

Biological Status and Conservation Concerns of Cranes in Khyber Pakhtunkhwa: A Case Study from District Lakki Marwat

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ABSTRACT

Cranes are significant and beautiful birds having long neck, legs and colorful. It is a group of birds that can boost the human spirit. During the present study 106 crane keepers of different villages in District Lakki Marwat were interviewed. Out of them 42 (39.6%) kept two breeding pairs, 27 hunters kept one breeding pair and the remaining had more than two breeding pairs in their home. Most of the crane keepers 52.2% were told that cranes laying two eggs and they hatching their eggs successfully. Some crane keepers told that sometime crane hatched one egg and rotten the second one due disturbance and climatic condition. The average incubation period was found 27 days. The fledging time of young one was an average of 90 days. Mostly cranes start breeding in the March and April and keep their young ones with them till the upcoming breeding season. They do not allow any person, animal or any object in their locality. The food of young ones is slightly different from adults and mostly includes grasshopper, insect larvae and Maize, bread. The hunters along with cranes they also hunting pheasant, Quails, Ducks and keeps them in captivity for aesthetic beauty and commercial purposes in Lakki Marwat. During this study it was

found that breeding and hunting is a common practice in District Lakki Marwat which posing severs threats to the cranes population. Strict action is essential by the wildlife department to stop firing at cranes and other migratory birds in Lakki Marwat.

Keywords: Biological status, captive cranes, common cranes, demoiselle crane, endangered species.

Introduction

Due to their roles in seed distribution, flower pollination, food chain development, and seed dormancy breaking, a wide variety of birds are essential to the ecosystem's health. Because of its varied variety of habitats, Pakistan is home to between 650 and 700 resident and migratory bird species. Furthermore, the nation offers exemplary routes for migration and designated staging areas for migratory avifauna. Cranes stand out as the most noteworthy among them. Globally, there exist fifteen distinct species of cranes; among these, eight inhabit the Asian continent, while merely four are present in Pakistan, contingent upon seasonal fluctuations. The harsh and inhospitable climates found on the continents of Antarctica and South America inhibit the existence of crane species. Although the Siberian and Sarus cranes are nearly extinct at present, the demoiselle and Eurasian cranes persist in their migratory passage through Pakistan. Despite their continued presence in significant numbers in Pakistan, demoiselle and Eurasian cranes face various vulnerabilities. Examples of such risks include shooting, live trapping, habitat damage, and disruption (Shah et al., 2024). Cranes are substantial and visually appealing. Organism of the natural world characterized by an elongated neck, limbs, and longevity. This group of birds possesses the remarkable ability to elevate the human spirit in a manner that few other wild animals can achieve. The various species of cranes exemplify the relationship with their environment as well as the human perspective on nature. At present, there are 15 species of cranes documented globally, inhabiting five distinct continents. The list includes Brogila, black-crowned crane, black-necked crane, blue crane, red-crowned crane, Siberian wattled crane, white-naped crane, whooping crane, sandhill crane, demoiselle crane, Eurasian crane, gray-crowned crane, hooded crane, and red-crowned crane (Suliman et al., 2023).

This study investigates the ecological condition, population trends, and conservation challenges facing cranes in this region. The District of Lakki Marwat, located in the Bannu Division of Khyber Pakhtunkhwa Province, serves as a significant habitat for cranes during their migration and wintering period. This establishes it as an excellent site for biological monitoring and conservation research. The research focuses on the biological factors that affect cranes, such as where they live, how many there are, and how they use their habitats. It also looks at the human-made threats to their existence, such as habitat destruction, hunting, and ignorance. The project is to elucidate the current condition of crane populations and to provide sustainable conservation techniques that might enhance the long-term protection of these ecologically significant avian species in Khyber Pakhtunkhwa.

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Materials and Methods

In order to collect data about the status of crane and other migratory birds the following method and material were used. The study was done in steps including a literature review, proper interview, and field survey and data analysis.

