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DISTRIBUTION AND POPULATION STATUS OF PUNJAB URIAL, *OVIS VIGNEI PUNJABIENSIS* (MAMMALIA: BOVIDAE), IN SOAN VALLEY, SALT RANGE, PUNJAB, PAKISTAN

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ABSTRACT

A study on Punjab urial (*Ovis vignei punjabiensis*) was conducted in Soan valley during June 2011 to find out its distribution, population status and potential threats. Five potential sites namely: Dadder, Khabeki, Chambel, Kund and Uchali Forests were selected. The study conducted was based on Sample Count Technique, Line Transects and Point Counts methods as well as discussion with officials of Punjab Wildlife and Parks Department, representatives of local communities and local hunters. The occurrence of urial was confirmed at four out of five study sites. Using 17 transects and eight point surveys, 28% of the total area was sampled and 110 animals were estimated with a population density of 1.39 animals / km^2. Male to female ratio was 1:1 while lamb to adult female ratio was 0.35:1. Questionnaire survey based on interviews of local residents including agriculturists, farmers, shepherds, livestock farmers, wildlife & forest officials, and local hunters was conducted for an assessment of the species occurrence and potential threats to the species. Signs such as fresh tracks, droppings and body parts including hair entangled with bushes, horns and other dead remains of the animal, as a result of natural or accidental deaths, were used as indication of the species presence in the study area. Habitat degradation due to increased developmental activities, poaching of lambs by local hunters, predation of lambs by continuously increasing population of jackals, illegal hunting due to weak enforcement of wildlife laws, intentional forest fire by local people to obtain firewood, food competition with livestock and transmission of various diseases from livestock to urial population were found as main threats to this species.

Key words: Distribution range, population density, Punjab urial, salt range, Soan valley.

INTRODUCTION

In Pakistan, *Ovis vignei* (Urial) is represented by three sub-species; *Ovis vignei blanfordi* (Baluchistan Urial) found in Balochistan and Sindh, *Ovis vignei vignei* (Ladakh Urial) found in Gilgit-Baltistan and Chitral and *Ovis vignei punjabiensis* (Punjab Urial) found in Salt and Kala Chitta Ranges in the Punjab (Aleem, 1977; Roberts, 1997).

Urial prefers to stay close to ridgelines or crests and cliffs and the distance to ridgeline, especially to be an important variable for their escape strategy (Geist, 1971). In Pakistan, it inhabits a wide latitudinal gradient with diverse habitat types ranging from sea level to over 4000 m altitude (Shackleton, 1991). In the Salt Range and lower hill ranges of southern Khyber Pakhtunkhwa, Urial is typically associated with low rounded stony hills dotted with *Olea ferruginea* and *Acacia modesta* (Roberts (1997).

Punjab Urial is distributed between the Indus and Jhelum Rivers from an altitude of 250 to 1500 m primarily in the Kala Chitta and Salt Ranges (Schaller and Mirza, 1974). The habitat type in these areas is dry sub-tropical semi-evergreen scrub forest (Roberts, 1997 and 2005). Dominant plant species include; *Acacia modesta, Olea ferrugenia, Salvadora alights, Zizyphus nummularia, Dodonea viscosa, Prosopis glandulosa, Justicia adhatoda* and *Calotropis procera.* Shrubs are sparse except in a few ravines and on high ridges grasses such as *Cymbopogon jwarancusa, Eleusine compressa, Heteropogon contortus, Aristida adscensionis, Cynodon dactylon and Saccharum spp.* are found (Frisina *et al.*, 2001). Punjab Urial form larger groups in winter than in other seasons. In the winter when forage quality is low, Urial uses more open habitats and may decrease vigilance and increase bite rate by increasing group size (Hoover and Bailey, 1985). Chundawat and Qureshi (1999) suggested that due to persistent threat of hunting, Urial would form cohesive groups that ensure equal safety to all.

