THREATS TO WILDLIFE BIODIVERSITY
AND MEASURES FOR ITS CONSERVATION

Threats to Biodiversity. More specific threats to biodiversity are posed by deforestation (estimated at 1% annually), overgrazing, soil erosion, rampant hunting and fishing, and agricultural practices. As a result, it is estimated that at least 12% of the flora is threatened and several of the faunal species are threatened too. However, the real status of most species remains unknown. Some of the major threats posed by human activities are discussed below:

1.   Population Growth

The principal threat to biodiversity comes from the increased pressure on natural resources produced by high population growth and demands for increased standards of living. The process of economic development itself widens inequality and may force the poor to depend heavily on natural resources, while the development models followed, in most instances, have been incompatible with the sustainable use of natural resources.

2.   Irrigated Agriculture

It is another major threat to both the riverine and mangrove forests of Pakistan, which are fast disappearing Riverine forests were rich in a wide variety of plants such as obhan, and animals like hog, deer, jungle cat, fishing cat, and gray and black partridges. Mangrove forests are particularly important habitats for certain fish species as noted earlier. Both have been identified as endangered ecosystems, and if they disappear they take with them a unique association of species. Marginal changes in water releases at certain times are critical to the preservation of riverine habitats, it might be possible to accommodate them, but if they require water diversions at times when irrigation demands are high and water supplies are short, the chances of being able to maintain them are low.

3.   Overharvesting / Hunting / Illegal Trade

Overharvesting is a serious threat to many species, but particularly to aquatic species. There are many examples of regulated fisheries (including hunting of marine mammals and harvesting of crustaceans and other species) monitored by fisheries scientists that have nevertheless collapsed. The western Atlantic cod fishery is the most spectacular recent collapse. While it was a hugely productive fishery for 400 years, the introduction of modern factory trawlers in the 1980s and the pressure on the fishery led to it becoming unsustainable. The causes of fishery collapse are both economic and political in nature.

Most fisheries are managed as a common resource, available to anyone willing to fish, even when the fishing territory lies within a country's territorial waters. Common resources are subject to an economic pressure known as the tragedy of the commons, in which fishers have little motivation to exercise restraint in harvesting a fishery when they do not own the fishery. The general outcome of harvests of resources held in common is their overexploitation. While large fisheries are regulated to attempt to avoid this pressure, it still exists in the background. This overexploitation is exacerbated when access to the fishery is open and unregulated and when technology gives fishers the ability to overfish. In a few fisheries, the biological growth of the resource is less than the potential growth of the profits made from fishing if that time and money were invested elsewhere. In these cases—whales are an example—economic forces will drive toward fishing the population to extinction.

Coral reefs are extremely diverse marine ecosystems that face peril from several processes. Reefs are home to 1/3 of the world's marine fish species—about 4000 species—despite making up only one percent of marine habitat. Most home marine aquaria house coral reef species that are wild-caught organisms—not cultured organisms. Although no marine species is known to have been driven extinct by the pet trade, there are studies showing that populations of some species have declined in response to harvesting, indicating that the harvest is not sustainable at those levels. There are also concerns about the effect of the pet trade on some terrestrial species such as turtles, amphibians, birds, plants, and even the orangutans. In Pakistan, harvesting of pangolins for their scales and meat, and as curiosities, has led to a drastic decline in population size for this fascinating creature.

Bush meat is the generic term used for wild animals killed for food. Hunting is practiced throughout the world, but hunting practices, particularly in equatorial Africa and parts of Asia, are believed to threaten several species with extinction. Traditionally, bush meat in Africa was hunted to feed families directly. However, recent commercialization of the practice now has bush meat available in grocery stores, which has increased harvest rates to the level of unsustainability. Additionally, human population growth has increased the need for protein foods that are not being met from agriculture. Species threatened by the bush meat trade are mostly mammals including many monkeys and the great apes living in the Congo basin.

Hunting has deep roots in Pakistani culture. It was the recreation of the Mughal emperors and is still extremely popular today. Wild animals have been hunted to extinction from hunting pressure. Various lizards and snakes are hunted for their skins, as are crocodiles and the larger mammals. Distributing the natural order has other more subtle consequences. The increase in the numbers of wild boars, jackals, and porcupines, for example, is directly attributable to the elimination of their predators, particularly the large cats. A greater number of wild boars has led to the trampling and uprooting of gropes and a reduction in the numbers of snakes, which in turn has led to an increase in the number of rats, responsible for post-harvest losses of grain. The loss of birds of prey has led to an increase in undesirable bird species. And having more birds can destroy undergrowth, through their droppings, or even the roost tree itself, which in turn can lessen the ability to resist water erosion, an ever-present threat in Pakistan.

4.   Deforestation and Loss of Habitat

Habitat generally refers to the part of the ecosystem required by a particular species. Humans rely on technology to modify their environment and make it habitable. Other species cannot do this. Elimination of their habitat—whether it is a forest, coral reef, grassland, or flowing river—will kill the individuals in the species. Remove the entire habitat and the species will become extinct, unless they are among the few species that do well in human-built environments. Human destruction of habitats accelerated in the latter half of the twentieth century. A greater threat to wildlife than hunting, however, is probably the disappearance of habitat or the competition with domestic grazing animals. The closed canopy forest in Khyber PakhtunKhwa (KPK) Province of Pakistan is reported to be shrinking at approximately 1% per year. Pressure from commercial logging (though this is not extensive) and the cleared areas. More significant is the relentless, incremental incursions into the forest by subsistence farmers; the killing of trees through lopping, burning, and tapping; the development of small agricultural plots among the trees; and excessive grazing by domestic animals.

Habitat loss can usually be placed in three categories.

   i.   There is **habitat destruction** which is done by completely removing trees and plants and instantly changing the landscape. Mass deforestation by cutting down trees is a prime example of this.
   ii.   Another type of habitat loss takes place by altering the land in a way that confuses the animals and disrupts their natural way of living. This is called **habitat fragmentation** and it occurs when we create roads and place attractions in the midst of woodlands and other natural areas. By fragmenting habitats, areas may not be completely destroyed but it still causes environmental chaos. Fragmentation can separate animals from one another and from their food sources. This happens both in water and on land. Beneath the water, structures such as dams tend to isolate species from one another, making it more difficult for them to mate and find food. For the many animals that depend on migration to preserve their species, fragmenting habitats takes away this advantage.
   iii.   Finally, there is **habitat degradation.** This form of destruction occurs by pollution that causes habitats to be destroyed because it changes the quality of air, water, and land while becoming a breeding ground for toxins. Degradation of the environment allows species that are not part of an ecosystem to invade the area. Known as invasive species, they naturally contribute to the downfall of other animals and plants. As this happens, species that were once native to a region begin to die from these negative environmental changes.

