



Comprehensive appraisal of protected areas of Pakistan; their management status and encumbrance

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Abstract

Establishment of Protected Areas has long history and in recent years their development has accelerated across whole world to cope with the problem of biodiversity loss. Pakistan has also shown serious concern towards sustainable use of biological resources and cultural heritage by establishing legislation, policies and institutions. However implementation of these laws and policies is not achieved to satisfactory level due to number of factors. The shortcomings associated with conservation of protected areas can be handled through collaboration of different segments of society for achieving effective management strategies. The purpose of this paper was to enlist the protected areas, provide comprehensive spatial and tabular information, and review the management strategies and current status of the protected areas of Pakistan. The paper not only focused on the problems but also recommended the solutions to tackle the problems associated with conservation of biodiversity.

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Introduction

Protected areas possess a peculiar environmental and cultural identity therefore; these spots need special protective measures. Protected areas exist in various kinds depending on the level of attention required; it also depends upon the laws enacted in each country and the rules prescribed by international organizations. Examples include parks, reserves and wildlife sanctuaries. The idea of protecting various places of natural and cultural importance for many purposes has a long history. For instance, some historians assert that protected areas were specifically left aside in India for the protection of natural resources over two million ago (Somuncu *et al.*, 2009).

In Europe, tradition of conserving some areas for hunting for influential people of community started nearly thousand years ago. Many societies, in past, set aside exceptional areas for cultural and resource uses. Protected areas were first separated by the rulers in Europe early in the Renaissance, typically for royal hunting purposes. Slowly these sites were opened for public use, giving the initiatives for community involvement and tourism (Eagles *et al.*, 2002). Soon the concept of protected areas spread throughout the world. In present era, many countries have developed protected areas for conserving biodiversity and cultural heritage. Furthermore, laws, policies and management plans are also formulated for conserving biological species.

Pakistan has been blessed with nine ecological zones, scenic landscape dynamics, varying seasons and diversity in altitude ranges which give birth to rich floral and faunal species. Like other countries, Pakistan is also suffering from biodiversity loss. Therefore Pakistan has taken serious steps towards the establishment of protected areas. Moreover, legislations, policies and various institutes have been established in Pakistan for preserving biological and cultural heritage but the implementations of laws and policies are not achieved upto desired level. Therefore the objective of current paper was to comprehend the current status of protected areas in Pakistan and to review the management strategies and constraints associated with them.

Concept of Protected Areas

Protected areas are defined in proceedings of Convention on Biological Diversity as "a geographically defined area which is designated or regulated and managed to achieve specific conservation objectives" (CBD, 2010). Another definition of protected areas given by International Union for Conservation of Nature (IUCN) is "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).

IUCN Protected Areas Management Categories

Due to various limitations and ambiguities the previous classification system was not recognized. By several efforts and trials, in 1994 IUCN classified protected areas in to following categories (Somuncu *et al.*, 2009).

Category I (a): Strict Nature Reserve

Category I (b): Wilderness Area

Category II: National Park

Category III: Natural Monument

Category IV: Habitat/Species Management Area

Category V: Protected Landscape/Seascape

Category VI: Managed Resource Protected Area

Protected areas of Pakistan

Pakistan has a variety of ecosystems existing within a wide range of ecological zones starting from Indus delta and coastal wetlands in the south, covering a vast area of dry tropical deserts and thorn forests in central plains of river Indus and semi-arid scrub lands of Pabbi hills of Pothwar region, to subtropical broad leaved evergreen scrub forests, dry and moist temperate coniferous forests and cold deserts occurring in the confluence of world famous Karakorum, Himalayas and Hindu Kush mountains in the northern parts of the country (Khan, 2003). The ecological trend of greatest concern in Pakistan today is the continuing loss, fragmentation and degradation of natural and modified habitats. The forest area, already greatly reduced and fragmented, is suffering further loss and degradation; most

rangelands are suffering more degradation; and many freshwater and marine ecosystems have already been lost or are threatened with further destruction.

Also of great concern in Pakistan today is the continuing decline in many native species of animals and plants; some species are already extinct, many are internationally threatened, and more still are of national concern. The degradation of agro-ecosystems and the accelerating loss of domesticated genetic diversity are also of grave concern in Pakistan (GoP, 2010). The first serious action to conserve the key ecosystems and habitats in Pakistan was made when large number of National Parks, Wildlife Sanctuaries and Game Reserves were established under the Wildlife Act in late 1960s and early 1970. When the protected areas started receiving attention of the global conservation community and data on protected area was gathered from the countries, Pakistan listed all of its national parks, wildlife sanctuaries and game reserves as protected areas.

Current Status of Protected Areas in Pakistan

There are 25 National Parks, 79 Wildlife Sanctuaries, 83 Game Reserves and 114 Community Conservation Areas covering an area of 109,969 km² or 12.54% of the area of Pakistan (IUCN, 2015).

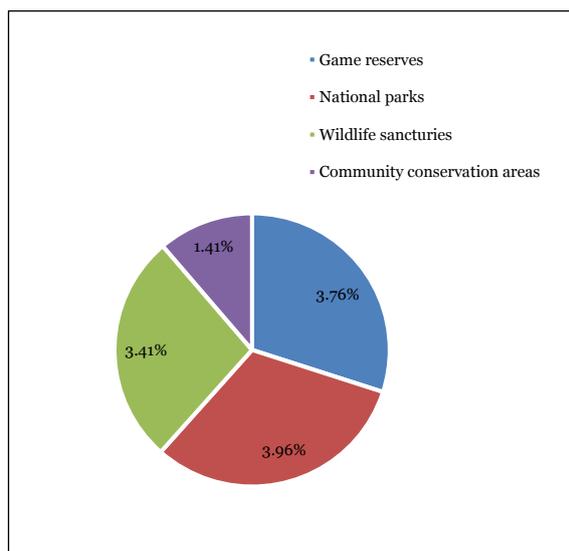


Fig. 1. Protected areas of Pakistan. (Source: IUCN, 2015)

Table 1. Province wise Distribution of Protected areas in Pakistan.

