

VERTEBRATE BIODIVERSITY AND KEY MAMMALIAN SPECIES STATUS OF HINGOL NATIONAL PARK

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ABSTRACT

Pakistan has recognized three categories of protected areas: National Parks, Wildlife Sanctuaries, and Game Reserves. Currently Pakistan has 22 National Parks of which Hingol National Park is the most unique and important because it consists of six ecosystems including Arabian Sea, Rugged Mountains, Desert, River, Estuary, and open plains. The park has rich biodiversity and diversified fauna of terrestrial, marine, and freshwater ecosystems. The park has many important mammals, birds, fish, reptiles and amphibian species, including Ibex (*Capra aegagrus*), Urial (*Ovis vignei*), Chinkara (*Gazella bennettii*), Dalmatian Pelican (*Pelecanus crispus*), Spotted-billed Pelican (*Pelecanus philippinus*), Houbara Bustard (*Chlamydotis undulata*), Imperial Eagle (*Aquila heliaca*), Sooty Falcon (*Falco concolor*), Flamingo (*Phoenicopterus roseus*), fish Mahsheer (*Tor putitora*), Marsh Crocodile (*Crocodylus palustris*), Green Sea Turtle (*Chelonia mydas*), Skittering frog (*Rana cyanophlyctis*) etc. During the study 2005 to 2009, 165 bird species (75 resident and 90 migratory species), and 16 mammalian species were recorded. While Ibex, Urial and Chinkara are the key species of the park. Jungle Cat (*Felis chaus*), Desert Cat (*Felis libyca*), Desert Fox (*Vulpes vulpes*), Wolf (*Canis lupus*), and Asiatic Jackal (*Canis aureus*) have been observed. Due to aesthetic reason, and venues like mountains, wetlands, river, estuary, sea beach, mud volcano and sand dunes, the park has a potential to be developed as Eco-tourist Park.

Keywords: Unique park, Hingol River, vertebrate biodiversity, green turtle, key mammalian species.

INTRODUCTION

Protected Areas are recognized as an important tool in conserving animal and plant species and ecosystems. These systems vary considerably from country to country, depending on priorities, and national needs, and on differences in institutional, legislative and financial support (Khan, 2004). Pakistan has 235 protected areas including 22 national parks (Table 1), 99 wildlife sanctuaries, 100 game reserves and 14 unclassified areas. Hingol National Park is located in the Province of Balochistan and covers an area of 619,043 hectares. This area falls at coordinates 26°00' and 25°17' North and 65°10' and 65° 55' East. Hingol National Park is named after the Hingol River, which flows through the center of the Park and empties into the Arabian Sea.

In 2005, 600 km long Mekran Coastal Highway was built along most of the Southern Coastal Area of Balochistan, that runs for some 109 km through the HN Park area (Management Plan of HNP, 2006). Hingol National Park comprises the area from the Arabian Sea up to 5 fathom depth to the Dhrun Mountain with the Shak top at 1580 m above sea level.

There are a number of plain valleys between hills in the HN park. The park area can be divided into areas West and East of Hingol River. The parallel mountain ranges West of the Hingol River follow an EW direction,

including the Shur Mountain Range, Hinglaj-Nani Mountains, Gurangatti and Rodaini - Kacho – Dhrun area. The mountain ranges East of Hingol River follow a more SSW-NNE direction including the Tranche Block and the Deo-Beharo Block. Further East, the mountain ranges show a NS direction including the Hala Range (Shir and Nawar Mountains) and the Haro Range, which flanks the Phore Valley respectively at the West and the East side. Between the large mountains blocks are small valleys including the Sham Valley located between Sangal-Kund Malir Range and the Shur Mountain Range, the Kundrach Valley between Shur and Hinglaj, the Harijan-Maneji Valley between Hinglaj and Gurangatti (Zehra, 2009). The drainage of the park area is mainly to the Hingol River. The main rivers from the North are the Nal-Hingol River entering the park at the NW boundary, the Arra River entering the park between the Dhrun Mountains and the Washiaab, the Babro River entering the park at the NE boundary, North of Tranch. The drainage of Dhrun Mountain is to all directions. The major drainage, from the high plateau is in Eastern direction emptying in the Ara River South of Kukeri Bhent. The largest part of the Southern slopes drains into the Rodaini Kacho Valley and then to the Daraj-Kacho gorge into the Northern Plains and its Ara River (Management Plan of HNP, 2006; Zehra, 2009).

In the HNP, 150 plant species have been reported (Zehra,

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Table 1. Current List of the National Parks of Pakistan (Khan and Siddiqui, 2005; Ahmad, 2009).

Name of National Park	Location	Year of establishment	Name of National Park	Location	Year of establishment
Ayubia	NWFP	1984	Kala Chitta	Punjab	2009
Central Karakoram	Northern Areas	1995	Khirthar	Sindh	1974
Chinji	Punjab	1987	Khunjerab	Northern Areas	1975
Chitral Gol	NWFP	1984	Lal Suhanra	Punjab	1972
Deosai	Northern Areas	1993	Lulusar	NWFP	2003
Deva Vatala	AJK	2009	Machiara	AJK	1996
Ghamot	AJK	2004	Margalla Hills	Fed. Capital Territory	1980
Gurez	AJK	2009	Pir Lasora	AJK	2005
Handrap Shandoor	Northern Areas	1993	Saif-ul-muluk	NWFP	2003
Hazarganji Chiltan	Balochistan	1980	Sheikh Budin	NWFP	1993
Hingol	Balochistan	1997	Toh Pir	AJK	2005

2009). The main vegetated areas are in the small zones of the valleys, the floodplains, riverbeds, and more extensive area of the coastal plains. Most ecological units are bare or almost bare including the mud flats, the salt plains, the clay Mountains and mud vent areas, the stone rippled terraces, and the smooth slopes of brown clay rock, mountains ridges, the steep mountain walls and the crusted valley floor and the active flood bank areas. The park is represented by six ecosystems including Arabian Sea, Rugged Mountains, River, Desert, Estuary, and open plains. The wildlife of the coastal area of HNP is diverse due to a combination of habitats found together at several areas. The coastal plains show rocky hill areas (Sappat Mountains, Agor Hills, Jabal Haro-Kund Malir), sand dunes, agricultural fields and river beds.

