

Use of Geoinformatics and Mathematical Equations to Assess Erosion and Soil Fertility in Cassava Growing Areas in Maha Sarakham Province, Thailand

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Abstract : Cassava is an important food source in the tropics and has recently gained attention as a potential source of biofuel that can replace limited fossil fuel sources. As a result, the demand for cassava production to support industries both within the country and abroad has increased. In Thailand, most farmers prefer to grow cassava in sandy and sandy loam areas where the soil has low natural fertility. Cassava is a tuber plant that has large roots to store food, resulting in the absorption of large amounts of nutrients from the soil, such as nitrogen, phosphorus, and potassium. Therefore, planting cassava in the same area for a long period causes soil erosion and decreases soil fertility. The loss of soil fertility affects the economy, society, and food and energy security of the country. Therefore, it is necessary to know the level of soil fertility and the amount of nutrients in the soil. To address this problem, this study applies geo-informatics technology and mathematical equations to assess erosion and soil fertility and to analyze factors affecting the amount of cassava production in Maha Sarakham Province. The results show that the area for cassava cultivation has increased in every district of Maha Sarakham Province between 2015-2022, with the total area increasing to 180,922 rai or 5.47% of the province's total area during this period. Furthermore, it was found that it is possible to assess areas with soil erosion problems that had a moderate level of erosion in areas with high erosion rates ranging from 5-15 T/rai/year. Soil fertility assessment and information obtained from the soil nutrient map for 2015-2023 reveal that farmers in the area have improved the soil by adding chemical fertilizers along with organic fertilizers, such as manure and green manure, to increase the amount of nutrients in the soil. This is because the soil resources of Maha Sarakham Province mostly have relatively low agricultural potential due to the soil texture being sand and sandy loam. In this scenario, the ability to absorb nutrients is low, and the soil holds little water, so it is naturally low in fertility. Moreover, agricultural soil problems were found, including the presence of saline soil, sandy soil, and acidic soil, which is a serious restriction on land use because it affects the release of nutrients into the soil. The results of this study may be used as a guideline for managing soil resources and improving soil quality to prevent soil degradation problems that may occur in the future.

Keywords : Cassava, geoinformatics, soil erosion, soil fertility, land use change

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