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Habitat selection of Common Moorhen (*Gallinula chloropus*) during Breeding in Impounded Marsh Wetlands in District Bahawalpur, Punjab

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Running Title: Habitat selection of Common Moorhen

ABSTRACT

This study has provided basic insight in to the habitat selection during breeding of common Moorhen in the area of Bahawalpur at different locations. First, of all vegetation, survey was conducted and the 32 flora species were recorded. *Acacia nilotica*, *Prosopis juliflora*, *Dalbergia sissoo, Typha elephantiana*, *Cynodon dactylon*, *Saccharum bengalensis*, *Solanum nigrum*, *Calotropis procera*, *Phoenix dactylifera* and *Zizyphus numularia* were commonly present in the habitat of moorhen. *Typha elephantiana* was the most abundant and preferred for moorhen during breeding season. Moorhen nests were searched through visiting all possible sites and monitoring the activities of the adults at dawn and dusk. Moorhen only used the microsites to build nests on the branches of trees or emergent vegetation bended on water up to 3-5 feet above the water level. These birds used foliage of *Dalbergia sissoo*, *Prosopis juliflora* and *Acacia nilotica* and other nearby vegetation as hide. Water and soil samples of all selected wetland were also collected and analyzed. Data obtained is a major addition in existing meager information on common Moorhen, its habitat use, especially during breeding season along with different wetland parameters preferred by this species in its habitat.
Key words: Habitat Selection, Impounded Marsh, Microsites, Moorhen

INTRODUCTION

The Common Moorhen (*Gallinula chloropus*) is a member of Family Rallidae that usually avoids large areas of water but inhabits all types of wetlands with reed cover (Grimmett *et al*., 2008). They can spread relatively rapidly and colonize a wide range and preferred to live in permanent swamps and areas with stable water level (Robert, 1991). Previously, it was believed that Species have a worldwide distribution but is now thought to overlap with distinct species with geographical variations at the margins of its range and occupy the Palearctic region (Chesser *et al*., 2011).

It is sexually monomorphic water bird, having fresh water ponds, canals to brackish marshy area as its habitat (Cramp & Simmons, 1980). The common moorhen seems to survive in both natural and human-modified areas (Cempulik, 1993) while mostly species of the rail family have gone extinct (Taylor & van Perlo, 1998) or are going to extinct in near future (Collar & Stattersfield, 1994; Takano & Haig, 2004). Moorhens are incredibly intelligent and are exclusive freshwater bird. It is vital to protect the habitat of this beautiful and interesting bird. It can be called as an indicator species of anthropogenic activities (DeLuca *et al*., 2008), but little information has been available about wetland habitat of this species.

This species is a resident, however, detailed study on its ecology and biology is lacking in Pakistan (Ali & Ripley, 1969; Roberts, 1991; Ali, 2002; Grimmett *et al*., 2008). The aim of the present study was to provide additional knowledge of habitat selection of common moorhen during breeding in marsh impounded wetlands of District Bahawalpur, Punjab, Pakistan.

MATERIALS AND METHODS

Study was carried out in district Bahawalpur; various locations viz., (29°07. 415N, 071°45.900E), (29°07. 391N, 071°46.486E), (29°07. 358N, 071°47.361E) between elevation of 107-109 m were selected (Fig. 1). Reconnaissance survey was conducted to selects the study sites within study area. The selected study sites in the study area were visited once a week during breeding period. Nests were searched and emergent vegetation height was estimated around the nest. Vegetation also recorded, listed and identified. Quadrate method was used for the quantitative study of

vegetation at each locality. Physico-chemical properties of soil, water and vegetation distribution were studied. Soil samples at 2 cm depth were collected from each quadrate in labeled polythene bags and transferred to the soil and water testing laboratories for research, Bahawalpur, Agriculture Department, Govt. of Punjab for chemical analyses. Soil PH, and humidity was measured. Soil texture and water holding capacity were determined by following the methods described in AOAC (1984). Electrical conductivity was measured. The ionic concentration (Na, K) of soil samples was noted and phosphorus was recorded. Data were analyzed by comparing different habitat selection of moorhen during breeding season.