The Arabian Sea, including the area bordering national park, is known to be highly productive. Nesting of Green turtle has been reported from the coastal area of HNP. A variety of water birds occurs at the coast line. Estuarine area of the River Hingol, supports a variety of resident and migratory water birds. Adjacent to coastline there is a large desert with prominent sand dunes. These sand dunes may be categorized as stable or fixed sand dunes. The desert area of the park has diversified biodiversity including birds, small mammals and reptiles. Occurrence of Houbara Bustard in winter is also reported in the dune areas (Azam, 2004).

The objective of the present study was to record the vertebrate biodiversity and population status of three key mammalian species (Ibex, Urial and Chinkara) of Hingol National Park in the selected areas during 2005-2009.

MATERIALS AND METHODS

Based on preliminary studies in the Hingol National Park, Nani Mandir Complex, Rodaini Kacho, Harian Valley, Dhrun, Machii, Maneji, Ara Kaur, Babro Kaur, Agor, Kundrach, Qasim Goth, Wadh Bundar, Maneji, Nani Mandir/Nani Bent, Nala Jhakee, Kashee Goth, Kund

Malir, Kalair Goth, Nokoo Goth, Allah Buksh Goth, and Sanguri area were selected for the study of key mammalian and other vertebrate biodiversity (Table 2, Fig. 1, 2). The following methods and surveys techniques were employed for the observation, census and documentation of key mammalian species.

1. Track Counts
2. Point Surveys
3. Roadside Counts
4. Line Transects or Strip Census
5. Pellet Counts

Track Counts

Tracks can be the first indication of the presence of animals in an area. Track counts especially after rain are useful in identifying different animals especially for nocturnal and secretive ones. A fresh rain eliminates the previous tracks, and the recent tracks of animals entering or leaving the study areas can be used as a measure of their abundance. During all studies the track count technique was applied at selected areas of HNP and this was more effective compare to other methods.

Point Surveys

In this method, observation points are established along roads, edges of ponds or marshes, at a higher place and other locations suitable for viewing the habitat. For a period of 1 to 5 hours at each observation point, the observer records all sightings of the mammals at that site and then an index of abundance of each species is expressed as the number of animals seen per hour of observations (Brower *et al.*, 1990). Point surveys were conducted twice daily, first during early morning, i.e. one hour before sunrise until dawn and second, in the evening, i.e., begins one-half an hour before the sunset until dark.

Roadside Counts

Usually it is difficult to locate a mammal especially a large mammal by walking in its habitat, because it smells

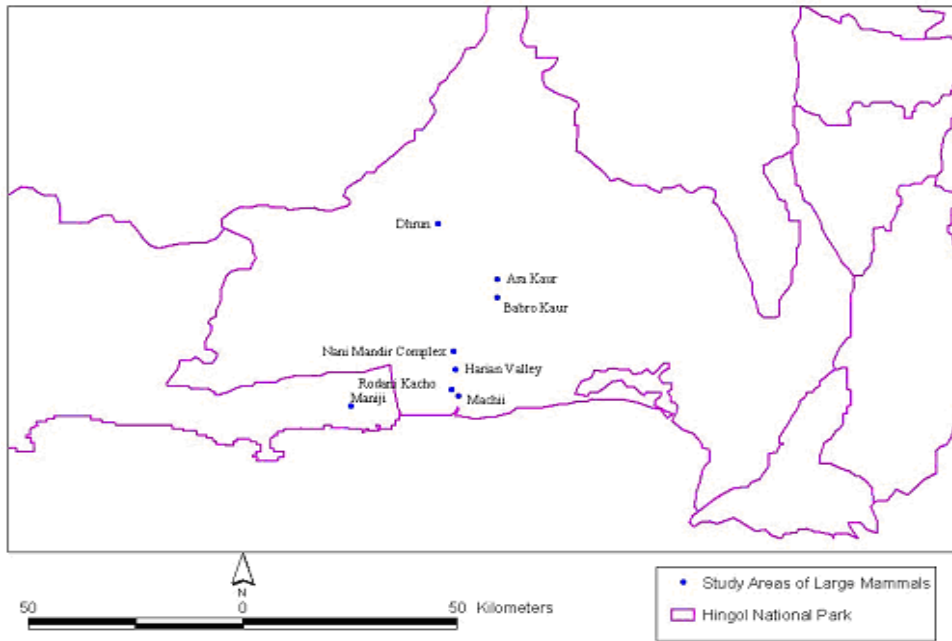


Fig. 1. Study areas of key mammalian species and birds of Hingol National Park.

