

Abstract

The society is looking for renewable sources of energy for example, wind energy, geothermal energy, solar energy, and hydro energy because utilization of fossil fuels poses the threat to global warming. Among these renewable energy sources, utilization of solar energy has shown great potential for growth in the current international energy mix. This research combines both Multi-Criteria Evaluation (MCE) and Geographical Information Systems (GIS) techniques to assess the sustainability of land for the installation of solar farms in Isiolo county in Kenya. Solar energy has the potential to provide the county of Isiolo with adequate energy to meet the demands of the county. The study also involves a two-step framework. The initial step which is the map of the unstable regions is extracted based of the defined constraints while the second step is to identify the suitability of defined criteria including road network, land/cover/land use, slope gradient, protected areas, electricity transmission network, and solar radiation. The relative weights of the defined criteria are defined by the fuzzy analytical hierarchy process (FAHP) technique. Then, by overlaying these criteria layers, the final map of prioritization of different regions of the county of Isiolo suitable for setting up the solar energy farms is developed. The findings were satisfactory as many regions were found to be moderately suitable with 22.95% and marginally suitable with 9.39% of the total study area for the development of these solar farms