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Daily food-intake and activity patterns of wintering common cranes (*Grus grus*) in wetlands of Khushab and Bahawalnagar Punjab, Pakistan

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Abstract

Present study was conducted to observe daily food intake and other activities patterns of wintering common cranes (*Grus grus*) at wetlands of Khushab and Bahawalnagar from September, 2015 to April, 2016. The results of the study showed that feeding activity was highest during late morning with a mean of 56.24% (± 9.62 SD) and lowest 36.64% (± 16.76) during early morning at Khushab and at Bahawalnagar highest feeding was recorded during evening time 69.83% (± 2.77 SD) and lowest in the morning 44.27% (± 13.37 SD). Alert, aggression and walking were least performed activities at both sites. It was concluded that in these non breeding migratory cranes time spent for feeding was more than 55%.

Keywords: Food-intake, activity patterns, Wetlands

Introduction

The Common crane (*Grus grus*) belongs to family *Gruidae*, they are also known as Eurasian crane. The scientific name of common crane is *Grus grus* and is from the Latin word *grus*, "crane" [1].

Morphologically it is medium-sized bird having long legs. Its body length is about 105-135cm having 190-250cm wings span [2]. The body weight may range from 3-6kg and eastern subspecies is small in size, weight and measurements. This species is found in the northern parts of Europe and Asia [3, 9].

Pakistan hosts to a few migratory fowls and provides them breeding or wintering grounds. Pakistan lies at a vital area at the union of 3 noteworthy faunal regions on Flyway route 4 or Green route. It gives the connection between Indian, African wintering grounds and Eurasian rearing grounds [4, 5]. The migratory parts of Pakistani birds are: summer visitors, winter visitors, track migrants, and interior migrants which migrate just inside the country [8, 12, 16].

The third most important wintering region lies in the northern half of Indian subcontinent, including Pakistan [15]. They also stay for nominal wintering in Vietnam, Burma and Thailand. Finally, the last eastern wintering stopover is in China. Migrating flocks fly in a "V" formation [19].

No sufficient data was recorded regarding non-breeding behavior so it is categorized as Least concern [6, 7, 20].

The purpose of present study was to observe the Daily Food-Intake and Activity Patterns of Wintering Common Cranes (*Grus grus*) in Khushab and Bahawalnagar Punjab, Pakistan.

Materials and Methods

Study Area

The District Khushab (32.3259° N, 72.1416° E) is situated between district Mianwali and Sargodha. Most of the area consists of lowland agricultural plains, hills and brackish water lakes. Thal desert also touch the in north west side of district, which has a breadth of over 110 km (70 miles) and is situated between the Jhelum and Indus river.

There are three wetlands (Uchalli, Khabbeki and Jahlar) in this district. Kanhatti Garden is the largest forest of Khushab district is near Khabbeki village in the Soun valley. Khabbeki Lake is a salt water lake in the southern Salt Range. The width of lake is one kilometre and two kilometers in length.

Khabbeki is also the name of a neighbouring village. Sakesar is the highest mountain in the Salt Range. Its summit is 4946 feet (1522 metres) high and is situated in Khushab District. Bahawalnagar, Punjab, Pakistan is located in southern Punjab. Its geographical coordinates are 29° 59' 0" North, 73° 16' 0" East. It contains many brackish water bodies which are feeding and resting places for migratory birds.

In District Khushab and Bahawalnagar there are many important wintering stop over for the migratory birds because of the availability of food and their preferred wintering habitat, which led to choose this site as study area. The area under study will be monitored by car, boat and on foot in migratory season from September, 2015 to April, 2016 fortnightly.

