

Seasonal Fluctuation in the Migration of Night Heron Bird Population vis-a-vis Environmental Quality: A Case Study of Kulik Wildlife Sanctuary, India

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Abstract: *An endeavour has been made in this paper to assess the environmental quality of a habitat by analyzing migration trend of Night heron bird population. The study has been conducted based on secondary data in particular and primary data in general. Secondary data has been collected from books, journal and official records of forest department, Govt. of West Bengal, India. Quantitative techniques like growth rate of Night heron bird population along with their rate of change in migration at four year interval have been collected. It has been derived that flood in the river Kulik adjacent to the Kulik Wildlife Sanctuary is the foremost causes of fluctuation in the migration of Night heron bird population. This is because of lowering down of environmental quality and dilapidated situation followed by an overall collapse of the ecosystem caused by the occurrence of flood in the sanctuary.*

Keywords: *Bird population, Kulik Wildlife Sanctuary, Night heron, Migration*

1. INTRODUCTION

Kulik wildlife sanctuary is one of the mature dwellings of migratory birds in West Bengal. The wildlife sanctuary having 1.30 km² areas including 0.14 km² as core and remaining 1.16 km² as buffer is located at western bank of the river Kulik near the border with Bihar in West Bengal, India (Negi, 1993). Kulik Wildlife Sanctuary has been considered as the significant breeding colony of Night heron bird population.

Night heron prefers fresh and salt- water wetlands ecosystem, for their breeding habitat. During the night time, they catch small fishes, frogs, aquatic insects, small mammals etc, as food but at the day time they take rest in the trees. Generally, birds like Night heron are quite consistent in their habitat preferences (Murin and Pfeiffer, 2002).

Night herons make nest alone or in colonies on platforms of sticks in a group of trees or on the ground in protected locations. They are usually found in flocks but single birds are not uncommon (Blanford, 1898). Although mostly resident within their range, they make long distance movements in response to weather and food availability. End of June is their migration period, August to September is egg laying period, October to November is their flying period and end of December is their departure period in the Kulik wildlife sanctuary, the study area. *Barringtonia acurangula* (Hijal), *Terminalia arjuna* (Arjun), *Dalbergia sisoo* (Sissoo), *Lagerstroemia speciosa* (Jarul), *Streblus asper* (Seora), *Trewia nudiflora* (Pituli), *Ficus bengalensis* (Bat), *Anthocephalus indicus* (Kadamba), *Alstonia scholaris* (Chhatim) etc, trees are chosen for nesting in the sanctuary under study. The specie is widespread and common in India, Sri Lanka, Burma and Thailand (Rasmussen and Anderton, 2005).

As the river Kulik flows adjacent to the bird sanctuary, the area has got its name 'Kulik Wildlife Sanctuary' and it has become abode of night heron and other migratory birds. The number of birds arrived to a location has strong link with biodiversity of an area that acts as potential indicator of environmental quality (Kumar, 2010). Isolated wetland ecosystem, marshy land and dense forest with long trees have turned the area into an abode of migratory birds. Being one of the colonial nesters,

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Night heron can fly up to 15 miles from nesting colony to feed. Nesting trees are found mainly in core area of the sanctuary although a few trees are also available in buffer zone. Migratory Birds are the key mobile links that contribute to the function of diverse eco-system and prime witness to global climate change (Wormworth and Sekercioglu, 2011). The fluctuation in the migration of any bird population to their habitat raises question about such behavioural differences and may be used to determine the environmental quality of a particular habitat. In order to assess the grade of environmental quality, indices like trend of migration, food and habitat characteristics may be taken into consideration in evaluating the environmental health of a locale (Chatterjee, 2001).

Biological monitoring as given by Koskimies (1889) shows that environmental change cannot be estimated by single or a number of factors due to intricate and inconsistent results but observation of bird's migration is comparatively reliable and easily understandable.

