

Assessment of heavy metal pollution in upper and lower catchments of Kelani River basin, Sri Lanka

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Kelani River is the second largest watershed in Sri Lanka and the major water source for Colombo District which is the most industrialized city in the country. Kelani River is deteriorated in many ways and also could be polluted with heavy metals that can bioaccumulate through food webs and cause chronic toxicity to humans and other organisms. Therefore, the present study was conducted to determine the heavy metal pollution of Kelani River by determining the heavy metal concentration in the upper and lower catchments. Sampling was carried out in 26 locations of the both catchments, and sample was collected once in three months for a duration of one year, from May 2019 to May 2020. The locations were selected based on industrial discharge, anthropogenic activities, catchment characteristics and land use practices. The collected samples were analysed using Inductive coupled plasma mass spectrometry. Heavy metals, such as Aluminium (Al), Cadmium (Cd), Chromium (Cr), Copper (Cu), Lead (Pb), Mercury (Hg) and Zinc (Zn) were selected for the study as they are most important pollutants which effect aquatic environment and fish. According to the results, only the metals of Al and Zn were detected and other metals were below the lowest detection limit of Cd-0.001 mg/L, Cr, Cu, Pd - 0.01 mg/L, Hg-0.0005 mg/L. Also, Cd, Cr, Cu, Pb, Hg, and Zn were within the stipulated drinking water standards (Central Environmental Authority, 2019) in both catchments. Level of Al was exceeded the recommended limit in some locations. The heavy metals in the surface water of the upper river basin varied between Al, 0.01-0.5 mg/L, and Zn, 0.02-0.04 mg/L, and lower river basin Al, 0.02-2.56 mg/L, and Zn, 0.03-0.05 mg/L. Maximum Al concentration was detected as 2.56 mg/L in adjacent to Ambathale area in the lower catchment and the value exceeded the recommended limit of 0.2 mg/L. The elevated concentrations of Al and Zn in the lower regions of the river including the demolition of the natural balance of the Al in Ambathale area possibly could due to the industrialized activities. Therefore, this study provides the valuable information to take immediate actions to protect Kelani river basin from heavy metal pollution and strongly expresses the necessity of establishing strategic plans to limit the sources of heavy metals in lower region of Kelani river basin.

Keywords: aluminium, heavy metal pollution, Kelani river basin, surface water

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