

Study of plankton population in relation of fisheries in Saikheda reservoir, Maharashtra state, India

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Abstract

Saikheda Reservoir has a diverse assemblage of plankton. Phytoplankton population varied from 1.6×10^8 – 9.8×10^8 cell l⁻¹. Chlorophyceae and Bacillariophyceae were co-dominant components of this reservoir. This reservoir supports a low standing crop of Zooplankton (6.7 – 9.8×10.4). The fish production on the basis of commercial landing was recorded as 30 t during 2015-16. Major carps constitute the main fisheries of the lake whereas catfishes, minor carps and trash fishes were the smallest components of catch during the year 2015-16. In present study, attempt has been made to evaluate plankton and fish production of Saikheda reservoir, so as to get an understanding their utilization at different trophic level in different seasons.

Keywords: Saikheda reservoir, phytoplankton, zooplankton, Maharashtra

1. Introduction

In India, there is great demand of fishes which is useful commercially for peoples and development of nations. Reservoir contributes the single largest inland fishery resources both in terms of size and production potential. The abundance and health of fish shows the health of water. Plankton constitutes a vital role in the aquatic food chain. Phytoplankton plays a phenomenal role in the biosynthesis of organic material while Zooplankton occupy an important trophic niche in the aquatic ecosystem [1]. Ecologically, plankton populations are one of the most important biotic components influencing the food chain, food web, energy flow and cycling of matter. All plankton provides a link between producers and secondary consumers, thus they not only provide an estimation of more comprehensive biological index of the aquatic ecosystem and their environmental condition. A Scientific study on variation of plankton community is necessary for extensive development of aquaculture. It also suggests whether there is any scope for introduction of additional species for commercial value in order to utilize the vacant food niche, if any [2]. Many researchers suggest that, increase in quantity of zooplankton would result in an increase in the quantity of zooplankton [3] while some worker reported that an inverse relationship between the two group i.e. Homeostatis.

The objective of the present study was to investigate the plankton population of saikheda reservoir in relation to fisheries and suggest conservation and management planning.

2. Material and methods

Saikheda reservoir is located in Yavatmal district of Maharashtra state which is present in central region of India and eastern part of state of Maharashtra. It lies in geographical zonation between $20^{\circ}6'55''N$ and $78^{\circ}28'4''E$. It is 14 km away from Pandharkawada taluka and 145 km away

from Nagpur. The main physical features are, maximum length and catchment area which is 1740 m, maximum depth 14.70 m and total surface area are 836 km². According to metrological department of India, the seasonal feature is a period cool from October to February (min-max; 8.9 – $27^{\circ}C$), October and March are transition month with variable weather, whereas the remaining three-month (April, May and June) are typically warmer (18 – $48^{\circ}C$). It has three well marked seasons namely rainy, winter and summer with an average rainfall of about 107.00 mm.

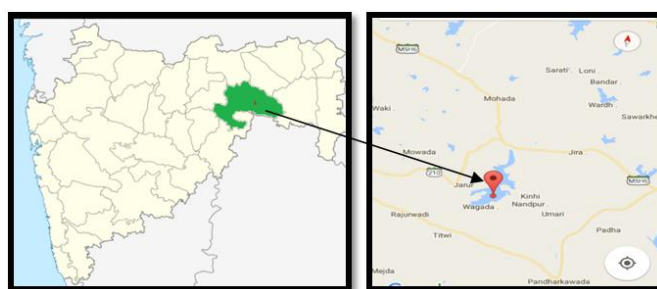


Fig 1: Map of Study site (Courtesy-Google)

3. Material and methods

The study was carried out during the year Jan. 2015 to Dec. 2016 for 12 months. Water samples were collected weekly for various Physio-chemical analysis as per the procedure and method described in the standard method of water analysis [4-5]. The present study has been conducted in the limonitic zone of the reservoir at six sampling stations. The plankton samples were collected from euphotic zone using standard filtered through net. The enumeration of the phytoplankton was done in a bright line haemocytometer [6]. Two slides were counted of each sample and the value calculated in terms of cells l⁻¹. All the species were counted a single unit where colonial (E.G. microcystis), Single celled (E.G. Chlamydomonas) or Filamentous (E.G. Melosira). Fishes were collected with the help of local fisherman using different types of nets namely Gill nets, Cast nets, and drag nets. After catching, fish was identified, if not possible immediately photographs were taken with the help of digital camera Nikon L810.