Knowing that the death of wildlife and negative environmental impact are the results of habitat loss, it's reasonable to question why we continue to carry on habits that destroy wildlife biodiversity.

   a.   One of the main reasons is the agricultural industry. Unlike in the past, when small areas of land were used to grow crops for families and local communities, farming is now a big business that can be ran by large corporations and it requires the mass production of foods that are able to quickly be sold for profit. Extra land is needed to grow more edible goods and more land has to be cleared to meet these needs.
   b.   A vast majority of natural habitats are destroyed for human homes as well. We decide to clear out land for large buildings and to make room for attractions that are profitable. Habitats are not always destroyed to use the land for humans to live.
   c.   They are also destroyed so that their materials can be used to keep us comfortable. For example, the trees are used to create various paper products and wood is also used for the production of furniture and miscellaneous items.
   d.   Habitats are also lost to make room for more businesses and to meet the demand of large corporations. If you think about how many stores, homes, and various places of business are in existence, then you know

that these places cover a massive amount of land. Many of them now stand where there was once only wildlife and natural habitats. Swamps and marshes are examples of areas known as wetlands. Wetlands are land areas of soil that are covered with water. Some wetlands form based on the season while others are permanent fixtures in a given area. Wetlands have their own ecosystem that is unique and extremely diverse. Unlike the forests where we cut down trees and make the land more compact from above, we fill wetlands to cover them up so that we can build things on top of them.

EFFECTS OF HABITAT LOSS AND DESTRUCTION

As we make more room for people, we often overlook the homes that are being destroyed in the process.

i. Habitat destruction is the leading cause of extinction for various species and is the reason that many animals are endangered. Animals are very intelligent beings, but without their natural homes, they are unable to protect themselves and care for their young.

ii. When we make way for homes and buildings, the land has to be level in order for the building to be stable and for the construction process to begin. When bulldozers go through woodlands to clear trees and flatten the ground, this is usually why. For animals, this process happens so suddenly that there is no time to adapt to such drastic changes.

iii. Animals store food and water for times of inclement weather or when their food source is no longer in season. During bad weather, natural shelters are very similar to human homes, serving as protection from storms, heavy rain, or extreme temperatures. As wildlife is displaced, it changes their entire way of living. Many species use their homes as a place to find solace from predators. Also, young animals need to be cared for in various ways in the wild. They have to be protected from predators that can attack them while they are defenseless, and they must learn to hunt and gather their own food.

iv. Ecosystems are nature's way of creating balance between different species and the environment. Life in the wild is instinctual with everything being interconnected. Everything from blades of grass to the tallest trees serves a purpose. Animals thrive off of the land and also from one another. When we disturb this balance, they are often left confused and lost, finding themselves in harm's way. The ultimate result of this is death and the inability to reproduce offspring that carries on the species.

v. We must also consider what happens to the ground. Many plants can no longer grow because the composition and soil quality is instantly changed, taking away the nutrients and the space that plants need to grow. The land itself is also packed down so tightly from human equipment that many plants cannot force themselves to grow and if the seeds are not sown elsewhere, the plant type could be completely lost within the region.

vi. With large amounts of land used for industrial farming, runoff is another issue that contributes to the pollution that leads to habitat degradation. Farming often requires large amounts of fertilizers, pesticides, and other materials that are full of chemicals and harmful ingredients. These substances used to protect crops and promote their growth. Ultimately, the toxic ingredients absorb into the ground and flow into lakes, rivers and oceans, poisoning the water and animals.

vii. Additionally, underwater systems are disrupted because we are siphoning water and changing the way it flows in order to meet the human needs for drinking water and irrigation for crops. The imbalance this creates leaves some areas especially dry, which is damaging to the underwater habitats and species.

viii. As humans destroy natural habitats, we are hurting ourselves because it is contributing to global warming and climate change. The more trees that are cut down, the more carbon dioxide that goes into the air and causes the Earth to heat up more quickly. This change in temperature is killing various species, especially in regions where the changes are extreme. Consequently, temperatures are becoming more unpleasant for us as time goes on and additional greenhouse gases fill the air.

SOLUTIONS FOR HABITAT LOSS AND DESTRUCTION

1. We can combat habitat loss by preserving natural resources and learning how to use them in a way that does not require such frequent destruction of habitats**.** Regulation is equally important. Plans and rules should be set forth to legalize how much of a given area can be altered for the benefits of humans. By practicing more restraint, we allow wildlife time to adapt and leave more areas undisturbed for the sake of biodiversity.

2. We should also teach others the importance of biodiversity**.** Comprehensive education regarding the environment helps people to understand how necessary biodiversity is and teaches ways in which everyone can contribute to causes that aid in keeping many different species alive.

3. Along with education, awareness should also be raised. Observers should make it a point to assist reporting professionals by safely documenting the process of habitat destruction whenever the opportunity arises. Videos and photos help to visually present the unfortunate circumstances that environmental destruction can create, evoking emotional responses that will inspire others to take action to protect natural habitats.

4. As quickly as humans can destroy natural habitats, we should be just as willing to put forth the effort to rebuild and attempt to replace what is lost. For areas that cannot be saved, we can assist in funding the creation of areas that will serve as a refuge for displaced wildlife instead. These safe havens mimic the natural habitats that allow plants to grow and animals to live healthily without the threat of devastation. Efforts have been put in place to create these sanctuaries by environmentalists all over the world to protect species from extinction.

5. Invasive Species

Exotic species are species that have been intentionally or unintentionally introduced by humans into an ecosystem in which they did not evolve. Human transportation of people and goods, including the intentional transport of organisms for trade, has dramatically increased the introduction of species into new ecosystems. These new introductions are sometimes at distances that are well beyond the capacity of the species to ever travel itself and outside the range of the species' natural predators. Most exotic species introductions probably fail because of the low number of individuals introduced or poor adaptation to the ecosystem they enter. Some species, however, have characteristics that can make them especially successful in a new ecosystem.

These exotic species often undergo dramatic population increases in their new habitat and reset the ecological conditions in the new environment, threatening the species that exist there. When this happens, the exotic species also becomes an invasive species. Invasive species can threaten other species through competition for resources, predation, or disease. Lakes and islands are particularly vulnerable to extinction threats from introduced species. In Lake Victoria, the intentional introduction of the Nile perch was largely responsible for the extinction of about 200 species of cichlids. The accidental introduction of the brown tree snake via aircraft from the Solomon Islands to Guam in 1950 has led to the extinction of three species of birds and three to five species of reptiles endemic to the island. Several other species are still threatened. The brown tree snake is adept at exploiting human transportation as a means to migrate; one was even found on an aircraft arriving in Corpus Christi, Texas. Constant vigilance on the part of airport, military, and commercial aircraft personnel is required to prevent the snake from moving from Guam to other islands in the Pacific, especially Hawaii. Islands do not make up a large area of land on the globe, but they do contain a disproportionate number of endemic species because of their isolation from mainland ancestors.