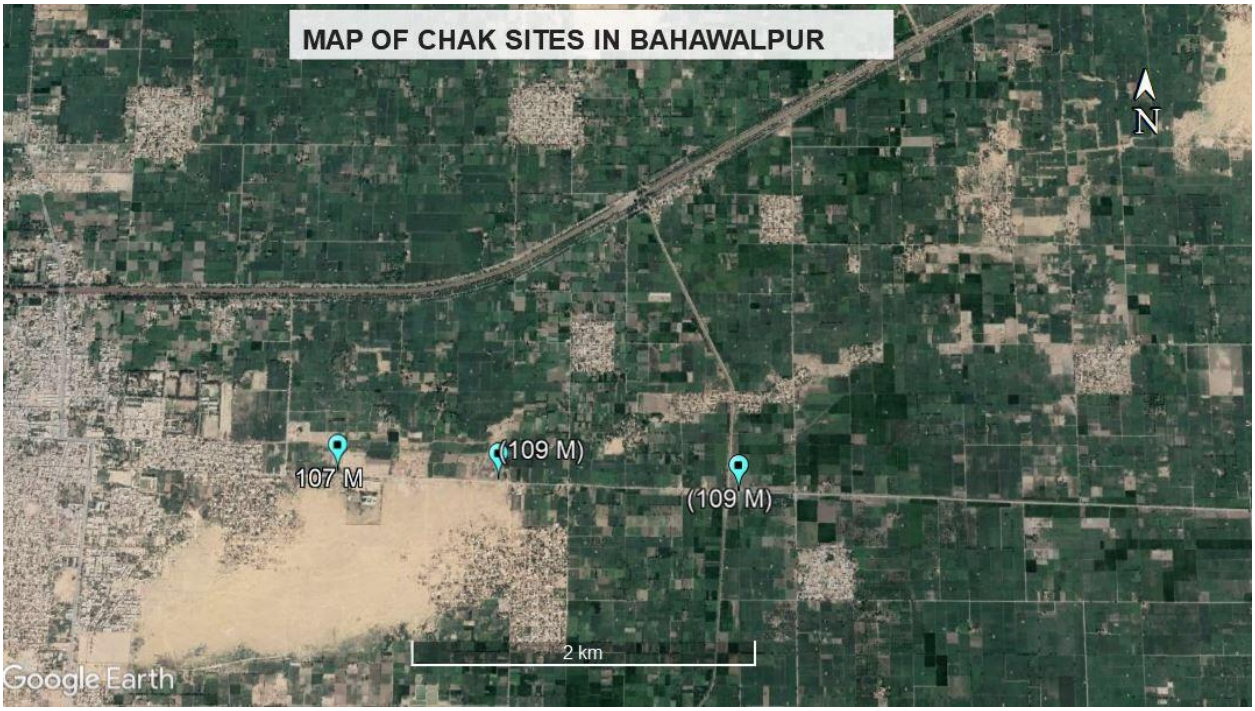

Fig. 1: Map of the study area showing selected sites for data collection

RESULTS AND DISCUSSION

Habitat selection by a species is an important part of its survival in an ecosystem. The study was conducted on the moorhen in the area of Bahawalpur at different locations (Table 1, Fig 2). First of all vegetation survey was conducted and the 32 flora species were recorded as; Typha elephantine, *Achyranthes aspera*, *Withania somnifera, Cynodon dactylon, Cyperus rotundus, Calotropis procera, Zizyphus nummularia, Tinospora cordifolia, Phoenix dactylifera, Eclipta alba, Acacia nilotica, Prosopis juliflora, Datura stramonium, Convolvulus arvensis, Dalbergia sissoo, Azadirachta indica, Cumis melo, Saccharum bengalensis, Solanum nigrum, Cirsium arvensis, Limeum indicum, Rehmex deticulata, Amaranthus virdis, Malva sylvestris, Polygonum glabrium, Ficus religiosa, Pongamia pinnata, Funaria indica, Aristida adscensionis, Boerhavia repens, Eucalyptus cammaldulensis, Citrullus colocynthis were most commonly present in the habitat of moorhen. Typha elephantiana* is the most abundant and preferred habitat for moorhen. Marshy places; natural or artificial were being used by the moorhen as its habitat (Fig. 3). According to Cmpulik (1993), Moorhens prefer small, shallow ponds and channels with a broad fringe of emergent vegetation in which Typha spp. is dominant. In Europe, the highest densities of Moorhens were noted in small, highly eutrophic bodies of water (Harengerd, 1968; Klemetsen, 1970; Engländer & Kuhn, 1975). It was also reported in other study done by Dyrcz *et al*. (1991), in industrial reservoirs that moorhen nests at exceptionally high densities in Upper Silesia. This density is one of the highest of those observed from Europe.