4. Observations and results

Annual studies of primary productive have shown that Saikheda reservoir was moderately productive. Phytoplankton community (30 species) were far diverse than the zooplankton. Chlorophyceae (38.5%) and Bacillariophyceae (30.3%) were main components of phytoplankton. Cyanophyceae were represented by 30% species. Among zooplankton, Rotifer was the most important components (10 species). Cladocera plankton was represented by 02 species (Table 1).

Table 1: List of Plankton of Saikheda reservoir

Sr. No.	List of Phytoplankton community	List of Zooplankton community
i)	Chlorophyceae	i) Rotifer
1)	<i>Spirogyra sp.</i>	1) <i>Brachionus angularis</i>
2)	<i>Pediastrum simplex</i>	2) <i>Brachionus calyciflorus</i>
3)	<i>Cosmarium sp.</i>	3) <i>Cephalodella adriatica</i>
4)	<i>Closterium acerosum</i>	4) <i>Colurella adriatica</i>
5)	<i>Clorellavulgaris</i>	5) <i>Filinia longiseta</i>
6)	<i>Blue green algae</i>	6) <i>Trichocerca porcellus</i>
7)	<i>Unidentified green algae</i>	7) <i>Keratella cochearis</i>
8)	<i>Volvox sp.</i>	8) <i>Haraella brahmi</i>
9)	<i>Chara sp.</i>	ii) Copepoda
ii)	Bacillariophyceae	1) <i>Diatoms sp.</i>
1)	<i>Synedra sp.</i>	2) <i>Cyclops sp.</i>
2)	<i>Fragilaria sp.</i>	3) <i>Nauplius</i>
3)	<i>Amphora Ovalis</i>	4) <i>Encyclops sp.</i>
4)	<i>Nitzschia sp.</i>	iii) Ostracoda
5)	<i>Epithemia</i>	1) <i>Cyclocypris sp.</i>
6)	<i>Gyrosigma sp.</i>	2) <i>Candolypria sp.</i>
7)	<i>Diatoma sp.</i>	iv) Cladocera
iii)	Cyanophyceae	1) <i>Alonella sp.</i>
1)	<i>Anabaena spiroides</i>	2) <i>Daphnia similis</i>
2)	<i>Oscillatoria sp.</i>	
3)	<i>Merismopaedia sp.</i>	
4)	<i>Chroococcus sp.</i>	
5)	<i>Nostoc sp.</i>	
6)	<i>Anacystis sp.</i>	
iv)	Euglenophyceae	
1)	<i>Euglena sp.</i>	
2)	<i>Phacus sp.</i>	

Phytoplanktons were the most important components of plankton comprising 90% of the total plankton population. In this study, seasonal variation in the density of Phytoplankton and Zooplankton population was found. The phytoplankton density ranged from 11.6×10^8 - 9.8×10^8 cell l⁻¹. With maximum and minimum season was the least phytoplankton abundance. Zooplankton activity was found minimum during winter (1.3 - 1.9×10^{-4} indm⁻³).

The average scale fishing in this reservoir was done from October to June. Here commercial catch is taken as fish yield. The total production of fish was 26t (2015) and 30 t (2016) during the study periods. The mean percent composition was, major carps (20%), Local minor carps and cat fishes (65%), Local major carps (5%) and weed fishes (10%).

5. Discussions

Accordingly the total population of nutrients of plankton in the reservoir is low. Reduced amount of nutrients reflects the low trophic status of the wetland [7]. The dominance of the diatoms is a characteristic feature of clean water. This reservoir has a permanent bloom of blue green algae as in south India [8-9]. Euglenophyceae are commonly found in this water bodies which indicates rich organic matter present in it. The annual zooplankton population in the reservoir was reported between Cladocera (21%), Rotifer (48%) and Copepoda (24%). The low abundance of Daphnia has been attributed the high density of fish. It appears that most of the energy fixed by the phytoplanktons is utilized by carp fishes

particularly *Labeo rohita*, *Catla catla*, *Cirrhinus mrigala* which was about 35% of the total fish population.

Fish species catches in Monsoon were so many different compared to post monsoon and summer season. The average fish yield for last five year arrives at 18.4 kg/h. The most dominant fish in this water body was small clupeiformes which is purely zooplanktonivore. The work has been concluded with future strategies for development of fish fauna, conservation and management of Saikheda reservoir. There is need to plan some future development strategies for management and conservation of fish fauna.

6. Reference

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