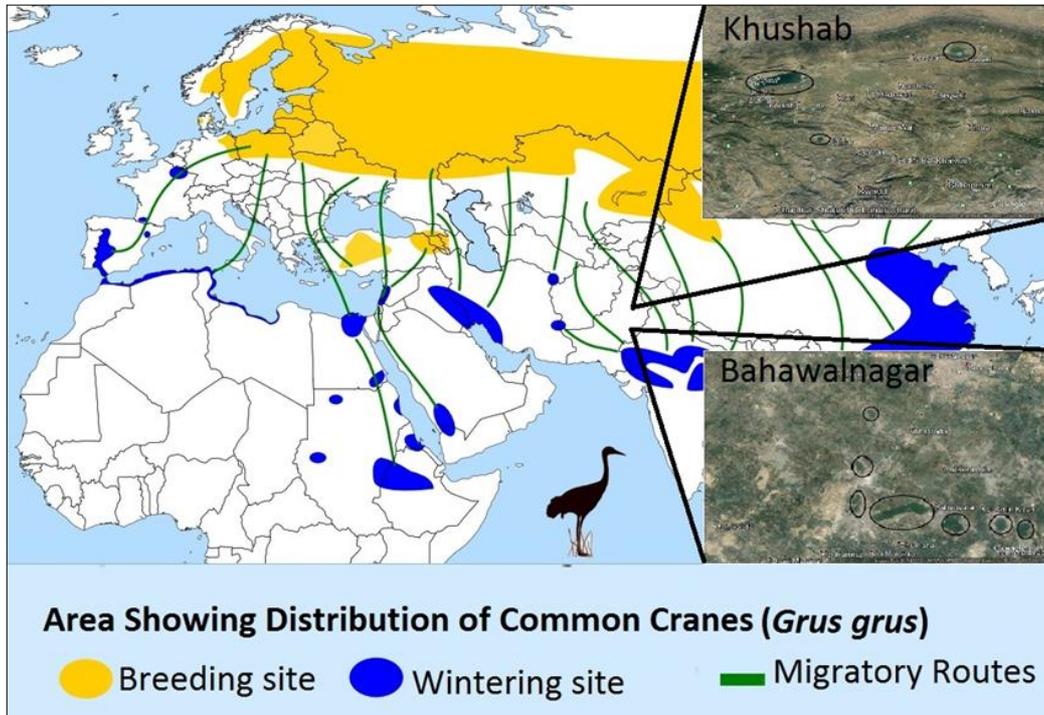


Fig 1: Migratory Routes of Common Crane

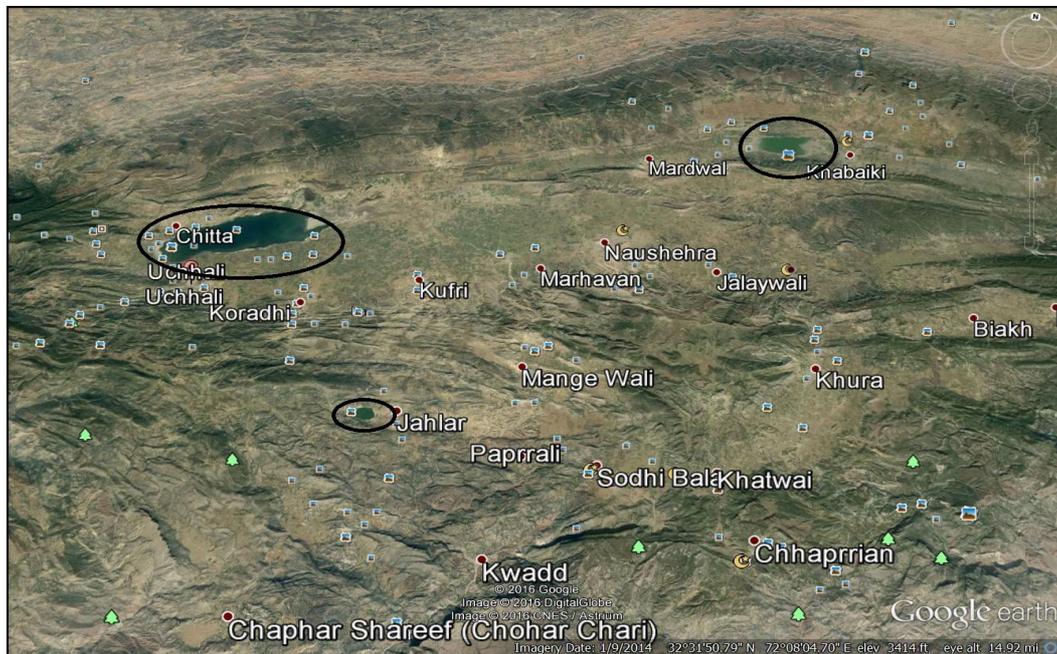


Fig 2: Satellite view of Uchalli Complex (Uchalli lake, Khabeki lake and Jahlar lake)



Fig 3: Satellite View of Grot, Khushab (Resting spot of Cranes)



Fig 4: Satellite View of Dhak, Khushab (Resting spot of Cranes)

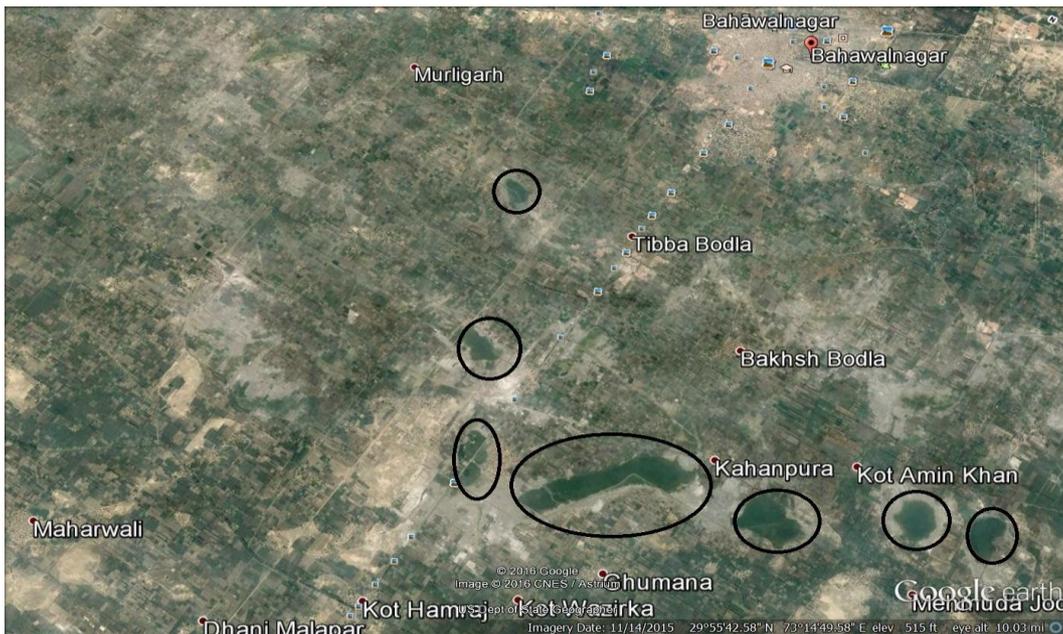


Fig 5: Satellite view of Wetlands of Bahawalnagar

Data Collection

Common Crane moves in flocks, they can counted easily by direct count method [10, 17]. They were observed by using 10x50mm binoculars, a 30-90mm x100mm vision king spotting scope. To study the activity patterns and to document them, DSLR Nikon D7000 with Lenses Sigma 300mm f/4 and Tamron 150-600mm was used. Observation of activity patterns of Cranes started at 7:00 a.m. with regular time intervals and ended at 5:00 p.m. Each sampling day was equally divided into four periods i.e. early morning (7-8 a.m.), late morning (10-11 a.m.) mid-day (1-2 p.m.) and late afternoon (4-5 p.m.) as adopted by Altman [18].

