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ECOLOGY AND BEHAVIOR OF INDIAN PEAFOWL DURING ITS BREEDING SEASON AT PRAYAGRAJ UTTAR PRADESH

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ABSTRACT: The Indian Peafowl (*Pavocristatus*) is national bird of India and currently facing various threats in its entire distribution range. A short study was conducted to understand the general ecology and behavior of Indian Peafowl, to assess its habitat, roosting preference and activity pattern during breeding time in and around Riverside of Yamuna(Arailghat road) Prayagraj, India. It was found that male peafowl spent their maximum time in walking, calling and displaying in open areas to attract females in the study period. The sex ratio is highly skewed towards females. The roosting pattern reveals that the highest number of female peafowl roost together on the trees of ***Acacia nilotica*** (babul) and *Neolamarckiacadamba*(kadam),*Ficusracemosa* (gular),whereas males roost singly on the top of large trees. In the rural area, it is particularly partial to feed on crops and garden plants and sometime on insects and live feed. The data suggest that in Prayagraj, the peafowl population is declining due to increased use of pesticides and herbicides in crop-fields, increase number of feral dogs in wild and habitat loss due to increases number of human population and contraction areas. These are also major causes of the population decline; hence need adequate conservation attention and public participation.

Keyword: Display, sex-ratio, roosting pattern, population decline.

The Indian Peafowl (*Pavocristatus*), also called Blue or Common Peafowl, is the largest among the pheasants. It was declared as the National Bird of India in 1963 due to its 'Flagship' value found on its glorious position in mythology. It belongs to the family Phasianidae (commonly called as pheasant) and order Galliformes (**Ali and** Ripley, 1989; Johnsgard, 1986). The physical appearance and behavior of peafowl have always created interest and intrigued by naturalists since long back. The distribution of peafowl is almost widespread and quite common in northern India, but due to the high demand of its train feathers, it is presently under threat. It is a bird of scrub-jungles and forest edges, showing affinity to moist, dry deciduous and semiarid biomes. It is also found in agricultural fields, along streams with good vegetation and close to human habitations in a semi-feral condition (Johnsgard, 1986).It roosts on trees and also uses tall buildings where trees are scarce. Indian Peafowl are reported to be polygamous (Ali and Ripley, 1969), polyandrous (Lank *et al*., 2002) and have a lek like mating system, where males defend small and clumped territories in their breeding season (Hillgarth, 1984, Rands*et al*., 1984, Loyau*et al*., 2007).

The functions of the elaborate iridescent coloration and large "train" of peacocks has been the subject of extensive scientific debate. Charles Darwin suggested that they served to attract females, and the showy features of the males had evolved by sexual selection. More recently, AmotzZahavi proposed in his handicap theory that these features acted as honest signals of the males' fitness, since less-fit males would be disadvantaged by the difficulty of surviving with such large and conspicuous structures.

The Indian peacock has iridescent blue and green plumage, mostly metallic blue. Females are a little smaller than males in terms of weight and wingspan, but males are significantly longer due to the "tail", also known as a "train" The peacock train consists not of tail quill feathers, but highly elongated upper tail coverts. These feathers are marked with eyespots, best seen when a peacock fans his tail. Both sexes of all species have a crest atop the head. The Indian peahen has a mixture of dull grey, brown, and green in her plumage. The female also displays her plumage to ward off female competition or signal danger to her young.

RESEARCH METHODOLOGY

The Investigation are Conducted in Prayagraj Uttar Pradesh, at the confluence of the Ganges and Yamuna. Prayagraj is well placed geographically and culturally. Prayagraj has a humid subtropical climate common to cities in the plains of North India. The annual mean temperature is 26.1 °C (79.0 °F); monthly mean temperatures are 18–29 °C (64–84 °F).Prayagraj has three seasons: a hot, dry summer, a cool, dry winter and a hot, humid monsoon. Summer lasts from March to September with daily highs reaching up to 48 °C in the dry summer (from March to May) and up to 40 °C in the hot and extremely humid monsoon season (from June to September). The monsoon begins in May, and lasts till August; high humidity levels prevail well into September. Winter runs from December to February with temperatures rarely dropping to the freezing point. The district falls under the central Ganga alluvial plain .Ganga and Yamuna are the most important rivers of the district. The holy Ganga and Yamuna confluence in middle of the district at Prayagraj and flow in the shape of 'Y' which divide the district in three physiographic tracts