Table 1: Study sites showing vegetation and birds activities

Site	Coordinates	Elevation	No. of birds	Plant species	Habitat type
1	29°07. 415N 071°45.900E	107m	120	*Acacia nilotica, Prosopis juliflora, Dalbergia sissoo, Typha elephantiana*	Wetland with sparse forest vegetation
2	29°07. 391N 071°46.486E	109m	100	*Typha elephantiana Zizyphus numularia Cynodon dactylon, Solanum nigrum*	Wetland with cultivated land and forest vegetation
3	29°07. 358N 071°47.361E	109m	150	*Typha elephantiana, Saccharum bengalensis, Calotropis procera, Phoenix dactylifera*	Wetland with dense forest vegetation

Fig. 2 (A-C): Selected study sites showing habitat of Common Moorhen.

Moorhen nests were searched through visiting all possible sites and monitoring the activities of the adults at dawn and dusk during breeding season; that extends from start of April to end of June. Moorhen only used the microsites to build nests on the branches of trees or emergent vegetation bended on water up to 3-5 feet above the water level. The nests were built by using the foliage leaves and straws of the emergent vegetation. The nests were only used during the breeding season. These were left empty during the non-breeding season. A similar study has favoured this finding as Common moorhen preferred nest sites in the areas which had dense growth of emergent vegetation dominated by *Typha angustata, Phragmites communis and Sparganuim ramosum*. Average reed density was 59 ±4 and reed height in nesting sites of moorhen was 98.4 ± 9.2 cm. Nesting sites of moorhen widely varied but mostly categorized by the presence of *Phragmites communis* and *Typha angustata* (Fazil, 2014). These were sitting hiding in the foliage of *Dalbergia sissoo*, *Prosopis juliflora* and *Acacia nilotica* and other nearby vegetation. The moorhen feeds on the aquatic plants seeds, phytoplankton and zooplanktons. It was seen mostly actively feeding in groups and with other water birds in early morning and in the evening. Mostly used the entire wetland area for feeding but also use nearby agriculture crops ad orchards for feeding alone. Maximum feeding distance was near about one to two acre around the wetland area. In a study conducted by Roberts (1991) reported that moorhen mostly pick their food from emergent vegetation in the form of insects and feed on seeds. Young ones also feed with their parents and they also hide themselves following their parents. Feeds freely with water birds species; Cattle egret, Pond heron, Red wattled lapwings and Black wing Stilt etc. (Fig. 4). The species is very shy and hides soon in the surrounding vegetation. According to Samraoui *et al*, (2013), Moorhen is very sensitive to changes in its habitat. It is able to thrive in the habitat degraded from anthropogenic activities. It responses well to the changes in its habitat by occupying nearby marshy areas. Soil samples analyzed from selected habitat of moorhen (Table 2). Analysis shows that moorhen preferred to live in a soil that range from normal to highly saline having PH 7-7.9 and organic matter 0.39-1.49. Water samples were also analyzed which have electrical conductivity from 1115 uScm-1-2520 uScm-1 (Table 3).

This study has provide detailed account on the habitat selection of the common Moorhen (Gallinula chloropus) including data on its habitat preference during breeding season, diurnal activity patterns and general feeding characteristics of the species. Study has also developed baseline data on habitat selection of common moorhen during breeding.

CONCLUSION

The present study relates the soil types and influence of various edaphic factors for the distribution of moorhen in the Bahawalpur, since determining the physico-chemical properties of soils, which reflects the vegetation distribution in the Bahawalpur. Data obtained is a major addition in existing

meager information on common Moorhen, its habitat selection, during breeding as well as different wetland parameters preferred by this species in its habitat in Pakistan and is useful for its conservation of ultimately helping in would assist in the conservation /management of common moorhen in the Bahawalpur.

