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Temporal Changes in Environmental Characteristics and Diversity of Net Phytoplankton in a Freshwater Lake

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Abstract: Temporal changes in the species composition, seasonal abundance, and diversity of net phytoplankton (NPP) were investigated in relation to some environmental characteristics of the water and sediment of Lake Krishnasayer, an ancient man-made shallow freshwater lake, located at Burdwan, India, between January and December 2003. In all, 43 species and 7 genera were identified from the weekly samples taken from a 1 x 1 x 1-m water column at sites I and II. The most abundant taxa were Cyanophyta (34.8%-37.8%) and Bacillariophyta (34.2%-34.3%), whilst Euglenophyta was the least abundant (4%-5.3%). The relationships (r) were significant ($P < 0.05$) and positive between water temperature and abundance of Euglenophyta, Secchi transparency, and Chlorophyta and Bacillariophyta, dissolved oxygen and Chlorophyta, dissolved chloride, and Cyanophyta and Euglenophyta, phosphate-phosphorus and Cyanophyta, and organic carbon and Bacillariophyta. In contrast, the relationships (r) were significant ($P < 0.05$), but inverse between water temperature and abundance of Bacillariophyta, Secchi transparency and Euglenophyta, dissolved chloride and Bacillariophyta, nitrate-nitrogen and Euglenophyta, and organic carbon and Euglenophyta. Furthermore, regression coefficients (b) indicated a significant ($P < 0.05$) positive relationship between Secchi transparency and overall NPP abundance, and a significant ($P < 0.05$) inverse relationship between silica and overall NPP abundance. The diversity indicated high values with peaks in species abundance in March, May, and September at site I, and in May, September, and November at site II. The seasonal abundance and frequency of occurrence for a few dominant species of Cyanophyta (e.g., *Anabaena circinalis*, *Nostoc carneum*, *Oscillatoria formosa*, *Rivularia haematitis*, and *Spirula subsalsa*), Chlorophyta (e.g., *Spirogyra communis*, *Ulothrix tenerrima*, and *Zygnema pectinum*), Euglenophyta (e.g., *Euglena viridis*), and Bacillariophyta (e.g., *Cyclotella glomerata*, *Navicula capitata*, *Nitzschia acicularis*, and *Pinnularia major*) in the surface water of this lake were 3.3%-5.5%, respectively.

Key Words: Freshwater lake, net phytoplankton, composition, diversity, physico-chemical environment, trophic status

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