Provinces	National Parks	Wildlife Sanctuaries	Game Reserves	Community Conservation Areas
Gilgit Baltistan	5	3	9	24
KPK	6	3	38	89
Punjab	4	37	23	0
Sindh	1	33	13	0
Baluchistan	2	14	7	1
AJK	7	0	11	0
Capital	1	0	0	0
Total	26	90	101	114

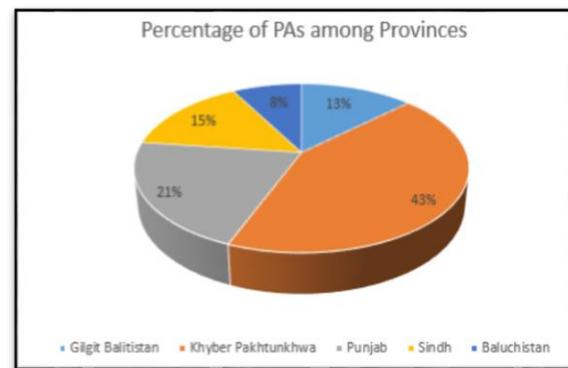


Fig. 2. Province wise percentage distribution of protected land.

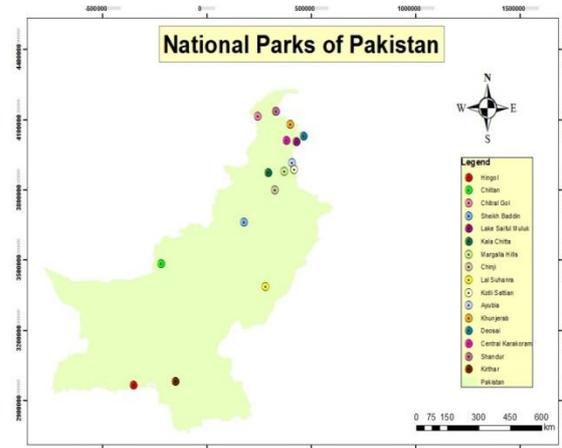


Fig. 3. Map of National Parks in Pakistan.

National parks

The key purpose behind establishment of a National Park is to initiate a conservation program for areas having exclusive geographical, biological and cultural importance that could render significant contributions for educational, recreational and scientific purposes. A national park comparatively encompasses a vast area known for its outstanding scenic merit and

natural interest, wherein the central objective is to preserve the natural state of landscape assets. This approach targets such resources which are accessible by the general public for the sake of recreation, education and research. Here in these protected zones public is restricted from hunting or trapping of birds or animal. Harvesting forest resources is allowed but is conditional as no such practices will be allowed that could possibly threaten the ecosystem existing within the national park.

Here in Pakistan national parks have been established basically for wildlife preservation. The areas do not exhibit any significant historic or scenic features. Provincial wildlife departments perform the administrative duties. The advents of biodiversity action plan have basically triggered the achievement of prime target to establish new national parks. Five new national parks in North West Frontier Province (NWFP) and Azad Jammu Kashmir (AJK) have been established in years 2004-05.

Table 2. List of National Parks in Pakistan in IUCN category II.

Sr. No	Name	Province	Area In Hectare	Year	Conservation Purpose
1.	Broghil National Park (Chitral)	KPK	134,744	2010	Migratory Pamirian and Siberian Bird Species
2.	Central Karakorum National Park (Nagar)	Gilgit Baltistan	973845	1993	Markhor, Ibex, Urial, Grey Wolf, Red Fox. Supports Sparse Grass and Scrubs
3.	Chinji National Park (Chakwal)	Punjab	6095	1987	Urial
4.	Chitral Gol National Park (Chitral)	KPK	7,750	1984	Markhor, Goats and Snow Leopards
5.	Deosai National Park (Skardu)	Gilgit Baltistan	363600	1993	Brown Bears
6.	Deva Vatala (Bhimber)	AJK	2,993	2009	Indian Rock Python
7.	Ghamot National Park (Neelam)	AJK	27,271	2004	Himalayan Musk Deer, Snow Leopard and Himalayan Ibex
8.	Gurez National Park (Neelam)	AJK	52,815	2009	Himalayan Brown Bear
9.	Khunjerab National Park (Gilgit)	Gilgit Baltistan	227143	1975	Morco Polo Sheep, Snow Leopard and Alpine Flora
10.	Kirthar National Park (1/3 In N Of Karachi and 2/3 In S-W Of Dadu)	Sindh	308733	1974	Mammals, Birds And Reptiles Of Arid Subtropics
11.	Lake Lulosar Dodipatsar National Park (Mansehra)	KPK	30375	2003	Indigenous Wildlife
12.	Lake Saiful Muluk National Park(Mansehra)	KPK	4867	2003	Natural and Cultural Biodiversity
13.	Pir Lasura (Kotli)	AJK	5,625	2005	Egyptian Vulture, Western Fulvous Fruit Bat, Golden Jackal and Small Kashmiri Flying Squirrel
14.	Poonch River (Kotli, Mirpur, Poonch)	AJK	4,500	2010	Mahaseer Fish And Markhor
15.	Qurumber National Park (Ghizer)	Gilgit Baltistan	74000	2011	Snow Leopard And Alpine Wetlands
16.	Sheikh Buddin National Park (D.I. Khan)	KPK	15540	1993	Markhor
17.	Tolipir National Park (Poonch)	AJK	5,045	2005	Butterflies Species

Table 3. List of National Parks in IUCN category IV.

Sr. No	Name	Province	Area In Hectare	Year	Conservation Purpose
18.	Deva Vatala (Bhimber)	AJK	2,993	2009	Indian Rock Python
19.	Kirthar National Park (1/3 In N Of Karachi and 2/3 In S-W Of Dadu)	Sindh	308733	1974	Mammals, Birds And Reptiles Of Arid Subtropics

Table 4. List of National Parks in IUCN category V.

