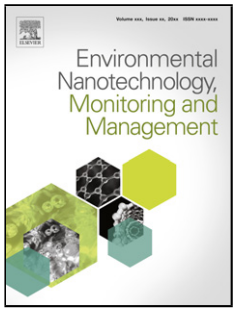

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Runoff characterization and pollutant load estimation of Nainital lake, India

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Highlights

- Phosphorous is the limiting nutrient in Lake Nainital
- Naina Devi drain with a catchment area of 49 % of the lake's catchment area is the major source of pollutants
- Runoff into the lake during the rainy season is the major source of nutrients and other pollutants

Abstract

Lakes are the primary sources of drinking water in hilly regions, where the scope of boring tubewells, canals and lift irrigation is limited. Nainital Lake is the principal source of water supply for Nainital, a popular hill station situated around 1,937 m above the mean sea level (MSL), in the foothills of the outer Himalayas. The Nainital Lake is the major tourist attraction and forms the economic backbone of Nainital town, India. Thus, the water quality of the lake, and the influent runoff characteristics are of critical importance. Eutrophication is the primary water quality issue. To reduce the excessive external nutrient loading, identification of the major influent drain and estimation of pollutant loads is a crucial step. We characterized various water quality parameters (pH, turbidity, BOD_5, COD, PO_4-P, T-P, NO_3-N, Pb, Cd, Zn and Cu) and pollutant loads over a period of one year, which included a rainy season. The runoff drain contributing the major share of the pollutants to the lake was identified. Nitrogen and phosphorous budgets over the one-year period revealed that wet weather flow is the major contributor of nutrients to the lake. Phosphorous is the limiting nutrient, which controls eutrophication. The Phosphorous load into the lake during the wet weather season was twelve times more than that during the dry weather season.

Key words: Eutrophication, Nainital lake, water pollution, nutrient, nutrient budget