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Freshwater Algal Diversity of Waddepally Lake Warangal

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ABSTRACT

Objective: *Waddepally lake, Warangal, remains unexamined for its algal flora. An effort has been undertaken to examine the variety of algae.* ***Methods:*** *Water samples were randomly obtained in plastic bottles from various locations inside the tank. Samples were further obtained by scraping the steps of the temple tank to gather the epilithic algae. The habitat was assessed for pH and temperature levels. Samples were transported to the laboratory and stored in 4% formalin for further analysis. The algae were seen and documented using the HOVERLABS Research Photo Microscopic Unit.* ***Findings:*** *The current research documented a total of 28 genera and 39 taxa across three distinct classes: Cyanophyceae, Chlorophyceae, and Bacillariophyceae. A maximum of nine taxa was discovered from the family Scenedesmaceae within Chlorophyceae. It was noteworthy that 16 families included just one taxon. The findings unequivocally indicate that the tank has a diverse and abundant algae flora. This research reveals that tank are among the optimal habitats for microalgae. Therefore, algal diversity may serve as an indicator of the pollution level in such tank.*

Keywords: *Bacillariophyceae, Chlorophyceae, Cyanophyceae, Waddepally lake.*

Introduction

Algae serve as the principal producers in the majority of aquatic ecosystems, while creatures such as zooplankton and various fish species function as primary and secondary consumers, establishing a full food chain. Environmental pollution may be quantified via the phytoplankton community, since they serve as the most reliable indicators.[1,2] When the algae species. Diversity is abundant, indicating elevated nutrient levels and the absence of eutrophication. Eutrophication may be assessed by examining the phytoplankton population in aquatic ecosystems. The presence of pollution-tolerant algae such as *Oscillatoria, Spirogyra, Scenedesmus, Pinnularia, Gomphonema,* and *Euglena* serves as an indication of pollution. Numerous algae arise in response to fluctuations in resources and competition for space and nutrients both intra- and inter-specifically.[3,4]

Materials and Methods

Study Site

Waddepally Lake is a lake situated in Hanamkonda, Telangana. The lake serves as a reservoir for drinking needs Hanamkonda and Kazipet. **Location:** Hanamkonda, Telangana (17°59′37″N 79°31′15″E) **Primary Function:** Serves as a drinking water source for Hanamkonda and Kazipet, with water pumped for municipal use.(Fig .1)

The beautification work of the lake's bund is being developed to aim at attracting tourists to the place. it is also a best spot for fishing. and it is located near a shiva temple.

Govt of Telangana recognized it and made it into a reservoir. now it pumps water for the city.



Figure No.1- Waddepally Cheruvu picture

Collection, Observation and Identification

In September 2026, water samples were taken at random from several lake locations using plastic bottles. Scraping with a scalpel was used to acquire samples of epilithic algae. We recorded the pH and temperature of the water.[5] The water in the lake was green and at a modest level. Samples were transported to the laboratory and stored in 4% formalin for subsequent analysis. The algae were seen and documented utilizing the HOVERLABS Research Photo Microscopic Unit. Identification was based on standard monographs.[6]

Table 1: Algal diversity of Waddepally lake

CLASS	FAMILY	NAME OF THE SPECIES
CYANOPHYCEAE	Aphanizomenonaceae	*Anabaenopsis circularis*
	Merismopediaceae	*Merismopedia minima*
	Oscillatoriaceae	*Lyngbya birgei* *Oscillatoria acuminate* *Oscillatoria curviceps* *Oscillatoria princeps* *Phormidium ambiguum* *Phormidium purpurascenhs*
CHLOROPHYCEAE	Nostacaceae	*Nostoc humifusum*
	Chlorellaceae	*Chlorella conclomerata*
	Closteriaceae	*Closterium dianae*
	Desmidiaceae	*Cosmarium nitidulum*
	Hydrodictyaceae	*Pediastrum duplex* *Pediastrum tetras* *Tetraedron trigonum*
	Radiococcaceae	*Radiococcus nimbatus*
	Scenedesmaceae	*Desmodesmus armatus* *Scenedesmus bijuga* *Scenedesmus dimorphus* *Scenedesmus incrassatulus* *Scenedesmus longus* *Scenedesmusobliquits* *Scenedesmus obtusus* *Scenedesmus quadricauda* *Scenedesmussmithii*
	Selenastraceae	*Ankistrodesmus falcatus* *Kirchneriella contorta* *Selenastrum gracile*
	Ulotrichaceae	*Ulothrix zonata*
	Uronemataceae	*Uronema elongatum*
	Oedogoniaceae	*Oedogonium microgonium*
BACILLARIOPHYCEAE	Bacillariophyceae	*Hantzschia amphioxys* *Nitzschia palea*
	Cymbellaceae	*Cymbellaturgida*
	Gomphonemataceae	*Gomphonemaparvulum*
	Catenulaceae	*Amphora proteus*
	Cocconeidaceae	*Cocconeis placentula*
	Stephanodiscaceae	*Cyclotella glomerata*