Sr. No	Name	Province	Area in hectare	Year	Conservation purpose
20.	Ayubia National Park (Abbottabad)	KPK	1,684	1984	Common Leopard
21.	Chilton Hazarganji National Park (Quetta And Mastung)	Baluchistan	27,421	1980	Chilton Markhor.
22.	Handerab Shandur National Park (Ghizer)	Gilgit Baltistan	165000	1993	Morco Polo Sheep
23.	Hingol National Park (Lasbela, Gawader And Awaran)	Baluchistan	619,043	1997	Wildlife Conservation and Medicinal Flora.
24.	Kala Chitta National Park (Attock)	Punjab	132,611	2008	Wildlife Conservation
25.	Lal Suhanra National Park (Bahawalpur)	Punjab	87,426	1972	Black Buck, Blue Bull and Chinkara
26.	Machiara National Park (Muzaffarabad)	AJK	13,532	1996	Lammergeyer, Himalayan Griffon Vulture and Musk Deer
27.	Margalla Hills National Park (Islamabad)	Islamabad	17,386	1980	Threatened native species
28.	Murree-Kotli Sattian-Kahuta (Rawalpindi)	Punjab	19,135	2009	Rhesus Monkeys and Flying Squirrels

Wildlife Sanctuary

Undisturbed breeding ground set aside for protection of all natural resources and where public access is restricted or regulated is defined as wildlife sanctuary. Grazing and settlements that are permitted in National Park are prohibited in wildlife sanctuary. Wildlife Sanctuary are primarily established to protect particular groups of species of flora and fauna whose reproduction rate is suffering due to external factors, in order to protect them from extinction. Hunting is strictly prohibited in these areas. At present there are 90 Wildlife Sanctuaries in Pakistan. Some wetlands of international importance have also given a status of wildlife sanctuaries and are included in list of Ramsar sites as mentioned in table no 9. In Pakistan, Wildlife sanctuaries enjoy better protection, but in practice, legal restrictions are seldom enforced other than to prevent hunting.

Most sanctuaries have been designated in reserve forests of commercial value where timber and minor forest products are harvested. Law enforcement is still somehow better in the national parks as compared to Wildlife Sanctuaries.

Game Reserves

An area where controlled hunting and shooting is allowed on permit basis is defined as game reserve. Private game reserve is defined as private land reserved by its owner to serve same purpose as game reserve. These areas are set aside with a purpose to provide habitat for game animals and they also offer a measure of security for non-popular floral and faunal species. In Pakistan 101 Game Reserves are declared as protected areas but conservation activities are not properly executed.

Most of the Game reserves in Pakistan are assigned category VI of protected area. Management Plan is available only for Kalar Kahar, Namal Lake and Uchali game reserve.

Provincial Wildlife departments are working in collaboration with WWF for managing these reserves and their management follow species conservation approach.

Table 5. List of Wildlife sanctuaries in Pakistan under category V.

Sr. No	Name	Province	Areas In Hectare	Year Of Declaration	Conservation Purpose
1.	Agram Basti Wildlife Sanctuary (Chitral)	KPK	29,866	1983	Himalayan Ibex, Snow Leopard and Wolf
2.	Astor Wild Life Sanctuary (Astor)	Gilgit Baltistan	41,472	1975	Scenery And For Large Mammal Population
3.	Baltistan (Skardu)	Gilgit Baltistan	41,457	1975	Threatened Animal Species
4.	Boraka (Kohat)	KPK	2025	1976	Urial and Chinkara
5.	Buzi Makola, (Gwadar)	Baluchistan	145,101	1972	Ibex
6.	Chapar Kohan, (Khuzdar)	Baluchistan	194,616	1988	Black Bear
7.	Chorani, (Khuzdar)	Baluchistan	19,433	1972	Black Bear and Ibex
8.	Chumbi Suria (Chakwal)	Punjab	559.45	1978	Indian Grey Mongoose, Grey Wolf and Jungle Cat
9.	Daphar (Mandi Baha-ud Din)	Punjab	2897	1978	Shisham, Mulberry, Eucalyptus, Simbal, Bakin
10.	Gut, (Chagai)	Baluchistan	165,992	1983	Ibex, Urial and Chinkara
11.	Kachu, (Khuzdar)	Baluchistan	21,660	1972	Urial
12.	Kargah (Gilgit)	Gilgit Baltistan	44,308	1975	Threatened Mammals
13.	Kharar Lake (Okara)	Punjab	235	1971	Waterfowl, Migratory Shorebirds and White-Headed Duck
14.	Khurkhera, (Lasbela)	Baluchistan	18,345	1972	Chinkara
15.	Koalwah Kap, (Kech)	Baluchistan	33,198	1972	Chinkara
16.	Koh-e-Gishk, (Kalat)	Baluchistan	24,356	1969	Ibex and Urial
17.	Lal Suhanra Plantation (Bahawalpur)	Punjab	5099	1972	<i>Dalbergia sissoo</i> (Shisham), <i>Eucalyptus sp.</i> (Sufaida)
18.	Manshi (Mansehra)	KPK	2321	1977	Musk Deer
19.	Maslakh, (Pishin)	Baluchistan	46,559	1968	Chinkara and Urial
20.	Naltar Wildlife Sanctuary (Hunza)	Gilgit Baltistan	27,206	1975	Threatened Mammal Species
21.	Raghai Rakshan, (Kharan)	Baluchistan	125,425	1972	Urial
22.	Raskoh, (Kharan)	Baluchistan	99,498	1962	Ibex and Urial
23.	Sasnamana, (Ziarat)	Baluchistan	6,607	1971	Juniper Forest
24.	Satpara Wildlife Sanctuary (Gilgit)	Gilgit Baltistan	31,093	1975	Spectacular Scenery and For Large Mammal Populations
25.	Shaahan, (Khuzdar)	Baluchistan	29,555	1972	??
26.	Taunsa Barrage (Muzaffargarh)	Punjab	6576	1972	Aquatic Plants, Water Fowl, Ducks and Shore Birds
27.	Ziarat Wildlife Sanctuary (Ziarat)	Baluchistan	37,247	1971	Markhor and Urial

Table 6. List of unassigned wildlife sanctuaries (IUCN, 2008; IUCN, 1990).

