

INVESTIGATION OF TOPOGRAPHIC-SOIL RELATIONSHIPS TO SUPPORT SPATIAL PREDICTION OF SOIL PROPERTIES

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Sri Lanka is an agricultural country with tropical weather so that the growing season can continue throughout the year. The development of soil maps for agricultural land use planning in the country is essential for the sustainable food production. Though the soil classification maps are available for soil information, these maps are not legible enough due to their small scale and qualitative nature of the information. Therefore, it causes more uncertainties when it comes to the decision making on land use for different produces. Therefore, it is crucial to develop soil maps depicting the quantitative continuous soil properties for natural resource planning and management in Sri Lanka. Soil depths and its characteristics considerably vary in a very complex manner in mountainous regions. The experimental station of the Department Export Agriculture which is located in Dalpitiya area in Gampola District was selected for the study. The study was conducted to investigate the spatial variability of soil texture and organic carbon content and examine the relationship between the elevations vs. topographic attributes and to use as the secondary information to develop the digital soil map layers of soil properties. For this, 30 sampling points were selected at 0-30 cm depth using randomly stratified methodology in a combined grid. Sand, silt and clay contents of the soil samples were determined using standard hydrometer and pipette techniques. The Walkley Black method was used to estimate organic carbon content. Primary and Secondary topographic attributes such as slope, topographic wetness index, contributing area, watershed area were derived from the digital elevation model (DEM) in a GIS environment. Sand, Silt and Clay, three types of soil categories were selected in the study. The variogram analysis is showed that the particle size classes and soil properties were spatially correlated. The semivariograms indicated that the range of spatial dependence of top soil varied from 50 m to 92 m. The correlation analysis indicated a moderate and positive correlation with elevation ($r = 0.295$) and slope ($r = 0.071$) for the organic content and a positive correlation with the specific catchment area ($r = 0.039$) and slope ($r = 0.286$) for the sand content. These Krigged contour maps of soil physical and chemical properties along with the spatial variability can be used in making better detailed sampling designs to provide accurate soil information especially for agricultural land use planning in Sri Lanka.