

Pakistan's Sixth National Report to the United Nations Convention on Biological Diversity



Kashmir Musk deer(*Moschuscupreus*)Photo by Amiruddin Mughal (AJK)

Ministry of Climate Change - Pakistan
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Introduction

In October 2010, the UN Convention on Biological Diversity (CBD) agreed on a Strategic Plan for Biodiversity and set five strategic goals and twenty international targets, known as 'Aichi Biodiversity Targets (ABTs)' for the period 2011-2020. The Aichi Targets are wide ranging and diverse in nature and present challenges both in terms of delivery and reporting. In 2014, Ministry of Climate Change, Government of Pakistan, started preparing a new National Biodiversity Strategy and Action Plan (NBSAP) in the context of ABTs, which was finally completed in 2017 and after the approval of the competent authority i.e. the Prime Minister of Pakistan, the same was submitted to the CBD Secretariat in 2018. NBSAP 2017-2030 sets the strategic priorities and roadmap to 2030 for Pakistan, and identifies the large-scale collaborative activities required to achieve ABTs.

A joint team of IUCN resource persons and officers of Biodiversity Directorate, Ministry of Climate Change initiated a country wide consultative process between 5th November and 28th December, 2018, to collect information from various stakeholders regarding implementation on NBSAP and progress made towards achieving 20 ABTs during the reporting period July 2014 - December, 2018, so that the actions taken in support of biodiversity conservation and its sustainable use could be assessed and reported to CBD Secretariat under Sixth National Report (6th NR). The same is an obligation under Article 26 of the convention.

Pakistan has periodically submitted its national reports in accordance with the guidelines provided by the convention. However, the format of the 6th national report for CBD is designed to reflect an interim progress towards meeting the ABTs by provinces, federating units and other organizations. During the country-wide consultation process, it was noted that the rate of loss of biodiversity has been slowed down where targeted actions were taken. However, the country's biodiversity indicators, the condition of designated habitats, species and protected areas, and progress made towards meeting biodiversity targets demonstrated that biodiversity loss has not yet been halted and would require renewed and sustained effort over a longer period of time.

The collection of information and data across the country regarding financial resource allocation, capacity building and conservation of genetic resources presented considerable challenges. However, collaborative approach adopted during the exercise and support from many organizations including government agencies, academicians, NGOs and research institutes, made compilation of this national report possible.

The national report has a combination of information and data available at the country level which includes, information on the targets being pursued at the national level; implementation measures taken and assessment of their effectiveness; assessment of progress made towards each national target; description of the national contribution to each of the global ABTs, description of the national contribution to Global Strategy for Plant Conservation (GSPC); contribution of indigenous peoples and local communities to ABTs and updated biodiversity country profiles.

In order to ensure a consistent approach to account development made so far and subsequent analysis for contribution of Pakistan, CBD reporting guidelines were followed to present the progress. A comprehensive information and data on each ABT will be made available at the end of 2020 to finally assess and report the progress achieved by Pakistan.

Section I

Information on targets being pursued at the national level

☒ My country has adopted national biodiversity targets or equivalent commitments in line with the Strategic Plan for Biodiversity 2011-2020 and the Aichi Targets

☐ My country has not adopted national biodiversity targets and is reporting progress using the Aichi Biodiversity Targets for reference. (Move to section II. In section III, the Aichi Biodiversity Targets should be used for the purpose of this report as the national targets and progress should be assessed towards their achievement in the national context.)

Pakistan developed its National Biodiversity Strategy and Action Plan (NBSAP) 2017-2030 in a transparent and participatory manner initiated by the Biodiversity Directorate, Ministry of Climate Change. The 6th national report has been prepared in line with Aichi Biodiversity Targets (ABTs) 2011-2020 and Sustainable Development Goals (SDGs) 2030 to meet the national as well as global commitment to implement the objectives of UN Convention on Biological Diversity (CBD). The NBSAP was approved by the Prime Minister of the Islamic Republic of Pakistan on 5th November, 2018. 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 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-sectorial collaboration and adopting a fresh financing strategy. The NBSAP comprises of 74 proposed actions across five strategic goals and 20 ABTs.

The NBSAP provides the targets and actions for conservation of biodiversity and ecosystem services within the set targeted period (i.e., 2030). The implementation of NBSAP will require the leadership role of federal, provincial, territorial governments of Azad Jammu and Kashmir (AJK) and Gilgit-Baltistan (GB), with the effective participation of local communities, nongovernmental organizations, policy makers and experts at various levels. This partnership, deploying the skills and resources of all participants, will help to conserve biodiversity, optimize its benefits, and enhance the quality of life for all Pakistanis.

National Biodiversity Targets:

Target 1: By 2020, at the latest, people are aware of the values of the biodiversity and the steps they can take to conserve and use it sustainably.

Loss of biodiversity is largely due to the lack of awareness and inadequate information available to general community about the importance and values of biodiversity. Importance of biodiversity for human wellbeing generally contrasts with the commonly held worldview of social and economic development. Therefore, generating awareness through effective communication is very important before people and communities can be asked to be a part of the solution. Change takes time and mere adoption of targets and NBSAP is not going to have much impact on biodiversity conservation. Well planned, consistent and targeted efforts will, therefore, be required to get 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 consequences of its loss. Educating public from the local level to national level about the relevance of conserving biodiversity will help communities to avoid over-exploitation of the natural resources.

Although the Biodiversity Action Plan (BAP) recognized the need for a comprehensive strategy for communication and outreach to raise biodiversity awareness, the measures taken to date were project-based and 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.

In recent year's well-structured communication and awareness raising activities have been carried out at federal and provincial levels, from regional and federal governments. NGOs and other civil society organizations have also focused on national, regional and local level on specific target groups, including parliamentarians, media, students, academia, local communities and general public. Furthermore, it is highlighted at various levels that integrating biodiversity concerns in all relevant sectoral policies and strategies is significant, so that knowledge about species and ecosystems is well recognized. To achieve this target a range of communication, education and awareness interventions are needed. In this regard different strategies and actions have been proposed in the NBSAP to make people and policy makers aware of the values of biodiversity and the steps they can take to conserve and use it sustainably. This target is further divided into five sub-targets. Main activities are presented in the sections-II and IV of the report.

Level of application:

- ☐ Regional/multilateral
- ☒ National/federal
- ☒ Subnational

Relevant websites, web links, and files:

- www.iucn.pk/publications/biodiversityactionplan.pdf
- <https://www.cbd.int/doc/world/pk/pk-v2-en.pdf>

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.

The fate of natural ecosystems depends to a large extent on a wide range of national policies and programmes for economic development. This is particularly true for the development of road infrastructures, 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.

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 a 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 before values of biodiversity can be integrated into planning processes, and national accounting and reporting systems.

In Pakistan it is important to establish stronger relationship between biodiversity conservation and other development sectors to understand the implication of biodiversity on other sectoral policies and agenda. The basis for this target is, therefore, to ensure that biodiversity conservation is integrated into all national and local development and poverty reduction instruments and planning processes.

In recent years the country has integrated biodiversity concerns in different policies and planning processes. In this regard, the National Climate Change Policy, 2012 suggests policy measures to conserve natural resources and protect forests, biodiversity and vulnerable ecosystems. The National Forest Policy, 2015, National Food Security Policy, 2018, and draft National Wildlife Policy, 2018, provides recommendations for expanding the national forests cover, protected areas, natural habitats, sustainable agriculture and green areas for restoration of ecological functions. However, poverty alleviation needs comprehensive strategy, including the long term sustainable management practices for food production systems (such as agriculture, livestock and aquaculture) that remain the main source of income and nutrition in the country.

This target is further divided into five sub-targets. The relevant interventions to pursue the target are given in section-II and IV.

Level of application:

- ☐ Regional/multilateral
- ☒ National/federal

☒ Subnational

Relevant websites, web links, and files:

- www.mnfsr.gov.pk
- www.mocc.gov.pk/policies
- www.gcisc.org.pk

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.

The imminent threat to biodiversity in Pakistan is from agriculture, infrastructure development, deforestation and conversion of forest lands for non-forestry purposes and population growth especially in environmentally sensitive areas.

Presently in some of the urban areas of Pakistan, provincial governments providing subsidy to the transport sector which indirectly supports the environment and reduces emissions. The purpose of this subsidy is not directly related to the biodiversity conservation rather it is to attract travelers to use newly introduced metro bus service facility in the Punjab and partly in the federal capital. Further, in Pakistan funds, like Mountain Areas Conservancy Fund and Fund for Protected Areas, are positive incentives which directly support biodiversity conservation activities. The ongoing Rural Development Programmes are also indirect source of funding for biodiversity protection in the country. However, in the context of merit and demerits of these instruments, a focused study to quantify the harmful and useful subsidies is badly required to develop future strategy for sustainable development of natural environment.

Under this target a study has been proposed to identify negative incentives and propose positive incentives that will reduce and ultimately halt the degradation and fragmentation of ecosystems.

Level of application:

- ☐ Regional/multilateral
☒ National/federal
☒ Subnational

Relevant websites, web links, and files:

- www.mocc.gov.pk/fpa

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.

The change in patterns of unsustainable consumption and production directly and indirectly impact the state of natural resources. The production sector poses a threat to the biodiversity directly or through air and water pollution. Further, increasing human population demands enhanced provision of commodities which increases pressure on the natural resources, particularly on land and water. Many species of flora and fauna, such as *mazri* for mats and baskets, medicinal plants, morels, pangolin and turtles, etc., are used in trade and their unsustainable extraction of these non-timber forest products adversely impacts the health and condition of habitats and threatens species with extinction.

Driven on increasing demand, there is a growing and unsustainable extraction of natural resources from the ecosystems, such as over-harvesting of fisheries resources, massive felling of trees and heavy dependence on firewood and over-grazing, have serious consequences for any healthy ecosystems and associated species. Sustainable extraction of these natural resources requires awareness and regulations for producers and consumers. To promote sustainable consumption and production patterns for the conservation and sustainable use of biodiversity, the following measures have been proposed in the NBSAP:

1. The awareness of producers and consumers about the social cost and environmental consequences of unsustainable production and consumption will be raised in order 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 sectors, 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.

This target is further divided into four sub-targets.

Level of application:

- ☐ Regional/multilateral
- ☒ National/federal
- ☒ Subnational

Relevant websites, web links, and files:

- www.mocc.gov.pk/nbsap

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.

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. NOAA satellite imagery recognizes 17 ecosystems. Ecological health of these ecosystems has not been assessed, yet it is generally presumed 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, ultimately impacting the national economy and potential of economic development and growth.

The forests of Pakistan are grouped into five physiognomic classes, that is, conifers, scrub, riverine, mangroves and plantations. 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. Contrary to this trend, efforts to increase social forestry and linear plantations have proved successful and forestry resources assessment in the country has indicated such efforts as the priority areas requiring immediate attention.

The following strategies are proposed in the NBSAP 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-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 will be adopted, including reforms of the rights and concessions of local people.

In the NBSAP, this target is further divided into two sub-targets.

Level of application:

- ☐ Regional/multilateral
- ☒ National/federal
- ☒ Subnational

Relevant websites, web links, and files:

- www.mocc.gov.pk/nbsap

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.

Fishery sector plays an important role in Pakistan by contributing to the economic development of the country in terms of provision of jobs, food security, poverty alleviation, and foreign exchange.

Different aquatic ecosystems exist in Pakistan including inland wetlands, coastal and marine and the associated biodiversity faces numerous challenges, some of which require action at national and sub-national level while others require global action such as trawler fishing in open sea waters. Marine fisheries are a direct livelihood source for over a million people and encompass more than 125,000 households. The species exported are mainly shrimp (65%), Indian mackerel, ribbon-fish, tuna, sole and crab. Sardines are caught as trash fish and converted into chicken feed. Shrimps are considered as a source of foreign exchange for the country. Lakes and rivers are also a lifeline for many people, and provide livelihoods to thousands of people through artisan fisheries. A major component of the fish fauna, especially warm water fish, is restricted to the Indus plain, which comprises of about 140 species. Other than sport fishing, fishing rights in the inland waters are auctioned every year for the duration of the fishing seasons, and exotic rainbow and brown trout represent potential threats to the highly specialized local cold water fish fauna.

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 fishermen folk usually have the knowledge of the resources and if provided the necessary support can learn to use these resources in a sustainable manner.

Conservation and sustainable use of resources in marine and coastal areas is well recognized by the government and the conservation agencies. Declaration of the first marine protected area is a step towards achieving the goals and targets under CBD and other obligations. The various conservation initiatives on mangrove conservation, the wetlands and freshwater fisheries provide the foundation for conservation and sustainable use of aquatic biodiversity in the country. However, there is a need to scale up efforts to prevent loss of biodiversity 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 in NBSAP.

The national target 6, has ten sub-targets: (1) Integrated management of water, fish and wildlife, (2) Harmonization of fisheries policies, laws and regulations with biodiversity conservation, (3) Baseline surveys of wetlands, (4) Procedures for sustainable fish harvest will be developed and implemented (5) Community participation in the wetland management, (6) Updating of laws, regulations and policies, (7) Initiation of pilot project to test approaches designed for sustainability, (8) Prevent over exploitation of marine fish and invertebrates, (9) Modification of fishing boats, and (10) Stock assessment and determine the sustainable harvest limits.

Level of application:

☒ Regional/multilateral

- ☒ National/federal
- ☒ Subnational

Relevant websites, web links, and files:

- www.fdb.org.pk/
- www.mops.org.pk/
- www.customstoday.com.pk
- www.niopk.gov.pk

Target 7: By 2020 areas under agriculture, aquaculture and forestry are managed sustainably, ensuring conservation of biodiversity.

Agricultural sector as an important ecosystem is a vital source of economic growth for Pakistan contributing approximately 20% to the country's GDP, and employing more than 60% of the rural labour force. The main crops of irrigated agriculture are cotton, wheat, rice, sugarcane, fruits, and vegetables. Dryland crops include wheat, chickpea, sorghum, millet, barley, maize, lentil, peanuts, rapeseed-mustard, and guar seed. In addition to providing food security, agriculture ecosystems, irrigated and dryland, help in conservation of biodiversity by providing habitat and food for wildlife. However, due to Green Revolution endemic varieties of crops have vanished as new varieties were introduced to increase the yield per hectare. The new varieties were dependent on large quantity of water for increasing the per hectare yield. This resulted in environmental problems, like water logging and salinity. Further, a huge seepage from irrigation conveyance system and poor drainage facilities also contributed to twin menace of waterlogging and salinity. The loss of endemic crop was actually the loss of biological diversity. Similarly due to Green Revolution, the use of insecticides and loss of endemic crops have adversely affected the population of pollinating insects.

Aquaculture presents opportunities to diversify exports, other than the marine fisheries. Aquaculture is one of the fastest-growing food sectors globally. Aquaculture creates a source of livelihood and food for the people. In Pakistan, the marine sector is a significant economic pursuit for people along the coasts of Sindh and Balochistan. Despite favourable climatic conditions, limited small-scale aquaculture practices and inland capture fisheries are exercised across the country. Aquaculture in Pakistan is limited in its variety and extent. The industry is dominated by carp, along with some tilapia and trout farming is also practiced. Marine and coastal aquaculture such as shrimp farming, are almost non-existent.

Pakistan is one of the low forest cover countries with only 5.1 percent (PFI, 2016) of its geographical land under tree cover. Growing population, climatic conditions, deforestation and overgrazing are some of the main reasons for degradation of forests in the country. The forestry sector contributes to Pakistan's national economy by creating employment opportunities and generating taxes and revenues. However, such benefits are yet to be studied and quantified thoroughly.

In recent years federal as well as provincial governments have initiated large scale afforestation activities to rehabilitate different forest ecosystems across the country, such as Billion Tree Afforestation Programme (2014) in KP, Restoration of Mangroves in Indus Delta, Sindh (2016) and Green Pakistan Programme (2017) by the federal government. The main objective of all these programmes 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 combined effects of agriculture, aquaculture and forestry ecosystems towards sustaining and conserving biodiversity are very important. In this context positive impact of these sectors on the environment by enhancing population of pollinators, improvement in habitats, restoration of different natural ecosystem and increasing the resilience of ecosystems is very important towards conservation of biodiversity. This national target is further divided into seven sub-targets.

Level of application:

- ☐ Regional/multilateral
- ☒ National/federal
- ☒ Subnational

Relevant websites, web links, and files:

- <https://hubs.worldbank.org/docs/ImageBank/Pages/DocProfile.aspx?nodeid=30140502>
- <https://hubs.worldbank.org/docs/ImageBank/Pages/DocProfile.aspx?nodeid=30599298>
- Nasir, S. M.; Afrasiyab M.; Athar M.: Application of Holdridge Life Zones (HLZ) in Pakistan; Pak. J. Bot., 47(SI): 359-366, 2015

Target 8: By 2020, pollution, including from excess nutrients, has been brought to levels that are not detrimental to ecosystem function and biodiversity.

Pollution is a growing problem for human health and biodiversity. In the context of Pakistan, the discharge of sewage and industrial effluent into aquatic and marine ecosystems is a major threat to aquatic habitat and biodiversity. Tanneries, oil refineries, coal power plants, plastics, electronic wastes, air pollutants and sugar industries are major industrial contributors to aquatic pollution. Ten major cities of the country produce more than 60% of all urban waste water, discharged directly into natural streams and rivers. Significant coastal pollution has been noticed around the sea ports, particularly Karachi harbour where oil products from vessels and port terminals are dumped. These are likely to have both acute and chronic toxic effects on human beings, marine biodiversity, and birds. The negative impacts of these pollutants on commercial fin-fish and shrimp fisheries are also significant. Pakistan Environmental Protection Act (PEPA), 1997, is a key environmental legislation for the entire country. The PEPA was more focused on environmental protection in general, primarily through controlling pollution, rather than ecosystem-based measures for conservation of biodiversity. In addition National Environment Policy, 2005, and National Sanitation Policy, 2006, of Pakistan are also used as guiding instruments helping in reducing the impact of pollution on biodiversity.

The NBSAP target 8 is further divided into three sub-targets to tackle the issue along with strategy to create awareness on pollution reduction measures, developing appropriate plans and strengthen guidelines.

Level of application

- ☐ Regional/multilateral
- ☒ National/federal
- ☒ Subnational

Relevant websites, web links, and files:

- www.mocc.gov.pk/
- <https://www.elaw.org/system/files/Law-PEPA-1997.pdf>
- www.asb.org.pk/sanitationpolicy.pdf
- <https://epd.punjab.gov.pk/system/files/PolicyonControllingSmogFinal.pdf>

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.

Invasive Alien Species (IAS) in Pakistan have caused serious issues for the natural distribution of local species resulting in negative impact on various terrestrial and aquatic ecosystems. The proliferation of common invasive alien plant species, such as mesquite (*Prosopis juliflora* and *P. glandulosa*), *Lantana camara*, paper mulberry (*Broussonetia papyrifera*), water hyacinth (*Eichhornia crassipes*), and *Parthenium hysterophorus*. Among fish fauna three species of tilapia (*Oreochromis aureus*, *O. niloticus*, and *O. mossambicus*), common carp (*Cyprinus carpio*) and three Chinese species, viz., silver carp, grass carp, mosquito fish (*Gambusia affinis*) are the invasive alien species which have already affected numerous water bodies and impacted fishing, and public health. Inland waters (wetlands) and agriculture are particularly being affected by invasive alien species through intentional and accidental introduction of alien fish and plant species. National customs and quarantine practices do not have adequate safeguards, thereby increasing the likelihood of species being spread through increased travel and trade (tourism and agriculture).

Pakistan is a signatory to key international conventions, such as CBD and Ramsar that address IAS and related issues. However, no serious attempts have been made to tackle this issue due to weak institutional and inadequate legislative instruments. The Centre for Agriculture and Biosciences International (CABI) – Pakistan is the only organization which has expertise on the subject and working with different public sector departments in capacity building and help in addressing IAS issue. Besides action plan developed by CABI, IUCN Pakistan has developed a proposal for GEF funding to sensitize the policy makers and sectoral experts to come forward and face the challenges posed by IAS and its devastating impact on biodiversity. Whereas policy guidelines on IAS are also reflected in the National Forest Policy, 2015, and draft National Wildlife Policy, 2018.

The national target 9 has proposed three sub-targets related to the assessment of threats, prevention measures to control the spread of IAS and development of appropriate legislative framework by 2020.

Level of application:

- ☐ Regional/multilateral
- ☒ National/federal
- ☒ Subnational

Relevant websites, web links, and files:

- www.mocc.gov.pk/nbsap
- www.cabi.org
- [IUCN Pakistan. The Ecological Baseline Study of Astola Island](#)

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.

The Arabian Sea is a biodiversity rich area, included in Global 200 Priority Ecosystems. Anthropogenic activities have contributed to habitat degradation and have led to a decline of the mere coral deposits in Pakistani waters. Corals are a diverse group of organisms belonging to the Phylum Cnidaria. In Pakistani waters (Churna and Astola Islands), the hard corals are common. Though no true coral reefs have been found in Pakistan, there is evidence of a proto-reef (a reef in its early stages of formation) at Astola Island (Ali *et. al.*, 2014).

Corals are important in supporting diversity because they structure complex habitats. They serve as a home for a great number of fish species. The offshore small islands are considered biodiversity hotspots while uplifted strata, especially along the Balochistan coast, have rich fossil coral diversity. Ecological baseline study of Astola Island carried out in 2017-18 recorded, 11 species of hard corals belonging to 5 families and 7 genera. Comparison to the previous study (Ali *et. al.*, 2014), 2017-18 study shows a marked reduction in coral cover. Fragile coral colonies at both these Islands have been damaged on a large scale mainly due to careless recreational activities (SCUBA and skin diving) and pollution. Increasing anthropogenic activities (diving, fishing, boat anchorage, fish dumping) at the islands are the main reason of the declining coral cover. Studies have proved that careless tourism is a major cause of reef destruction. However it needs further studies to understand the phenomenon of climate change and its impact on coral reef decline in Pakistan. Declaration of Astola Island as the first marine protected area of Pakistan will help in protecting this valuable resource and to save the associated biodiversity. This specialized target to explore, restore and conserve coral diversity will require special management measures.

Level of application:

- ☐ Regional/multilateral
- ☒ National/federal
- ☒ Subnational

Relevant websites, web links, and files:

- www.mocc.gov.pk/nbsap
- [IUCN Pakistan. The Ecological Baseline Study of Astola Island](#)

Target 11: By 2020, at least 17 percent of terrestrial and inland water, and 10 percent 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.

Pakistan has a well-established network of protected areas, including national parks, wildlife sanctuaries, game reserves and a large number of private as well as community managed areas.

Aichi Biodiversity Target-11 calls for the expansion of protected areas coverage both at landscape and seascape levels. Further, it also emphasizes the importance of effective and equitable management, ecological representativeness, connectivity of the protected areas system, recognition of other effective area-based conservation measures, and a focus on areas of particular importance for biodiversity and ecosystem services. The protected areas network of Pakistan extends over 13% of the total area of the country. In addition to this, in June 2017, Astola Island has been notified as the first marine protected area of the country.

In Pakistan, marine protected areas need to be strengthened to ensure long term conservation of coastal and marine biodiversity, including globally important marine turtles, dolphins, porpoises, whales and many species of birds and to safeguard livelihoods of local dependents on coastal fisheries resources. Moreover, wildlife rich areas and corridors outside PA's also require due attention to maintain ecological and genetic connectivity. Such areas shall be effectively secured by developing, strengthening and restoring habitats and managing ecological corridors.

Under this ambitious national target eight sub-targets with several proposed activities have been envisaged in the NBSAP.

Level of application:

- ☐ Regional/multilateral
- ☒ National/federal
- ☒ Subnational

Relevant websites, web links, and files:

- www.mocc.gov.pk/nbsap
- [IUCN Pakistan, The Ecological Baseline Study of Astola Island](#)

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.

