

CHARACTERIZATION OF SOIL CHEMICAL AND PHYSICAL PROPERTIES SUPPORTING TO FOREST RESTORATION IN ENDANA TEA ESTATE, KAHAWATHTHA, SRI LANKA

N.G. Sriyani¹, R.A.A.S. Rathnayaka¹, D.M.S. Duminda¹ and N. Geekiyanage²

¹*Department of Agricultural Engineering and Soil Science, Faculty of Agriculture, Rajarata University of Sri Lanka, Anuradhapura, Sri Lanka*
²*Department of Plant Sciences, Faculty of Agriculture, Rajarata University of Sri Lanka, Anuradhapura, Sri Lanka.*

Spatial characterization of soil properties is an initial step in forest restoration process. This study was conducted to explore soil spatial variability in a forest restoration site of Endana Estate, Kahawaththa, Sri Lanka. The land use map and digital elevation models of the study area were developed based on Google Earth satellite images. Sixty seven soil samples (0-30 cm) were randomly collected spatially representing different land uses of the study field and analysed to determine pH, EC, Total N, Available P, Exchangeable K, Organic Carbon (OC) and Bulk Density (BD). Ordinary Kriging procedure was implemented to prepare maps of different soil properties. Higher (Coefficient of Variation (CV) > 60%) spatial variability was recorded in EC and total N. Soil OC, K, P, and BD showed moderate (12% < CV < 60%) spatial variability. Lower (12% > CV) spatial variability was recorded in pH. Strong (Relative Nugget Effect (RNE) < 25%) structured spatial variability were recorded in EC, K, N, P, and BD. Moderate (25% < RNE < 75%) structured variability was recorded in pH and OC. An elevation gradient (276 – 402 m) was observed from northern to southern direction in the study area. The same pattern was observed in spatial variability maps of pH and OC. Higher N, P, K, and EC values were observed in the middle part of the study field probably due to fertilizer application. Moreover, higher N and P values were shown in the northern area of the respective maps due to fertilizer application. High BD values were shown in the southern area of the respective map probably due to being compacted by animals and roots activities. Maps showed high (N, BD, EC, and P) to moderate accuracy (K, OC and pH) based on leave-one-out cross validation technique. The results suggest suitable land use specific soil management approaches for forest restoration in the study site.

Keywords. Land uses, Soil mapping, Soil spatial variability