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AGRICULTURAL LAND MANAGEMENT**

A PROJECT REPORT PRESENTED BY  
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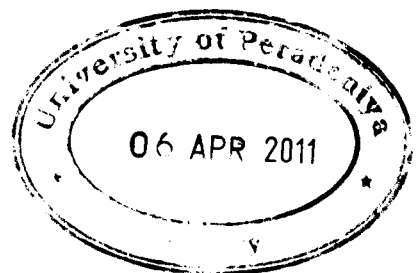
To the Board of Study in Earth Sciences of the  
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*In partial fulfilment of the requirements  
for the award of the degree of*

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# **SPATIAL ANALYSIS OF SOIL FERTILITY FOR BETTER AGRICULTURAL LAND MANAGEMENT**

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## **ABSTRACT**

Precision agriculture has become an outstanding trend in modern times. The association of Geographic Information Systems (GIS) and Remote Sensing (RS) technology in many diverse fields related to agriculture is one major usage of the above technology. The Purpose of this study was to incorporate GIS and RS technology in order to predict the spatial variability of soil fertility conditions of the Kadurugasdamana paddy tract in Anuradhapura District, in the Dry zone of Sri Lanka. The land extent was approximately 77 hectares and the study was done in the *Maha* season of year 2007/2008 period. By integrating soil resources data into GIS, an attempt was made to delineate the area which is mostly suited for paddy cultivation.

The main objectives of this study were to identify spatial variability of individual soil properties of the area and to identify the spatial variation of important soil related parameters with respect to the standards and the requirements of the paddy crop. In order to fulfill the above requirements, soil pH, soil drainage, soil electrical conductivity, available soil phosphorous, exchangeable soil potassium, exchangeable soil zinc, copper and soil organic matter percentage were calculated. As the next step, spatial variations of each soil property maps were prepared under each measurement. In each map, the selected soil property was categorized into groups according to the prevailing ranges. Based on that, spatial variability of each parameter was mapped. As the final output, a cumulative soil property spatial variation map was produced.

The results revealed that the Kadurugasdamana paddy track was mainly suitable for paddy cultivation in both seasons. Since the pH of the soil was alkaline, farmers were encouraged not to burn rice straw, which support formation of alkaline soil. The northern part of Kadurugasdamana (28.5 %) was identified as high salinity area, and adaptations should be taken to control the salinity. Potassium availability varies from 86.5 ppm to 131 ppm in the study area which was within the recommended levels for paddy cultivation. The eastern part of the study area was low in Zn levels (1.39-2.0 mg/Kg) but the Zn levels of western part was adequate for paddy farming. Copper variation in the whole study area was at sufficient levels. All the soils have insufficient quintiles of organic matter for paddy cultivation. Therefore frequent application of organic matter should be encouraged. A few of the cultivation plots (15%) are recognized as imperfectly drained, which are suitable for other crops as well.

Based on the above mentioned single factor maps, the cumulative soil property map was produced. The main purpose of cumulative soil property variation maps was to identify the fertility condition of the soils as well as to identify the precautionary methods or safety methods to be implemented for better land use systems

Finally considering all the findings each and every farmer of the study area was given a recommendation according to the prevailing conditions of soil properties of their own lands.