

DOES TROPHY HUNTING OF KASHMIR MARKHOR REALLY CONTRIBUTING IN ITS CONSERVATION?

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Abstract

Markhor Capra falconeri, the national animal of Pakistan, is globally recognized as endangered. The current study was conducted to find the population size, structure and the contribution of trophy hunting in conservation and development of Kashmir Markhor (Capra falconeri cashmiriensis) in Kiagah valley Kohistan. Point count method was used to collect data during February 2016 and 2018. The population recorded was 213 and 291 individuals in 2016 and 2018 respectively. Out of 213 individuals, 12 were adult male, 57 were female, while Young males (between age of 3 to 7 years) were 28, Yearlings (both male and female between 1 to 3 year) were 59, Kids (less than 1 year) were 33 and 40 were unknown (Markhor could not be classified by age and sex). The total density/Km² area in 2016 was 4.438 individuals/km² and average sex and age wise ratios; male to female ratio (M: F**) was 1:4.75 and kids to female (K*****: F**) ratio was 1:1.727. While out of 291 individuals, 19 were adult male, 95 were female, while Yong males (between age of 3 to 7 years) were 51, Yearlings (both male and female between 1 to 3 year) were 64, kids (less than 1 year) were 50 and 12 were unknown (Markhor could not be classified by age and sex) individuals. The total density/Km² area in 2018 was 6.063 individuals/km² and Average sex and age wise ratios; male to female ratio (M*: F**) was 1:5 and kids to female (K*****: F**) ratio was 1:1.9. Study concluded that community-based trophy hunting program has helped much in improving the conservation and management of Markhor.*

Keywords: Markhor; Population size; Trophy; Vantage point; Kiagah valley

Introduction

Markhor Capra falconeri is distributed in Pakistan, India, and Afghanistan in South Asia to Turkmenistan, Tajikistan, Russia and Uzbekistan in Central Asia [1, 2]. The *Markhor* population mostly distributed in Pakistan from the mountains of Baluchistan North to Khyber Pakhtunkhwa and the Northern areas [3-5]. Markhor are divided into two categories: flare-horned *Markhor (Capra falconeri falconeri)* and straight-horned *Markhor (Capra falconeri megaceros)*. Flare-horned *Markhor* includes two sub-species: Pir Panjal or Kashmir *Markhor Capra falconeri cashmiriensis* and Astore *Markhor Capra falconeri falconeri*; straight-horned *Markhor* also includes two sub-species: Kabul *Markhor Capra falconeri megaceros* and straight-horned or Suleiman *Markhor Capra falconeri jerdoni*. The Chiltan *Markhor Capra falconeri chialanensis* has been categorized as Chiltan Wild Goat

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Capra aegagrus [3, 4]. Zoological diversity in Pakistan is benefited due to Huge Mountains, snow covered peaks and hills, ravines, different range valleys and streams with dry alpine scrub vegetation represents a predominantly cold arid and mountainous climate. Globally Markhor is considered to be “Near Threatened” [6] and categorized by CITES in appendix I [7]. The world’s largest population of Markhor is present in Pakistan [4, 8]. Markhor is mostly found in arid mountain ranges, above the tree line of higher rainy cold regions in Himalayas, Karakoram and Hindukush [8, 9]. Markhor is a social animal and prefers to live a gregarious life in herds. In the herds females, kids and yearlings are present. Mature males prefer solitary life and only become part of herds during rut season (late December to late February) [10]. They mostly browse/graze early in the morning (before sun rise) and late in the evening (around sunset). They can feed throughout the day irregularly during winter [3]. It can be seen climbing onto oak and wild olive trees to browse on its leaves mostly during winter, when the ground is either covered with snow or dry of vegetation due to severe cold [1]. Population density of Markhor in winter increases from high altitudes towards low altitudes of mountains region due to reduction of snow level and temperature [11].

