

STUDIES ON ASSESSING THE DIVERSITY OF BIRDS, PHYTOPLANKTONS AND ZOOPLANKTONS IN PONDS IN MUTHUPETTAI BLOCK, THIRUVARUR DISTRICT, TAMIL NADU

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ABSTRACT

The study was aimed to make an assessment on birds, phytoplanktons and zooplanktons in the ponds of Muthupet block, Thiruvavur and samples were collected from five ponds. Plankton samples were collected from the surface water at predecided locations and were identified. Nearly 22 phytoplanktons and 11 zooplanktons were identified from the ponds. Spot counting was used for recording the number of water birds and counting was done during early morning hours. The identification was done using an identification manual of Indian sub Continental birds by Grimmett and nearly 22 water birds were recorded. The pond water remains green in color in all the seasons. The presence of cyanophyceae members like *Anacystis sp.* and *Spirulina sp.* may be responsible for green color of the pond water. Migratory birds like gull billed tern, yellow wagtail and wooded sand piper were recorded in the month of February. The water quality of the pond is in eutrophic condition but the presence of rich bank vegetation attracts the birds for roosting. Further, the thick vegetation of *Eichornia sp.* provides hiding place for the water birds.

Keywords: Zooplanktons diversity; birds; phytoplanktons; ponds.

INTRODUCTION

Aquatic ecosystems are characterized by a complex combination of physical, chemical and biological properties that depend on the surrounding environment. So, it is normal that the quality of water in two different habitats belonging to the same category have different physicochemical and biological properties [1]. In this study, five ponds were selected in a small town to study the status of water bodies. Pattukkottai is a town and a municipality in Thanjavur district in the Indian state of Tamil Nadu. In this town five ponds are mostly affected by sewage water and agricultural runoff and are surrounded by temples, agricultural fields, and human settlements. The upper catchment area of the ponds

includes rural and agricultural areas and the inlet and outlet of the ponds are open. The runoff in the monsoon and sewage from the area are disposed into the ponds, as there is no proper sewage collection and disposal system. The overflow from the pond flows into nearby open channel and is ultimately disposed into river without any treatment. Apart from *Eichornia sp.*, there is tremendous load of phytoplankton in the ponds due to the addition of organic matter.

MATERIALS AND METHODS

Study Area and Collection of Water Samples

The ponds were monitored seasonally in the year of Feb'2012 – June'2012. The

samples were collected in the month of February'12, March'12, April'12 & June'12 representing winter and summer season respectively. The samples were collected in the morning between 8 am - 10 am. The pond water is used for bathing the cattle's and construction purpose. During rainy season the pond overflows and emits noxious smell. All ponds are located near the temples about 1-2 km. from Pattukkottai Bus stand. Water samples were collected

from 5 sampling points of the pond in Pattukkottai block. The samples were collected in clean polythene bottles without any air bubbles. The bottles were rinsed before sampling and tightly sealed after collection and labelled in the field. A total of 5 water samples from pond used by people of Pattukkottai city were collected in clean polythene bottles and brought to the laboratory.