Many introductions of aquatic species, both marine and freshwater, have occurred when ships have dumped ballast water taken on at a port of origin into waters at a destination port. Water from the port of origin is pumped into tanks on a ship empty of cargo to increase stability. The water is drawn from the ocean or estuary of the port and typically contains living organisms such as plant parts, microorganisms, eggs, larvae, or aquatic animals. The water is then pumped out before the ship takes on cargo at the destination port, which may be on a different continent. The zebra mussel was introduced to the Great Lakes from Europe prior to 1988 in ballast water. The zebra mussels in the Great Lakes have created millions of dollars in clean-up costs to maintain water intakes and other facilities. The mussels have also altered the ecology of the lakes dramatically. They threaten native mollusk populations, but have also benefited some species, such as smallmouth bass. The mussels are filter feeders and have dramatically improved water clarity, which in turn has allowed aquatic plants to grow along shorelines, providing shelter for young fish where it did not exist before. The European green crab, *Carcinus maenas*, was introduced to San Francisco Bay in the late 1990s, likely in ship ballast water, and has spread north along the coast to Washington. The crabs have been found to dramatically reduce the abundance of native clams and crabs with resulting increases in the prey species of those native crabs. Invading exotic species can also be disease organisms. It now appears that the global decline in amphibian species recognized in the 1990s is, in some part, caused by the fungus *Batrachochytrium dendrobatidis*, which causes the disease chytridiomycosis). There is evidence that the fungus is native to Africa and may have been spread throughout the world by transport of a commonly used laboratory and pet species: the African clawed frog, *Xenopus laevis*. It may well be that biologists themselves are responsible for spreading this disease worldwide. The North American bullfrog, *Rana catesbeiana*, which has also been widely introduced as a food animal but which easily escapes captivity, survives most infections of *B. dendrobatidis* and can act as a reservoir for the disease. Similarly Limosa harlequin frog (*Atelopus limosus*), an endangered species from Panama, died from a fungal disease called chytridiomycosis. The red lesions are symptomatic of the disease.

Early evidence suggests that another fungal pathogen, *Geomyces destructans*, introduced from Europe is responsible for white-nose syndrome, which infects cave-hibernating bats in eastern North America and has spread from a point of origin in western New York State (Figure 6). The disease has decimated bat populations and threatens extinction

of species already listed as endangered: the Indiana bat, *Myotis sodalis*, and potentially the Virginia big-eared bat, *Corynorhinus townsendii virginianus*. How the fungus was introduced is unknown, but one logical presumption would be that recreational cavers unintentionally brought the fungus on clothes or equipment from Europe.

6.   Climate Change:

Climate change, and specifically the anthropogenic warming trend presently underway, is recognized as a major extinction threat, particularly when combined with other threats such as habitat loss. Anthropogenic warming of the planet has been observed and is due to past and continuing emission of greenhouse gases, primarily carbon dioxide and methane, into the atmosphere caused by the burning of fossil fuels and deforestation. Scientists overwhelmingly agree the present warming trend is caused by humans and some of the likely effects include dramatic and dangerous climate changes in the coming decades. Scientists predict that climate change will alter regional climates, including rainfall and snowfall patterns, making habitats less hospitable to the species living in them. The warming trend will shift colder climates toward the north and south poles, forcing species to move (if possible) with their adapted climate norms.

The shifting ranges will impose new competitive regimes on species as they find themselves in contact with other species not present in their historic range. One such unexpected species contact is between polar bears and grizzly bears. Previously, these two species had separate ranges. Now, their ranges are overlapping and there are documented cases of these two species mating and producing viable offspring. Changing climates also throw off the delicate timing adaptations that species have to seasonal food resources and breeding times. Scientists have already documented many contemporary mismatches to shifts in resource availability and timing.

Other shifts in range have been observed. For example, one study indicates that European bird species ranges have moved 91 km (56.5 mi) northward, on average. The same study suggested that the optimal shift based on warming trends was double that distance, suggesting that the populations are not moving quickly enough. Range shifts have also been observed in plants, butterflies, other insects, freshwater fishes, reptiles, amphibians, and mammals.

Climate gradients will also move up mountains, eventually crowding species higher in altitude and eliminating the habitat for those species adapted to the highest elevations. Some climates will completely disappear. The rate of warming appears to be accelerated in the arctic, which is recognized as a serious threat to polar bear populations that require sea ice to hunt seals during the winter months. Seals are a critical source of protein for polar bears. A trend to decreasing sea ice coverage has occurred since observations began in the mid-twentieth century. The rate of decline observed in recent years is far greater than previously predicted by climate models.

Finally, global warming will raise ocean levels due to melt water from glaciers and the greater volume occupied by warmer water. Shorelines will be inundated, reducing island size, which will have an effect on some species, and a number of islands will disappear entirely. Additionally, the gradual melting and subsequent refreezing of the poles, glaciers, and higher elevation mountains—a cycle that has provided freshwater to environments for centuries—will be altered. This could result in an overabundance of salt water and a shortage of fresh water.

CATEGORIES OF WILDLIFE POPULATION STATUS ACCORDING TO THE IUCN RED LIST

EXTINCT (EX)
A species is Extinct when there is no reasonable doubt that the last individual has died. A taxon is presumed Extinct when exhaustive surveys in known and/or expected habitat, at appropriate times (diurnal, seasonal, annual), throughout its historic range have failed to record an individual. Surveys should be over a time frame appropriate to the species life cycle and life form.

EXTINCT IN THE WILD (EW)
A species is Extinct in the Wild when it is known only to survive in cultivation, in captivity or as a naturalized population (or populations) well outside the past range. A species is presumed Extinct in the wild when exhaustive surveys in known and/or expected habitat, at appropriate times (diurnal, seasonal, annual), throughout its historic range have failed to record an individual. Surveys should be over a time frame appropriate to the species life cycle and life form.

CRITICALLY ENDANGERED (CR)
A species is Critically Endangered when the best available evidence indicates that it meets any of the criteria for Critically Endangered and it is therefore considered to be facing an ***extremely high risk of extinction*** in the wild.

ENDANGERED (EN)
A species is Endangered when the best available evidence indicates that it meets any of the criteria for Endangered and it is therefore considered to be facing a ***very high risk of extinction*** in the wild.

VULNERABLE (VU)
A species is Vulnerable when the best available evidence indicates that it meets any of the criteria for Vulnerable and it is therefore considered to be facing a *high risk of extinction* in the wild.

NEAR THREATENED (NT)
A species is Near Threatened when it has been evaluated against the criteria but does not qualify for Critically Endangered, Endangered or Vulnerable now, but is close to qualifying for or is likely to qualify for a threatened category in the near future.

LEAST CONCERN (LC)
A species is Least Concern when it has been evaluated against the criteria and does not qualify for Threatened. Widespread and abundant species are included in this category.

DATA DEFICIENT (DD)
A species is Data Deficient when there is inadequate information to make a direct, or indirect, assessment of its risk of extinction based on its distribution and/or population status. A species in this category may be well studied, and its biology well known, but appropriate data on abundance and/or distribution are lacking. Data Deficient is therefore not a category of threat. Listing of taxa in this category indicates that more information is required and acknowledges the possibility that future research will show that threatened classification is appropriate. It is important to make positive use of whatever data are available. In many cases great care should be exercised in choosing between DD and a threatened status. If the range of a species is suspected to be relatively circumscribed, and a considerable period of time has elapsed since the last record of the species, threatened status may well be justified.

