pakhtunkhwa	Under implementation

18.	Sheikh Buddin NP	Khyber Pakhtunkhwa	Lacks management plan
19.	SaifulMaluk NP	Khyber Pakhtunkhwa	Lacks management plan
20.	Lulusar-Dodhipath NP	Khyber Pakhtunkhwa	Lacks management plan
21.	Broghil NP	Khyber Pakhtunkhwa	Lacks management plan
22.	Lal Sunhara NP	Punjab	Lacks management plan
23.	Kala Chitta NP	Punjab	Lacks management plan
24.	Chinji NP	Punjab	Lacks management plan
25.	Murree-Kahuta-KotliSattianNP	Punjab	Lacks management plan
26.	Khirthar NP	Sindh	Under implementation

Annex 10: List of Ramsar Sites in Pakistan

Sr.	Ramsar Site	Location	Remarks
1.	Astola (Haft Talar) Island	Balochistan	Needs attention
2.	Chashma Barrage	Punjab	Received attention
3.	Deh Akro-II Desert Wetland Complex	Sindh	Needs attention
4.	Drigh Lake	Sindh	Needs attention
5.	Haleji Lake	Sindh	Received attention
6.	Hub Dam	Sindh, Balochistan	Needs attention
7.	Indus Delta	Sindh	Received attention
8.	Indus Dolphin Reserve	Sindh	Received attention
9.	Jiwani Coastal Wetland	Balochistan	Needs attention
10.	Jubho Lagoon	Sindh	Needs attention
11.	Kinjhar (Kalri) Lake	Sindh	Received attention
12.	MianiHor	Balochistan	Needs attention
13.	Nurri Lagoon	Sindh	Needs attention
14.	Ormara Turtle Beaches	Balochistan	Received attention
15.	Runn of Kutch	Sindh	Needs attention
16.	Tanda Dam	Khyber Pakhtunkhwa	Needs attention
17.	Taunsa Barrage	Punjab	Received attention
18.	Thanedar Wala	Khyber Pakhtunkhwa	Needs attention
19.	Uchhali Complex	Punjab	Received attention

Annex 11: Ecosystems and Habitats Identified for Filling Gaps in the PA System

Vegetation Type	Ecosystem	Proposed Sites	Location	Representation	Priority
Marine and Island	Astola Island, Arabian Sea	Arabian Sea including Astola	Balochistan	Gap	High
	Indus Delta	Arabian sea including Indus Delta	Sindh	Gap	High
Littoral and Mangrove	<i>Avicenna</i> – <i>Ceriops</i>	Ganjabad, Cheer Koh, Sonmiani, Gwathar Bay, Jiwani, Kalmat	Balochistan	Inadequate	Medium
		Jubho Lagoon, Nurri Lagoon, Hawks Bay	Sindh	Inadequate	High
Riverine	<i>Dalbergia sissoo</i> – <i>Populus euphratica</i>	Indus River, D. G. Khan	Punjab	Gap	High
	<i>Acacia nilotica</i> – <i>Populus euphratica</i>	Indus River, Hyderabad	Sindh	Inadequate	High
Wetlands, Swamps and Seasonal Inundations	<i>Tamarix dioica</i> - <i>Typha angustata</i> ,	Northern Kashmir wetland complex	AJK	Adequate	High
		Wasta Lake, and Zarri Daggar Zhob,	Balochistan		High
Sand Dune Desert	<i>Prosopis cineraria</i> – <i>Salvadora oleoides</i>	Thal Desert	Punjab	Gap	High
		D. I. Khan	KP		

	<i>Prosopis cineraria</i> – <i>Tamarix aphylla</i>	Thar	Sindh	Gap	Medium
	<i>Capparis decidua</i> – <i>Sueda fruticosa</i>	Sibi	Balochistan	Gap	Medium
Dry Sub Tropical Semi-evergreen Scrub Forest	<i>Olea ferruginea</i> - <i>Acacia modesta</i> – <i>Justicia adhatoda</i>	KotKandhari and PirGali area	AJK	Adequate	Medium
Dry Temperate Semi-evergreen Scrub Forest	<i>Olea ferruginea</i> – <i>Acacia modesta</i> – <i>Artemesia Maritima</i>	Fort Munro	Punjab	Inadequate	High
	<i>Olea ferruginea</i> – <i>Acacia modesta</i> – <i>Monothecha buxifolia</i>	Indus Kohistan	Gilgit-Baltistan	Inadequate	Medium
Sub-Tropical Chir Pine Forest	<i>Pinus roxburghii</i> – <i>Quercu sincana</i>	Massar RF	KP	Inadequate	High
Sub-Tropical Dry Mixed Deciduous Forest	<i>Acacia modesta</i> – <i>Bauhinia variegata</i>	Thumb Pattni Maloni Areas, Chamairi	AJK	Inadequate	High
		Garamthum	KP		
	<i>Acacia modesta</i> – <i>Butea monosperma</i> – <i>Acaica nilotica</i> var. <i>cupressiormis</i>	Salt Range	Punjab	Gap	High

Balochistan Dry Coniferous Forest	<i>Juniperus excelsa</i> – <i>Fraxinus xanthoxyloides</i>	Khalifat, Zargoan, and Ziarat	Balochistan	Inadequate	High
Himalayan Moist Temperate Forest	<i>Pinus wallichiana</i> – <i>Abies pindrow</i>	PirChinassi	AJK	Inadequate	High
		Kamal Ban, Manshi, and Kund Forest	KP		High
Himalayan Dry Coniferous Forest	<i>C.deodara</i> – <i>P. wallichiana</i>	Kumrat Valley	KP	Gap	High
	<i>Piceas mithiana</i> – <i>Pinus wallichiana</i>	Nanga Parbat, Astore	Gilgit-Baltistan	Inadequate	High
	<i>Pinus gerardiana</i> – <i>Pinus wallichiana</i> - <i>Quercus baloot</i>	Shishi Valley	KP	Gap	High
		Takhat –i- Suleiman	Balochistan		High
		Tangir	GB		

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