

Habitat Preferences and Nesting Ecology of Indian Moorhen (*Gallinula chloropus*) in Lakes and Wetlands of Kashmir Valley.

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Abstract

Little information exists on breeding Indian moorhens (*Gallinula chloropus*) in lakes and wetlands of Kashmir Himalaya. We studied the nesting ecology of Indian moorhens inhabiting Hokersar and Eastern foreshore area of Dal Lake. Nesting sites were dominated by *Sparganium erectum*, *Butomus umbellatus*, *Typha angustata*, *Phragmites australis* and *Salix* tree species and adjacent foraging areas were primarily composed of *Nymphaeae* spp, *Nymphoides peltata*, *Trapa bispinosa*, *Salvinia* spp, *Myriophyllum verticillatum*, *Potamogeton* spp, *Azolla* sp. The mean water depth surrounding nests was 70 cm in Hokersar and 96 cm in Eastern foreshore area of Dal Lake. The population of common moorhen sighted in Hokersar was greater than the population found in the eastern foreshore stretch of Dal Lake as evidenced by the number of birds and nests located from this area.

Introduction

The Indian common moorhen is a breeding bird species in Kashmir valley. Its habitats are wetlands with vast reed beds and edges of lakes with dense vegetation. It is a slaty grey and brown marsh bird with edges to the closed wings and conspicuous undertail coverts. Nest is bulky made up of sedges and weeds on ground amongst aquatic herbage generally in a low shrub near water on the margins of lakes (Ali, 1979). Moorhen breeds in the waterbodies of Kashmir valley from April to August, the young ones are dispersed by August and they live independently while as the adults leave the waterbody on their way back to the plains of India. Quite a number of chicks stay back for their journey next year. The moorhens preferred to inhabit marshes in the wetlands and peripheral thickly vegetated areas of the large lakes. In Hokersar moorhen was found nesting in emergent vegetation (Shah, 1984) and plants comprised 70% of the food of moorhens (Pandit, 1989).

Aquatic vegetation provides food and refuge for water birds (Bartodziej and Weymouth, 1995). In the breeding season, monitoring and the gathering of data on reproductive functions such as breeding biology, clutch size, nesting success, and number of nests are important ways to evaluate breeding habitat and conserve and protect the populations of species, especially vulnerable and endangered species (Robinson *et al.*, 2005). The importance of monitoring programs is frequently stressed in many international and national agreements relating to nature conservation (Straub, 2006). Bird species composition was regulated more by human activity than by plant community composition and that the bird communities were a better choice than the plant communities to index the effect of human disturbance. Though the Kashmir Himalaya lakes and wetlands have been reasonably well studied for water chemistry (Siraj *et al.*, 2011), macrophyte communities (Qadri and Yousuf, 2005) and micro flora

and fauna (Ganaie *et al.*, 2010 and Siraj *et al.*, 2007) but avifaunal ecology has received overall little attention. Hence the objective of this study was to gather information from this unexplored field.

Study area

Hokersar is located 10Km North of the city of Srinagar, Kashmir (34°05' N, 74°40'E) and covers an area of 13.0 sqkm. Most parts of the wetland are covered with the reeds, *Phragmites australis*, *Typha spp*, *Sparganium ramosum* and *Salix* trees. The Hokersar was designated as a Ramsar site and has been identified as an important bird habitat by Wildlife Protection Department, J & K State.

Dal Lake is an urban lake located in the heart of Srinagar city, Kashmir valley (34°07' N 74°52'E). The eastern foreshore area of the lake is dominated by emergent vegetation *Phragmites australis*, *Butomus umbellatus* and *Salix* plantations. The present study was conducted in the accessible sections in the eastern area of the Dal Lake covering a length of 4Kms.

Materials and Methods

The field work of this survey was carried out during 2 breeding seasons from March to November 2001 and 2002. The waterbodies were divided into subunits and population of birds was estimated once every two weeks by visual census and transects method (Gaston, 1975, 1994). Boat visits were carried out and the study areas were searched for nests during the breeding season. The locations of nests were recorded and for each nest a number of parameters were recorded. Firstly we measured parameters relating to the nest site, focussing on habitat quality which could have an effect to breeding success (Sanchez *et al.*, 1998). Secondly we measured parameters relating to the shape and structure of the nest cup and the materials used for building the nests. In order to minimize the disturbance at the nest only the morphological characters of eggs were recorded.

