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Microflora Dynamics of Mullaperiyar Reservoir, Idukki

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Abstract

Periyar Lake situated inside the Periyar Tiger Reserve, a major international tourist centre in Kerala, was studied for one year inorder to explore the phytoplantkton status of the oldest manmade freshwater Lake in Kerala. A total of 59 taxa of phytoplanktons of three different habitats (plankton, benthos and periphyton) were identified in the Lake. Among the total microflora, Melosira granulata of Bacillariophyceae dominated in the Lake waters during all the seasons. The Lake was found to be oligotrophic, but certain trends of eutrophication was observed at the tourism zone. In the waters of the boat landing site (P-1), indicator species like *Euglena acus* , *Microsystis aeruginosa* were observed, where the anthropogenic influence in comparatively larger.

Keywords: Microflora Dynamics, Periyar Lake, phytoplantkton

Introduction

Fresh water Lakes/Reservoirs situated in the Western Ghats region of India are little explored for their Phytoplankton. Periyar Lake in the Idukki District is the largest (26km^2 area) and oldest (built in 1895) reservoir –Lake constructed in Kerala to irrigate the plains of Tamil Nadu. The Mullaperiyar dam was constructed near the confluence of Periyar (244km) and Mullayar. This study was designed to understand the micro-flora of the Lake, which was not yet explored, and will give information about the biology of the freshwater bodies in the Western Ghats region (one of the biodiversity hotspots of the World), majority of them are parts of International tourist centers.

Materials and Methods

The Lake is situated at the centre of PTR (core environment of the precious wildlife of the Project Tiger Reservoir and Project Elephant Sanctuary), and it lies between 09'16' and 09'40'N latitude, and 76'55' and 77'26'E longitude, and an altitude of 1525m above mean sea level. Three stations were fixed in the Lake. They were P-1 (Boat landing), P-2(Mullaperiyar Dam site), and P-3 (confluence zone of Mullayar and Periyar). The stations were sampled between January 2011 and December 2012. Free floating Plankton, Benthic algae and Periphyton were collected and examined. Samples for free floating plankton were collected from surface water (1-2cm) in 1L, clean wide mouthed plastic jars and were centrifuged to concentrate the planktonic organisms, before counting. Epiphytes were gathered by collecting the micro-algae colonized on angiosperm plants along the shorelines of the Lake, and were kept in 100mL distilled water in clean plastic bottles. Benthic algae were collected from the surface sediments using 50ml (2cm wide) syringe from the shorelines. Two representative samples (having 50mL) for Benthos analysis were collected from each location (50mLx50mL=100mL). All the samples were fixed in Lugol's iodine solution immediately after collection (1mL:10mL). The phytoplanktons were enumerated by Lackey's drop method APHA (1980), in the laboratory using an electric microscope, having 45x magnifications and were identified using the standard keys provided by Reynolds (1984), and Subrahmanyam (1946).

Results and Discussion

A total of 59 taxa of micro-flora were identified from different representative samples. Among them 54 were identified up to Species level and 5 were identified up to the Genus level (Table-1).

Plankton assemblage

Among the total planktons identified 60 per cent were Diatoms, 30 per cent were Desmids and 10 per cent were Blue-green algae. Major species among Diatoms noticed was Melosira granulata, which dominated the whole year in the Lake. The filament integration of this centric Diatom varied with season. During rainy season with increased water level, Melosira showed 6 to 8 celled, and large sized filaments. While during other seasons filament size and cell numbers decreased (3 to 4). The second most abundant

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Table 1. List of the Micro-flora of Mullaperiyar Lake (Identified taxa and their habitat)

