**Assessing the Feasibility for Paddy Cultivation sites through Multi-Criteria Evaluation and GIS Approach: A Case Study of Ampara District, Sri Lanka**

Malavipathirana C.G. 1\*, Sandamali J.2, Chathuranga K.3 and Hasara K.S.L.S.4

1,4 Department of Spatial Sciences: Instructor, Faculty of Built Environment and Spatial Sciences, General Sri John Kotelawala Defence University, Sri Lanka

2,3 Department of Spatial Sciences: Lecturer, Faculty of Built Environment and Spatial Sciences, General Sri John Kotelawala Defence University, Sri Lanka

[\*cheshinipathirana@gmail.com](mailto:*cheshinipathirana@gmail.com)

***ABSTRACT***

Land suitability analysis is essential for the optimal use of available land resources. In Sri Lanka, rice serves as the staple food. However, the COVID-19 pandemic and economic challenges have led to significant food shortages. Paddy is the principal crop, with the Ampara district being the country's most prolific paddy producing area. Despite the limited number of lands currently used for paddy cultivation, numerous other potential areas within Ampara could be developed to enhance rice production. Geographic Information Science (GIS) has proven to be a highly effective tool for natural resource management and agricultural research. Accordingly, this study aimed to produce a map identifying areas optimally suited for paddy cultivation, utilizing Multi-Criteria Decision Making (MCDM) integrated with GIS and open-access data. Selection criteria for this analysis included climatic factors (rainfall, temperature, and humidity), topographical elements (slope), soil characteristics (texture, pH, drainage, and depth), and land cover data, informed by literature reviews and expert opinions. The suitability analysis was conducted utilizing a GIS-based Multi-Criteria Decision-Making (MCMD) technique. The Analytical Hierarchical Process was employed to rank the various suitability factors, and the resulting weights were subsequently applied to generate the suitability map. Findings indicated that 73% of the currently used area is highly suitable, while 25% is moderately suitable. Overlaying the current land cover map with the suitability map highlighted discrepancies between current and potential land use, showing that 42% of the study area has potential for paddy cultivation, predominantly in areas classified as highly and moderately suitable. The findings suggest that integrating spatial analytical processes with GIS significantly enhances its effectiveness, providing a robust tool to aid decision-makers in developing strategies in agricultural context.

**Keywords:** Geographical Information Science (GIS), Land suitability, Multi-Criteria Decision Making (MCDM), Paddy Cultivation