

Physico-Chemical Factors and Plankton Community of Freshwater Habitats in Madambakkam Town Panchayat, Tamilnadu and Its Adjacent Areas

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Abstract

Physico-chemical parameters such as temperature, pH, dissolved oxygen, alkalinity, hardness and salinity were observed along with the collections of plankton samples were from six different localities in the water bodies of Madambakkam and its adjacent areas. A total of 36 species of plankton were encountered and the variation in plankton diversity seems to be higher in Madambakkam lake (ML) and Vengaivasal Temple Tank (VTT). The volvox colonies among phytoplankton were found to be dominant (algal bloom) in some locations.

Key words : Madambakkam, Plankton, Palmer index, Physico-chemical factors, Freshwater.

Madambakkam is a panchayat town in Kancheepuram district in the Indian state of Tamilnadu. It borders few places like Selaiyur, Vengaivasal and Sithalapakkam. Madambakkam is known for its historic Shiva Temple of Lord Dhenupureeswarar, built during the period 956-973 AD which is highly residential area. Studies on physico-chemical variables and biological factors such as phytoplankton and zooplankton in the waterbodies of these areas were untouched and the results obtained from this investigation will be the first hand information.

Methods

Madambakkam is located at 12°51'N 80°03'E 12.85°N 80.05°E. Six different localities were selected for the study viz., Madambakkam lake (ML)—three stations, temporary pools near Madambakkam residents near the Madambakkam lake (TP-M)—two stations, Vengaivasal pond (VP), Vengaivasal Temple Tank (VTT)—three stations, Nootchencheri Tank (NT)—three stations, Vengaivasal Pond (VP)—three stations, Vengaivasal Sitheri (or) Periya yeri (VS)—three stations (Fig. 1). Physico-chemical parameters like pH, temperature, salinity and dissolved oxygen were esti-

mated by adopting the methods given in APHA et al. (1). Plankton samples were collected by plankton net of mesh size 50 and 250 µm. Bimonthly samplings were carried out from January to March 2010. Identification of phytoplankton was done following Anand (2), Anand (3), Desikachary (4) and pollution index was calculated by Palmer index (5) and zooplankton following Altaff (6), Battish (7), Dhanapathi (8), Edmondson (9), Michael (10), Michael and Sharma (11), Sharma and Michael (12) and Victor and Fernando (13).

Results and Discussion

The surface water temperature ranged from 28 to 30 C, the pH values (7.77 to 8.16), DO values (3.4 and 5.3 mg/liter), the total hardness (78 to 84 mg/liter), the alkalinity values (68 to 93 mg/liter) and the concentration of salinity (0 to 0.28 ppt) (Table 1). Totally 36 species of plankton were encountered from six different localities in the water bodies of Madambakkam and its adjacent areas. Among zooplankton (20 sp.), Protozoa (01 sp.); Rotifera (6 sp, 3 genera); Cladocera (9 sp. 8 genera); Copepoda (3 sp, 2 genera); Ostracoda (1 sp. genera) were recorded, Phytoplankton (16 sp.) were identified mostly upto generic level belongs to

Table 1. Mean value of physico-chemical parameters of various localities in and around Madambakkam.

Loc	Temperature (C)	pH	Dissolved Oxygen (mg/l)	Hardness (mg/l)	Alkalinity (mg/l)	Salinity (ppt)
ML	29.5	7.78	5.3	82	67	0.28
TPM	28	7.86	3.4	78	70	0
VTT	18.5	7.77	5.2	81	81	0.21
VP	29	8.16	4.8	79	65	0.20
NT	30	7.97	4.5	80	80	0
VS	28	8.02	3.6	84	83	0

Bacillariophyceae (1 sp., 1 genera), Chlorophyceae (14 sp. 12 genera) and Cyanophyceae (1 sp. 1 genera) were detected. Few rare species such as *Trichotria*

Table 2. Plankton encountered from six different localities. ML-Madambakkam lake, TP-M-Temporary pools near Madambakkam, VTT-Vengaiwasal Temple Tank, VP-Vengaiwasal pond, NT-Noothencheri Tank and VS-Vegaivalal Sitheri.

Species encountered	TP-					
	ML	M	VTT	VP	NT	VS
Zooplankton						
PROTOZOA						
1. <i>Arcella discoides</i> Ehrenberg, 1871			+			
ROTIFERA						
2. <i>Brachionus calyciflorus</i> Pallas, 1766						+
3. <i>B. diversicornis</i> (Daday, 1883)			+			
4. <i>B. falcatus</i> Zacharias, 1898				+	+	
5. <i>Lecane</i> sp.			+			
6. <i>Lecane (M) bulla</i> (Gosse, 1851)	+	+				
7. <i>Trichotria tetractis</i> Ehrenberg, 1830	+					
CLADOCERA						
8. Cladoceran neonates		+				+
9. <i>Ceriodaphnia cornuta</i> Sars (1885)			+	+	+	
10. <i>Chydorus barroisi</i> Richard, 1894	+	+				
11. <i>Dunhevedia crassa crassa</i> King 1853	+	+				
12. <i>Echinisca triserialis</i> (Brady 1886)	+					
13. <i>Macrothrix laticornis</i> (Jurine 1820)	+					
14. <i>Moina micrura</i> Kurz, 1874				+	+	+
15. <i>Pseudosida bidentata</i> Herrick 1884	+	+		+		

Table 2. Continued.

