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ECONOMICALLY IMPORTANT BIRD: CHUKAR PARTRIDGE (ALECTORIS CHUKAR) SPATIAL DISTRIBUTION, BREEDING ECOLOGY, AND RISKS TO ITS POPULATION IN DIR LOWER, PAKISTAN

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Article Info

Abstract
The Alectoris chukor is a widely occurring game bird and inhabits green bushy areas at high altitudes for nesting. Due to extensive hunting, this amazing creature is threatened, which may lead to it becoming an endangered species in the future. The current study aimed to evaluate the spatial distribution and breeding ecology of A. Chukor and the associated risks to its population in different regions of Dir Lower. The data was collected in terms of the number of calls, clutch size, hatching success, total calls, and field setting in two consecutive visits to the field each month. From the result, it is indicated that the highest total calls (72 calls) were observed at Lalqila, and hatching success was 90%. Similarly, the highest clutch size was 116 in the Timer Gara region of the study area. And highest. The highest calling frequency was observed during February to April. Similarly, a higher number of calls was also observed during June to July. The risk to the concerned bird population was investigated through a survey questionnaire from the local people of the study area. Most of the people showed that habitat destruction and illegal hunting are the main risks to the bird population in the study area. Among the risks, food scarcity was found to be a major risk for the birds concerned. Wildlife birds such as chukar play a vital role in controlling pest populations; however, the extensive hunting of birds may lead to extinction. It is therefore recommended that the wildlife department act against these harmful activities to conserve the bird population in the study area.

Keywords:
Alectoris chukor, game bird, breeding, ecology, Lower Dir.

1. Introduction

The Chukar or Chukar Partridge (Alectoris chukar) is a broad and commonly a hunting bird that belongs to the Phasianidae family (Mahmood et al., 2019. The bird order Galliformes includes 81 genera and more than 280 game bird species. The A. chukar is also from Galliformes, family Phasianidae, subfamily Phasianinae and tribe Perdicini. The genus Alectoris contains 7 species and 24 subspecies worldwide (Kendall et al., 1996). Chukor is indeed very adaptable in Pakistan to all types of arid, rocky and hilly regions rising to the higher mountainous areas of the southern Himalayan ranges. It is found in the range of Khirthar in Sindh, the range of Salt between Sakesar and popular in the forest reserves of Chinji and the Margalla Hills in Punjab. It occurs in the upper Swat and Indus Kohistan regions and Baluchistan. In the Kurram area and Waziristan, it is nevertheless prevalent. It can also be seen in certain regions of Chitral in late spring (Roberts, 1991; Mahmood et al., 2019). It is reported that Chukor Partridge needs extensive management and care when they breed in severe conditions (Turan, 1990; Woodard et al., 1993; Yilmaz & Tepeli, 2009; Ahmad et al., 2017). Due to the remote and practically required landscape specifications, the Chukar partridge is largely untouched by hunting or habitat degradation. Its annual numbers are influenced significantly by climatic conditions throughout its mating season (Duarte & Vargas, 2004; Ahmad et al., 2017).

Summer is the breeding season of the Chukar partridge. At its age of nine or ten months, breeding age. From April to May, the breeding season begins with a clutch size of 8 to 24 eggs and an incubation time of 22 to 24 days. The male bird can also perform a high stage straight walk when making a special call. In approval, the female bird can then take cover, and the male climbs to copulate while holding the female's neck (Finn & Frank, 1915; Baker & Stuart, 1922; Whistler & Hugh1949; Ali & Ripley, 2001). The Chukor bird eats a wide range of seeds and insects on the ground and is diurnal (Christensen, 1954). The male bird takes the food, displaying courtship feeding, where the female bird may chase to pick in response to head lowered wings and fluffed neck (Johnsgard, 1973; Oates, 1980). The chukor bird population has rapidly decreased in the Malakand division (Ahmad et al., 2017). The main factors contributing to the decline in bird population could be due to interspecific interaction, shortage of food supply, pollution and climatic changes (Kushlan, 1993; Hetrick & Sieving, 2012). Some factors minimizing risks to bird population are threat diagnosis and further critical aspects lessening risks in the concerned community (Amano et al., 2010), soon, long-term unfavourable weather conditions (Yasue & Dearden, 2006), an increasing number of predatory species will be a serious threat for bird’s population decline (Birdlife international, 2004). The ultimate consequences will lead to ecosystem disturbances such as increased population, etc. (Luck et al., 2003). The present study aimed to investigate the population and sex ratio, the breeding ecology, clutch size, calling frequency and risk factors responsible for the Chukor partridge (Alectoris chukar) population decline in three regions of Lower Dir District of Khyber Pakhtunkhwa.

