

A GEOCHEMICAL APPROACH TOWARDS UNDERSTANDING THE PRESENT ENVIRONMENTAL STATUS OF ALLUVIAL SOIL OF KUKRAIL RESERVE FOREST, LUCKNOW

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Abstract

Soil is one of the most valuable resources, and acts as a habitat for soil dwelling organisms and a medium for plant growth. Anthropogenic climate change has jeopardized the global soil resources and has put at risk the crop productivity. The Indo-Gangetic Plain (IGP) is one of the most extensive fluvial plain in the world and sustains millions of people. Considering the importance of alluvial soils of the Indo-Gangetic plain, the present study was undertaken to understand the extent of weathering, elemental geochemistry and the present environmental status of alluvial soils of Kukrail Reserve Forest (KRF), Lucknow. Ten sites were chosen to collect 26 soil samples at different depths from each site. Apart from geochemical and mineralogical analysis, general soil chemical properties like pH, electrical conductivity (EC), cation exchange capacity (CEC), percent base saturation (PBS) and soil organic matter (SOM) were analysed. Grain size analysis suggests that the soil samples consist mainly of silt. Minerals identified were quartz, feldspar, calcite, dolomite, muscovite, microcline, oligoclase and chlorite/kaolinite. Major and trace element geochemistry data of the soil samples show similarity with the upper continental crust (UCC), except for the depletion in some mobile elements like Ca, Mg and Sr, which were mobilized during weathering. Weathering is one of the most important processes that releases essential nutrients in the soil. Chemical Index of Alteration (CIA) shows that the soil samples have gone through moderate chemical weathering having CIA values ranging from 64.8 to 73.9. On the basis of results of general soil tests, it could be inferred that these soil samples are slightly alkaline in nature with an average pH of 7.7. EC values (0.017 to 0.307 dS/m) of all soil samples lie in the safe category (0 to 2 dS/m). All samples lie in the safe range for plant growth in terms of CEC and PBS. SOM in the soil samples has an average value of 3.1%. It was observed that soil pH, CEC, CIA and clay mineral abundance show an increasing trend with depth at most of the sampling sites in Kukrail Reserve Forest. On the other hand, soil EC and soil organic matter shows a decreasing trend with depth in the majority of the sampling locations.

Keywords: Alluvial soils; Kukrail Reserve Forest; Geochemistry; Weathering; CIA; Soil chemical properties.