



Food Plants, Weeds and other Management Aspects of some Protected Biodiversity rich Wetlands in Uttar Pradesh

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Uttar Pradesh (UP) is one of the northern states of India spread between the longitudes (77°05' - 84°38' E) and latitudes (23°52' - 30°24' N). It has the floodplains of Gangetic river system. The northern part of the state has the landscape of Tropical Moist Deciduous Forests (*Tarai Ecosystem*) while the southern part has the Tropical Dry Deciduous landscape (*Vindhyan Ecosystem*). In between these two landscapes, there is agriculture dominated plains (*Ganga Yamuna Plains Ecosystem*) having scattered water bodies with or without forested surrounding except south west dry part (Semi-arid Ecosystem). TERI has recorded as many as 1154 wetlands in the state in the form of different types like Ox-bow lakes (407), Lakes and ponds (98), Marsh and swamp (310), waterlogged (277) and reservoirs (62). Islam and Rahmani have reported 19 of these water bodies as the Potential Ramsar Sites and 25 as the Important Bird Areas (IBA). Two third of these IBAs are declared Wildlife Sanctuaries under the provisions of Wildlife (Protection) Act 1972. Out of these protected wetlands 12 are primarily the bird dominated sanctuaries, commonly known as Bird Sanctuaries of UP. These are aimed at conserving the avian species basically (resident and migratory), and other animal species and plants inhabiting the ecosystem. Figure 1 illustrates the Important Bird Areas, Potential Ramsar Sites and Wildlife (Bird) Sanctuaries in different ecosystems.

Apart from the thousands of population of hundreds of birds, scores of fishes and hundreds of flora, these protected wetlands harbour a number of avian species of immediate concern, for example,

critically endangered species, vulnerable species and near threatened species. All these and other important birds survive on the food available in the wetlands predominantly in the form of aquatic herbaceous vegetation and fish along with other fauna. However, these resources are facing threat from other herbaceous species popularly known as weeds, grazing by domestic cattle and encroachment of land, choking of water courses that drain in these wetlands during the rainy season. Other management issues of these wetlands like, fishing (Lakh-Bahoshi, Samaspur, Sandi, Parvati-Arga), water chestnut cultivation (Sandi, Sarsainawar wetland, Patna), pesticide (Saman, Samaspur), agriculture (Saman, Samaspur), siltation (Nawabganj, Samaspur, Seikha wetland, Sursarovar) and poaching (Saman, Sandi) are not dealt with for the sake of brevity and out of the scope of the text.

All the significant floral and faunal diversity mentioned above are conserved in the wetlands by adopting different management strategies like protection of herbaceous flora, controlling the weed spread, altering the habitat, promoting ecodevelopment works and ecotourism.

Food plants

All the resident and migratory birds depend on the food available in and around the wetlands. They are mainly categorized as herbivorous, piscivorous and insectivorous birds. The important plants used by the herbivorous birds as food are given in Table 1. These plants fall in all the categories of aquatic plants

Important Bird Areas, Potential Ramsar Sites and Wildlife (Bird) Sanctuaries of Uttar Pradesh