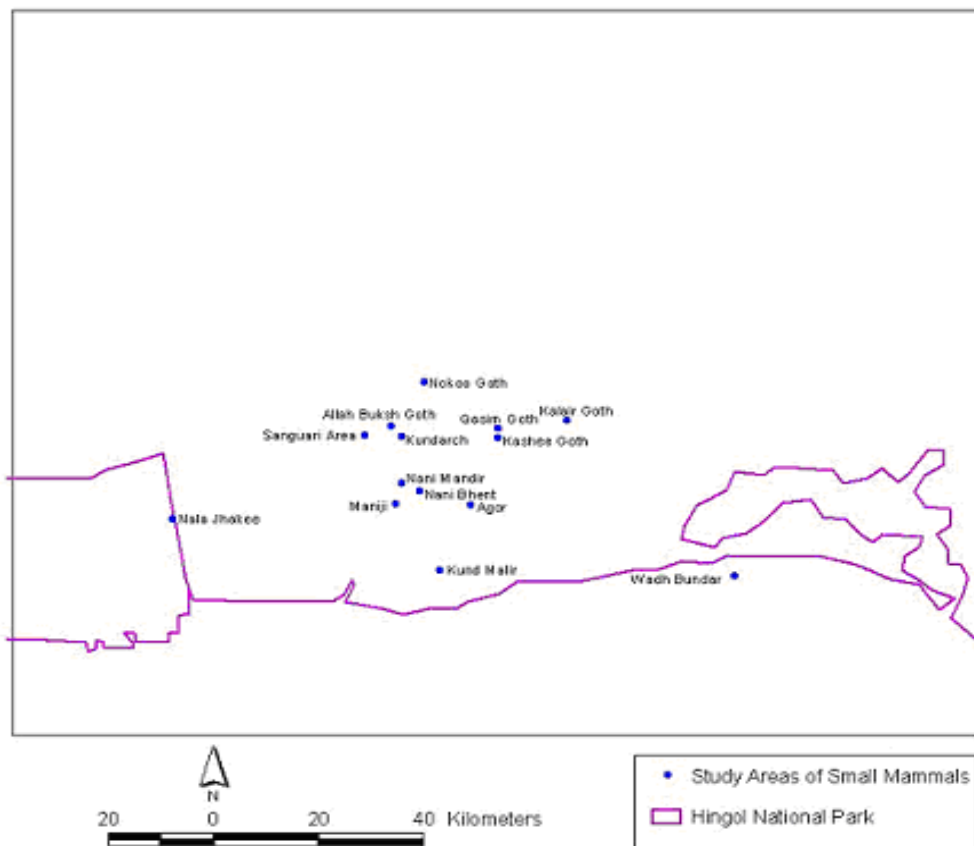


Fig. 2. Study areas of small mammals and birds of Hingol National Park.

human presence from a long distance. Hence, the method of roadside counts was applied to locate and estimate the population of different mammalian species. In this method, the observer travels by motor vehicle along roads

and trails while the sighted number of individuals of the species being estimated is tallied and related to the number of km travelled (Brower *et al.*, 1990). This method has some advantages such as; travelling by

vehicle disturbs the animals and there is always a chance to observe the animals along the road / track from a distance of few meters. Secondly, by this method large areas can be covered quickly and easily by only two persons. The roadside counts technique was applied during survey along the coastal highway, mostly for nocturnal mammals like foxes, jackals, cats as well as for the diurnal mammals e.g., mongoose. For this purpose, 4 x 4 vehicles were driven at a slow speed (7km/h) on inter-compartmental tracks, sandy plains river bank (4km/h) and on rough tracks along water channels at Hingol River (3km/h) in the park. These roadside counts were carried out during early morning, at dusk and during night by using search lights on top of the vehicle.

Line Transects

The line transect or strip census method of population estimation involves counting the animals seen by an observer traversing a predetermined transect line and recording the distances at which they were seen or flushed. The average of the flushing distance is determined and used to calculate the effective width of the strip covered by the observer. The population for the entire area is then considered to be the number of animals flushed, divided by the area of the strip and multiplied by the total area (Schemnitz, 1980).

$$P = AZ / 2 XY$$

Where P = population

A = total area of study

Z = number of animals flushed

Y = average flushing distance

X = length of strip

Line transects or strip census method is particularly a useful technique when animals are difficult to see and must be flushed to be counted. This methodology was applied in HNP for estimating large mammals eg., Ibex, Urial, Chinkara etc. The transect method was also used for surveys of marine mammals in HNP. The transect was randomly selected from the chart prior to leaving shore. Large and medium sized boats were used during the survey. The boat speed was maintained below 12 knots and the width of transect was 25 m on either side of the boat. Two observers and one recorder worked at a time. Each observer watched 90° in an arc sweeping one quarter on front view from mid boat. The auto focus binoculars were used for observations.

Pellet Counts

Fecal material such as pellets counted in a specific area is a good technique for locating large mammals and assessing their population. This technique involves removing all pellet groups from plots and then estimating from subsequent observations on those plots the number of groups per hectare to compare animal use of areas

between sampling periods. In some cases it is not possible to remove all the pellet groups from an area. Therefore, under such circumstances; an observer with a little practice can identify the fresh pellets depending on the color and dryness of the pellets. Ten to fifteen 100 sq. m plots (7.07 X 14.14) can be used for this purpose. These plots should be checked every three to seven days and the periods between sampling should not be so long that feces will decompose or be destroyed by weather or insects. A random selection of plots in the study area and the number of pellets groups in each plot were tallied and summed (Brower *et al.*, 1990).

The number of pellet group per unit area is determined as an index of density (ID) and determined as:

$$ID = n / A$$

where, n is the sum of pellet group counted over all plots and A is the total area sampled (i.e., the sum of the areas of all the plots).

This method is effective in habitats with dry weather and little or no dung beetle activity where pellets groups remain preserved between sampling periods. After counting pellets, one must be assured that they will not be counted on successive sampling periods so they should be removed by the observer if they will not disappear by natural processes. Defecation rates for the species under the study are estimated if it is desired to convert pellet counts to number of animals.

Techniques and tools for survey of small mammals

Trapping

Sherman Traps were used to collect the live specimens. Traps were set on a line approx 500 m long and approx 10 m apart. Each trap was marked by a colored ribbon to locate the traps easily. The traps were set in the afternoon and checked early morning. The trapped animals were each carefully transferred into an already weighed transparent polythene bag. The species and sex of the trapped animals were noted. Other data for each trap, such as date of trap setting, date of data collection, habitat, location, elevation and weather conditions were recorded on a data sheet. After recording the data, the animals were released. Specimens with some doubt in identification were preserved in 10% formalin and brought to laboratory and identified. Specimens of each species were preserved as voucher specimens.

A mixture of different food grains mixed with fragrant seeds was used as bait to attract small mammals. Wheat and rice were used as food grains while peanut butter coriander, oats and honey were used for fragrance. This bait was very successful in the study area probably due to overall food shortage and also because four ingredients were used for fragrance. Freshly prepared

bait was used on every trapping day. Only a small amount of bait was put on the platform near the traps. Because of limited time for surveys, trapping was done only at night at each of the sites and for best results trapping continued at least for 3 nights. To supplement low intensity trapping during field surveys, other data collection procedures such as active searching (day and night), spot light search, and interviews of local peoples, visible signs and literature review were also adopted.