Results and Discussion

In the breeding season of 2001 approximately 30-40 individuals were recorded in emergent vegetation and willow grooves in Hokersar wetland and approximately 10-15 individuals in the reeds and rushes of Eastern foreshore area of Dal Lake. In the breeding season of 2002, 44 nests of Indian Moorhen were located in the two habitat zones of Hokersar wetland and 9 nests were located in the emergent vegetation zones of E F A of Dal Lake (**Table 1**).

Nesting site

Nests were located within emergent vegetation and willow trees in Hokersar wetland and in reeds in EFA of Dal Lake, in which there were small areas of open water. The nest cups were concealed by the stems of reed vegetation. The average closest distance from the edge of the nest cups to an open water area was 5.5 m in Hokersar and 3.2 m in EFA of Dal lake. The average closest distance from the edge of the nest cups to an area with boat traffic was 15.6m in Hokersar 7.6m in EFA of Dal Lake. The average water depth under the nest cups was 0.7m in Hokersar and 0.96m in EFA of Dal Lake.

Nest

In Hokersar wetland the nests of the Indian Moorhen were in most cases constructed within emergent and were hidden from view by vegetation cover and in few cases were constructed in the willow trees

covered by tender willow branches and leaves. The nests had shallow cups and were placed at the bottom of the emergent vegetation clusters, just above the water level or on the muddy sediments. The nests constructed amongst willow branches were also placed just above the water level. 16 active nests with a clutch of 5- 16 eggs were located. The average diameter of the nest cups was 17.9 cm and average height of the edge of the nest cups to the water surface was 10.4 cm.

Table 1: Nesting sites and nests of moorhen at Hokersar wetland and eastern foreshore area (EFA) of Dal Lake (Mean \pm SD).

	Hokersar Wetland			EFA of Dal Lake		
	N	Min-Max	Mean \pm SD	N	Min-Max	Mean \pm SD
1. Diameter of nest cups (cm)	4	16-20	17.9 \pm 1.54	9	14-20	16.45 \pm 2.20
2. Height from the edge of the nest cups to the water surface (cm)		7-15	10.4 \pm 2.23		0.8-1.2	0.99 \pm 0.15
3. Water depth under the nest cups (m)		0.3-1.1	0.7 \pm 0.33		0.6-1.4	0.96 \pm 0.26
4. Closest distance from the edge of the nest cups to the open water (m)		1.2-11.6	5.5 \pm 4.37		1.0-5.9	3.2 \pm 1.86
5. Closest distance from the edge of the nest cups to the boat traffic area (m)		8.0-25.0	15.3 \pm 7.17		3.0-11.0	7.6 \pm 3.25

In EFA of Dal Lake the nests of moorhen were sighted in reeds and rushes, though were hidden apparently by reed stems. The nests were placed just on the water surface and only 4 active nests with clutches of 5-12 brown dotted yellow eggs were located. The average diameter of the nest cups was 16.45 cm and average height of the edge of the nest cups to the water surface was 0.99 cm.

The findings in the present study are in line with the result of Sugden (1979), which states that in many temperate species onset of breeding season depends largely on the availability of nest site and most of the aquatic birds often breed in relation to water level and suitable nesting material. It is stated that Moorhen builds its nest in the dense emergent vegetation of *Typha angustata*, *Butomus umbellatus*, *Sparganium ramosum* and *Phragmites communis*, that provided additional adequate cover and protection from predators (Shah, 1985). Ralton (1972), found that moorhen were nesting in hedge grow or woodland edges in Hutingtoneshire farm ponds. The nesting site seems to vary greatly and nests may be found in water or suspended above it or on mudbanks surrounded by water (Wood, 1974). Doss *et al.* (2009) studied purple swamphen in India, where the average distance between the nest and the edge of the lake was only 2.95 \pm 0.91m and the number of nests recorded was 25. In Anzali wetland of Iran 9 nests including 4 active nests of purple moorhen with 16 eggs were recorded, the nests had shallow cups and were constructed in reed clusters (Najafi *et al.*, 2012). In present study the emergent vegetation and willow grooves were the preferred nesting sites of the bird. The nesting area in present study was

shallow throughout with thick soft sediments. The depth of water under the nest-cups was an average 0.7m and 0.96m in the two study sites. In the present study the nest cups were oval in shape and formed a deep cup. The distance from the top edge of the cup to the water level was 10.4cm and 0.99cm on average. In China the dimensions were however greater than in the present study 17.7 cm (Junhua *et al.*, 2010).