Trophy Hunting

Trophy hunting is a type of sport that has been practiced perhaps as long as human started hunting. Ungulate males are mostly hunted due to their large ornamental parts or weapons such as horns, antlers and tusks, used for display. Ungulates are polygamous, and additionally, seeking the largest individual in a taxon hunting [12, 13]. As a consequence of polygyny, removing some males from a population does not necessarily affect the reproductive capacity (growth rate) of the population [12]. The critical aspect, regardless of population size, is to ensure that sufficient mature males are left for normal reproduction rates to be achieved and that the long-term survival of the population is not jeopardized [14]. Trophy hunting is sustainable and fully supports the conservation and minimizes the risk for the population, if well managed [15-17]. In 1973 Markhor was a place in appendix II of CITES then in 1992 it is shifted to appendix [18], due to legal hunting the population subsequently increased worldwide finally in 1997 the Pakistan taken the permit of 6 trophies export in a year, now this permit increased and annually Pakistan exporting 12 trophies. Weakly regulated, hunting must be damaging the target population, which will lead to population decline [19]. In 1983 the Wildlife Department of Khyber Pakhtunkhwa (KP) started Conservation Hunting Programme of Markhor but trophy hunting was not community based, Income generated from trophy hunted was totally deposited in government treasury hence could not continue for long (Khyber Pakhtunkhwa Wildlife Department record 1983 to 1992). In 1998 hunting was again resumed with true community participation in KP. Kiagah valley Kohistan also included and taken 1 permit of trophy in 2005 and a separate Conservation Plan was prepared with the help of WWF Pakistan.

Objectives of research were to find out current population, estimate age and sex ratios of Markhor and document the contribution of trophy hunting for the conservation and development of Markhor in Kiagah valley.

Materials and Methods

Study Area

The current study was conducted in Kohistan, located in the extreme north of Khyber Pakhtunkhwa province occupying an area of 7,492 square kilometers. Geographically, it is contiguous with Azad Kashmir in the east, district Swat in the West, Chilas (Gilgit Baltistan) at north and at south attached with Battagram and Shangla. The District lies between 34°-54° and 35°-52° North latitudes and 72°43′ and 73°57′ East longitudes. District Kohistan is a

Biodiversity hotspot: world’s largest population of Western Horned Tragopan occurs in Pallas valley of Kohistan, besides other species of conservation concern. The intensive study area Kiagah valley lies on left site of Indus River in district Kohistan covering an area of 48km², with the population of 470 persons living in 54 households (Fig. 1).

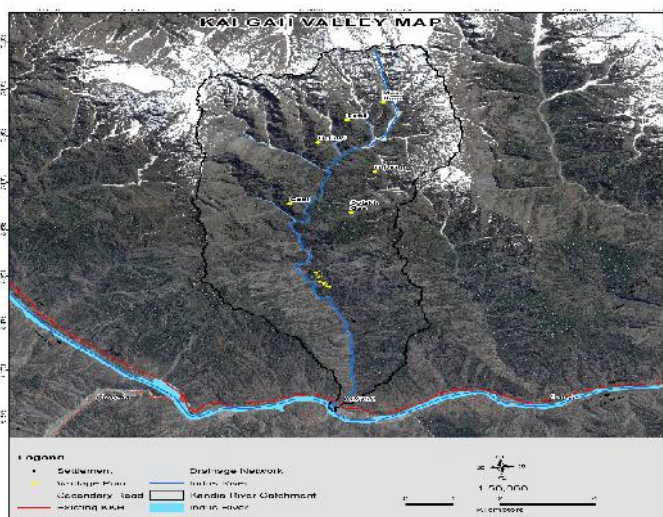


Fig. 1. Map of Kiagah valley (game reserve) Dasso Kohistan, KP Pakistan

Methodology

The survey was conducted in the month of February 2016 and two years later again conducted in the month of February 2018 with the help of 5 community watchers and local experts. The methodology used to record the population was Vantage count method or point count method. Six equally spaced vantage points were selected at peak of mountains to achieve maximum visibility. Vantage points were selected through previous survey reports of KP wildlife department, visual suitability of habitat and must accessible from camping site. The timing of observation was arranged to reduce the chance of intermixing or duplication of individual. Each day only one point was observed in dusk and dawn and finally, one day a special survey was arranged in all the six vantage points simultaneously. From all vantage points recorded various parameters such as population size of Markhor, sex differentiation, slopes, habitat type and elevation.



Fig. 2. Pictures of trophy taken during the year 2018 and 2016.

Results

Total of 363 individuals of Markhor were recorded throughout the valley. The animals were classified into five categories; (i) The adult male which have trophy and age more than 7 year (M*), (ii) the females above three years (F**), (iii) males between 3 – 7 years (YM***), (iv) yearlings (both male and female between 1 – 3 years) (Y****), (v) kids (below one year) (K*****) counted separately (Table 1).

