

OTHER SIDE OF THE ASHULIA WETLAND: A LIMNOLOGICAL PURVIEW

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Abstract

Limnology of a temporary wetland Ashulia was found highly seasonal. Fluctuations of water depth, water temperature, Secchi depth, pH, conductivity, total dissolved solids, dissolved oxygen and alkalinity were studied in three different stations for one year. Water depth showed a range of 1.5 - 4.2 m and Secchi disc transparency from 0.07 - 2.15 m. Annual ranges in respect of pH, conductivity, total dissolved solids (TDS), dissolved oxygen (DO) and alkalinity of water varied from 6.3 - 7.2, 92 - 1028 $\mu\text{S}/\text{cm}$, 43.4 - 491.0 mg/l, 4.3 - 28.9 mg/l, and 0.71 - 6.45 meq/l, respectively. The wetland showed a good to moderate water quality during rainy season because in this season visibility of water increased, TDS load, alkalinity and conductivity came down to their lowest. Dissolved oxygen content also showed an acceptable water quality value during rainy season.

Introduction

Wetlands in Bangladesh have great ecological, economic, commercial and socio-economic values. They contain very rich components of biodiversity of national and regional significance.⁽¹⁻²⁾ The total area of wetlands in Bangladesh is about 8 million ha of which nearly 4.3 million ha belongs to natural wetlands.⁽³⁻⁴⁾ Some of the important domains of natural wetlands are water transport, capture fisheries, biomass production, recreation and support for food chain. Of the natural wetlands, Islam⁽⁵⁾ studied the hydrobiology of the Haor Hakaluki. Later limnological studies of wetland ecosystems of Bangladesh.⁽⁶⁻¹²⁾ Most of those works were concentrated to deepwater rice fields, Beel ecosystems and marshlands situated in different parts of Bangladesh. There are some important wetlands surrounding Dhaka Metropolis. Limnology of Khilkhhet Beel and some nearby ponds (c 15 km north of Dhaka Metropolis) was studied.⁽¹³⁾ Another famous wetland near Dhaka Metropolis is Ashulia. It is a vast water body and takes a panoramic view during rainy season. Many a city dwellers visit this place year round. Open water capture fishery is also an important activity upon which livelihood of many inhabitants from the

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surrounding areas depend. Considering the importance of this wetland the present limnological investigation was undertaken.

Materials and Methods

The study was carried out from September 2000 to August 2001 in the wetland Ashulia. It is situated in the north western part of Dhaka metropolis and is about 30 km away from the city centre. Via western fringe of the wetland Ashulia, river Turag flows (Fig. 1). At rainy season, overflow from Turag inundates the eastern part of the