Species encountered	TP-					
	ML	M	VTT	VP	NT	VS
16. <i>Pseudosida bidentata</i> var <i>szalayi</i>						+
17. <i>Scapholeberis Kingi</i> Sars, 1903	+					
COPEPODA						
Calanoida						
18. Calanoid nauplii		+				+
19. Calanoid copepodite	+	+		+	+	
20. <i>Heliodiaptomus cinctus</i> (Gurney 1907)						+
21. <i>Heliodiaptomus cinctus</i> male						+
22. <i>Heliodiaptomus viduus</i> (Gurney, 1916) female	+			+	+	+
23. <i>Heliodiaptomus viduus</i> brood female				+		
24. <i>Heliodiaptomus viduus</i> male				+	+	
Cyclopoida						
25. Cyclopoid nauplii	+	+	+	+	+	+
26. Cyclopoid copepodite	+	+		+	+	
27. <i>Mesocyclops leuckarti</i> (Claus, 1857) female	+		+			
Ostracoda						
28. <i>Strandesia indica</i> Hartmann, 1964	+		+			+
Phytoplankton						
BACILLARIOPHYCEAE						
29. <i>Navicula</i> sp.	+	+	+			
CHLOROPHYCEAE						
30. <i>Closterium tumidum</i> Johnson, 1895	+					
31. <i>Gomphosphaeria</i> sp					+	
32. <i>Harmidium flaccidum</i>					+	
33. <i>Kirchneriella</i> sp.					+	
34. <i>Oscillatoria</i> sp	+	+				+
35. <i>Oscillatoria subbrevis</i> Schmidle, 1901	+					
36. <i>Pandorina</i> sp.					+	
37. <i>Pediastrum simplex</i> Meyen 1829					+	
38. <i>Pediastrum duplex</i> Meyen 1829	+	+				
39. <i>Phormidium</i> sp.	+	+	+			+
40. <i>Scenedesmus</i> sp.					+	
41. <i>Spirogyra</i> sp.	+	+				
42. <i>Ulothrix</i> sp.					+	
43. <i>Volvox colonies</i>				+	+	+
CYANOPHYCEAE						
44. <i>Anabaena</i> sp. Palmer's Index	10	9	4	0	6	0
Miscellaneous						
45. Nematode	+					
46. Insect eggs				+		

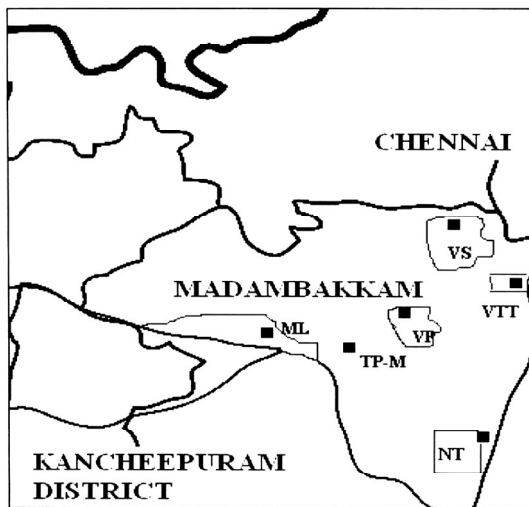


Figure 1. Six locations from Madambakkam and its adjacent areas.

tetractis Ehrenberg, 1830, *Echinisca triserialis* (Brady 1886). *Macrothrix laticornis* (Jurine 1820), *Pseudosida bidenta* Herrick 1884 and *Pseudosida bidenta* var *szalayii* were observed. Nematodes and insect eggs were also recorded.

It was inferred that the species diversity seems to be higher in Madambakkam lake (ML) and Vengaivasal Temple Tank (VTT). The observation of volvox colonies among phytoplankton were found to be dominant (algal bloom) in Vengaivasal Temple tank, Vengaivasal pond and Vengaivasal Sitheri (VS) which is a responsible factor leads to destruction of the zooplankton community (14). This trend on physico-chemical factors related with plankton community were reported by Michael (15), Sumitra (16) and Rao (17), Kedar et al. (18) and Wang et al. (19). Volvox colonies represented the higher levels of nitrogen in the water and subsequently damage the gills of fishes. According to Palmer's algal pollution index (5) were ranged from 4 to 10% which indicated less organic pollution in the study areas.

Bottazzi et al. (20) published first report on faunal and biogeographical account from northern Apenninic springs, Italy during the survey April to June, 2007. The occurrence of most of the zooplankton taxa and the overall scarcity of data, due to only one season of sampling, did not allow for the detection of any clear pattern in the distribution of the

plankton relation to different environmental variables. Further studies are to be explored in these areas to know the variation in plankton diversity according to seasonal influences. But the plankton availability and specific species occurrence from the current investigation would be a first report from these areas. In general, with the substantial increase in population leads to development or encroachments (house sites, commercial establishments) rapidly in water catchment areas such as marshlands and lakes in the Chennai city. This has resulted in the environmental degradation and ecological imbalance with consequent failure of monsoon and acute water scarcity even for drinking purposes. Such developments were observed in Madambakkam and its adjacent areas may face difficulties of water scarcity in future.

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