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Physico-chemical Properties and Microfaunal Diversity of Masoli Reservoir, Parbhani (MS), India

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Abstract

Fresh water habitats are highly diversified and marked by a wide range of physico-chemical conditions, which greatly influences the aquatic biota. Plankton are the basic biotic components of any aquatic ecosystem. These organisms play a vital role in aquatic environment. Microfaunal diversity play an important role in transferring energy to consumers hence they form the next higher trophic level in the energy flow after phytoplankton. Masoli reservoir is a rural aquatic habitat and hence an attempt has been made to assess its physico-chemical properties and microfaunal diversity. Present work has been carried out for the period of one year i.e., from February 2018 to January 2019. During the studies various physico-chemical parameters were analysed viz., pH, dissolved oxygen, total hardness, chlorides, nutrients etc. Study revealed the interrelation between physico-chemical properties and microfaunal diversity at Masoli reservoir.

Keywords : Physico-chemical properties, Microfaunal diversity, Interrelation, Masoli reservoir, Parbhani

1. Introduction

Water is vital for life molecule to survive. It possesses a number of physico-chemical properties that help the molecule to act as best suited medium for life activities. The movement of water from earth surface to atmosphere through hydrological cycle appears to be a close system. Water occurs in all its very familiar forms i.e., ice, liquid and vapour. Physico-chemical factors play a vital role in influencing the quality of water

bodies besides topographical, geographical and other environmental factors. In aquatic ecosystem nutrients like nitrates, phosphates and sulphates from sewage, fertilizers, animal wastes and detergents enter lakes and affects aquatic life in various ways. Nutrient enrichment seriously degrades aquatic ecosystems and impairs the use of water for drinking, industry, agriculture and recreation [1]. Zooplankton are microscopic free swimming components of an aquatic ecosystem which are primary consumers of phytoplankton. Zooplankton provides the main food item of fish and can be used as indicators of trophic phase of water body. Physico-chemical parameters govern the density and diversity of the zooplankton in the lakes. Hence, an attempt has been made to assess various physico-chemical properties of Masoli reservoir and zooplankton diversity of the same aquatic habitat.

2. Materials and Method

Assessment of various physico-chemical parameters and microfaunal diversity of Masoli reservoir, Parbhani (MS), India, was conducted for the period of one year i.e., from February 2018 to January 2019. Water samples from selected experimental water body were collected on monthly basis for assessment of various physico-chemical properties and microfaunal diversity. Sample preparation for microfaunal diversity and various physico-chemical parameters viz., pH, dissolved oxygen total hardness, chlorides, sulphates, phosphates and nitrates were estimated by using standard methods given by APHA [2] whereas identification of micro-fauna was done by using keys and monographs given by Edmondson [3].

3. Results and Discussion

Physico-chemical parameters and microfaunal diversity of Masoli reservoir, Parbhani was assessed. Results are shown in Table 1 and 2 respectively. Temperature is a vital parameter for growth of organism and plays an important role in the physico-chemical and physiological behavior of aquatic ecosystem [4]. In the present investigation water temperature followed similar seasonal trend as that of air temperature and recorded minimum as compared to air temperature. Both these variables were recorded maximum in summer whereas minimum in winter. Fluctuations experienced in air and water temperature may be due to the influence of season, location and difference in the time of collection [5].

Table 1:- Seasonal Variations in Various Physico-chemical Parameters of Masoli Reservoir, Parbhani

Sr. No.	Parameters	Winter	Summer	Monsoon
1	Air Temperature (^{0}C)	20.40± 0.14	27.27± 0.18	25.74± 0.17
2	Water Temperature (^{0}C)	19.27± 0.11	25.11± 0.15	23.63± 0.17
3	Total Solids (mg/L)	422.37± 0.41	502.46± 0.42	321.77± 0.32
4	pH	7.93± 0.10	8.34± 0.11	7.57± 0.12
5	Dissolved Oxygen (mg/L)	8.16± 0.11	6.52± 0.10	7.12± 0.12
6	Chlorides (mg/L)	32.88± 0.11	41.14± 0.14	30.88± 0.21
7	Total Hardness (mg/L)	70.20± 0.31	84.75± 0.40	67.00± 0.42
8	Sulphates (mg/L)	0.16± 0.010	0.24± 0.012	0.14± 0.011
9	Total Phosphorous (mg/L)	0.25± 0.009	0.34± 0.011	0.21± 0.008
10	Nitrates (mg/L)	0.31± 0.009	0.54± 0.010	0.30 ± 0.008

Table 2:- Zooplankton diversity of Masoli reservoir, Parbhani during February 2018 to January 2019