Pakistan has faced recent loss of important species, such as, gavia and black buck. Moreover in the last two-three decades, various assessments and studies have determined that because of different reasons several species of wild animals are in danger of extinctions in Pakistan. However due to concerted efforts, some of them, such as mahashar fish, long-billed vulture,

blind Indus dolphin, are now out of immediate danger, whereas remaining species, like musk deer, sarus crane, great Indian bustard, lesser florican, white-backed vulture, chir pheasant and western-horned tragopan, are still included in Critically Endangered category. However, initiatives like declarations of Musk Deer National Park and Poonch River Mahasher National Park have helped to improve the status of some of the threatened species. Further, based on global diversity indicators tracked by different conservation organizations and researchers of 'Flora of Pakistan' believe that out of more than 6,000 flowering plant species of Pakistan, 465 are threatened, of which 50 are on the verge of extinction (2015).

The fight to save these species is not just about them; their disappearance is an indicator that there is a loss of habitat for other species as well. All such species are accorded the highest level of protection under provincial wildlife laws. The loss of biodiversity is resulting in the loss of livelihoods of local inhabitants, in the short term, and lowered ecological resilience that can severely impact human health and the economy in the long term. This national target is further divided into four sub-targets.

Level of application:

- ☐ Regional/multilateral
- ☒ National/federal
- ☒ Subnational

Relevant websites, web links, and files:

- <http://www.tropicos.org/Project/Pakistan>
- http://www.efloras.org/flora_of_Pakistan

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.

The agriculture sector in Pakistan has been facing a number of major challenges over the last decade. As a result, the performance of this sector has been lower than its potentials in recent times. One of the major factors underlying this underperformance is genetic erosion faced by replacing different varieties of cultivated plant species with drought resistant climate smart ones.

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. The gaps in the *in-situ* and *ex-situ* conservation of the agro-biodiversity will be assessed and measures will be taken to fill the gaps. Important local varieties, land races and breeds will be improved to pursue the NBSAP target in line with ABT's. This will be done by updating the strategy for agricultural plant and livestock genetic resources. The lead agency to carry out this task will be Bio-Resource Conservation Institute (BCI).

Level of application:

- ☐ Regional/multilateral
- ☒ National/federal
- ☒ Subnational

Relevant websites, web links, and files:

- <http://www.parc.org.pk/>

Target 14: By 2020, ecosystems that provide essential services, including services related to water, and contribute to health, livelihood and well-being, are restored and safeguarded, taking into account the needs of women, indigenous and local communities, and the poor and vulnerable.

The ecological health of Pakistan's natural 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 peasants, making significant contributions to the national economy with a potential for economic development and growth. Due to the economic significance of these assets, there is a need of biodiversity valuation studies to attract investments for restoration of biodiversity and alleviation of poverty. Mangroves also play key ecological and socio-economic roles, as these provide habitat for commercial fisheries and other aquatic species. The measurement, valuation and monitoring of important ecosystem services is therefore critical for ensuring sustainability of its various benefits.

Two terrestrial ecosystems of Pakistan, including Western Himalayan Temperate Forests and Tibetan Plateau Steppe, are included in the list of global 200 priority ecosystems of the Millennium Ecosystem Assessment with the status of endangered and vulnerable, respectively. Under this national target the 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.

Level of application:

- ☐ Regional/multilateral
- ☒ National/federal
- ☒ Subnational

Relevant websites, web links, and files:

- <http://www.mocc.org.pk/nbsap>

Target 15: By 2020, ecosystem resilience and the contribution of biodiversity to carbon stocks has been enhanced, through conservation and restoration, including restoration of at least 15 percent of degraded ecosystems, thereby contributing to climate change mitigation and adaptation and to combating desertification.

The national target focuses on restoration of at least 20% of the degraded ecosystems of ecological significance to combat desertification and to demonstrate economic, social and cultural benefits. Further at least 25 percent of all the degraded forest ecosystems will be restored to improve their resilience and contribution to carbon stocks. Pakistan's ecological high value mountain, riverine and mangrove ecosystems provide multiple economic benefits and environmental services.

In this regard country-wide afforestation activities and ongoing projects like sustainable forest management and sustainable land management programme to combat desertification will help to achieve the set targets. Further through these initiatives not only enhanced ecosystem resilience and improvement in environmental practices will be showcased but will also provide improved ecological services and promote biodiversity conservation. The need to mainstream the management of natural resources into national policy, planning and the budgeting process has, therefore, become critical to ensure that the use of the resources is sustainable.

Level of application:

- ☐ Regional/multilateral
- ☒ National/federal
- ☒ Subnational

Relevant websites, web links, and files:

<https://www.mocc.org.pk/nbsap>

<https://www.info.undp.org/sfm>

<https://www.undp.org/slmp>

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.

Pakistan ratified the Nagoya Protocol on 'Access and Benefit Sharing (ABS)' arising from the utilization of genetic resources under Convention on Biological Diversity in 2016. Pakistan has also developed its model ABS law prior to accession of instrument in 2012 to ensure effective implementation of protocol. Draft ABS legislation intends to facilitate access to genetic resources and their derivatives for environmentally-sound uses, protecting associated traditional knowledge, equitably sharing benefits derived from these, promoting technology transfer and building associated scientific knowledge and technological capacity.

The national target set for the ratification of Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization had been achieved in 2016, however, the draft ABS Act of Pakistan is not yet approved and adopted.

The ABS 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 these, promoting technology transfer and building associated scientific knowledge and technological capacity. The act is a legislative requirement under the protocol to which Pakistan is a party, and is intended to protect community rights with respect to genetic resources, including: (1) The inalienable right to 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.

As far as the Access to Plant Genetic Resources and Fair and Equitable Sharing of PGR; the Pakistan Agricultural Research Council, under the Ministry of National Food Security and Research, is the relevant agency. However, the mechanism for Fair and Equitable Sharing of Benefits Arising from their Utilization is not in place. The Director, Bio-resources Conservation Institute is the National Focal Point for the International Treaty (ITPGRFA-FAO) and projects undertaken for the implementation of International treaty.

Level of application:

- ☐ Regional/multilateral
- ☒ National/federal
- ☒ Subnational

Relevant websites, web links, and files:

- <https://www.mocc.org.pk/nbsap>
- **Pakistan Access to Genetic Resources and Benefit-sharing Act, 2012 (Draft)**

Target 17: By 2015, each Party has developed, adopted as a policy instrument, and has commenced implementing an effective, participatory and updated national biodiversity strategy and action plan.

Pakistan has developed its National Biodiversity Strategy and Action Plan (NBSAP) 2017-2030 after extensive countrywide stakeholders consultations. Subsequently, the Prime Minister has accorded approval to NBSAP in November, 2018. This national document has been prepared in line with Aichi Biodiversity Targets (ABT) 2011-2020 and Sustainable Development Goals (SDGs) to meet the national as well as global commitment to implement the objectives of UN Convention on Biological Diversity (CBD).

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. The proposed actions are further classified into 31 thematic areas.

NBSAP will provide strong basis for integration of biodiversity conservation into national policy and planning process. The Implementation of NBSAP for Pakistan requires the leadership of

federal, provincial, territorial governments of AJK and GB and the effective participation of local communities, non-governmental organizations, and the general public, hence a coordination and participation is necessary.

Level of application:

- ☐ Regional/multilateral
- ☒ National/federal
- ☒ Subnational

Relevant websites, web links, and files:

<https://www.mocc.org.pk/nbsap>

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 Convention with the full and effective participation of indigenous and local communities, at all relevant levels.

The important role of indigenous peoples and local communities and their associated traditional knowledge (TK) have been very much recognized by the world community and international forums like the CBD, and Intergovernmental Science Policy Platform on Biodiversity and Ecosystem Services (IPBES). In many parts of the world indigenous knowledge and collective wisdom of the local communities might be the only source of knowledge base to understand the ecosystems.

Similarly, in Pakistan traditional knowledge and its application in natural resource management is well recognized, like in other developed society of the world. In the past indigenous resource management institutions and their role to manage these resources on sustainable basis was quite visible. In the changed scenario, the weakening of these institutions has deepened the crises by augmenting the natural resource degradation process in their respective areas.

Pakistan is convinced of the important role of local communities in the protection and conservation of biological diversity to achieve the Aichi Targets adopted by the country. 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.

Level of application:

- ☐ Regional/multilateral
- ☒ National/federal
- ☒ Subnational

Relevant websites, web links, and files:

- <https://www.mocc.org.pk/nbsap>
- Country Report Pakistan-Territories and Areas Conserved by Indigenous and Local Communities, 2018

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.

Keeping in view the importance of knowledge on the science base and technologies relating to biodiversity, a national target has been set with following five sub-targets:

- A cross boundary coordination mechanism between India and Pakistan will be developed to protect the watershed values of Indus Basin, which shall combat water scarcity and conserve wetland biodiversity.
- A GIS lab will be established for assessing health (deforestation) and condition (degradation) of forests, ecosystems and habitats and maps prepared compatible with remote sensing technologies to identify conservation priorities and opportunities.
- A forest and ecosystem classification system using agreed international standards including broad indicators of biodiversity will be developed.
- The gap between the scientists and conservationists will be bridged to improve the knowledge and practice of biodiversity conservation.
- 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 levels.

Level of application:

- ☐ Regional/multilateral
- ☒ National/federal
- ☒ Subnational

Relevant websites, web links, and files:

<https://www.mocc.org.pk/nbsap>

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 assessment to be developed and reported by Parties.

The estimated financial resources of US \$74.8 million have been proposed in the NBSAP for its successful implementation. However, many of the recommendations contained in the Plan can be implemented through policy and legal reforms only. The strategy is to use the existing funding sources, ongoing development activities and transform existing public sector programmes more inclined towards biodiversity conservation. The plan developed innovative funding mechanisms to implement most of the programmes outlined in the programme. The plan also seeks partnerships with the private sector, NGOs and other civil society organizations.

The targets for creating biodiversity awareness will be integrated in the annual and medium term development plans. Additional financial resources if needed for implementing NBSAP will be mobilized through GEF and other windows.

Level of application:

- ☐ Regional/multilateral
- ☒ National/federal
- ☒ Subnational

Relevant websites, web links, and files:

<https://www.mocc.org.pk/nbsap>

Section II

Implementation measures taken, assessment of their effectiveness, associated obstacles and scientific and technical needs to achieve national targets

Describe a measure taken to contribute to the implementation of your country's national biodiversity strategy and action plan

Awareness Raising Activities

Lack of awareness often costs loss of biodiversity. Therefore, awareness about the consequences of the loss of biodiversity and its impact on human well-being is of prime importance and requires people, policy makers and planners to be well aware about the biodiversity and ensure its sustainability.

During the reporting period (July 2014 to December 2018) well planned and targeted efforts have been made in Pakistan to achieve this ABT. In this regard around one hundred awareness events and relevant activities have been organized at the national and sub-national levels in partnership with the leading NGOs and other public and private organizations like IUCN, WWF, SDPI, LEAD Pakistan, Serena Hotels, AKRSP, Mangroves for the Future (MFF) program, Ministry of Climate Change, Pakistan Museum of Natural History, National Agricultural

Research Council, Zoological Survey of Pakistan, National Institute of Oceanography, Provincial Environment, Forests, Wildlife and Fisheries departments, Academic institutes etc. Many of these events directly addressed the thematic areas of biodiversity, whereas some such activities indirectly conveyed the message of the importance of biodiversity. All-important international days, such as international biodiversity day, international mountain day, world migratory birds day, world water day, world oceans day, world environment day, international day of forests, world wetlands day, world day to combat desertification, world wildlife day, international snow leopard day, world fisheries day, world maritime day, monsoon and spring tree planting campaigns, etc. were observed at federal, provincial and local levels.

Leading NGOs, like IUCN Pakistan, WWF-Pakistan, SDPI and other organizations have published a number of informative publications including brochures, leaflets, identification guides, infographics, posters and other communication materials for creating awareness among stakeholders, students and general public. In addition, a number of seminars, workshops, walks and talks have also been organized with the support of the corporate sector, regional and UN agencies. All these events were very well captured by the print and electronic media.

Bio-resources Conservation Institute (BCI) and its allied institutions have also organized several awareness seminars in the federal Capital, Khyber Pakhtunkhwa and Punjab on the importance of biodiversity and its conservation. Students from several universities also visited BCI facilities to acquire firsthand information on work carried out by the institute regarding preservation of genetic resources. In addition, the Billion Trees Afforestation Project (BTAP) of Khyber Pakhtunkhwa (KP) Government has also contributed positively to creating awareness about biodiversity conservation and related ABTs through use of print, electronic and social media, involvement of public representatives, religious leaders, educational institutions, the judiciary, the armed forces, and civil society. Further an exclusive project website was created for sharing information (<http://billiontreeproject.kp.gov.pk/>).

For the implementation measure, please indicate to which national or Aichi Biodiversity Target(s) it contributes

Aichi Target 1,
NBSAP Target 1,

Assessment of the effectiveness of the implementation measure taken in achieving desired outcomes:

- ☒ Measure taken has been effective
- ☐ Measure taken has been partially effective
- ☐ Measure taken has been ineffective
- ☐ Unknown

Relevant websites, web links and files:

http://issuu.com/youngnation/docs/young_nation_magazine_09_august_201/15?e=2479522/8887770
http://epaper.dawn.com/DetailNews.php?StoryText=11_08_2014_116_007
<http://pakistan.worldnewsviews.com/2014/08/23/200-smuggled-turtles-brought-home-from-china/>

<http://www.dawn.com/news/1127745/call-for-research-on-invasive-species-threatening-environment>
<http://www.dawn.com/news/1132199>
<http://www.brecorder.com/agriculture-a-allied/183/1244242/>
<http://tribune.com.pk/story/816992/karachis-mangroves-defence-against-storms-and-tsunamis-threatened/>
<http://www.thenews.com.pk/Todays-News-4-302057-WWF-P-eco-guard-rescues-dolphin-at-Sandspit>
<http://www.thenews.com.pk/Todays-News-4-306714-Ajmal-joins-Earth-Hour-celebrities-club>
<http://www.thenews.com.pk/Todays-News-4-310996-A-carnival-for-environmental-awareness>
<http://www.thenews.com.pk/Todays-News-4-324246-Experts-for-use-of-sustainable-fishing-practices>
<http://www.thefridaytimes.com/tft/conservation-and-islam/>
<http://tribune.com.pk/story/972996/alarming-situation-natural-resources-in-coastal-belt-in-danger-experts-warn/>
<http://www.dailytimes.com.pk/national/21-Nov-2015/report-released-on-delta-ecosystem-in-indus-river>
<http://thenaturenews.com/category/wild-life/endangered-species/>
<http://www.dailytimes.com.pk/E-Paper/Lahore/2016-02-03/page-15/detail-3>
<http://tribune.com.pk/story/1042356/reminder-to-govt-policies-needed-to-protect-biodiversity/>
<http://www.brecorder.com/general-news/172:pakistan/15119:workshop-on-illegal-wildlife-trade-held/?date=2016-02-11>
<http://pamirtimes.net/2016/03/22/wwf-and-partners-celebrate-world-water->
<http://www.dailytimes.com.pk/E-Paper/Lahore/2016-03-30/page-15/detail-5>
<https://www.thenews.com.pk/print/147342-International-Vulture-Awareness-Day-marked>
http://epaper.dawn.com/DetailNews.php?StoryText=23_10_2016_152_009
http://epaper.dawn.com/DetailNews.php?StoryText=26_01_2017_153_004
<https://www.thenews.com.pk/print/183587-Experts-stress-need-for-conservation-of-wetlands>
<https://tribune.com.pk/story/1345187/world-wildlife-day-wwf-p-wants-youth-help-serve-environment/>
http://www.dailymail.co.uk/wires/reuters/article-4318452/Billion-tree-tsunami-surges-northern-Pakistan.html?ito=whatsapp_share_mobile-top
<https://timesofislamabad.com/international-forest-dayrebuilding-pakistan-forest-cover/2017/03/21/>
<https://www.thenews.com.pk/print/205994-GCU-observes-biological-diversity-day>
<https://www.thenews.com.pk/print/234639-World-Animal-Day-observed>
<https://fp.brecorder.com/2017/11/20171122237127/>
<https://www.thenews.com.pk/print/288344-world-wildlife-day-observed>
<https://tribune.com.pk/story/1691219/1-world-earth-day-give-use-plastic-save-environment/>

<https://www.dailymotion.com/search/greenjournalist1>
<http://www.k2times.com/index.php?Issue=&page=5&date=2017-12-30>
<http://www.hamariweb.com/articles/article.aspx?id=100292>

<https://www.youtube.com/watch?v=uUFqRGWNnYI&t=4s>
<http://www.k2times.com/index.php?Issue=&page=5&date=2017-12-28>
<http://photo.icimod.org/story/earning-through-turning-waste-resources-products>

<http://mahasib.com.pk/epaper/page.php?id=2&edition=abbottabad&dt=27-03-2018>

<https://www.youtube.com/watch?v=OiDCTL8aXEM&t=21s>

<http://mahasib.com.pk/epaper/page.php?id=2&edition=abbottabad&dt=29-12-2017><https://epd.punjab.gov.pk/system/files/PolicyonControllingSmogFinal.pdf>

Describe a measure taken to contribute to the implementation of your country's national biodiversity strategy and action plan

Billion Tree Tsunami and Green Pakistan Programmes

Pakistan, with a per capita forest area of 0.02 hectare compared to the world average of 1 hectare, is one of the low forest cover countries. The current forest cover of Pakistan is around 5.1 percent of the total land area (PFI 2016), which is extremely inadequate, considering the expected future climatic change threats.

Billion Trees Afforestation Project

In 2014, the Government of Khyber Pakhtunkhwa (KP) as a part of the “Green Growth Initiative” initiated the Billion Trees Afforestation Programme (BTAP), and planted one billion seedlings in less than three years. According to the International Union for Conservation of Nature, 350,000 hectares of forests and degraded lands are being restored under this initiative, surpassing KP's commitment to the Bonn Challenge of restoring 348,000 hectare. The stated objectives of BTAP were: 1) to increase forest area in KP by 2 percent in five years, 2) to rehabilitate degraded forests, 3) to conserve KP forests as valuable natural asset for future generations, 4) to establish rules for REDD+ to assign carbon value to forests, and; 5) to support skill development, awareness and sensitization. The project also attached special importance to biodiversity conservation and aimed at improving wildlife habitat in various ecosystems, including dry temperate ecosystem, moist temperate ecosystem, sub-tropical chir-pine ecosystem, sub-tropical evergreen broad-leaved ecosystem, and tropical thorn ecosystem, to achieve the Aichi Biodiversity Targets by increasing in natural and indigenous vegetative cover. According to the World Wide Fund for Nature (WWF-Pakistan), which carried out independent monitoring of the initiative in 2015, the average survival rate was 86 percent in block plantations, 79 percent in roads and canal-side plantations, 72 percent in saline and waterlogged plantations, and 65 percent in farm forestry.

The BTAP not only met Pakistan's Bonn Challenge commitment, it was also ranked as the 4th largest initiative by the Plant for Planet Foundation and UNFCCC declared it as the 6th Forestry Tiger during COP 21, and also received recognition from the World Economic Forum.

Green Pakistan Programme

Learning from the successful implementation of BTAP, the Federal Government on the special directives of the Prime Minister of Pakistan launched the largest national-level afforestation programme - the Green Pakistan Programme (GPP) in 2016 as a proactive response to a number of threats, issues and challenges faced by the country's meager but ecologically significant forestry and wildlife resources. The programme has the overall objective 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 has three specific objectives i.e., plantation of 100 million plants of indigenous and fast growing tree species, including flowering and fruit trees; strengthening policy milieu for conservation and biodiversity; and supporting communication measures and demand mobilization for environmentally resilient Pakistan.

The GPP, coordinated by the Ministry of Climate Change, at the federal level and implemented by the provincial forest and wildlife departments and federating entities plans to implement this project over five years (2016–2021) with a total cost of Pak Rupees 4794 million to make the country greener. The umbrella GPP project has two broader components:

1. Revival of forestry resources in Pakistan, and
2. Revival of wildlife resources in Pakistan.

Under its forestry component, till December 2018, Green Pakistan Programme has achieved a target of planting and regenerating 26.77 million plants through different afforestation, plantation and natural regeneration activities. Under wildlife component of GPP progress has been made on habitat improvement, establishment of new community managed protected areas and establishment of improved protection and watch and ward system.

For the implementation measure, please indicate to which national or Aichi Biodiversity Target(s) it contributes

Aichi Target 5, 7, 10,
NBSAP Target 5, 7, 10,

Assessment of the effectiveness of the implementation measure taken in achieving desired outcomes:

- ☒ Measure taken has been effective
- ☐ Measure taken has been partially effective
- ☐ Measure taken has been ineffective
- ☐ Unknown

Please explain the selection and where possible indicate the tools or methodology used for the assessment of effectiveness above

The Billion Tree Afforestation Project (BTAP) is being implemented in Khyber Pakhtunkhwa province with the full involvement of local communities, civil society organizations and line public sector departments. Similarly, the Green Pakistan Programme (GPP) also adopted a widespread participatory afforestation approach through provincial and federating forestry departments across Pakistan. All segment of society such as students, youths, and farmers are actively involved in the afforestation activities. Upscaling of this programme is in the process to make Pakistan an ecologically stable and a climate resilient country.

Relevant websites, web links and files:

- <https://www.facebook.com>
- <http://www.bonnchallenge.org/content/pakistan-kpk>
- <http://www.moc.org.pk/>

Impact of Biodiversity - Billion Trees Afforestation Project - IUCN Pakistan 2018

Khyber Pakhtunkhwa (KP) Province of Pakistan has implemented the Billion Trees Afforestation Project (2014-2018) to achieve a number of sectoral goals, including biodiversity conservation and carbon sequestration. The major interventions proposed for the achievement of the above objectives include: establishment of enclosures to promote natural regeneration of degraded natural forests. This intervention has been implemented in five major ecological zones in the province, viz., dry temperate zone, moist temperate zone, sub-tropical chir pine zone, sub-tropical broadleaved or scrub forest zone and dry tropical thorn forest zone.

Assessment of the biodiversity impact of BTAP was carried out independently by IUCN Pakistan in 2018. This study also assessed BTAP's contributions towards various forest ecosystem services, such as provisioning services, regulatory services, supporting services, and cultural/informational services. Further, it highlighted the role the project is playing and the contributions it can make to various Multilateral Environmental Agreements (MEAs) and relevant sustainable development related policies, strategies and actions plans.

Based on the assessment made by IUCN, the establishment of enclosures under BTAP to restore degraded natural forests through assisting natural regeneration processes by protecting the young seedlings of indigenous species from grazing, fire and other anthropogenic disturbances is a leap forward towards biodiversity conservation. The value of this intervention for biodiversity conservation lies in the fact that it follows the ecological principles of forest rehabilitation because it makes use of indigenous species. Moreover, it aims at restoration of degraded sites rather than replacing natural ecosystems, such as forests, grasslands and shrub lands. The restoration of species richness and community structure over time due to enclosures also implies increasing ecosystem complexity and functionality. Enclosures under BTAP therefore will not only increase forest cover but will also enhance forest ecosystems quality and improve wildlife habitats.

This study finds that the enclosure intervention of BTAP is an initiative of great ecological significance, contributing to meeting Pakistan's obligations under various MEAs/international conventions (CBD, UNCCD, UNFCCC, CITES, CMS, Ramsar Convention, their protocols, Aichi Biodiversity Targets, Bonn Challenges Targets and Commitments and SDGs), and to the achievement of the objectives of various national and provincial policies, strategies and action plans, such as the National Biodiversity Strategy and Action Plan, KP Biodiversity Strategy and Action Plan, Climate Change Policy and Action Plan, National Wetlands Policy, National Environment Policy, National and Provincial Forest Policies, and Rangeland Policies.

