Title: Biological Integrity and Ecosystem Study in Sewage Fed Fisheries in East Kolkata Wetlands

Abstract

Ecologically prudent city sewage management is a global necessity. East Kolkata Wetland (EKW), in West Bengal, India is the oldest and largest sewage fed fisheries system in the world. The shallow fish ponds in EKW receive regular supply of city sewage which the fishermen purify through a management process, standardized over last eight decades. Present study investigates the effect of raw sewage on the faunal diversity of the fisheries which plays pivotal role in upholding ecosystem services. The study assesses the integrity of the EKW fisheries along with the underlying biotic mechanism that are critical in purifying the sewage water for commercial fish cultivation. In current study, thirty species of zooplankton were found in EKW fisheries and twenty four in natural pond. Thirty three macroinvertebrate species were found in control ponds and twenty nine in of EKW fisheries. Zooplankton diversity was higher in fish ponds whereas macroinvertebrate diversity values were higher in natural system. IBI parameters were indicative of organic pollution in sewage fed fisheries. Hilsenhoff Biotic Index (HBI) values of water quality in EKW fish culture ponds showed feasibility of some organic pollution in premonsoon and monsoon season compared to control ponds. This study examined carbon cycling pathways mediated by the plankton community in this system in comparison with normal freshwater ponds. Alkalinity and water temperature are the major environmental regulators controlling phytoplankton and zooplankton communities and different physical processes in water. Plankton communities play an important role in transport and conversion of various carbon forms e.g., soil organic carbon, particulate organic carbon, carbon from dead soil organism, dissolve carbon di-oxide and soil inorganic carbon. The present study also endeavors to map the carbon cycling process in a sewage fed wetland system for the first time and examines the effectiveness of this system as carbon sink. The study argues that this system can be proposed to be replicated elsewhere as an efficient carbon sequestering and competent resource recovery system.