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## **Modeling phytoplankton diversity and dynamics due to altered niche dimensions caused by cultural eutrophication**

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**M**odeling system dynamics in a eutrophic lakes is quite complex especially with a constant influx of materials which continually changes the state variables. Cultural eutrophication has become a global problem for aquatic systems due to the influx of a variety of substances such as detergents, sewage material, fertilizers and urban runoff washed into the system from upland drainage and serves as a stressor leading to changes in niche dimensions. A change in niche dimensions creates a stress for organisms adapted to unpolluted conditions. This leads to changes in the community composition so that the best fitted, and tolerant of the changed conditions now take over the community. The change interferes with the assessment of the chemical rhythm. In this paper we present a model for predicting system dynamics in a complex environment. Studies were done on a hyper-eutrophic lake at Ranchi to understand the altered environmental dynamics of the system, and its impact on the plankton community. The lake was monitored regularly for five years and the data collected was used to design a model for evaluating the system. Nutrient dynamics of carbon, nitrates, phosphates and silicates were considered and an attempt was made to coordinate the chemical rhythm with plankton dynamics. Nitrates and phosphates were not limiting. Free carbon dioxide was found to control the overall system and interacting with other parameters determined the diversity and dynamics of the plankton community. The N/P ratio determines which group of phytoplankton dominates the community while, the TOC/TIC ratio determines the abundance.

### **Biography**

Mukherjee B (BSc, MSc – gold medalist) did his PhD on the Coral reef ecosystems and received a Post-Doctoral training in the University of Southern California. He completed his DSc on 'Mathematical Modeling of Ecological and Environmental Systems' and has been working on aspects of carbon modeling in aquatic ecosystems. He has published more than 25 papers in reputed national and international journals. He has successfully completed three major projects on system analysis of freshwaters and was given the Senior Scientist award by CUSAT. He is presently engaged in teaching and research in Environmental Sciences at Ranchi College.

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