Materials and methods

Study Area

The present study was conducted in three tehsils of District Lower Dir, named Tehsil Timer Gara, Tehsil Balambat, and Tehsil Lal Qala. District Dir lower lies in the “Hindukush” range between 35° 10 to 35° 16 N Latitude and 71° 50 to 71° 83 E Longitudes. It is situated between Chitral and Peshawar, along the Afghanistan border, with a total area of 1,582 km2.

The study was conducted in six months from February to July 2020. Each month, two visits were arranged to each sampling site a structured questionnaire was used for the data collection from local people of the area.

Number of calling frequency

The Calling frequency was obtained through the following equation of Mahmood et al. (2017).

$$Calling\ frequancy\ = \frac{Total\ number\ of\ calls}{total\ number\ of\ observation}$$

Statistical analysis

The data collected during the current research was analysed using Microsoft Excel.

Result and Discussion

During the current study, calling frequency, number of calls, field settings and hatching success were recorded in three tehsils of Dir Lower. During the first and second visits to Tehsil Lal Qila, the highest total calls (17 calls) were observed at the Union Council Zimdara region and, similarly, during the second visit (15 calls) at the same position. In contrast, the lowest total calls were 9 in the Hayaseri and Gal regions. The total calling frequencies during both visits were 12.7 and 11.5, respectively, and the highest hatching success was 88.2 % (Table 1). The maximum number of calls was recorded in March and April, which is their suitable breeding season. The higher calls were observed when two male birds came in contact, an intraspecific competition. A similar observation was reflected in a study by Williams and Allen (1965). Similarly, during the current study, the higher number of total calls was 13 and 12 in the region of Balambat. The higher number of calls was observed in March and April at all visited sites of the Balambat region of the study area, while the high hatching success was recorded as 77.8 % (Table 2). Similarly, during the first and second visits to the Timergara site of the study area, a higher number of calls (15) were observed at the Timergara and Bandagay regions. At the same time, the high hatching success was recorded as 90 %. A total of 72 calls on the first visit and 63 calls during the second visit were recorded here, the highest number of calls (17) recorded in June (Table 3). The hatching success of 90 % recorded in this study is higher than previously observed by Khan (2010), which was 44 % and Panek (2005), which was 29-49%. Nevertheless, this was higher, as stated by Hussain et al. (2012), which was 76.19% success.

Table 1. Calling frequency of Alectoris Chukor at Tehsil Lal Qila visit 1st and 2nd.

Visit 1st										
Site	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Total calls**	**Calling frequency**	**Field setting**	**Hatching success**
Uc Besh gram	3	3	4	3	1	0	14	2.3	8	77.8
Uc Gal Madian	1	4	3	2	0	2	12	2	6	80.0
Uc Hayaseri	3	3	1	1	1	1	10	1.7	10	90.9
Uc Kotkay	2	1	1	0	2	3	9	1.5	12	87.5
Uc Lalqila	4	3	3	1	1	2	14	2.3	8	71.4
Uc Zim Dara	2	3	3	3	3	3	17	2.8	10	83.3
Total	15	17	15	10	8	11	76	12.7		
Mean	2.5	2.8	2.5	1.7	1.3	1.8				

Visit 2nd										
Uc Besh gram	2	4	3	2	1	0	12	2	8	77.8
Uc Gal Madian	2	3	2	1	0	1	9	1.5	6	80.0
Uc Hayaseri	2	3	1	2	2	1	11	1.8	10	90.9
Uc Kotkay	3	2	2	0	1	2	10	1.7	12	87.5
Uc Lalqila	3	4	2	0	1	2	12	2	8	71.4
Uc Zim Dara	3	2	4	2	2	2	15	2.5	10	83.3
Total	15	18	14	7	7	8	69	11.5		
Mean	2.5	3	2.3	1.2	1.2	1.3				

Table 2. Calling frequency of Alectoris chukor at Tehsil Balambat visit 1st and 2nd

