



Spatio-Temporal Assessment of Waterbodies for Sustainable Sub-Urban Planning and Development– A Geo-Informatics Approach

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Abstract

World Population is expected to be 67% by the year 2050 in the urban areas, with the most rapid levels of urbanization and industrialization taking places in developing countries. Due to the rapid urban and sub-urban growth, most of the industries and industrial colonies are developed in the lake catchment and polluting the lakes. Hence, it is an urgent need to assess the lake catchment using Geo-spatial tools for their sustainability. The main aim of the present study is to assess the status of surface waterbodies using multi dated remote sensing data for sustainable urban planning. The Kolavai Lake of the Chennai City Sub-urban has been taken as a study area, where the water degradation is existing by the urbanization process. Due to the increasing anthropogenic activities and the natural process in the catchment of the Kolavai lake is under ecological pressure, losing its area, perimeter and carrying capacity. Siltation from the run-off, discharging of pollutants from the industries and dumping of municipal waste in the lake, the turbidity in the lake water is increasing day by day leads to lake water degradation. The physical and anthropogenic activities have been studied using Level-II landuse/landcover (LULC) classification through multi-dated satellite data. It is observed from the LULC change detection analysis, about 53% of the catchment is occupied by the settlement and industries. The chemical and biological studies have been analyzed through lake water sample analysis. About 27 water samples locations have been chosen and samples were collected on season basis. The water samples were analyzed and the Water Quality Index (WQI) has been calculated to study the suitability of the lake water. The Water Quality Index (WQI) shown higher values in TDS, NO₃, CO₃, Mg, Cl, SO₄, BOD, COD, and Fl. The water quality of the Kolavai Lake was found unsuitable for drinking because of WQI values exceeds 100. By studying the physical, anthropogenic and chemical parameter of the lake, suitable recommendation has been given for the sustainable development of the lake by controlling the catchment area activities. Further, the study concludes that the government and nongovernmental agencies to be taken in to a comprehensive ecological auditing and continuous monitoring of land use/land cover practices that will promote the awareness among the stakeholders in a transparent way for sustainable usage of lake water.

Keywords: Sub-urban, Water Quality Index, Sustainable Water usage, land use/land cover, Water pollution