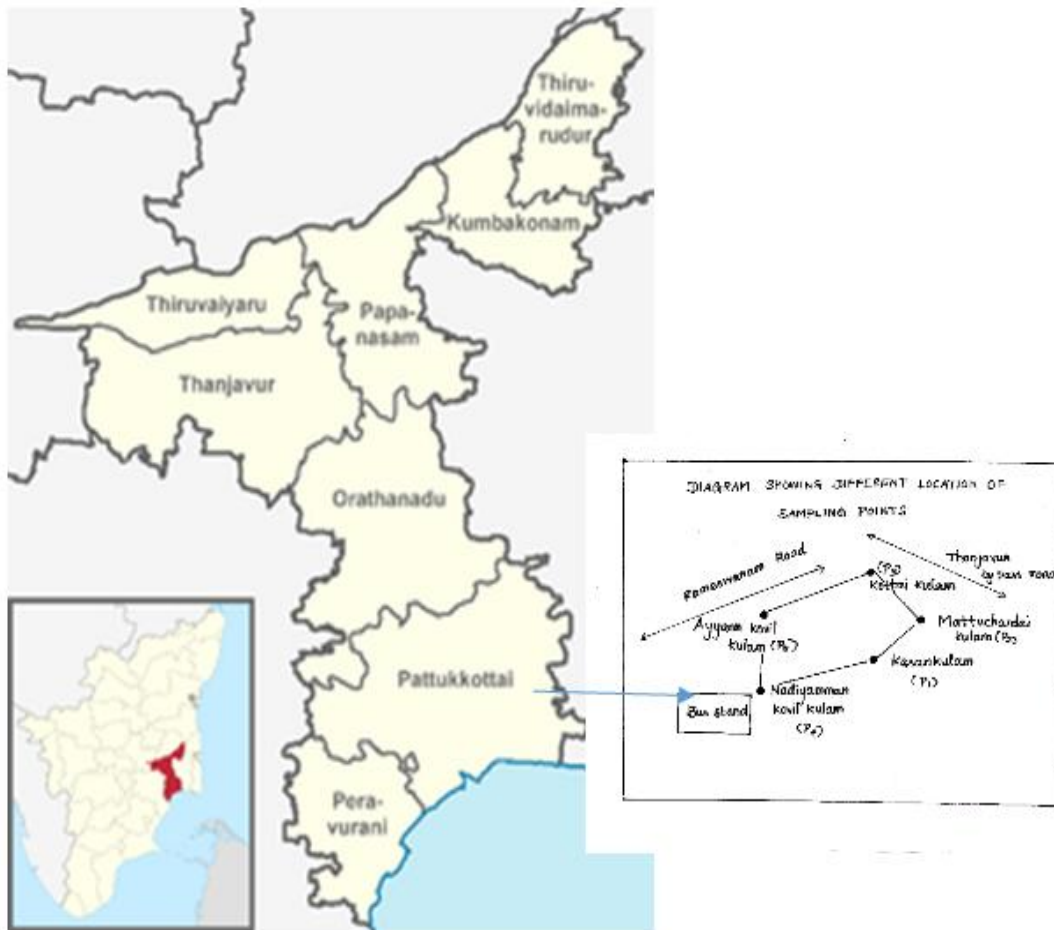


Fig. 1. Location map of sampling points

Table 1. Descriptions of sampling locations

Sample no	Location	Brief description
P1	Kasankulam	Pond is located at om sakthi kovil. Pond water is used for bathing and construction purposes. (Surface area 3 Ha)
P2	Mattuchandai kulam	Pond receives sewage contaminations. During rainy season the pond over flows and emits noxious smell.
P3	Kottaikulam	Pond situated in the bypass of Thanjavur road.
P4	Nadiyamman kovil kulam	Pond is located at Nadiyamman kovil. 150 families were living around the pond.
P5	Ayyanar kovil kulam	Pond is located at Ayyanar kovil on the way of Rameswaram road. Pond fully infested with <i>Eicchornia</i> sp.

Biological Analyses of Water Samples

Plankton samples were collected from the surface water at predecided locations. The sampling stations were located as near as possible to those selected for chemical sampling to ensure maximum correlation of findings. From each location water samples were collected and concentrated to 250 ml by filtering through 20u mesh sized plankton net. The concentrated samples were immediately preserved by addition of 5 ml of 4% formalin. Plankton samples were identified up to species level under binocular compound microscope following standard monographs [2].

Spot counting was used for recording the number of water birds. Counting was done during early morning hours. The identification was done using an identification manual of Indian sub Continental birds by Grimmett [3].

RESULTS AND DISCUSSION

Changes in Phytoplankton and Zooplankton

Bajpai and Agarker [4] have observed that green algae prefer water with high

concentration of dissolved oxygen. High density of phytoplankton species diversity and physico chemical parameters exhibited during the study period except during rainy season. During rainy season cloudy weather, low transparency and heavy flood caused the decline of phytoplankton density. Temperature affects the oxygen content of the water (oxygen levels become lower as temperature increases); the rate of photosynthesis by aquatic plants; the metabolic rates of aquatic organisms and the sensitivity of organisms to toxic wastes, parasites and diseases. Causes of temperature change include weather, removal of shading stream bank vegetation, impoundments, discharge of cooling water, urban storm water and groundwater inflows to the stream [5]. The biological parameters include plankton analysis and observation of aquatic birds. The plankton analysis results include zooplankton and phytoplankton, which are presented in the Table 3. The pond water remains green in color in all the seasons. The presence of cyanophyceae members like *Anacystis* sp. and *Spirulina* sp. may be responsible for green colour of the pond water. The green colour of the pond water can be seen in the photograph

of the pond water. The Chlorophyceae and Englenophyceae group indicate slightly polluted condition and the Cyanophyceae group indicates the eutrophic condition of the aquatic system. Sankaran Unni [6]. The cyanobacteria are of particular interest to limnologists and lake users because members of this group are those that often form nuisance blooms and their dominance in lakes may indicate poor water conditions. Some species of *Cyanobacteria* are known to produce toxins [7].