Sr. No	Name	Province	Areas In Hectare	Year Of Declaration	Conservation Purpose
28.	Bahawalpur Plantation (Bahawalpur)	Punjab	547	1978	<i>Dalbergia sissoo</i> (Shisham), <i>Eucalyptus sp.</i> (Sufaida)
29.	Balkasar Bear (Chakwal)	Punjab	6	2010	Asian Black Bears, and Himalayan Brown Bear
30.	Bhagat Reserve Forest (Toba Tek Singh)	Punjab	251	?*	<i>Dalbergia sissoo</i> (Shisham), <i>Eucalyptus sp.</i> (Sufaida)
31..	Bijoro Chach Wildlife Sanctuary (Thatta)	Sindh	121	1977	Important Breeding Area For Water Fowl
32..	Changa Manga (Kasur)	Punjab	5027	1866	Indian Peafowl
33.	Chasma And Taunsa Barrage Dolphin (Mianwali)	Punjab	6,576	1972	Indus Dolphin
34.	Chichawatni Plantation (Sahiwal)	Punjab	4666	1986	<i>Acacia nilotica</i> (Kiker), <i>Dalbergia sissoo</i> (Shisham)
35.	Daman Forest (Rajanpur)	Punjab	2270	?*	<i>Dalbergia sissoo</i> (Shisham), <i>Eucalyptus sp.</i> (Sufaida)
36.	Harnoli Plantation (Mianwali)	Punjab	878	?*	<i>Dalbergia sissoo</i> (Shisham), <i>Eucalyptus sp.</i> (Sufaida)
37.	Head Qadirabad (Gujranwala)	Punjab	2816	1978	<i>Dalbergia sissoo</i> (Shisham), <i>Eucalyptus sp.</i> (Sufaida)
38.	Jalalpur Sharif (Jhelum)	Punjab	42	1993	<i>Acacia nilotica</i> (Kiker), <i>Olea europaea</i> , (Wild Olive)
39.	Jauharabad Plantation (Khushab)	Punjab	394	1990	<i>Eucalyptus sp.</i> (Sufaida)
40.	Jhallar (Khushab)	Punjab	17	?*	<i>Eucalyptus sp.</i> (Sufaida)
41.	Kamalia Plantation (Toba Tek Singh)	Punjab	42.76	1990	Gazing Wolf and Ring Necked Pheasant
42.	Keenjhar (Kalri) Lake Wildlife Sanctuary (Thatta)	Sindh	13,468	1976	Migratory Birds
43.	Khanewal Plantation (Khanewal)	Punjab	7213	1986	<i>Propolis Cineraria</i> (Jhad), <i>Tamraris Aphylla</i> (Okan)
44.	Kot Laissan Plantation (Rajanpur)	Punjab	2178	1990	<i>Dalbergia sissoo</i> (Shisham)
45.	Langh Lake Wildlife Sanctuary (Larkana)	Sindh	19	1972	Wintering Area For A Wide Variety Of Waterfowl
46.	Lehri Nature Park (Jhelum)	Punjab	17000	?*	<i>Acacia modesta</i> (Phulai), <i>Olea europaea</i> (Wild Olive)
47.	Machu Plantation (Layyah)	Punjab	4109	1986	<i>Dalbergia sissoo</i> (Shisham), <i>Eucalyptus sp.</i> (Sufaida)
48.	Miranpur Plantation (Lodhran)	Punjab	760	?*	<i>Dalbergia sissoo</i> (Shisham), <i>Eucalyptus sp.</i> (Sufaida)
49.	Mitha Tiwana Plantation (Khushab)	Punjab	1116	1970	<i>Propolis Cineraria</i> (Jhad), <i>Acacia Farnesiana</i> (Babool)
50.	Rajan Shah Plantation (Layyah)	Punjab	2110	1989	<i>Dalbergia sissoo</i> (Shisham), <i>Eucalyptus sp.</i> (Sufaida)
51.	Rakh Ghulaman (Bakhar)	Punjab	4286	1989	<i>Salvadora Oleoides</i> (Pilu), <i>Prosopis Cineraria</i> (Jhad)
52.	Rakh Kharewala (Layyah)	Punjab	5877	?*	<i>Propolis Cineraria</i> (Jhad), <i>Acacia nilotica</i> (Kiker)
53.	Rakh Kundal (Jhelum)	Punjab	2964	?*	<i>Dalbergia sissoo</i> (Shisham)
54.	Shorkot Plantation (Jhang)	Punjab	4032	1990	<i>Dalbergia sissoo</i> (Shisham), <i>Eucalyptus sp.</i> (Sufaida)
55.	Walhar Plantation (Rahim Yar Khan)	Punjab	1853	?*	<i>Dalbergia sissoo</i> (Shisham), <i>Eucalyptus sp.</i> (Sufaida)

Table 6. List of GR in Pakistan in category VI.

Sr. No	Name of Game Reserve	Province	Areas in hectares	Year of declaration	Conservation purpose
1.	Astor Nullah	Gilgit Baltistan	12,959	?*	Astor Markhor
2.	Bajwat (Sialkot)	Punjab	5795	1964	Waterfowl and Hog Deer
3.	Bureji (Lasbela)	Baluchistan	178,259	1998	Sindh Ibex, Urial, Chinkara and Marsh Crocodile
4.	Hillan (Bagh)	AJK	384	?*	Himalayan Griffon
5.	Indus River (Jacobabad/Ghotki/shikarpurand Sukkur)	Sindh	44.200	1974	Indus Blind Dolphin
6.	Kilik/Mintaka	Gilgit Baltistan	65,036	?*	Marco Polo Sheep
7.	Moji (Muzaffarabad)	AJK	3859	?*	Pir Panjal Markhor, Grey Goral, Musk Deer Grey Langur, Black Bear and Brown Bear
8.	Nar/Ghoro Nuilah	Gilgit Baltistan	7,255	?*	?*
9.	Nara (Khairpur)	Sindh	109,966.39	?*	Pangolin and Honey Badger
10.	Rakh Topi (Kohat)	KPK	17600	?*	Urial and Chinkara,
11.	Salkhala (Neelam)	AJK	859	?*	Koklass Pheasant ,Monal Pheasant and Himalayan Griffon
12.	Wam (Ziarat)	Baluchistan	3,887	1962	Game birds

Those Game reserved that are not included in the IUCN protected areas are listed in table 7.

Table 7. List of unassigned Game Reserve.