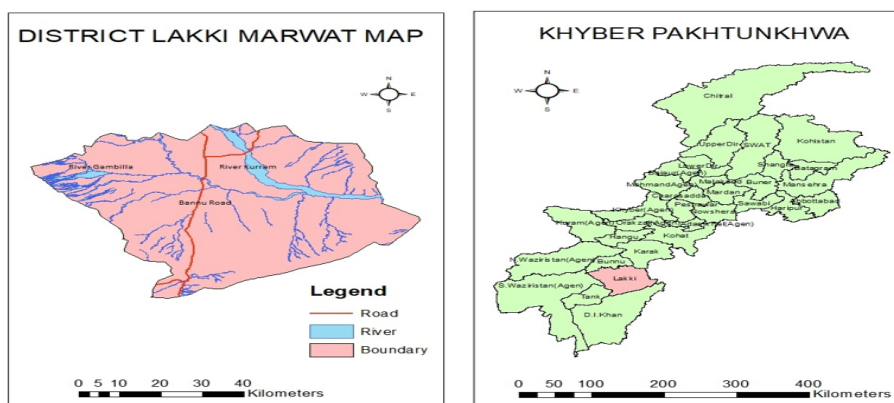
Study Area

The current study was conducted in District Lakki Marwat, located in the Bannu Division of southern Khyber Pakhtunkhwa (KPK), Pakistan. Lakki Marwat is around 3,164 km² in size and is located between 32°36'–33°04' N latitude and 70°33'–71°16' E longitude. It has semi-arid characteristics with scorching summers, mild winters, and little rain. The environment comprises sandy plains, dunes, scrub vegetation, and seasonal streams, which provide suitable habitats for migrating birds, particularly cranes. Bannu Division, encompassing Bannu and North Waziristan, represents a significant biological region in southern KPK, hosting a diverse array of animal species. Khyber Pakhtunkhwa is a province characterized by diverse ecosystems that accommodate both resident and migratory species. These habitats consist of rugged highlands, fertile valleys, and semi-arid plains. Agriculture and livestock serve as the primary income sources for local residents, while traditional hunting and resource utilization impact the region's biodiversity.

Proper Interview

To collect data from crane keeper and hunters, a questionnaire was designed, pre-tested and confirmed before the real inspection was conducted in various villages and a National Park of wildlife of Lakki Marwat. I have also visited and interviewed some of the crane hunter at the river Gambilla and river Kurram who have established hunting camps.

LOCATION MAP OF DISTRICT LAKKI MARWAT



Data Analysis

MS excel was used for the collecting and preparation of graphs and charts.

Results

This Study Was Conducted On Captivated Cranes and Other Migratory Bird in District Lakki Marwat and Tehsil Serai Naurang. During This Study 106 Crane

Keepers of Different Villages Were Interviewed. The Following Method and Material Were Used Including Literature Review, Field Survey and Data Analysis.

Captive Breeding of Cranes in Lakki Marwat

The People of This Area Keep the Cranes for Aesthetic, Amusement and Also for Commercial Purposes.

Breeding Pairs

During This Study It Was Observed That in District Lakki Marwat and Tehsil Serai Naurang 25.47% (27) Hunters Have Kept One Breeding Pair, 39.6% (42) Hunters Have Kept Two Breeding Pairs ,18.86% (20) Hunters Have Kept Three Breeding Pairs and from 16% (17) Hunters Reported More Breeding Pairs Which They Keep Them in Their Home (Table 3.1 Fig 3.1.1).

Figure: 3

Breeding Pairs of Captivated Cranes in District Lakki Marwat

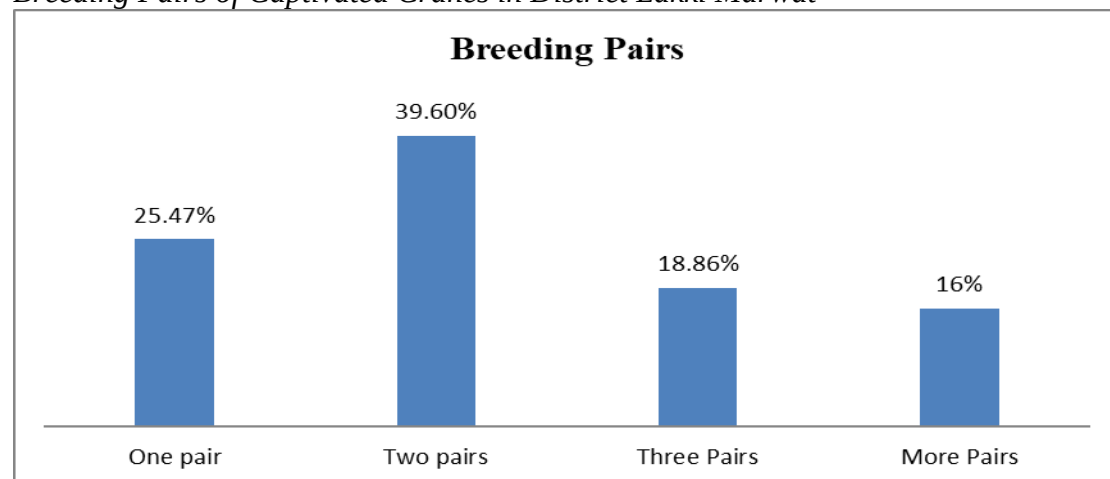


Table: 1

Captive Breeding of Cranes in District Lakki Marwat and Tehsil Serai Naurang

S.NO	Captive breeding of cranes	Case	Percentage	PD(max-min)	Chi-square value
1.	Number of cranes pair	One pair	7.5%	26.4%	0.000437
		Two Pair	33.9%		
		Three Pairs	25.47%		
		More pairs	33.01%		
2.	Adult Survival rate	100%	43.3%	51.132%	1.52278E-10
		<50%	53.2%		
		>50%	1.88%		
3.	Young survival rate	100%	30.1%	20.78%	0.707787
		<50%	45.2%		