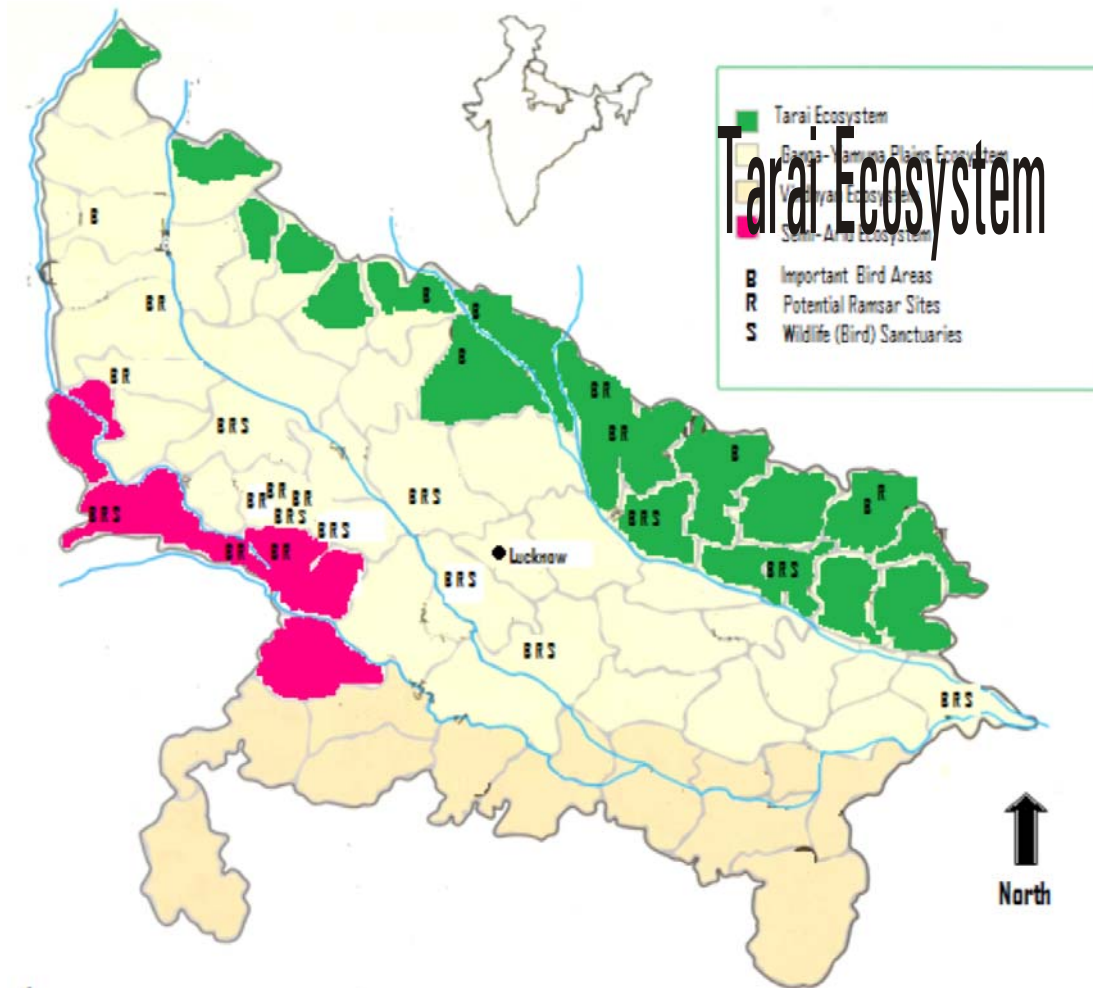


Fig. 1

like, free floating, rooted floating, submerged, emergent and marginal but the majority of them are either floating or submerged. Some of the birds observed eating on the aquatic vegetation are gadwall, mallard, red crested pochard, tufted pochard, shoveller, coot, teal, pintail, wigeon etc. As management strategy, nothing is done till some of the plant species outgrow and start behaving like weeds. To reduce the impact of these weed like food plants, manual removal is being done as and when required.

There are some grainivorous waterfowls like, lesser whistling teal, bar headed geese, saras crane, white breasted waterhen, Indian moorhen, purple moorhen, coot etc. which feed on the crops growing in the neighbouring field of the farmers. Most of the time damage caused to the grain production goes against the swift management of the wetland as the farmers try to harm the birds. However, as a strategy to overcome the conflict, certain farmers have been convinced to do cooperation farming. The farmers are

allowed to do agriculture on the private land falling in the Sanctuary area and the same has not yet been acquired for wildlife management by the forest department. In return the farmers cooperate by growing

such species of the grain which are the feed of the birds. They have also been convinced not to use the pesticide and chemical fertilizer. The common crops sown by them are paddy, wheat, mustard, barley etc.

