Study on Variation in Habitat use of the Cotton Pygmy-goose in Kadamani wetland, Assam, India

Sanjib Upadhyaya

Department of Zoology, T.H.B. College, Sonitpur 784 189, Assam, India

ABSTRACT

The Kadamani wetland, a perennial wetland is an important biodiversity site of Assam, India with an area of 15 hectares. The habits of the Cotton Pygmy-goose (CPG), *Nettapus coromandelianus coromandelianus* Gmelin and its habitat use were studied previously during June 2012 to August 2013 and recently during June 2021 to August 2022 at the Kadamani wetlands of Assam from five different zones by *observational scan* and *ad libitum* methods. Altogether twenty two and fourteen birds were encountered respectively, and tracked to study their habit during all the three sessions of a day, *i. e.* morning, day and dusk with a continuous 15-20 minutes observation (N=30, N=16). The study showed a special pattern of habitat use during the days in both the periods of study. CPGs that were tracked at least twice were included for summarizing the daily habitat use (N= 22 and 14 birds; 80 + 31 locations). In the morning session, during 2012-13, the zone-wise habitat use was found to be 4% (east), 7% (west), 12% (central), 12% (north) and 65% (south); while during 2021-22 the frequency were found to be 2%, 10%, 27% 12% and 49% respectively. Zone-wise maximum habitat use was found to be a total of 65% of time in south zone in the morning session, while in the day it was 43% of the time in the central zone and 44% in the south zone during dusk. Again, there is distinct seasonal variation was observed during the two study periods, *i.e.*, in 2012-13 and 2021-22. The goose preferred to feed in the wetland during all the seasons of the year with a high frequency during the winter season (44% & 38% respectively). The birds that were tracked at least twice were included in results summarizing seasonal habitat use (N= 56 birds; 1240 minutes in 130 locations).

Key words*: Breeding, Crepuscular tracking, Diurnal, Dusk and vegetation.*

Introduction

Each species of birds has its special habitat, and habitat selection is an important feature of behavior and population dynamics (Fretwell and Lucas, 1970). The Cotton Pygmy-goose, *N. coromandelianus coromandelianus* Gmelin is the smallest and a resident species in the fresh water or slightly brackish water pools of the Indian Subcontinent. It prefers more or less open waters having reedy borders, and plenty of aquatic vegetation and aquatic fauna. It is gregarious, and flocks of 6 to 15 birds are of common occurrence. Their food consists of rice grain, especially the seeds of wild rice, commonly called *Pasaie* in Northern India and of the shoots of various kinds of aquatic plants, worms, aquatic insects, and their larvae (Mukherjee, 1972). It is mainly vegetarian; it feeds on shoots, corns and seeds of aquatic plants, grains of cultivated and wild rice. Occasionally prefers crustacean, worms and insects and their larvae (Balachandran and Rahmani, 2005). Aquatic invertebrates dominate in the diets of breeding hens and ducks, providing an external source of essential amino acids for egg production. The feeding behav-

(Asst. Prof.)

S136

Eco. Env. & Cons. 29 (October Suppl. Issue) : 2023

ior in the Mediterranean duck community was studied by Green (1998) in relation to its habitat use as a whole. Measuring habitat preference often has been done simply by relating habitat utility to its availability (Neu *et al.*, 1974; Alldredge and Ratti, 1986). The present paper deals to evaluate the habitat utilization pattern in relation to the vegetation structure during the breeding and non-breeding seasons of Cotton Pygmy goose, *Nettapus coromandelianus coromandelianus* Gmelin during 2012-13 and 2021-22.

Methodology

The habit and habitat use by the Cotton Pygmy goose was studied during June to August 2012-2013 and 2021-2022 at Kadamani wetland of Assam. The Kadamani wetland lies in Biswanath part of Sonitpur district of Assam, between $26^0 42' 22''N$ to $26^0 43' 18''N$ and $93^0 07' 16'' E$ to $93^0 07' 43'' E$ and is more or less perennial in nature with an area of about 15 hectares. The whole wetland can be divided into five zones as per the vegetation pattern of the wetland- east zone, west zone, north zone, south zone and central zone. The 'east zone' and 'west zone' are the sparsely vegetated areas. The 'north zone' and 'south zone' are quite elongated areas towards the north and south of the wetland with *Eichhornia* species in abundance. The 'central zone' is a zone full of submerged vegetation and is with very clean and transparent water.

The *scan* and *ad libitum* methods were used to study the habit of the bird in the wetland. Habitat preference use was determined by observational sampling method of Altmann (1974) to determine the extent of habitat use. Continuous focal sampling was conducted on arbitrarily selected birds for approximately 10 - 12 minutes from a distance of about 75 meters. The sample size taken in the present study was 50, *i. e.* focal observations were made by the time interval for at least 50 times. Undisturbed visible detections were made randomly within each habitat type: (1) at east, west, north and south zones at a random starting point and direction and the first bird encountered of each sex (not of the same pair) was selected as the focal animal, (2) at central zone, one direction was randomly selected (clockwise or counter clockwise) to circumnavigate the wetland, and the first bird encountered was chosen as the focal animal.