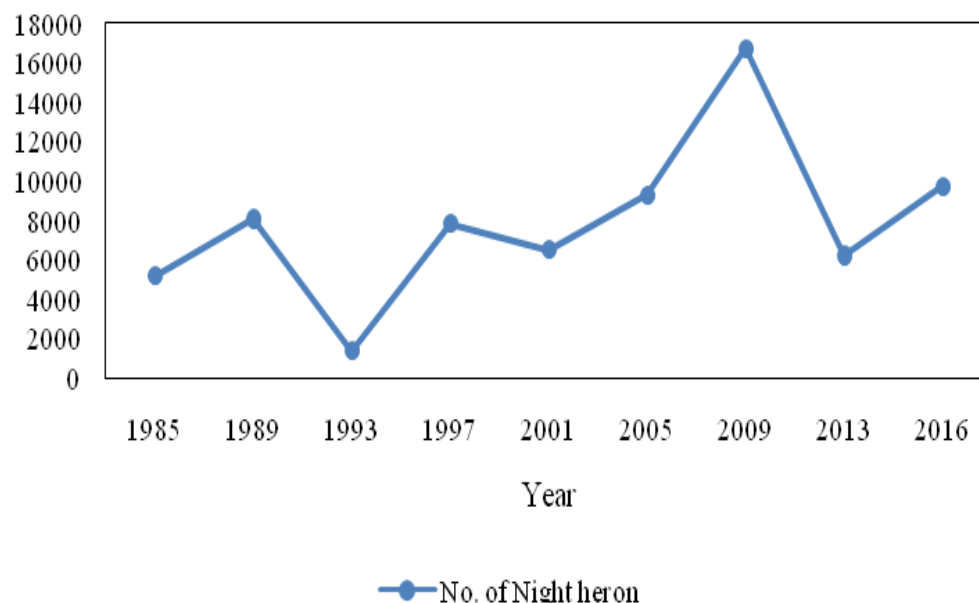
Birds are considered as good indicator of environmental quality (Johnson, 2007). The migration trend of bird population can tell about how well the ecosystem of an area performs. Like other birds; Night heron, one of the specialized species found in Kulik Wildlife sanctuary can indicate environmental quality as they need very specific nesting requirements and are dependent on clearly defined food habits. In the wetland ecosystem of Kulik Wildlife sanctuary, Night heron prefers to accept nesting sites and breeding in the branches of tall trees. They often prey small fishes and aquatic insects of wetland, pond and water bodies adjacent to their habitat. Therefore, any type of lack of such food and shelter resists them to come at their usual habitat. On the contrary, paucity of food and shelter in the sanctuary is found acute during flood period because of scarce food and shelter. The sanctuary experiences significant degraded environmental quality during flood time that lasts long even after long days of flood. Since the number of Night heron bird population is found declining in the sanctuary particularly in the years of flood occurrence, it clearly indicates illness of the habitat.

2. MATERIALS AND METHODS

The study was carried out based on secondary data in particular and primary data in general. Secondary data was collected from different books, journals, websites and official records of various departments particularly forest department, Govt. of West Bengal. For easy interpretation, quantitative techniques like growth rate of Night heron bird population along with their rate of change at four year interval have been calculated.

3. RESULTS AND DISCUSSION

In the year 1989, there was positive growth (+ 55.80%) in the migration of Night heron bird population, if compared with the influx of 1985.



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Figure: *Fluctuation in the migration of Night heron*

But in 1993, there was significant decrease in their arrival (-83.80%) if compared with the year 1989. There was again extreme positive growth (+ 475.92 %) in their arrival in 1997 as compared to 1993 (Table-1).