Feeding Habit and Behavior

Feeding habit and behavior was noted by observing them keenly on designed schedule by using binocular, telescope and were recorded through still camera.

Statistical Analysis

To construct diurnal time-activity budgets, behavior of Cranes first expressed as the mean percentage of birds engaged in behavior of a particular category each hour. The hourly data were analyzed in two ways. Firstly, the whole data set was inspected to determine the mean percentage time spent by Cranes in each activity for the entire non-breeding season. Secondly, the data were re-analyzed to determine the mean

percentage time allocated to different activities during the four time blocks from sunrise to sunset. Standard deviation was indicated as (\pm SD) [21, 22].

The data were used only from September, 2015 to April, 2016 because Cranes were not present at the site during the rest of the study period. Most of the statistical analyses were carried out in Microsoft excel and Minitab 7.1 were used to perform Analysis of Variance test (ANOVA) and other statistical analyzes and to illustrate graphs and charts. Kruskal-Wallis test was used to analyze behavior [19].

Results and discussion

Activities at Dhak, Balwal and Grot (Khushab)

A flock of Cranes arrived Bahawalnagar (mid November) before Khushab (1st week of February). Mainly three activities differed significantly in cranes across time periods were feeding (KW = 19.34, $P < 0.05$), flying (KW = 22.07, $P < 0.05$) and resting (KW = 18.13, $P < 0.05$).

Feeding activity was highest during third period with a mean of 56.24% (\pm 9.62 SD). Feeding activity was uniform in second and fourth periods and did not differed significantly.

Resting was highest in 2nd period i.e. 19.95% (\pm 9.08 SD) while it was lowest in 4th period i.e. 5.27% (\pm 4.13 SD).

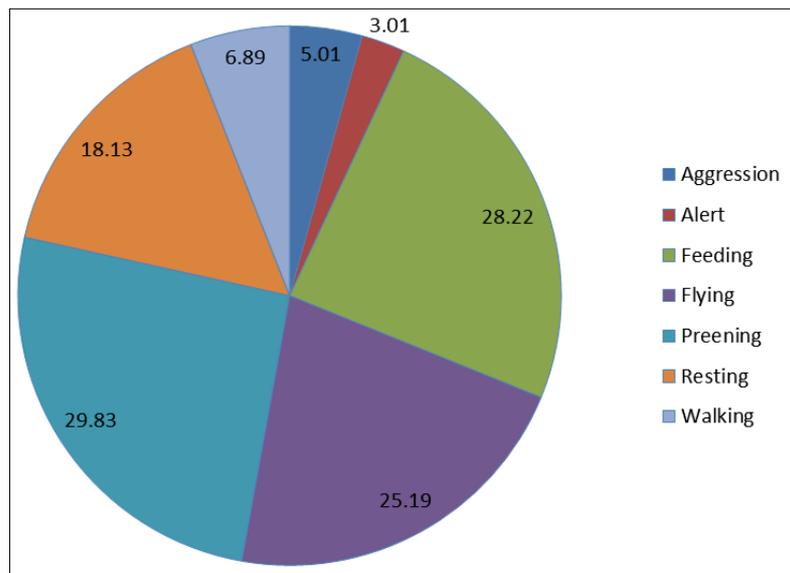


Fig 6: Time Spend in Different Activities at Dhak, Balwal and Grot (Khushab)

Flying was highest in the first period with the mean percentage of 21.38% (\pm 9.21 SD). Least flying was observed in 3rd period with a mean percentage of 5.37% (\pm 2.19 SD).

4.74% (\pm 3.21 SD) and was least in 1st period 2.07% (\pm .04 SD).

Aggression was showed higher significantly in 3rd period

Activity budget and pattern of Cranes

Table 1: Percentage of time spent (mean \pm SD) on different activities by non-breeding Cranes based on time of day at sites of Khushab.