RESULTS AND DISCUSSION

The pH of the water was measured at 7.5, and the water temperature was 26˚C. A total of 28 genera and 39 species were documented from the tank, categorized into three primary classes: Cyanophyceae, Chlorophyceae, and Bacillariophyceae, as shown in Table 1. The hierarchy of algal diversity percentages is as follows: Chlorophyceae (56%) > Cyanophyceae (26%) > Bacillariophyceae (17%).

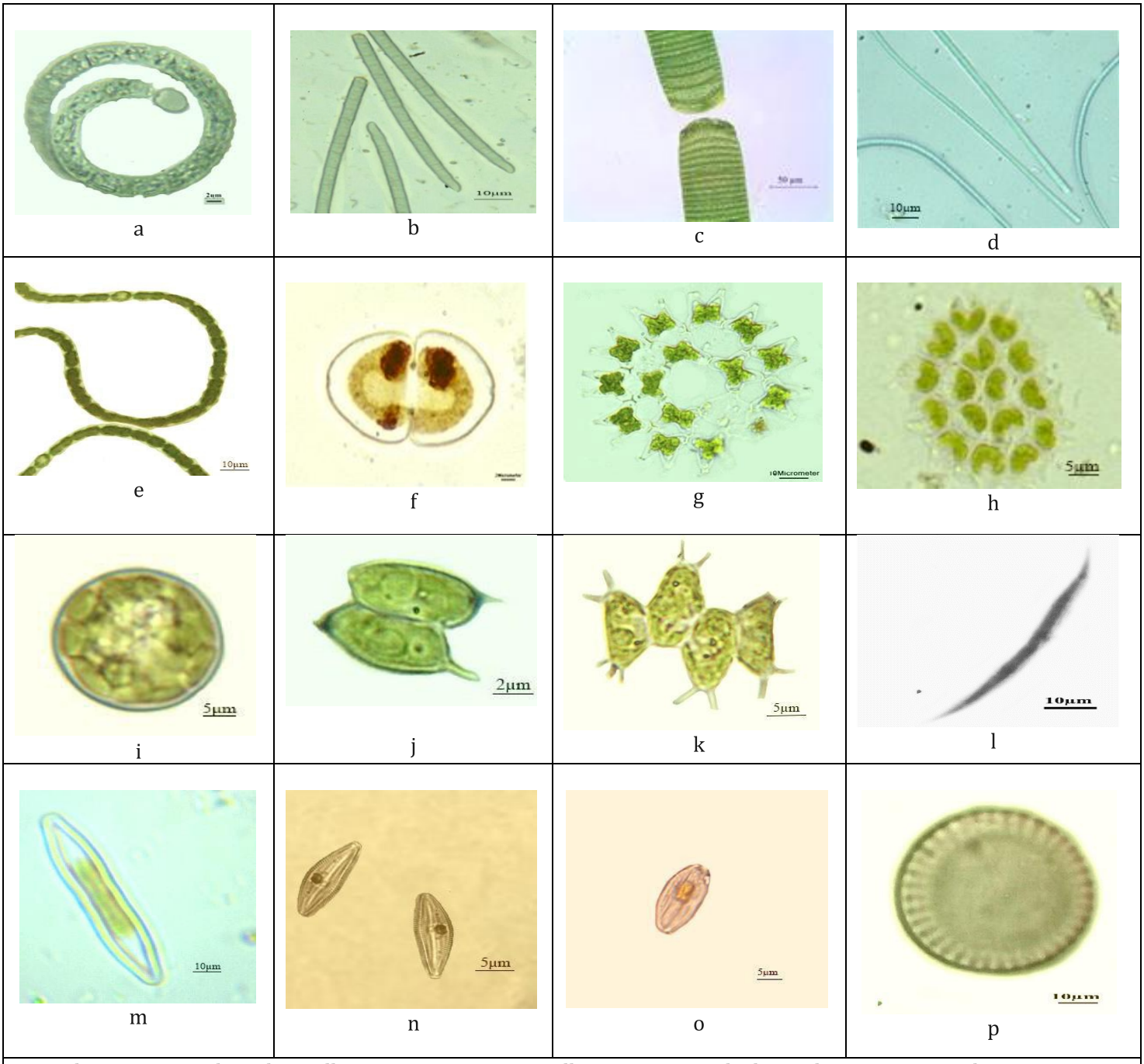
Chlorophyceae: The analysis of the Dharmasagar lake water indicates that the Class Chlorophyceae was represented by the maximum quantity of fourteen genera and twenty-two species. Ten families were documented under the Class Chlorophyceae. The families *Chlorellaceae, Closteriaceae, Desmidiaceae, Radiococcaceae, Ulotrichaceae, Uronemataceae*, and *Oedogoniaceae* were each represented by a single genus and species.

