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Distribution of Selected Metals in Lake Sediments and Soils in Padaviya, Sri Lanka

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Abstract

This main objective of this study was to examine the distribution of metals in soil and lake sediments in Padaviya, Sri Lanka. During the initial stage of the study, six soil samples, three from paddy fields and three from domestic lands and three sediment samples from the Padaviya Reservoir were collected and analyzed. At each sampling point, three samples were collected; surface soil/sediment from surface to 20 cm deep, sub-soil/sediment from 20 cm to 50 cm deep and deeper soil/sediment from 85 cm to 100 cm deep. The acid and water soluble metal concentrations were determined after digesting the sample in a mixture of concentrated HCl and HNO₃ and in Mehlich 3 (M-3) solution respectively. The digested samples were filtered and analyzed for the metals Na, K, Ca, Mg, Fe and Mn using atomic absorption spectrometry. The metal concentration data are expressed in units of mg per kg of dry soil.

According to the experimental data, acid and water soluble concentrations of Na, Mg and Fe in soil increased with increasing depth of soil or sediment column whereas K, Ca and Mn concentrations decreased with increasing depth. The average acid soluble concentrations of Na, K, Mg, Ca, Fe and Mn at the surface were 1290±310, 1460±650, 2350±1800, 4450±1800, 700±250 and 710±95 respectively. On the other hand, the average concentration Na, K, Mg, Ca, Fe and Mn at the deepest were 2300±625, 765±235, 3750±1260, 2700±1500, 1190±260 and 370±70 respectively. The water soluble metal ion concentrations were significantly lower for Fe and Mn and moderately lower for Na, K, Mg and Ca compared to the acid soluble concentrations. Lake sediments and soils from paddy fields showed high metal concentrations than domestic lands. In addition to the metals, soil pH, organic matter content and cation exchange capacity were also studied. The metal ion distribution in soils and sediments is difficult to explain using a single natural or an anthropogenic process. The research is still in progress to understand the processes responsible for the observed metal distribution.

Keywords: Metals, Padaviya, Soils, Sediments