Sr. No	Name of Game Reserve	Province	Areas in hectares	Year of declaration	Conseavrtion purpose
16.	Abbasia (Rahim Yar Khan)	Punjab	2731	1979	<i>Propsois cineraria</i> (Jhad), <i>Acacia nilotica</i> (Kiker).
17.	Bagra Game Reserve (Haripur)	KPK	2560	?*	Grey Partridge and Black Partridge
18.	Balyamin (Hangu)	KPK	7090	?*	Jackal, Grey partridge and Black partridge
19.	Banjosa (Poonch)	AJK	558	?*	Chakor, Khaleej Pheasant, Common Leopard, Red Fox, , Palm Civet and Yellow Throated Martin
20.	Bhon Fazal (Gujarawala)	Punjab	2068	1978	<i>Tamarix aphylla</i> (Okan).
21.	Border Belt	Punjab	?*	1995	Local wildlife species of mammals and birds
22.	Cholistan (Bahawalpur)	Punjab	20326	1975	Indian Chinkara and Antelope
23.	Chopalia (Bahawalnagar)	Punjab	9857	1960	<i>Calligonum Leptadinia</i> (Phog)
24.	Danyor Nuilah	Gilgit Baltistan	44,308	?*	?*
25.	Darmalak (Kohat)	KPK	9788	?*	Chakor Partridge
26.	Daulana (Jhang)	Punjab	2314	1979	<i>Prosopis cineraria</i> (Jand)
27.	Deh Jangisar (Thatta)	Sindh	313.642	1965	?*
28.	Deh Khalifa (Thatta)	Sindh	428.982	1965	?*
29.	Dhoda (Kohat)	KPK	3900	?*	See-See Partridge
30.	Diljabba Domeli (Jhelum and Chakwal)	Punjab	118,106	1972	Grey Francolin and <i>Acacia modesta</i> (Phulai)
31.	Doom Kalla (Bagh)	AJK	715	?*	Chakor, Khaleej Pheasant, Common Leopard, Jackal and Red Fox
32.	Dosu Forest (Larkana)	Sindh	2,312.212	1973	?*
33.	Drosh Gol (Chitral)	KPK	2060	?*	Snow Leopard, Ibex and Ram Chakor

Sr. No	Name of Game Reserve	Province	Areas in hectares	Year of declaration	Consevation purpose
34.	Duzdarabad Koh-e-Surko (Quetta)	Baluchistan	2,351	1999	Endemic Wild animals
35.	Gatwala (Faisalabad)	Punjab	5883	1978	Endemic Herbivores.
36.	Gehrait Gol (Chitral)	KPK	4800	?*	Snow Leopard, Ibex, Chakor Partridge and Ram Chakor
37.	Ghurzandi (Kohat)	KPK	6649	?*	Raptors
38.	Gogi (Ziarat)	Baluchistan	10,364	1962	Game Birds
39.	Goleen Gol (Chitral)	KPK	49750	?*	Ibex, Markhor and Snow Leopard
40.	Hala Forest (Hyderabad)	Sindh	953.473	1965	?*
41.	Head Islam (Vehari)	Punjab	3,132	1978	Migratory Water Fowl, Shorebirds, Hog Deer and Waterfowls
42.	Indus River (D.I.Khan)	KPK	81000	?*	Crane, Ducks and Partridges
43.	Jabbar (Kohat)	KPK	13288	?*	Grey partridge and Raptors
44.	Junjhal Hill (Sudhnutti)	AJK	631	?*	Red Fox, Leopard Cat and Palm Civet.
45.	Kachai Marai (Kohat)	KPK	7090	?*	Partridges, Fox and Hare
46.	Kala Chitta (Attock)	Punjab	132,61	1983	Urial, Bengal Fox and Game birds
47.	Kalabagh (Mianwali)	Punjab	1,550	1966	Golden Jackal
48.	Kalinjar (Haripur)	KPK	2000	?*	Partridges
49.	Kambran (Chagai)	Baluchistan	211,433	1983	Ibex, Urial and Chakor
50.	Kamrani (Lower Dir)	KPK	2119	?*	Black Partridge, Grey Partridge and Chakor Partridge
51.	Kathar (Rawalpindi)	Punjab	1141	1978	Black Francolin
52.	Khairpur (Khairpur)	Sindh	?*	?*	?*
53.	Khan Pur Plantation (Muzaffargarh)	Punjab	?*	?*	?*
54.	Khipro Forest (Sanghar)	Sindh	3,885.254	?*	?*
55.	Kingar Gali (Bunir)	KPK	20300	?*	Goral
56.	Kot Sabzal (Rajanpur)	Punjab	10117	1978	<i>Calligonum leptadinia</i> (Phog)
57.	Loi Bher (Rawalpindi)	Punjab	887	1993	<i>Acacia modesta</i> (Phulai), <i>Olea ferrginea</i> (Kao).
58.	Makhnial (Mansehra)	KPK	4148	?*	Barking Deer, Kalij Pheasant, Chakor Partridge and Black Partridge
59.	Mando Dero Forest (Sukkur)	Sindh	1,234.335	1972	?*
60.	Mang (Haripur)	KPK	4350	?*	See-See Partridge
61.	Marchungee (Kohat)	KPK	4400	?*	Chakor Partridge
62.	Maroba (Nowshera)	KPK	3520	?*	Black Partridge and Grey Partridge
63.	Mirpur Sakro Forest (Thatta)	Sindh	777.024	1965	?*
64.	Nabi Shah Lake (Sargodha)	Punjab	?*	?*	<i>Dalbergia sissoo</i> (Shisham), <i>Eucalyptus sp</i> (Sufaida)
65.	Nar (Bagh)	AJK	558	?*	Palm Civet
66.	Nazbar Nullah	Gilgit Baltistan	33,425	?*	?*
67.	Nizam Pur (Nowshera)	KPK	780	?*	Grey Partridge, Chakor Partridge, See-See and Hare
68.	Pai Forest (Nawabshah)	Sindh	1,969.270	1976	?*
69.	Pakora	Gilgit Baltistan	7,515	?*	?*
70.	Pind Hashim Khan Haripur)	KPK	3150	?*	Partridges and Hare