Punjab urial is endemic to Pakistan and principal mammalian game species of scrub forest in Salt and Kala Chitta Ranges of the Punjab (Chaudhry *et al*., 1991). It is listed as Endangered by IUCN Red List of Pakistan

Mammals (Sheikh and Molur, 2005), and Vulnerable by IUCN Red List of Threatened Species (IUCN, 2013). The species is also protected under the Punjab Wildlife (Protection, Preservation, Conservation and Management) Act, 1974 (Punjab Wildlife & Parks Department, 2010). It is facing severe hunting and poaching pressure and hence striving for its survival (Awan *et al*., 2006)**.** Apart from its trophy value in sport hunting, it is also traditionally prized as a pet by animal collectors. The ownership of this pet (Urial) is considered as status symbol among some communities in Pakistan (Awan, 2001). Habitat degradation due to construction of roads, dams, towns, cutting of trees for fuel wood and conversion of wild lands into agricultural lands have also increased the threats to the species. Such activities are also supportive to the poachers in having close access to the core habitat of the species (Awan *et al*., 2006).

The present study has determined the distribution and population status of Punjab urial and possible potential threats to the species in Soan valley, district Khushab. The findings are expected to help in formulating management recommendations by wildlife protection and conservation authorities to maintain and enhance the existing Urial population on sustainable basis.

MATERIALS AND METHODS

Study Area: Soan valley (the study area) is situated in Salt Range and surrounded by a number of villages, hamlets, lakes and forests. The area, as a whole is surrounded by the Potohar Plateau in the North, river Jhelum in the East and Southeast, Thal desert in the South and river Indus in the West (Figure 1 & 2). There are five prominent forests in the area namely: Dadder, Khabeki, Chambel, Kund and Uchali Forests and all are located in District Khushab. The terrain in all five forests is typical Potohar shaped with small mountains, nullahs and small valleys. These forests offer ideal habitat to the Punjab urial.

Dadder forest covers an area of 41 km^2 with dominant plant species including *Acacia modesta* and *Olea ferruginea* in nullahs and *Dodonaea viscosa* along the slopes. Khabeki forest covers an area of 20.3 km^2 with *Acacia modesta* and *Olea ferruginea* as dominant trees species. Chambel forest covers an area of 18.21 km^2 with *Acacia modesta*, *Olea ferruginea*, *Zizyphus mauritiana* and *Zizyphus nummularia* as dominant tree species. Among shrubs *Dodonaea viscosa* is the dominant species whereas grasses like *Chrysopogon serrulatus, Digitaria sanguinalis, Arundo donax, Eragrostis funiculata, Dicanthium annulatum, Pennisetum divisum, Cynodon dactylon* and *Panicum sp*. are widely distributed in the whole area. Kund forest covers an area of 13.6 km^2 with *Acacia modesta* and *Olea ferruginea* as dominant tree species found in nullahs whereas *Dodonaea viscosa* is found along the slopes. Uchali forest covers an area of 14.29 km^2 with dominant tree species including *Acacia modesta*, *Olea ferruginea*, *Zizyphus mauritiana* and *Zizyphus nummularia.* Among shrubs *Dodonaea viscosa* is the dominant species.

Methodology: Study was conducted from June 11 to 23, 2011 and field trips for data collection were arranged early in the morning starting at dawn and in the evening about two hours before dusk. Spending two days at each site, the field data was collected twice during two consecutive days at each site.

Urial distribution range: Five study sites were selected based on discussion with officials of Punjab Wildlife and Parks Department, representatives of local communities and local hunters. Signs such as fresh tracks and droppings of the urial and body parts including hair entangled with bushes and horns and other dead remains of the animal as a result of natural or accidental deaths, were used as indication of its presence in the study area. Geographical Coordinates were recorded using GPS receiver at each site where urial existence was confirmed.

