SUSTAINABLE AGRICULTURE THROUGH GIS

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Abstract

Geographic Information Systems (GIS) and cartographic tools have emerged as crucial instruments for addressing global food security challenges arising from climate change and an expanding population. This study investigates the incorporation of GIS and cartographic tools into agriculture to improve productivity, sustainability, and environmental preservation. We present a versatile GIS library for sustainable agricultural applications employing Leaflet.js, an open-source JavaScript library. The library merges GPS data from agricultural equipment with OpenStreetMap base maps, enabling farmers to visualize and analyze information about their fields, such as the paths taken by tractors and other farm machinery. Surface areas of agricultural fields are calculated using numerical integration techniques, like Simpson's rule, which is then integrated into the web application. Potential applications of GIS and cartographic tools in agriculture encompass precision agriculture, water resource management, land-use planning, crop monitoring, and pest and disease management. The study also examines the advantages, challenges, and prospects of employing GIS and cartographic tools in agriculture. The library is documented and accessible to the agricultural community, with anticipated extensive applications in precision agriculture.

Keywords: Geographic Information Systems (GIS), precision agriculture, crop monitoring, reusable GIS libraries