Conclusion

In this study the average closest distance from the edge of the nest cups to an area of boat traffic was 7.6m in EFA of Dal Lake which was less as compared to the average closest distance recorded in Hokersar i.e., 15.3 m and this has a positive correlation with the total number of birds and number of active nests located in the two study areas. Dal Lake being an urban water body with lots of human activities going in and around the system has made it less suitable for the breeding birds. The negative impact of human disturbance on the suitability of the breeding habitat has frequently been emphasized.

References

- Ali, S 1979. *The Book of Indian Birds*. Eleventh Edition. Bombay Natural History Society, Bombay, 187 pp.
- Bartozeij, W. and Weymouth, G. 1995. Waterbird abundance and activity on water hyacinth and Egeria in St Marks river, Florida. *Journal of Aquatic Plant Management*. 33:19-22.
- Doss, D. P. S. Gopu K. N and Sripathik. 2009. Breeding biology of the purple swamphen (*Porphyrio porphyrio*) at Tirunelveli in South India. *The Wilson Journal of Ornithology*, **121(4)**: 796-800.
- Ganaie, S. U., Bhat, S.U., Shah, J. A and Pandit, A. K. 2010. Phytoplankton studies of Hokersar wetland, Kashmir. *J. Himalayan. Ecol. Sustain. Dev.* **5**:157-167.
- Gaston, A. J. 1973. Methods for estimating bird populations. *J. BNHS* . **72(2)**: 272-281.
- Gaston, K. J. and McArdle, B. H. 1994. The temporal variability of animal abundances: measures, methods and patterns. *Philosophical Transactions: Biological Sciences*. **345 (1314)**: 335-358
- Junhua, H.U., Jiang, Z., Yang, D., Hu, H. 2010. Nest site selection by the purple swamp hen in Haifeng, China. *Chinese Birds*. 4: 230-235.
- Najafi, N.N. Kahrom, E. Karami, M. 2012. Preliminary survey of the Breeding biology of the Purple Swamphen (*Porphyrio porphyrio*) in Anzali wetland, South West Caspian sea. *Podoces*. **7(1/2)**: 9-15.
- Pandit, A. K. 1989. Feeding ecology of breeding birds in 5 wetlands of Kashmir. *Indian J. Ecol.* **9(2)**: 181- 190.
- Qadri. H and Yousuf, A. R. 2005. Macrophyte distribution in Dal Lake, Kashmir, during summer. *J. Res. Dev.* **5**:79-85.
- Ralton, J. 1972. Breeding biology of moorhens on Hitingdonshire farm ponds. *Brit. Birds* 65: 246-256.

- Robinson, R.A., Clark, N.A., Lancht, R., Nebel, S., Harrington, B., Clark, J.A., Gill, J. A., Meltofte, H., Rogers, D. I., Rogers, K.G., Evis, B.J., Reynolds, C. M., Ward, R. H., Piersma, T and Atkinson, P. N . 2005. Long term demographic monitoring of wader populations in non-breeding areas, *Wader Study Group Bulletin*, 106: 17-29.
- Sanchez-Lafuente, A. M., J. M. Algantara, and M. ROMERO. 1998. Nest site selection and nest predation in the Purple Swamphen. *Journal of Field Ornithology* 69:563-576.
- Shah, G. Mustafa. 1984. Birds of Hokersar: food, feeding and breeding biology of resident and non-resident birds. Ph. D Thesis, Department of Zoology, University of Kashmir, Srinagar (unpublished).
- Siraj, S., Yousuf, A. R and Parveen, M. 2007. Cladoceran community in Shallabug wetland, Kashmir. *J. Res. Dev.* 7: 67-74.
- Siraj, S. Yousuf, A. R. Parveen, M. 2011. Spatio temporal dynamics of macrophytes in relation to ecology of a Kashmir Himalayan wetland. *Internat. Res. J. Biochem. Bioinform.* 1(4): 84-88.
- Straub, E .2006. The importance of Wildlife monitoring for Evaluating Measure of Habitat improvement , **Agriculture and its impacts on Wildlife- oppurtunities for Cyprus.**
- Sugden, L.G. 1979. Habitat use by nesting American coots in Saskatchewan parks. *Willson Bull.* 91 (4): 599-607.
- Wood, N. A. 1974. The breeding behaviour and biology of Moorhen. *Brit. Birds.* 67: 104-115.