Urial population estimation: Six transects each of 3×0.6 km were taken to assess the population of Punjab urial in Dadder Forest. Around 10.8 km^2 (6×3×0.6) area was searched that makes about 26% of the total area with a sample fraction of 0.26. Line transects or strip census technique involves counting the animals seen by an observer while traversing along 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 then is considered to be the number of animals flushed, divided by the area of the strip and multiplied by the total area (Schemnitz, 1980). Line Transect method was applied in Dadder, Khabeki and Chambel forests.

Point Counts are particularly useful in areas of difficult terrain such as hills or swamps, where one cannot easily lay a straight, continuous transect (Brower *et al*., 1990). Point Count is a variation of the Transect Count. Here the observer stands at a fixed point for a specific period and counts all the animals either within a specified circle (fixed radius) or as far as the animal can be seen (open radius). This is actually like a transect count of length zero. Analysis is similar to that of transect count, except that perpendicular distance is replaced by radius and the area becomes $\pi \times r^2$ instead of L × W (length × width) (Rodgers, 1991). The Point Counts Technique was applied in Kund and Uchali Forests because of difficult terrain and hills. Five sites were selected for Point Counts in Kund Forest and three sites in Uchhali Forest.

Laying 17 transects and eight point counts, about 28 % of the total area was sampled to assess the

population of Punjab urial in the study area. The selected sites were observed twice by two teams simultaneously during two consecutive days. The observation time was just after the sunrises; from about 6:00 am to 9:30 am i.e. the grazing time for urial along the hill slopes. The equipments and field kits used during the study included; binoculars (Nikon 7×50), digital camera (Canon EOS 60 D), GPS (Garmin Map 76) and range finder. Population density and sample fraction were calculated by using the formulae;

$$\text{Population Density} = \frac{\text{Animals observed}}{\text{Total area of Study Area Searched}}$$

$$\text{Sample Fraction} = \frac{\text{Total Area of Reserve}}{\text{Total Area of Reserve}}$$

$$P = AZ / 2XY$$

Where;

P = population
A = total area of study
Z = number of animals flushed
Y = average flushing distance
X = length of strip
Area of a circle = π x r^2

Where;

r = radius of the circle
π = 22/7

Assessment of threats: To assess the existing threats to the species in the study area, questionnaire survey was conducted taking interviews of relevant people in the study area. A questionnaire was developed before interviewing different people. Thirty six persons including senior field biologists, local hunters, local agriculturists, farmers, shepherds, livestock farmers and officials of Forests and Wildlife Departments including divisional forest officer, district wildlife officers, forest guards, game inspectors and wildlife watchers were interviewed for the assessment of various threats to the species.

RESULTS

Distribution range: The existence of urial was confirmed in four study sites including Dadder, Khabeki, Kund and Uchali forests but no direct or indirect evidence was found in Chambel forest. Urials were directly observed at two locations in Dadder and Khabeki forests, five locations in Kund forest and at one location in Uchali forest (Table 1; Figures 2 & 6).

Population status: Total urial population in the study area was estimated at 110 animals with population density of 1.39 animals/ km^2 (Table 7).

At Dadder forest, six animals were observed in Transect No. 2 (adult ♂ = 2, sub-adult ♂ = 2, sub-adult ♀ = 2) and three animals in Transect No. 4 (adult ♀ = 1, yearling = 1, lamb = 1) but no direct evidences of urial were found in rest of the four transects (Table 2). A population of 17 animals was calculated with a population density of 0.41 animals per km^2. Male to female ratio was observed as 1:0.75 whereas; adult female to lamb ratio was 1:0.35 (Table 7).

At Khabeki forest, six transects each of 2×0.6 km were taken and about 7.2 km^2 (6×2×0.6) area was searched that makes 35% of the total area and thus, the sample fraction was 0.35. Five animals were observed in Transect No. 1 (adult ♀ = 2, yearling = 2, lamb = 1) and three animals in Transect No. 4 (adult ♂ = 1, sub-adult ♂ = 2) but no direct evidences of urial were found in rests of the four transects (Table 3). A population of 11 animals was estimated in Khabeki forest with a population density of 0.55 animals / km^2. Male to female ratio was observed as 3:2 whereas lamb to adult female ratio was 3:5.