Sr. No	Name of Game Reserve	Province	Areas in hectares	Year of declaration	Consevation purpose
71.	Pir Mahfooz	Sindh	?*	?*	?*
72.	Puritgol and Chinar (Chitral)	KPK	4646	?*	Markhor, Snow Leopard, Chakor Partridge and Ram Chakor
73.	Qalandarabad (Abottabad)	KPK	8490	?*	Raptors, Fox and Hare
74.	Qazinag (Muzaffarabad)	AJK	4830	?*	Pir Panjal Markhor, Grey Goral, Musk Deer, Rhesus Monkey, Grey Langur, Black Bear, Yellow Throated Martin and Himalayan Griffon
75.	Rahri bungalow (Bahawalpur)	Punjab	5463	1978	<i>Haloxylon calligonum</i> (Phog)
76.	Rakh Khari Murat (Attock)	Punjab	5616	1964	<i>Acacia modesta</i> (Phulai), <i>Olea ferruginea</i> (Kao)
77.	Rakh Sardaran (Haripur)	KPK	4200	?*	Grey partridge and Black partridge
78.	Rasool Barrage (Jhelum and Gujrat)	Punjab	1138	1988	Water fowl population, Conserve and protect the Avifauna
79.	Resi, Toi Banda (Kohat)	KPK	5908	?*	Grey Partridge and See-See Partridge
80.	Sand Khush Dil Khan (Pishin)	Baluchistan	1,296	1983	Staging and breeding area for waterfowl
81.	Sewagalai (Swat)	KPK	1820	?*	Grey Partridge, Black Partridge and Chakor Partridge
82.	Shamshtoo (Nowshera)	KPK	3490	?*	Chakor Partridge, Black Partridge, See-See Partridge and Grey Partridge
83.	Shawaki, Chukhtoo (Hangu)	KPK	11379	?*	Bea eater and Raptors
84.	Sher Qillah	Gilgit Baltistan	16,842	?*	?*
85.	Shinawarai (Hangu)	KPK	5360	?*	Fox, Hare, Jackal and Partridges
86.	Shujabad Canal (Khanewal)	Punjab	?*	?*	?*
87.	Sudham (Mardan)	KPK	11500	?*	Black Partridge, Grey Partridge and Chakor Partridge
88.	Sudhan Gali (Bagh)	AJK	525	?*	Koklass Pheasant and Black Bear
89.	Surjan, Sumbak, Eri and Hothiano Mountains (Dadu)	Sindh	40,631.88	1976	?*
90.	Tando Mitho Khan Forest (Sanghar)	Sindh	5,343,294	?*	?*
91.	Tangir	Gilgit Baltistan	14,251	?*	?*
92.	Teri, Isak Kumari (karak)	KPK	18966	?*	Grey Partridge, Chakor Partridge and Black Partridge
93.	Thal (Bhakkar, Layyah and Mianwali)	Punjab	71275	1978	?*
94.	Thanedarwala (Bannu)	KPK	4050	?*	Grey Partridge
95.	Tilla Jogian (Jhelum)	Punjab	10065	?*	<i>Acacia modesta</i> (Phulai), <i>Olea ferruginea</i> (Kao)
96.	Togh Mangara (Kohat)	KPK	1250	?*	Jackal, Black Partridge and Chakor Partridge
97.	Tooshi Gol Chitral)	KPK	1545	?*	Snow Leopard, Markhor, Chakor Partridge and Ram Chakor
98.	Totalai (Bunir)	KPK	17000	?*	Urial and Patridges
99.	Vatala (Bhimber)	AJK	450	?*	Nilgai, barking Deer, Jackals, Striped Hyena, Porcupine, Red Jungle Fowl, Indian Peacock and Python
100.	Zangi Nawar (Chagai)	Baluchistan	1,069	1982	Breeding and wintering area for Waterfowl, including Whooper Swan and Marbled Teal
101.	Zarkani (D.I.Khan)	KPK	12800	?*	Houbara Bustard
102.	Zawakhan (Chagai)	Baluchistan	1,060	1963	Markhor and Urial

Management plans and Boundary Demarcation

Majority of the protected areas in Pakistan lack management plans, and in areas where management plans exists are not followed and implemented properly. They are considered as blue prints with no updating rather than adaptive management strategy. In recent years some efforts have been taken to improve the situation of protected area. Boundary demarcation and management plans have been formulated for some national parks and wildlife sanctuaries.

But after 2010 WWF in collaboration with provincial management authorities have also succeeded in establishing management plan for two game reserves. Another problem is the inaccessibility of management plans to public and researchers. The gaps and needs can be dealt with integration of various segments of society.

Ramsar Sites

Some of the protected areas also included in Ramsar sites are given in table below.

Table 8. List of protected areas with management plan.

Name	Boundary Demarcation	Management plan	Management authority
Ayubia national park (Abbottabad)	Yes in 2008 by WWF-P, Federal Ministry of Environment and PPEPCA (WWF, 2008).	Yes (2002-2007) by WWF and Wildlife and forest Department (Farooq, 2011).	KPK wildlife and Forest Department, Galliat Development Authority and WWF
Chitral Gol national park (Chitral)	Not demarcated	Yes (1985-1989) and 2003-2009) by WWF and Wildlife department (GEF, 2008).	WWF and KPK wildlife department
Hingol National Park (Lasbela, Gawader and Awaran)	Yes in 2009 by WWF-P, Federal Ministry of Environment and PPEPCA (WWF, 2009).	Yes drafted in 2008 by WWF-PK, Wildlife Department, Ministry of Environment (WWF, 2009).	Baluchistan Wildlife and forest department in collaboration with WWF is working for management and project is funded by GEF
Chilton Hazarganji National Park (Quetta and Mastung)	Not demarcated	Yes in 1998 by WWF-PK, Wildlife Department (Qasim <i>et al</i> , 2014).	Baluchistan Wildlife and forest department in collaboration with WWF
Kirthar National Park (1/3 in N of Karachi and 2/3 in S-W of Dadu)	Yes in 2009 by WWF-P, Federal Ministry of Environment and PPEPCA (WWF, 2009).	Yes in 1973-1978 by Sindh Wildlife Department Board	Sindh Wildlife Management Board
Khunjerab National Park (Gilgit)	Yes in 2009 by WWF-P, Federal Ministry of Environment and PPEPCA (WWF, 2009).	Yes in 1994-1995 by Federal Government and WWF (Khan, 1996) and was reviewed in 2013 by WWF and International Centre for Integrated Mountain Development (ICIMOD, 2013)	Department of Forest, Wildlife and Environment, Gilgit-Baltistan
Deosai National Park (Skardu)	Yes 1993 by HWF	HWF had prepared a draft in 1992 but it could not approved due to budgetary constrain. Later HWF prepared a comprehensive management plan in 2011.	Department of Forest, Wildlife and Environment, Gilgit-Baltistan
Central Karakorum National Park (Nagar)	Yes, roughly demarcated 1999 by IUCN and later mapped by WWF and SUPARCO in 2009	Yes drafted in in 2009 by IUCN and for final approval presented in 4th meeting of Gilgit-Baltistan Wildlife Management Board held on 26 February 2015 under the chairmanship of Chief Secretary Gilgit-Baltistan	Department of Forest, Wildlife and Environment, Gilgit-Baltistan
Qurumber National park (Ghizer)	Not demarcated	Drafted by forestry, wildlife and fishery Punjab department in collaboration with WWF and Gilgit Baltistan Wildlife Department in 2011	Department of Forest, Wildlife and Environment, Gilgit-Baltistan
Margalla hills national park (Islamabad)	Not demarcated	Yes in 2008 by WWF and PEPPCA (WWF,2009)	Capital Development authority
Lal Suhanra national park (Bahawalpur)	Not demarcated	Yes (IUCN,2012)	Punjab Wildlife Department
Murree-Kotli Sattian-Kahuta (Rawalpindi)	Not demarcated	Yes (IUCN,2012)	Punjab Wildlife Department and Himalaya Wildlife Foundation
Machiara national park (Muzaffarabad)	Yes in 2008 by WWF and PPEPCA (WWF,2008)	Yes (IUCN,2012)	Wildlife and fisheries department, Government of AJK
Naltar Wildlife Sanctuary (Hunza)	Not demarcated	Under preparation	Wildlife department Govt of Gilgit-Baltistan