Spot Light Method

This method is used at night for locating small and large mammals such as Hare, Porcupine, Hedgehog, Fox, Wild Cat, Jackal etc. because all these nocturnal animals move for food. In this way the populations of different species at different localities were estimated.

Counting of Fresh Holes and Tracks

According to Brower *et al.* (1990) the holes and tracks method can be used to determine the population range and status of small mammals. Fresh holes and tracks were counted in the study area of one sq. km, which provided population estimate.

Several bird surveys were undertaken during the study. For bird identification, field guides such as Grimmett *et al.* (1988) and Khanum *et al.* (1980) were used.

RESULTS AND DISCUSSION

In this study, vertebrate biodiversity and key mammalian species status of Hingol National Park was determined for the selected sites, using several methods and survey techniques for the observation, census and documentation of the mammalian fauna, and other vertebrate biodiversity from 2005 to 2009. During the study, 16 mammalian species have been recorded including three large and 13 small mammal species

Population and Status of Key Mammalian Species

Three key mammalian species have been recorded during 2005 to 2007. Ibex (*Capra aegagrus*) was rated common, while Urial (*Ovis vignei*), and Chinkara (*Gazella bennettii*) less common. In 2005, Ibex was rated 79.64%, Urial 10.32%, and Chinkara 10.02% (Table 3). In 2006, Ibex was rated 78.53%, Urial 11.12%, and Chinkara 10.34% (Table 4). In 2007, Ibex was rated 78.29%, Urial 11.18%, and Chinkara 10.51% (Table 5). During 2008 and 2009, Wild goat (*Capra aegagrus*) was rated as common, while Urial (*Ovis vignei*), and Chinkara (*Gazella bennettii*) less common. In 2008, Wild goat was rated 79.16%, Urial 11.45 %, and Chinkara 9.37% (Table 6). In 2009, Wild goat was rated 80%, Urial as 11.6%, and Chinkara 8.4% (Table 7). The population of key species at Nani Mandir Complex, Rodaini Kacho, Harian Valley, Dhrun, Machii, Maneji, Ara Kaur, and Babro Kaur areas has also been summarized in tables 8-10.

Ibex (*Capra aegagrus*)

There are three key mammalian species in HNP, and *Capra aegagrus* (Ibex) is one of them. The estimated population of Ibex was observed was 540 in 2005, 600 in 2006, 700 in 2007, 760 in 2008 and 800 in 2009 in different areas of the park (Table 8). Males, females, yearlings and young ones were also included in count. During the study period 2005 – 2009, the habitat conditions are better as both feed and shelter are in plenty in HNP. Even though the Ibex has to face the hunting pressure from different sources and disturbance at different times of the year from the pilgrims to Nani Mandir area and from the livestock herders, its population is still good. Livestock pressure in the area is the deciding factor in the distribution of the Ibex. In the face of competition with the livestock, Ibex either leave the area or their visitation is reduced.

Urial (*Ovis vignei*)

During the study period, *Ovis vignei* (Urial) was rated as less common. The estimated population of Urial was observed was 70 in 2005, 85 in 2006, 100 in 2007, 110 in 2008 and 116 in 2009 in different areas of the park (Table 9). The Urial population has faced the hunting pressure due to easy access to its habitat and the competition with the livestock. However, during our study, no direct evidence of hunting pressure on Urial was found. The reason for the decline could be the deterioration in habitat conditions and competition with livestock. (Scanty population demands further studies and adoption of conservation measures). Urial habitat was observed in the foothill areas, close to the mountains where a reasonably good shelter may be available.

Chinkara (*Gazella bennettii*)

Gazella bennettii (Chinkara) was also rated as less common. Chinkara being distributed in the plain area is susceptible to hunting pressure as these areas are easily approachable even on motor cycles. This was evident by the presence of signs of motor cycles in many areas. The condition of the animals seen was good and did not suggest that they were not reproducing. The habitat conditions in the area were suitable. There was no indication of a competition with the livestock as no interaction was witnessed. Chinkara was observed in specific habitat *viz.*, large plain areas in the valley bottoms and vast nullah beds. They move to the mountains or even to the foothill. Low population of Chinkara needs immediate attention and further studies especially into the population structure and non-recruitment to the population are required. The estimated population of Chinkara was observed to be 68 in 2005, 79 in 2006, 94 in 2007, 90 in 2008 and 84 in 2009 in different areas of the park (Table 10).

Table 3. Population of key Mammalian Species of Hingol National Park in 2005.

S. No	Study Area	Ibex (<i>Capra aegagrus</i>)	Urrial (<i>Ovis vignei</i>)	Chinkara (<i>Gazella bennettii</i>)	Total	%
1.	NaniMandir Complex	325	-	-	325	47.93
2.	Rodaini Kacho	110	11	10	131	19.32
3.	Harian Valley	40	09	13	62	9.14
4.	Dhrun	18	-	-	18	2.65
5.	Machii	25	14	-	39	5.75
6.	Maneji	22	15	12	49	7.22
7.	Ara Kaur	-	11	17	28	4.12
8.	Babro Kaur	-	10	16	26	3.83
	Total	540	70	68	678	
	%	79.64	10.32	10.02		

Table 4. Population of key Mammalian Species of Hingol National Park in 2006.

S. No	Study Area	Ibex (<i>Capra aegagrus</i>)	Urrial (<i>Ovis vignei</i>)	Chinkara (<i>Gazella bennettii</i>)	Total	%
1.	NaniMandir Complex	360	-	-	360	47.12
2.	Rodaini Kacho	120	13	12	145	18.97
3.	Harian Valley	44	10	16	70	9.16
4.	Dhrun	20	-	-	20	2.61
5.	Machii	30	17	-	47	6.15
6.	Maneji	26	18	12	56	7.32
7.	Ara Kaur	-	15	21	36	4.71
8.	Babro Kaur	-	12	18	30	3.92
	Total	600	85	79	764	
	%	78.53	11.12	10.34		

Table 5. Population of key Mammalian Species of Hingol National Park in 2007.

