

MODELLING AND MAPPING OF POTENTIAL ZONES FOR SOLAR ENERGY IN ASWAN REGION, EGYPT

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ABSTRACT:

Solar energy is a clean, pollution free and renewable source of energy. The privileged location of Egypt gave it an enormous potential for solar radiation all through the year. Solar energy can provide a great opportunity for sustainable development and population redistribution in its vast deserts. One problem facing the development of the vast desert zones is the lack of data. Deficiency of meteorological stations is an example. In this study, potential zones for locating solar energy stations were explored using remote sensing data and geographic information systems. First, remote sensing including Landsat TM was used to derive land use/land cover map of the study area. Shuttle Radar Topography Mission (SRTM) was used to model the global solar radiation map for the study area (direct and diffuse radiation, WH/m²). A spatial decision support system (SDSS) that combines multicriteria analysis and the analytic hierarchy process with geographical information systems (GIS) technology was conducted, taking into account land use, orography, infrastructure, and climate factors. The resultant annual global solar radiation map shows the spatial distribution of the annual total solar radiation among the pixels in watt hours per square meters (WH/m²). The SDSS identified the most appropriate zones for siting solar stations in the region through a continuous suitability index. High potentials sites were identified and ranked based on location criteria.