Visit 1st										
Site	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Total calls**	**Calling frequency**	**Field setting**	**Hatching success**
Uc Balambat	2	2	2	2	2	2	12	2	12	90
Uc Koto	1	0	2	2	2	2	9	1.5	10	77.8
Uc Odigram	0	2	3	1	3	1	10	1.7	8	88.9
Uc Rabat	2	2	2	0	2	3	11	1.8	6	87.5
Uc Munjae	2	2	1	2	1	2	10	1.7	10	66.7
Uc Lajbook	1	0	1	3	0	1	6	1	8	90.9
Total	8	8	11	10	10	11	58	9.7		
Mean	1.3	1.3	1.8	1.7	1.7	1.8				
Visit 2nd										
Uc Balambat	2	2	2	2	3	2	13	2.2	10	88.9
Uc Koto	1	1	2	2	2	1	9	1.5	12	80
Uc Odigram	3	2	1	1	1	2	10	1.7	12	81.8
Uc Rabat	2	2	2	0	0	0	6	1	16	77.8
Uc Munjae	0	3	2	2	2	2	11	1.8	10	70
Uc Lajbook	1	1	2	3	2	1	10	1.7	14	88.9

Total	9	11	11	10	10	8	59	9.8		
Mean	1.5	1.8	1.8	1.7	1.7	1.3				

Table 3. Calling frequency of Alectoris chukar at Timer Gara visit 1st and 2nd.

Visit 1st										
Site	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Total calls**	**Calling frequency**	**Field setting**	**Hatching success**
UC Bagh Dushkhail	2	2	2	2	2	2	12	2	12	90
UC Bandagyi	2	3	2	2	3	3	15	2.5	10	77.8
UC Khongy	4	1	2	1	3	2	13	2.2	8	88.9
UC Timer Gara Urban	2	2	3	3	4	1	15	2.5	6	87.5
UC Noora Khail	1	1	1	1	3	0	7	1.2	10	66.7
UC Shahi Khail	0	2	2	2	2	2	10	1.7	8	90.9
Total	11	11	12	11	17	10	72	12		
Mean	1.8	1.8	2	1.8	2.8	1.7				
Visit 2nd										
UC Bagh Dushkhail	2	2	2	3	2	1	12	2	10	88.9
UC Bandagyi Talash	2	2	3	2	2	3	14	2.3	12	80
UC Khongy	3	3	1	0	3	2	12	2	12	81.8
UC Timer Gara Urban	1	3	0	1	2	0	7	1.2	16	77.8
UC Noora Khail	1	2	2	3	0	2	10	1.7	10	70
UC Shahi Khail	2	1	1	2	1	1	8	1.3	14	88.9
Total	11	13	9	11	10	9	63	10.5		
Mean	1.8	2.2	1.5	1.8	1.7	1.5				

The number of calls used in different population studies of birds (Abbasi & Khan, 2004; Mahmood et al., 2010; Khan, 2010; Hussain et al., 2012) to meet such an accurate population figure. In the spring season,

call counts were regarded as more accurate signs to record the breeding pairs/birds in the grey partridge population (Weigand, 1977), even though these forecasts for other phases that year were not considered reliable. The practice of tracking the birds via calling is strongly affected by weather patterns, climates, landscape and food insecurity factors. The practice of tracking the birds via calling is strongly affected by weather patterns, climates, landscape and food insecurity factors; such issues were discussed in the calling counts method as revealed to game birds previously (Abbasi and Khan, 2004). Calling counts represent the number of calling birds and thus show the volume of calling male birds (Nijman, 1998; Winarni et al., 2009) or a bird's group from a specific bird group (Panek, 2005; Bealey et al., 2006).

The highest number of hatched eggs (94) was found in the Timergara region of the study area (Table 4), while the lowest number of hatched eggs (68) was found in the Balambat region of the study area (Table 5). Similarly, the higher number of unhatched eggs was 22, and the lower number was 18. The total higher clutch size (116) was found in the Timergara region of the study area (Table 4). At the same time, the lower clutch size (90) was found in the Lal Qila region of the study area (Table 5). The higher numbers (18) for observed nests were found at the Lal Qila, and the lower number (9) was found at the Timergara region. Most of the nests were found in green shrubby areas. This indicates that A. chukor prefers rocks with large surfaces surrounded by green shrubs (Liao et al., 2007). The clutch size recorded in the present study was comparable with studies of 4 to 10 eggs Baker, 1921), 8 to 10 eggs Clark, 1901), 6 to 8 Sharma, 1983), and 2 to 13 eggs Khan, 2010). The current research found that in the study region, higher reproduction success could be due to higher mean annual precipitation. Chukor is predominantly associated in the study area with native forests around native forests for breeding. Thus, further, by enhancing the natural forest area in its habitat, its population can be sustained.

