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ABSTRACTS

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N_R BUDGET AND SUSTAINABLE N-RECOVERY IN A SEWAGE FED URBAN WATERBODY – CASE STUDY OF VARTHUR LAKE, BANGALORE

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Rapid urbanization (3000 cities) accompanied by high sewage discharges has resulted in reactive nitrogen (N_r) overloads fed to waterbodies resulting in their eutrophication accompanied by high macrophyte cover – yet offering simple and sustainable N_r recovery and storage option. These water bodies also remove organic loads offering a purifying function. A N_r budget was prepared for a 220ha sewage fed manmade lake receiving 595 million liters per day (MLD) to examine their functioning and quantifying threats and risks. For the study the lake was divided into five zones and water quality, various N components, microbial and macrophyte biomass, etc. was monitored at monthly intervals. The lake could be divided into three zones – a.anaerobic, b.algal driven facultative and c.macrophyte (with algae) dominated aerobic zones depending upon functions. Loadings were higher during the monsoon due to the intrusion of storm-water. Multiple point sources contributed significantly in the increase in the overall loading to the lake. The major N forms in the system were in the form of NH_4-N (60%, 20 t/d) of the total N entering the system. Estimates made from such periodic sampling reveal that on a daily basis the water body received about 32tpd N_r which was then partitioned into bacterial, micro-algal, macrophyte biomass and that into sludge and NO_3-N, NH_4-N in effluent after a 5d retention time (measured). The balance (unaccounted) was considered to be losses from the system through ammonia volatilization and de-nitrification processes. While bacterial uptake remained fairly constant throughout the year, micro-algae was the major player during monsoon and winter and macrophytes dominated N_r capture during summer. From the estimates we find that nearly 55% N_r was recovered and recycled when this water is used for irrigating fodder crops and the remaining 45% was lost from the system - thereby showing a reasonably high potential for sustainability. Based on these findings a better way to manage the system to enhance the N recovery is suggested – mainly through rapid uptake of ammonia after the anaerobic stage and conversion to algal biomass.

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