At Kund forest, Point Count technique was applied for urial population estimation. About 4.215 km^2 area was covered using five point counts that make around 31% of the total area (13.60 km^2) with a sample fraction of 0.3. A total of 45 animals were directly observed including 14 males, 19 females and 12 yearlings (Table 4). A population of 73 animals was estimated with a population density of 5.33 animals / km^2. Male to female ratio was observed as 1:1.35 and lamb to adult female ratio was 0.36:1.

In Uchhali forest, Point Counts were made at three locations in the forest and an area of 2.35 km^2 was covered that makes around 16.45% of the total area (14.29 km^2) with a sample fraction of 0.16. Three animals were directly observed all being adult male (Table 5). A population of 9 animals was estimated with a population density of 0.64 animals / km^2. In total, 65 individuals were directly observed (Table 6) with an overall population estimation of 110 animals in all five study sites in Soan valley (Table 7).

THREATS

Habitat degradation: The recent increase in the population of both humans and their livestock has placed immense pressures on wildlife species and their habitats. Similarly, increased developmental activities like construction of roads, dams, military bases, towns and agricultural lands etc. in wild lands have also increased the threats to wildlife species especially by easy human access to the intact Urial habitats. This has consequently made the species more vulnerable to threats of poaching. Collecting fuel wood and intentional forest fires for getting new grasses and vegetation for livestock is a major factor for habitat destruction in the area (Fig 3 & 4).

Poaching of urial lambs: Poaching can accelerate extinction processes particularly when driven by

commercial gain. In the study area, usually the human habitations are adjacent to Urial habitats and poaching of Urial lambs is common in that area. It was revealed while interviewing different local residents that poaching of lambs is the major threat to Urial population and almost 50% lams are collected by poachers within one week of parturition. Poachers use to spot the pregnant females in different nullahs and keep watching them and soon after the parturition, collect the newly born lambs. Almost 90% of such newborn lambs collected by poachers cannot survive in captivity and hence around 45% newborn lambs in the study area are removed from the wild each year. This threat to the Urial can be checked if a strict and effective monitoring could be ensured in the area even just for three months in a year i.e. from March to May which is the lambing season of Urial in the study area.

Predation of urial lambs by jackals: Due to human settlements around Urial habitats and plenty of organic wastes from poultry industry in the study area, a large number of jackals (*Canis aureus*) is found around the study area which has now become a pest species. Jackals not only attack the domestic poultry, sheep and goats but also the newly born Urial lambs during lambing season.

Illegal hunting: Many hunting parties from different areas approach the study area for Urial hunting especially in Daddar and Kund Forests. The Urial is protected in Punjab i.e. its hunting is banned and only a few trophy sized animals are offered annually for legal hunting by the Punjab Wildlife & Parks Department. But, illegal hunting practices are still there and a large number of animals are hunted illegally each year. This situation is also posing a serious threat to the Urial population in the study area.

Weak enforcement of wildlife laws: Uncontrolled illegal Urial hunting despite the existence of strict wildlife laws suggests that either the Punjab Wildlife & Parks Department do not have effective control on the area or some of the members of the department are involved in illegal Urial hunting. Because, a significant number of Urial (adults) are hunted illegally and almost 50% Urial lambs are collected by poachers every year.

Intentional forest fires: The natural predators of Urial like leopards, wolves, jackals etc. do not pose any serious threat to Urial population in its core habitats but the actual threat is the presence of human being in close proximity of Urial habitats. Every year one or the other part of the forest is burnt through intentional forest fires (Figures 3 & 4). Such forest fires are of dual benefit for the local residents as they provide fuel wood as well as promote growth of fresh grasses for their livestock. No action is being taken by the relevant departments to control the situation.