Table 1. Vantage points wise Markhor Population, Density/km² estimated in Feb 2016

| Sr# | Vantage Point | GPS | Elevation (m) | M* | F* | YM** | Y*** | K**** | UK***** | Total | Density /km ² |
|-------|---------------|--------------------------------|---------------|----|----|------|------|-------|---------|-------|--------------------------|
| 1 | Main dara | 35°24'38.75"N 73°15'57.46"E | 2099 | 0 | 8 | 2 | 10 | 3 | 2 | 25 | 3.125 |
| 2 | Sattil | 35°24'47.81"N 73°17'43.71"E | 2498 | 2 | 11 | 3 | 18 | 6 | 4 | 44 | 5.5 |
| 3 | Dozkho | 35°23'53.02"N 73°18'44.19"E | 2670 | 1 | 10 | 7 | 12 | 4 | 3 | 37 | 4.625 |
| 4 | Dadayi | 35°22'48.01"N 73°18'39.89"E | 2842 | 3 | 7 | 6 | 9 | 11 | 6 | 42 | 5.25 |
| 5 | Solakh gaa | 35°23'5.54"N 73°17'10.58"E | 3009 | 2 | 12 | 4 | 6 | 7 | 9 | 40 | 5 |
| 6 | Gotii | 35°23'3.00"N 73°16'22.05"E | 3201 | 4 | 9 | 6 | 4 | 2 | 0 | 25 | 3.125 |
| Total | | | | 12 | 57 | 28 | 59 | 33 | 24 | 213 | 4.438 |

In 2016 vantage point (Table 2) *Main dara*, total population of Markhor recorded were 25, among them adult males were 0, females 8, male between 3-7 years were 2, yearlings between 1-3 years were 20, kids below one year were 3 and unknown recorded were 2 respectively. In 2018 the same vantage point has total population recorded were 44, among them adult male, female, male between 3-7 years, yearlings, kids and unknown were 1, 11, 4, 13, 12 and 3 respectively.

Table 2. Vantage points wise Markhor Population, Density/km² estimated in February 2018.

| S.NO | Vantage Point | M* | F** | YM*** | Y**** | K***** | UK***** | Total | Density /km ² |
|-------|---------------|----|-----|-------|-------|--------|---------|-------|--------------------------|
| 1 | Main dara | 1 | 11 | 4 | 13 | 12 | 3 | 44 | 5.5 |
| 2 | Sattil | 3 | 18 | 10 | 9 | 10 | 2 | 52 | 6.5 |
| 3 | Dozkho | 0 | 13 | 5 | 8 | 6 | 0 | 32 | 4 |
| 4 | Dadayi | 4 | 17 | 9 | 10 | 10 | 2 | 52 | 6.5 |
| 5 | Solakh gaa | 5 | 19 | 12 | 18 | 6 | 1 | 61 | 7.875 |
| 6 | Gotii | 6 | 17 | 11 | 6 | 6 | 4 | 50 | 6.25 |
| Total | | 19 | 95 | 51 | 64 | 50 | 12 | 291 | 6.063 |

In 2016 Vantage point *Sattil*, total recorded population of *Markhor* was 44. Among them adult males were 2, females 11, male between 3-7 years 3, yearlings between 1-3 years were 18, kids below one year 6 and unknown were 4 recorded respectively. In 2018 the same vantage point has total population recorded were 52, among them adult male, female, male between 3-7 years, yearlings, kids and unknown were 3, 18, 10, 9, 10 and 2 respectively.

In 2016 Vantage point *Dozkho*, total recorded population of *Markhor* were 37, among them adult males were 1, females 10, male above three years and below seven years 7, yearlings above one year and below three years 12, kids below one year were 4 and unknown were 3 recorded respectively. In 2018 the same vantage point has total population recorded were 32, among them adult male, female, male between 3-7 years, yearlings, kids and unknown were 0, 13, 5, 8, 6 and 0 respectively.

Total population recorded from Vantage point *Dadayi*, was 42. Among them adult males were 3, females 7, male between 3-7 years were 6, yearlings between 1-3 years were 9, kids below one-year were 11 and unknown were 6 recorded respectively. In 2018 the same vantage point has total population recorded were 52, among them adult male, female, male between 3-7 years, yearlings, kids and unknown were 4, 17, 9, 10, 10 and 2 respectively.

