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**THE GEOCHEMISTRY OF MAJOR AND TRACE ELEMENTS  
IN THE SOILS OF THE CENTRAL PROVINCE OF SRI LANKA**

**A THESIS PRESENTED BY**

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ABSTRACT

Anomalous geochemistry of surface soil environment exhibits a dominant influence on human health and agricultural economy. Many scientists reported some diseases of cultivated plants owing to deficiencies and excesses of elements in soils of Sri Lanka. The major and trace elements of soil show marked variation according to their location in climatic zones. The Central Province of Sri Lanka has all three climatic zones namely Dry Zone, Intermediate Zone and Wet Zone. Regional geochemical mapping of elemental levels based on soils provides valuable information relevant to the agricultural and health problems. Twenty Geochemical maps covering the Central Province have been compiled from the data obtained from this study.

Total alkalis and alkaline earths in soils of Central Province depend on parent materials, climate and degradation of minerals. These elements concentrate in the soils of the Dry Zone while they leach out from the soils of Wet Zone where intense weathering occurs. Soil erosion caused by heavy rainfall and high altitude affect the elemental abundances in the up country Wet Zone. Results obtained from studies on cation exchange capacity and nature of clay minerals having high adsorption capacity in the soils of the Dry and Mid Country Intermediate Zones showed that they play a major role in fixation of elements during their release from primary minerals.

Among the transition elements Mn and Co levels are severely affected by high intensity of rainfall while Fe, Cr and V associate together and tend to concentrate in Wet Zone soils. In Northern and Central parts of the Central Province Mn, Co, Cu and Ni levels follow the trend of the underlying marble beds. The chemical adsorption of Co, Ni, Cu, Zn on Iron and Manganese Oxides which depends on soil pH is a significant process controlling the geochemistry of those elements.

Cluster and correlation analyses reveal the importance of the ionic parameters of the elements namely radius, charge and ionic potential in the study of elements having similar geochemical behaviour.