S. No	Study Area	Ibex (<i>Capra aegagrus</i>)	Urrial (<i>Ovis vignei</i>)	Chinkara (<i>Gazella bennettii</i>)	Total	%
1.	NaniMandir Complex	415	-	-	415	46.42
2.	Rodaini Kacho	140	14	15	169	18.90
3.	Harian Valley	50	12	20	82	9.17
4.	Dhrun	29	-	-	29	3.24
5.	Machii	36	20	-	56	6.26
6.	Maneji	30	20	16	66	7.38
7.	Ara Kaur	-	18	22	40	4.47
8.	Babro Kaur	-	16	21	37	4.13
	Total	700	100	94	894	
	%	78.29	11.18	10.51		

Population and Status of Small Mammals

From 2005 – 2009, thirteen species of small mammals have been recorded. Based on the data, House Mouse (*Mus musculus*), Balochistan Gerbil (*Gerbillus nanus*), Palm Squirrel (*Funambulus pennantii*), Afghan Hedgehog (*Hemiechinus auritus*), House Rat (*Rattus rattus*), Porcupine (*Hystrix cristatus*), Indian Gerbil (*Tatera indica*), and Grey Spiny Mouse (*Mus saxicola*) were rated as common, while Cairo Spiny Mouse (*Acomys*

cahirinus), Cape Hare (*Lepus capensis*), Mouse like Hamster (*Callomyscus bailwardi*), and Indian Desert Jird (*Meriones hurrianae*) were rated as less common, and during 2006 – 2009, Persian Jird (*Meriones persicus*) was rated as rare.

In 2005, House Mouse was rated as 12.17%, Balochistan Gerbil 8.86%, Cairo Spiny Mouse 5.79%, Palm Squirrel 11.34%, Cape Hare 3.54%, Mouse like Hamster 4.49%,

Table 6. Population of key Mammalian species of Hingol National Park in 2008.

S. No	Study Area	Ibex (<i>Capra aegagrus</i>)	Urial (<i>Ovis vignei</i>)	Chinkara (<i>Gazella bennettii</i>)	Total	%
1.	Nani Mandir Complex	445	-	-	445	46.35
2.	Rodaini Kacho	148	16	14	178	18.54
3.	Harian Valley	56	14	19	89	9.27
4.	Dhrun	34	-	-	34	3.54
5.	Machii	42	22	-	64	6.66
6.	Maneji	35	22	16	73	7.60
7.	Ara Kaur	-	19	21	40	4.16
8.	Babro Kaur	-	17	20	37	3.85
	Total	760	110	90	960	
	%	79.16	11.45	9.37		

Table 7. Population of key Mammalian Species of Hingol National Park in 2009.

S. No	Study Area	Ibex (<i>Capra aegagrus</i>)	Urial (<i>Ovis vignei</i>)	Chinkara (<i>Gazella bennettii</i>)	Total	%
1.	NaniMandir Complex	467	-	-	467	46.7
2.	Rodaini Kacho	155	17	13	185	18.5
3.	Harian Valley	59	15	18	92	9.2
4.	Dhrun	38	-	-	38	3.8
5.	Machii	44	23	-	67	6.7
6.	Maneji	37	23	15	75	7.5
7.	Ara Kaur	-	20	20	40	4
8.	Babro Kaur	-	18	18	36	3.6
	Total	800	116	84	1000	
	%	80	11.6	8.4		

Table 8. Population of Ibex (*Capra aegagrus*) in HNP during 2005 to 2009.

S. No.	Study Area	2005	2006	2007	2008	2009
1.	Nani Mandir Complex	325	360	415	445	467
2.	Rodaini Kacho	110	120	140	148	155
3.	Harian Valley	40	44	50	56	59
4.	Dhrun	18	20	29	34	38
5.	Machii	25	30	36	42	44
6.	Maneji	22	26	30	35	37
	Total	540	600	700	760	800

Afghan Hedgehog 10.87%, House Rat 9.69%, Indian Desert Jird 6.38%, Porcupine 10.52%, Indian Gerbil 9.10%, and Grey Spiny Mouse 7.21%.

In 2006, House Mouse was rated as 11.12%, Balochistan Gerbil 10.01%, Cairo Spiny Mouse 6.06%, Palm Squirrel 11.12%, Cape Hare 5.35%, Mouse like Hamster 4.55%, Afghan Hedgehog 11.12%, House Rat 8.08%, Indian Desert Jird 4.85%, Porcupine 9.90%, Indian Gerbil 8.80%, Grey Spiny Mouse 7.88%, and Persian Jird 1.01%.

In 2007, House Mouse was rated as 13.64%, Balochistan Gerbil 9.93%, Cairo Spiny Mouse 6.14%, Palm Squirrel 6.50%, Cape Hare 4.06%, Mouse like Hamster 3.25%,

Afghan Hedgehog 11.29%, House Rat 10.38%, Indian Desert Jird 6.05%, Porcupine 9.93%, Indian Gerbil 9.30%, Grey Spiny Mouse 8.58%, and Persian Jird 0.90% (Table 11).

In 2008, House Mouse was rated as 12.25%, Balochistan Gerbil 10.22%, Cairo Spiny Mouse 6.70%, Palm Squirrel 6.79%, Cape Hare 3.79%, Mouse like Hamster 3.08%, Afghan Hedgehog 11.37%, House Rat 9.96%, Indian Desert Jird 6.17%, Porcupine 10.40%, Indian Gerbil 8.73%, Grey Spiny Mouse 8.73%, and Persian Jird 1.76% (Table 11).

In 2009, House Mouse was rated as 12.33%, Balochistan Gerbil 10.42%, Cairo Spiny Mouse 6.68%, Palm Squirrel

Table 9. Population of Urial (*Ovis vignei*) in HNP during 2005 to 2009.