Table 1: Habit, phenology and utility of some important aquatic food plants

Plants	Habit	Flowering and Fruiting period	Use by wildlife
<i>Azolla pinnata</i>	Free floating on shallow and muddy water	Not seen	Entire plant eaten by gadwall, shoveller, pintail and mallard birds
<i>Ceratophyllum demersum</i>	Submerged plants of shallow water level	February - May and August - November	Seed and leaves favoured by migratory water birds (gadwall, mallard), moles and other small wild animals also like it
<i>Cyperus alopecuroides</i>	Perennial marshy plant	September- November	Stem, roots and seeds eaten by marshy birds
<i>Eleocharis dulcis</i>	Perennial, emergent shallow water plant	September-November	Tuber and nodes eaten by purple moorhen, Wigeon, and other water birds, moles also like it
<i>Hydrilla verticillata</i>	Submerged plant, generally grows with Najas	March-May and August-November	Flower and seeds eaten by ducks
<i>Ipomea aquatica</i>	Floating creeper on mud or water surface	Round the year but main flush in April-May and October-November	Roots, buds and seeds consumed by water birds, leaves eaten by human beings
<i>Jussiaea repens</i>	Free floating, shallow water	March-June	Fruits, seeds, buds and roots eaten by water birds
<i>Najas minor</i>	submerged	March-May and August-November	Stem, leaf, fruit seeds eaten by all water ducks. Mallard seen feeding frequently on this
<i>Nelumbo nucifera</i>	Rooted floating, shallow water	June to November	Fruits and seeds- food of birds, Stem and seeds eaten by human beings
<i>Neptunia oleracea</i>	Shallow to moderately deep water level	October- November	Fruits, nodes and roots eaten by whistling teal, coot, pintail and gadwal
<i>Nymphaea pubescens</i>	Free floating rooted	August-October	Tuber, anther and seeds eaten by majority of water birds
<i>Nymphoides indica</i>	Rooted floating, shallow and open water	Round the year, main flush during April-May and September - November	Flower and fruits favoured food of migratory birds



Plants	Habit	Flowering and Fruiting period	Use by wildlife
<i>Oryza rufipogon</i>	Emergent, shallow	July-November water plant	Seeds eaten by red crested pochard, pintail, shoveller, common teal
<i>Polygonum limbatum</i>	Shallow water	November - March	Seeds and buds liked by resident as well as migratory birds, also liked by moles
<i>Potamogeton amplifolius</i>	Submerged	February-April	Roots, stem, fruits seeds eaten by water birds, turtles were also seen eating this
<i>Potamogeton nodosus</i>	Emergent	August- January	Roots, stem, fruits seeds eaten by water birds, turtles were also seen eating this
<i>Potamogeton natus</i>	-	-	Roots, stem, fruit and seeds eaten by migratory birds and fish
<i>Spirodela polyrhiza</i>	Free floating	Post rainy season	Entire plant eaten by water birds
<i>Trapa natans</i>	Submerged	September-November	Both resident and migratory birds seen eating fruit pulp
<i>Wolffia globosa</i>	Free floating	Not seen	Migratory birds eat them, shoveller seen frequently feeding on this

Weeds

Weeds are the plants which are not desired at the place where they occur. The aquatic weed refers to a large variety of aquatic plants which interfere with one of the other use of the resources in a water body. The wetlands are generally rich in nutrients, have shallow water and normally support extensive growth of a large variety of macrophytes. These macrophytes provide shelter, food, and nesting and breeding sites for most of the waterfowls and fishes. However, certain plants start growing in large proportions to reduce and eliminate the growth of other desirable plants, thus act like weeds. Common examples of this type of aquatic weeds are *Ceratophyllum demersum*, *Hydrilla verticillata*, *Limnophyton obtusifolium*, *Potamogeton pectinatus* and *Najas minor*. Other macrophytes which are not used by the water birds at all and are true weeds by definition are *Eichhornia crassipes* (exception: purple moorhen use the mat as

breeding surface) and *Pistia stratiotes*. Such common terrestrial weeds are *Calotropis procera*, *Parthenium hysterophorus*, *Argemone mexicana* etc. *Ipomea carnea*, although provides shelter to some waterfowl it behaved like weeds since its spread reduced the water area for the growth of food plant and impeded free movement of certain waders, dabblers and divers. Details of the weeds of the study area are given in Table 2.

