

Assessing Water Quality and Plankton Abundance in Jaffna Lagoon

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Jaffna Lagoon, located on the Northern coast of Sri Lanka, is a significant habitat for marine life, yet its water quality and the role of environmental parameters on plankton distribution and abundance remain unknown. The present study aims to investigate the water quality of Jaffna Lagoon, plankton diversity, abundance, and their relationship with water quality parameters. Water samples were collected from 20 different locations between September 2021 and March 2022, and water quality parameters and plankton samples were analyzed. The results revealed that the water quality of Jaffna Lagoon was highly variable, with pH ranging from 7.67 to 8.52, dissolved oxygen ranging from 5.34 to 8.76 mg/L, salinity ranging from 20.5 to 29.5 PSU, temperature ranging from 26.06°C to 29.98°C, total nitrate ranging from 10×10^3 mg/L to 21.9×10^6 mg/L, and total phosphate ranging from 0.01 mg/L to 0.32 mg/L. A total of 13 species belong to 12 families of planktons were identified, viz., *Coscinodiscus granii*, *Leptocylindrus minimus*, *Gyrosigma balticum*, *Woronichinia elenkin*, *Acartia* sp., Gastropod larvae with ciliated foot, *Chaetoceros vanheurckii*, *Melosira* sp., *Cymbella cuspidata*, *Cymbella lanceolata*, *Chaetoceros costatus*, *Closterium limneticum* and *Protoperdinium pellucidum*. *Gyrosigma balticum* was the most abundant plankton species (13%) in the lagoon, followed by *C. granii* (10%) and *C. vanheurckii* (10%). The total phytoplankton abundance fluctuated from values of $<10^4$ cells L⁻¹ to values $>2 \times 10^6$ cells L⁻¹. The regression analysis was performed to examine the relationship between plankton abundance, temperature, and nitrate content. These findings contribute to the understanding of the ecological status of Jaffna Lagoon and can inform the development of sustainable management strategies for the lagoon ecosystem.

Keywords: Aquatic ecology, Lagoon environment, Plankton diversity, Water quality