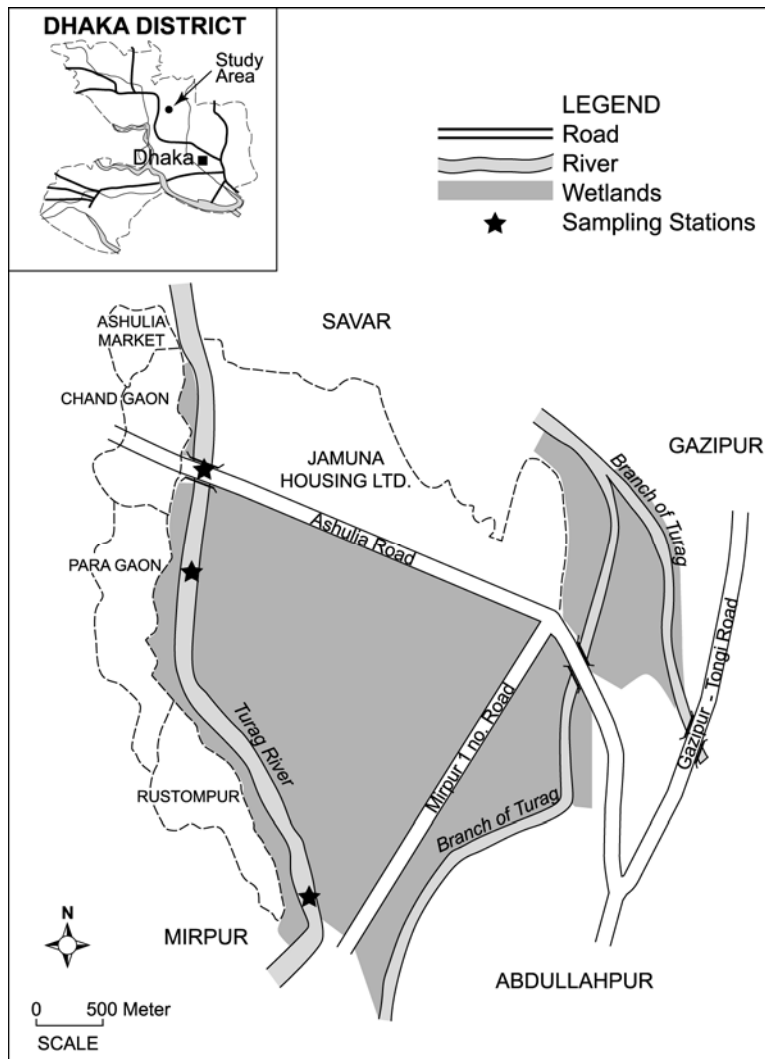


Fig. 1. Map of the sampling sites.

wetland which dries out in dry season and converted into rice fields. Therefore, three study stations were set up along a 2 km stretch of the river Turag for carrying out the sampling year round (Fig. 1). The estimated area of the wetland is about 743 ha. Sampling was done fortnightly. At each station water temperature, water depth, Secchi depth and pH were measured *in situ*. Duplicate Pyrex glass bottles (125 ml capacity) were filled with sample water at each station and fixed by adding Winkler's reagent for the determination of dissolved oxygen (DO). One litre sample water from a depth of 20 cm below the surface was collected from each station for chemical analysis. The samples were brought to the laboratory and its alkalinity and conductivity were measured.⁽¹⁴⁻¹⁵⁾ The data from all the three stations were transformed into mean values \pm sd and plotted.

Results and Discussion

Annual trend of the measured variables has been presented in Fig. 2A-D. A strongly seasonal relationship in the water depth of the wetland was exhibited. Highest water depth was recorded in September which started decreasing in the onset of November reaching its lowest value in February. Beginning from April water depth started rising and again reached its maxima in August (Fig. 2B). However extremely lowest Secchi depth was observed throughout the whole period ranging from October to July. Slight improvement in the Secchi depth was found in September and August (Fig. 2B). Beginning from October, the water temperature started falling reaching a lowest value in January then rose up again showing a highest value in May (Fig. 2A). Water pH ranged rather in an irregular mode having its peak in April and a minimum in July (Fig. 2A). Both the TDS and conductivity values related directly to each other showing a peak in April (Fig. 2C). During most of the study periods, concentration of dissolved oxygen remained in between 5 and 6 mg/l except the months of March and April (Fig. 2D). Alkalinity was more or less uniform in most of the parts of the present study (Fig. 2D). The seasonal trends of the limnological variables were quite conspicuous. Monsoon is the season during which water depth and temperature showed a highest value (Table 1). Compared to other seasons the Secchi depth also improved (0.59 m). Among the other water quality parameters, pH, conductivity, TDS, and alkalinity dropped in monsoon (Table 1). Dissolved oxygen of water was lowest in autumn and highest in summer. During summer, seasonal mean values for pH, dissolved oxygen, alkalinity, TDS and conductivity were high (Table 1).

Ashulia is a temporary wetland and its limnology is highly seasonal. After peaking the water depth in monsoon actually a lot of dilutions in its water occur as a result Secchi depth increases but pH, DO, conductivity and TDS content drop (Table 1). In monsoon, conductivity of water decreases nearly seven times from its previous