Table 4. Spatial position and Hatching Successes of Alectoris chukar at Tehsil Timer Gara, visit 1st and 2nd.

Visit 1st				
Sites	**Nest number**	**Clutch size**	**Eggs hatched**	**Unhatched Eggs**
UC Bagh	4	20	18	2
UC Bandagyi	2	18	14	4
UC Khongy	2	18	16	2
UC Timer Gara	1	16	14	2
UC Noora Khail	2	18	12	6
UC Shahi Khail	1	22	20	2
Total	12	112	94	18
Mean	2	18.7	15.7	3
Visit 2nd				
UC Bagh Dushkhail	2	18	16	2
UC Bandagyi	1	20	16	4
UC Khongy	1	22	18	4
UC Timer Gara	2	18	14	4
UC Noora Khail	2	20	14	6
UC Shahi Khail	1	18	16	2
Total	9	116	94	22
Mean	1.5	19.5	15.7	3.7

Table 5. Spatial position and Hatching Successes of Alectoris Chukor at Tehsil Lal Qila and Balambat in visits 1st and 2nd.

Visit 1st				
Sites	**Nest number**	**Clutch size**	**Eggs hatched**	**Unhatched Eggs**
UC Bagh	4	20	18	2
UC Bandagyi	2	18	14	4
UC Khongy	2	18	16	2
UC Timer Gara	1	16	14	2
UC Noora Khail	2	18	12	6
UC Shahi Khail	1	22	20	2
Total	12	112	94	18
Mean	2	18.7	15.7	3
Visit 2nd				
UC Bagh Dushkhail	2	18	16	2
UC Bandagyi	1	20	16	4
UC Khongy	1	22	18	4
UC Timer Gara	2	18	14	4
UC Noora Khail	2	20	14	6
UC Shahi Khail	1	18	16	2
Total	9	116	94	22
Mean	1.5	19.5	15.7	3.7

Risk to A. Chukor in Dir Lower

Habitat destruction and illegal overhunting are the main challenges that lead to population decline (Ahmad et al.,2017). The illegal overhunting can be largely observed in the study area in the summer and late autumn seasons. The respondents of the current study largely agreed with the risks due to the

mentioned reasons (Figure 1). The habitat destruction is usually due to deforestation in the study area. Trees are the main source for avian fauna to get their food and nesting (Ullah et al., 2020).

Food scarcity in the field is also a key risk for the Chukor population decline in the study area. Some of the respondents agreed with the statement, while the majority were neutral. However, food scarcity is also an accountable risk for population decline (Amano et al.,2010). Besides the food, most of the respondents agreed (Figure 2) with predator animals, A kind of interspecific competition (Kushlan, 1993; Hetrick & Sieving, 2012). Likewise, an earlier study identified illegal hunting as an important factor affecting the population of A. chukar in natural forests (Mann & Chaudry, 2000). Agricultural incomes have declined in Europe and recent years, causing some farms to shift land use for hunting and game bird shooting. This has led to fear that the remaining stocks of wild grey partridges that could be unintentionally shot while hunting pheasants and red-legged partridges are affected by shooting. Agricultural incomes have declined in Europe and recent years, causing some farms to shift land use. This has led to fear that the remaining stocks of wild grey partridges that could be unintentionally shot while hunting pheasants and red-legged partridges are affected by shooting (Aesbischer & Ewald, 2004). In Italy, after the revolution in agriculture, the partridge population has declined significantly, but there has been little or no change in the amount of shooting (Tout & Perco, 2000).

