

Abundance and distribution of Phytoplanktons in Thamaraikulam Pond, Uthamaplayam Taluk, Theni Dt., T.N, India

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ABSTRACT

The study of freshwater planktons is an imperative study for understanding aquatic ecosystems, as these microscopic organisms play a dynamic role in biogeochemical cycles and serve as indicators of water quality. This research emphasizes the identification of freshwater planktons using traditional microscopic techniques. By employing compound microscopy, I file the diversity of planktons in freshwater bodies. The integration of these methods allows for a comprehensive assessment of plankton diversity and offers insights into their ecological roles and distribution patterns. The findings helped in monitoring freshwater ecosystems, managing water resources, and understanding the influences of environmental changes on aquatic biodiversity.

Key words: Phytoplanktons, Phytoplankton distribution, Algae

Introduction

Ponds are important wetlands situated in and around human habitations. They are semi-natural ecosystems erected by man in the landscape. Ponds are commonly small, shallow, confined bodies of standing water, habitats of great importance providing water for domestic, industrial and agricultural uses. Information regarding the ecology of pond water is an important tool for its systematic study. The planktonic study is a very useful tool for the valuation of water quality and productivity of any type of water body, and also contributes to the understanding of lentic water bodies (Pawar *et al.*, 2006).

Water is the elixir of life and acopiousre source on

Earth. But this vast natural resource has been exhausted and turned into a scarce commodity with amplified usage. Water bodies contain a variety of Zooplankton and Phytoplankton.

The term "Plankton" means to drifter. Planktons are the free-floating microscopic creatures of aquatic ecosystems that swim on the upper surfaces of water or are suspended in the water column. Phytoplanktons are the fabricators of aquatic ecosystems as they store sun energy and supply the energy to higher trophic levels. They make their food by the process of photosynthesis. They provide food to zooplankton, fish and other higher organisms in aquatic ecosystems. Phytoplankton is a very important component of an aquatic ecosystem and plays a crucial role in the energy transfer among the aquatic

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food chains or food webs. Freshwater phytoplankton plays a vital role in aquatic ecosystems like ponds, lakes and reservoirs (Sant Manickam *et al.*, 2014).

Phytoplankton is the chief primary producer in almost all aquatic systems and is an important food source for other organisms (Sukumaran *et al.*, 2022). Zooplankton feeds on phytoplankton. They are accountable for eating millions of algae and other phytoplankton (Hillebrand *et al.*, 2022). Phytoplankton not only serve as nutrition or food or diet for the aquatic animal, but also play a significant role in keeping the biological equilibrium and the quality of water (Pandey Usha Pandey *et al.*, 1998).

In aquatic systems, phytoplankton is an important biological characteristic, which includes blue-green algae, green algae, diatoms, euglenoids, etc. Similarly, zooplankton occupies the secondary level in the food chain and plays a significant role in the conversion of food energy synthesized by the phytoplankton to the higher trophic level. These freshwater communities are enormously sensitive to environmental variations. The phytoplankton community shows high diversity with periodic fluctuation, which designates the diversity in ecological niches. The phytoplankton population of the Thamaraiikulam pond includes Chlorophyceae, Bacillariophyceae, Cyanophyceae, and Euglenophyceae. In the present study, an attempt has been made to assess the diversity of phytoplankton and their distribution in the village pond.

Materials and Methods

Study area

Thamaraiikulam pond is located in the Gokilapuram village in Uthamapalayam Taluk of Theni District in Tamil Nadu. It covers 663 hectares of land surrounded by paddy fields. In the plains, the temperatures range from a minimum of 13°C to a maximum of 39.5 °C. The district is known for its wholesome climate, hills and lake. The 2,889 km² (1,115 sq mi) District lies at the foot of the Western Ghats between 9° 39' and 10° 30' North latitude and between 77° 00' and 78° 30' of East Longitude. The source of water supply to this town is from the Mullai Periyar River. It is one of the attractions of this town. The yearlong pleasant climate is a treat for residents and visitors. The district receives the rainfall under the influence of both the southwest and northeast monsoon.