namely Trans-ganga region, doab region and Trans Yamuna region. The northern part of Prayagraj district, Known as Gangapur and the northern region of Prayagraj is known as Yamuna par, as the party hilly and agriculturally backward**.** The Study was conducted during the month of March to July .The behavioral data of Indian peafowl was collected from the 3km radius on arailghat road along the Yamuna River. Extensive survey works in the 3km radius area and locates the specific area where to observed peacock behaviors easily. The following variables were recorded during first appearance of the area is type of habitat, sex identification, age distribution, weather condition, vegetation cover and any kind of disturbance or threats.

During present study, all individuals of peafowl were classified into three categories: Adult males, sub- adult males and females. Scan sampling is a technique of observing and recording animal behavior with time intervals under this method, one records the activity of individuals at pre-selected time intervals.

Trail survey: It was carried out during early morning and early evening hours. During walk on the field, all the sightings of peafowl were recorded on data sheet. The male and female peafowl were distinguished by their neck color appearance, i.e., males recognized by blue neck and female recognized by green neck. Sub-adult males were recognized by the tail feather's length. Thirdly, age and sex of all sightings, each and every sighting of peafowl individuals were counted and sex was recorded by neck color and age by the length of the tail feathers of males only in the Indian peafowl is closely related to the monsoons, and therefore the timing in the year varies according to locality. In our study area, displaying by males started in April and continued until the last week of June when the first rains stated in the region. The birds were located each day and observed until 30 min and they disappeared into the woods. During mid-day the birds retreated into dense vegetation and were not observed.

Additionally, photographs and videos were also under taken of male, female and adults male behaviors. Habitat wise peafowl status evolved through regular monitoring in and around 3 km radius of Arail Rd. Both direct (walking along the study area during late evening and early morning to flush the roosting birds and locate the trees) and indirect methods (searching the piles of drooping under the big trees) were used to locate and identify the roost trees for habitat analysis.

Duration of displays was measured during the scan sampling using a stopwatch timed as the period that the tail of the male was fanned. The duration of display was recorded independent of the scan samples.

Tools used in research includea mirror less camera, Sony a7mark3 with Sony 200-600mm lens was used to recording image and videos of the bird behavior, a mobile phone for recording weather forecasting, time and location using GPS.

RESULTS AND DISCUSSION

Habitat preference for Feeding /Breeding: The habitats used by Indian peafowl was categorized as follows: 'river bed' which was sandy and dry throughout the period of study, with only few scattered waterholes; 'open flat' areas supporting short or tall grass with scattered trees termed 'grassland'. Occasionally, such areas had profuse growth of Cassia tora and Parthenium. This area was dominated by the exotic weed Lantana camara; 'Miscellaneous forest' surrounded around the grassland and it had trees such as Salvadora species, Acacia nilotica, Cassia fistula, Ficusreligiosa, Ficusracecemosa etc.Observations from study area showed that males were recorded spending more time on activities like standing, walking, running, roosting, calling, displaying, preening; some activities were restricted like fighting and flying. Females consumed most of the observed activity time in feeding, standing, walking followed by other activities like running, roosting, flying, and preening.

Indian Peafowl are ground foragers and they were found to spend more time in feeding as compared to other activities. The time spent in foraging activities was more in early morning when they come out from their nocturnal roosting sites and also in late afternoon in the study areas. At study area males used to spend less time in feeding then female. The most common activity of Indian Peafowl was feeding followed by standing and walking. During breeding season, Indian Peafowl spent more time in standing, roosting, displaying and preening and less time in feeding than in later days. Standing seemed to be an important behavioral state for a predominantly ground living bird like Indian Peafowl, as it enabled the bird to be in vigilant from predators and human disturbance. This posture may have enabled the adult males to locate groups of females from a distance .Males spent their maximum time in walking, calling, displaying in open areas to attract females. When disturbed, they usually escape by running and rarely take flight.