To obtain time activity budgets, focal observations were made in each habitat type during the four time-periods: morning (4.30 hours; approx. 04.00–08.30 hours), day (3.30 hours; approx. 09.00 6–2.30 hours) and evening (1.30 hours; approx. 16.00–17.30 hours). The birds (N =72) were tracked for the study of their habit during all the three sessions devoting a total time of 350 minutes with a continuous >12 minutes observation. Focal data were analyzed and the Chi-square *goodness of fit* was tested using computer software.

Results

The results showed a variation in habitat use among the individuals. Altogether twenty two and fourteen birds were encountered respectively during all the three sessions of a day, *i.e.* morning, day and dusk devoting a total time of 600 minutes with a continuous 15-20 minutes observation (N=30, N=16). The study showed a special pattern of habitat use during the days in both the periods of study.

The CPGs that were tracked at least twice were included for summarizing the daily habitat use (N= 22 and 14 birds; 80 and 31 locations) that showed some distinct variations in diurnal habitat use patterns. The crepuscular tracking sessions were characterized by the most active movement, and by use of all the habitat zones. At sunrise, many birds were found feeding at the south zone which moved from there to the central zone and then to the other, while some geese were back to the south zone again. During 2012-13, in the morning session the zone-wise habitat use was found to be 4% (east), 7% (west), 12% (central), 12% (north) and 65% (south); while during 2021-22 the frequency were found to be 2%, 10%, 27% 12% and 49% respectively. Zone-wise maximum habitat use was found to be a total of 65% of time in south zone in the morning session, while in the day it was 43% of the time in the central zone and 44% in the south zone during dusk (Fig. 1abc). Again, there is distinct seasonal variation was detected during the two study periods, *i.e.*, during 2012-13 and 2021-22. The goose preferred to feed in the wetland during all the seasons of the year (Fig. 2) with a high frequency during the winter season (44% & 38% respectively). The birds that were tracked at least twice were included in results summarizing seasonal habitat use (N= 56 birds; 1240 minutes in 130 locations). While comparing the data of seasonal habitat use, they were found to spend 46% of the time for sleeping or rest in winter, while during the summer the birds used the habitat ac-
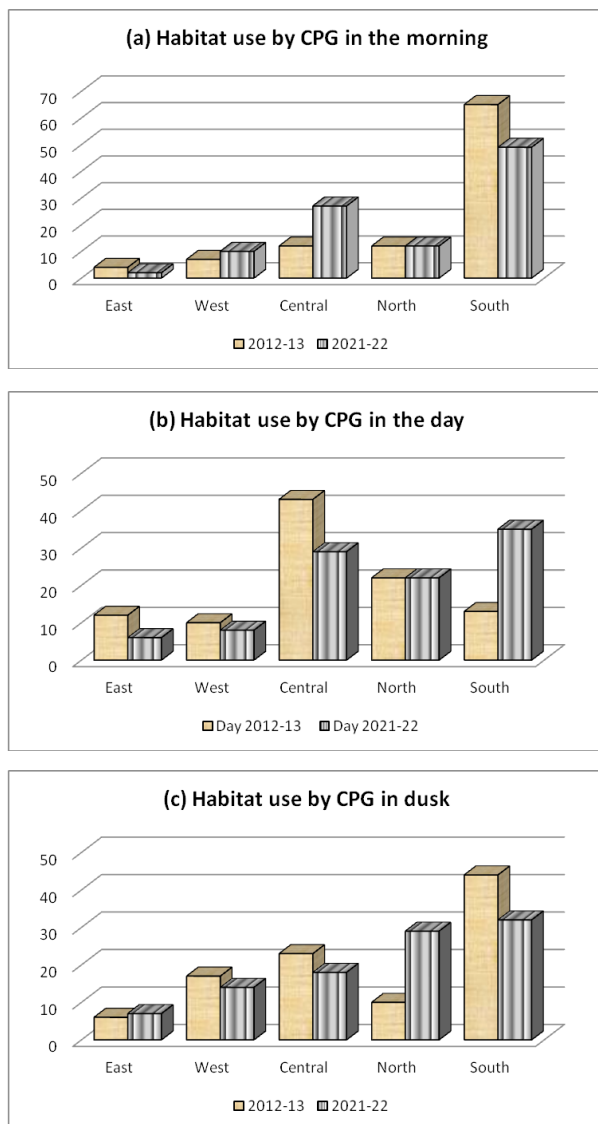
(a) Habitat use by CPG in the morning