Relevant websites, web links and files:

www.iucn.org/pakistan

Other relevant information

National Forest Policy 2015

In 2017, Pakistan adopted its first 'National Forest Policy, 2015' after approval from the Council of Common Interest. The goal and objectives of this policy are expansion, protection, and sustainable use of national forests, protected areas, natural habitats, and watersheds for

restoring ecological functions and improving livelihoods and human health in line with the national priorities and international agreements. Some of the interventions proposed in the policy are establishment of a transboundary ecological corridor with activities of protection, restoration and regeneration of native species and promotion of integrated approach of forest, wildlife and biodiversity management.

Objectives:

- Promoting ecological, social, and, cultural functions of forests through sustainable management and use of forest products, including wood and non-wood forest products
- Implementing a national-level mass afforestation program to expand and maintain optimum forest cover
- Maximizing forest areas by investing in available communal lands/shamlats and guzara forests and urban forestry
- Facilitating and harmonizing inter-provincial movement, trade and commerce of wood and non-wood forest products through the Federal Forestry Board
- Interlinking natural forests, protected areas, wetlands, and wildlife habitats to reduce fragmentation
- Enhancing the role and contribution of forests in reducing carbon emissions and enhancing forest carbon pools
- Facilitating implementation of international conventions and agreements related to forestry, wetlands, biodiversity and climate change
- Promoting standardized and harmonized scientific forest planning, research and education, including for community-based management.

Relevant websites, web links and files:

<http://www.moc.org.pk/>

Sustainable Forest Management (SFM) Project

GEF-UNDP funded SFM project was launched in 2017 with an objective to promote sustainable forest management in Pakistan's Western Himalayan temperate coniferous, sub-tropical broadleaved evergreen thorn (scrub) and riverine forests for biodiversity conservation, mitigation of climate change impacts and securing of forest ecosystem services. In particular, it aims at implementation of three inter-related and mutually complementary components, that are focussed at addressing the barriers of inadequate planning, regulatory and institutional frameworks to integrate forest resource management, and the inadequate experience among key government and civil society stakeholders in developing and implementing SFM practices on the ground.

Component 1 will support the incorporation of sustainable forest management objectives and safeguards in forest management planning, forestland allocation and compliance of monitoring

systems at the local level. Component 2 will identify, demarcate and implement on-the-ground approaches to improve management of high conservation value forests within seven landscapes covering an area of 67,861 hectares with the aim of meeting the life requisites of the target species, and habitats such as breeding areas, feeding areas, water sources, dispersal and connectivity corridors, etc. Component 3 will develop practical approaches to enhance carbon sequestration through restoring degraded and former forested areas (LULUCF activities) by a combination of restoration and reforestation of 10,005 hectare of degraded conifer forests; 3,400 hectare of degraded scrub forests, and reforestation of 13,099 hectare of riverine forests with native species.

Relevant websites, web links and files:

<https://info.undp.org/sfm>

Rehabilitation of Indus Delta Mangroves (2015-2018)

Sindh Forest Department has demonstrated progress not only in halting the deforestation of mangroves but has also reversed it through massive plantations. Mangrove stocked area has been enhanced through their steady efforts. It is worth mentioning that the rehabilitation efforts of Indus delta mangroves are successful only due to adaptation of sustainable forest management principles and concerted and coordinated efforts of all stakeholders, including Sindh Forest Department, other provincial and federal government departments, international and local NGOs, neighboring communities and donor agencies. The successful rehabilitation of mangroves in Indus delta is a model that can be replicated. Sindh government has shown special commitment in the rehabilitation of Indus delta in the last few years, and it needs to be continued to get sustainable benefits of biodiversity conservation and welfare of the society from the rehabilitated Indus delta mangroves. Community engagement and watch and ward system; and engaging households for the protection of mangroves have resulted in the successful rehabilitation of the Indus delta. The management plan has also been developed for Mangrove forests in Balochistan province under a development project, viz., "Extension of Mangrove Plantation in Coastal Districts of Balochistan (2013-2017)".

Relevant websites, web links and files:

- <https://www.sfd.org.pk/mangroves>

South Punjab Forest Company

The South Punjab Forest Company (SPFC) is one of the leading forestry institutions established in 2017 with a unique model that supports the government in meeting its national and international obligations in the context of SDGs, Pakistan's Climate Change Policy, Vision 2025 and many international agreements to mitigate and stabilize the climate change impacts at a time when Pakistan has become the 7th most vulnerable country to climate change. This public private partnerships initiative is being looked after by a team of renowned professionals.. This climate compatible initiative in Punjab is equally rewarding as the Billion Tree Tsunami Project implemented in KP. It will help to afforest 100,000 acres of land in the South Punjab, which at the moment is lying barren. This Company is a pioneer in the country and will create green employment, promote green industry, reduce carbon emissions, improve vegetation cover, and will act as a revenue generating engine for the government. The Company is owned by the provincial government through legal provisions and will also help in preventing the encroachment of the land by the influential.

SPFC is a public sector not-for-profit company, established in the province of Punjab under the Forestry, Wildlife & Fisheries Department (FW&FD), through a notification dated March 16, 2016, assigning 134,995 acres of blank forest land, spreads across 42 forest areas falling in six districts of the South Punjab i.e. Dera Ghazi Khan, Rajanpur, Muzaffargarh, Bahawalpur, Bahawalnagar and Rahim Yar Khan. The model aspires to increase public private partnerships (PPPs) in the forestry sector that will empower entrepreneurs and improve biodiversity by increasing forest cover of the country.

- *(Feasibility Report (2017). Transaction advisory services for afforestation projects in south Punjab under PPP mode by Grant Thornton Consulting (Pvt) Ltd).*

Relevant websites, web links and files:

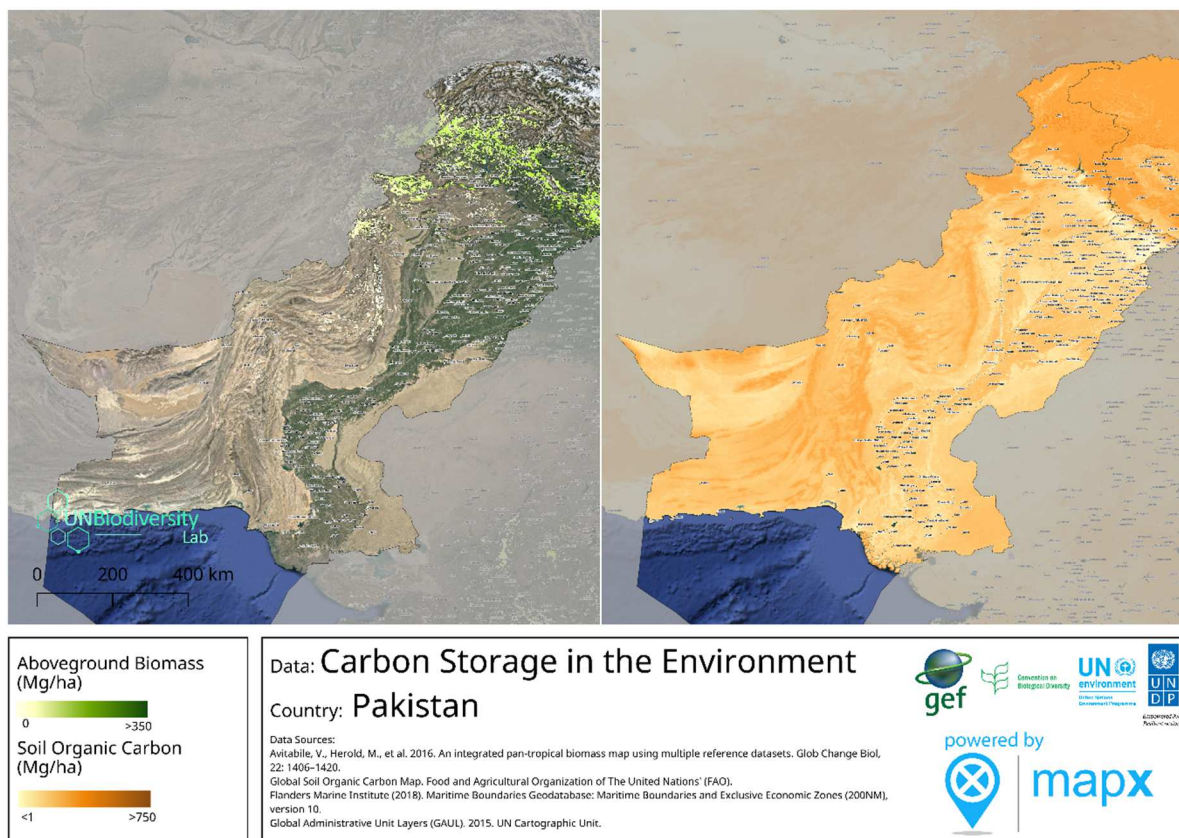
<https://spfc.org.pk/>

REDD+ Readiness Project

The REDD+ process was initiated by the Government of Pakistan in 2009 with preliminary awareness raising activities. In June 2011, Pakistan joined the UN-REDD Programme and has taken steps to start implementing REDD+ readiness activities through its targeted support fund. A REDD+ Coordination Committee was constituted, which was later redesigned as National Steering Committee (NSC) in 2012 by Ministry of Climate Change in order to facilitate stakeholders' coordination and oversee REDD+ implementation in Pakistan.

Pakistan formally became a member of the Forest Carbon Partnership Facility (FCPF) of the World Bank in July 2013. Due to heavy costs involved and limited availability of public funds to run REDD+ initiatives, Pakistan submitted REDD+ Readiness Preparation Proposal (RPP) for funding to the FCPF which was approved in December 2013 and became effective on May 04, 2015 enabling Pakistan to secure USD 3.8 million to make Pakistan REDD+ ready. Under this first phase Pakistan has prepared its REDD+ national strategy/action plan, national forest monitoring system, national forest reference emission level and a national system of safeguards by 2018. The second phase of this process with additional funding will support ongoing REDD+ Readiness activities to demonstrate on-site results of R-PP to bring Pakistan to a stage where it can claim to have become REDD+ ready by 2020 and to play its obligatory role in climate change mitigation through REDD+ and also support biodiversity conservation directly and indirectly.

Under the FCPF grant, REDD+ Readiness Preparation Activities are broadly categorized into four components. These include REDD+ policy analysis, REDD+ technical preparation, REDD+ readiness management and designing and testing of REDD+ payment for environmental services. These activities have been completed by 2018. The uniqueness of this project output is that its deliverables would make Pakistan compliant with the UNFCCC decisions, in particular the Cancun Agreement on REDD+ and Article 5 of the Paris Agreement.



Relevant websites, web links and files:

- <https://theredddesk.org/location/pakistan>
- <http://redd-pakistan.org>
- Ali, A., 2015. *Biomass and Carbon Table for Major Tree Species of Gilgit Baltistan.* Gilgit Baltistan Forest Department & Pakistan Forest Institute, Peshawar.
- Ali, A., 2017. *Forest Reference Emission Level of Khyber Pakhtunkhwa.* Pakistan Forest Institute, Peshawar.
- Khan A.A. 2017. *Effects of commercial timber harvesting on local economy and forest ecology.* Consultancy report. Kaghan Forest Division. 34 pages.

GB REDD+ Pilot Project

The provincial government of Gilgit-Baltistan (GB) also implemented the REDD+ pilot project during 2014-2017 out of its own Annual Development Programme. The key achievements of this project included: the establishment of GIS lab, reviewing laws and regulations, assessment of forest inventory/ carbon stock of natural forest of GB using data collected from 537 samples, organization of awareness sessions for the stakeholders and capacity building of GB Forest Department staff relevant to REDD+ built through various trainings/capacity building programs.

The GB Government has now initiated REDD+ Phase-II (road map and operational plan for REDD+) aimed at ensuring contribution towards implementation of National REDD+ Strategy

and to develop Provincial Action Plan of GB to reduce greenhouse gas (GHG) emission from forestry sector and to conserve biodiversity in the region.

PAKISTAN'S NATIONALLY DETERMINED CONTRIBUTION

In November 2016, Pakistan ratified the Paris Agreement on Climate Change, and has put forth its Nationally Determined Contributions (NDC), 2017, to signal the commitment that Pakistan has in reducing domestic greenhouse gas (GHG) emissions. The NDCs outline a broad range of potential adaptation and mitigation measures, as well as the challenges associated with the implementation of these measures in current as well as future scenarios. The NDC describes adaptation and mitigation measures already being implemented in Pakistan and draws attention to present and future challenges that the Government of Pakistan would need to address to ensure that the country can adopt and sustain a low carbon development trajectory. Having considered the existing potential for mitigation in the country, Pakistan intends to reduce up to 20% of its 2030 projected GHG emissions subject to availability of international grants to meet the total abatement cost for the projected 20 percent reduction amounting to about USD 40 billion at the current price. Further, Pakistan needs USD 7-14 billion per annum during this period.

Supported by the NDC Partnership, the Ministry of Climate Change is developing a roadmap for the operationalization of NDCs implementation in coordination with line ministries and relevant stakeholders in the public and private sectors. Some of the ongoing and planned interventions directly and indirectly supporting ABTs are:

- ☐ Green Pakistan Programme of tree plantation across Pakistan,
- ☐ Large-scale tree plantation programmes in Khyber Pakhtunkhwa,
- ☐ Conservation of national parks and protected areas,
- ☐ Clean development mechanism,
- ☐ Green Charter for cities,
- ☐ Construction of 1,000 MW Quaid-e-Azam solar park in Punjab,
- ☐ Improvement of urban public transport systems.

Relevant websites, web links and files:

- Policy in Action – Pakistan, NDC Partnership, 2017

Pakistan's Second National Communication on Climate Change - 2018

Pakistan's Second National Communication on Climate Change has been prepared by Ministry of Climate Change, Government of Pakistan, to fulfill the obligatory requirements of UNFCCC. The Second NC contains an update till the year 2015 about efforts identified and undertaken by Pakistan in different thematic areas related to climate change. It also highlights vulnerabilities of the country and presents an inventory of the emission sources and sinks. It also encompasses the aspects related to climate change research, technology, capacities/awareness, besides other areas of climate change communications.

Pakistan, being an active member of international climate negotiations, is part of global efforts to reduce GHG emissions in a way that fits the priorities of its citizens. In line with the other developing countries, it has agreed to craft its nationally appropriate mitigation actions with its national development objectives.

Table – 1GHG emissions by sector

Sectors	Mt CO2	Percentage Share
Energy (Power)	126.694	34.3
Transport	42.572	11.6
Industries	14.301	3.9
Agriculture	165.295	44.8
Forestry and land use change	9.671	2.6
Waste	10.470	2.8

Source: Ministry of Climate Change (2016)

Pakistan reiterates its commitment and obligations towards the UNFCCC and Paris Agreement, and aims to limit the average global temperature increase to 1.5 to 2.0 °C. It will continue to play a meaningful role in global efforts towards achieving this goal. A number of mitigation and adaptation measures and actions are already being taken with domestic resources. Various initiatives/ measures which are to be, or being undertaken for mitigation in different sectors have been spelled out in the Framework for Implementation of Climate Change Policy 2014-30. The second national communication highlights the importance of biodiversity conservation in agriculture, forestry, livestock and water (wetlands and coastal) sectors in the context of GHG emissions and relevant measures, which are directly related to ABTs.

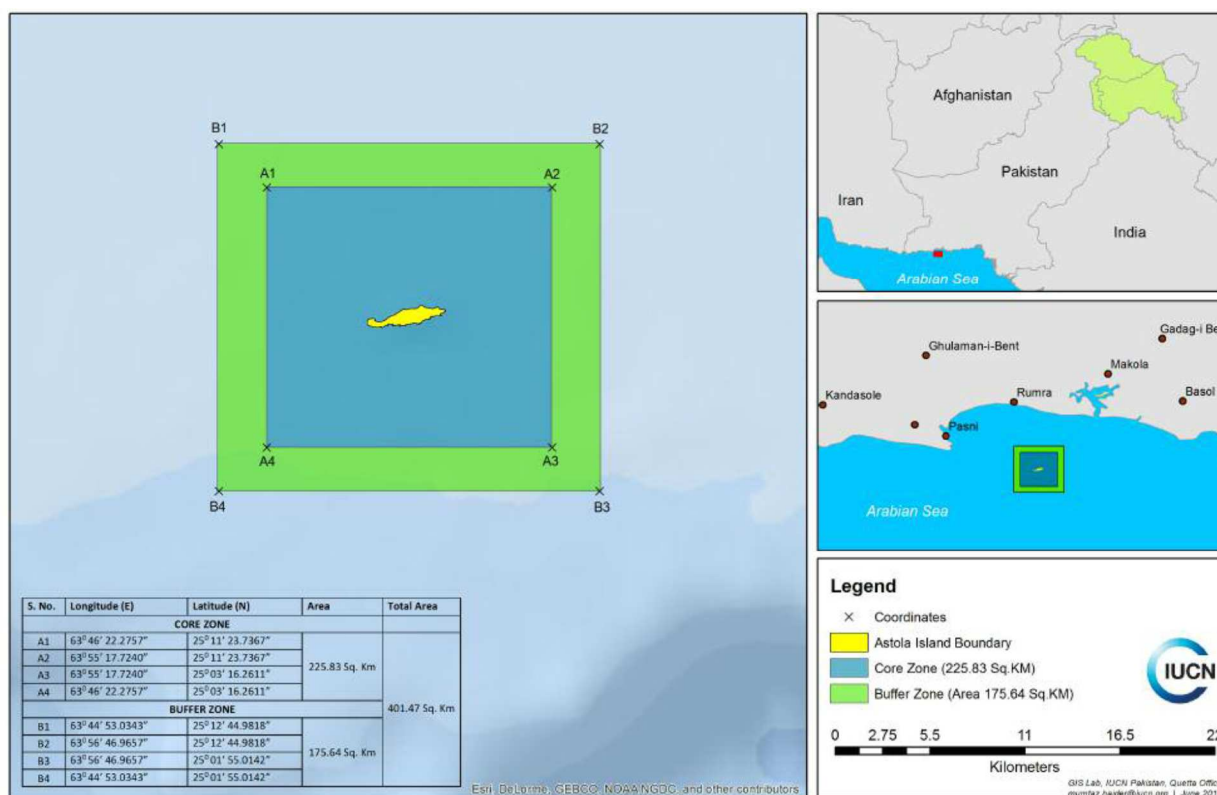
Describe a measure taken to contribute to the implementation of your country's national biodiversity strategy and action plan

ASTOLA ISLAND – First Marine Protected Area of Pakistan

The Astola Island known as “Jezira Haft Talar” (Island of the Seven Hills) is located on the Mekran coast of the Arabian Sea in Balochistan. It was the year 2010 when Pakistan joined the Mangroves for the Future (MFF) a regional initiative and in the same year the world community agreed upon Aichi Biodiversity Targets under the UN Convention on Biological Diversity. One of the Aichi targets invites the country parties to enhance coverage of their marine protected areas network up to 10 percent of its geographical limits. To pursue the target, the MFF National Coordinating Body has provided a platform to understand the situation and explore potential sites for declaration as a Marine Protected Area in Pakistan. IUCN, WWF, Indus Earth, and Balochistan Forest & Wildlife and Fisheries departments facilitated the process with the close cooperation of Pakistan Navy.

The entire process to declare Astola as a marine protected area of Pakistan was completed on 15th June, 2017 under the provisions of Balochistan Wildlife Act, 2014, which involved great commitment and wisdom of different institutions and individuals. Astola covering an area of 6.7 km² with a height of about 240 feet above sea level is the largest, uninhabited offshore island of the country, located at a distance of 20 nautical miles east of Pasni along the north coast of the Arabian Sea. The total area declared as a marine protected area (MPA) around the Astola Island including its buffer zone is 401.47 km². This spectacular spot and surrounding marine water was used earlier by local fishermen for makeshift huts anchoring their boats and catching lobsters and oysters. This island otherwise is almost free of human influence and maintains its pristine wilderness.

Map of Astola Island MPA Core and Buffer Zones



After the notification of the Island as MPA, an ecological baseline and resource use survey was carried out under the supervision of IUCN Pakistan in early 2018 which revealed that Astola's western beach is sandy, whereas other side is steep. As the island is exposed to strong winds with dry conditions, vegetative cover remains sparse. Among animals, visiting green turtles and seabirds are common on the island. Astola also serves as a staging ground for many migratory birds, including pelicans, and the island has already been designated as a Ramsar site – a wetland of international importance. Further, Astola enjoys rich biodiversity and is home to many rare land and sea species. Another noteworthy reptile endemic to island is sub-species of saw-scaled viper. In the breeding season, large flocks of sooty gulls fly in and around the island, making it a paradise for seafowl. In winters, raptors such as saker and eagle can be observed. Moreover Pasni shore and island coasts are major fishing grounds for local fishermen. This area also enjoys exquisite submarine landscape. As coral grows in some places, schools of tropical fish in bright colors can be seen.

During the process, other potential sites like 'Churna Island' and 'Miani Hor' are also identified as candidates for marine protected areas.

For the implementation measure, please indicate to which national or Aichi Biodiversity Target(s) it contributes

Aichi Target 10, 11,
NBSAP Target 10, 11,

Assessment of the effectiveness of the implementation measure taken in achieving desired outcomes:

☐ Measure taken has been effective

- ☒ Measure taken has been partially effective
☐ Measure taken has been ineffective
☐ Unknown

Please explain the selection and where possible indicate the tools or methodology used for the assessment of effectiveness above

National Coordinating Body of MFF has constituted a working group of relevant member organizations to facilitate the process. WWF Pakistan, based on their experience of Pakistan Wetlands Project, carried out the site assessment process. After the approval of NCB, a stakeholders' consultation was carried out at the highest level. Finally the government of Balochistan was approached for issuance of necessary notification. After declaration of Astola as a marine protected area, a scientific baseline study of Astola Island has been conducted to move forward for future management of this PA.

The declaration of Astola Island as MPA has triggered a similar process for Churna and MianiHor with stakeholders, which will lead towards designation of more new MPA's in the country.

Relevant websites, web links and files:

- <http://www.moc.org.pk/nbsap>
- [IUCN Pakistan, The Ecological Baseline Study of Astola Island](#)
- MFF-Pakistan, 2016. A handbook *on Pakistan's Coastal and Marine Resources*. IUCN-Pakistan
- NIO, 2016. *Expert Panel Report on Marine Resources Technology Foresight Exercise*. Pakistan Council for Science and Technology, Ministry of Science & Technology, GoP.