Table-1: Scan sampling data of different behaviour of Indian peafowl in interval of 5 min. (April)

Time (min)	Feeding	Walking	Running	Standing	Flying	Roosting	Preening	Display
0	6	1	2	5	-	3	1	1
5	5	3	1	4	-	3	3	1
10	7	4		3	-	3	1	1
15		7	8		-	3		1
20	6	3	2	2	-	3	2	1
25	7	3	-	5	-	3	-	1
30	4	3	1	2	2	3	3	1

Table-**2:** Scan sampling data of different Behaviour of Indian peafowl in interval of 5 min. (May)

Time(min)	Feeding	Walking	Running	Calling	Standing	Flying	Roosting	Preening	Display
0		5	-	-	-	-	-	2	-
5	3	2	-	-	2	-	-	-	-
10	5	1	-	-	-	-	-	1	-
15	4	2	-	-	1	-	-		-
20	4	1	-	-	2	-	-	-	-
25	2	2	-	-	2	-	-	1	-
30	3	2	-	-	-	-	-	-	2

Table- 3: Scan sampling data of different behaviour of Indian peafowl in interval of 5 min. (June)

Time (min)	Feeding	Walking	Running	Calling	Standing	Flying	Roosting	Preening	Display
0	3	-	-	-	1	-	-	1	-
5	3	-	-	-	-	1	-	1	-
10	3	-	-	-	1	-	-	1	-
15	3	-	-	-	1	-	-	1	-
20	3	-	-	-	-	-	-	1	-
25	3	-	-	-	-	-	-	1	1
30	-	-	3	-	-	-	-	1	1

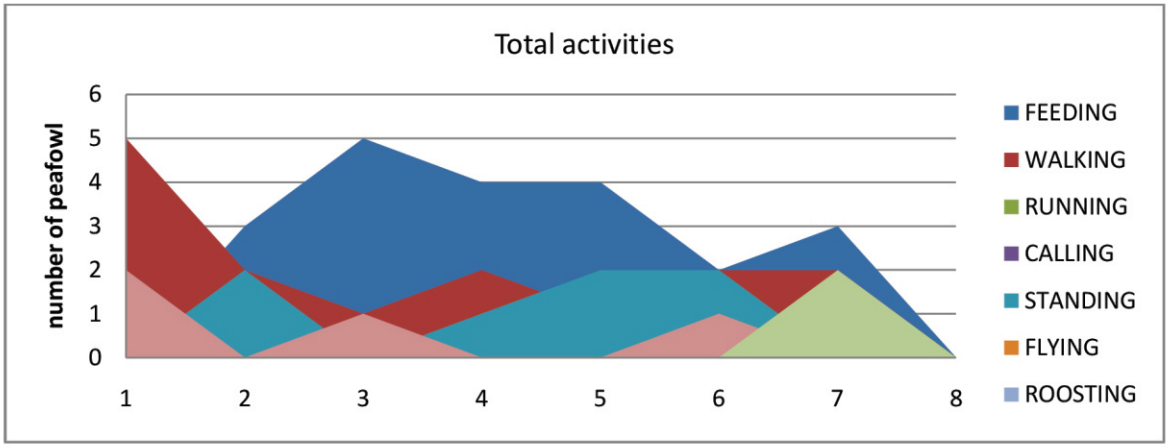

Fig. 1. Daily activities of Indian peafowl in the month of April.

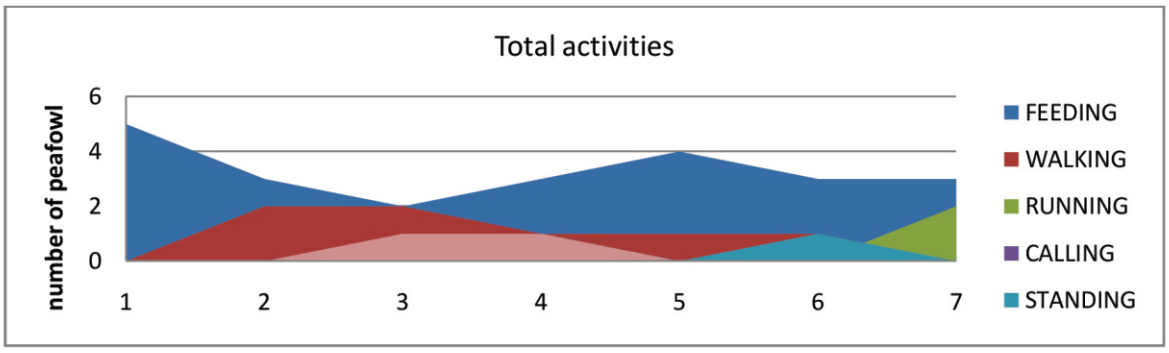

Fig.2. daily activity of Indian peafowl in the month of May.