NOT EVALUATED (NE)
A species is Not Evaluated when it has not yet been evaluated against the criteria.

INITIATIVES TO PROMOTE AND CONSERVE BIOLOGICAL DIVERSITY
Pakistan has given serious thought to promote and conserve its biological resources by taking important steps in the following areas:

1. **Establishment of Protected Areas (P.As):**

The World Conservation Union (IUCN) defines a Protected Area as: "A clearly defined geographical space, recognized, dedicated and managed, through legal or other effective means, to achieve the long-term conservation of nature with associated ecosystem services and cultural values" (Dudley 2008).

In order to conserve as many species and ecosystems as possible, the government has established 237 protected areas (P.As) so far. These include 26 national parks, 99 wildlife sanctuaries, 96 game reserves and 16 unclassified areas. The extent of land under protection in Pakistan comprises 9% of the country area, i.e., 71649 square kilometers. As of March 2013, there are nineteen (19) Ramsar Wetland sites, covering an area of 1,343,627 hectares (3,320,170 acres) in Pakistan declared under the Ramsar Convention.

Biosphere reserves: They are established according to the UNESCO's Man and the Biosphere Programme (MAB) to promote sustainable development for conservation of biological and cultural diversity.[1] As of 2016, the Lal Suhanra Biosphere Reserve and Ziarat Juniper Forest are the only two biosphere reserve in Pakistan, which were approved by UNESCO in 1977 and 2013 respectively. A number of initiatives and projects have been undertaken to promote and develop other biosphere reserves in Pakistan but due to weak implementation this has not yet been materialized. In July 2012, Pakistan Museum of Natural History and Beijing Museum of Natural History signed a MoU to work on trans-boundary biodiversity and to improve MAB related activities in the Karakoram, Himalaya, and Hindukush regions.

2. **Institutional Measures:**

The first step towards legislation to protect biodiversity was introduced in 1968 with establishment of the Wildlife Enquiry Committee (WEC). This Committee drafted conservation legislation which was later adopted through various provincial acts and ordinances. These statutes provide for the creation and management of Various categories of P.As; national parks, wildlife sanctuaries; game reserves; and private game reserves. A national Council for Conservation of Wildlife (NCCW) was established in 1974 within the Ministry of Food, Agriculture and Livestock. The NCCW has an advisory board and is responsible for coordinating, formulation and implementing wildlife policies at the federal and provincial levels, coordinating activities with international agencies and promoting conservation generally. The first piece of legislation to consider environment as a whole was the

Environmental Protection Ordinance 1983. The National Conservation Strategy (NCS) marked a further shift away from simple regulation and protection measures towards a holistic view of environmental problems.

3. **International Conventions and Agreements**:

Pakistan is a signatory of virtually all the major international agreements in this field: the Convention on International Trade in Endangered Species of Wild Flora and Fauna (CITES), the Convention on Wetlands of International Importance (Ramsar), the World Heritage Convention, and the Convention of the Conservation of Migratory Species of Wild Animals(Bonn). Pakistani is a member of the World Conservation union (IUCN) and the International Waterfowl and Wetland Research Bureau (IWRB). In addition, Pakistan also signed convention on Biological Diversity (Rio de Janeiro). Today 125 countries are parties to this convention. iv. National Conservation Strategy (NCS): The Ministry of Environment, Urban Affairs, Forestry and Wildlife, Islamabad which is the apex body in Pakistan responsible for environment related issues has formulated a ®National Conservation Strategy¯ which encompasses Biodiversity along with other thirteen core programme areas. This strategy provides backward and forward linkages among various core areas.

The NCS recognizes that the existing protected areas (P.As) system is incomplete, in that it is not representative of all the ecosystems and plants and animal communities; the boundaries of existing P.As are in most cases not drawn according to ecological criteria; many are too small and isolated; and there are limited management planning capabiliities and weak law enforcement programmes. There are no plans which identify species ®hot spots¯, or the specific management requirements of rare and endangered species. The lack of any significant financial benefits and incentives to local people to participate also constrains biodiversity conservation in the country. As a result of these conditions, much of Pakistan¯s biodiversity is severely threatened, and in critical need of attention. To conserve biodiversity, the NCS recommends investing Rs. 1.08 billion in the following seven programmes.

- Management of national parks and protected areas.
- Development of new national parks.
- Development of new wetland reserves.
- Medical, botanicals and germplasm preservation programme.
- Community management of game reserves.
- Programmes for endangered species.
- Captive breeding in the private sector.

NATIONAL PARKS OF PAKISTAN

In Pakistan a National Park is an area of outstanding scenic merit and natural beauty where the landscape, flora and fauna are protected and preserved in a natural state. Public access for recreation, education and research is provided for. Access roads and other facilities should be planned so they do not conflict with the main objectives of national parks. Hunting wild animals is prohibited, as is firing gun or otherwise interfering with animals and plants. Clearing land for cultivation, mining or allowing polluted water to flow in National Parks is also prohibited. Under the regulations, these acts may be allowed for scientific purposes or to improve the park. Minimum geographical area required for an area to be declared as a national park is 1000 acre (04 km²) and such a national park exists in Pakistan that is ToliPir National Park located in Poonch district of AJ&K. There are 26 National Parks in Pakistan which are given as under.

01. **Margallah Hills National Park:** Islamabad, established 1980, area 15,883 ha.
02. **Hazarganji Chiltan National Park:** Balochistan, established 1980, area 15,555 ha.
03. **Hingol National Park:** Balochistan, established 1997, area 6, 19,043 ha.
04. **Kirthar National Park:** Sindh, established 1974, area 3, 08,733 ha.
05. **Ayubia National Park:** Khyber Pakhtunkhwa, established 1984, area 3,122 ha.
06. **Chitral Gol National Park:** Khyber Pakhtunkhwa, established 1984, area 7,750 ha.
07. **Sheikh Badin National Park:** Khyber Pakhtunkhwa, established 1999, area 15,540 ha.
08. **Saiful Maluk National Park:** Khyber Pakhtunkhwa, established 2003, area 12,026 ha.
09. **Lulosar Dodipat National Park:** Khyber Pakhtunkhwa, established 2003, area 75,058 ha.