Other relevant information

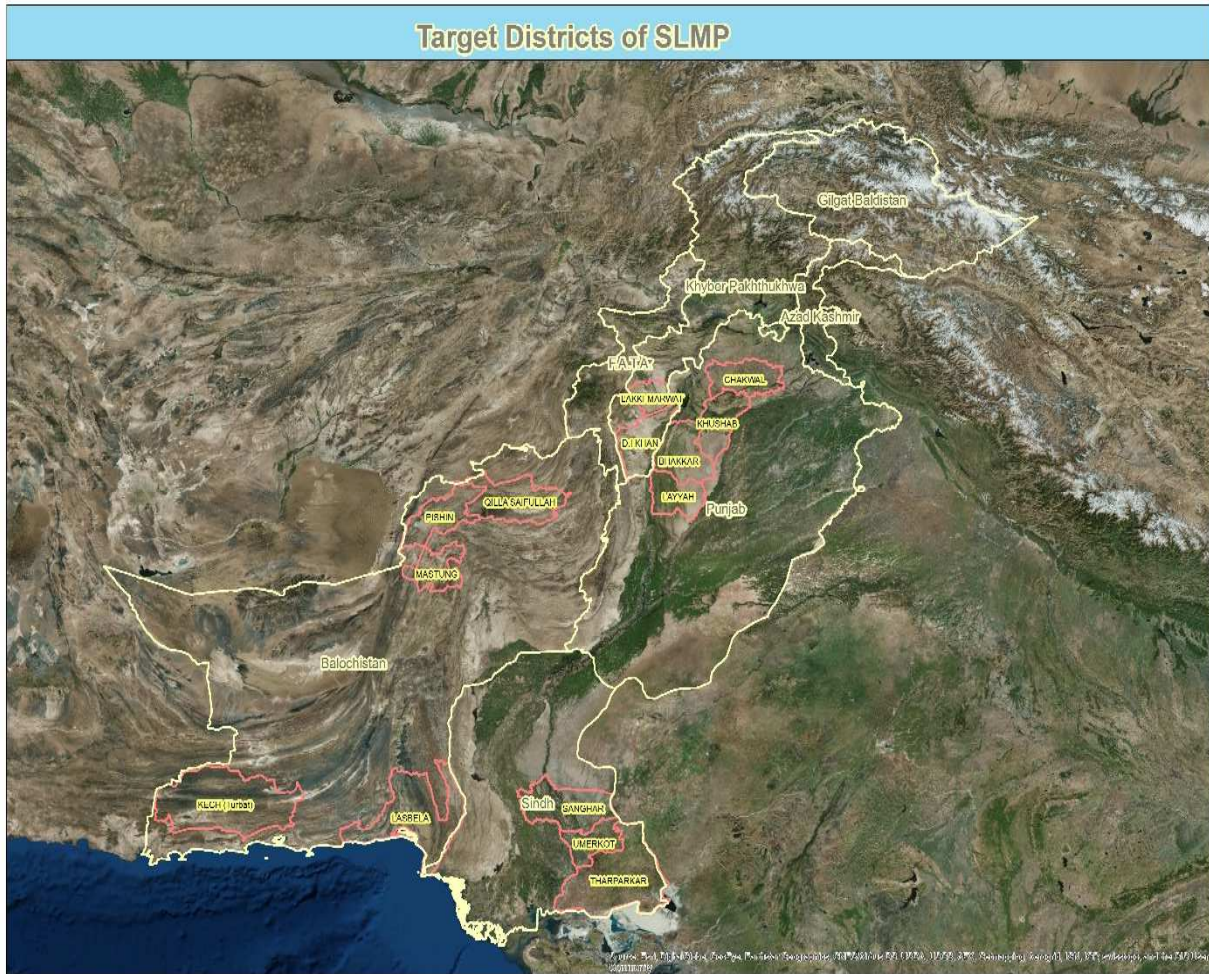
Coastal Resilience in Action – Achievements and Lessons Learned from MFF in Pakistan (2014-2018): In Pakistan, MFF in its third phase has made substantial progress. The National Coordinating Body of MFF Pakistan has been vital to steering several ground and policy level actions to support the implementation of the National Strategy and Action Plan. The ground level actions have targeted the key thematic issues, identified through resilience assessment of the five priority geographic sites along the coast of Pakistan. Cumulatively, 30 small grant projects, a medium project and two regional projects have been supported for implementation in Pakistan through MFF funding. These initiatives pertain to participatory conservation and restoration of mangroves; sustainable management of coastal fisheries resources; post-harvest fish catch management; community resilience building; coastal erosion; demonstrating biological waste water treatment systems; gender empowerment and advocacy; and capacity building and awareness on integrated coastal resources management. At the policy level, MFF Pakistan has taken initiatives to support the process of the establishment of Marine Protected Areas and to promote transboundary collaboration in coastal resources management with the neighboring countries.

Relevant websites, web links and files:

- <https://www.iucn.org/pakistan>
- [Sindh Coast: A Marvel of nature - An Ecotourism Guidebook](#)
- [Coastal Resilience in Action - Achievements and Lessons Learned from Mangroves for the Future in Pakistan 2014-2018](#)
- [A Handbook on Pakistan's Coastal and Marine Resources](#)

Describe a measure taken to contribute to the implementation of your country's national biodiversity strategy and action plan**Sustainable Land Management to Combat Desertification in Pakistan (SLMP-II)**

The GEF-UNDP funded project started its operation in September 2015. This project is an up-scaling phase of the SLMP pilot phase project implemented in 14 dryland districts in 4 provinces. It will assist the Government of Pakistan to achieve the long-term goal “to combat land degradation and desertification in Pakistan” with the primary objective “to promote sustainable management of land and natural resources in arid and semi-arid regions of Pakistan in order to restore degraded ecosystems and their essential services, reduce poverty, and increase resilience to climate change”. The project's success depends on the strong commitment of the provincial and federal governments of Pakistan and the involvement of key stakeholders, in particular those at the community level. The project will deliver three outcomes: 1. Strong enabling environment at national and provincial levels supports up-scaling of SLM practices; 2. Effective, targeted and adaptive implementation of SLM Land Use Planning and Decision Support System; and 3. Implementation of climate-resilient SLM activities up-scaled across landscapes. The project will result in successful application of SLM over an area of some 800,000 ha in 14 districts covering more than 200 villages. The integrated activities are performed in agriculture, forestry, irrigation, livestock, rangelands and soil conservation/stabilization sectors.



During 2018 project assessed baseline status of land degradation in 14 SLMP target districts. Similarly a strategy and guidelines for introducing payment for ecosystem services in Pakistan was developed in 2017.

For the implementation measure, please indicate to which national or Aichi Biodiversity Target(s) it contributes

Aichi Target 15,
NBSAP Target 15,

Assessment of the effectiveness of the implementation measure taken in achieving desired outcomes:

- ☒ Measure taken has been effective
- ☐ Measure taken has been partially effective
- ☐ Measure taken has been ineffective
- ☐ Unknown

Please explain the selection and where possible indicate the tools or methodology used for the assessment of effectiveness above

The methodology adopted for the implementation of SLM project involves close coordination of community based organizations (CBOs) and provincial public sector organizations. The operations are related to the forest and fruit nurseries, dry afforestation and plantation, rangelands rehabilitation, rain-water harvesting ponds, shelter belts, officials and farmers' trainings, etc.

Relevant websites, web links and files:

- <https://www.simp.com.pk>

Land Degradation Neutrality (LDN) Targets for Pakistan

As a signatory to UNCCD, and in agreement with global SDG's (Sustainable Development Goals), Pakistan committed to achieving Goal 15 which urges countries to "protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, halt and reverse land degradation, and halt biodiversity loss". More specifically, target 15.3 aims to "combat desertification, restore degraded land and soil, including land affected by desertification, drought and floods, and strive to achieve a land degradation-neutral world" by 2030.

Pakistan, in view of guidelines provided by UNCCD, has set its seven LDN targets after extensive national level consultation, held in December 2018, to achieve Land Degradation Neutrality (LDN) by 2030 are in line with NBSAP of Pakistan and ABTs. The specific targets agreed nationally are:

1: Attain land degradation neutrality (LDN) in:

- 1.1. At least 30% of degraded forest.
- 1.2. At least 5% of degraded cropland.
- 1.3. At least 6% of degraded grassland (rangeland).
- 1.4. At least 10% of degraded wetlands.

2. Limiting conversion of forest lands/ grass lands/ croplands to artificial land.

3. Converting other lands (bare lands) into croplands and productive lands to avoid soil loss/erosion and reverse land degradation.

4. Reclaiming forest lands.

5. Enforcement of land use plans and sustainable management practices.

6. Improved climate change resilience for sustainable water management.

7: Shift to green economy through social enterprise and businesses.

Describe a measure taken to contribute to the implementation of your country's national biodiversity strategy and action plan

Pakistan Snow Leopard and Ecosystem Protection Program (PSLEP) Project

A GEF-UNDP funded 'Snow Leopard and Ecosystem Protection Program (PSLEP)' 2018-2022 is a four-year project which commenced in 2018. The high-range Himalayan ecosystem in

Pakistan is of critical importance for the biodiversity and ecosystems of global significance that harbors and forms an important life-support system. The region is also the center of the globally endangered snow leopard (*Uncia uncia*) range that extends from the mountain of Central and Southern Asia across twelve range countries. Despite the immense biological, socio-cultural and hydrological values of the Himalayan ecosystems, these natural ecosystems are under severe threat from high dependence of local communities on natural resources, pressures from economic development, selective removal of medicinal and aromatic plants, and the emerging threat of illegal wildlife trade. To address these threats, the project will adopt a landscape approach to conserve and manage, ensuring that key biodiversity areas, buffer zones, corridors and areas outside traditional protected areas (critically important for conservation of endangered snow leopard and associated species and habitats) are managed in tandem with the sustainable use of these resources and improvements in livelihoods of local communities living in this region.

The Himalayan snow leopard is the top predator of its habitat, which extends up to three million kilometers across the great mountain ranges. But the species population is thought to number around 10,000 worldwide, at the most generous estimate. Only a few hundred (200 - 400) are believed to exist in Pakistan, on the slopes of the Karakoram, the Himalayas and the Hindukush. About a decade and a half ago, this feline was listed as Critically Endangered (IUCN Red List; Appendix I of CITES). Hectic work and the dedication of conservationists involved meant an increase numbers which went up enough to take it to 'merely' the endangered status. Presently wildlife experts have noticed an 'alarming decline' in the animal's numbers in this country. The emerging threat to this Leo is climate change and an expanding human footprint that is leading to the loss of the predator's habitat and the food chain of which it is part. The populations of its natural prey – ibex, markhor, Ladakhurial, etc. – are also dwindling for the same reasons. Other important species sharing the same habitats are Himalayan lynx (*Lynx lynx*); brown bear (*Ursus arctos*); and Indian wolf (*Canis lupus*).

The project's incremental value lies in promoting the sustainable management of alpine pastures and forests in the high range Himalayan ecosystems to secure conservation of globally significant wildlife species, including endangered snow leopard, and their habitats. The project at the sametime ensure sustainable livelihood and socio-economic benefits for the local community in three high altitude landscapes falling in the Himalayan region (alpine pastures, sub-alpine forests and critical watersheds). This will be achieved through four inter-related components of the project: 1) Landscape level approach for snow leopard conservation; 2) Protected area expansion and strengthening; 3) Participatory conservation in snow leopard model landscapes through sustainable community development; and 4) Support for international cooperation and conservation and management actions informed by knowledge, awareness and monitoring and evaluation. These actions aimed at conserving snow leopards, wild prey and associated species and habitats contained within these landscapes through measures, such as maintaining their ecosystem values and ameliorating climate change impacts, enhancing surveillance, monitoring and inter-provincial and trans-boundary cooperation to reduce wildlife crime and related threats, and improving knowledge and communications.

Snow Leopard Status in Pakistan

The snow leopard (*Uncia uncia*) is an iconic flagship species and reported to occur in 12 countries of South and Central Asia, including Pakistan. In Pakistan, the cat's range covers about 80,000 km² spread across four major mountain ranges; the Hindu Kush in the Khyber Pakhtunkhwa (KP) province and the Pamir, Karakorum, and Himalaya in Gilgit-Baltistan (GB) and Azad Jammu and Kashmir (AJK), respectively (Din et al., 2016). Habitat suitability analysis conducted by Snow Leopard Foundation (SLF) using the data of the over a decade long camera trapping, genetics and sign-based site occupancy surveys, undertaken in about 30 percent snow leopard range in Pakistan revealed the Karakorum and Pamir mountain ranges to encompass promising habitat of snow leopard.

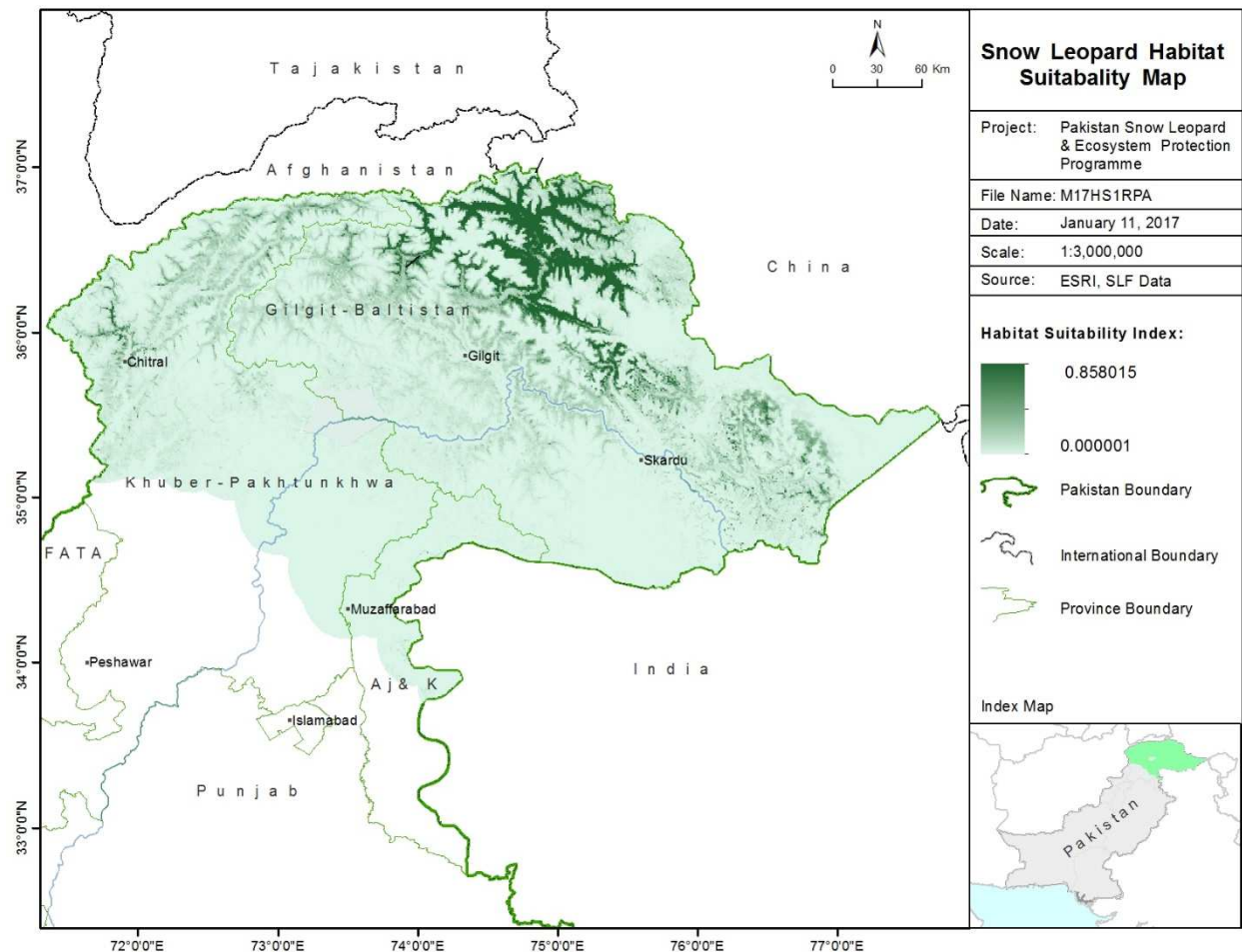
Schaller (1976) estimated 250 cats remained in Pakistan, Roberts (1997), quoting Jackson (1993) estimated 300, and Hussain (2003) estimated 300–420 snow leopards in the country. These figures are guestimates, derived based on anecdotal reports and sign surveys collected from smaller sites and then extrapolated to the entire Pakistan range (Din et al., 2016) and actual number may be much lower than thus reported (Nawaz and Hameed 2014).

A national level assessment deemed snow leopard critically endangered (Sheikh and Molur, 2004) within the country due to both conventional and emerging threats. Major threats to snow leopard, its natural prey and habitat in the Pakistan include habitat loss and degradation, livestock-based livelihood impacting prey base, retaliatory killing of snow leopards, weak institutional capacity, poor law enforcement, wildlife diseases, lack of awareness, climate change, and unsustainable developmental initiatives in the snow leopard habitat (MoCC 2017), respectively.

The ongoing project on snow leopard and ecosystem protection aims to conserve globally significant animal along with its associated species and habitats in Pakistan.



Snow Leopard Photo by Muhammad Osama (SLF)



For the implementation measure, please indicate to which national or Aichi Biodiversity Target(s) it contributes

Aichi Target 5, 10, 12, 15,
NBSAP Target 5, 10, 12, 15,

Assessment of the effectiveness of the implementation measure taken in achieving desired outcomes:

- ☐ Measure taken has been effective
- ☒ Measure taken has been partially effective
- ☐ Measure taken has been ineffective
- ☐ Unknown

Please explain the selection and where possible indicate the tools or methodology used for the assessment of effectiveness above

The project adopts a participatory conservation approach at landscape level through sustainable community development where specific activities are driven by community members themselves. The Snow Leopard Foundation (SLF) is executing this project with its strong roots in the communities. The SLF under this initiative has a plan to not only sensitize the endangered

status of the species but also provides compensation for livestock losses to snow leopard attack. The other local and international non-governmental organizations (NGOs) are also helping SLF in implementation of this initiative.

Relevant websites, web links and files:

- <https://slf.org.pk/>
- <http://www.snowleopard.org/>
- <http://www.moc.org.pk/>
- <https://www.pakistan.wcs.org/>

References:

- Din, J.U., Ali, H. & Nawaz, M.A. 2016. The current state of snow leopard conservation in Pakistan. pp. 486-491 in McCarthy, T.M. and Mallon, D.P. (Eds.), Snow Leopards. Elsevier, New York
- Hussain, S., 2003. The status of the snow leopard in Pakistan and its conflict with local farmers. Oryx 37, 26–33.
- Ministry of Climate Change (MOCC), 2017. Pakistan National Snow Leopard and Ecosystem Protection Priorities. LG&RD Complex, 5th Floor, Sector G-5/2, Islamabad 44000.
- Nawaz, M.A. & Hameed, S. 2015. Research Update 2008-2014. Pakistan Snow Leopard Program. Report developed for Red List Assessment Team. SLF Pakistan, Islamabad
- Roberts, T.J., 1997. Mammals of Pakistan. Oxford University Press, Karachi.
- Schaller, G.B., 1976. Mountain Mammals in Pakistan. Oryx.
<https://doi.org/10.1017/S0030605300014071>

Other relevant information

Conservation of Snow leopard and its prey-base in Misgar Valley, Hunza District, Gilgit-Baltistan-Pakistan, through the piloting of the SMART Approach (March 2018-February 2019)

WWF Pakistan is implementing a small scale project to promote snow leopard conservation in one of its habitats in the northern Pakistan. The objectives of this intervention are:

- Effective community engagement model developed for monitoring snow leopards which is capable of being replicated in other sites in Pakistan;
- Assessing poaching threats and level of illegal trade of snow leopards and their body parts in Misgar Valley, Pakistan;
- Piloting SMART in Pakistan as a tool to reduce the impacts of poaching on snow leopard populations in Pakistan;
- Development of a case study to demonstrate the effectiveness of SMART to tackle illegal wildlife crime to the government for Pakistan
- Develop a better understanding on the factors which affect motivation of rangers in Pakistan
 - www.wwfpak.org

National Vulture Conservation Strategy and Action Plan

National Vulture Conservation Strategy and Action Plan (2016-2025) has been prepared with the goal to restore viable wild populations of vultures in Pakistan. The twin objectives are to strengthen the conservation of vultures in the wild and in captivity, and to save vultures from the effects of nonsteroidal anti-inflammatory drugs (NSAIDs) and other toxic compounds. The major priority actions are: i) Nation-wide population assessment, ii) policy and legal frameworks, iii) *ex-situ* conservation, and iv) *in-situ* conservation. Similarly, the supporting actions are: i) Research and monitoring, and ii) communication and awareness. For each priority action area, issues are identified and strategies and activities are proposed.

Pakistan National Vulture Recovery Committee has taken the lead in initiating preparation of the National Strategy and Action Plan under a joint initiative by IUCN Pakistan and BaanhnBeli with the financial assistance from USAID – Small Grants Ambassador's Fund Program.

Relevant websites, web links and files:

- www.iucn.org/pakistan
- www.wwfpak.org

Research on the Illegal Trade in Freshwater Turtles in Sindh and Balochistan (2017)

Five species of freshwater turtles found in Pakistan are globally threatened. The study reviews the efforts made to protect the species and control their illegal trade. It also identifies the hotspots for the capture and export of freshwater turtles in Sindh and highlights the successful efforts of the Sindh Wildlife Department to control this illegal activity in the province through detection and registration of cases of the illegal trade of the species. The study emphasizes on the need for regular monitoring of the status of the species and recommends actions for their safeguard. This initiative was jointly carried out by the IUCN Pakistan and USAID.

[Research on the Illegal Trade in Freshwater Turtles in Sindh and Balochistan](#)

Saving the Sea Turtles and their habitat through effective Solid Waste Management at Sandspit, Karachi, Pakistan

WWF Pakistan initiated a short-term activity in March, 2018 to save the sea turtles and their nesting habitat on Karachi coast with the specific objectives, to: i) ensure reduction of solid waste at the Turtle Beach through establishment of community managed waste collection and recycling system by 2020, and ii) enhance public awareness about responsible tourism and protection of marine biodiversity at the Turtle Beach by 2018.

- www.wwfpak.org

Bears Conservation

In 2015, Pakistan Bio-resource Research Centre (BRC) conducted a study of brown (*U. arctos isalbellinus*) and black (*U. t. laniger*) bears in northern parts of Pakistan. Brown bears were more frequent in northern latitudes and altitudes (northern Chitral, Ghizer, Gilgit and Skardu), while black bears were widely distributed in southern latitudes and at lower altitudes (Battagram). Study identified 34 populations of brown bears; 9 isolated meta-populations more frequently sharing common gene pools; 7 very small with serious inbreeding and threat of extinction.

Black bears were present in 45 localities with 6 meta-populations and 3 other small populations, possibly having high inbreeding.

The major threats to wild bears population of Pakistan is capturing of cubs by gypsies (Kalandars) to use them as dancing bears and in bear baiting. However, decades long efforts of BRC has lowered annual bear baiting events in the country from some 1,800 in 1993 to only 100-120 events organized secretly. Number of captive bears (Asiatic black and Himalayan brown) in the custody of gypsies has also witnessed a decrease from reported 1,200 in 1992 to 118 in 2017 in different districts of the Punjab for the purpose of public entertainment. For the purpose BRC adopted a number of independent actions, including lectures at school children, alternate infotainment for spectators at bear baiting events, alternate livelihood for gypsies for volunteer surrender of bears, motivation of gypsies and the landlords for not holding such events, involving religious leaders providing them baseline religious information, supporting sermons at mosques during Friday prayer and administration confiscation of the bears maintained illegally by gypsies or those used at bear baiting events. A scheme of registration of gypsies and bears in their possession was launched by the BRC to monitor the movement of bears with gypsies, whereby a coded micro-chipping method has been introduced. Under this scheme all existing dancing/baiting bears were micro-chipped in cooperation with the Punjab Wildlife Department, and a log book prepared for future reference. So far 52 bears have been rescued from gypsies which are currently being rehabilitated in Federal Government's designated 'Rehabilitation Center, Chakwal' managed by the BRC. Two brown and three black bears were successfully reintroduced back into wild and five more bears have been selected to be rehabilitated and released by spring 2020.

Relevant websites, web links and files:

<http://www.pbrc.edu.pk/rescuedbear.htm>

Conservation of Blind Indus River Dolphin (2017)

The Indus River dolphin (*Platanista gangetica minor*) or blind dolphin is an obligate freshwater cetacean, endemic to the Indus River in Pakistan (Brauliket *al.* 2015a). The Indus River dolphin is classified as *endangered* on the International Union for Conservation of Nature (IUCN) Red List of threatened species. It is the second most endangered obligate freshwater dolphin species in the world, the first being the 'functionally extinct' Yangtze River dolphin. It is also listed in Appendix I of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) and legally protected under all wildlife protection legislations of Pakistan.