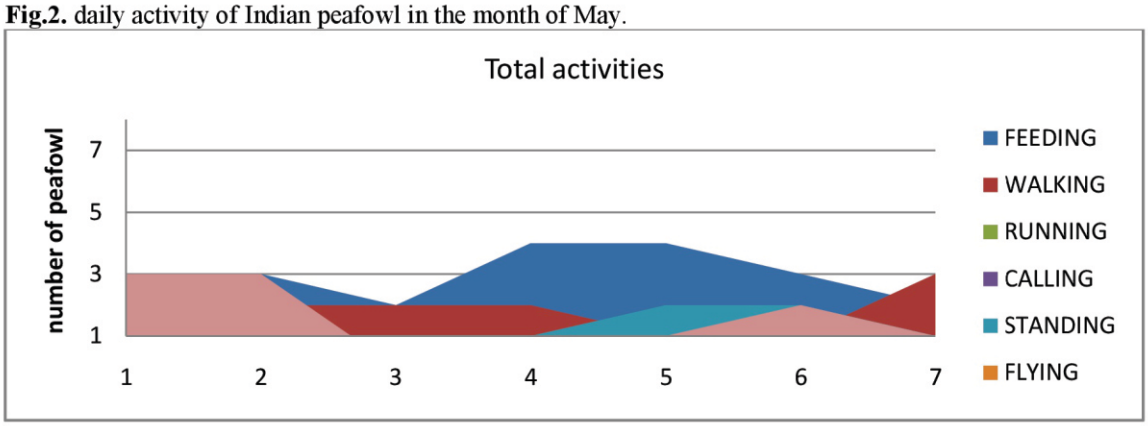

Fig-3: Daily activity of Indian peafowl in the month of June.

These graphical presentation of daily activity of Indian peafowl shows that most of the time peafowl are spending time in feeding, walking and standing.

- X Axis represent the time during the occurrence of behavior and the y axis represent the number of peafowl.
- In respective graphical presentation we see the most number of peafowl spending their time in feeding, walking and standing.

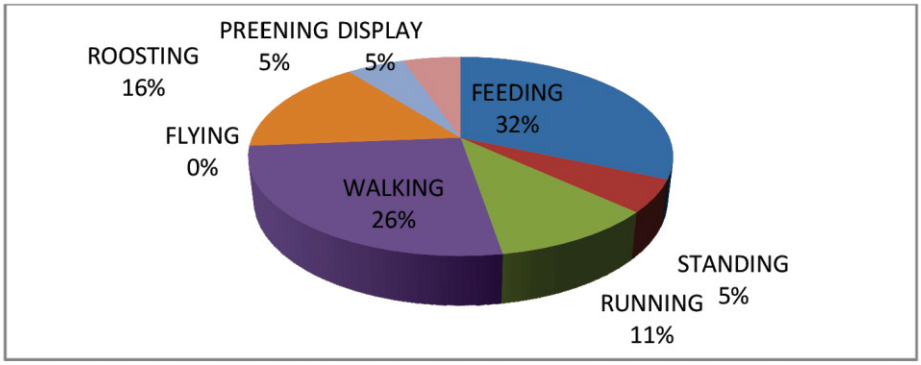

Fig.4. Pie chart of behavior wise daily activities of Indian peafowl during breeding season in Prayagraj.

This pie chat shows that Indian peafowl mostly spending their time in feeding and walking during its breeding season. Mainly female and sub adults are high in number in compare to the adult male. Only few number of peacock spending their time in displaying, preening in the breeding season to attract the female.