Sample collection

The study was carried out from 2023-2024. Plankton samples were collected between 8.00 AM to 9.30 AM at the selected station. Plankton net of bolting silk no. 25 was used for sampling purposes. Samples were taken at midstream, 0.5 to 1 m below the surface of the water. Collected concentrated plankton samples were fixed and preserved in 5% formalin. Plankton samples were examined under a high-power microscope and identified up to genus and species level with the help of standard books and monographs (Prescott, 1962).

Calculation of species diversity

The indices of species diversity were calculated using the following expression derived from the Shannon-Weiner equation

$$H' = \sum_{i=1}^s - P_i \log_e P_i$$

$$\log_e = \ln; P_i = n_i / N$$

Where H' = Diversity

S = Number of Species

P_i = Proportion of individuals of the total sample belonging to the ith number

Results and Discussion

Four families (Bacillariophyceae, Chlorophyceae,

Table 1. Species composition and abundance of phytoplankton in Thamaraiikulam pond

Species	Total abundance	%Abundance
<i>Flagilaria</i>	103217	27.76
<i>Tabellaria</i> sp	12530	3.36
<i>Naviculales</i>	4121	1.10
<i>Nituschia</i>	2350	0.63
<i>Yclotella</i>	12350	3.32
<i>Ankistrodesmus</i>	88790	23.88
<i>Chlorella</i>	18700	5.02
<i>Ulothrix</i>	4523	1.21
<i>Enteromorpha</i>	1006	0.27
<i>Closterium</i>	5345	1.43
<i>Eudornia</i>	1010	0.27
<i>Oocystis</i>	11458	3.08
<i>Zugrema</i>	1543	0.41
<i>Microspora</i>	5121	1.37
<i>Aphanocapsa</i>	78521	21.11
<i>Anabaena</i>	12456	3.35
<i>Oscillatoria</i>	1321	0.35
<i>Aphanizomenon</i>	7450	2.00
Total	371812	

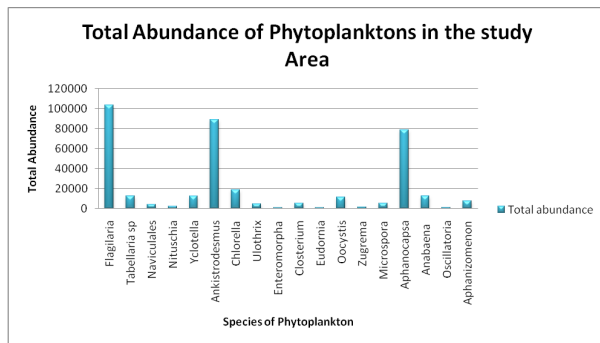


Fig. 1. Total Abundance of phytoplankton in Thamaraikulam Pond

Table 2. Shannon Wiener Diversity Index

Statistical method	Value
Shannon Weiner Diversity	2.039



Fig. 2. Spirulina



Fig. 3. Spirulina



Fig. 4. Euglena



Fig. 5. Anabena



Fig. 6. Navicula



Fig. 7. Phacus

Chrysophyceae, and Myxophyceae) and 18 phytoplankton species were found after the one-year survey. Flagilaria species is the highest with a percentage abundance of 27.76%, followed by Ankistrodesmus with 23.88%, Aphanocapsa with 21.11%, while Eudornia with 0.27% is the least abundant (Table 1).

Conclusion

In summation, the phytoplankton communities inhabiting the tranquil waters of Thamaraikulam pond exhibit a commendable degree of maturity, ecological stability, and vibrant diversity. This year-round investigation, spanning the ebb and flow of seasons and the nuances of geographical influence, reveals that while both climate and location subtly shape the abundance and composition of these microscopic marvels, their overall diversity remains remarkably steadfast, a testament to the resilience of the aquatic ecosystem.

The meticulous identification of freshwater plankton stands as a cornerstone in the realm of aquatic ecology and environmental stewardship. As we navigate the ever-evolving challenges of ecological conservation, sustained scientific inquiry coupled with cutting-edge technological advancement becomes not merely beneficial but indispensable. Such endeavours will continue to illuminate the hidden intricacies of freshwater ecosystems and pave the way for more informed and holistic management strategies.

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Conflict of Interest- None

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