Food competition with livestock: Presence of a huge number of domestic animals including sheep and goats in the study area is also a threat to the endemic Punjab Urial population. These livestock consume much of the available vegetation in the study area thus, posing a tough food competition for the wild animals (Fig. 5). Moreover, in the presence of the shepherds accompanying their livestock, Urial hesitate to graze and browse in the area. Thus, Urial seems to be under certain pressures in its natural habitats.

Transmission of diseases from livestock: Most of the diseases common to livestock in the study area present a potential threat to the Urial population. The livestock owners can treat their animals but no such facility is available for the wild animals. Therefore, the urial are vulnerable to certain common diseases of livestock through the mixing of both livestock and wildlife species in the wildlife habitats.

Table 1. Locations where the urial was directly observed in the study area

Sr. No.	Study site	GPS coordinates
1	Dadder forest	Latitude 32º 40’ 00.9” N Longitude 72º 12’ 36.2” E
2	Dadder forest	Latitude 32º 40’ 47.9” N Longitude 72º 12’ 03.1” E
3	Khabeki forest	Latitude 32º 39’ 41.0” N Longitude 72º 15’ 42.5” E
4	Khabeki forest	Latitude 32º 39’ 34.4” N Longitude 72º 14’ 34.3” E
5	Kund forest	Latitude 32º 27’ 34.2” N Longitude 72º 13’ 18.1” E
6	Kund forest	Latitude 32º 26’ 40.8” N Longitude 72º 14’ 57.0” E
7	Kund forest	Latitude 32º 27’ 53.2” N Longitude 72º 14’ 53.3” E
8	Kund forest	Latitude 32º 27’ 29.7” N Longitude 72º 14’ 35.3” E
9	Kund forest	Latitude 32º 27’ 46.9” N Longitude 72º 16’ 05.0” E
10	Uchali forest	Latitude 32º 31’ 25.4” N Longitude 71º 57’ 00.7” E

Table 2. Number of urial observed in Daddar forest

Transect No.	♂	♀	Young	Total
1	-	-	-	-
2	4	2	-	6
3	-	-	-	-
4	-	1	2	3
5	-	-	-	-
6	-	-	-	-
Total	**4**	**3**	**2**	**9**

Table 3. Number of urial observed in Khabeki forest

Transect No.	Males	Females	Young	Total
1	-	2	3	5
2	-	-	-	-
3	-	-	-	-
4	3	-	-	3
5	-	-	-	-
6	-	-	-	-
Total	**3**	**2**	**3**	**8**

Table 4. Urial observed during Point Counts in Kund forest

Sr. No.	Locality	GPS Coordinates	Male	Female	Young	Total
1	Tamkala More	N 32º 27’ 34.2” E 72º 13’ 18.1”	-	1	2	3
2	Bareela Bun	N 32º 26’ 40.8” E 72º 14’ 57.0”	4	6	3	13
3	Khan Wali Bun	N 32º 27’ 53.2” E 72º 14’ 53.3”	3	5	4	12
4	Chitti Chaaree	N 32º 27’ 29.7” E 72º 14’ 35.3”	2	5	3	10
5	Piru Wali Bun	N 32º 27’ 46.9” E 72º 16’ 05.0”	5	2	-	7
Total			**14**	**19**	**12**	**45**

Table 5. Urial observed during Point Counts in Uchali forest

Sr. No.	Locality	GPS Coordinates	Male	Female	Young	Total
1	Umb Sharif	N 32º 30’ 34.2” E 71º 55’ 54.7”	-	-	-	-
2	Behind Skasar Hills	N 32º 31’ 25.4” E 71º 57’ 00.7”	3	-	-	3
3	Besides Sakaser Hills	N 32º 31’ 39.8” E 71º 57’ 26.6”	-	-	-	-
		Total	**3**	**-**	**-**	**3**