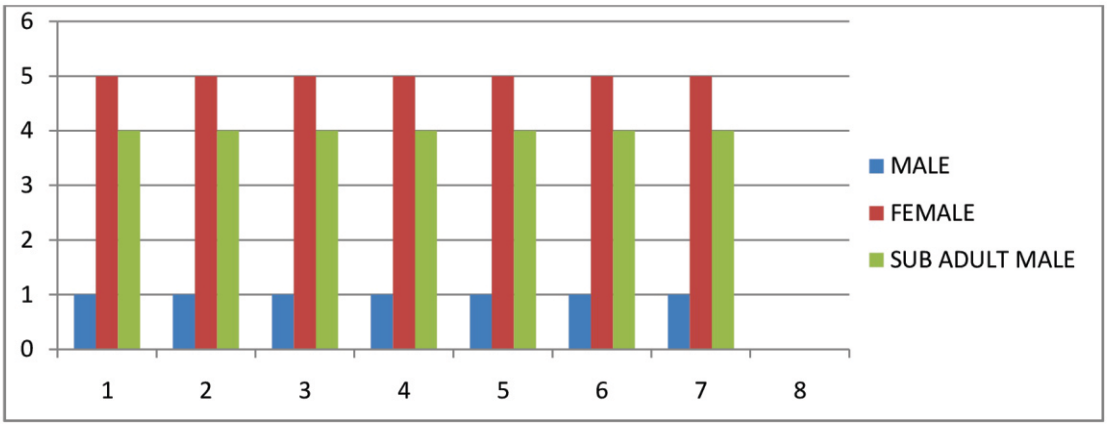

Fig.5.**Sex-wise distribution of peafowl population.**

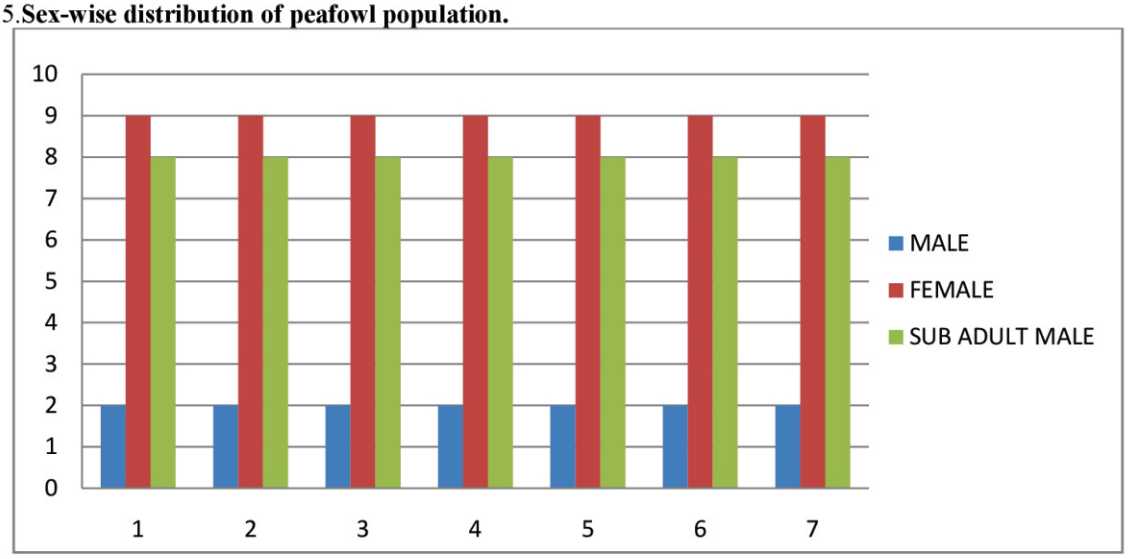

Fig.6. Sex-wise distribution of peafowl population.

This graphical presentation shows the sex ration or population distribution is not equal to male and female.

- X Axis represent the time during occurrence of behavior and the y axis represent the number of individual peafowl in study area.
- The variation in sex ratio shows the higher number of female peafowl and lower number of adult male present in the study area.

Breeding Behavior:-

Peacocks are polygamous. They have a lek like mating system, where males defend small and clumped territories in their breeding season. Several males may congregate at a lek site and these males are often closely related. Males at lek appear to maintain small territories next to each other and they allow females to visit them. The male peafowl display their magnificent trains and use loud calls to attract a harem of three to five females. The wings are held half open and drooped and it periodically vibrates the long feathers producing a ruffling sound. The peacock faces the hen initially and struts and prances around and sometimes turns around to display the tail. Males may display even in the absence of females. When a male is displaying, females do not appear to show any interest and usually continue their foraging. Females do not appear to favor specific males. The females most often mate with the males who have the most eyespots on their fans and the largest displays. Males may also freeze over food to invite a female in a form of courtship feeding.