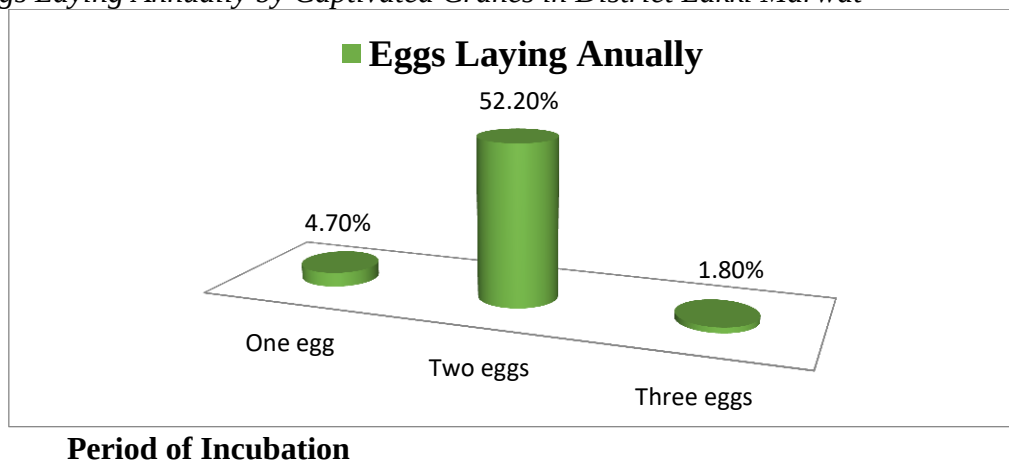
		>50%	24.5%		
4.	Number of breeding pairs	One pair	25.47%	23.6%	0.004045
		Two pairs	39.6%		
		Three pairs	18.86%		
		More pairs	16%		
5.	Laid eggs	One	4.7%	52.2%	1.02829E-27
		Two	52.2%		
		Three	1.8%		
		More	0%		
6.	Hatched eggs	One	45.2%	52.8%	3.4631E-20
		Two	52.8%		
		Three	0%		
		More	1.88%		
7.	Rotten eggs	One	56.6%	55.7%	2.18003E-14
		Two	17.92%		
		Three	0.9%		
		NO	22.6%		
8.	Period of incubation	26 days	27.35%	24.53%	0.002082
		27 days	39.62%		
		28 days	17.92%		
		More	15.09%		

Eggs laying annually

During this research study 4.7% hunters was told that crane laying one egg, 52.2% hunters have told that cranes laying two eggs annually and from 1.8% hunters reported that cranes laying three or more eggs (by giving hormonal injection) (Table:3.1 fig 3.1.2). Similarly, during this survey, I was also observed that cranes have the potential to lay new eggs after the removal of old ones, but if cranes are physically strong and are fed with good food.

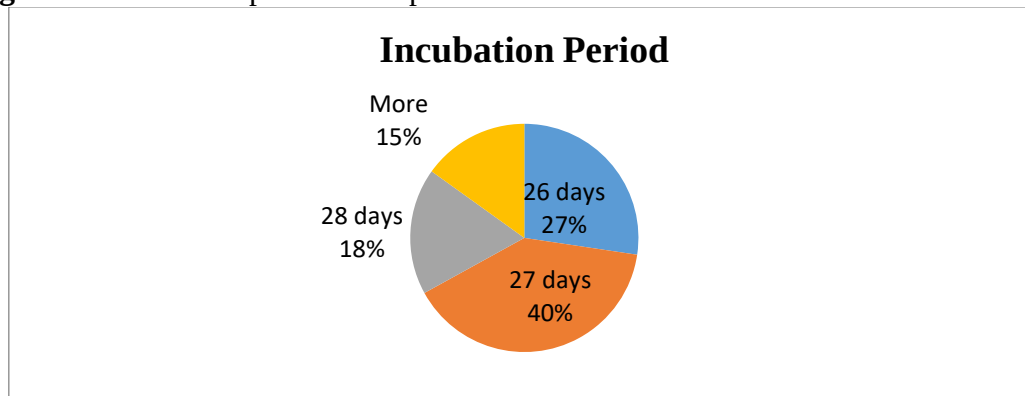
Figure: 4

Eggs Laying Annually by Captivated Cranes in District Lakki Marwat



During the survey from 27.35% hunters reported that the incubation period of captivated cranes is 26 days, 39.62% hunter told that incubation period of cranes is 27 days, 17.92% hunters told that their incubation period of eggs is 28 days and 15.09% hunter told more days (Table:3.1fig3.1.3).

