Economic potential of red earth deposits in the north and northwestern coastal belt of Sri Lanka

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Massive layers of red earth formations that belong to the Quaternary age is found along the northwestern coastal belt of Sri Lanka. The deposit is overlaying the Miocene limestone beds, covering approximately 40 sq. km with an average thickness of 20 m. At present the material is wasted and used only as a land filling material. Therefore, the present study aims to evaluate the economic importance and also assess the spatial distribution of economically important minerals in the red-earth deposit. Red earth samples were collected from 2 to 3 m depths from selected locations along the deposit. Sieve analyses, isodynamic separation followed by XRD analyses and ICP-MS techniques were used to determine the particle size distribution, mineralogy and geochemical composition of collected samples. The main constituents of red earth were quartz, clay- and iron oxide minerals such as magnetite and hematite. Zircon and monazite are also present in minor quantities. The granulometric data showed that southern part of the deposit is well sorted (CC<4) sand compared to the northern part (CC>4). The content of Rare Earth Elements (REEs) were significantly higher in the southern part compared to the northern part. Among the REEs, cerium (499 mg/kg), lanthanum (255 mg/kg), and neodymium (205 mg/kg) were dominated. Even though the REEs concentrations were proportionally increased with the depth, some intermediate layers were found with a lower content of REEs. The lateral distribution of opaque minerals such as magnetite and ilmenite showed a similar trend where 2 to 3% of such minerals were recorded. Kaolinite was the most abundant clay mineral in the deposits. The clay content significantly decreased towards the northern part of the deposit. The red earth also showed a potential of removing toxic elements such as Pb, As and Cr from industrial waste water.

Keywords: Red earth, rare earth elements (REE), water treatment potential, Miocene limestone

