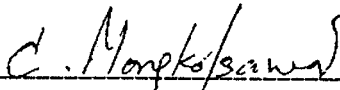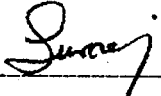THESIS TITLE : A MODEL OF LAND SUITABILITY EVALUATION FOR ECONOMIC CROPS IN SONG KRAM WATERSHED : AN APPLICATION USING SATELLITE DATA AND GEOGRAPHIC INFORMATION SYSTEM

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ABSTRACT

The objectives of this study are to establish a spatial model for assessing land suitability for economic crops and to analyze the structure and pattern of spatial database of land characteristics.

The study area, Song Kram Watershed, covers extensively in the Northern part of North East Thailand with an area of about 8,175,922 rai. The majority of the people are engaged in agriculture as only a few percent of the area is accessible to irrigation. Paddy cultivation is commonly practised in lowland area while upland crops such as cassava and sugar-cane are restricted in well drained upland. Topographically, the area is covered by a wide range of landscape: gently undulating flat, alluvial plain and slope complex of Phu Phan mountain ranges. The evaluation of land was based mainly on the method as described in FAO guidelines for land evaluation for rainfed agriculture. The economic crops to be used in this evaluation comprise 4 crops: rice, cassava, sugar-cane and pasture. For each crop, a land unit resulting from the overlay process of the defined theme layers has a narrow range of information of land qualities for which the suitability is base on. The land qualities or theme layers for most of the crops include water availability (A), oxygen availability (B), nutrient availability index (NAI),

water retention (X), rooting condition (D), salt hazard (S), and topography (T). The theme layers were systematically collected from a number of sources including satellite data, topographic map, soil map and rainfall data. Analysis of rainfall data provide information on water availability. Oxygen availability, water retention, nutrient availability index, rooting condition and salt hazard were compiled from soil map of Land Development Department (LDD). Satellite data and topographic map offer spatial information of landform and slope. Each of the theme layers with their associated attributes was digitally encoded in GIS database to create thematic layers. Overlay operation of the layer with a given model was logically performed and produce polygonal layer, each of which is land unit with defined qualities of land. The application model is multiplication form of each land quality (A x B x X x NAI x D x S x T). Factor rating of land quality was assigned to each class in the thematic layers in accordance with crop requirements. The factor rating was assigned as 1.0, 0.8, 0.5 and 0.2 for highly, moderately, marginally and non suitable class, respectively. The resultant land suitability for each crop was checked against the crop yields and the suitability map produced by LDD. It was found to be satisfactory.