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Phytoplankton Assemblage and Physicochemical Parameters of a Perturbed Tropical Manmade Lake, Southwestern Nigeria

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Abstract : This study identified the phytoplankton assemblage of the Dandaru Lake (that received effluents from a zoological garden and hospital) as bioindicators of water quality. Physicochemical parameters including Dissolved Oxygen (DO), biochemical oxygen demand, nitrate, phosphate and heavy metals were also determined. Samples of water and plankton were collected once monthly from April to September, 2015 at five stations (I – V). The mean physicochemical parameters were within the limits of National Environmental Standards and Regulations Enforcement Agency (NESREA) and USEPA except Lead, 0.02 ± 0.08 mg/ L; Manganese, 0.46 ± 1.00 mg/ L and Zinc, 0.05 ± 0.17 mg/ L. Means of DO, alkalinity, and phosphate were significantly different between the stations at $p < 0.05$. While highest mean DO (6.88 ± 1.34 mg/L) was recorded in station I with less anthropogenic activities, highest phosphate concentration (0.28 ± 0.28 mg/L) occurred in station II, the entry point of wastewater from hospital and zoological garden. The 147 phytoplankton species found in the lake belonged to six classes: Chlorophyceae (50), Euglenophyceae (40), Bacillariophyceae (37), Cyanophyceae (17), Xanthophyceae and Chrysophyceae (3). The order of abundance for phytoplankton was Euglenophyceae (49.77%) > Bacillariophyceae (18.00%) > Cyanophyceae (17.39%) > Chlorophyceae (13.7%) > Xanthophyceae (1.06%) > Chrysophyceae (0.02%). The stations impacted with effluents were dominated by members of Euglenophyceae (Station III, 77.09%; IV, 50.55%) and Cyanophyceae (Station II, 27.7%; V, 32.57%). While station I was dominated by diatoms (57.98%). The species richness recorded was 0.32 – 4.49. Evenness index was highest in station I and least in station III. Generally, pollution tolerant species (Microcystis, Oscillatoria, Scenedesmus, Anabaena, and Euglena) showed greater density in areas impacted by human activities. The phytoplankton assemblage and comparatively low biotic diversity in Dandaru Lake could be attributed to perturbations in the water column that exerted selective effects on the biological assemblage.

Keywords : manmade lake, Nigeria, phytoplankton, water quality
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