Sl.no.	Phytoplankton found in the Lake	Habitat
	BACILLARIOPHYCEAE	
1	*Amphora ovalis* Kurtz.	Plankton
2	*Cocconies placentula* Her.	Plankton
3	*Cyclotella meneghiniana* Kuetz	Plankton
4	*Cyclotella ocellata* Pantocsek	Plankton
5	*Cymbella affinis* Kutzing.	Benthos
6	*Denticula inflate* W.Smith.	Plankton
7	*Eunotia asterionelloides* F.Hustedt.	Plankton
8	*Mastogloia smithii* Thwaites.	Benthos
9	*Melosira granulata* (Her.)Ralfs.	Plankton & Epiphyte
10	*Navicula cuspidate* Kuetz.	Plankton
11	*Nitzschia palea* W.Smith	Plankton
12	*Pinnularia borealis* Ehrenberg.	Benthos
13	*Pinnularia viridis* (Nitzsch) Ehrenberg.	Plankton
14	*Pinnularia interrrupta* W.Smith.	Epiphyte
15	*Ropalodia gibba* Ehrenberg.	Epiphyte
16	*Surirella elegans* Ehrenberg.	Epiphyte
17	*Synedra ulna* (Nitz). Eher.	Epiphyte
18	*Tabellaria fenestrata* (Lyngdie) Kutzing.	Epiphyte
	CYNOPHYCEAE	
19	*Agmenellum gelatinosa*	Plankton&Benthos
20	*Cylindrospermum Sp.*	Benthos
21	*Microcystis aeruginosa* Kutz.	Plankton
22	*Oscillatoria Sp.*	Benthos
23	*Spirulina major* Kutzing.	Benthos
	CHLORPHYCEAE	
24	*Arthrodesmus convergens* Ehrenderg.ex Ralfs.	Plankton
25	*Bulbochaeta Sp.*	Epiphyte
26	*Closterium ehrenbergii* Meneghini ex Ralfs.	Epiphyte
27	*Closterium parvulum* Nageli.	Epiphyte
28	*Closteriopsis longissima* (Lemm)Lemm.	Plankton
29	*Coelastrum microsporum* Nageli.	Epiphyte
30	*Cosmarium botrytis* Meneghini ex Ralfs.	Benthos
31	*Cosmarium contractum* O.Kirchner.	Epiphyte
32	*Cosmarium portianum* W.Archer.	Plankton
33	*Crucigenia crucifera* (Wolle)Collins.	Epiphyte

Sl.no.	Phytoplankton found in the Lake	Habitat
	CHLORPHYCEAE	
34	*Crucigenia pulchra* (West &G.S.West) Komarek.	Plankton
35	*Euastrum insulare* (Wittrock) J.Roy.	Epiphyte
36	*Gonatozygon monotaenium* de Bary.	Plankton
37	*Micrasterias pinnatifida* (Kutzing) Ralfs ex Ralfs.	Epiphyte
38	*Oedogonium gracilis* (Wittrock) Tiffany.	Epiphyte
39	*Pediastrum duplex* var. clatchratum(A.Braun) Lagerheim.	Epiphyte
40	*Pediastrum duplex* var. boryanum	Epiphyte
41	*Penium cucurbitinum* Bisst.	Epiphyte
42	*Pleurotaenaium ehrenbergi* (Brebisson) De Bary.	Benthos
43	*Scenedesmus dimorphus* (Turpin)Kutzing.	Epiphyte
44	*Scenedesmus quadricauda* var.Maximus West&G.S. West.	Benthos
45	*Scenedesmus quadricauda* var. Westii GM Smith.	Epiphyte
46	*Staurastrum asteroideae*	Epiphyte
47	*Staurastrum chaetoceras* (Schroder) GM Smith.	Epiphyte
48	*Staurastrum leptocladu*m var. bar.borgii	Plankton
49	*Staurastrum paradoxum* var. reductum P.F.M. Cosel.	Plankton
50	*Stigeocolonium Sp.*	Plankton
51	*Ulothrix Sp.*	Epiphyte
	EUGLENOPHYCEAE	
52	*Euglena acus*	Plankton
53	*Euglena caudate*	Plankton
54	*Euglena marsonii*	Plankton
55	*Lepocinclis texta* (Dujardin) Lemmermann.	Plankton
56	*Lepocincilis ovum* (Eher.)Lemm.	Plankton
57	*Phacus accuminatus* Stockes.	Plankton
58	*Trachelomonas armata* (Ehrenberg)F.Stein.	Plankton
	DINOPHYCEAE	
59	*Dynobryon divergens* O.E.Imhof.	Plankton

plankton noticed was Staurastrum paradoxum var. reductum, a Desmid. Three species of this plankton were identified in the Lake, Staurastrum paradoxum var.reductum, S.leptocladum and S.chetocceras.

Benthic algal assemblage

Among the Benthic algae 50 per cent of the total comprised of Diatoms, 30 per cent Cyanophyta and 20 per cent Desmids. Among the Diatoms of the benthic sample the dominant species noticed was Pinnularia borealis and among Cyanophyta the dominants were Oscillatoria Sp. and Cylindrospermum Sp.

Periphyton

The epiphyte flora was abundant during dry seasons, samples possessed high number of Melosira granulata and Staurastrum chaetoceras. In other seasons the periphyton were dominated by S. chetoceras alone.

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