Name	Boundary Demarcation	Management plan	Management authority
Drigh Lake Wildlife Sanctuary (Qambar Shahdadkot)	Not demarcated	Drafted in 1977 by WWF	Sind Wildlife Management Board
Hadero Lake Wildlife Sanctuary (Thatta)	Not demarcated	Drafted in 1977 by WWF	Sind Wildlife Management Board
Haleji Wildlife Sanctuary (Thatta)	Not demarcated	Drafted in 1977 by WWF	Sind Wildlife Management Board
Langh (Lungh) Lake Wildlife Sanctuary (Larkana)	Not demarcated	Drafted in 1977 by WWF	Sind Wildlife Management Board
Taunsa barrage wildlife sanctuary (Muzaffargarh)	Not demarcated	Yes 2014-2020 by Punjab Forest, Wildlife and Fisheries Department and WWF	Punjab Forestry, Wildlife and Fisheries Department
Ucchali Lake Game Reserve (Khushab)	Not demarcated	Yes drafted in June 2011 by WWF and Government of Punjab	Punjab Wildlife Department
Namal lake (Mianwali)	Not demarcated	Yes drafted in 2011 by PWP	Punjab Wildlife Department

Table 9. List of Ramsar sites as protected areas.

Sr. No	Name	Province	Areas In Hectare	Year Of Declaration	Conservation Purpose
1.	Deh Akro-II Desert Wetland Complex Wildlife Sanctuary (Larkana)	Sindh	20,500	2002	Marsh Crocodile and Hog Deer
2.	Hub Dam Wildlife Sanctuary (Karachi, Lasbela)	Sindh	27,000	2001	Fish Species
3.	Runn Of Kutch (Tharparkar)	Sindh	566,375	2002	Migratory Birds
4.	Khabbeke Lake (Khushab)	Punjab	283	1967	White-Headed Duck and Flamingo
5.	Nurri Lagoon Wildlife Sanctuary (Badin)	Sindh	2,540	1976	Migratory Birds
6.	Haleji Wildlife Sanctuary (Thatta)	Sindh	1,704	1977	Staging And Wintering Area For A Variety Of Waterfowl
7.	Indus Dolphin Reserve Wildlife Sanctuary (Guddu Barrage Near Kashmore)	Sindh	125,000	2001	Migratory Birds
8.	Jubho Lagoon Wildlife Sanctuary (Thatta)	Sindh	706	2001	Migratory Birds
9.	Hadero Lake Wildlife Sanctuary (Thatta)	Sindh	1321	1977	Wintering Area For A Waterfowl, Common Coot, Houbara Bustard
10.	Drigh Lake Wildlife Sanctuary (Qambar Shahdadkot)	Sindh	182	1972	Breeding Area For Water Fowl
11	Kallar Kahar Lake (Chakwal)	Punjab	?*	2006	<i>Acacia nilotica</i> (Kiker), <i>Dalbergia sissoo</i> (Shisham), <i>Eucalyptus sp.</i> (Sufaida)
14.	Ucchali Lake (Khushab)	Punjab	492	1991	White headed duck, Greylag Goose and Ferruginous Duck
15.	Namal Lake (Mianwali)	Punjab	482	1970	Endangered native species

*in all the table shows data deficiency.

Protected Area classification according to IUCN categories

Protected Areas of Pakistan mostly falls in categories II and V while Game reserves and community Conservation Areas are assigned under the IUCN category VI. Reason behind why other categories are not included in Pakistan are as follows

- Lack of comprehensive data
- NGOs working on PAs are not registered in Pakistan
- Sites are not accurately recorded on the WDPA and protected planet.net
- Sites are not up to the standards of Aichi targets under CBD

- Not according to the definition and criteria assigned by IUCN guidelines 2008 on protected areas (IUCN and WCPA, 2012)

Those areas that are not following the Aichi Targets and IUCN guidelines 2008 of protected areas are not officially assigned any category.

Issues Related to Management of Protected Areas

Government of Pakistan is continuously trying to improve the overall status of environment in the country. In particular, the conservation activities relating to biodiversity have gained power in recent years after the involvement of international organizations. For this purpose, various projects associated with management and development of Protected Areas, have been launched throughout Pakistan. However, due to a number of internal issues that provide barrier for desired results, these projects are not much successful.

There is lack of sufficient data in many respects. Information about the biodiversity of Pakistan is presently scattered among a wide range of institutions, and current capacity to collect, store, analyze, and disseminate information is limited. Moreover, information about the component of biodiversity is very incomplete. There is no biodiversity information and monitoring centre to maintain, store, and organize data or to analyze, evaluate and disseminate data in a usable form. Besides, there are many loop holes regarding management plans and policy formation for these areas. Some management related issues and suggestions are discussed here in order to understand the situation more systematically.

a) Fragile Laws

Existing wildlife laws do not provide an adequate framework for management. The laws give authority for protected area management to the provincial wildlife departments, but give no authority to these departments over the management of nearby areas. Consequently, development activities in areas near to protected areas often conflict with biodiversity conservation.