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Fig. 3: Common moorhen in the study area during its normal daily activity.

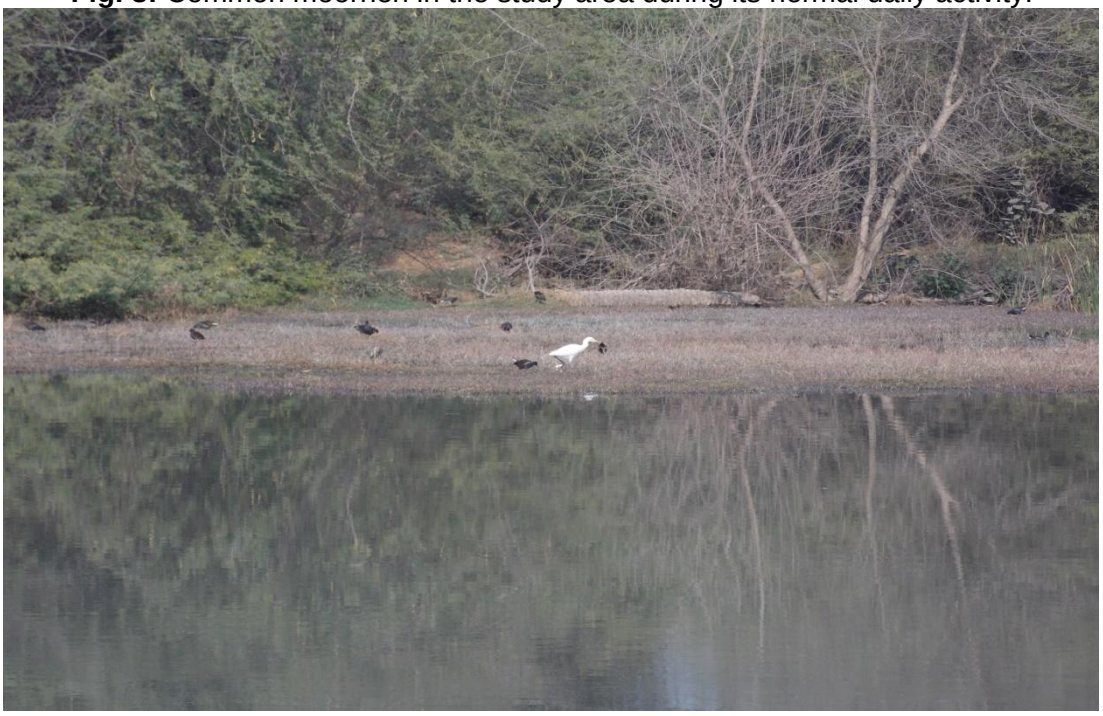

Fig. 4: Common moorhen during its feeding with Cattle egrets and Red wattled lapwing.

Table 2: Soil Analysis

Sr. no	Location	Depth	Soil type	Texture	EC dSm-1	pH	Organic matter %	P (ppm)	K (ppm)	Saturation %
1	IUB	0-6	Saline	loam	5.4	7	1.49	8.6	377	36
2	Yazman	0-6	Highly saline	loam	22.0	7.3	0.39	5.4	253	32
3	Ahmad Pur	0-6	Normal	Clay loam	1.3	7.9	0.72	3.8	193	50

Table 3: Water Analysis

Sr. no	Location	Electrical Conductivity (uScm)-1	Calcium+ Magnesium (meq L)-1	Sodium	Carbonate (meq L-1)	Bi Carbonate (meq L-1)	Chloride (meq L-1)	Sodium Adsorption Ratio (SAR)	Residual Sodium Carbonate (meq L-1)
1	IUB	1115	3.5	7.65	NIL	4.10	4.89	5.79	0.60
2	Yazman	2520	3.0	22.2	NIL	15.62	7.11	18.19	12.02
3	Ahmad Pur	1320	5.6	7.6	NIL	4.72	5.72	4.55	NIL

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