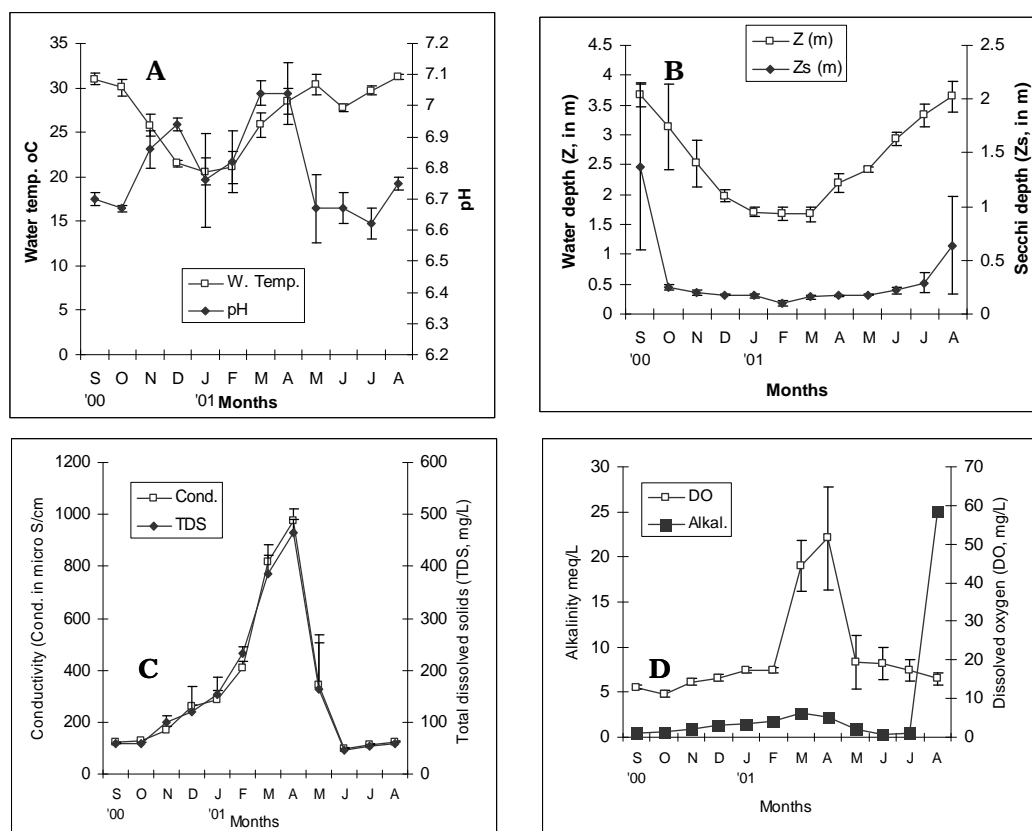


Fig. 2A-D. Annual fluctuations of A, water temperature and pH; B, water depth and Secchi depth; C, conductivity and total dissolved solids; D, dissolved oxygen and alkalinity of water.

Table 1. Mean (\pm sd) values of different limnological parameters of wetland Ashulia over the four major seasons of Bangladesh.

Parameters	Winter	Summer	Monsoon	Autumn
Water temp. ($^{\circ}$ C)	21.6 \pm 1.9	28.2 \pm 2.3	30.0 \pm 1.4	28.1 \pm 1.7
Water depth (m)	1.89 \pm 0.33	2.09 \pm 0.34	3.42 \pm 0.40	2.56 \pm 0.42
Secchi depth (m)	0.16 \pm 0.04	0.17 \pm 0.16	0.59 \pm 0.61	0.22 \pm 0.03
pH	6.85 \pm 0.12	6.92 \pm 0.19	6.62 \pm 0.13	6.74 \pm 0.06
DO (mg/l)	7.06 \pm 0.53	16.48 \pm 7.17	6.64 \pm 1.60	5.49 \pm 0.35
Alkal. (meq/l)	3.43 \pm 0.63	4.54 \pm 1.82	1.04 \pm 0.16	1.59 \pm 0.28
Cond. (μ S/cm)	298.1 \pm 103.3	710.3 \pm 294.0	115.7 \pm 10.8	146.0 \pm 12.7
TDS (mg/l)	165.9 \pm 47.9	337.4 \pm 140.0	54.3 \pm 5.4	73.3 \pm 13.3

season summer (Table 1). A slight increase in conductivity occurred in autumn. Begum *et al.*⁽⁹⁾ studied the water quality of deepwater rice fields of Sonargaon and

found lower values (30 - 58 $\mu\text{S/cm}$). However, in some temporary marshlands near Rajendrapur, Dhaka water conductivity in autumn varied from 154.5 - 175.0 $\mu\text{S/cm}$.⁽¹²⁾ In autumn mean pH, conductivity, DO and alkalinity for this marshland were recorded as 6.7 and 163.7 $\mu\text{S/cm}$, 4.69 mg/l and 1.54 meq/l, respectively.⁽¹²⁾ The values are quite comparable with those obtained in Ashulia in autumn (Table 1). Annual mean pH and conductivity of Khilkhet Beel were reported as 7.06 and 121.7 $\mu\text{S/cm}$, respectively.⁽¹³⁾ Pulling the annual mean values of these two parameters for wetland Ashulia a lower pH (6.78) and a high conductivity (317.5 $\mu\text{S/cm}$) were obtained. In case of wetland Ashulia river Turag actually receives pollutants from Tongi industrial area and all these might be the reason for high conductivity values. The conductivity showed a seasonal maximum (710.3 $\mu\text{S/cm}$) in summer when the wetland actually shrinks in its size only leaving the flow of the river Turag. Ashulia is not a deepwater rice field rather its vast open water act as an excellent ground for capture fisheries and tourist activities to a limited scale. So far its limnology is concerned, the wetland shows a good to moderate water quality during rainy season because in this season visibility of water increases. TDS load, alkalinity and conductivity came down to their lowest or minimum and dissolved oxygen content also showed an acceptable water quality value.

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