Conclusion

Chukor is a wide-ranging game bird in Pakistan. The current study investigated various locations for the spatial and breeding ecology of Alectoris chukor in Dir Lower. From the current study, it was inferred that the concern chukor bird nests in green, bushy areas. The study also investigated that many calls were observed during the month of late February to late April, which is the reproductive period of the bird. The highest clutch size was observed in the Lal Qila region of the study area; similarly, a high number of nests were found in the Bagh Dushkhail region of the study area. The current study concluded that A. chukor prefers the larger crevices of rocks surrounded by green bushes for nesting. The study also investigated some risk factors for the population decrease in the study area. Among the risk factors, habitat destruction and illegal hunting were the major concerns and challenges for the A. chukar population in the study area. Wildlife birds such as chukar play a vital role in controlling pest populations. However, the extensive hunting of birds may lead to their extinction. It is therefore recommended that the wildlife department act against these harmful activities to conserve the bird population in the study area.

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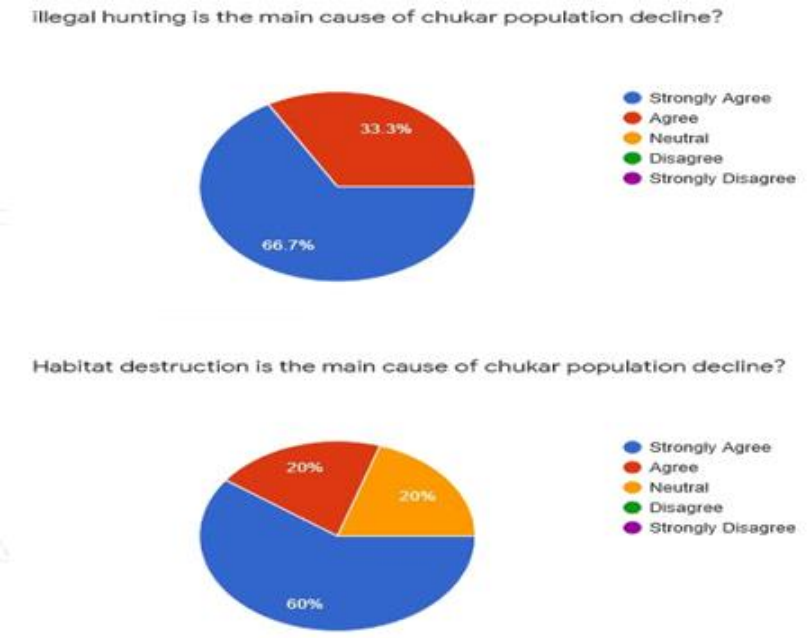

Figure 1: Response of Different people to illegal Hunting and Habitat destruction.

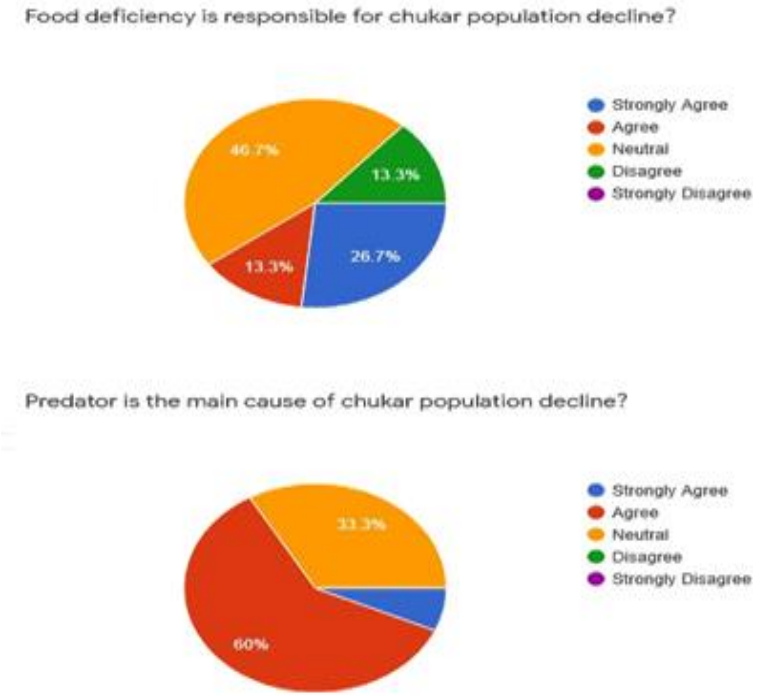

Figure 2: Response of Different people to Food Deficiency and the Predictor.