Table 2. List of microbes recorded in the pond water

Sl. no.	Organism
1	<i>Staphylococcus sp.</i>
2	<i>Enterobacter sp.</i>
3	<i>Escherichia coli</i>
4	<i>Pseudomonas sp.</i>
5	<i>Bacillus sp.</i>
6	<i>Micrococcus sp.</i>
7	<i>Streptococci sp.</i>
8	<i>Vibrio sp.</i>

Table 3. List of water birds recorded in the pond water

Sl. no.	Common name	Scientific name
1	Black headed Ibis	<i>Thrdskiornis melanocephalus</i>
2	Cattle Egret	<i>Bubulcus ibis</i>
3	Common Coot	<i>Gallinula chloropus</i>
4	Common Moorhen	<i>Gallinula chloropus</i>
5	Drater	<i>Anhinga melanogaster</i>
6	Grey Heron	<i>Ardea cinerea</i>
7	Gull billed tern	<i>Gelochelidon nilotica</i>
8	Indian Cormorant	<i>Phalacrocorax fuscicollis</i>
9	Indian pond heron	<i>Ardeola grayii</i>
10	Intermediate Egret	<i>Mesophoyx intermedia</i>
11	Lesser whistling Duck	<i>Dendrocygna javanica</i>
12	Little Cormorant	<i>Phalacrocorax niger</i>
13	Little Egret	<i>Egretta garzetta</i>
14	Little Grebe	<i>Tachybaptus ruficollis</i>
15	Purple Swamp hen	<i>Porphyrio porphyrio</i>
16	White Breasted Water hen	<i>Amaurornis phoenicurus</i>
17	Wood Sandpiper	<i>Tringa ochropus</i>
18	White wagtail	<i>Motacila alba</i>
19	White throated kingfisher	<i>Halcyon smyrnensis</i>
20	Pied kingfisher	<i>Ceryle rudis</i>
21	Common kingfisher	<i>Alcedo atthis</i>
22	Red Wattled lapwing	<i>Vanellus indicus</i>

Table 4. Phytoplanktons and zooplanktons reported during sampling period

Phytoplankton		Zooplankton	
Chlorophyceae			
1	<i>Actinastrum sp.</i>	1	<i>Brachinous sp.</i>
2	<i>Closterium sp.</i>	2	<i>Filinia sp.</i>
3	<i>Chlorella sp.</i>	3	<i>Keratella sp.</i>
4	<i>Chlorococcum sp.</i>	4	<i>Lecane sp.</i>
5	<i>Cosmarium sp.</i>	5	<i>Monostylus sp.</i>
6	<i>Pediastrum sp.</i>	6	<i>Polyarthra sp.</i>
7	<i>Scenedesmus sp.</i>	7	<i>Bosmina sp.</i>
8	<i>Staurostrum sp.</i>	8	<i>Daphnia sp.</i>
Euglenophyceae			
1	<i>Euglena sp.</i>	9	<i>Moina sp.</i>
2	<i>Phacus sp.</i>	10	<i>Cyclops sp.</i>
3	<i>Bacillariophyceae sp.</i>	11	<i>Nauplius sp.</i>
4	<i>Caloneis sp.</i>		
5	<i>Gomphonema sp.</i>		
6	<i>Navicula sp.</i>		
7	<i>Nitzschi sp.</i>		
8	<i>Synedra sp.</i>		
Cyanophyceae			
1	<i>Anabaena sp.</i>		
2	<i>Anabaena sp.</i>		
3	<i>Lyngbya sp.</i>		
4	<i>Merismopedia sp.</i>		
5	<i>Oscillatoria sp.</i>		
6	<i>Spirulina sp.</i>		

Sewage water contains pathogenic microorganisms like bacteria, viruses, fungi, algae etc., having the potential risks to cause diseases that can cause immense harm to public health. The water borne diseases are typhoid, paratyphoid fevers, dysentery and cholera, polio and infectious hepatitis. The responsible organisms occur in the faces or urine or infected people, where raw untreated sewage water is used to irrigate crops spreads helminthic disease which is caused by *Ascaris* and *Trichuris* spp. as occurred in West Germany.

Melbourne, Australia and from Denmark (Shuval et al. [8]).

Scenario of Water Birds

The aquatic birds observed are listed in Table 2. Migratory birds like gull billed tern, yellow wagtail and wooded sand piper were recorded in the month of February. The water quality of the pond is in eutrophic condition but the presence of rich bank vegetation attracts the birds for roosting. Further, the thick vegetation of

Eichhornia sp. provides hiding place for the water birds.

CONCLUSION

Because of presence of various pathogenic bacteria and toxic *Cyanobacteria* like *Anacystis sp.*, the pond is not useful for any purpose like drinking, washing and bathing. By proper treatment and management of the pond the area can be converted into recreation centre. The pond needs appropriate drainage system so that the sewage can be disposed at a place other than the pond. This will help in restoring the natural aquatic ecosystem of the pond. The good pond ecosystem will reduce the health hazards like epidemics of cholera and dysentery. Dredging has to be carried out to remove the organic wastes settling at the bottom of the pond.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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