Eichhornia has grown alarmingly in all most all wetlands and has drawn serious attention. Only manual removal has been practiced to control the spread of this weed. Since *Ipomea carnea* and *Saccharum spontaneum* are known to provide shelter to purple moorhen and other waterfowls their spread is regulated by controlled cutting manually. Although chemical and biological control are available for *Eichhornia* and other weeds these methods are not



Table 2 : Aquatic and terrestrial weeds of Protected Wetlands

Plant	Habit	Utility
<i>Ageratum conyzoides</i>	An invasive terrestrial plant seen growing in moist area	Utility not known
<i>Argemone mexicana</i>	Terrestrial, grows on the bank of wetland	Of no utility for birds and animals
<i>Calotropis procera</i>	Terrestrial plant seen growing around the lake, on bund, near the dykes and on the islands	Not eaten but seen rarely used as shelter
<i>Cannabis sativa</i>	Terrestrial	Utility not known
<i>Cassia tora</i>	Terrestrial	Utility not known
<i>Ceratophyllum demersum</i>	Submerged	Although it is a good source of food, seen to grow faster than neighbouring plants
<i>Cyperus alulatus</i>	Emergent	
<i>Datura innoxia</i>	Terrestrial, grows on the bank of wetland	Not used by birds and wild animals
<i>Eicchornia crassipes</i>	Free floating, invasive water weed	Known as cancer of the lake, causes eutrophication
<i>Hydrilla verticillata</i>	Submerged	Although tubers, fruit and seeds are eaten by birds, the species is seen to grow faster than the neighbouring useful plants and thus behave as weed
<i>Ipomea carnea</i>	Marginal plant	Not used as food but as shelter and nesting place by a few amphibious birds
<i>Limnobium spongia</i>	Emergent	Although eaten by marshy birds but many a times over grow and behave as weed since they alter the normal habitat
<i>Limnophyton obtusifolium</i>	Emergent	
<i>Nelumbo nucifera</i>	Rooted floating	Good food plant but occasional and enumerable production of fruit and seeds make the species behave like weed next year
<i>Parthenium hysterophorus</i>	Terrestrial	Utility not known
<i>Pistia stratiotes</i>	Free floating	Spreads in the lake quickly and alters the habitat
<i>Solanum nigrum</i>	Terrestrial, grows on moist surface	Not used by birds but leaves eaten rarely by wild animals

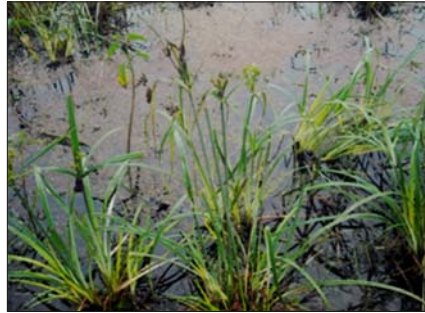


Photo-plate 1 : Aquatic food plants of herbivorous birds like purple moorhen, shoveler, coot, greylag goose, pitail, gadwall etc.; clockwise from left : *Eleocharis* sp., *Potamogeton* sp. and *Cyperus* sp.



Photo-plate 2 : Weeds. Floating plant, *Eicchornia* sp., a menace in most of the wetlands, (left) most of the time causing eutrophication. Emerging plant, *Ipomea* sp. (top left). *Saccharum* sp. (above). These plants creates hinderance to waders, dabblers, and d ivers.



Photo-plate 3 : Weeds. Habitat management and its impact. Creation of artificial island and planting on it to provide roosting and nesting place (left). A flock of Pel icans on the artificial island (topeleft). Comb ducks on the mounds (above). Photo courtesy : Neeraj Kumar.



Photo-plate 4 : Prized avian biod iversity of the UP wetlands. Left : Flamingos, Top Left : Pel icans; Above : Spoon bills. Photo courtesy : Kartik Singh and Neeraj Kumar.



being adopted in these protected wetlands. It is worth mentioning here that use of herbicide and biocide was taken up initially on experiment basis with limited success. In certain years of past it was observed that *Nelumbo nucifera* flowered profusely and as a result there was copious production of fruits, locally known as kamalgatta, and in turn seeds. Following year, there was enormous spread of this species in the wetland affecting the balance of other essential plants in the habitat. As a weed control strategy to this problem immature kamalgatta were chopped off manually to check the spread next year.

Conclusion

The wetlands of UP are the most precious gene pool of our irreplaceable biological heritage and natural refuge of the migratory avian species. They must be protected by different management intervention methods suited to their inhabitants. The weeds or invasive plants must be eradicated or kept under strict control as these endanger the ecological process and survival of threatened wildlife. The efforts of conservation of the wetlands of UP being done so far have been positive and successful. However, integration of research input for managerial optimization and further boosting of ecodevelopment activities are still required.