S. No.	Study Area	2005	2006	2007	2008	2009
1.	Rodaini Kacho	11	13	14	16	17
2.	Harian Valley	09	10	12	14	15
3.	Machii	14	17	20	22	23
4.	Maneji	15	18	20	22	23
5.	Ara Kaur	11	15	18	19	20
6.	Babro Kaur	10	12	16	17	18
	Total	70	85	100	110	116

Table. 10. Population of Chinkara (*Gazella bennettii*) in HNP during 2005 to 2009.

S. No.	Study Area	2005	2006	2007	2008	2009
1.	Rodaini Kacho	10	12	15	14	13
2.	Harian Valley	13	16	20	19	18
3.	Maneji	12	12	16	16	15
4.	Ara Kaur	17	21	22	21	20
5.	Babro Kaur	16	18	21	20	18
	Total	68	79	94	90	84

Table. 10. Population of Chinkara (*Gazella bennettii*) in HNP during 2005 to 2009.

S. No.	Study Area	2005	2006	2007	2008	2009
1.	Rodaini Kacho	10	12	15	14	13
2.	Harian Valley	13	16	20	19	18
3.	Maneji	12	12	16	16	15
4.	Ara Kaur	17	21	22	21	20
5.	Babro Kaur	16	18	21	20	18
	Total	68	79	94	90	84

Table 11. Population of Small Mammals in Hingol National Park 2005 to 2009.

S. No	Year	House Mouse	Baloch Gerbil	Cairo Spiny Mouse	Palm Squirrel	Cape Hare	Mouse like Hamster	Afghan Hedgehog	House Rat	Indian Desert Jird	Por-cupine	Indian Gerbil	Grey Spiny Mouse	Persian Jird	Total
1	2005	103	75	49	96	30	38	92	82	54	89	77	61	0	846
2	2006	110	99	60	110	53	45	110	88	48	98	80	78	10	989
3	2007	151	110	68	72	45	36	125	115	67	110	103	95	10	1107
4	2008	139	116	76	77	43	35	129	113	70	118	99	99	20	1134
5	2009	142	120	77	80	42	33	133	121	73	122	104	88	16	1151
	Total	645	520	330	435	213	187	589	519	312	537	463	421	56	5227

6.95%, Cape Hare 3.64%, Mouse like Hamster 2.86%, Afghan Hedgehog 11.55%, House Rat 10.51%, Indian Desert Jird 6.34%, Porcupine 10.59%, Indian Gerbil 9.03%, Grey Spiny Mouse 7.64%, and Persian Jird 1.34% (Table 11).

Other Vertebrate Biodiversity

In the Hingol National Park the following vertebrates have been reported. However, none was seen during the study (Zehra, 2009):

Desert Wolf (*Canis lupus*)

The presence of Desert Wolf (*Canis lupus*) was reported in valleys viz Ara Kaur, Babro Kaur, adjoining Tranche valley, and Dhrun areas.

Caracal or Bashoshah (*Felis caracal*)

Caracal was reported only from Rodaini Kachho area.

Common Leopard (*Panthera pardus saxicolor*)

Common Leopard signs were reported from at least two valleys (between Dhrun and Rodaini Kacho). Local people also talked about the occurrence of this animal.

Asiatic Jackal (*Canis aureus*)

Asiatic Jackal footprints were seen in Pachree valley.

Pangolin or Scaly anteater (*Manis crassicaudata*)

Local people reported Pangolin occurrence in other valleys also but this could not be confirmed. Its footprints were seen in Pacchri valley only.

Wild Boar (*Sus scrofa davidi*)

Wild Boar was recorded through the footprints in Harian and Pachree valley areas.

Birds

In Pakistan, 666 bird species have been recorded, out of which 380 species have been recorded in Balochistan (Ghalib *et al.*, 2004). Azam (2004) reported 108 species belonging to 68 genera 37 families and 14 orders from HNP. The avifauna of the HNP consists of resident as well as migratory bird species. During the study, we have observed many bird habitats including; coastal area, estuarine area, river, mangrove area, mountains and desert. During the study 165 bird species were recorded in which 75 were resident and 90 were migratory species (Table 12).

Table 12. Birds of Hingol National Park, observed during 2005-2009.

S. No.	Scientific name	Common name
1.	<i>Phalacrocorax carbo</i>	Large Cormorant
2.	<i>Phalacrocorax niger</i>	Little Cormorant
3.	<i>Pelecanus crispus</i>	Dalmatian Pelican
4.	<i>Pelecanus onocrotalus</i>	White or Rosy Pelican
5.	<i>Pelecanus philippensis</i>	Spotted billed Pelican
6.	<i>Dupetor flavicollis</i>	Yellow-throated black bittern
7.	<i>Egretta alba</i>	Large Egret or Great Egret
8.	<i>Egretta garzetta</i>	Little Egret
9.	<i>Egretta gularis</i>	Indian Reef Heron
10.	<i>Egretta intermedia</i>	Smaller or Median Egret
11.	<i>Ardea cinerea</i>	Grey Heron
12.	<i>Ardea goliath</i>	Giant Heron
13.	<i>Ardea purpurea</i>	Purple Heron
14.	<i>Ciconia nigra</i>	Black Stork
15.	<i>Psuedibis papillosa</i>	Black Ibis
16.	<i>Platalea leucirodia</i>	Spoonbill
17.	<i>Phoenicopterus roseus</i>	Flamingo