In Vantage point *Solakh Gaa*, total population of Markhor recorded was 40. Among them adult males were 2, females 12, male between 3-7 years 4, yearlings between 1-3 years were 6, kids below one year 7 and unknown 9. In 2018 the same vantage point has total population recorded were 61, among them adult male, female, male between 3-7 years, yearlings, kids and unknown were 5, 19, 12, 18, 6 and 1 respectively.

In Vantage point *Gotti*, total population of Markhor recorded was 25. Among them adult males were 4, females 9, male between 3-7 years were 6, yearlings between 1-3 years were 4, kids below one year 2 and unknown 0. In 2018 the same vantage point has total population recorded were 50, among them adult male, female, male between 3-7 years, yearlings, kids and unknown were 6, 17, 11, 6, 6 and 4 respectively (Table 3).

Table 3. Vantage point wise and total Male (M*) female (F**) ratio and Kids (K*****) female (F**) ratio Of year 2016 and 2018.

| S.NO | Vantage Point | GPS | Elevation (m) | 2016 | | 2018 | |
|--------------|---------------|--------------------------------|---------------|---------------|----------------|------------|--------------|
| | | | | M*: F** | K*****: F** | M*: F** | K*****: F** |
| 1 | Main dara | 35°24'38.75"N 73°15'57.46"E | 2099 | 0:8 | 1:2.67 | 1:11 | 1:0.92 |
| 2 | Sattil | 35°24'47.81"N 73°17'43.71"E | 2498 | 1:5.5 | 1:1.83 | 1:6 | 1:1.8 |
| 3 | Dozkho | 35°23'53.02"N 73°18'44.19"E | 2670 | 1:10 | 1:2.5 | 0:13 | 1:2.17 |
| 4 | Dadayi | 35°22'48.01"N 73°18'39.89"E | 2842 | 1:2.33 | 1.57:1 | 1:4.25 | 1:1.7 |
| 5 | Solakh gaa | 35°23'5.54"N 73°17'10.58"E | 3009 | 1:6 | 1:1.71 | 1:3.8 | 1:3.16 |
| 6 | Gotii | 35°23'3.00"N 73°16'22.05"E | 2099 | 1:2.25 | 1:4.5 | 1:2.34 | 1:2.84 |
| Total | | | | 1:4.75 | 1:1.727 | 1:5 | 1:1.9 |

In 2016, the lowest density/km² recorded from vantage point *Main dara* was 3.125 and highest density/km² recorded from *Sattil* which was 5.5 and total density/whole area recorded was 4.438. In 2018 the lowest density recorded from *Dozkho* was 4 and highest density/km² recorded from *Solakh Gaa* was 7.875.

From the recorded population of 2016 and 2018 the ratios are also analyzed. In 2016 the total ratio of adult male to female were 1:4.75 and total kids to female ratio were 1:1.727. In 2018 the total male to female ratio was 1:5 and total kids to female ratio were 1:1.9.

The trophy hunting program was properly started in Kiagah Valley from 2005. To monitor/evaluate benefits of Trophy hunting and its contribution towards conservation, data and information were collected from the literature, secondary information and from field work. Data on Trophy hunting were also gathered from KP Wildlife Department and community of Kiagah valley, Kohistan. The method which was commonly used by wildlife department in their surveys was general counting method.

At the beginning of trophy hunting program March 2005 total 74 Markhor were recorded, out of 74 only 5 trophy size Markhor were observed. In March again population counted and recorded total 138 individuals among them 9 trophy size *Markhor* were observed. In December 2015 wildlife department again counted the Markhor at the valley, the total recorded population were 224 out of 224, 13 *Markhor* were trophy size. In December 2016 the total recorded population of *Markhor* were 173, among these 11 were trophy size Markhor. Finally, again the general counting method used by wildlife department in the whole valley and

recorded the total population of 360 individuals, out of 360, 23 were trophy size *Markhor* (Table 4).