Figure: 5 Incubation period of Captivated Cranes in District Lakki Marwat

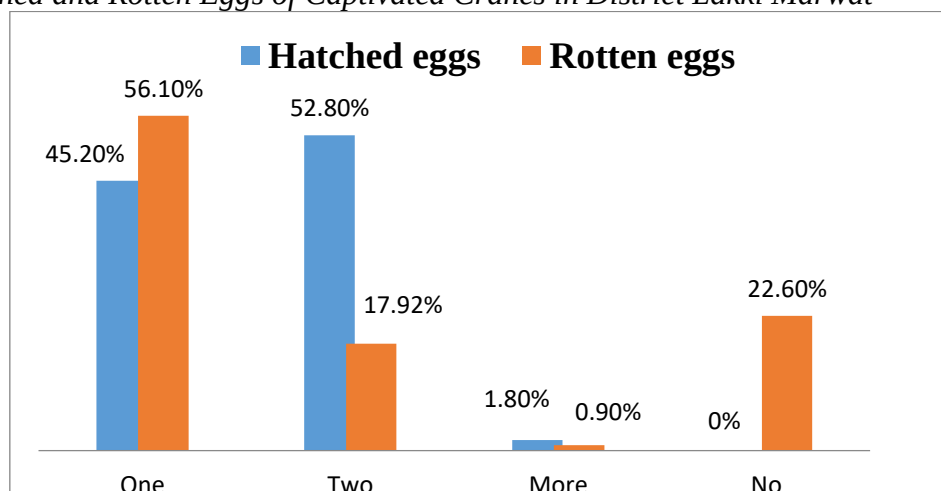


Hatched eggs and rotten eggs

During this study I met 106 crane keeper belong different villages of Lakki Marwat out of them 45.2% crane keeper reported that cranes hatched one egg (Table 3.1) similarly 52.8% told that cranes hatched two eggs and from 1.8% hunters reported that cranes hatched more eggs (if give hormonal injection). Similarly during this survey I also found that 56.1% crane keeper told that crane rotten one egg, 17.92% told that two eggs were rotten, 0.9% told that it rotten more eggs and from 22.6% crane keeper reported that cranes were rotten no eggs (Table 3.1).

Figure:6

Hatched and Rotten Eggs of Captivated Cranes in District Lakki Marwat



Survival rate of Young ones

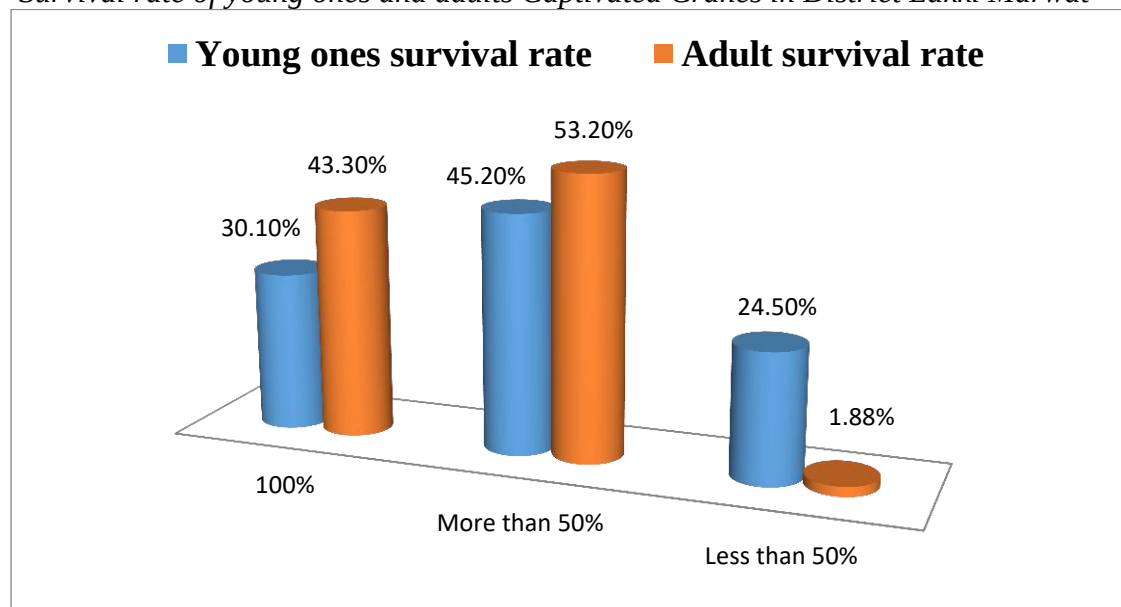
During the survey it was found 106 crane keepers by interviewed them 30.1% told that the survival rate of young ones is 100%, 45.2% told that its survival rate is more than 50% and from 24.5% crane keepers reported that the survival rate of young ones is less than 50% (table 3.1, fig.3.1.5). Large number of young ones expires due to various diseases because the chicks are very susceptible to the disease. Moreover, the chicks are also dying due to imbalance food and accident with the electric wires, trees, and climatic condition etc.