10. **Broghil Valley National Park:** Khyber Pakhtunkhwa, established August 25, 2010, Area 134,744 ha.
11. **Khunjerab National Park:** Gilgit-Baltistan, established 1975, area 2, 27,143 ha.
12. **Hunderab Shandoor National Park:** Gilgit-Baltistan, established 1993, area 1, 65,000 ha.
13. **Deosai National Park:** Gilgit-Baltistan, established 1993, area 3, 63,600 ha.
14. **Central Karakoram National Park:** Gilgit-Baltistan, established 1993, area 9, 73,845 ha.
15. **Qurumber National Park:** Gilgit-Baltistan, established August 2, 2011, area 74,000 ha.
16. **Machhiara National Park:** AJ & K, established 1996, area 13,532 ha.
17. **Ghamot National Park:** AJ & K, established 2004, area 27,271 ha.
18. **Pir Lasoorha National Park:** AJ & K, established 2005, area 1,580 ha.
19. **Toli Pir National Park:** AJ & K, established 2005, area 1,000 ha.
20. **Musk Deer Gorez National Park:** AJ & K, established 2007, area 52,815 ha.
21. **Deva Vatala National Park:** AJ & K, established 2007, area 2,993 ha.
22. **Poonch River Mahaseer National Park:** AJ & K, established 2011
23. **Lal Suhanra National Park:** Punjab, established 1972, area 87,426 ha.
24. **Chinji National Park:** Punjab, established 1987, area 6, 097 ha.
25. **Kala Chitta National Park:** Punjab, established Dec. 2008, area 36,965 ha.
26. **Murree-Kotli Sattian-Kahuta National Park:** Punjab, established Sep. 2009

Following are the major National Parks of Pakistan:

LAL SUHANRA NATIONAL PARK

Geographical Location: 29*24'N-72*01'E

Physical Location: 36 km to the east of Bahawalpur in the province of Punjab

Total Area: 87,426 hectares

Date Established: 1972

Best Time to Visit: October to March

Lal Suhanra Nartional park was declared a national park on 26 October 1972, following recommendations made by the Wildlife Enquiry Committee in 1971. Originally, the park comprised an area of 31,355ha, of which 20,932ha were desert, 8,488ha irrigated forest plantation and 1,934ha reservoir; it was due to be enlarged by 22,680ha. It is crossed by the dried-up bed of the Hakra River and features an important wetland, Patisar Lake. Pakistan Tourism Development Corporation(PTDC) has 6 A/C bedroom resorts in the park. Beside this camping can also be done in selected campsites.

Wildlife:
Blackbuck became virtually extinct in the Cholistan Desert but the species has been re-introduced in Lal Suhanra within large enclosures, together with Chinkara gazelle, Nilgai antelope, Hog deer and Indian rhinoceros. There is big lake in the center of the park called Patisar Lake, which is ideal for bird watching. Patisar Lake regularly holds between 10,000 and 30,000 ducks and common coot in mid-winter. Over 13,00 waterfowl were present in January 1987. The park also supports a large population of birds of prey.

Mammals:
Mammals in the park include--Long-eared Hedgehog (**C**), Nilgai antelope (**T**), Black buck (**T**), Chinkara gazelle (**V**), Hog deer (**T**), Red fox (**C**), Bengal Fox (**V**), Golden Jackal (**C**), Porcupine (**C**), Caracal cat (**R**), Moongoose (**C**), Jungle cat (**C**), Indian Wolf (**R**), Wild boar (**C**), Honey Badger or Ratel (**?**), Little Civet (**?**), Indian (Black-naped) Hare (**C**), Smooth-coated Otter (**V**) and Indian rhino (**introduced**) (**T**).

Note: T=Threatened, V=Vulnerable, R=Rare, C=Common, ?=Unknown.

Birds:
Total species: 160
Birds in the park are--Houbara bustard, Griffon vulture, Honey buzzard, Marsh harrier, Hen harrier, Laggar falcon, Peregrine falcon, Kestrel, Indian sparrow hawk, Egyptian vulture, Larks, Shrikes, Wheatears and Barn Owl.

Reptiles:
Reptiles in the park are-- Monitor lizard, Russell's viper, Indian cobra, Saw scaled viper, Wolf snake, John's sand boa and Spiny tailed lizard.

KHUNJERAB NATIONAL PARK

Geographical Location: 34*44'N-75*17'E

Physical Location: Karakoram Range Mountains on Pakistan/China border in upper Hunza/Gojal

Total Area: 226,913 hectares

Date Established: 1975

Best Time to Visit: March to September

Khunjerab National Park is Pakistan's third largest National Park. The park is adjacent to Taxkorgan Natural Reserve (1,400,000ha) in China. This park was created on 29 April 1975 by the late Zulfikar Ali Bhutto on the recommendation of Wildlife biologist Dr. George Schaller. Over half of the park is above 4,000m. Khunjerab Pass, the gateway to China via the Karakoram Highway, is at 4,934m.

Wildlife:
The primary purpose of setting up of this park was to provide protection to the endangered Marco polo sheep, which is only found in this area in Pakistan. According to the Mir of Hunza, the population was around 400 but had dropped to below 180 by the time of the completion of the Karakoram Highway. A herd of almost 75 Marco Polo sheep was recorded in the spring of 1984 and park staff saw at least 50 crossing the Pass in May 1989. The park is also famous for its Snow Leopards. Some reports say that it might contain the highest density of these beautiful cats in the total Himalayan ecosystem which is the natural habitat of these cats. Over 2,000 Siberian ibex, widely distributed and abundant in the park but absent from neighbouring China are also present here.

Mammals:
Total species: 16
Mammals in the park include------- Snow leopard (**T**), Himalayan Ibex (**C**), Brown bear (**T**), Tibetan red fox (**C**), Tibetan wolf (**T**), Blue Sheep (**in Shimshal area only**) (**V**), Marcopolo Sheep (**T**), Tibetan wild ass or Kiang (**Unconfirmed reports**) (**?**), Ermine (**C**), Alpine weasle (**?**), Stone Martin (**C**), Golden Marmot (**C**), Lynx (**Unconfirmed reports**) (**?**), Large-eared Pika (**C**), Dhole (**Unconfirmed reports**) (**?**), Cape hare (**C**), Common field mouse (**C**), Royle's mountain vole (**C**), Lesser shrew (**C**) and Migratory hamster (**C**).
Note: T=Threatened, V=Vulnerable, R=Rare, C=Common, ?=Unknown.

Birds:
Total species: 66
Common birds in the park are---- Lammegier vulture, Golden eagle, Himalayan griffon vulture, Eurasian black vulture, Marsh harrier, Eurasian sparrow hawk, Eurasian kestrel, Lesser kestrel, Saker falcon, Peregrine falcon, Himalayan Snow cock, Snow partridge, Chukar, Grey heron, Common sandpiper, Hill pigeon, Snow pigeon, Northern eagle owl, Eurasian cuckoo, Common swallow, Magpie, Alpine cough and Raven.

HAZARGANJI CHILTAN NATIONAL PARK

Geographical Location: 30'17'N-67*13'E

Physical Location: 20 south-west of Quetta in the province of Baluchistan

Total Area: 15,555 hectares

Date Established: 1980

Best Time to Visit: March to September

Hazarganji Chiltan National Park, is another beautiful national park of Pakistan. The area is mountainous with precipitous slopes divided by ravines. The Chiltan Hills and Hazar Ganji Range lie west and east, respectively, of the north-south Chiltan divide. It can easily be reached from the provincial capital Quetta and attracts many visitors. Facilities include a museum, picnic spots and accommodation in rest houses.