Table 6. Urial observed at five different sites in Soan valley

Sr. No.	Study Site	Sample Fraction	Males Observed	Females Observed	Young / Lambs	Total
1	Dadder Forest	26 %	4	3	2	9
2	Khabeki Forest	35 %	3	2	3	8
3	Chambel forest	33 %	-	-	-	-
4	Kund Forest	30 %	14	19	12	45
5	Uchhali Forest	16 %	**3**	**-**	**-**	**3**
	Total	**28 %**	**24**	**24**	**17**	**65**

Table 7. Population estimates of urial at five sites in Soan valley

Sr. No.	Study Site	Estimated Population	Density per km^2	♂ : ♀ Ratio	Adult : Young Ratio
1	Dadder forest	17.08	0.416	4 : 3 :: 1 : 0.75	7 : 2 :: 1 : 0.28
2	Khabeki forest	11.27	0.55	3 : 2 :: 1 : 0.66	5 : 3 :: 1 : 0.6
3	Chambel forest	-	-	-	-
4	Kund forest	72.59	5.33	14 : 19 :: 1 : 1.35	33 : 12 :: 1 : 0.36
5	Uchali forest	9.1	0.636	**-**	**-**
Overall Population		**110.04**	**1.386**	**24 : 24 :: 1 : 1**	**48 : 17 :: 1 : 0.35**

