Web-Based Geospatial Information System to Access Land Suitability for Arable Crop Farming in Ekiti State, Nigeria

Israel Taiwo, Lawrence Adewole, Mofolusho Fagbeja and Ifeoluwa Balogun (Nigeria)

Key words: Geoinformation/GI; Remote sensing; Spatial Planning; Sustainable Agriculture; Non-Speculative Land Suitability; Accessibility; Web-based; Fuzzy; Weighted Overlay

SUMMARY

This work identifies suitable locations for growing arable crops such as cassava, maize and yam to enhance crop yield in Ekiti state. It describes the use of geoinformation and web technology as efficient and effective tools for managing land suitability information in meeting the goals of food security while ensuring sustainable development. Land suitability evaluation for cassava maize and yam was carried out to evaluate the viability and sustainability of the area to grow arable crops. The potential of the web was leveraged to aid easy access to crop-land suitability information for agriculture extension workers, farmers, and the general public. Accessibility to road, access to water supply, climate, land use/land cover, soil slope, soil available water capacity, pH, soil texture, and topsoil organic carbon content were used in a combined fuzzy membership, weighted overlay, and fuzzy overlay operation in conformity with FAO guidelines to determine the suitability of the area for the crops. Climate data was acquired from the WorldClim database, land use/land cover information was derived from a classification process of Landsat 8 imagery, soil data were obtained from the Harmonized World Soil Database and topographic data were derived from the Shuttle Radar Topographic Mission (SRTM) satellite imagery. The SCP plugin version 5.3.8 of QGIS 2.14.17 was used in the land use classification process, and ArcGIS 10.2 was utilized in the suitability determination processes. Information on land suitability was made available on the web for easy accessibility to users from a spatially enabled QGIS cloud webserver The research reveals that despite the unfavourable soil slope condition, more than 64% of Ekiti state land is highly suitable for common arable crops, and less than 10% of Ekiti state land is permanently not suitable for agriculture. The work emphasizes that to reduce environmental degradation, negative effects of climate change and the cost incurred by farmers in obtaining land suitability information, the role of spatial data, non-speculative methods of identifying land-use suitability and web technology cannot be overemphasized.