Estimating the population of the Indus River dolphin is of great importance to evaluate the effectiveness of conservation management initiatives. Dolphin population monitoring, following the same methodology of population assessment, has been carried out every five years since 2001. This information has been key in understanding the population trend of this specie, and the health of its habitat in order to adapt specie's management initiatives accordingly. WWF-Pakistan conducted fourth comprehensive survey in 2017.

The survey results consistently indicate that the population of this endangered specie has been steadily rising from estimated 965 in 2001 to 1,816 in 2017, suggesting that the population of the Indus River dolphin is increasing. However, there is a need to further study and understand

other factors, in addition to current conservation efforts, which may be influencing this increasing trend.

www.wwfpak.org

WWF Pakistan (2017), Signs of Hope for the endemic and endangered Bhulan.

Describe a measure taken to contribute to the implementation of your country's national biodiversity strategy and action plan

Action Plan Launched to Raise Awareness on Invasive Weed (2018)

In many parts of the country invasive alien species (IAS) have emerged as the most serious threats to biodiversity. Ecosystems most impacted by invasive alien species in Pakistan include agriculture, wetlands and protected areas. There is a strong perception in the country that the spread of IAS is mainly out of ignorance. However, in recent years, efforts have been underway with the assistance of the Centre for Agriculture and Biosciences International (CABI) to sensitize the stakeholders and cope with this threat by adopting better surveillance and management practices across the country.

Parthenium is one of the deadliest weed that destroys crops and is also harmful to public health. Along with farmers it is essential that the general public be aware of the presence of this silent enemy living amongst them. CABI - Pakistan launched a comprehensive action plan aimed at combating parthenium, a highly invasive weed species that is rapidly spreading in Pakistan. CABI, which works to help farmers in saving pre and post-harvest losses to their crops, to plant health problems. CABI has developed its 'Weed Management Action Plan'. Parthenium, commonly known as *gajar booti*, with white flowers is often locally used in bouquets and other decorations. Most people are unaware of the health hazards posed by this weed, which was first reported in Gujrat in the 1980s and spread rapidly thereafter. Its seeds spread through air and can cause asthma, eye irritation, throat infections and eczema. It has also been known to cause allergies and digestive problems in livestock and other animal species, as well as humans.

Parthenium is harmful to people, crop, livestock and the environment and needs to be rooted out. CABI action plan consists of three stages: research, development and communication. It emphasizes the strengthening of links between stakeholders to set priorities, list key activities and the institutions involved. It also focuses on developing a weed management decision guide in order to utilize best practices for early detection, prevention and control. Though the weed can be controlled by chemicals, but these are toxic to the environment and for this reason the CABI decided to assist farmers by providing them with an integrated and sustainable framework to address the issue.

Plan explains that parthenium manipulates the ecology of fields, effects crop yields, and invades forests through its aggressive nature and allelopathy (hindering the development of different plants). It even causes serious threat to surrounding livestock and has the capability to cause rigorous allergies among humans who regularly interact with it.

For the implementation measure, please indicate to which national or Aichi Biodiversity Target(s) it contributes

Aichi Target 1, 9,
NBSAP Target 1, 9,

Assessment of the effectiveness of the implementation measure taken in achieving desired outcomes:

- ☐ Measure taken has been effective
- ☒ Measure taken has been partially effective
- ☐ Measure taken has been ineffective
- ☐ Unknown

Relevant websites, web links and files:

- www.cabi.org

Describe a measure taken to contribute to the implementation of your country's national biodiversity strategy and action plan

Establishment of Bio-Resources Conservation Institute of Genetic Resources

Bio-resources Conservation Institute (BCI), formerly the Plant Genetic Resources Institute (PGRI), is an institution of Pakistan Agricultural Council (PARC) upgraded to broaden the horizon of biodiversity from only plant to include microbes and animals as well. Since its revamp in 2016, the work on microbial genetic resources was initiated in BCI, besides the plant conservation and research on local and exotic biological resources in Pakistan. However, the animal genetic resources division is still non-functional due to lack of capacity and required infrastructure. BCI is working in collaboration with federal and provincial agricultural research institutes and universities engaged in biodiversity conservation. BCI is also linked with international gene banks and other biodiversity conservation partners for achieving global food security.

Objectives of this institute include: 1) to serve as the national facility for conservation and distribution of genetic resources to researchers; 2) to document/disseminate information on genetic resources; 3) to generate knowledge and create awareness about biodiversity; and 4) to strive for the implementation of the International Treaty (ITPGRFA).

Plant Genetic Resources Programme (PGRP) has national genebank of Pakistan and allied research laboratories including exploration lab, seed preservation lab, *in vitro* conservation lab, evaluation lab, plant introduction and seed health lab and data management lab.

The PGRP scientists have collected indigenous plant genetic resources from diverse ecologies of Pakistan through germplasm exploration. Genebank conserves more than 38,000 accessions of 400 plant species and distribute about 12000 samples of accessions every year for agriculture research to the NARD and universities. Seed preservation lab provides the facility of seed germination tests. The extent and distribution of genetic diversity in the germplasm is studied by agro-morphological evaluation and molecular techniques. Clonally propagated crop

species that cannot be conserved in the form of seed are preserved at in vitro conservation lab using tissue culture technique and as plants in the field Genebank.

Microbial Genetic Resources Programme (MGRP) Identification and preservation of microbes have not been included in the main applied microbiological research in Pakistan. Microbial Genetic Resources Programme (MGRP) was established recently to explore new species of bacteria with emphasis on their preservation in the National Culture Collection of Pakistan (NCCP) and distribution of these novel beneficial microbes useful in biotechnology, agriculture and industry. The main goal of MGRP is the establishment of internationally recognized NCCP with emphasis on addition of novel microbes and their distribution for feeding biotechnology, agriculture and industry.

To control genetic erosion and ensure sustainable agriculture with bio-diversification of agro-ecosystems, conservation of pollinators and soil biodiversity, all new policy instruments, such as national food security policy and draft agriculture policy, have been developed in the last few years. In this regard, Bio-resources Conservation Institute (BCI), being a lead research agency, is working to safeguard and improve the important local varieties, land races and breeds to pursue the NBSAP target.

BCI has collected a wealth of indigenous plant genetic resources (PGR), including landraces of various crops as well as their wild relatives. BCI is evaluating these accessions and reporting traits of interest for their inclusion in the breeding programs. BCI is serving as a safety, duplicating PGR of other national institutions, and has restored germplasm in an event of total loss of PGR.

For the implementation measure, please indicate to which national or Aichi Biodiversity Target(s) it contributes

Aichi Target 13
NBSAP Target 13

- ☐ Measure taken has been effective
- ☒ Measure taken has been partially effective
- ☐ Measure taken has been ineffective
- ☐ Unknown

Relevant websites, web links and files:

- <http://www.parc.org.pk>

Other relevant information

National Herbarium Programme

National Herbarium Programme (NHP) houses more than 100,000 plant specimens, representing about 225 families. National herbarium has plant specimen of over 12,000 species from Pakistan, India, Afghanistan, Iran and Central Asian countries.

National herbarium serves as a reference collection for plant identification and as a source of information on plant locations/ranges, abundance, habitat and flowering/fruiting periods. Herbarium specimens and related data are used for publication of monographs and flora of Pakistan. National herbarium helps develop strategies for conservation of priority species of the country requiring conservation measures and create awareness and disseminate knowledge on native flora and its importance.

- <http://www.parc.org.pk>

Khyber Pakhtunkhwa Agriculture Department has established a germplasm repository at Agriculture Research Institute (ARI) Tarnab for seeds of cereals, food legumes, oilseed and vegetables; and field gene bank for pine/ nuts is being developed as Alpine GPU at Kaghan. On the recommendation of this unit, the provincial seed council approved 13 varieties of wheat, citrus, peach, apple, rice, pulses, oil seed and cotton in 2015, and 10 more seed varieties of wheat, sugarcane and mung bean in 2017. Further, a gene-based study on Mahseer fish was carried out in AJK.

- Cytochrome Oxidase Subunit 1 (COI) Gene-Based Phylogenetic analysis of Mahseer (*Tor Putitora*) of Pakistan, 2015 (The Journal of Animal & Plant Sciences).

Promotion of Organic Cotton Cultivation with Small and Marginal Tribal Farmers in Pakistan

Pakistan is 5th largest producer of cotton in the world and 3rd largest exporter of raw cotton. Cotton contributes about 10 percent to GDP and 55 percent to the foreign exchange earnings of the country. On the whole 30 - 40 percent of cotton is consumed domestically as final products, the remaining exported as raw cotton, yarn, cloth, and garments. Cotton, known as a thirsty crop, uses more than 20,000 liters of water to produce just 1kg of cotton; equivalent to a single T-shirt and pair of jeans (WWF report: The Impact of Cotton on Freshwater Resources and Ecosystems). Unsustainable cotton farming, with massive inputs of water and pesticides is responsible for the large-scale destruction of ecosystems and deteriorating health and livelihoods of people living there.

Organic cotton is grown without using any chemical fertilizers or pesticides and is cultivated on land that has been detoxified from residues of chemical fertilizers and pesticides for over three years. The seeds used to grow organic cotton are not genetically modified and are kept clean from chemical impurities during processing and packaging.

During the cotton season 2015, WWF-Pakistan launched a three-year biodiversity friendly project, named 'Organic Cotton Cultivation Promotion with Small and Marginal Tribal Farmers in Pakistan' in Lasbela, Sibi, Bolan and Barkhan districts of Balochistan province. During this period of the project, capacity building sessions for over 4000 farmers were conducted to educate them on specific practices leading to organic cotton production. Farmers have also been educated through 160 Farmer Field Schools (FFS), established at different feasible locations of the project area. Sixty (60) Women Open School (WOS) were established to train 900 women on safe and clean cotton picking practices and preparation of natural pesticide to rule out risk of use of chemical pesticides. About 50 demonstration plots were also set to demonstrate standard practices of organic cotton cultivation.

Seven (07) ginners and few well-reputed seed companies have been motivated to become the part of organic cotton supply chain and ensure availability of non GMO cotton seed. An event

was also organized to bring together all stakeholders including members from academia and cotton research institutes and supply chain actors. Pre-audits and inspections were carried out by the Control Union Sri Lanka for Organic Certification during April 2017.

The dream turned true in 2018 through joint efforts of WWF-Pakistan and Agriculture Extension Department, Balochistan, and a group of 180 farmers qualified for Scope Certification of Organic Cotton by Control Union-Sri Lanka. Thus cotton production of over 2,000 hectare belonging to 181 farmers has been declared as organic cotton. This cotton has been purchased by AA Cotton Ginning Factory (the only GOT certified ginning factory of Pakistan) and around 400 organic cotton bales were generated.

http://www.wwfpak.org/newsroom/23516_cottonfarming.php

Describe a measure taken to contribute to the implementation of your country's national biodiversity strategy and action plan

Promotion of Aquaculture in Pakistan

Aquaculture is an increasingly important component of Pakistan's fishing sector, producing approximately 150,000 tons of fish annually. Most productive capacity has been developed only recently, and aquaculture remains a nascent industry in many parts of Pakistan, particularly compared to neighboring countries. For decades, semi-intensive composite carp culture, mainly undertaken in Punjab and Sindh, has been the slowly growing mainstay of this industry. From the 1980s onwards, polyculture of Indian and Chinese carps was carried out in Punjab and Sindh and to a lesser extent in Khyber Pakhtunkhwa and Balochistan. More recently, carp farming has started to move beyond systems that use supplementary feeds to more intensive, economically efficient systems using floating pellets. There is some trout farming in hilly areas in the north. Commercial-scale marine and coastal aquaculture, such as shrimp farming, is non-existent. For now, Pakistan is producing only limited fish species through aquaculture, but is experimenting with broadening the selection. In recent years, tilapia farming has developed, first with imported seed and now with domestically produced seed from public and private hatcheries. Small tonnages of shrimp and sea bass are being raised experimentally.

A Fisheries Development Board (FDB) was established to test new aquaculture approaches in Pakistan. The board works in partnership with the private sector to support the development and expansion of aquaculture by determining locally-appropriate and cost-effective production methods. The current priorities are tilapia, shrimp, and sea bass farming. A shrimp demonstration farm was recently established as a FDB joint venture with the private sector, with experimental output of 50-70 tons per year.

For the implementation measure, please indicate to which national or Aichi Biodiversity Target(s) it contributes

Aichi Target 6, 7,
NBSAP Target 6, 7,

- ☒ Measure taken has been effective
- ☐ Measure taken has been partially effective
- ☐ Measure taken has been ineffective
- ☐ Unknown

Relevant websites, web links and files:

- <http://www.fdb.org.pk/>

Other relevant information

Improvement in legislations and Managements: Fisheries legislations have been updated to include Endangered, Threatened and Protected Species (ETP) including those listed in various appendices of CITES. Government of Sindh has enacted new legislation dated 18 May 2016, and Government of Balochistan has enacted a similar law, dated 8 September 2016. These laws also included protection of some of the species of guitarfishes and wedge fisheries which are not included in CITES Appendices so far, however in near future chances for placing them into the CITES appendices are quite bright.

In order to make the stakeholders aware of the new laws, WWF-Pakistan has printed informative poster depicting CITES listed species. These posters have been placed at all major landing centres to appraise fishermen, traders, exporters and fisheries officers about the ban on the export of threatened shark and ray species.

WWF-Pakistan marine section and MFF Pakistan programme, in close collaboration with the coastal communities, have contributed in sustainable management of marine resources. Further, coastal communities in Miani Hor Lagoon have developed a local management system and protocol for protection of the coastal resources. The community decided to declare one of the creeks (Safe Dori) as "no fishing zone". WWF-Pakistan supported the community in implementation of this no fishing zone and persuaded Government of Balochistan to legislate for the purpose. A new law to this effect was promulgated in January 2017. Similarly with the technical support of WWF-P since July, 2018 coastal communities of Rehri village have introduced longlining for demersal fishes which is aimed to reduce pressure on pelagic and demersal-pelagic species. WWF-Pakistan has also introduced sub-surface gillnetting for tuna vessels operating in offshore waters (EEZ and beyond) which has almost eliminated the catch of ETP species, such as dolphin, whales and turtles. The entire tuna gillnet fleet is now converted into subsurface fishing.

Government of Pakistan is implementing a new Deep Sea Fishing Policy, 2018, to limit the number of fishing boats. It is expected that new policy will help in sustainable operation of fishing vessels, including reduction in fleet. In addition a number of other new techniques have been introduced to promote sustainable fishing such as introduction of fish trawling instead of shrimp trawling, and fishing for ivory shells using traps are getting popularity as major economic activity.

Seafood Clusters to Improve Competitiveness: The concept of a seafood cluster or hub was proposed in the mid-2000s, based on UNIDO's experience operating successful clusters. UNIDO and the Pakistan Government considered the creation of a cluster in 2014. Korangi Harbor was initially planned as the site due to its function as a higher value capture port. The seafood hub would entail:

- Development of public infrastructure such as boat repair, fuel supply, roads, lighting, utilities, and security.
- Investment in a range of processing activities to utilize fish landed.
- Co-location of business services and input suppliers including co-packing, cold storage, packaging suppliers, staff catering, chemicals, sanitation services, technology and quality control laboratories, official certification, pre-shipment inspection, transport services, and freight forwarding agents. The goal is to reduce costs and promote innovation through proximity. The feasibility study proposed charging a variety of tariffs and fees to businesses to cover the project's investments and operating costs.

A new comprehensive plan for revamping the Korangi Fisheries Harbor into a modern-day fishing port, again applying the cluster concept, was developed by the Korangi Fisheries Harbor Authority in June 2017 (KFA 2017). The first phase would require an estimated investment of US\$5 million. The plan includes: transfer of harbor ownership to the Sindh Government, and ensuring to receive the required support (e.g. public infrastructure investment). Various institutional issues, however, remain to be solved, including the role of the Fishermen's Cooperative Society, sources of income for management, user fees, and auctions at harbor.

Relevant Link: Revitalizing Pakistan's Fisheries (Options for Sustainable Development) 2018 – World Bank.

Sustainable Fisheries Entrepreneurship: A Citizen Based Approach to Save Pakistan's unique Marine Environment (July 2016-December 2018): WWF Pakistan had completed a short duration project at Karachi coast in collaboration with the local fishermen community to safeguard important coastal and marine resources. The main objective of the intervention was "to support and promote improved fisheries management in 3 union councils of Karachi, Pakistan, by reforming governance and management to combat illegal fishing and to reduce pressure on marine ecosystems through increased awareness and improved livelihood options".

- www.wwfpak.org

During the reporting period, in KP and AJK various field based studies and research work on distribution and potential of freshwater fisheries including scope of aquaculture, have been carried out with the involvement of Universities and Fisheries Departments. Some of the relevant links are given below:

- Diversity of Edible Fishes at Rhound Stream District Dir Lower, Khyber Pakhtunkhwa Pakistan, 2015 (<http://www.ijias.issr-journals.org/>)
- The Edible Ichthyofauna of Konhaye Stream District Dir Lower, Khyber Pakhtunkhwa, 2014 (www.awkum.edu.pk/PJLS)
- Exploring the Fish Fauna of River Swat, Khyber Pakhtunkhwa, Pakistan, 2014 (www.idosi.wjfm.com)
- Fish Diversity of Sharki Dam, District Karak, Khyber Pakhtunkhwa, Pakistan, 2015 (*Sindh Univ. Res. Jour. (Sci. Ser.)*)
- The diversity of fish fauna in Baran dam of district Bannu, Khyber Pakhtunkhwa province (KPK), Pakistan, 2014 (<http://www.journalijar.com>)
- Study on Ichthyofaunal Biodiversity of River Swat, 2014 (<https://www.researchgate.net/publication>)
- Fish Biodiversity of District Karak Khyber Pakhtunkhwa Pakistan, 2014 (*Res. J. Animal, Veterinary and Fishery Sci.*)
- Comparative Abundance of Fish Fauna of Different Streams of Bajaur Agency, Khyber Pakhtunkhwa, Pakistan, 2014 (www.biosoc.pk)
- Fish fauna of River Kabul Downstream Warsak Dam, 2017 (<https://www.researchgate.net/publication/313881515>)
- Ichthyofaunistic study of river Kabul at Michini, Khyber Pakhtunkhwa, Pakistan, 2015 (<http://www.innspub.net>)
- Ichthyofaunal Diversity of River Panjkora, District Dir Lower, Khyber Pakhtunkhwa, 2015 (*The Journal of Animal & Plant Sciences*)
- Ichthyofaunal Diversity of River Zhob, District Zhob, Balochistan, 2015 (*The Journal of Animal & Plant Sciences*)
- Breeding biology of snow trout (*Schizothorax plagiostomus*) in Neelum and Jhelum Rivers, Azad Kashmir, Pakistan, 2017 (<http://www.innspub.net>)

Describe a measure taken to contribute to the implementation of your country's national biodiversity strategy and action plan

Mountains and Market: Business and Biodiversity in Northern Pakistan (2013-2017)

Northern Pakistan is a rich storehouse of global biodiversity. Populations of many globally threatened species are still found here, from snow leopard and lynx to the highly endangered woolly flying squirrel. Threats to biodiversity components in the region are extreme poverty in general populace, dependence of local communities on natural resources, and lack of enabling policies. To overcome these issues, GEF-UNDP Project has used the voluntary certification of Non-Timber Forest Products (NTFP) as a tool to promote biodiversity conservation and to strengthen existing conservation efforts with innovative market-based mechanisms. Project has also developed community and institutional capacity for certified production of 'biodiversity-friendly' NTFPs and stimulated market demand for biodiversity friendly NTFP, thereby creating new economic incentives for conservation.

The basic objective of the project was sustainable harvest of biodiversity goods and services through community ecosystem-based enterprises (CBEs) in demonstration of conservancies in the northern mountainous regions of Pakistan. The objective was successfully perused through four outcomes:

1. Market demand for biodiversity-friendly Non-Timber Forest Products (NTFP) stimulated.
2. Strengthened capacity of local communities to produce and market biodiversity-friendly product.
3. Positive biodiversity linkages strengthened through CBE conservation and sustainable resource-use agreements.
4. Strengthened institutional capacity for scale up and replication of CBEs.

Successful approaches to biodiversity-friendly NTFP production and CBE establishment demonstrated through this project will need to be scaled up and replicated to other suitable valleys in the northern mountains.

For the implementation measure, please indicate to which national or Aichi Biodiversity Target(s) it contributes

Aichi Target 2, 3, 4,
NBSAP Target 2, 3, 4,

Assessment of the effectiveness of the implementation measure taken in achieving desired outcomes:

- ☐ Measure taken has been effective
- ☒ Measure taken has been partially effective
- ☐ Measure taken has been ineffective
- ☐ Unknown

Relevant websites, web links and files

- www.pk.undp.org/content/pakistan/en/home/.../projects/.../mountains-and-markets.h

Describe a measure taken to contribute to the implementation of your country's national biodiversity strategy and action plan

Protected Areas System

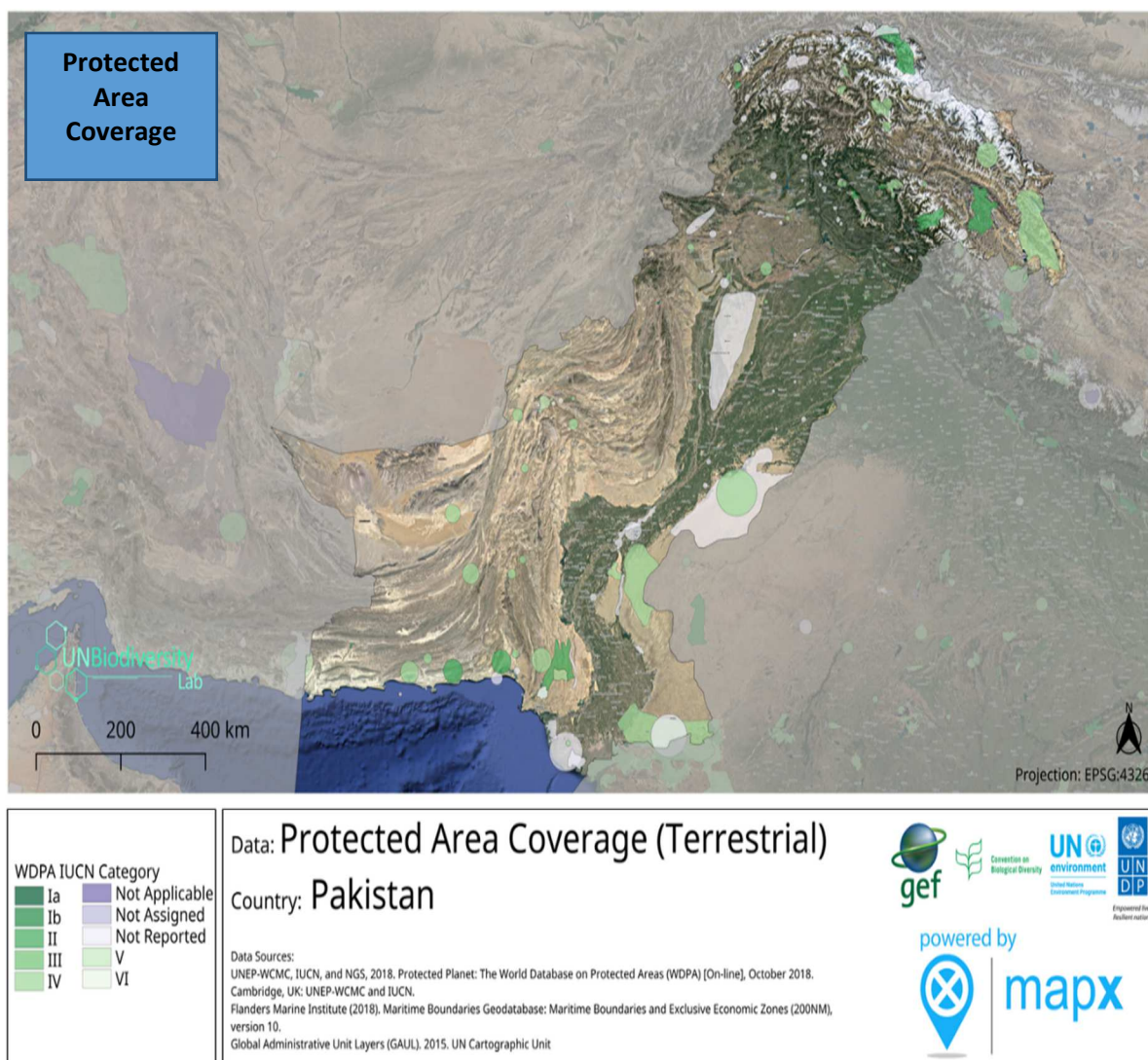
Protected area coverage in Pakistan has improved during the reporting period but still lagging behind in terms of Aichi targets and overall management effectiveness. Between 2015 and 2018, the country has notified more terrestrial protected areas (two national parks, and one wildlife sanctuary) and its first marine protected area (Astola Island). However, the progress is still slow to achieve, Aichi Biodiversity Target 11, of declaring 17 percent of the land and 10 percent of marine as protected areas.