Survival rate of Adult Cranes

During the survey 106 crane keepers were interviewed 43.3% told that the survival rate of adult crane is 100%, 53.2% told the adult survival rate is more than 50% and from 1.88% crane keepers reported that the survival rate of adult is less than 50% (Table: 3.15, fig3.1.5). The main causes of their death are including various diseases, accidents and predators such as dogs, jackals etc.

Figure: 7

Survival rate of young ones and adults Captivated Cranes in District Lakki Marwat



Effect of caption on Breeding of Cranes

During this research study it was observed that caption effects the breeding pairs of cranes because when they are captured, their pair bond which was formed in the natural environment get separate from each other and takes a lot of time to form a pair bond with another, so in this way the caption seriously affects their breeding and they cannot breed for some year in captivity, however when previous pair is captured then it can start breeding within few months but this situation in rare.

Table: 4

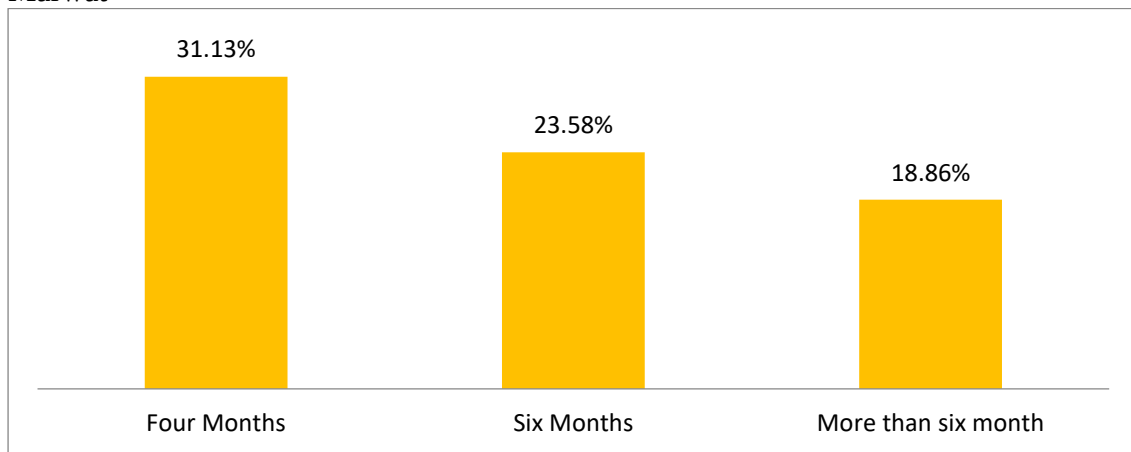
Captive Breeding of Cranes in District Lakki Marwat and Tehsil Serai Naurang

S.No	Captive breeding of cranes	Case	Percentage	PD(max-min)	Chi-square value
1	Laying extra eggs after removal of old ones	Yes, Two	78.3%	56.7%	1.40452E-08
		No	21.6%		
2.	Time taken by new pair up to breeding	Two month	22.6%	4.7%	0.927455
		Four months	27.3%		
		Six months	25.45		
		More	24.5%		
3.	Duration of choosing new partner after death of one	Two month	26.41%	12.27%	0.363911
		Four months	31.13%		
		Six months	23.58		
		more	18.86		
4.	Parental care duration	Two month	8.4%	23.6%	0.001872
		Four months	32%		
		Six months	31.1%		
		more	28.3%		
5.	Fledging duration	Two month	45.2%	18.8%	0.000193
		Four month	26.4%		
		More than four	28.3%		

Preparation for breeding

During the survey I met 106 crane keepers and reported that cranes take approximately Seven months to prepare themselves for breeding. After caption they will take some time to adjust with the new environment in the home and then they will search for suitable pair. So in this way 26.41% hunters told that crane takes two months to prepare for breeding after caption, 27.3% hunters told that its takes four months, 25.45% hunters told six months and 24.5% hunter told that cranes takes more times for breeding preparation after caption (Table 3.2.fig.3.1.6).