There are a number of weaknesses related to enforcement of laws regarding conservation of biodiversity. With regard to the conservation of species, a serious weakness in the law is that it deals excessively with animal species with no provisions for the protection of threatened and endangered plant species. Attempts have been made to control the hunting of designated game animals, but most of these regulatory measures have proved difficult to enforce.

b) Lack of Public participation

Current thinking on protected area management is that, to be effective, the communities living near the area should have a hand in management and should derive some benefits from the area. None of the existing categories of protected areas in Pakistan make allowance for participatory management by communities. In order to overcome these deficiencies a draft wildlife law empowering local communities to participate in joint wildlife management with governments has been prepared and is currently under review by the provinces.

Local communities rarely have any role in the management of protected areas. Little progress has been made on instituting collaborative management regimes for protected areas. Few efforts have been directed at raising public education and awareness in areas adjacent to protected areas, providing environmentally sound and sustainable development assistance to local communities, or formulating appropriate packages of incentives and disincentives. Consequently, local communities continue to disregard protected area provisions leading to degradation of the protected area. Moreover, where those provisions are enforced against local communities' interests, conflicts have arisen.

c) Deficiencies in Selection Criteria

The majority of Pakistan's protected areas were created in the 1970s, and paid insufficient attention to ecological criteria and the requirements of communities. Protected areas have been created haphazardly, often in the absence of any criteria for their selection, and boundaries drawn with little or no ecological basis. Besides, selection criteria for

protected areas have also other serious shortcomings. No attention was being made for regional distribution of areas. Therefore considerable regional inequality in the distribution of Protected Areas across Pakistan can be observed. For example, whilst over 16% of Punjab is protected as one of three Protected Area categories (national park, wildlife sanctuary or game reserve); about 6% of the KPK and less than 6% of Baluchistan is formally protected. This is unfortunate; since these are the regions where most of Pakistan's remaining biodiversity is concentrated (Arshad, 2011).

d) Limited Protected Area Categories

The three categories of Protected Areas used in Pakistan are too limited for contemporary needs. Most of the remaining unprotected areas of biodiversity significance are currently used and managed by local communities in one way or another. The best way to protect these areas will be through the establishment of collaborative management regimes. However, existing wildlife legislation in Pakistan does not provide for a protected area category in which sustainable use of resources and community involvement can take place (along the lines of IUCN Category VI: Managed Resource Protected Area). Moreover, many of the Protected Areas are too small and isolated to be effective. Most ecological zones are not adequately represented within the protected area system, including a majority of the critically threatened ecosystems. For example, there are no marine Protected Areas, very few coastal Protected Areas and no formal designation to protect the remaining juniper forests in Baluchistan.

e) Shortage of experts

There is lack of sufficient professionals in order to formulate and implement the policies regarding development and conservation of biodiversity. Untrained persons cannot successfully manage the related problem and issues. Provincial wildlife departments lack the capacity to carry out their functions effectively, and in particular, suffer from a shortage of suitably trained personnel. Therefore, management activities in remote areas of the country cannot be conducted in appropriate way.

Moreover, current opportunities for training professionals in the area of conservation biology are very limited. There are institutions offering strong programmes in forestry and agriculture, but there are no degree programmes in wildlife management, bio-systematic, biodiversity conservation or community based conservation of natural resources. A shortage of funding and lack of trained staff have also limited the amount of research on the identification, conservation, and sustainable use of biological diversity in Pakistan. There is little integration of research among institutions and disciplines, and very limited use of traditional knowledge in defining management programs.

f) Lack of management Plans

Most protected areas in Pakistan lack comprehensive management plans, and where plans do exist, they are not fully implemented. There is also a tendency to regard management plans as blueprints rather than adaptive strategies requiring constant updating. In recent years, some efforts have been made to redress this situation, and plans have been developed for the parks in KPK and WWF is also working for their improvements. But there are still many National Parks without an adequate management plan. There is strong requirement to formulate management plans for these areas as soon as possible.

g) Lack of funds

There is lack of adequate funding in order to conduct management activities fruitfully.

Although a reasonable amount is allocated by Government for these activities but it does not meet the needs required for proper administration of protected areas. The federal and provincial governments are the most important stakeholders with overall responsibility for providing an adequate policy and legal framework, enforcing regulations, building capacity and providing incentives and funds for the conservation of biodiversity. The policies and programmes of key federal ministries i.e. Environment, Local Government and Rural Development; Food and Agriculture; Finance; and Science and Technology and provincial departments of agriculture, livestock, forestry, wildlife and fisheries regarding funding are crucial to the conservation and sustainable use of biodiversity.

Conclusion and recommendations

Conservation of biodiversity in a sustainable way is vital for future of any country. Pakistan has taken practical steps towards protection of environment in steady manner. Many efforts have been made for protection and improvement of environmental biodiversity to reach the international standards. But there are still too many gaps and differences due to lack of proper management activities. It is necessary to take serious actions for effective management of protected areas in Pakistan. After comprehensive analysis of present situation of protected areas of Pakistan, following recommendations are put forward

- Most important issue regarding development of protected areas according to international standards is enforcement of existing laws in more effective mode. Although laws related to environmental protection have formulated since the independence of Pakistan but their implementation is very rare or partial. Law enforcing agencies should provide accomplishment of rules and regulation in a firm way without any exception. The goal of conservation is only achieved wholly through execution of policies regarding restriction on resource use, hunting, land use or any other activity in protected areas. Therefore strict implementation of polluter pay principle as is the norm in developed countries is strongly recommended.
- Without provision of proper management plan and monitoring the conservation of environmental biodiversity in protected areas cannot be attained. Effective management plan for any protected area is compulsory for successful implementation of concerning rules and regulation. In Pakistan many of protected areas lack appropriate management plan, and if any exists is not practiced productively. So it is suggested that management plans for good administration of protected areas must be formulated and executed as soon as possible. In this way, areas with unique characteristics of biodiversity can be safeguarded more efficiently.
- Community involvement during establishment of protected areas is another important factor concerning this issue. Needs of local population of the area are not considered properly before establishment of protected areas in Pakistan.

Residents of periphery of protected areas play important role in effective conservation strategies. The alternative income sources must be provided to local people if they are dependent upon natural resources for their livelihood. For this purpose local community must be benefited from development activities related to areas.

Moreover local community's participation in management activities can also enhance the viability of protected area. Therefore, more positive results can be achieved through effective policies related to community involvement.

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