Activities	1 st Period	2 nd Period	3 rd Period	4 th Period	K W	Probability
Aggression	2.07 \pm 0.04	3.46 \pm 1.18	4.74 \pm 3.21	2.46 \pm 4.67	12.05	0.2386
Alert	10.36 \pm 5.65	8.11 \pm 6.02	7.14 \pm 6.58	4.27 \pm 2.29	0.92	0.4821
Feeding	36.64 \pm 16.76	55.61 \pm 11.23	56.24 \pm 9.62	53.17 \pm 7.67	19.34*	0.0015
Flying	21.38 \pm 9.21	11.33 \pm 5.28	5.37 \pm 2.19	8.10 \pm 3.74	22.07*	0.0255
Preening	5.71 \pm 6.43	3.76 \pm 4.21	3.74 \pm 2.93	6.18 \pm 3.14	2.19*	0.0509
Resting	16.14 \pm 11.32	19.95 \pm 9.08	9.93 \pm 6.87	5.27 \pm 4.13	18.13*	0.0003
Walking	10.73 \pm 5.18	9.33 \pm 3.15	14.08 \pm 4.67	10.21 \pm 6.02	0.57*	0.0283

*Significantly differ (Kruskal-Wallis test, $P < 0.05$) between time periods.

Activities at Wetlands of Bahawalnagar

Cranes at Bahawalnagar showed a more defined and varied behavior between time periods. 5 activities out of 7 showed a significant difference ($P < 0.05$) between time periods. Values of Kruskal-Wallis test, a non-parametric behavioral test, for feeding, flying, preening, resting, walking were 28.22, 25.19,

29.83, 18.13 and 6.89 respectively.

Among these cranes 60% of the time was spent in feeding in daylight hours. Feeding was highest in fourth period 69.83% (± 2.77 SD) and lowest in the morning in first period 44.27% (± 13.37 SD).

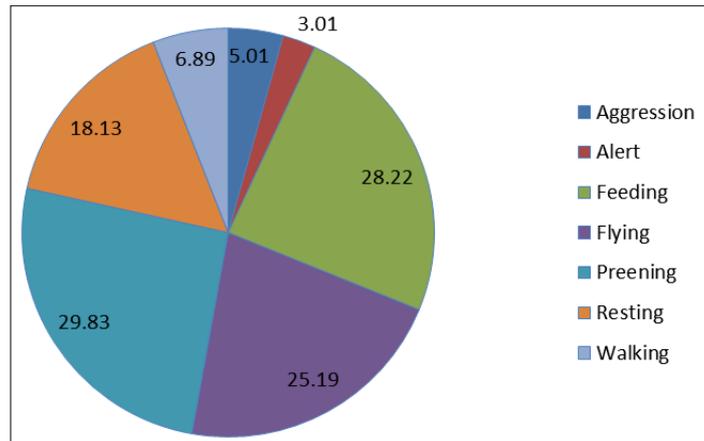


Fig 7: Time Spend in Different Activities at Wetlands of Bahawalnagar

Resting occurred throughout the day but was highest in second period 19.95% (± 9.08 SD) and lowest in fourth period 5.27% (± 4.13 SD).

Most flying was observed in first period with a mean percentage of 19.88% (± 13.76 SD). Flying remained constant

in third and fourth period but was lowest in second period 4.65 (± 6.88 SD).

Aggression and alert were the least activities performed by juveniles throughout the day.

Table 2: Percentage of time spent (mean \pm SD) on different activities by non-breeding Cranes based on time of day at Wetlands of Bahawalnagar.