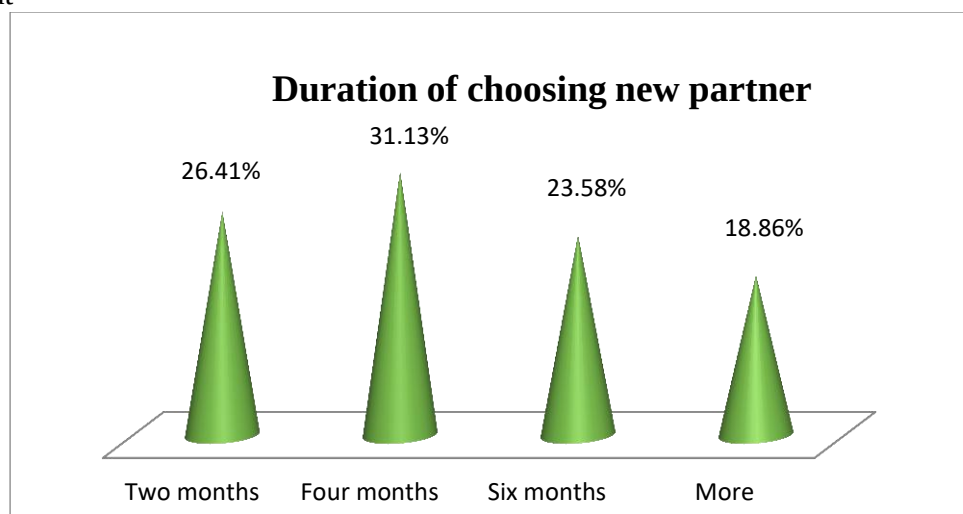
Figure:8Time taken to prepare for breeding by Captivated Cranes in District Lakki Marwat



Duration of choosing new partner

The research identified that the cranes are faithful. However, when one member of the established pair dies then they establish a new pair bond with another member. Sometime they don't form another pair bond throughout life after the death of one individual. During the survey 106 crane keepers were interviewed and from 26.41% hunters reported that cranes requires two month to form bond pair with a new partner after the death of old ones, 31.13% hunters told that it takes four months, 23.58% hunters told that it requires six months and from 18.86% hunters reported that cranes takes more time to become partner of new one after the death of old ones (Table 3.2 fig 3.1.10).

Figure: 9Duration of choosing new partner of Captivated Cranes in District Lakki Marwat



Parental Care Duration

The care of young ones from the enemies and unfavorable condition is called as parental care.

Mostly cranes start breeding in the March and April and keep their young ones with them up to the upcoming breeding season. During the survey identified that 8.4% crane keepers told that the parental care of crane is two months, 32% hunter told four months, 31.1% hunters told six months and from 28.3% crane keepers reported that the parental care of cranes is more than six months (Table 3.2).

Parents behavior during parental care

During the survey I met with 106 cranes keeper 100% of them told that cranes showing aggressive behavior during the first few days (Table 3.3). They do not allow any person, animal or any object in their locality. When someone passed near it then they produce a loud sound and also their feathers are protruded out and they looks very dangerous. They also bite with their powerful and pointed beaks when someone is trying to touch their chicks.

Habituation Time

During this research study it was observed that the cranes takes approximately nine months to become habituate with the new environment in the home. Firstly they are placed in small cages and covered with cloth so they cannot see the other substances e.g. human, animals or any other because they sense fear for some days and start jumping in the cage when sighted these objects which will injured them.

Fledging Time

The fledging time of chicks depend on various factors e.g. food and health status. The protein rich diet causes obesity weight gain in them and resulting in the bowing of their legs and also affect their fledging duration.

According to the research survey it was found that 45.2% hunters told that the fledging time of young ones is two months, 26.4% told four months and from 28.3% crane keeper reported that the fledging duration of chicks is more than four months (Table 3.20).

Other Migratory Birds in District Lakki Marwat

During this study it was observed that other migratory birds are also found in District Lakki Marwat such that Waterfowl, *Hobara bustards*, Teals, Gallard, Geeze, Spoon Bills and Falcons.

Food Habits of Captivated Cranes

Table: 10 Food Habits of Captivated Cranes in District Lakki Marwat

S.No	Food habits and behavior of captivated cranes	Case	Percentage	PD(max-min)	Chi-square value
1.	Food habits of adult	Grasshopper	15%	62.2%	1.18599E-16
		Maiz,bread	73.5%		
		Other (meat, lizard etc.)	11.3%		
		Grasshopper	58.4%		

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2.	Food habits of young one	Insect larvae	15%	54.1%	3.33123E-14
		Maiz,bread	21.6%		
		Other (meat, lizard etc.)	4.7%		
3.	Behavior during parental care	Normal	0%	100%	1.52397E-23
		aggressive	100%		