Wildlife:
This park was primarily establised to provide refuge to the endangered Chiltan wild goat or Markhor. In the 1950s it was said to exceed 1,200, but in November 1970 the population was estimated to number about 200, based on a total count of 107 individuals. At present the total population of the Chiltan wild goat is estimated to be about 800. The Suleiman markhor is also present in the northern part of the Chiltan Range and a few urial still survive on the western slopes between 1,500m and 2,100m. Carnivores include Stripped hyaena and Red fox.

Mammals:
Mammals in the park include--Chiltan wildgoat or Markhor (**T**), Suleiman Markhor (**T**), Urial sheep (Gad) (**V**), Indian wolf (**R**), Stripped hyena (**V**), Leopard (**?**), Caracal (**?**), Jackal (**C**), Red fox (**C**), Porcupine (**C**) and Desert hare (**C**).

Note: T=Threatened, V=Vulnerable, R=Rare, C=Common, ?=Unknown.

Birds:
Birds in the park are--Houbara bustard, Griffon vulture, Egyptian vulture, Honey buzzard, Laggar falcon, Peregrine falcon, Kestrel, Indian sparrow hawk, Scops owl, Common cuckoo, European bee-eater, Rock partridge, European nightjar, Long-billed pipit, Orphean warbler, Variable wheatear, Blue rock thrush, Stonechat, and Lichtenstein's desert finch.

Reptiles:
Reptiles in the park are-- Monitor lizard, Russell's viper, Saw scaled viper and Spiny tailed lizard.

KIRTHAR NATIONAL PARK

Geographical Location: 25*42'N-67*35'E

Physical Location: South-western part of the province of Sind, north east of Karachi

Total Area: 308,733 hectares

Date Established: 1974

Best Time to Visit: Mid October to November and December to mid March

Kirthar National Park is Pakistan's second biggest National Park (Hingol National Park being the biggest now). It is also the first National Park from Pakistan to be included in the 1975 United Nation's list of National Parks around the world. Kirthar is an area of outstanding beauty and cultural heritage which provides important habitat for a variety of mammals, birds and reptiles characteristic of the arid subtropics Approximately one third of the park lies in the north of Karachi district and two thirds in the south-west of Dadu district. The park is part of a 447,161ha protected areas complex, being contiguous with Mahal Kohistan Wildlife Sanctuary (70,577ha) to the south and Hab Dam Wildlife Sanctuary (27,219ha) to the south-west. Surjan, Sumbak, Eri and Hothiano Game Reserve (40,632ha) lies just to the east of the park. There are two tourist centers in the Park managed by Sind Wildlife Management Board, namely Khar and Karchat. The centres offer cottage and dormitory accommodation and guides are available. There are some 671km of unmetalled roads within the park, most of which are negotiable only by four-wheel drive vehicle.

Wildlife:
In 1977, 1,480 wild goat and 430 urial were counted in the park and 2,141 chinkara in the park and adjacent Surjan, Sumbak, Eri and Hothiano Game Reserve. There are now over 5,000 wild goat, about 1,250 urial and less than 150 chinkara in the park, and a further 400 wild goat and 70 urial in the game reserve . A helicopter survey conducted in November 2000 yielded estimates of the total populations of the three large indigenous ungulates in the park. The Sindh ibex population was estimated at $13,155 \pm 2460$, and concentrated on the Khirthar Range, with lower concentrations on Khambu and Dumbar and small numbers elsewhere; higher elevations appear critical to this species. The Sindh urial population was estimated at $10,425 \pm 675$ and concentrated on rocky sites with characteristic vegetation mainly near Khar and at Dumbar, with small numbers elsewhere. The chinkara population was estimated at 1060 ± 580 and concentrated in the lowlands, sharing much of its habitat with farming. The KNP populations of all three species are of conservation importance. In October 1984, 15 blackbuck from the USA were brought to Khar visitor centre for captive propagation . It is planned to introduce the species to the park.

Mammals:
Total species: 34
Mammals in the park include--------Sindh leopard (**T**), Stripped Hyena (**T**), Desert Wolf (**T**), Indian Fox (C), Sind Wildgoat (**C**), Blandford's Urial (**V**), Honey Badger (**R**), Indian Pangolin (**R**), Caracal (**T**), Jungle cat (**C**), Jackal (**C**), Chinkara Gazelle (**V**), Black Buck (Reintroduced) (**R**), Hedgehog (**C**), Porcupine (**C**), Indian Grey Mongoose (**C**), Cairo Spiny mouse (**?**) and the Rock Mouse (**C**).

Note: T=Threatened, V=Vulnerable, R=Rare, C=Common, ?=Unknown.

Birds:
Total species: 58
Birds in the park are Lammegier vulture (**Winter migrant**), Bonnelli's eagle, Imperial eagle, Tawny eagle, Golden eagle, Eurasian griffon vulture, Egyptian vulture, Cinereous vulture, Lagger falcon, Red-headed merlin, Kestrel, Close-Barred sandgrouse, Houbara bustard, Grey partridge, See See partridge, Stone Curlew, Indian sand grouse, Coronetted sand grouse, Painted sand grouse, Eagle owl , Sind pied woodpecker, Hume's chat, Brown rock pipit, Striped buning, Finche larks, Hoopoe, Shrikes and Wheatears.

Reptiles:
The Rock python, Sind cobra, Russell's viper, Saw-scaled viper, Sind krait, Royal rat snake, Tortoises, Desert Monitor lizard, Yellow Monitor lizard, Sind Crocodile (**Possibly extinct**) and different species of lizard and chameleon.

HINGOL NATIONAL PARK

Geographical Location: 25*30'N-65*30'E

Physical Location: Makran coast, Baluchistan province. Approximately 190 km west of Karachi

Total Area: 610, 043 hectares

Date Established: 1988 and 1997 (includes Dhrun Wildlife Sanctuary)

Best Time to Visit: Mid October to November and December to mid March

Covering about 610,043 ha, Hingol National Park, the largest National Park in Pakistan, lies on the Makran coast approximately 190 km from Karachi. The area was for the first time declared *reserved* in 1988. The park area covers parts of the three districts, namely; Lasbela, Gawader and Owaran of Baluchistan province containing a variety of topographical features and vegetation, varying from arid sub tropical forest in the north to arid montane in the west. Large tracts of the NP are covered with drift sand and can be classified as coastal semi desert. The National Park includes the estuary of the Hingol river which supports a significant diversity of bird and fish species.

Currently, 20 staff members including 18 game watchers, two deputy rangers are responsible for the management of the Park under the guidance of the park Manager who reports to the Conservator and the Secretary Wildlife, Forest, Livestock, Environment and Tourism.

Wildlife:

Although no detailed inventories of wildlife have been undertaken, Hingol is known to support threatened invertebrates in addition to a variety of bird species. One reliable source informed that the park has been an excellent habitat to wild animals including over 3000 ibexes, and 1500 Urials and more than 1200 Chinkara, besides number of resident and migratory birds. The Houbara Bustard (*Chlamydotis undulata*), Dalmatian and Spot-billed Pelican (*Pelecanus philippensis*) are regular visitors to the area.