Table-4: Table shows that the pattern of displaying behavior of adult male peacock towards female and the number of eyespot present in their wings.

Distance from female (meter)	Number of eyespot	Wing rotation	Wing shaking
0-1	127-164	2	6
1-2	120-145	5	8
2-3	139-158	3	9
3-4	127-157	7	12

Female choice and congregation

Multiple hypotheses attempt to explain the evolution of female choice. Some of these suggest direct benefits to females, such as protection, shelter, or nuptial gifts that way the female's choice of mate. Another hypothesis is that females choose mates with good genes. Males with more exaggerated secondary sexual characteristics, such as bigger, brighter peacock trains, tend to have better genes in the peahen's eyes. These better genes directly benefit her offspring, as well as her fitness and reproductive success. Runaway selection also seeks to clarify the evolution of the peacock's train. In runaway sexual selection, linked genes in males and females code for sexually dimorphic traits in males, and preference for those traits in females.

Roosting Behavior

The roosting behaviors of Indian Blue Peafowl gives us lot of management strategies to safe guard the trees in the relevant habitats. But information on the roost selection is a vital component in the overall habitat selection process. However, very limited information is available on the roost study of Indian Blue Peafowl. **Ali and Ripley (1983)** have reported that large birds need tall trees and small birds need small trees for roosting. Roosting site selection plays a pivotal role in the nesting success of any species. Judicious selection of the roosting site enhances the survival of birds, by virtue of reduced heat loss, information sharing, accountability of population and better protection from predators.

The roost comprises of adult males, females, sub-adults. The roost height, canopy cover and habitat play a vital role in choosing the roost trees by Peafowl. Peafowls preferably roost on high, open trees so that they could get vision from all directions; and they generally select the tallest trees for roosting in forests in order to protect themselves from the tree-climbing, night predators such as the leopard and other cats. We found some banyan trees (Ficusbengalensis) served as the roosting site for peafowl. Roosting of the peafowls is very closely related with the sunset but temperature has no relation with roosting.

According to the observations peafowl roost in their habitats during their inactive period (i.e., noon and in late evening hours) on dominant tree species. There was 16 species of trees for roosting, namely, *Acacia nilotica, Dalbergiasissoo, Eucalyptus hybrid, Ficusbengalensis, Ficusrumphii, Ficusracemosa, Syzygiumcumini, Tectonagrandis, Mangiferaindica, Populus populous, Azadiractaindica, Prosopsisjuliflora, Ziziphusmauritina, Delonixregia, Vachellianilotica, Peltophorumpterocarpum*. The peafowl preferred the primary and secondary branches for roosting .The Peafowl in districts of Uttar Pradesh are seen roosting on large and old Sheesam trees, peepal trees, chirol, Gulmohar, Neem, imli, etc. They are also seen resting on human constructed buildings during the day time. Roosting site may enhance the survival of birds, by virtue of reduced heat loss, information sharing and better protection from predators under the wildlife management practices.

Table- 5: Tree species prefer by Indian peafowl for roosting purpose in Prayagraj.

Common name	Scientific name	Family
Babul or gum Arabic tree	*Acacia nilotica*	Fabaceae
shisham	*Dalbergiasissoo*	Fabaceae
Eucalyptus	*Eucalyptus*	Myrtaceae
Banyan	*Ficusbengalensis*	Mulberry
Bodhi,Pakur	*Ficusrumphii*	Moraceae
Gular, Dumur	*Ficusracemosa*	Moraceae
Jamun	*Syzygiumcumini*	Myrtaceae

Teak	*Tectonagrandis*	Lamiaceae
Mango	*Mangiferaindica*	Anacardiaceae
popular	*Populus populous*	Salicaceae
Neem	*Azadiractaindica*	Meliaceae
Vilayati babul, jungle kakur	*Prosopsisjuliflora*	Fabaceae
Gulmohor	*Delonixregia*	Fabaceae
Babul	*Vachellianilotica*	Fabaceae
Copper front, yellow frame	*Peltophorumpterocarpum*	Fabaceae