Activities	1 st Period	2 nd Period	3 rd Period	4 th Period	K W	Probability
Aggression	1.94 \pm 1.32	1.97 \pm 2.02	1.53 \pm 1.47	1.75 \pm 2.65	5.01	0.1879
Alert	5.52 \pm 4.12	4.72 \pm 4.82	5.64 \pm 4.87	5.14 \pm 5.17	3.01	0.5292
Feeding	44.27 \pm 13.37	57.29 \pm 7.47	59.89 \pm 5.11	69.83 \pm 2.77	28.22*	0.0030
Flying	19.88 \pm 13.76	4.65 \pm 6.88	6.17 \pm 3.41	7.45 \pm 4.17	25.19*	0.0406
Preening	8.02 \pm 5.07	6.18 \pm 5.00	1.04 \pm 1.18	0.98 \pm 1.14	29.83*	0.0050
Resting	13.20 \pm 8.92	19.95 \pm 9.08	9.93 \pm 6.87	5.27 \pm 4.13	18.13*	0.0003
Walking	9.46 \pm 7.94	8.02 \pm 5.94	15.01 \pm 8.12	11.91 \pm 5.94	6.89*	0.0509

*Significantly differ (Kruskal-Wallis test, < 0.05) between time periods.

Major threats to cranes

Loss of habitat, illegal hunting, poaching, cattle grazing in the feeding sites of cranes, the use of pesticides on agricultural crops and fruit orchards are major threats to cranes. During the entire study period, 20% of wetlands of study area were drained to create agricultural land. The local peoples reported that more than 5 cranes were injured/ killed by different reasons in one season (approximately 40% of the total recorded population of cranes) in the study area.

Discussion

The three main activities of Common crane in a study by and results are closely related to the findings of Khaleghizadeh. Over 60% times of cranes was observed engaged in foraging except early morning time i.e. 7am to 8am. Morning time foraging was least recorded and only 36.64% time was spent on feeding [11, 13].

At sites of district Khushab highest feeding activity was recorded in 3rd period i.e. 1to2pm and it was 56.24% and at Bahawalnagar, early morning, i.e. 7am to 8am least time was spend on feeding i.e. 44.27%, while in evening on 4th period i.e. 4pm to 5pm maximum time was spend on feeding i.e. 69.83%. The observations of Alonso were same regarding feeding activities as he also found feeding peaks at morning.

In this study maximum time was spend in evening time [21].

At Khushab (Dhak, Balwal and Grot) mean maximum feeding activity was observed during 3rd period (pm to 2pm) i.e. 56.24% and minimum on early morning (7am to 8am) i.e. 36.64%. While at Bahawalnagar maximum feeding activity was observed during 4th period (4pm to 5pm) i.e. 69.83 and least feeding was observed on early morning (7am to 8am) i.e. 44.27%. These results are in close contact of Kumessa and Bakela [20].

According to Khaleghizadeh [11] walking peaked at 08:00 a.m. in the present study resting was observed all the day but maximum resting was observed during 1st period (7am to 8am) and 2nd period (10am to 11am) at both sites. It verified the results of Khaleghizadeh [11].

Flying was in accordance with the previous study and was highest in the first period. Feeding time, Flying and aggression are associated with availability and food abundance and the presence of other birds, grazing animals and predators. Similar results were found by Schmitz and Baldassarre [15].

Common cranes were more frequently concerned in feeding and aggression with variation in flock size same conclusion were drawn by Toureno, Schmitz and Baldassarre and Lingle. No such symmetric model was recorded in present study and

a little was aggression was observed all the day ^[13, 15, 19].

Conclusion

No interspecific relevancy was seen between common cranes and other water fowls during the entire study period, and intra-specific aggressive behavior was observed only less than 5% with other water fowls and birds. Intra specific aggression was very low and significantly different observation were recorded regarding feeding, flying and preening in present study period. The long neck and legs of the cranes are helpful for them in providing awareness from hunters and predators and food exploitation in shallow and deep water bodies with no cover area. Cranes show competition and aggression about assets and scrounging patches in nature. So it was thought to be the best feeding and wintering sites for these birds because no intraspecific competition was observed regarding feeding and aggression.

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