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**Selecting suitable locations to establish a ground solar farm in Trincomalee District in Sri Lanka using GIS**

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Renewable energy is energy derived from natural sources that are regenerated at a higher rate than consumed. One of the examples of the most effective renewable energy sources is solar energy, which is derived from the sun. Solar energy can be extracted directly or indirectly for human use. With the rapid growth in energy demand, solar energy has led to an increased interest in power generation. In Sri Lanka, solar energy investments have developed rapidly in recent years. The ground solar farm is one of the solar energy harvesting types for electricity generation, especially at the industrial level. Our main focus is to provide an additional power supply to the National Grid of Sri Lanka, and this study focuses on utilising Geographic Information Systems (GIS) to identify suitable areas for establishing a ground solar farm in the Trincomalee District, Sri Lanka. Trincomalee District has a tropical wet and dry climate with high sunlight. According to that Trincomalee District was selected as the study area by considering solar irradiation and by focusing on the cumulative solar power plant capacity in Sri Lanka. According to the literature review, various factors can be useful for selecting locations for a ground solar farm. Land surface temperature, slope, land use, and proximity to roads were selected as criteria for this case study. The separate criterion maps were generated and they were reclassified according to the requirements, and those were used with Analytical Hierarchical Process (AHP) to find the weights for overlay analysis in GIS. The resulting final factor map shows a land area of 24.47 km<sup>2</sup> for Trincomalee District as highly suitable for establishing a ground solar farm. This case study aims to reduce the overconsumption of natural resources that are used to produce energy and to ensure the protection of the environment through using renewable energy.

**Keywords:** GIS, Ground solar farm, Suitability analysis, Analytical Hierarchical Process (AHP), Sri Lanka