

Effect of Bird Foraging on Dynamics of Plant Community in Hokersar Wetland, Kashmir

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ABSTRACT

The effects of grazing by winter migratory ducks and geese on the vegetation of Hokersar wetland were studied during the year 2002. Migratory ducks and geese were seen to be feeding on above-ground shoots of *Sparganium erectum* Huds, *Carex* sp, *Phragmites australis* Trin; floating parts of *Nymphoides peltata* Link, *Potamogeton lucens* L, *Trapa bispinosa* L and submerged plants *Ceratophyllum demersum* L. Biomass of these plants was significantly affected. Selective foraging by birds seems to work in tandem with the anthropogenic pressures in changing the plant community dynamics in the wetland.

Keywords: Hokersar wetland, migratory birds, feeding

INTRODUCTION

Bird herbivory has been reported to have an impact on species composition, abundance and production of plant communities. The response of a plant species to herbivory may vary depending on the nature of injury, part involved in herbivory, and the plant community in which it is growing (Crawley, 1997). Hokersar wetland, a famous stopover for lakhs of migratory birds on their south-ward migration during autumn and winter from Central Asia, Europe, China and Siberia, provides a congenial habitat to many species of ducks, viz., Mallard (*Anas platyrhynchos* L), Pintail (*Anas acuta* L), Common teal (*Anas creca* L), Coot (*Fulica atra* L), Gadwall (*Anas strepera* L), Widgeon (*Anas penelope* L), Garganey (*Anas querquedula* L), Shoveller (*A. clypeata* L), several species of Pochards (*Aythya* spp), Greylag goose (*Anser anser* L), and many other bird species. A large population of these birds, during their stay at Hokersar, feed on the aquatic macrophytes growing in the wetland.

An attempt was made during August-October, 2002 to study the feeding behaviour of some of the migratory ducks and geese in the wetland. In the present paper the impact of their foraging on the plant community of this ecosystem is discussed

STUDY AREA

Hokersar bird sanctuary (34°-7' N lat. and 74°-39' E long.), located 10 km north-west of Srinagar city, has a central open water body inhabited by surface floating and submerged vegetation, surrounded by the area characterised by emergent vegetation and marshes. Emergent vegetation belt, included zones infested with *Sparganium erectum* Huds, *Phragmites australis* Trin and *Typha angustata* Bary and Chaub. Surface floating vegetation comprised of macrophytes like *Nymphoides peltata* Link, *Nymphaea* spp, *Trapa bispinosa* L, etc. and submerged vegetation included *Ceratophyllum demersum* L, *Utricularia flexuosa*, *Myriophyllum spicatum* L, etc. Marsh area was dominated by *Carex* sp, *Menyanthes trifoliata* L, *Scirpus* sp, *Juncus* sp. etc. (Fig. 1). The migratory birds stop in the wetland for several weeks in autumn (September-October) during their flight towards plains of North India and for several weeks in late winter (February and March) during their return flight towards Siberia, Central Asia, etc. Most of these birds use Hokersar only as an over-wintering resort.

MATERIAL AND METHODS

The study was conducted during August, September and October, 2002. Every month 15 quadrats of 25 x 25 cm were laid randomly in each of the 4 well differentiated vegetational zones of the wetland (Fig. 1). The macrophytes from within the quadrats were collected and identified to determine their abundance. The nature of injury to the macrophytic tissue due to bird foraging was checked and biomass of each species used by birds was determined.

RESULTS

Hokersar wetland has profuse growth of macrophytes. Spatial differences were observed in the quality and quantity of macrophytes (Fig. 1). Emergent macrophytes, *Sparganium erectum*, *Phragmites australis* and *Typha angustata* were widely distributed in variegated fashion over the entire littoral zone. In certain areas patches of *Butomus umbellatus* L and *Scirpus* sp were growing in association with the above mentioned macrophytes. Lower emergents, *Myriophyllum verticillatum* L and *Ranunculus lingua* L, were scattered all over the emergent zone. Marshes, floating masses of soil, were colonized by plants such as *Scirpus* sp, *Juncus* sp, *Cyperus* sp, *Menyanthes trifoliata* L, *Sagittaria sagittifolia* L, *Barberia* sp, etc. The emergent vegetation belt and marshes provided cover,

Outlet Channel









-  Willow Grooves
-  Marshes
-  Emergent Vegetation
-  Rice fields
-  Surface floating vegetation
-  Submerged vegetation

Fig.1. a Location map of Hokersar showing different zones.

resting and preening space to the migratory ducks and geese which started visiting the wetland from September onwards. The surface floating vegetation belt, found towards the eastern part of the wetland, was relatively deeper zone of the ecosystem. This belt was characterized by either rooted plants like *Nymphoides peltata*, *Nymphaea* spp, *Potamogeton* spp etc. or free floating plants, viz., *Salvinia natans* L, *Lemna* spp, etc. *Potamogeton*, a minor constituent of the total macrophytic production, was represented by *P. pectinatus* L, *P. lucens* L and *P. crispus* L in patches all over the zone. The submerged group was dominated by *Ceratophyllum demersum* and *Myriophyllum spicatum* was found in small numbers only.