Food of adult cranes

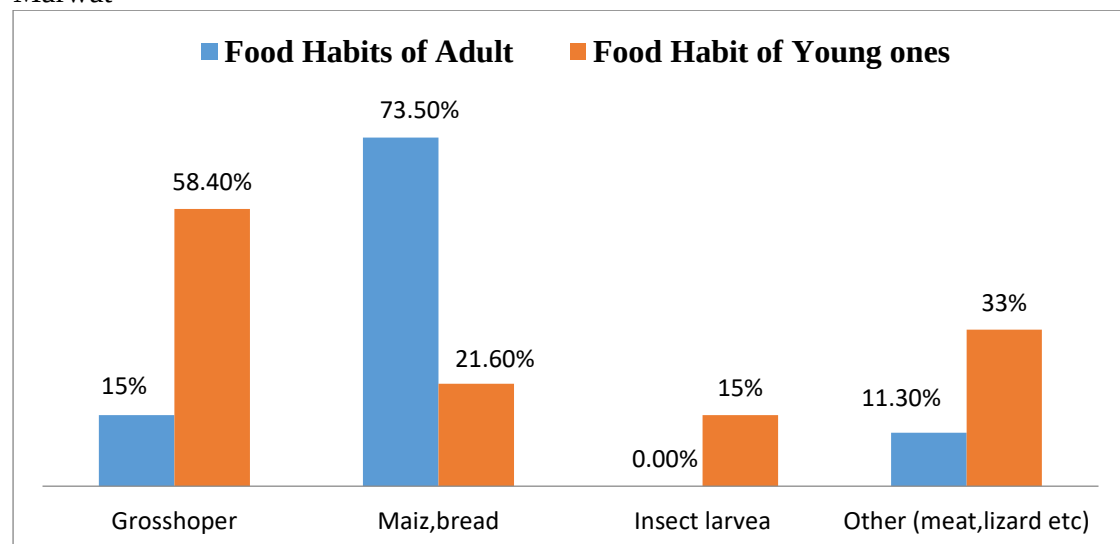
During the survey it was observed that cranes feed on variety of food items.

According to 106 crane keeper 15% hunters told grasshopper, 73.5% told Maiz, bread and 11.3% hunters told that others items e.g., meat lizard given to all individuals (Table 3,3 fig3.2.1).

Food Habits of Young ones

During this research study it was observed that the young ones is also fed with variety of food. According to the present study 58.4% hunter told grasshopper, 15% hunters told insect larvae, 21% told Maize, bread and 4.7% told that other food e.g. meat, lizard etc. is given to the chicks (Table 3.3 fig 3.2.1). The parents search for different types of food (insect various worms and small pebbles) in the form and pick it in their bills and then give them to their young ones.

Figure: 12 Food Habits of Adults and Young ones captivated Cranes in District Lakki Marwat



Migratory Routes

During this research study I met with 106 cranes keeper and interviewed about the migration and migratory routes of the cranes. According to them the cranes passing through Pakistan comes from two countries which are Siberia and Britian. According to the collected information the cranes migrate through Pakistan in two season and follow various migratory routes i.e.,

Autumn Migration

During the survey it was found that during august they start migration together with their chicks from Britain and Siberian passing through various countries and ocean and reach to different parts of K.P.K and Baluchistan, Pakistan via Afghanistan. The Britain cranes are slightly blackish in color. The various migratory routes followed by them are given bellow.

Siberia→ Afghanistan→ Karak→ RiverKurram→ Gambilla→ D.I. Khan→

Draban→ Mughal Kot

Siberia→ Afghanistan→ Zarmilan→ Gulkuch→ Zhob→ Qila-

Saifullah→ Quetta→ Chaman

Britain → Afghanistan → Qamardin → Qandeel → Qila Saifullah → Mandokhel → Zhob → Takht-e- Suleiman → Manriakhwa → Musa khel → Katmandu Hills.

Spring Migration

During the survey it was found that the cranes migrate back from India in the March. During their back migration the Britain cranes five days to reach the Britain while to Siberia they cover the whole distance in seven days. The breeding cranes starts migration from 10-20 March, after that specially during 24th-26th March to 7th April the remaining non-breeding and the young ones migrates. During this migration they follow the same routes which were used during the autumn migration.

Types of Pheasant in Lakki Marwat

During the survey various crane keepers were interviewed about the presence of pheasants in District Lakki Marwat. According to the collected information various types of pheasant found in Lakki Marwat e.g. Black and grey partridges, Monal, Cheer, Khaleej pheasant, silver pheasant, Golden pheasant and Palawan peacock etc. The cranes hunters along with cranes they also hunting pheasant and keeps them in captivity for aesthetic beauty and commercial purposes.

Hunting Sites in Pakistan

During the research study I met with 106 hunters of different villages, from them it was reported that besides doing hunting in Lakki Marwat they also visited to different places of hunting in Pakistan, in which, Karak, Zhob, Lorlai, Rajinpur, Chamman, Karachi, D.I. Khan, Tharparkar, South Waziristan and including Quetta etc.

Effective approach for crane conservation

The degradation of cranes presents a significant concern within the study area. The wildlife department is active in the study area; however, their contributions to crane conservation are inadequate. Hunting remains unrestricted, and there is a lack of awareness initiatives within the community regarding the ecological significance and values of cranes. The respondents indicated that the relevant wildlife department and the local Jerga system can significantly contribute to the conservation of crane species in the study area.

