**Developing a Decision Framework Driven by Land Use Simulation to Evaluate Sri Lanka's National Physical Policies: A Case Study of the National Physical Plan (2023-2048)**

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***ABSTRACT***

The National Physical Plan (NPP) of Sri Lanka, prepared by the National Physical Planning Department (NPPD), is a strategic framework aimed at guiding the country’s physical and spatial development, particularly over a long-term time horizon. The main objective of the plan is to provide a broad national framework for planning and executing development activities, impacting Sri Lanka’s physical environment and infrastructure. To achieve this objective, it is necessary to assess development scenarios based on land use changes to determine whether the proposed policy framework can be envisioned. Hence, this study aims at developing a land use simulation-based decision framework using QGIS MOLUSCE plugin, for predicting land use change in accordance with proposed projects outlined in the National Physical Plan 2023 – 2048. Previous studies utilizing MOLUSCE predominantly focused on small-scale predictions, encountering limitations due to edge effects in contexts where simulation model results are influenced by adjacent countries. However, since Sri Lanka is an island nation, simulations can be conducted without external interferences, thereby eliminating edge effects and yielding more realistic predictions. The methodology of this study involves digitizing proposed infrastructure projects, particularly railway and expressway projects, and creating predictive maps for 2028, 2035, and 2050 to demonstrate short-term, medium-term, and long-term scenarios, respectively. Distance to water bodies, railway stations, main towns, highway interchanges, slope, and population are the main factors considered in developing the land use change model. Overall, this research addresses the critical need to assess the effectiveness and implications of proposed projects outlined in the NPP, providing insights into future land use patterns, and supporting evidence-based policies for sustainable development in Sri Lanka.

**Keywords:** Land Use Simulation, National Physical Plan, QGIS MOLUSCE Plugin