Figure 1: Location map of the study area

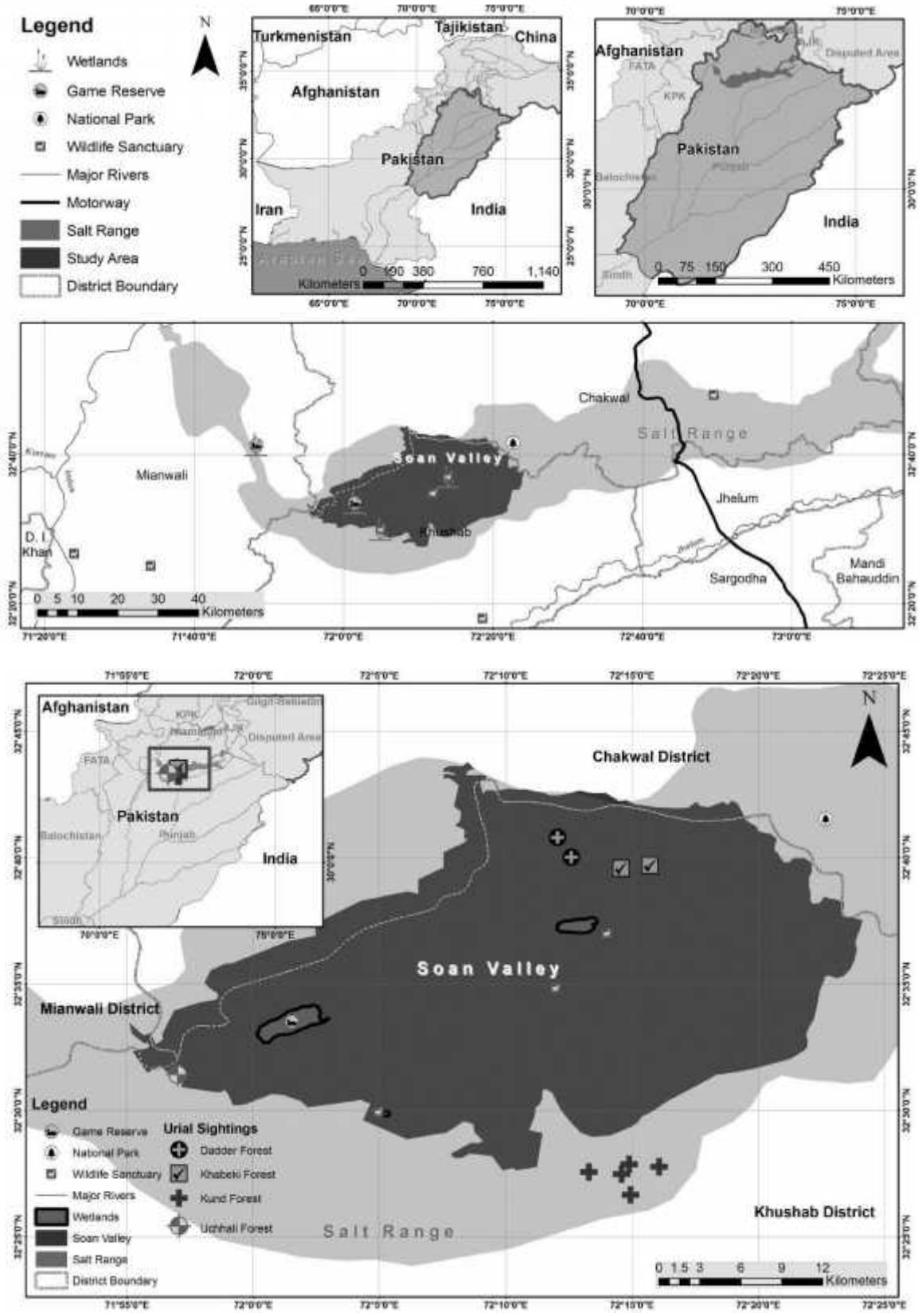

Fig. 3: Tree cutting in Daddar Forest © PWP, WWF Pakistan

Fig. 4: Evidences of forest fire in Daddar Forest © PWP, WWF Pakistan

Fig. 5: Food competition for Urial Khabeki Forest © PWP, WWF Pakistan

Fig. 6: A herd of seven Urial in Kund Forest © PWP, WWF Pakistan

DISCUSSION

Punjab Urial is distributed between the Indus and Jhelum rivers from an altitude of 250 to 1500 m primarily in the Kala Chitta and Salt Ranges (Schaller and Mirza, 1974). It is found in small, fragmented populations throughout Kala Chita and Salt Range (Hess *et al*., 1997). While Roberts (1997) described that Urial is typically associated with low rounded stony hills dotted with *Olea ferruginea* and *Acacia modesta* in the Salt Range. Urial prefers to stay close to ridgelines or crests and cliffs (Geist, 1971) and the distance to ridgeline is an important variable for their escape strategy. Although like other wild sheep Urial use speed to escape predators but on perceiving danger they were seen to escape to the nearest crest or ridgeline, possibly to enable the monitoring of predators from a safer distance and to keep them in sight. However, during the present study, pregnant females showed some different behavior and were found usually in depressions and nullah to avoid predators and poachers.

It is documented that the peak parturition occurs during the first half of April (Awan, 2001). Awan and Festa-Bianchet (2006) stated that Lambs may die from many causes including a variety of potential predators like jackals. Killing of lambs by jackals also affect the urial population (Aleem 1977; Schaller 1977). The findings of the present study also confirm the predation of urial lambs by jackals. Another factor is accumulation of plenty of organic wastes due to rapidly growing poultry industry in the study area that also attracts large number of jackals. Jackals, being pest species in the area, not only attack the domestic poultry, sheep and goats but also to newly born Urial lambs during lambing season.

Urial population is facing number of other threats and the most serious one is lamb poaching. Keeping urial as pet is considered as status symbol in the region (Awan, 2001). Findings of the present study revealed that illegal hunting and poaching of urial lambs is still in practice and around 50% newborns are removed from the wild each year. Various policies, Acts and laws exist in the country to save wildlife well summarized by Shafiq (1998). For the conservation of Punjab urial, five Wildlife Sanctuaries, one National park and two game reserves have been established in its distribution range in Punjab (Awan, 2006). For the effective implementation of the existing wildlife rules & regulation, there are penalties including imprisonment and fine for the hunters and poachers who violate the rules by illegal hunting, disturb the natural habitat of urial and capture urial lambs. But despite the existence of strict wildlife legislation, continuous practices of hunting, poaching and trading of urial lambs suggests that either the Punjab Wildlife & Parks Department do not have effective control on the area or some of the members of the department are involved in illegal Urial hunting.

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