S. No.	Scientific name	Common name
18.	<i>Anas acuta</i>	Pintail
19.	<i>Anas crecca</i>	Common Teal
20.	<i>Anas clypeata</i>	Shoveller
21.	<i>Anas penelope</i>	Wigeon
22.	<i>Anas strepera</i>	Gadwall
23.	<i>Milvus migrans</i>	Black Kite
24.	<i>Haliaeetus indus</i>	Brahminy Kite
25.	<i>Haliaeetus leucoryphus</i>	Pallas's Fishing Eagle
26.	<i>Gypaetus barbatus</i>	Bearded Vulture
27.	<i>Neophron percnopterus</i>	Egyptian Vulture
28.	<i>Gyps fulvus</i>	Indian Griffon Vulture
29.	<i>Circus aeruginosus</i>	Marsh Harrier
30.	<i>Accipiter badius</i>	Central Asian Shikra
31.	<i>Accipiter nisus</i>	Eurasian Sparrow Hawk
32.	<i>Aquila heliaca</i>	Imperial Eagle
33.	<i>Aquila rapax</i>	Tawny Eagle
34.	<i>Pandion haliaeetus</i>	Osprey
35.	<i>Falco columbarius</i>	Pallid Merlin
36.	<i>Falco concolor</i>	Sooty Falcon
37.	<i>Falco jugger</i>	Lagger Falcon
38.	<i>Falco naumani</i>	Lesser Kestrel
39.	<i>Falco peregrinus</i>	Peregrine Falcon
40.	<i>Falco tinnunculus</i>	Kestrel
41.	<i>Ammoperdix griseogularis</i>	See-see Partridge
42.	<i>Francolinus pondicerianus</i>	Grey Partridge
43.	<i>Conturnix conturnix</i>	Common Quail
44.	<i>Gallinula chloropus</i>	Moorhen
45.	<i>Fulica atra</i>	Coot
46.	<i>Chlamydotis undulata</i>	Houbara Bustard
47.	<i>Himantopus ostralegus</i>	Oyster Catch or Sea-Pie
48.	<i>Himantopus himantopus</i>	Black-winged Stilt
49.	<i>Dromas ardeola</i>	Crab Plover
50.	<i>Burhinus oedicephalus</i>	Stone curlew/ Eurasian Thick-Knee
51.	<i>Esacus recurvirostris</i>	Great Stone Plover/Thick-Knee
52.	<i>Charadrius alexandrinus</i>	Kentish Plover
53.	<i>Charadrius dubius</i>	Little Ringed Plover
54.	<i>Charadrius hiaticula</i>	Ringed Plover
55.	<i>Charadrius leschenaultii</i>	Large Sand Plover
56.	<i>Charadrius mongolus</i>	Lesser Sand Plover
57.	<i>Vanellus gregarious</i>	Sociable Lapwing
58.	<i>Vanellus indicus</i>	Red Wattled Lapwing
59.	<i>Vanellus leucurus</i>	White-tailed Lapwing

S. No.	Scientific name	Common name
60.	<i>Calidris alpinus</i>	Dunlin
61.	<i>Calidris minutus</i>	Little Stint
62.	<i>Calidris temminckii</i>	Temminck's Stint
63.	<i>Calidris testaceus/ferruginea</i>	Curlew-Sandpiper
64.	<i>Limicola falcinellus</i>	Broad billed Sandpiper
65.	<i>Philomachus pugnax</i>	Ruff
66.	<i>Capella gallinago</i>	Common or Fantail Snipe
67.	<i>Limosa lapponica</i>	Ber tailed Godwit
68.	<i>Limosa limosa</i>	Black tailed Godwit
69.	<i>Numenius arquata</i>	Curlew
70.	<i>Numenius phaeopus</i>	Whimbrel
71.	<i>Tringa hypoleucos</i>	Common Sandpiper
72.	<i>Tringa nebularia</i>	Greenshank
73.	<i>Tringa ochropus</i>	Green Sandpiper
74.	<i>Tringa stagnatilis</i>	Marsh Sandpiper
75.	<i>Tringa terek</i>	Terek Sandpiper
76.	<i>Tringa totanus</i>	Redshank
77.	<i>Larus argentatus</i>	Herring Gull
78.	<i>Larus brunnicephalus</i>	Brown-headed Gull
79.	<i>Larus cachinans</i>	Yellow-legged Gull
80.	<i>Larus fuscus</i>	Black-backed Gull
81.	<i>Larus genei</i>	Slender billed Gull
82.	<i>Larus ichthyaetus</i>	Great Black headed Gull or Pallas's Gull
83.	<i>Larus ridibundus</i>	Black-headed Gull
84.	<i>Gelochelidon nilotica</i>	Gull billed Tern
85.	<i>Hydroprogne caspia</i>	Caspian Tern
86.	<i>Sterna albifrons</i>	Little Tern
87.	<i>Sterna bengalensis</i>	Lesser Crested Tern
88.	<i>Sterna hirundo</i>	Common Tern
89.	<i>Sterna repressa</i>	White-cheeked Tern
90.	<i>Sterna sandvicensis</i>	Sandwich Tern
91.	<i>Chlidonias hybrida</i>	Whiskered Tern
92.	<i>Pterocles coronatus</i>	Caronnetted Sandgrouse
93.	<i>Pterocles indicus</i>	Painted Sandgrouse
94.	<i>Pterocles orientalis</i>	Imperial or Black-bellied Sandgrouse
95.	<i>Columba livia</i>	Blue Rock Pigeon
96.	<i>Streptopelia decaocto</i>	Ring Dove
97.	<i>Streptopelia senegalensis</i>	Little Brown or Senegal Dove
98.	<i>Psittacula krameri</i>	Rose Ringed Parakeet
99.	<i>Caprimulgus mahrattensis</i>	Syke's or Sind Nightjar
100.	<i>Athene brama</i>	Spotted Owlet
101.	<i>Apus affinis</i>	House Swift
102.	<i>Apus apus</i>	Common Swift
103.	<i>Apus pallidus</i>	Pale Brown or Pallid Swift