In addition, during 2017- 2018 the provincial government of Gilgit-Baltistan has declared, 30 Community-managed Conservancies as Community Controlled Hunting Areas (CCHAs) under the provisions of Gilgit-Baltistan Wildlife Preservation Act 1975 for the conservation of flora and fauna. The Wildlife Conservation Society (WCS) Pakistan has facilitated GB Government in such process in declaration of these community controlled hunting areas to improve livelihoods of local people, and to promote sustainable development. However, at this stage it is difficult to recognise these as a new type of protected areas, equal to 'Community Managed Protected Areas'- IUCN category VI. In term of land coverage, presently the country has 12.225 percent terrestrial area under PA system still below that required under Aichi target of 17 percent.

Table2: Protected Areas System of Pakistan (2018)

National Parks	Wildlife Sanctuaries	Game Reserves	Community Areas/Community Hunting Areas	Conservation Controlled
28	92	116	145	

Source: CITES Management Authority of Pakistan and WCS Pakistan.



Section III

Assessment of progress towards each national target

The assessments presented are based on a combination of credible information and data, some available at federal level, whereas others available with provinces, NGO's and individual experts. In order to ensure a consistent approach to account development and enable the data and subsequent analysis to contribute to Pakistan's reporting, the CBD guidelines were used to assess each national target, with reference to available documented information.

This section contains assessment of information and data provided in the previous section as measures taken towards achievement of Aichi targets. It also shows trends about changing

situation and state of biodiversity conservation over the last four and half years. The reference documents and firsthand information used for this assessment are different publications, NBSAP, policy documents, scientific papers, projects, press clippings, interactive sessions with different stakeholders and consultations with provincial partners. The assessment also considered national reports submitted to the other multilateral environmental agreements, like CMS, CITES, Ramsar, UNCCD, UNFCCC, SACEP, ECO, and MFF. The progress captured in **Table-3** is structured in line with the Aichi targets pursued.

The CBD lined up all 20 Aichi targets under five strategic goals, covering; A) mainstreaming; B) direct pressures; C) biodiversity status; D) benefits to all; and E) enhanced implementation. An account of progress with each Aichi target is provided with a summary of the assessment of each target. Six (6) Aichi targets have been assessed as being on track while 3 being not on track, with 2 having slow progress, and 9 exhibiting progress, though partly on track yet requiring additional actions to meet these targets by 2020 or 2030 as targeted in the NBSAP.

There are some areas where Pakistan is progressing well with mainstreaming biodiversity. These include work to increase public awareness about biodiversity values through the development of policy and planning process on natural capital and translating these activities into changes to clearly influence decision making across key sectors of government and society.

The most challenging area of work is actions contributing to the Aichi targets under the Strategic Goal B, which relate to the direct pressures on biodiversity. Although positive changes are underway in relation to species and habitat protection, improved management of marine resources, sustainable management, pollution reduction and protection of ecosystems vulnerable to climate change, yet there is still more to be done. Improved and focused actions on a range of pressures are planned and being executed.

Progress in safeguarding biodiversity, with the creation of first marine protected area of Pakistan and having 13.2 percent of area under terrestrial protected areas, can be assessed as average, but still far below that is required under Aichi targets, 10 percent and 17 percent respectively. Development of MFF National Strategy and Action Plan and its implementation in coastal and marine areas since 2015 is helping to focus efforts towards sustainable management in the marine environment. Work will continue up to 2020 and beyond to ensure management, integration and connectivity is improved.

Aichi targets relating to Strategic Goal D; benefits to all from biodiversity and ecosystem services have not progressed as desired. Before ratification in 2016, a draft ABS Act, 2012, was in place, but it has not yet been approved to ensure compliance with the Nagoya Protocol across the country, which safeguards the fair and equitable sharing of benefits arising out of the utilization of genetic resources. The ecological status of wetland ecosystems continues to decline.

Finally, there is mixed progress on Aichi targets regarding Strategic Goal E. So far the progress on NBSAP implementation is not on track. The protection of traditional knowledge and the rights of communities are contributing positively to Pakistan's biodiversity. The improved collation of data and data management are helping and ensuring decision making. However, more work is required to improve data recording, data analysis and data relating to ecosystem functions.

There has been a continued increase in public sector spending on the biodiversity conservation since 2015. However there are many other investments and non-monetary contributions to biodiversity conservation that are not currently accounted for in this target reporting.

Summary assessment of progress described in this section is based on the measures taken against each target and consensus reached among stakeholders during regional and national consultative process, carried out during November - December, 2018. Further, in March, 2019 representatives of all the federating units, biodiversity experts and focal points of multilateral environmental agreements reviewed the indicators used for this assessment and finally endorsed these with few minor changes. Many different sectoral reports (annual progress reports, workshop proceedings, monitoring and evaluation reports of completed and ongoing projects, etc.), published scientific papers, media coverage, and field surveys were used as indicators. However, in some cases, there were no quality data available to imply overall progress.

Table 3. Summary assessments of 20 Aichi Targets pursued in Pakistan.

Aichi Targets	Summary of Assessment	Trend
Strategic Goal A: Address the underlying causes of biodiversity loss by mainstreaming biodiversity across government and society.		
1	A1: Awareness increased Currently in Pakistan biodiversity awareness is not properly measured or assessed at any level. However, on the basis of information gathered and events carried out regarding biodiversity awareness during the reporting period is satisfactory. Besides Ministry of Climate Change and relevant provincial departments, there are a large number of organizations, particularly IUCN Pakistan and WWF Pakistan actively involved in promotion of biodiversity awareness and sustainable use of its components.	On Track
2	A2: Biodiversity values integrated In recent years, values of biodiversity are integrated into almost all national sectoral strategies, policies and plans to promote biodiversity conservation in Pakistan. However challenges remain to encapsulate sustainable use of biodiversity in practice.	On Track
3	A3: Incentives reformed In Pakistan some positive incentives are in practice to enhance and support biodiversity management, such as trophy hunting and participation of communities in the management of protected areas. However, incentives negatively impacting biodiversity and their elements have not yet been studied at any level.	Partly on Track
4	A4: Sustainable consumption and production In national development agenda sustainability is enshrined in the economic strategy as an integral part. Pakistan, being a low carbon emitting country, has committed to achieve its sustainability targets.	Partly on Track

	However, presentsituation is not much clearer to ensure that economy is operating within safe ecological limits.	
Strategic Goal B: Reduce the direct pressures on biodiversity and promote sustainable use.		
5	B1: Habitat loss halved or reduced Due to rapid land use changes and anthropogenic pressures, many important habitats have been degraded with loss of associated biodiversity potential. The habitat mapping has not yet been carried out in Pakistan to provide baseline data and to provide real time picture of habitat changes occurred over the time. Information on ecosystem health Indicators will improve knowledge on habitat degradation and disintegration.	Partly on Track
6	B2: Sustainable management – marine Reasonable progress has been made in line with the existing sectoral policies to promote sustainable harvesting of fisheries and associated marine resources. Mangroves for the Future (MFF) National Strategy and Action Plan, Maritime Policy, and National Food Security Policy are helping in sustainable management of coastal and marine environment.	Partly on Track
7	B3: Sustainable agriculture, aquaculture and forestry Agriculture, aquaculture and forestry sectors are important in economic development of Pakistan. In formulating policies and developing strategies and action plans, a reasonable advancement has been achieved that will help in pursuance of sustainability targets by 2020 and beyond.	On Track
8	B4: Pollution reduced Some improvement has been recorded during recent years in lowering pollution, yet degree of improvement is not exactly known. More work is required, with effective measures to control water and air pollution, control marine litter, plastic pollution and quantification of the effects of pollution on species, habitats and ecosystems of Pakistan.	Progress slow
9	B5: Invasive species prevented and controlled Measures to raise awareness and plan to control problematic invasive alien species is underway with the assistance of CABI and new information systems are being developed to help control the spread of invasive species, which have emerged as serious threat to biodiversity.	Partly on Track
10	B6: Pressures on vulnerable ecosystems reduced Pakistan's vulnerability to climate change is very high having impact on mountains, coastal, desert, forests, and wetlands ecosystems. Alpine and sub-alpine ecosystems are particularly vulnerable to glaciers melting under increasing temperature. Steps are being taken to identify pressures and to make ecosystems more resilient through strengthening of protected areas system.	Not on Track

Strategic Goal C: Improve the status of biodiversity by safeguarding ecosystems, species and genetic diversity.		
11	C1: Protected areas increased and improved In Pakistan, species and habitats of national and international importance are safeguarded as protected areas, contributing to lowering biodiversity loss. By December 2018 some over 13% of terrestrial and inland water areas and less than 1% of marine areas had been brought under PA's system. These percentages are below Aichi targets requiring further efforts to bring more area under protected area system, including representative of different habitats and ecosystems, integrated to protect biodiversity.	Progress Slow
12	C2: Extinction prevented Black buck and gaur have witnessed recent extinctions from wild and status of many other species still needs conformed. More effort is required to develop a country priority species indicator, and improvement of the status, based on reliable species data.	Not on Track
13	C3: Genetic diversity maintained Sufficient information is lacking about genetic diversity. Comprehensive reporting on Target 13 involves addressing several knowledge gaps/issues. Despite some progress on plants diversity, the gaps assessment may guide future course of actions. This has to be bifurcated in <i>in situ</i> and <i>ex situ</i> . <i>Ex situ</i> conservation is on track for plant genetic resources for food and agriculture (PGRFA), however for other species and <i>in situ</i> conservation it is not on track.	Partly on Track
Strategic Goal D: Enhance the benefits to all from biodiversity and ecosystem services.		
14	D1: Ecosystems and services safeguarded Pakistan has a number of important ecosystems which provide essential environmental, cultural, and economic services for human wellbeing. Most habitat types are under pressure because of different factors. Various policies, directives and legislations are in action to safeguard these ecosystems. However, biodiversity potential and status of different ecosystems need further analysis and assessment at the national level.	Not on Track
15	D2: Ecosystems restored and resilience enhanced Reduction in ecosystem degradation and increased biodiversity conservation are key objectives of NBSAP. Considerable efforts have been made on restoration of some of the country's most threatened habitats over the past few years. In particular forests, dryland and coastal ecosystems have witnessed focused efforts, helping in enhancement of ecosystem resilience and climate change mitigation.	Partly on Track
16	D3: Nagoya protocol in force and operational	Partly on

	Pakistan ratified Nagoya Protocol on access and benefit-sharing (ABS) in 2016. Country developed its draft ABS Act in 2012, which needs approval of the parliament. Draft Act provides guidance on compliance and provision of access and benefit-sharing, and will facilitate the implementation of the Nagoya Protocol.	Track
Strategic Goal E: Enhance implementation through participatory planning, knowledge management and capacity building.		
17	E1: NBS and AP adapted as policy instruments NBSAP 2017-2030 was approved by the Prime Minister of Pakistan in 2018. This document sets the strategic direction for biodiversity action in Pakistan towards 2030. The document is the main policy instrument for biodiversity conservation in Pakistan.	On Track
18	E2: Traditional knowledge respected Pakistan's traditional knowledge has been safeguarded and protected under draft ABS Act, 2012. Further, the rights of communities have been recognized through several pieces of legislation and policies. Traditional land management practices are helpful in biodiversity conservation practice.	Partly on Track
19	E3: Knowledge improved, shared and applied In recent years Pakistan has made efforts in developing data delivery and data management systems, environmental web system, and published biodiversity documents are contributing greatly to improved sharing and application of the country's knowledge. NGO's and academia have made contributions to a number of species and habitats records and these are being used. More work is required to address data recording and analysis gaps.	On Track
20	E4: Financial resources increased Mainstreaming biodiversity in the national development agenda with increased financial resources is on the card. During the last five years financial resources have been increased substantially to implement short term and medium term projects and programmes.	On Track

Section IV

Description of the National Contribution to the Achievement of each Global Aichi Biodiversity Target

Aichi Biodiversity Target 1: Awareness of biodiversity increased

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.

In Pakistan electronic and print media is well aware of value of natural environment with particular emphasis on biodiversity conservation. There are several ongoing initiatives to ensure that awareness raising on biodiversity sustainability is effective and successful. Air time is dedicated on electronic media for public messages. Under this obligation media is regularly highlighting issues and importance of biodiversity as a life supporting system to sensitize the general public and policy makers. Involvement and participation of local people in protected areas management and regulation of community managed trophy hunting programme is another important tool to raise awareness about values of biodiversity and its sustainable use. The proactive role of NGOs and civil society organizations in Pakistan is a driving force to sensitize masses about values of biodiversity components and their vulnerability in the context of population growth and development.

Another front used in Pakistan to create awareness about sustainability of biodiversity is rapidly growing social media, where outreach of several web based groups like 'All foresters', Friends of Parks n Trees, WhatsApp Friends, DRR NCRD, Friends of Wildlife, Wildlife Conservation of Pakistan, Pak Wildlife and many YouTube documentaries are playing positive role to raise awareness on contribution of biodiversity in national development. In addition several publications, reports, environmental magazines (Wildlife & Environment, Natura, Farozan, etc.) and newsletter in national/local as well as English languages are also responsible for boosting awareness movement in the country.

Two tree planting campaigns during spring and monsoon seasons are regularly organized at national and sub-national levels. International Day for Biodiversity, World Wetlands Day, World Environment Day, World Wildlife Day, World Migratory Bird Day, World Day to Combat Desertification, Earth Day, World Water Day, World Oceans Day, International Mountain Day, International Day of Forests are celebrated at national and organizational levels with several awareness raising activities related to biodiversity. All such events are in line with the achievement of the global biodiversity objectives.

Under ongoing projects and programmes round the year several education and awareness related workshops and seminars are organized, mainly focused on importance of biodiversity and its sustainability, which is a big driving force to sensitize the parliamentarians, students and youth about values of biodiversity and how to achieve relevant targets of SDGs, mainly 14 & 15. These events aim at positively changing attitudes of people towards biodiversity conservation. Similarly awareness activities regarding large scale planting and REDD+ also contribute to climate change adaptation and mitigation (SDG 13).

There are a large number of organizations including MoCC, PMNH, BCI, Provincial Forest, Wildlife, Fisheries, Livestock, and Environment Departments, NGO's, like WWF Pakistan and IUCN Pakistan are actively engaged to promote biodiversity and help raise the awareness of conservation and sustainable use of biodiversity.

Aichi Biodiversity Target 2: Biodiversity values integrated

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.

Integration of biodiversity into mainstream national and local development and poverty reduction strategies and planning, in Pakistan, is the major achievement. Various national and provincial programmes and projects are integrated into and implemented for the development and improvement of the wellbeing of the environment and people. Different biodiversity programmes

with financial benefits to the parties that relate to biodiversity conservation were implemented at national and regional levels with the support from donors and governments.

Green Growth Initiative

After the success of Green Growth initiative, launched in 2014 in KP, the Government of Pakistan has decided to extend it to the whole of Pakistan in 2016 with a focus on cities as well.

First it was initiated with the name of Green Pakistan Programme and now it is scaled up as Clean and Green Pakistan Movement (2018). Both initiatives have been acclaimed internationally and registered with the Bonn Challenge. This project delivered multiple benefits – enriched biodiversity, enhanced aesthetics values, helped to mitigate impact of climate change and provided a variety of economic benefits to the local people. The ongoing long term Clean and Green Pakistan initiative with a focus on urban areas will not only improve aesthetics, but will also reduce the impact of extreme events under global warming, smog and will serve to conserve and improve the floral biodiversity. It will also promote conservation of pollinators and other faunal biodiversity particularly avifauna.

Mountain and Markets

A GEF-UNDP funded project ‘Mountain and Markets: Business and Biodiversity in Northern Pakistan’ was implemented during 2013-2017. The basic objective of the project was to promote sustainable production of biodiversity goods and services through community ecosystem-based enterprises. The project used voluntary certification of Non-Timber Forest Products (NTFP) as a tool to promote biodiversity conservation and strengthen existing conservation efforts with innovative market-based mechanisms. The project has developed community and institutional capacities for certified production of ‘biodiversity-friendly’ NTFPs through increasing market demand thereby creating new economic incentives for forest conservation in the mountains.

Sustainable Land Management

The ongoing GEF-UNDP ‘*sustainable land management to combat desertification in Pakistan (2015-2020)*’ project, an up-scaled phase of the SLMP pilot phase project, is under implementation in 14 dry land districts in all four provinces. It will assist to achieve the long-term goal – “to combat land degradation and desertification in Pakistan” with the primary objective - “to promote sustainable management of land and natural resources in the arid and semi-arid regions of the country in order to restore degraded ecosystems along with associated biodiversity and their essential services, reduce poverty, and increase resilience to climate change”.

<https://www.slmp.com.pk>

Mangrove for the Future (MFF)

During 2014-2018, the main vehicle to implement the MFF national strategy and action plan (NSAP) has been a small grant facility (SGF) projects. The facility has proved as an effective tool, enabling MFF Programme in Pakistan to demonstrate a number of operations and approaches that empower coastal stakeholders in decision making processes. The projects supported by this regional initiative covered a wide range of interventions, including support to restoration and management of ecological services in degraded coastal habitats; development of supplementary livelihood opportunities that contribute to reduce threats to biodiversity; and building of capacity through the social empowerment process for collective action in community based management and co-management. (<https://www.mangrovesforthefuture.org>).

How and to what extent these contributions support the implementation of the 2030 Sustainable Development Goals

Integrating biodiversity into large scale afforestation drive, sustainable land and forest management initiatives and sustainable aquaculture (crab fattening) activates through different ongoing projects and programmes such as Green Pakistan Program, Mangroves for the Future initiative, GEF-UNDP funded sustainable land management project and sustainable forest management project are promoting sustainable use of terrestrial as well as coastal ecosystems. Further these programmes have also contributed to combat desertification and land degradation and to halt biodiversity loss (SDG 14 & 15), such country wide participatory focused operations are a source of poverty reduction as well (SDG 1).

In Pakistan despite several challenges the biodiversity values have been integrated into the mainstream planning, policy and reporting frameworks.

Aichi Biodiversity Target 3: Incentives reformed

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 socio-economic conditions.

Please describe how and to what extent your country has contributed to the achievement of this Aichi Biodiversity Target and summarize the evidence used to support this description

At present no such strategy exists. However Pakistan's National Biodiversity Strategy and Action Plan 2017-2030 targets a study to identify and determine the impact of incentives already in practice and that are negatively impacting biodiversity and natural ecosystems. The study will also propose positive incentives for different sectors to encourage and promote biodiversity conservation in the country. Towards the achievement of the Aichi Target 3, an assessment will be conducted to accelerate the process of removal of harmful incentives and strengthening of incentives that reward positive contribution to biodiversity and its components. The proposed exercise will also provide the roadmap, which will lead to achieve the targets related to SDGs 14 and 15.

Incentives help to influence behaviour of the community towards achieving a range of objectives and targets. These can encourage activity that can promote biodiversity. However, in Pakistan, presumably some negative incentives are probably in conflict with the overall biodiversity protection regime and are leading to its deterioration and loss. WWF-Pakistan provided support to Marine Fisheries Department in preparation of documents for The World Trade Organization (WTO), so as to eliminate subsidies in fisheries sector and presently no such subsidy is being provided in fisheries sector in Pakistan.

Pakistan supports the informal group in the WTO negotiation on subsidies called 'Friends of Fish' and supported their move for the categorisation of fisheries subsidies in an effort to create a negotiating platform on fisheries subsidies.

A flagship project, the "Billion Trees Afforestation Project (BTAP)" of Khyber Pakhtunkhwa (KP) Government (2014-2020) had covered almost 100 percent of the cost of rehabilitation of 156,000 ha of degraded community forests. In addition, the project covered the costs of plantations on community and family owned lands and gave 165 million plants for planting on

their farmlands. However, this model of covering the full cost may not be sustainable in the long run, since vast ecosystems and habitats are in need of rehabilitation throughout the KP province.

The Provincial Government of Gilgit-Baltistan (GB) has taken steps to reduce the impacts of climate change on biodiversity in the region. In this regard an initiative has been introduced to support afforestation and biodiversity conservation through the involvement of various stakeholders and government line departments. For the purpose, 1% of the cost is being deducted from each development project in GB that would be used to incentivize the local communities to promote biodiversity conservation in Gilgit-Baltistan.

Aichi Biodiversity Target 4: Sustainable production and consumption

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 the use of natural resources well within safe ecological limits.

Pakistan is a highly diversified country, having 12 agro-ecological zones, where more than 35 types of crops and livestock and the mixed farming systems are practiced. Livestock is rapidly growing in Pakistan and is central to the livelihood of its rural people providing economic security in years of bad agriculture hitting in the area in a cycle of 4 - 7 years. Pakistan like many other countries is facing various challenges in its efforts to keep balance between production and consumption to fight malnutrition. Pakistan has made significant progress in food production over the last several decades. However, food security has remained a key challenge due to high rate of population growth, rapid urbanization, low purchasing power, and high price fluctuations. According to the Food Security Assessment Survey (FSA), 2016, 18% of the population in Pakistan is undernourished. To address the challenge of food insecurity, the Government of Pakistan has taken the initiative to formulate a national food security policy, 2018.

According to Pakistan Economic Survey 2016-17, agriculture contributes 19.5% to Pakistan's GDP, employs 42% of the labour force, constitutes 65% of export earnings, and provides livelihoods to 62% population of the country. The harmonization of non-agricultural activities, such as those related to nutrition, trade, natural resource management, non-farm income opportunities, targeted income support, and other innovative options, with the agriculture sector are also recognized as important steps in achieving the food security. There are several projects under implementation in different parts of the country to promote sustainable production and consumption through public sector organizations.

Pakistan is a party to a number of international treaties and conventions and a member of regional and international initiatives relating to biodiversity conservation. These conventions include CBD, Ramsar, CMS, UNCCD, CITES and other platforms, like MFF, ECO, SACEP. The objectives and policies derived from these instruments mainly focus and target sustainable production and consumption of biological resources.