Sr. No.	Name of Group and Species
A.	**Protozoa**
1	*Centropyxis sp.*
2	*Paramecium sp.*
3	*Vorticella sp.*
B.	**Rotifera**
1	*Brachionus angularis*
2	*Brachionus calyciflorus*
3	*Brachionus forficula*
4	*Cephalodella adriatica*
5	*Colurella adriatica*
6	*Filinia longiseta*
7	*Keratella cachlearis*
8	*Keratella valga*
9	*Lecane monostyla*
10	*Trichocerca cylindrica*
11	*Trichocerca porcellus*
C.	**Ostracoda**
1	*Candocypria sp.*
2	*Candona sp.*
3	*Cyclocypris sp.*
4	*Eucypris sp.*
5	*Stenocypris sp.*
D.	**Copepoda**
1	*Cyclops sp.*
2	*Diaptomus sp.*
3	*Eucyclops sp.*
4	*Mesocyclops leuckartti*
5	*Microcyclops sp.*
6	*Nauplius*
E.	**Cladocera**
1	*Alona monocantha*
2	*Chydorus sphaericus*
3	*Dadaya macrops*
4	*Daphnia similis*
5	*Leydigia acanthocercoides*
6	*Macrothrix sp.*

Total solids refer to matter suspended and dissolved in water. Solids may affect water or effluent quality adversely in a number of ways. Waters with high dissolved solids generally are of inferior palatability and may induce an unfavourable physiological reaction in the transient consumer [2]. In the present investigation total solids of the selected aquatic habitat were estimated which recorded as maximum in summer and minimum in monsoon. pH is an important parameter in water body since most of the aquatic organisms are adopted to an average The higher photosynthetic activity increases production of phytoplankton, which support an increase in pH [6]. The higher pH is also attributed to anthropogenic activities like washing of cloths with detergents and mixing of sewage [7].

Dissolved oxygen is a very important parameter for the survival of fishes and other aquatic organisms. Oxygen is also needed for many chemical reactions that are important to lake functioning oxidation of metals, decomposition of dead & decaying matter, etc. [8]. During the study period maximum dissolved oxygen was recorded in winter. Low dissolved oxygen in summer may be due to the low solubility of atmospheric oxygen and high degradation of organic substances [9].

Chloride anion is generally present in natural waters. In the present investigation seasonal variations in chlorides was estimated and all have shown the maxima in summer and minima in monsoon. Decrease in the water levels of these waterbodies during summer may be the reason for increase of chloride concentration. Similar findings were also made by Karne & Kulkarni [10].

Total hardness of water is the measure of the capacity of water to react with soap. In the present investigation maxima of seasonal total hardness was recorded in summer. High range of total hardness in summer obviously was due to high loading organic substances, detergents, chlorides and other pollutants [12].

Various nutrients viz., sulphates, phosphates and nitrates were also estimated during the study period.

All the estimated nutrients were showed peak in summer whereas low count in monsoon. Lower values in monsoon may be due to inflow of water [5,8,12,13]

In the present investigation, 31 species of zooplankton were recorded at Masoli reservoir, Parbhani. In this water body rotifera occupied first position with 11 species whereas last position was taken up by protozoa with 03 species. Second position was collectively secured by copepod and cladocera with six species each and third rank is scored by ostracoda with 05 species (Table 2). Group Protozoa was composed of 03 species namely *Centropyxis sp., Paramecium sp.* and *Vorticella sp.* Rotifera was represented by 11 species, out of which *Brachionus* was the most diversified genera represented by three species viz. *B.angularis, B.calyciflorus* and *B.forficula* followed by *Keratella* and *Trichocerca* genera which were represented by 02 species each namely *Keratella cochlearis* & *K.valga* and *Trichocerca cylindrica* & *T.porcellus* while rest of the genera i.e. *Cephalodella, Colurella, Filinia* and *Lecane* were represented by single species only. Group Ostracoda was represented by 05 species viz. *Candocypria sp., Candona sp., Cyclocypris sp., Eucypris sp.* and *Stenocypris sp.* at Masoli reservoir. Group Copepoda was represented by 06 species namely *Cyclops sp., Diaptomus sp., Eucyclops sp., Mesocyclops leuckartti, Microcyclops sp.* and *Nauplius*. Group Cladocera was also composed of 06 species namely *Alona monocantha, Chydorus sphaericus, Dadaya macrops, Daphnia similis, Leydigia acanthocercoides* and *Macrothrix sp.* Presence of good diversity of zooplankton at Masoli reservoir suggests its healthy status.

Das and Kar [14] reported 26 species of Zooplankton from an oxbow lake of Cachar, Assam. Nimbalkar *et. al*., [15] reported 15 rotifers, 12 cladocerans and 6 copepods from Ambe Ghosale lake, Thane city of Maharashtra. A total 54 genera were observed during the study of Verma *et. al.*,[16] in an anthropogenic pond in Madhya Pradesh. Dutta *et al.*, [17] reported 16 species of microfauna from freshwater wetland in Cachar, Assam.

During the present study, rotifera showing highest percentage is supported by other works in the recent years where rotifera were found to be dominating over other groups of zooplankton. Verma *et. al*., [16] reported highest population percentage of rotifera over other groups of zooplankton reported from the investigated site. Similarly Kar and Kar,[18] reported highest abundance percentage of rotifera over other groups of zooplankton in Sat Beel, Cachar, Assam.

Conflict of interest

No conflict of interest influenced in this research.

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