The River Hingol has been nurturing crocodiles for centuries. The Marsh Crocodile (*Crocodylus palustris*), Olive Ridley (*Lepidochelys olivacea*) and Green Marine Turtles (*Cheloniamydas*), endemic and threatened species of fish, such as the Mahasheer occur and schools of Plumbeous Dolphins (*Sousa plumbea*) are known from close in-shore areas.

Mammals:

Mammals in the park include--------Sindh leopard (**T**), Indian Fox (**R**), Jungle cat (**C**), Jackal (**C**), Sind Wildgoat (**V**), Blandford's Urial (**T**), Chinkara Gazelle (**T**), Honey Badger (**R**), Indian Pangolin (**R**), Hedgehog (**C**), Porcupine (**C**), Indian Grey Mongoose (**C**), Cairo Spiny mouse (**?**) and the Rock Mouse (**C**).

Note: T=Threatened, V=Vulnerable, R=Rare, C=Common, ?=Unknown.

Birds:

Birds in the park are-------Houbara Bustard, Dalmatian and Spot-billed Pelican, Bonnelli's eagle, Imperial eagle, Tawny eagle, Golden eagle, Eurasian griffon vulture, Egyptian vulture, Cinereous vulture, Lagger falcon, Red-headed merlin, Kestrel, Close-Barred sandgrouse, Grey partridge, See See partridge, Stone Curlew, Indian sand grouse, Coronetted sand grouse, Painted sand grouse, Eagle owl , Sind pied woodpecker, Hume's chat, Brown rock pipit, Striped buning, Finche larks, Hoopoe, Shrikes and Wheatears.

Reptiles:

The Marsh Crocodile, Olive Ridley and Green Marine Turtles, Desert Monitor lizard, Yellow Monitor lizard, and different species of lizard and chameleon.

CHITRAL GOL NATIONAL PARK

Geographical Location:	35*56'N-71'40*E
Physical Location:	Northwest in the N.W.F.P province of Pakistan bordering Afghanistan in the Hindukush Range
Total Area:	7750 hectares
Date Established:	1984
Best Time to Visit:	May to September

Chitral Gol National Park is situated in the beautiful valley of Chitral. Chitral Gol is a narrow valley, its gorge running for some 18km before broadening out into a basin surrounded by high peaks. Numerous tributaries drain into the Chitral Gol, which flows southwards into the Kunar River. Visitors and Visitor Facilities Include two hunting lodges, originally built by the Mehtars.

Wildlife:

This park is famous for its Markhor goats, estimated 100-125 in 1970, and 225 in 1975. A more recent estimate indicates a population size of 650. Other ungulates, such as Siberian ibex and Ladakh urial (*Shapu*), occur in very small numbers, as do black bear. The status of snow leopard changed from tenuous security in 1970 to seriously

threatened by 1974. The species does not appear to be resident, visiting the park occasionally. Wolves are seen less frequently following restrictions on grazing by livestock.

Mammals:
Mammals in the park include---Snow leopard **(T)**, Kashmir Markhor **(V)**, Siberian ibex **(V)**, Ladakh urial **(T)**, Black bear **(T)**, Tibetan Wolf **(V)**, Red fox **(C)**, Yellow throated martin **(C)** and Himalayan otter **(V)**.

Note: T=Threatened, V=Vulnerable, R=Rare, C=Common, ?=Unknown.

Birds:
Common bird in the park are---- Lammergier vulture, Himalayan Griffon vulture, Golden eagle, Demosille crane (*Passage migrant*), Peregrine falcon, Himalayan snowcock, Himalayan monal, Snow partridge and rock Partridge.

DEOSAI NATIONAL PARK

Geographical Location: Lat:****---Lon:****

Physical Location: South east of Skardu in the Karakoram range bordering India

Total Area: 3,58,400 hectares

Date Established: *****

Best Time to Visit: March to September

Above the tree line and at an average height of 13,500 feet above sea level, the Deosai Plains are among the highest plateaus in the world. The Deosai Plains cover an area of almost 3,000 square kilometers. For just over half the year - between November and May - Deosai is snow-bound. In the summer months when the snow clears up, Deosai is accessible from Skardu in the north and the Astore Valley in the west.

Wildlife:
Deosai Plains make up one of the last frontiers of natural habitat for the Himalayan brown bear, a creature that once roamed the mountains freely. The park currently has inbetween 20-28 Brown bears. This park was establised to protect these endangered bears. Recently a research project has started by Himalayan Wildlife Foundation (HWF) and the Northern Areas Forests, Parks, and Wildlife Department to secure the survival of the brown bear in the Deosai Plains and to monitor their population. The Deosai Plains are also home to the ibex, red fox, golden marmot, wolf, the Ladakh urial, the snow leopard, and a number of resident and migratory birds.

Mammals:
Mammals in the park include--Brown bear **(T)**, Snow leopard **(T)**, Himalayan Musk deer **(V)** Golden marmot **(C)**, Pika **(C)**, Migratory hamster **(?)** and Ermine **(C)**.

Note: T=Threatened, V=Vulnerable, R=Rare, C=Common, ?=Unknown.

Birds:
Birds in the park are--Golden eagle, Lammagier vulture, Griffon vulture, Laggar falcon, Peregrine falcon, Kestrel, Indian sparrow hawk and Snow cock.

AYUBIA NATIONAL PARK

Geographical Location: 33*52'N-73*09'E

Physical Location: North of Murree in the Himalayan range mountains

Total Area: 1,684 hectares

Date Established: 1984

Best Time to Visit: March to September

Ayubia National Park is a small national park in the Murree hills. The initial area of the park was 1684 ha, expanded through a northern extension in 1998 to make a total of 3312 ha. The park supports one of the best remaining examples of moist Himalayan temperate forest in Pakistan and is surrounded by seven major villages and three small towns (Nathiagali, Ayubia and Khanspur). The national park consists entirely of reserve forests, which spill out of the park area on the west and south sides. The scenery is superb with huge pine forests covering the hills and providing shelter to the larger and smaller mammals. Ayubia National Park is a major recreation area visited by large numbers of local tourists, mostly from Islamabad and Abottabad. No official figures are available, but local estimates suggest that there are about 100,000 visitors per year.

Wildlife:

This park provides refuge to the elusive leopard and the black bear. Bird watching is excellent here. Some of the bird species pass through the park on migration. The population of the Koklass Pheasant and the rare Kalij Pheasant are the highest known for Pakistan. Only 30 individuals of the Kalij Pheasant are known to exist in the park.

Mammals:

Mammals in the park include--Asiatic leopard (**V**), Black bear (**T**), Yellow throated marten (**R**), Kashmir hill fox (**C**), Red Flying squirrel (**C**), Himalayan palm civet (**R**), Masked civet (**R**) and Rhesus Macaque (**C**).

Note: T=Threatened, V=Vulnerable, R=Rare, C=Common, ?=Unknown.

Birds:

Birds in the park are--Golden eagle, Himalayan Griffon vulture, Honey buzzard, Peregrine falcon, Kestrel, Indian sparrow hawk, Hill pigeon, Spotted dove and Collared dove.