The government of Pakistan under its national food security policy, 2018, has expressed its strong commitment for the realization of Sustainable Development Goals (SDGs), as a national agenda, both at the federal and provincial levels. Within the framework of this agenda the achievement of zero hunger (SDG 2) is emphasized as a top priority for Pakistan, with the commitment to pursue the goals, of "ending hunger, achieving food security and improved nutrition and promoting sustainable agriculture".

Increased climate variability and extreme weather events are negatively impacting food stability, food production and livelihoods of the farmers and vulnerable masses. Threatened ecosystem services are limiting our capacity to achieve sustainable production (agriculture, livestock, and fishery) in the long run.

Sustainability is an integral part of the country's economic progress and is embedded within the government's strategy to lead the development agenda. Pakistan is committed to being a low carbon economy and has ambitious targets to achieve this. However, so far progress made does not indicate with confidence that it is on the track or has achieved safe ecological landmarks.

Aichi Biodiversity Target 5: Habitat loss halved or reduced

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.

Intact habitats coupled with biological corridors are essential to ensure continued abundance and distribution of diversity of species. Loss or degradation of natural habitats means loss of biodiversity and the future of many species and their associated ecosystems. Many natural habitats of Pakistan have ecological, recreational, educational and scientific value to the nation and its people.

The Federal Ministry of Climate Change promulgated National Forest Policy 2015, which is a step in the right direction. The policy aims at providing broader guidelines to support provincial forest policies.

Historically, the forestry sector has been a low development priority and has received limited investments. Budget allocations for this important sector are normally less than one percent of provincial budgets. However, in recent years (2014-2018) the government has increased its attention to forests, as demonstrated by the nationally determined contribution, the Green Pakistan Program, and the Billion Tree Tsunami Afforestation Program. Future plans are also in place to enhance and scale up these new and important initiatives in order to strengthen landscape management and improve habitats conditions in different ecological zones. Similarly since 2014 many degraded mangrove areas have been restored by implementing large scale afforestation programmes in the Indus delta.

In addition to above, critical habitats of riverine and scrub forests in Sindh and Punjab provinces are in process of rehabilitation and improvement through SFM interventions. A country wide SLM project is under implementation since 2015 to combat desertification. Further several community managed trophy hunting areas are examples of best practices to protect unique biodiversity rich habitats throughout the country.

In achieving the Aichi target 5, Pakistan is contributing towards achievements of target 14 & 15 of SDGs by providing protection and promoting sustainable use of marine and terrestrial habitats and ecosystems, which will ultimately contribute to reverse habitat degradation and halt biodiversity loss.

Some of the important habitats such as mangroves, riverine forests, and mountains of northern areas have suffered degradation and losses through changes in land use and wild habitat conversion. Restoration is underway on different habitat types. The habitat mapping is badly needed as a baseline for timely actions.

Aichi Biodiversity Target 6: Sustainable management of aquatic living resources

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.

Pakistan's fisheries contribute modestly to economic growth and social development. Fisheries account for less than 0.4 percent of GDP. In 2015, marine capture fisheries produced almost 360,000 tons of fish, while inland capture fisheries and aquaculture operations produced 132,500 tons and 151,000 tons, respectively. The marine sector is a significant economic pursuit for people along the coasts of Sindh and Balochistan, while small-scale aquaculture and inland capture fisheries are found across the country. Fisheries employ some 390,000 people directly, and some 900,000 - 1,800,000 indirectly through jobs offered in processing, transport and retailing.

Fisheries sector has potentials to become a much stronger engine of economic growth and social development. The underlying potential of Pakistan's fisheries and aquatic resources is not reflected in the current production, growth, and value. In addition to economic benefits, fisheries offer important benefits for food security and nutrition.

The sector has much more to offer in terms of boosting export revenues, creating decent jobs, supporting livelihoods in coastal communities, improving domestic nutrition and food security, and narrowing Pakistan's significant economic gender inequality. The Government of Pakistan recognizes these opportunities, and has signaled its intention to increase the contribution of the fishery sector towards these goals. The improved ecosystem management will ensure sustainable management of aquatic living resources and prevent further degradation of marine and important freshwater resources (Revitalizing Pakistan's Fisheries, WB-AFD, 2018).

In Pakistan, fishing operations are considered major threats to Endangered, Protected and Threatened (ETP) species. WWF-Pakistan conducted studies to estimate the extent of mortality and entanglement in fishing gears, as well as developed techniques to reduce the mortality of turtles and dolphins in fishing gears. Introduction of subsurface gillnetting has resulted in reducing turtle mortalities. Also, the entanglement, and thus the mortality level of dolphins, too has dropped from 99.9% to only 2 to 3%. This is a major achievement for the conservation of these species. In addition, WWF-Pakistan has developed a data bank of large whales in Pakistani waters and collected useful information on Arabian humpback whale, blue whale, Bryde's whale, sperm whale, killer whale, dwarf sperm whale and pygmy sperm whales.

Pakistan's efforts to promote sustainable development of aquatic living resources, particularly in the fishery sector, is in line with SDG's 12, 14, & 15.

Considerable progress has been made in ensuring protection to aquatic living resources in Pakistan. The MFF NSAP is helping to focus efforts towards sustainable management in the marine environment.

Aichi Biodiversity Target 7: Sustainable agriculture, aquaculture and forestry

By 2020, agricultural, aquaculture and forest ecosystems should have increased resilience and provide essential services in order to secure the country's variety of life, and contribute to human well-being, and poverty eradication.

Agriculture

The Government of Pakistan has taken the initiative to formulate a national agriculture and food security policy, 2018. Agricultural growth has not benefited the rural poor in Pakistan to the extent it was expected. Wheat, rice and sugarcane, being major food crops, are given more attention during previous policies. Despite a consistent increase in the production of these crops, approximately one fourth of the population is undernourished. For balanced food intake, there is a need to focus on the production of diverse food i.e., vegetables, fruits, nuts, oilseed, pulses, and livestock products: which not only contribute around 50% of dietary energy, but also significantly contributes in nutritional food security.

The commitment of the Government of Pakistan is to promote good agricultural practices to ensure conservation of biodiversity in line with the Aichi road map and Sustainable Development Goals, particularly to the SDG-1 and 2, to achieve poverty reduction and Zero Hunger Challenges.

Aquaculture

Aquaculture is one of the fastest-growing food sectors globally. Pakistan has extensive resources of fresh and brackish water, however aquaculture is limited in its variety and extent. The industry is dominated by carp, while tilapia and trout are playing a minor role. The marine and coastal aquaculture, such as shrimp farming is almost non-existent. On the world map of aquaculture production Pakistan ranks 28th. Its aquaculture growth rate of approximately 1.5 percent per year over the past five years is considerably lower than the rates in India and Bangladesh. Furthermore, Pakistan's aquaculture growth is well below these countries' growth during equivalent periods of their aquaculture industries' development despite continued strong global demand.

Aquaculture extension in Pakistan primarily takes place at the Provincial and Territorial level, largely through independently working institutions. Institutional coordination, upgraded curricula, and learning from other countries' successes could increase productivity. This should be supported through increased research, undertaken jointly by public and private sectors.

Forestry

Forestry being a provincial responsibility, the National Forest Policy 2015, can be effectively implemented only if all the provinces fully own it. To achieve this, consultations with provincial stakeholders would help, especially on the development of an action plan with clearly defined responsibilities and time-bound targets. In addition, the current forest laws and regulations at the provincial level are mostly outdated and are required to incorporate modern management requirements for changing scenarios in the forestry sector, such as community participation, benefit sharing with forest-dependent communities, biodiversity conservation, and payment for ecosystem services, climate change adaptation, and buffer zone management around protected areas.

Despite above mentioned limiting factors, Pakistan has achieved remarkable development in forestry sector by introducing a few flagship forestry development programmes with national as well as donor funding such as, Billion Tree Tsunami Project in Khyber Pakhtunkhwa (2014), REDD+ Readiness Project (2015), Green Pakistan Programme (2016) and Sustainable Forest Management (SFM), to Secure Multiple Benefits in Pakistan's High Conservation Value Forests (2017).

Agriculture, aquaculture and forestry are important sectors of Pakistan's economy. Considerable progress has been made in developing policies and strategies that will help achieve and support sustainability targets by 2020 and beyond.

Aichi Biodiversity Target 8: Pollution reduced

Minimizing pollution, including excess nutrients, to levels that are not detrimental to ecosystem function and biodiversity.

Pakistan roughly generates more than 20 million tonnes of municipal solid waste with an annual growth rate of 2.4 percent. All major cities including Karachi, Lahore, Peshawar, Quetta and Islamabad are facing enormous challenges in tackling the problem of urban waste. Particularly environmental pollution along the coastline of Pakistan, including Karachi city harbor areas, has serious impact due to their untreated release into the sea, which is effecting coastal human population and marine ecosystem (2017). However, the Government of Pakistan in 2018 announced its plan regarding waste based power plants which have dual benefits – disposing off garbage and generation of electricity through garbage. The Sindh Industries and Commerce Department has drafted a new law. 'The Sindh Industries Registration Act, 2017' making it mandatory for the industrial units to install a pre-treatment plant within the factory premises to treat toxic waste.

In addition NIO has initiated a study, in line with UN-SDG-14 and UNEP Resolution 1/6 Marine Plastic Debris and Global Programme of Action (GPA), intergovernmental programme to prevent degradation of the marine environment from land-based activities and Global Partnership on Marine Litter (GPML), to protect human health and environment by the reduction and management of marine litter (NIO, 2017).

The new steps taken, on the orders of the Supreme Court of Pakistan, 2017, to control pollution and improve state of environment, federal and provincial governments have started working on the agenda. This will impact positively on natural ecosystems and the dependent species. Further, it will help to achieve the targets set under SDG 6, i.e. improve water quality by reducing pollution, eliminating dumping and minimizing release of hazardous chemicals and materials, halving the proportion of untreated wastewater and substantially increasing recycling and safe reuse globally.

The Punjab province of Pakistan experiences periods of low visibility due to fog, mist and smog between November and February each year for an average of 10 to 25 days. In recent years, however, the situation is exacerbating as it causes a sensation of burning of eyes and foul smell. Data shows that this is a regional phenomenon, covering large areas of South Asia, from Delhi to Faisalabad and beyond. Various studies have linked it to the burning of rice stubbles in the Indian states of Punjab, Haryana and Uttar Pradesh. During 2016 alone around 32 M tons of rice stubble were estimated as burnt in the Indian Punjab. Local sources of pollution, however, also had their contribution to this situation. To address this issue a Policy and Action Plan for Control, Mitigation, and Advisory and Protective Measures in Extreme Weather Conditions of Dense Smog in the Punjab 2017 has been developed and adopted.

Despite some good work for the improvement of air and water much work remains to be done, with more challenging measures and actions are required to control pollution and diffuse pollution, control marine litter, particularly plastic pollution, and better quantified effects of pollution on biodiversity and ecosystems.

Aichi Biodiversity Target 9: Invasive alien species prevented and controlled

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.

In Pakistan, Invasive Alien Species (IAS) are prevalent over vast landscapes and have displaced local species. Some of these invasive plant species include Mesquite (*Prosopis juliflora* and *P. glandulosa*), *Lantana camara* and *Parthenium spp.* Among fish fauna, tilapia is the most invasive alien species which has altered the aquatic ecosystem of the major water bodies of the country. Section 2.3 of Pakistan's Biodiversity Action Plan identifies IAS as one of the major causes of degradation of habitats in Pakistan.

It is important to highlight the introduction of several alien species of fauna and flora on Astola Island, the only marine protected area of Pakistan. These species, range from house rat and domestic cat to *Prosopis juliflora* (Devi), posed a serious threat and challenge for the island biodiversity, particularly for nesting birds and marine turtles (*Ecological Baseline and Resource Use Survey of Astola Island, 2017-18 IUCN-Pakistan*).

The National Forest Policy, 2017 places emphasis on supporting provinces in remedial actions, including legislation for controlling of invasive alien species.

It was identified that in Pakistan parthenium manipulates the ecology of fields, effects crop yields, and invades forests through its aggressive nature and allelopathic (hindering the development of different plants) effects. It even causes serious threats to surrounding livestock and has the capability to cause serious allergies among humans, who regularly interact with it.

The Centre for Agriculture and Biosciences International (CABI) – Pakistan has launched a comprehensive action plan- 2018, aimed at combating parthenium (locally known as *gajar booti*), a highly invasive weed species that is spreading in Pakistan. CABI, which works to help farmers to develop a 'Weed Management Action Plan' with reference to parthenium and its impact on Pakistan. CABI action plan consists of three stages: research, development and communication. CABI will assist farmers and provide an integrated and sustainable framework to address the issue.

Implementation on weed management action plan will also contribute to support the implementation of SDG 15.8 which recommends measures to prevent introduction and significant reduction in the impact of invasive alien species on land and water ecosystems.

In Pakistan action to control the most problematic non-native invasive species, such as *Parthenium*, is underway and an information system has been developed by CABI to inform rapid response. However, the spread of invasive non-native species and their impacts on biodiversity is an active and growing threat.

Aichi Biodiversity Target 10: Ecosystems vulnerable to climate change

Minimizing the multiple anthropogenic pressures on coral reefs, and other vulnerable ecosystems impacted by climate change or ocean acidification, so as to maintain their integrity and functioning.

Pakistan is one of the top ten most vulnerable countries to the impacts of climate change, therefore, its geographical location, its water resources, glaciers, forests, wildlife, fisheries and associated biodiversity are vulnerable to the impacts of climate change.

The National Strategy and Action Plan (NSAP), 2014, of Pakistan was developed under the Mangroves for the Future (MFF) initiative to deal with the issues of coastal and marine ecosystems, it provides a good framework to promote integrated coastal and marine management and is, in fact, a critical document that links local actions with global thinking. This document suggests strategies and actions that support the implementation of the National Climate Change Policy, and directing the way forward towards meeting Pakistan's obligations under various international environmental conventions including CBD. In addition, the State of Azad Jammu and Kashmir (AJK) has also developed AJK Climate Change Policy 2017 to address the issue at sub-national level.

Subsequently 'Expert Panel Report on Marine Resources Technology Foresight Exercise, 2017' was undertaken by Pakistan Council of Science and Technology under the Ministry of Science and Technology. The objective of this exercise was to review the present system of marine natural resources management and to provide useful inputs to reform the relevant policies of the government's science and technology policy system of Pakistan. One of the main objectives of the foresight studies is to identify areas of science and technology, as well as the emerging generic technologies that have the potential to yield the highest economic and social benefits in the long term (next 10 to 20 years).

Pakistan in its, Nationally Determined Contribution (NDC), 2017 document identified priority areas for the country's mitigation and adaptation efforts with the intention to pursue Climate Smart Agriculture (CSA) and to strengthen risk management systems.

These instruments are providing guidance to the management authorities to sustainably manage the country's coastal and marine ecosystems, especially mangroves, which contribute to SDG 14, and also to conserve and sustainably use the oceans, seas and marine resources for sustainable development.

Aichi Biodiversity Target 11: Protected areas

Ensuring that at least 17 per cent of Terrestrial and Inland water and 10 per cent of Coastal and Marine Areas are conserved through Systems of Protected Areas.

Please describe how and to what extent your country has contributed to the achievement of this Aichi Biodiversity Target and summarize the evidence used to support this description

Since submission of the last CBD National Report, in 2014, two more national parks and one wildlife sanctuary have been established to move closer to the national and global targets. With these new additions the country's terrestrial protected area network comes to over 13 percent of its geographical area. Similarly during the reporting period, a concrete steps were taken to designate biodiversity hotspot marine areas as marine protected areas, and in this regard 'Astola Island' has been notified as the first marine protected area of Pakistan. Further, preparatory work is in its final stage to declare 'Churna Island' and 'Miani Hor' as two more marine protected areas.

In view of the above developments, the country is still away from the global targets set under the Aichi Biodiversity targets. However, Pakistan has made commendable progress towards protecting its terrestrial and marine ecosystems and has contributed in conservation of biodiversity and has moved forward in achieving the national as well as Aichi target 11. Further, species and habitats are safeguarded in a comprehensive protected areas system of Pakistan, contributing towards halting biodiversity loss. More work is still required on management, integration, and connectivity of sites.

Pakistan's contribution to establish significant proportion of its terrestrial and marine ecosystems as protected areas for conservation of biodiversity also supports the implementation of SDGs 14 and 15.

Aichi Biodiversity Target 12: Reducing risk of extinction

Preventing the extinction of known threatened species and their conservation status, particularly of those most in decline, and improving and sustaining their status.

Please describe how and to what extent your country has contributed to the achievement of this Aichi Biodiversity Target and summarize the evidence used to support this description

Although Pakistan lacks a comprehensive species database to adequately monitor the changing trends vis-a-vis known threatened species of flora and fauna. However, during the last few years the status of several threatened species have improved through continuous conservation efforts by concerned management authorities, environmental NGO's and community activism. Some of the species on the target include: long-billed vulture, snow leopard, and brown bear. Different ungulates species, have shown a comeback due to ongoing successful community managed trophy hunting programme in various parts of the country. The main reason behind this partial success is stringent reporting commitments to international agreements, such as Convention on the International Trade in Endangered Species of Wild Fauna and Flora (CITES), as well as appropriate efforts of concerned institutions like National CITES Management Authority, Ministry of Climate Change, Provincial Wildlife and Forest Departments and community participation in enforcing conservation regulations. However, despite all these success stories still many resident and migratory species that are facing illegal trafficking and trade such as pangolin, freshwater turtles, falcons, houbara bustard, and monitor lizards, are under severe pressure.

The ongoing, Billion Trees Afforestation Project (2014-2020) of Khyber Pakhtunkhwa (KP) province paid special attention to improve status of the threatened species of trees like *Taxus baccata*, *Pinus gerardiana* (chilghoza), *Alnus nitida*, and *Juglans regia* (walnut) and attempted rehabilitation of ecosystems through natural regeneration. Further, Zoological Survey of Pakistan, an attached department of Ministry of Climate Change, has been given the task to develop a National Red-List Data Book on fauna of Pakistan. The work is under progress.

National processes to update lists of nationally threatened species coupled with conservation strategies, have contributed to the objectives of SDG15 to save biodiversity loss from complete destruction and prevent extinction of threatened species of flora and fauna.

Aichi Biodiversity Target 13: Safeguarding genetic diversity

Maintaining the genetic diversity of cultivated plants and farmed and domesticated animals and of wild relatives.

Bio-resources Conservation Institute (BCI) is an institution of Pakistan Agricultural Research Council (PARC) established in 2016 is working for conservation and research on local and exotic biological resources in Pakistan. BCI is working in collaboration with the federal and provincial agricultural research institutes and universities engaged in biodiversity conservation. BCI is also strongly linked with international gene banks and biodiversity conservation partners for global food security.

Objectives of the institute includes: 1) to serve as the national facility for conservation and distribution of genetic resources to researchers; 2) to document/disseminate information on genetic resources; and 3) to generate knowledge and create awareness about biodiversity.

Pakistan by establishing BCI has made effort to ensure maintenance of genetic diversity and to provide mechanisms that help to manage Biodiversity Genetic Information System that allows sharing of biodiversity information globally.

The establishment of BCI, as an institution serving as a gene bank, coordinates and develops capacity of other sub-national institutions that will contribute to the objectives of SDG 2. Specifically, it supports to achieve SDG 2.5 that aims to maintain the genetic diversity of seeds, cultivated plants and micro-organisms, while it has planned such system for farmed and domesticated animals, and promote access to fair and equitable sharing of benefits, arising from the utilization of genetic resources and associated traditional knowledge, as internationally agreed.

Aichi Biodiversity Target 14: Ecosystem services

Restoring and safeguarding ecosystems that provide essential services, including ecosystem services.

Under implementation of programmes/ projects of forestry and wildlife sectors, such as the sustainable forest management project, billion trees afforestation programme, rehabilitation of mangrove forests in Indus delta and protected areas management activities, focus on ecosystem services and associated services has increased. Local communities are benefiting from these ecosystem services directly by participating as partners in the conservation.

In recent years improvement in protected areas management has strengthened the health of various ecosystems, particularly mangroves and coastal ecosystems, and has enhanced conservation status and resilience capabilities of these ecosystems. Further, a Billion Trees Afforestation Project in Khyber Pakhtunkhwa has contributed in rehabilitation of degraded natural forests, which helped in recharge of springs and increased the availability of drinking water for the local communities and down country population. The project has also created thousands of green jobs for the rural poor, coupled with easy availability of fuel wood for the local people. The project will have a positive impact on women, who are responsible to collect forage, fuel wood and bring water from spring and wells.

Pakistan being an active member of IPBES platform is also playing its role in the assessment of the regional and global ecosystem services assessments.

Aichi Biodiversity Target 15: Ecosystem restoration and resilience

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.

Please describe how and to what extent your country has contributed to the achievement of this Aichi Biodiversity Target and summarize the evidence used to support this description

Mentionable efforts are underway for the last five years to restore important ecosystems, such as mountain ecosystem, coastal and marine ecosystem, dryland ecosystem, wetlands ecosystem and forest ecosystems, by empowering local communities with modest available resources. In this regard sustainable land management, sustainable forest management programmes with a special emphasis on restoration of degraded riverine forest and mangroves ecosystems are important steps in right direction.

In addition, Billion Trees Afforestation Project and Green Pakistan Programme have also positively contributed in restoration of degraded ecosystems of up-country and coastal forests. In achieving this Aichi target, it will also support and contribute directly and indirectly in the implementation of the SDG 15.

Aichi Biodiversity Target 16: Nagoya Protocol on Access and Benefit-Sharing

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

Please describe how and to what extent your country has contributed to the achievement of this Aichi Biodiversity Target and summarize the evidence used to support this description

Pakistan became party to the Nagoya Protocol in 2016. However, well before accession the country had formulated its draft Access to Genetic Resources and Benefit-Sharing Act, 2012. This legislation 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 also intended to protect community rights in respect to genetic resources, including use of traditional knowledge and the right to share the benefits arising from the utilization of traditional knowledge.

The protocol enables Pakistan to help create equitable partnerships between communities and other groups, such as scientific organizations and private sector enterprises to develop new products based on natural resources. Nagoya Protocol is a mechanism that explicitly encompasses not only ecological, but also social and economic aspects.

Aichi Biodiversity Target 17: Biodiversity strategies and action plans

By 2015 each Party has developed, adopted as a policy instrument, and has commenced implementing an effective, participatory and updated national biodiversity strategy and action plan.

Please describe how and to what extent your country has contributed to the achievement of this Aichi Biodiversity Target and summarize the evidence used to support this description

Pakistan developed its National Strategy and Action Plan (NSAP) in 2014 under its Mangroves for the Future programme to speed up its mangroves and coastal conservation and rehabilitation activities in a coordinated manner. Subsequently National Forest Policy, 2015, was approved to give sectoral direction for a long term enhancement of forest and associated resources. Recently in 2018, Government of Pakistan has approved a wide ranging the National Biodiversity Strategy and Action Plan (NBSAP), 2017-2030.

The successful implementation of Pakistan's NBSAP requires a concerted effort at all levels of governments (federal, sub-national and local), communities, private sector, NGO's and civil society, as a whole. Key considerations in the implementation of NBSAP are an integrated approach with good governance and efficient allocation of resources to ensure smooth progress to achieve targets related to biodiversity conservation and sustainable development goals.

In addition to NBSAP, Biodiversity Strategy and Action Plans (BSAP's) for Punjab, Sindh, Khyber Pakhtunkhwa, Balochistan, Gilgit-Baltistan and Azad Jammu and Kashmir (AJK) have been independently developed after extensive stakeholders' consultations. However, till now, only AJK Government has approved its sub-national Biodiversity Strategy and Action Plan in 2018.

Aichi Biodiversity Target 18: Traditional knowledge

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 local communities, at all relevant levels.

