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Hydrobiology of Vembanad wetland on the South West Coast of India and its sustainable management for livelihood measures

S Bijoy Nandan, Asha C V, Retina I Cleetus and Suson P S
Cochin University of Science and Technology, India

Vembanad wetland system, a major Ramsar site on the West coast of India nurture high biological diversity providing a wide range of inter related environmental functions and socio-economic benefits. To regulate salinity intrusion into the Kuttanad agrarian system, the Thaneermukkom barrage was constructed in 1975 across the Vembanad estuarine system, transforming the water body into a fresh water zone on the south and a brackish water zone on the north, resulting in gross changes in physical, chemical and biological entity of the wetland system.The eco biological studies in Vembanad backwater from March 2011- February 2012 formed the basis of the present investigation. The average depth ranged from 1.27 to 7.5 m; temperature ranged between 25°C to 32.5°C. The ANOVA of water temperature showed an overall significance at 1% level (F=5.36). pH ranged between 5.94 to 10.02 that of dissolved oxygen showed a variation from 4.88 mg/l to 9.76 mg/l. Average annual salinity ranged from 0.9 ppt in St. 2 to 14.18 ppt in St. 10. An oligohaline condition prevailed in the southern stations (0.5-5ppt), whereas meso and polyhaline condition (5-18 ppt) prevailed in the northern stations. A significant seasonality in the nutrient cycling was observed in Vembanad estuarine system. Concentrations of nutrients viz. nitrite (0.03 to 5.53 µmol/l), nitrate (0.05 to 5.9 µmol/l) and ammonia (0.06 to 37.31 µmol/l) also varied significantly on a spatial scale. Maximum N/P ratio of 6.85 was observed during postmonsoon and minimum of 4.89 was observed during monsoon. During the study period, a nitrogen limiting condition was observed (N: P < 16) in Vembanad backwater. Compared to the northern zone, a higher N/P and Si/P ratio was always observed in the southern zone. Comparing the prebarrage phase, the dominance of Microcystis sp., Pediastrum sp., Leptocylindricus sp., Zygnema sp., Ulothrix sp., Oscillatoriasps. was observed in the southern part of the water body. In the southern zone, fresh water copepod, Heliodiaptomus cintus contributed maximum abundance (62%), whereas in northern zone, Acartia southwelli were the abundant group (36%). The annual fishery production indicated a declining trend with an annual landing of 4387.31t, of which 480.98t and 3906.33t was contributed by southern and northern zone of Vembanad respectively. From the 14 species of polychaete observed during the study period, only two species, Nemalycasis indica (80%), Dendronereis aestuarina (20%) were present in the southern sector of Vembanad. On a time scale basis, glaring changes were observed, on the ecology of the estuarine system, influencingthe regionaldynamics of planktonic, benthic and fishery structure. A more retrained and effective management of the resources and environmental quality is proposed for the long term conservation of the largest Ramsar site of Kerala.

bijoynandan@yahoo.co.in

Heavy metal-laden wastewater treatment using a waste material

Pejman Hadi
Hong Kong University of Science and Technology, China

Treatment of industrial wastewater effluents containing various pollutants is a subject of many researches. Numerous methods, including precipitation, filtration, membrane, reverse osmosis, solvent extraction, cementation, ion exchange and adsorption have been studied and developed for the removal of pollutants from wastewater streams.Each of these treatment techniques has specific disadvantages, such as low removal efficiency, high energy consumption, high capita/operation cost and high material/chemical cost. Among all these treatment technologies, adsorption has been proved to be a popular and promising approach to remove the pollutants from industrial effluents with high efficiencies. However, high cost of the adsorbent materials has driven the researchers to look for more economic precursor options to reduce the material cost. Waste carbonaceous precursors have been the most widely-investigated materials for porous adsorbent production. However, high activation temperatures and low yield are the two common disadvantages of this class of materials. Our research focuses on the innovative production of porous functionalized siliceous adsorbent material from nonmetallic fraction of waste printed circuit boards (NMF). The novel modification and utilization of NMF as precursor for the removal of heavy metals from wastewater poses significant advantages namely lower activation temperatures, higher yield and higher removal capacities, compared with the carbonaceous materials. Furthermore, the utilization of this waste material for wastewater treatment purposes diverts it from being disposed of into landfill. The efficiency of this novel material has been shown to be much beyond the commercially-available adsorbent materials under the same experimental conditions.

kehadi@ust.hk