Field observations made from the vantage points with the help of 20 x 50 binoculars revealed that the surface floating and submerged vegetation belts were liked by the diving ducks and pochards. The birds started arriving in the wetland in September and during their stay in the wetland the macrophytes found to be injured by bird foraging included *Nymphoides peltata*, *Nymphaea* spp, *Ceratophyllum demersum*, *Trapa bispinosa*, *Potamogeton lucens*, *P. crispus*, *Carex* sp; *Scirpus* sp, *Cyperus* sp, *Sparganium erectum*, *Phragmites australis* and *Typha angustata*. Birds were found to feed on foliage of *Nymphoides*, *Nymphaea*, *Ceratophyllum*, *Sparganium*, *Phragmites* and *Typha*, fruits (nuts) of *Trapa* and seeds of *Sparganium*, *Carex*, *Scirpus*, *Cyperus*, *Phragmites* and *Potamogeton* species. Birds also fed on underground parts of several plants, like *Sagittaria*, *Alisma*, etc. The data on biomass of various macrophytes before the arrival of these birds in the wetland (i.e., August, 2002) and during their feeding activity (i.e., September and October, 2002) are presented in Table 1. From the data it is evident that the bird foraging is influencing the biomass of the various macrophytes in the wetland.

DISCUSSION

Macrophytes have been reported to constitute 73 - 98% of the food in water fowl and 100% of the food in wild geese (Pandit, 1980, 1982). Further Pandit and Kaul (1981) and Pandit and Fotedar (1982) emphasized the importance of *Polygonum* spp, *Cyperus serotinus*, *Scirpus lacustris*, *Carex* spp, *Sagittaria sagitifolia*, *Najas gramineae*, *Potamogeton crispus*, *P. lucens*, *Nymphoides peltata* and *Trapa* as the most potential food for ducks and *Phragmites australis* as the most favourite food for geese (*Anser anser*). As per Shah (1983) the food of greylag goose comprised seeds / fruits, leaves and pieces of stem and roots of aquatic herbage found in the wetlands.

Table 1 :- Mean macrophytic (food plants) biomass (in gm²) as obtained from four sites before and after arrival of birds in the wetland.

	← Before →	← After →	
	August	September	October
<u>Emergent belt</u>			
<i>Sparganium erectum</i>	580	410	168
<i>Phragmites australis</i>	510	400	136
<i>Typha angustata</i>	300	210	96
<u>Surface vegetation belt</u>			
<i>Nymphoides peltata</i>	260	215	122
<i>Trapa bispinosa</i>	280	230	200
<i>Potamogeton lucens</i>	200	150	85
<i>P. crispus</i>	50	23	20
<i>Nymphaea sp.</i>	350	210	195
<u>Submersed vegetation belt</u>			
<i>Ceratophyllum demersum</i>	98	73	50
<u>Marshes</u>			
<i>Carex sp.</i>	310	250	170
<i>Scirpus sp</i>	180	153	141
<i>Cyperus serotinus</i>	100	93	80

Over the years there has been a gradual change in the population dynamics of different plant species in the wetland. *Phragmites australis* and *Typha angustata*, which were very common in the wetland and were widely distributed (Bates and Lowther, 1952), have now very low population. Instead, forms like *Sparganium erectum* have infested most parts of the wetland. Certain species viz., *Nelumbo nucifera*, *Euryale ferox* and *Acorus calamus* have almost completely disappeared from this wetland. Anthropogenic pressures and recurring floods have been held responsible for this succession (Kak, 1990). However, a perusal of the data collected during the present study indicated that foraging by birds has played its role in changing the macrophytic structure.

Presence of food plants in plenty and varied macrophytic zones have been attracting large flocks of winter migrants to the Hokersar. Zacheis *et al* (2001), found that herbivores alter competitive interactions between plant species. Belanger and Bedard (1994) found that bird grazing has as such no effect on plant dynamics but still its grazing on the emerging stems of plants in late spring partly influenced the plant production. A comparison of the plant biomass during the present study also indicated that feeding activity of the birds had an impact on the plant community in the wetland. Dwindling population of *Phragmites* in the wetland may be attributed to the fact that it is the favourite food plant of geese. In the marsh zone, ducks feed on *Sagittaria* and *Alisma* roots (tubers). Both these plants have become rare in the wetland. However, only herbivory cannot lead to dramatic fall in the population of these plants; it is more probable that herbivory in unison with the changing ecology of the wetland resulted in the population decrease of these plants. Similarly birds feeding on seeds and fruits of *Phragmites australis*, *Trapa natans*, *Carex* sp, *Scirpus* sp, *Juncus* sp, etc. have affected the reproduction and hence production of these plants. This is substantiated by the distributional pattern of plants like *Nymphoides peltata* and *Ceratophyllum demersum* in the wetland. The changing ecological conditions of the wetland are quite suitable for the growth and development of thick population of these plants. Still their population is rather limited. This seems to be directly related to the foraging behaviour of the birds. Both these species are a favourite food for the ducks and pochards. It may therefore be inferred that bird foraging has kept their population under check inspite of the suitable ecological conditions.

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