The families *Selenastraceae* and *Hydrodictyaceae* each include three species. The genus *Scenedesmus* of the *Scenedesmaceae* family was documented with the highest number of species.[7] *Chlorophyceae* is significant in freshwater ecosystems, since many of its species are ecologically vital. The increased diversity of *Chlorophyceae* indicates generally favorable water quality. The abundant occurrence of *Scenedesmus* indicates that the water body has a high concentration of organic substances. The presence of abundant algal flora often occurs in locations with elevated nutrient levels and conducive environmental conditions.[8]

Cyanophyceae : The current investigation revealed that Cyanophyceae ranks as the second largest Class, comprising seven genera and ten species. Additionally, Cyanophyceae included five families, with Oscillatoriaceae showcasing the highest number of representatives, comprising three genera and six species. The remaining families, specifically Aphanizomenonaceae, Merismopediaceae, Microcoleaceae, and Nostocaceae, each consisted of a single genus with one species. [9]Cyanobacteria are prevalent in numerous freshwater ecosystems, where the nitrogen fixation carried out by these organisms plays a crucial role in sustaining phosphorus limitation of primary productivity. BGA represent a notable category of photosynthetic plant forms. Microcystis is recognized as a significant pollutant responsible for the production of Blue Green Algae. Microcystis blooms are frequently observed phenomena in tropical freshwater bodies. [10]

Bacillariophyceae : The examination of the lake samples revealed the presence of seven genera and seven species across six families within the Class Bacillariophyceae. Notably, the Bacillariaceae family contained two species, while the other families included *Cymbellaceae*, *Gomphonemataceae*, *Catenulaceae, Cocconeidaceae,* and *Stephanodis*. Each family was represented by a single genus, with only one species present. The quality of water is typically evaluated with the occurrence of Diatoms(Table 1).[11].

Investigations employing diatom assemblages to forecast environmental changes have gradually advanced in India, with efforts made to evaluate organic pollution through the analysis of diatom species. The algae have been cataloged with particular attention to the pollution index. The biomass and community composition of phytoplankton are crucial for comprehending the structure and dynamics of an ecosystem. The current study aimed to examine the algal diversity present in the tank. Fresh water and the biodiversity it sustains are crucial for the survival of all living organisms.[12] The findings indicate that the study area exhibits a higher diversity of algae.[13] Clean water fosters a vast array of organisms, while polluted water tends to produce only a limited number of species, often dominated by one or a few forms. Typically, a high level of species diversity indicates a low degree of pollution. The tank exhibited significant algal diversity, suggesting that the water remains unpolluted.[14, 15]



a. Anabaenopsis circularis, b. Oscillatoria acuminate, c. Oscillatoriaprinceps, d. Phormidiumpurpurascenhs, e. Nostochumifusum, f. Cosmarium nitidulum, g. Pediastrum duplex, h. Pediastrum tetras, i. Radiococcus nimbatus j. Desmodesmus armatus, k. Scenedesmussmithii, l. Ankistrodesmus falcatus, m. Hantzschia amphioxys, n. Cymbellaturgida, o. Amphora proteus, p. Cyclotella glomerata

Plate 1. Most Abundant Algal Species –Waddepally lake.

Conclusion

The algal flora of the waddepally lake freshwater lake has been examined for the first time, resulting in the identification of 39 species across three main groups. It has 28 genera with notable species variety, and the family Scenedesmaceae of Chlorophyceae exhibits higher richness.

Disclaimer (Artificial Intelligence)

Author(s) hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc) and text-to-image generators have been used during writing or editing of this manuscript.

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Competing Interests

Authors have declared that no competing interests exist.

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