Table 4. Markhor population size recoded by KPK wildlife department (Kohistan) at Kiagah valley since 2005, 2012, 2015, 2016 and 2018.

| S.NO | Year | M* | F** | YM*** | Y**** | K***** | UK***** | Total |
|------|--------|----|-----|-------|-------|--------|---------|-------|
| 1 | Mar-05 | 5 | 22 | 11 | 18 | 16 | 2 | 74 |
| 2 | Mar-12 | 9 | 28 | 34 | 37 | 21 | 7 | 138 |
| 3 | Dec-15 | 13 | 75 | 42 | 43 | 51 | 0 | 224 |
| 4 | Dec-16 | 11 | 40 | 60 | 29 | 33 | 0 | 173 |
| 5 | Jan-18 | 23 | 138 | 68 | 51 | 80 | 0 | 360 |

Discussion

The world's largest population of *Markhor* is present in Pakistan [4, 8]. The *Markhor* population mostly distributed in Pakistan from the mountain of Baluchistan north to Khyber Pakhtunkhwa and the northern areas of Pakistan [3-5]. From the previous literature and the current study, it's obvious that the population of *Markhor* mostly distributed in the northern areas of Khyber Pakhtunkhwa and Pakistan. *Markhor* is mostly found in arid mountain ranges, above the tree line of higher rainy cold regions in Himalayas, Karakoram and Hindukush [8, 9]. In the valley the *Markhor* mostly observed and recorded in open area between trees and above tree line and preferred mostly arid and steep zones of mountain. Flare-horned *Markhor* includes two sub-species: Pir Panjal or Kashmir *Markhor Capra falconeri cashmiriensis* and Astore *Markhor Capra falconeri falconeri* [3, 4]. In Kiagah valley the most abundantly population recorded were Kashmir *Markhor* but some time Astore *Markhor* are also recorded in the Valley. *Markhor* is a social animal and prefers to live a gregarious life in herds. In the herds females, kids and yearlings are present. Mature males prefer solitary life and only become part of herds during rut season (late December to late February) [10]. The population of *Markhor* recorded in the valley mostly in herds which includes females, yearlings and kids but some sometime the adult male also seen with herds during rut season. Population density of *Markhor* in winter increases from high altitudes towards low altitudes of mountains region due to reduction of snow level and temperature [11]. In 2016 Maximum population of females, yearlings and kids were recorded at lower altitudes of the valley, due to harsh and cold environmental condition during the study. These lower elevations have the temperature is moderate and vegetation cover is better than other higher altitude having temperatures are severe due to heavy snowfall and vegetation cover is scanty. Trophy males are normally distributed at higher elevations because they have thick coats and are most sensitive to human interaction. In 2018 the condition was opposite and environment was clear and pleasant, so the distribution was also opposite to that of 2016 distribution pattern. The current investigation also revealed that the population is distributed throughout the Valley for their nutritional requirement. Large individuals are feeding in high altitude and hard zone and smaller are feed at low altitude. They mostly browse/graze early in the morning (before sun rise) and late in the evening (around sunset). They can feed throughout the day irregularly during winter [3]. The population also recorded in dawn and dusk due high accuracy and abundance of *Markhor* in the grazing land and it also noticed that *Markhor* climbing onto oak and wild olive trees to browse on its leaves mostly in harsh condition when the ground is either covered with snow or dry of vegetation due to severe cold. Male population was less than that female population in each Vantage point, in Kiagah valley while yearlings and kid's population was increasing, the Male and female ratio were 1:5 analyzed in the valley. Trophy hunting is sustainable and fully supports the conservation and minimizes the risk for the population, if well managed [15-

17]. In 1973 Markhor was placed in appendix II of CITES then in 1992 it is shifted to appendix I [18]. In Kiagah valley the population of Markhor is higher than that of other valleys having the same climate and habitats because the Kiagah valley has strict community conservation rules which are in favor of population density, while other neighboring valleys had no community conservation programs. Consequently, illegal hunting and human interference which directly affects and huge decrease the population size of Markhor. Apparently, number of trophy sized animals increasing due to high economic value from trophy hunting programs of the species by local community. At the time of beginning of Kiagah conservation community programme, the population of Markhor was negligible, but with the passage of time population of Markhor increased, according to the data collected by K-P Wildlife department in 1993, the population of Markhor was merely 275 animals throughout the province However, that number is currently over 3,500 (Safdar Ali Shah, Chief Conservator of Wildlife **2015**).

Conclusions

It is concluded from this study that Markhor population size increased in Kiagah Valley Kohistan due to better community management program and protection. It can also be concluded that Trophy hunting with strict management is beneficial for conservation of Markhor.

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