Table1. *Percent Difference in the migration of Night Heron*

Year	No. of Night heron	% of birds between the year (N1-N2)/N2*100
1985	5168	-
1989	8052	55.80
1993	1362	-83.08*
1997	7844	475.92
2001	6512	-16.98*
2005	9284	42.57
2009	16720	80.09
2013	6192	-62.97*
2016	9710	56.82

Negative growth rate of bird population was again found (-16.98%) in the year 2001 in comparison to previous year 1997. In the year 2005 and 2009, there was positive growth in their arrival, 42.57% and 80.90% respectively. Again the arrival of bird population was decreased in 2013 (- 62.97%) After three years i.e. in 2016, there was again positive growth (56.82%) in the migration of Night heron bird population to the sanctuary. So, there has always been noticed a fluctuating trend in their arrival.

Birds live in an environment that is subject to both regular and irregular fluctuations, and bird populations respond to these changes in predictable ways (Stanley and Wiens, 1989). This sort of fluctuating trend in the migration of Night heron bird population in Kulik Wildlife sanctuary has raised question about their inconsistent arriving behaviour. In rainy season, when intense rainfall occurs, water level rises in the river and the sanctuary is inundated. Long day inundation causes damage of nesting tress and crisis of available aquatic food of the migratory birds particularly Night heron. As the flood water enters in the sanctuary, very often, their nests with baby birds fall down with the nesting tress for loosening the roots of the trees with the soil. In addition, foods that are purely aquatic in nature are hardly available for long time inundation. Naturally, they feel insecure to make shelter in the post flood period for long time disturbed environment of the sanctuary as the entire ecosystem is badly affected. In this way, their behavioural change in the form of refusal for nesting takes place that ultimately shows degrading environmental quality of the habitat because of the washing out of their foods with the flood water, destruction of nesting trees due to long time inundation of the sanctuary (Table-2).

Table2. *Impact of flood on the migration of Night heron*

Year	Night heron birds population	Percent of decrease
1992	5060	-73.08
*1993	1362	
1996	8176	- 4.06
*1997	7844	
2012	7356	-15.82
*2013	6192	

Source: *Computed by Authors; *Flood year*

By examining the rate of change in the migration of Night heron bird population, not only the trend of their influx but also the environmental health of the habitat required for their nesting, breeding and survival are known. Here, the common assumption is that if the rate of change is lower, there seems to be a deficiency in environmental requirements or ecological imbalance and vice versa (Basu Roy and Sah, 2013). While analyzing the rate of change in the migration of Night heron, significant fluctuating trend was noticed. There was a declining trend in their influx in 1993, 2001 and in 2013 (Table-3). In depth study about their irregularity strongly points out the occurrence of flood as the only cause of

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such decline in their migration in these years. Therefore, breeding of birds is affected by flooding significantly (Rogers and Ralph, 2011).

Table3. Rate of Change in the migration of Night Heron

Year	No. of Night heron	(P1-P0)/t	(P1+P0) / 2	$R = \frac{(P1-P0) / t}{(P1+P0) / 2} * 100$
1985	5168	-	-	-
1989	8052	721	6610	10.91
1993	1362	-1672.5	4707	-35.53*
1997	7844	1620.5	4603	35.21
2001	6512	-333	7178	-4.64*
2005	9284	693	7898	8.77
2009	16720	1859	13002	14.30
2013	6192	-2632	11456	-22.97*
2017	9710	879.5	7951	11.06

Source: Computed by Authors; *Occurrence of Flood

Here R = Rate of Change, P1= Bird population of later year and P0= Birds population of previous year whereas t = time of interval.

4. CONCLUSION

It is fact that birds like Night Heron are good indicator to know the environmental quality of a habitat. A disturbed habitat in any form commonly discourages birds to migrate to their locale. Similarly birds try to avoid habitat that is vulnerable or likely to be uninhabitable. This type of behavioural or physiological alteration among bird population is due to the habitat unsuitable for their nesting, breeding and food. Therefore, birds strive to indicate the downtrodden quality of their habitat; suggest restoring their habitat in sustainable way. The sensitivity of Night heron bird population to function the wetland ecosystem of Kulik Wildlife sanctuary properly has made them reliable indicator of environmental quality of habitat.

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