S. No.	Scientific name	Common name
104.	<i>Alcedo atthis</i>	Common Small Blue Kingfisher
105.	<i>Halcyon smyrnensis</i>	White breasted Kingfisher
106.	<i>Merops orientalis</i>	Small Green Bee-eater
107.	<i>Merops superciliosus</i>	Blue-checked Bee-eater
108.	<i>Coracias bengalensis</i>	Ruller or Blue Jay
109.	<i>Upupa epops</i>	Hoopoe
110.	<i>Picoides assimilis</i>	Sind Pied Woodpecker
111.	<i>Eremopterix grisea</i>	Ashycrowned Finch-lark
112.	<i>Eremopterix nigriceps</i>	Blackcrowned Finch-lark
113.	<i>Ammomanes deserti</i>	Indian Desert Finch-lark
114.	<i>Alaemon alaudipes</i>	Hoopoe Lark / Bifasciated Lark
115.	<i>Calandrella acutirostris</i>	Hume's Short-toed Lark
116.	<i>Galerida cristata</i>	Crested Lark
117.	<i>Riparia paludicola</i>	Brown-throated Sand Martin
118.	<i>Riparia riparia</i>	Collared Sand Martin
119.	<i>Delichon urbica</i>	Common House Martin
120.	<i>Hirundo daurica</i>	Redrumped Swallow
121.	<i>Hirundo rustica</i>	Barn Swallow
122.	<i>Hirundo smithi</i>	Wire-tailed Swallow
123.	<i>Motacilla alba</i>	White or Pied Wagtail
124.	<i>Motacilla cinerea</i>	Grey Wagtail
125.	<i>Motacilla flava</i>	Yellow Wagtail
125.	<i>Anthus trivialis</i>	Tree Pipit
127.	<i>Pycnonotus cafer</i>	Red-vented Bulbul
128.	<i>Pycnonotus leucogenys</i>	White-cheeked Bulbul
129.	<i>Lucinia svecica</i>	Bluethroat
130.	<i>Oenanthe alboniger</i>	Hume's Chat or Wheatear
131.	<i>Oenanthe deserti</i>	Desert Chat or Desert Wheatear
132.	<i>Oenanthe isabellina</i>	Isabelline Wheatear
133.	<i>Oenanthe monacha</i>	Hooded Chat or Wheatear
134.	<i>Phoenicurus ochruros</i>	Black Redstart
135.	<i>Saxicola ferea</i>	Gray Bushchat
136.	<i>Saxicola torquata</i>	Collared Indian Bush Chat or Stone Chat
137.	<i>Acrocephalus dumetorum</i>	Blyth's Reed Warbler

S. No.	Scientific name	Common name
138.	<i>Acrocephalus stantoreus</i>	Clamorous Warbler
139.	<i>Phylloscopus collibita</i>	Chiffchaff
140.	<i>Phylloscopus neglectus</i>	Plain Leaf Warbler
141.	<i>Prinia buchanani</i>	Rufous Fronted Wren Warbler
142.	<i>Sylvia curruca</i>	Lesser Whitethroat
143.	<i>Sylvia nana</i>	Desert Warbler
144.	<i>Ficedula parva</i>	Red throated Flycatcher
145.	<i>Rhipidura aureola</i>	White browed Flycatcher
146.	<i>Turdoides caudatus</i>	Common Babbler
147.	<i>Nectarinia asiatica</i>	Purple Sunbird
148.	<i>Lanius excubitor</i>	Grey Shrike
149.	<i>Lanius isabellinus</i>	Rufous-tailed or Isabelline Shrike
150.	<i>Lanius schach</i>	Rufous-backed Shrike
151.	<i>Lanius vittatus</i>	Baybacked Shrike
152.	<i>Dicrurus adsimilis</i>	Black Drongo or King Crow
153.	<i>Corvus corax</i>	Common Raven
154.	<i>Corvus ruficollis</i>	Dasert Raven
155.	<i>Corvus splendens</i>	Indian House Crow
156.	<i>Acridotheres tristis</i>	Indian Myna
157.	<i>Passer domesticus</i>	House Sparrow
158.	<i>Passer hispaniolensis</i>	Spanish Sparrow
159.	<i>Passer pyrrhonotus</i>	Sind Jungle Sparrow
160.	<i>Passer xanthocollis</i>	Sind Yellow throated Sparrow
161.	<i>Lonchura malabarica</i>	Common Silverbill or White throated Munia
162.	<i>Carpodacus erythrinus</i>	Common Rosefinch
163.	<i>Emberiza cia</i>	Rock Bunting
164.	<i>Emberiza melanocephala</i>	Black headed Bunting
165.	<i>Emberiza striolata</i>	Striped or House Bunting

Fish fauna

Following fourteen fish species have been recorded: *Cyprinion watsoni*, *Cyprinion microphthalmum*, *Cyprinion milesi*, *Schistura balochiorum*, *Tor pititora*, *Scaphiodom irregularis*, *Jalmius soldado*, *Pseudorhombus arsius*, *Mugil cascasia*, *Mugil cephalus*, *Scatophagus argus*, *Dastatis gugei*, *Aspidoparia morar* and *Crossocheilus diplocheilus*.

Amphibians and Reptiles

During the study, two species of amphibian *Rana cyanophlyctis* (Skittering Frog) and *Bufo stomaticus*

(Indus Valley Toad) have been recorded. Nine species of reptiles including two species of turtle *Chelonia mydas* (Green turtle), *Eretmochelys imbricata* (Hawksbill Turtle), five species of lizards *Hemidactylus brooki*, (House Gecko), *Trapelus agilis* (Brilliant Agama), *Acanthodactylua cantrois* (Indian Fringed-toed Lizard), *Varanus griseus* (Desert Monitor), *Crossobamon orientalis* (Sand Sind Gecko), one species of *Crocodylus palustris* (Marsh Crocodile) and one snake species *Echis carinatus* (Saw Scaled Viper) have been observed.

Ecotourism and Hingol National Park

Tourism is a principal export for 83% of developing countries. For the world's poorest countries, tourism is the 2nd most important source of foreign exchange, after oil (Hospodarsky and Lee, 2007). Due to aesthetic venues like mountains, wetlands, river, estuary, sea beach, mud volcano, sand dunes, and cultural attractions, the HN park has the potential to be developed as Eco-tourist Park, and eco-tourism can increase local jobs, income and other benefits for local peoples. The Hingol National Park area also has the Nani Mandar, a popular sacred place for the Hindus.

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