MARGALLA HILLS NATIONAL PARK

Geographical Location: 33*43'N/72*55'E

Physical Location: North east of the national capital Islamabad, in the province of Punjab

Total Area: 17,386 hectares

Date Established: 1980

Best Time to Visit: Throughout the year

Margalla Hills National Park, is located in the foothills of the Himalayan range. The topography is rugged, with numerous valleys and many steep and even precipitous slopes. The area is drained by the River Kurang and its tributaries, which flow into the River Soan. This park is the most accessible park in Pakistan due to its close proximity to the national capital, Islamabad. A visitor centre is planned for Daman-E-Koh, providing lounge accommodation and an information service. Lodges, camping grounds and picnic sites are also planned and the provision of a chair lift may be considered

Wetlands

A wetland is "an ecosystem that arises when inundation by water produces soils dominated by anaerobic and aerobic processes, which, in turn, forces the biota, particularly rooted plants, to adapt to flooding." There are four main kinds of wetlands – marsh, swamp, bog and fen (bogs and fens being types of mires). Some experts also recognize wet meadows and aquatic ecosystems as additional wetland types. The largest wetlands in the world include the swamp forests of the Amazon and the peatlands of Siberia.

Ramsar Convention definition: Under the Ramsar international wetland conservation treaty, wetlands are defined as follows: "Wetlands are areas of marsh, fen, peatland or water, whether natural or artificial, permanent or temporary, with water that is static or flowing, fresh, brackish or salt, including areas of marine water the depth of which at low tide does not exceed six metres and may incorporate riparian and coastal zones adjacent to the wetlands, and islands or bodies of marine water deeper than six metres at low tide lying within the wetlands."

Wetlands may be natural or man-made. Natural wetlands include rivers, lakes, marshes and swamps, and man-made wetlands include canals, ponds, paddy fields and fish farms. Wetlands may be long lasting or short term and cover about 6% of the surface area of globe.

Wetlands of Pakistan:

Pakistan is a home for different types of wetlands and below is the wetlands found in Pakistan;

- Inland waters
- Delta marshes
- Mangroves
- Lakes and reservoirs
- Fish farms and ponds

Out of 122 numbers of wetlands, 10 wetlands are found in Azad Jammu and Kashmir, 22 are in Balochistan, 01 in Islamabad, 12 in Northern areas, 20 in NWFP, 17 and 30 in Punjab and Sindh respectively.

Internationally recognized Ramsar Sites of Pakistan:

The Ramsar Convention on Wetland Protection has been signed in Ramsar, Iran in 1971. As of March 2013, there are nineteen Ramsar sites, covering an area of 1,343,627 hectares (3,320,170 acres) in Pakistan

Sr. No.	Site Code	Name	District	Province
1	2PK009	Astola (Haft Talar) Island		Balochistan
2	2PK002	Chashma Barrage	Mianwali District	Punjab
3	2PK017	Deh Akro-II Desert Wetland Complex		Sindh
4	2PK007	Drigh Lake		Sindh
5	2PK008	Haleji Lake		Sindh
6	2PK010	Hub Dam		Sindh, Balochistan
7	2PK018	Indus Delta		Sindh
8	2PK011	Indus Dolphin Reserve		Sindh
9	2PK012	Jiwani Coastal Wetland		Balochistan
10	2PK013	Jubho Lagoon	Sujawal District	Sindh
11	2PK006	Kinjhar (Kalri) Lake	Thatta District	Sindh
12	2PK014	Miani Hor	Lasbela District	Balochistan
13	2PK015	Nurri Lagoon	Badin District	Sindh
14	2PK016	Ormara Turtle Beaches		Balochistan
15	2PK019	Runn of Kutch		Sindh
16	2PK004	Tanda Dam	Kohat District	Khyber Pakhtunkhwa
17	2PK003	Taunsa Barrage	Muzaffargarh District	Punjab
18	2PK001	Thanedar Wala	Bannu District	Khyber Pakhtunkhwa
19	2PK005	Uchhali Complex	Khushab District	Punjab

Importance of Wetlands:

Wetlands of Pakistan are important in cultural, economic and socioeconomic value. Majority of that population who live near the inland and coastal wetlands depend for their food and livelihood on wetlands. Local communities around the wetlands are using this valuable resource right from forefathers. Their importance can be summarized as follows

- Wetlands are important source of food supply (leafy plants source of vegetables, production of rice and seeweeds)
- Wetlands act as habitat for a wide range of plant and animals. They provide oxygen through the respiration of plants and algae.

- They filter the water running into the stream, river or ocean, cleaning it of toxins that could cause pollution in major waterways.
- They provide protection against storms, flood control, stabilization of shorelines and maintain surface water flow during dry periods.
- They are important for the landscape point of view and attract the tourists (recreational opportunities).
- They help to store the nutrients and regarded as the more important productive system.

Causes of wetland degradation in Pakistan:

Pakistan has different types of wetlands and various factors are causing serious stress and potentially altering the natural valuable resource. Wetlands in sub-tropical and tropical regions have been damaged progressively or lost due to conversion into agricultural land use. People do not know the importance of these wetlands and through their home waste and pollutants in water.

These wetlands Kalar Kahar Lake (Salt Range), Rawal Lake, Mangla Lake, Simbly Lake and Khanpur Lake are suffering from contaminants caused by human beings. Many people have developed their business, homes, number of small hotels and shops of edible items near to wetlands to attract the tourists and this hard infrastructure is increasing day by day.

Climate change and global warming has become a hot issue of the world. Global warming increases the temperature and drought that leads to loss of species and bleaching of coral reefs. An off-site activity causes physical and chemical changes in wetlands. Addition of polluted water draining into wetlands from upstream agricultural, industrial or other activities is a major cause. Changes occurring in water flow system due to rapid expansion of population. Lack of effective policies and inadequate management is major problem in our country.

Management of wetlands:

Currently, Pakistan's wetland program working on restoration projects and promotes globally significant biodiversity of the country. Primarily, it has two main objectives;

1. To create and maintain enabling environment for sustainable and effective conservation of natural wetlands at local level.
2. To implement sustainable wetland conservation strategy at four representative sites that will serve as model for subsequent wetland conservation.

   The program is working in 4 areas namely, Lakes of the alpine region, Lakes of the Salt Range, Coastal wetland, and Riverine wetlands. Preserve and protect the aquatic resources (flora and fauna). More local plants should be planted and illegal activities should be reported. Restore natural integrity and natural structure. Work within the water shed, pick all the litter and waste and dispose it in proper way. Almost all kinds of wetlands providing support for earning livelihood. Wetland centre at Sandspit, located in west of Karachi has established for the conservation and restoration of wetlands of Pakistan. WWF Pakistan wetland projects objectives are to conserve the wetland of Pakistan, identify the wetland complexes, enhance biodiversity, create awareness among the people, and prepare and implement national wetland conservation strategies for sustainable development of wetlands.

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