(b) Habitat use by CPG in the day

(c) Habitat use by CPG in dusk

Fig. 1. Daily habitat use by the Cotton Pygmy goose during 2012-13 & 2021-23
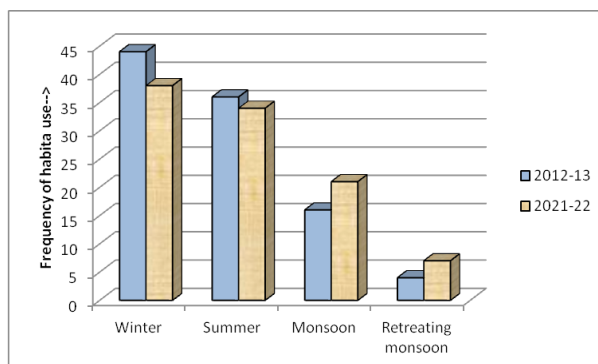

Fig. 2. Seasonal habitat use by the Cotton Pygmy-goose during 2012-13 & 2021-23.

tively (upto 37%). During monsoon season, they used the habitat very actively with frequent and short flights while foraging (11%). The observations indicate that the geese use the wetland habitat actively upto a frequency of 6% with the remaining time being probably spent in concealment under the aquatic vegetation either with the young ones or loafing about during the monsoon season.

Of the total 44% habitat use in winter (2012-13), a maximum 46% of time was found to be spent in winter (sleeping or rest), while only 37% was found to have been spent during summer (foraging) in the wetlands. While with the highest total 38% habitat use during 2021-22 the annual habitat use showed a distinct pattern. Of the various foraging sites, wetlands with submerged vegetation were found to have been maximum used, during all the three years of study.

Discussion

The habitat use during breeding and foraging are opportunistic (Reynolds, 2002). The response of a bird to its environment and the resources it uses may differ during egg laying, broad rearing and molting period and the change in response to weather, in abundance or availability of the resources, and differing physiological requirements depending on the phenology of the species (Recher, 1990). The present studies indicate that the breeding habitat use on full submerged vegetation in the wetlands and brood production is positively correlated with the growth and abundance of vegetation. This suggests that breeding occurs during the periods of high vegetation abundance, *i.e.,* during rainy season. Similar results have been suggested by Perrins (1970) in different species of birds.

Though the CPGs were found in diverse habitats of the wetlands they were found to show definite activity according to the habitat characteristics. Their activity pattern was characterized by concealment and loafing during the day, primarily in the west zone of the wetland. The birds increased their movements between the zones in the evening, with more habitat use for foraging in the morning. Specialization may occur because few resources are available in a particular environment or specific characteristics of the organism may constrain its diet (Recher, 1990).

The behavioral flexibility is believed to provide survival advantages for the animals (Sol *et al.*, 2002).

S138

Eco. Env. & Cons. 29 (October Suppl. Issue) : 2023

The Cotton Pygmy-goose exhibits plasticity in habitat use, foraging tactics, substrate use, diet, and breeding which serves to improve the chances for their successful re-establishment in mammalian predator free habitats. Though the species, as supposed to be, has a vast population without any threats of extinction, it can presumed to be decreasing in number due to habitat loss which is the result of the developmental or agricultural activities at and/or around the wetlands and their nearby habitat areas. The importance of a varied prey base, vegetative cover, a source of fresh water during brood rearing, and the absence of mammalian predators should be emphasized while choosing a suitable habitat for new populations.

References

Alldredge, J.R. and Ratti, J.T. 1986. Comparison of some statistical techniques for analysis of resource selection. *Journal of Wildlife Management*. 50: 157–165.

Altmann, J. 1974. Observational study of behaviour: sampling methods. *Behaviour*. 49: 227 6˜ 267.

Balachandran, S. and Rahmani, A. R. 2005. Habitat evaluation of Chilika Lake with special reference to birds as bio-indicators. Final Report. BNHS, Mumbai 57pp.

Fretwell, S.D. and Lucas, H.L. 1970. On territorial behavior and other factors influencing habitat distribution in birds. *Acta Biotheoretica.* 19: 16–36.

Green, A. J. 1998. Comparative feeding behaviour and niche organization in a Mediterranean duck community. *Can. J. Zool. Rev. Can. Zool*. 76(3): 500–507

Mukherjee, A.K. 1972. Food-habits of Water-birds of the Sundarban, 24 Paraganas District, West Bengal, India-IV. *Journal Bombay Natural History Society.* 71(2): 188–200.

Neu, C.W., Byers, C.R. and Peek, J.M. 1974. A technique for analysis of utilization-availability data. *Journal of Wildlife Management*. 38: 541–545.

Perrins, C.M. 1970. The timing of birds' breeding. *Ibis* 112: 242–255.

Recher, H.F. 1990. Specialist or generalist: avian response to spatial and temporal changes in resources. *Studies in Avian Biology*. 13: 333–336.

Reynolds, M.H. 2002. *The foraging ecology, habitat use and population dynamics of the Laysean teal* (*Anas layseanensis*). Ph. D. Thesis. Submitted to Virginia Polytech. Institute and State University viii+187pp.

Sol, D., Timmerman, S. and Lefebvre, L. 2002. Behavioral flexibility and invasion success in birds. *Animal Behavior.* 63 : 495–502.