Both in rural and urban societies of Pakistan, the value and usage of traditional knowledge is ages old practice. Human setups had traditional values that exhibit as much capability and depth as that in any other developed society of the world. Organizations have evolved, with the passage of time, which are trying to accommodate the needs of the modern age, yet this knowledge has been managed to be kept in its initial/ original form to a large extent. The traditional institutions, systems are not new for the people of Pakistan. Even in present era the people in different parts of the country still apply many ancient indigenous principles in conducting the affairs of their daily lives in a better and sustained way. However, traditional health practitioners are being gradually integrated with modern medical systems. Pakistan's NBSAP fully recognizes the role of traditional knowledge in biodiversity conservation.

In the field of agriculture several traditional knowledge based measures along with scientific knowledge have been adopted as regular practices to improve productivity of crops and livestock. In this regards Intellectual Property Organization (IPO) of Pakistan is effectively

registering genetic resources and traditional knowledge. IPO has also indicated geographical indicators for crops, like Kasurimethi.

Aichi Biodiversity Target 19: Sharing information and knowledge

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.

Please describe how and to what extent your country has contributed to the achievement of this Aichi Biodiversity Target and summarize the evidence used to support this description

In Pakistan, biodiversity and environment related science based research activities are independently undertaken in a number of institutions and universities, with little direct coordination. However, Pakistan Museum of Natural History (PMNH), Pakistan Agricultural Research Council (PARC), National Institute of Oceanography (NIO) and Bioresource Research Centre-Pakistan (BRC) are a few national level institutions/ organizations provide platform for biodiversity-related research in the country. The facilities of molecular taxonomy, gathered with BRC can help in the proper identification of the species/ races/ ecotypes present in different parts of the country. To facilitate enhanced knowledge based information on biodiversity in the country, there is a need for increased and continuous/ persistent research and development and the need for continuous learning for future occurrences. Upon achieving this Aichi target, Pakistan is set to achieve SDGs 14 and 15.

Scattered information on different aspects of biodiversity and its conservations is present in the form of research papers published in local/ not very widely distributed journals and as thesis lying in the libraries of different educational institutions. An effective coordination mechanism between institutions/ organizations is required to avoid duplication of research work and also for sharing of results of research taking place in different places. Such coordination will help in adopting uniform sampling and research techniques for producing comparable data used in reliable species and ecosystem status.

Please describe other activities contributing to the achievement of the Aichi Biodiversity Target at the global level (optional)

Bio-resources Conservation Institute (BCI) for its NGP data *ex situ* holdings share its information internationally with WIEWS database of FAO-UN (<http://www.fao.org/wiews/data/organizations/en/?instcode=PAK001>). Nationally the *ex-situ* holdings of the NGP can be viewed at www.iabgr.org. Besides catalogs, and reports & publications are regularly published on PGRs.

Aichi Biodiversity Target 20: Mobilizing resources from all sources

By 2020, at the latest, the mobilization of financial resources for effectively implementing the Strategic Plan 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 resources needs assessments to be developed and reported by Parties.

Please describe how and to what extent your country has contributed to the achievement of this Aichi Biodiversity Target and summarize the evidence used to support this description

Although Pakistan is making efforts for full mobilization of its resources towards national biodiversity conservation/ management and to achieve national biodiversity conservation targets, yet under its specific geopolitical location the available resources allocated for the purpose are meager compared with the investments made in some other countries. Inadequacy of financial resources has been a serious constraint in pursuing the implementation of CBD Strategic Plan and Aichi Biodiversity Targets. At the national level, in view of the current economic crisis, the financial allocation for conservation of biodiversity and other natural resources is not a top priority agenda. Bilateral and multilateral financial assistance, especially from GEF, is playing a role in the modest progress towards achieving the global biodiversity targets.

Please describe other activities contributing to the achievement of the Aichi Biodiversity Target at the global level (optional)

Environmental NGO's like IUCN and WWF are capable enough to generate some funds from international circles or from local corporate sector for their regular activities to push the agenda of biodiversity conservation.

PGRP & NH at BCI, NARC have won national and international funding for biodiversity and used it for the collection, evaluation and conservation, and safety duplication of PGRs. In 2017 a Crop Trust project on Crop Wild Relatives was executed at PGRP.

Section V

Description of the national contribution to the achievement of the targets of the Global Strategy for Plant Conservation (optional)

Research on flora of Pakistan, with its headquarter at University of Karachi, involving countrywide surveys, investigations and a reliable process of authentication by foreign experts has till 2015, published 222 volumes of the *Flora of Pakistan*. The basic collection and identification have mostly been undertaken by the qualified and experienced botanists present in the country, though identifications were confirmed through the help of international experts. The identification largely is based on morphological characters. The assessment indicates that only 30 percent flora is similar to that of India, the rest of 70 percent is similar to that of Iran's, Afghanistan's and Central Asia's. About 400 species are endemic to Pakistan (Ali, 2008). It is estimated that there are 465 species in Pakistan are threatened, of which 50 are on the verge of extinction in the wild.

Flora of Pakistan provides the first most comprehensive scientific data on the country's flowering species. The project funded by the US Department of Agriculture, was launched in 1968-69 in two institutions, Gordon College Rawalpindi and University of Karachi simultaneously, which was later on supported by the Missouri Botanical Gardens. Pakistan has no Botanical Survey Department to take care of this great biological resource.

Flora of Pakistan volumes contain information about the plant habitat, their figures, family, characteristics, details of their distribution, key to identification, local and scientific names, list of threatened species, plant utility (chemical and medicinal properties) if any, and citations. The country has more than 6,000 flowering species whose details have been recorded in *Flora of Pakistan*. Information of lower groups is still much below desired level.

Although Pakistan has no targets related to Global Strategy for Plant Conservation (GSPC), yet all known plants of Pakistan are available online on the following links:

- <http://www.tropicos.org/Project/Pakistan>
- http://www.efloras.org/flora_of_Pakistan

Ali, S. I. 2008. Significance of flora with special reference to Pakistan. *Pak. J. Bot.*, 40(3): 967-971.

Medicinal Plants: Medicinal plants have a long history for their effective use to prevent and treat different diseases. During the recent decades, modern drug discovery approaches have refocused on traditional medicinal plants because of their higher contribution in providing new drugs, drug candidates, and novelty and mechanism insights. International Center for Chemical and Biological Sciences (HEJ Research Institute for Chemistry + Dr. Panjwani Center for Molecular Medicine and Drug Research), University of Karachi, has taken a lead in development of chemical profile of many local plant species, traditionally known for their medicinal values.

Hypertension and hyperlipidemia are two main causes of cardiovascular diseases with rapidly increasing pervasiveness worldwide. Complimentary alternative medicines provide an effective choice to these highly prevalent global health issues. *Nigella sativa* has diverse range of traditional and pharmacological potential with established safety profile. A clinical study carried out in 163 randomly selected patients of both sexes (20-65 years old) with mild/ moderate hypertension and hyperlipidemia were given *Nigella sativa* oil. The results conferred that *Nigella sativa* had significant ($p < 0.05$) effect on controlling hypertension and hyperlipidemia when as compared to standards used. Moreover, *N. sativa* had proved to have excellent antioxidant potential as compared to other commercially available edible oils.

Juglans regia (fruits, leaves, stem bark and green husk) was investigated for metal contamination by using atomic absorption spectroscopy and found that Cd (in its fruits), Cu and Mg (in all parts) concentrations were critically above the standard permissible limits. Methanolic extracts of different parts were screened for antimicrobial activities against 12 pathogens, which suggested that fruits, leaves, stem bark and green husk held significant antimicrobial activities. Breast cancer is the top most prevalent cancer in women worldwide and is responsible for nearly 58% of all cancer deaths. *Juglans regia* fruits, green husk, stem bark and leaves showed promising ant proliferative activities against breast cell lines.

- <http://www.aloki.hu> (Use of Black seed (*Nigella sativa* L.) Oil in the Management of Hypertensive and Hyperlipidemic Individuals of District Muzaffarabad, AJK, Pakistan, 2017).
- <http://www.aloki.hu> (Measurement of Toxic Metal Contamination, Phenolic and Flavonoid Contents, Anticancer, Antimicrobial and antioxidant Activities of Dietary and Medicinal Plant *Juglans regia* L, 2018)

- Indigenous Ethnobotanical Remedies Practice to Cure Feminine Diseases in Tribal Communities of Kashmir Himalayas, 2014,
<http://www.arjournals.org/index.php/ijpm/index>

Please provide information on any active networks for plant conservation present in your country

Botanic garden maintained by Government College University (GCU) Lahore, Pakistan, is a member of the Botanic Gardens Conservation International (BGCI; <http://www.bgci.org>), a global non-governmental organization. In 2015, GCU Lahore and BGCI published the 'Dry Woodlands in Pakistan's Punjab Province' (available on BGCI and GCU Lahore websites, http://www.gcu.edu.pk/Bot_Garden.htm).

In addition to above, a *Botanical Conservatory* has been established at the National Agricultural Research Centre for *ex-situ* conservation of rare/endemic plants and economically important native species. So far more than 200 native plants are being maintained in the Conservatory. Examples of rare/endemic species maintained in the Conservatory, including *Nepeta griffithii*, *Jasminum leptophyllum*, *Rauvolfia serpentina*, *Ceropegia bulbosa* and *Douepia tortuosa*.

The newly established Microbial Genetic Resources Program of BCI, the National Culture Collection of Pakistan (NCCP), holds a collection of bacteria from different ecosystems and ecological conditions of Pakistan and presently, ≥1360 strains have been identified and preserved in the glycerol stocks.

Section VI

Information on the contribution of indigenous peoples and local communities (optional)

Local communities, in different parts of Pakistan, are enjoying rights of ownership over biological resources present in their areas. This situation demands enduring relationships between different partners. Further, this establishes certainty with respect to the ownership and management of lands and resources, create a stable climate for investment, and promote broader economic and policy objectives to the benefit of all Pakistanis. These rights and responsibilities provide platform to federal, provincial, territorial and local communities to establish cooperative management regimes for the conservation and sustainable use of renewable and non-renewable resources. Through these participatory modes, local peoples are assuming increased responsibility for the management of biodiversity in Pakistan.

Contribution by local communities is facilitated with the funding of donors and partners, to enable them to engage in and provide inputs and views on the development and implementation of policies and programs related to conservation of natural resources, including wildlife and biodiversity. Involvement of the local people enhances their capacity and enables them to participate actively in the conservation and recovery of threatened species. Capacity building includes skill development (education, training, learning), tool development (systems or mechanisms), and information management (data) to enable community based organizations to

acquire, develop, and use knowledge and skills so that they can play an active role in the implementation of local and national level conservation plans.

Traditional Knowledge

Cultural values are also taken into account for effective management of wetlands. For example, a floating habitation of fishermen community of Manchar Lake contributes in strengthening cultural and traditional practices of resource use.

Participation

The federal Ministry of Climate Change in collaboration with provincial departments involves local communities in a number of processes that impact on the improved co-management of protected areas and in particular, biodiversity conservation of the mountainous region. In this regard a number of conservancies of local communities have been established and they are receiving financial resources from federally funded programmes, such as Fund for Protected Areas (FPA) and Mountain Areas Conservancy Fund (MACF), to promote conservation and sustainable use of biodiversity in their areas. Similarly across the country many local communities are engaged in management of trophy hunting programme to promote wise use of biodiversity and in return community earnings substantial benefits.

Similarly, the human societies in Pakistan had traditional values, which in context, exhibited capability and depth, like any other society in the developed world. This society still having central control/ command system has a high adoption rate, requiring convincing of a few family/ tribal areas heads. Although traditional institutions have evolved with the passage of time to accommodate needs of the modern age, yet the traditions remain intact in their initial form to some extent. The existence of traditional institutions, as well as systems is, therefore, not a new concept for the people of Pakistan. Even in today's era the people in different parts of country still apply a range of ancient indigenous principles in conducting the affairs in their daily lives in a better and sustained way.

Today, this entire heritage, culturally and technologically, lies in tatters, for which a number of actors are involved in a complex way. However, research signifies a strong nexus between natural resource management and cultural diversity (especially, values, myths and effectiveness of traditional management systems) and suggests that success in natural resource management is possible provided the cultural diversity is protected and conserved, accordingly. It is quite clear that loss of cultural diversity is part and parcel of the same socio-ecological processes, leading to natural resource management.

The trend of centralized policies, nationalization of the resources and use of policing in wildlife management, isolation of indigenous people from its management and undermining the centuries old traditional management systems has resulted in lack of ownership and unsustainable resource use. Moreover, issues of competition and conflicts between natural resources and human populations over resource use have not been addressed adequately in planning procedures. In the past indigenous resource management institutions, values and myths were quite active to manage these resources on sustainable basis. They were seen to hold a key role in the ecological sustainable development. They had direct long-term interests in the protection of natural treasures and their reinforcement. The weakening or breakdown of

these institutions has deepened the crises by augmenting the natural resource degradation process in their respective areas.

Section VII

Updated biodiversity country profiles – Pakistan

Biodiversity Facts

Status and trends of biodiversity, including benefits from biodiversity and ecosystem services

Pakistan's current estimated population is over 200 million (Census 2017), the sixth most populous country of the world. Pakistan has a wide variety of landscapes. Beautiful beaches of Karachi and Balochistan, mangroves of the Indus delta, mighty mountains in the north, deserts with plenty of wildlife species and cultural diversity and wetlands of international importance are prime areas of biodiversity attraction. In Pakistan many protected areas and wetlands, such as Ayubia, Khunjerab, Deosai, Khirthar, Lal Suhanra, Margalla, Saiful Malook national parks, and Haleji, Keenjhar, Astola Island and Uchali wetland complexes are popular tourism destinations that have the potential to support sustainable tourism and biodiversity conservation together with well-planned actions and policy measures.

Pakistan has a remarkable ecosystem diversity, resulting in high species diversity, including 198 mammal species (6 being endemic), 700 bird species (25 being endangered), 177 reptile species (13 being endemic), 22 amphibians (9 being endemic), 198 fresh water fishes (29 being endemic) and 5,000 species of invertebrates, as well as more than 6,000 species of flowering plants (over 400 being endemic). Moreover, Pakistan is rich in indigenous crop diversity with an estimated 3,000 taxa and around 500 wild relatives of crops. Pakistan has two breeds of buffalo, eight of cattle, one yak, 25 goat, 28 sheep, one horse, four camels and three poultry breeds. However, this biological diversity is now declining due to large scale anthropogenic activities and the degradation of natural habitats.

Due to a wide variation in rainfall and geomorphology, Pakistan is one of the few countries in the world with a vast diversity of ecosystems functioning over a relatively small area. These include among others, coastal and marine ecosystems, mangroves, Indus delta, riverine forests, dry tropical thorn forests, irrigated plantations, tropical deciduous forests, subtropical broad leaf evergreen forests, sub-tropical pine forests, dry temperate forests, moist temperate forests, sub-alpine forests, alpine pastures, glaciers and permanent snow fields, plateau, natural lakes and man-made reservoirs (wetlands). These ecosystems are hosts to a wide variety of fauna and flora. Several of the dependent species of animals are globally threatened, such as keystone species like snow leopard, markhor, Ladakh urial, musk deer, Kashmir grey langur, Asiatic black bear, Himalayan brown bear, Eurasian lynx, Eurasian otter, and woolly flying squirrel. Likewise several of the bird and plant species, are also endangered. There are also plant species such as wild relatives of cultivated wheat, millets, pea and fruits, making an invaluable part of the global genetic gene pool.

Pakistan is among the custodians of the important migratory route 'Central Asian-South Asian flyway' previously known as the Indus flyway or Green Route through which hundreds of thousands of migratory birds, including water birds and ground birds, like Houbara bustard, visit this part of the world for their winter refuge. Conserving migratory species and their habitats helps to preserve entire ecosystems. Another group of birds is the Great Indian bustard, saruscrane and songbirds migrating from India to Pakistan, whereas among large animals, Marco Polo's sheep and snow leopard populations use the Pak-China and Pak-Afghan corridors during their seasonal movements. Furthermore, acting as pollinators, pest controllers and seed distributors, migratory as well as resident birds play an important role in enhancement of the agricultural economy.

Pakistan has a well-established network of protected areas, including 28 national parks, 92 wildlife sanctuaries, 116 game reserves and a large number of private as well as community managed areas. These protected areas hold some of the unique and valuable species and landscape diversity of the country. In addition, in June 2017, Astola Island, the largest Island of Pakistan has been notified as the first marine protected area of its type in the country. In Pakistan, marine protected areas are important to ensure long term conservation of coastal and marine biodiversity including globally important marine turtles, dolphins, porpoises, whales and many species of birds and to safeguard local livelihoods dependent on coastal fisheries resources. Pakistan's coastal and marine areas are rich with plenty of biological resources and variety of unique landscape. The maritime area of Pakistan extends up to Exclusive Economic Zone (EEZ) of 200 NM, covering an area of about 240,000 sq. km. In addition, an area of about 50,000 km² of the continental shelf has been recently added to the maritime areas of Pakistan (NIO, 2016). This protected area network covers more than 13 percent of the land area and less than 1 percent of the marine territory. However, most of the PAs have no management plans with specific goals and targets.

Pakistan is blessed with more than two hundred wetlands of significance, including natural and artificial. These wetlands are important habitats of migratory as well as resident wildlife species. Pakistan's wetland ecosystems support conservation of diversified species which include animals like the blind Indus dolphin, otters, marsh crocodile, marine and fresh-water turtles and many species of water birds, including globally threatened white-headed duck, marbled teal, white-eyed pochard, Dalmatian pelican, cranes, flamingoes and a variety of fish species. The wetland treasures of Pakistan also include 19 Ramsar Sites.

Pakistan's coastline is around 1000 km long and very rich in marine resources as its vast creek system of the River Indus and shallow sub-tidal areas provide ideal conditions for growth of fisheries resources. Fishing is an important economic activity along the coast of Pakistan as about 80 percent of the coastal population (excluding Karachi) is engaged in fisheries related activities. The present production of fish and shellfish is estimated to be about 355,000 million tons. Although more than 1,500 types of finfish and shellfish are found along the Pakistan coast, about 200 species are commercially harvested. Shrimp is the most important commodity which is mainly exported. Among other shellfish, crab, lobster, squid, cuttlefish and mollusk are important.

Community-based trophy hunting programmes for the markhor and other ungulate species, like ibex and urial (wild sheep), are being successfully implemented in Pakistan. As a result of community-based trophy hunting, populations of ungulates, have shown considerable increase in addition to improvement in the socio-economic condition of the local communities. These

community managed areas are now a classic example of sustainable biodiversity management, where rural people are benefiting through their involvement in conservation activities and they provide protection to target species.

Main pressures on and drivers of change to biodiversity (direct and indirect)

The major threats to terrestrial ecosystems are from un-managed grazing and deforestation due to high population pressure and increasing poverty. Various wild animals and their habitats are increasingly vulnerable to escalating agricultural and industrial development, and expanding and changing demands for biodiversity resources. Further phenomena, such as climate change, urbanization, un-planned tourism and the spread of invasive alien species, threaten survival of both terrestrial and aquatic biodiversity.

The diversion of water for irrigation has adversely impacted the ecology of mangrove and riparian ecosystems. Game birds and animals are heavily hunted while fisheries from inland and marine ecosystems are harvested to the full limit (with pressure increasing in parallel with population growth). In addition, agrobiodiversity has suffered serious erosion due to the introduction of higher yielding varieties and the use of agrochemicals. Finally, pollution and disposal of untreated sewage and industrial effluent into the rivers and seas are major threats to aquatic and marine biodiversity.

Introduction of some exotic and harmful fishing gears has aggravated the situation. It is feared that continuing decline in fish at this rate and use of harmful gear may result in a collapse of the fisheries stocks and diversity. Introduction of another exotic fishing gear, i.e. seine gear (Katra), has resulted in overfishing of small fishes, such as sardine, anchovies and scads.

Measures to enhance implementation of the Convention

Implementation of the NBSAP:

Pakistan adopted its first National Conservation Strategy (NCS) in 1992 and the first Biodiversity Action Plan (BAP) in 2000. The new National Biodiversity Strategy and Action Plan (NBSAP) 2017-2030 has been developed in the light of CBD strategic plan for biodiversity 2011-20 inclusive Aichi Biodiversity Targets for 2020 and global development agenda 2030 of Sustainable Development Goals (SDGs). Also a Mangroves for the Future (MFF) National Strategy and Action Plan, 2014, has supported implementation of coastal and marine biodiversity resources.

During 2014-2018, several politically motivated forestry and wildlife related initiatives, such as billion tree tsunami project, mangrove rehabilitation in Indus Delta and Green Pakistan Programme, enhance forest and wildlife governance through large scale afforestation and conservation activities have further contributed to biodiversity conservation and nature protection in Pakistan.

Support mechanisms for national implementation (legislation, funding, capacity-building, coordination, mainstreaming)

National legislation

Pakistan has developed comprehensive national and sub-national legislative frameworks for biodiversity protection and conservation, such as Pakistan Trade Control of Fauna and Flora Act, 2012, Marine Fisheries Act, Maritime Security Act, 2016, ABS Law -provincial and federally

administrative areas Forest, Wildlife and Fisheries Act. Further sectoral policies and guidelines are also supportive to these legislative instruments in implementation of NBSAP.

International Instruments

At international level, Pakistan has ratified around 16 international conventions, protocols concerning environment and biodiversity, such as CBD, CMS, Ramsar, CITES, UNCCD, UNFCCC, Nagoya Protocol on Access and Benefit Sharing, and Cartagena Protocol on biosafety. Pakistan has also ratified the International Treaty for Plant Genetic Resources for Food and Agriculture. All these international instruments and mechanisms also provide support in the national implementation of NBSAP. In the recent past, the Khyber Pakhtunkhwa Wildlife and Biodiversity (Protection, Preservation, Conservation and Management) Act, 2015, is another legal instrument to ensure biodiversity at sub-national level.

Funding

Funding options, available for biodiversity conservation and management operations in Pakistan, in both federal and provincial budgets, are relatively low as compared to the volume of work required in terms of species and habitat protection, management of protected areas, research and development, monitoring and evaluation, awareness and capacity building, and enforcement of laws and regulations. Most biodiversity management authorities face serious financial constraints. The last decade has seen some new avenues of conservation funding through establishment of trust funds, like the Fund for Protected Areas (FPA), Mountain Areas Conservancy Fund (MACF), and the recently created Houbara Bustard and Migratory Birds Endowment Fund (2017). Similarly the Khyber Pakhtunkhwa (KP) Biodiversity and Wildlife Fund has been established under KP Wildlife and Biodiversity Act, 2015. In addition GEF and GCF windows are also available with little support. In 2017 IUCN has initiated a first 'Business and Biodiversity Platform' in coordination with corporate sector. However, the amount of funding from all these sources is insufficient compared to the total requirement.

Mainstreaming

In recent years, due to proactive role of media and awareness campaigns launched by the NGOs and public sector organizations, mainstreaming of biodiversity in other sectoral policies and plans has become common. However, a lot has to be done in the next decade during implementation of NBSAP.

Relevant Websites, web links and files:

- www.mocc.gov.pk/policies
- www.qcisc.org.pk
- www.niopk.gov.pk
- www.iucn.org/pakistan
- www.iucn.pk/publications/biodiversityactionplan.pdf
- <https://hubs.worldbank.org/docs/ImageBank/Pages/DocProfile.aspx?nodeid=30140502>
- <https://hubs.worldbank.org/docs/ImageBank/Pages/DocProfile.aspx?nodeid=30599298>
- [IUCN Pakistan, The Ecological Baseline Study of Astola, 2018](#)
- [USAID- National Vulture Conservation Strategy & Action Plan, 2016](#)
- [National action Programme to Combat Desertification in Pakistan, 2017](#)
- [CBD Fifth National report of Pakistan, 2014](#)

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