Discussion

This study was performed in the District Lakki Marwat of Khyber Pakhtunkhwa. The aim of this study was investigate the current status of cranes and other migratory birds in District Lakki Marwat and Tehsil Serai Naurang. The people of this area hunt and keep the crane for aesthetic beauty and commercial purposes. During this study total of 106 crane keepers belonging to 31 different villages of Lakki Marwat, Khyber Pakhtunkhwa, Pakistan were interviewed and the data was analyzed. The present study shows that majority of hunting sites in District Lakki Marwat is present at the side of river Kurram, river Gambilla and Chal and Nungar. According to the hunters in Pakistan other hunting sites of cranes is found in Baluchistan, Zhob, Chamman, Karak, D.I.khan, Rajin pure, Lorlai, Bannu, Karachi. This study shows similarity with the study conducted by (Khan et al., 2024).

The majority of hunter told that the best timing for hunting cranes in Lakki Marwat is night. During the day time cranes flies very high from earth, so it become very difficult for the hunters to trap the cranes. According to the survey most of hunter told that besides doing hunting of cranes they also hunting other birds e.g., Ducks, Quail, pheasants etc.

During this study it was observed that majority crane keepers (36) keep two breeding pairs in their home. According to the crane keeper cranes usually lay two eggs but also have the ability to lay new eggs after the removal of old ones. The cranes can also lay more (2-7) eggs after the removal of old ones if give hormonal injections. But they do not allow the cranes for multiple clutching because it has bad effect on the health of cranes. If the cranes are physically well and are fed with good food, then multiple clutching has no serious effect on their health. During the survey from 27.35% hunters reported that the incubation period of captivated cranes is 26 days, 39.62% hunter told that incubation period of cranes is 27 days, 17.92% hunters told that their incubation period of eggs is 28 days and 15.09% hunter told more days (Wheeler, Barzen, Crimmins, & Van Deelen, 2021).

Pakistan is among the top five countries facing devastating effects of climate change. Pakistan has experienced devastating flood events, severe heatwaves, and irregular as well as unexpected heavy rainfall in recent years. These extreme environmental anomalies are expected to increase in future if the current trend continues. Our future projections showed that the species is expected to lose a major proportion of its current habitat (which is considered moderately and highly suitable as a species habitat). This loss could be attributed to the ongoing climatic anomalies and ever-increasing human population of Pakistan. Currently, the areas offering suitable habitat to the species are those with plain open grounds and a relatively lower human population density. There are more suitable grounds spanning an area of (5313 km²) with a relatively lower human population density in Khyber Pakhtunkhwa compared to northern districts, including Peshawar, Mardan, Charsadda, Hazara, and Abbottabad. Moreover, compared to the northern region, this part of the province receives less, but sufficient, rain to support natural vegetation growth and natural wetlands. Notably, the observed shift in suitable habitat towards the western-central parts of the study area, particularly in the southern districts of Khyber Pakhtunkhwa and adjacent districts of Baluchistan, signals a spatial reconfiguration of suitable conditions for the Demoiselle Crane. These areas near the Pakistan–Afghanistan

border exhibit a concentrated shift in suitable habitat. We presume that these areas have lower human populations, and therefore the related consequences for the environment and habitat would be minimal (Khan et al., 2024).

The present research was carried out in Pakistan's Bannu districts of Khyber Pakhtunkhwa. The hunting of demoiselles with cranes is a long-standing custom in Pakistan's Baluchistan and Khyber Pakhtunkhwa provinces. Every year, some 20,000 cranes travel eastward through Zaro-Anam Bostan (Baluchistan) in the autumn (Gulati & Rana, 2022). This route was used to entrance 700 cranes in the spring of 1989. (Khan et al., 2024) reported that over 50,000 cranes travel over the Pakistan route. One third of the 12,000 captive and breeding cranes in Kurram Valley are utilised as decoys to hunt and trap other migratory cranes throughout the migration season (Shah et al., 2024).

Conclusion

From this study we have concluded that breeding and hunting is a common practice in District Lakki Marwat which posing severe threats to the cranes population. Strict action is essential by the wildlife department to stop firing at cranes and other migratory birds in Lakki Marwat. The government should start public awareness programs about the migratory birds in Lakki Marwat.

Recommendation

A complete awareness campaign should be launched in general, as well as seminars and workshops in particular, in order to enhance the level of understanding and appreciation of the necessity of conservation of these species among the populations that are located where they are found. The prohibition of illegal hunting in the region is warranted. The wildlife department should be more proactive and vigilant in its efforts to enforce the wildlife laws. It is imperative to vehemently discourage the use of firearms. In order to augment the captive population, a captive reproduction program should be implemented and promoted. It is imperative to implement an awareness campaign regarding the significance of cranes and their preservation. The local community should be encouraged to engage in conservation activities.

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