Conclusions

It could be inferred that the time spent by Indian Peafowl in feeding activity was greater as compared to other activities at study Areas. Display activity was found to be related with breeding season and was not triggered by a female. The initiation of display seemed to be unrelated to the female's presence. In the present study, preening was noticed in adult and sub adult male compare to female. Indian Peafowl preferred big tree with maximum height to hover all around area and to protect them from over external disturbance. No significant relationship was found between the behavioral activities performed by males and females at the study location. The present study emphasizes the need for habitat specific, sex specific and season specific in situ behavioral activities of Indian Peafowl in agricultural areas. The Indian peafowl is known for its adaptive nature, a factor responsible for its extended and cherished association with the population in India. The diverse culture and religions of India has valued the absolute charisma and unrivaled gorgeousness of the Peafowl. Conservation of the Indian National Bird is important ecologically and ethically. Control the feral dog population to overcome an upcoming threat for the peafowl population. It is critical that urgent efforts are made to understand the habitat and population status of the species through field based research and in situ conservation projects. The present study may be useful in order to increase the information's regarding peafowl habitat, behavior and distribution status on the riverside of Yamuna, Prayagraj.

References

Ali, SD. (1969)Handbook of the birds of India and Pakistan. Vol. III. Oxford University Press Bombay, India, 1969.

Ali, SD. (1989) Handbook of the birds of India and Pakistan. Second edition. New Delhi: Oxford University Press, 1989

Ali, SD (1980) Handbook of the birds of India and Pakistan 2 (2 Ed).Oxford University Press, 1980, 123- 126.

Altman J (1973) Observational study of behavior: sampling methods. Behaviours, 1973, 227-267.

Armstrong AA (1977) Bird display and behavior an introduction to the study of bird psychology. Lindsay Drummond Ltd, England, 1947.

Chakkaravarthy QQ (2002) Call to save our national bird, Indian peafowl (Pavocristatus). Proceedings of the National Symposium on Galliformes, Division of Wildlife Biology, AVC College, Bharathidasan University, Tamil Nadu, 2002, 77-78.

D Hoyo J *et al*. (1994) Handbook of the Birds of the World. New World Vultures to Guineafowl –Lynx Edicions, Barcelona, 1994; 2:434-552.

Dodia, P. P.,(2011). Roost Tree Selection by The Common Indian Peafowl Pavocristatus at Bhavnagar District, Gujarat (India). Life sciences Leaflets, 11: 346–354.

Gadgil M.(1972) The function of Communal roost: relevance of mixed roosts. Ibis. 1972; 114(4):531-533. 8.

Gadgil M, Ali S. Communal roosting habits of Indian birds. J Bombay Nat. Hist. Soc. 1975; 72(3):716-727.

Gadagkar, R., (2003). Is the peacock merely beautiful or also honest? Current Science, 85: 1012–20.

Harikrishnan, S., K. Vasudevan, and K. Sivakumar, (2010).Behaviour of Indian Peafowl Pavocristatus Linn. 1758. during the mating period in a natural population. The open ornithology, 3: 13–19.

Hillgarth N. Social organization of the wild peafowl in India.J world pheasant Assoc. 1984; 9:47-56.

IUCN (2008) Pavocristatus. In: Red List of Threatened Species, IUCN, 2008.

Johnsgard PA (1986) The pheasants of the world. Oxford University Press.New York, 1986.

Johnsigh AJT, Murali S (1999) The ecology and behavior of the Indian peafowl (Pavocristatus) Linn. Of Injar, Tamilnadu. J Bom Nat. Hist. Soc. 1978; 75:1069-1079.

Johnsingh AJT (1976)Peacocks and cobra. J Bombay Nat. Hist. Soc. 1976; 73(1):214.

Lank DB, S CM, Hanotte O, Ohtohen A, Bailey S, Burke T.High frequency polyandry in a lek mating system. Ecol 2002; 13:209-15.

Loyau, A*et al.* (2007a). Iridescent structurally based coloration of eyespots correlates with mating success in the peacock. Behavioral Ecology, 18: 1123–1131. Loyau, A., M. Saint Jalme, and G. Sorc.

Loyau A, Jalme MS, Sorci G.(2007) Non-defendable resources affect peafowl lek organization: a male removal experiment. Behavior.Proc 2007; 7:64-70.

Parasharya BM, Mukherjee A. (1999) Roosting behaviour of Indian Peafowl Pavocristatus. Journal of Bombay Natural History Society. 1999; 96(3):471-472.