

Geoinformatics based multi-criteria decision support analysis of selection of renewable energy sites: A case study of Khyber Pakhtunkhwa Province, Pakistan

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Pakistan faces serious energy crisis. The demand for energy is much higher than its supply. This is affecting badly all sectors of life including commerce, industry and daily life of people. There is a need to enhance production of energy from all sources together with renewable energy need to be explored. Pakistan has enormous potential to generate energy from renewable sources like hydel, solar, wind, biogas and geothermal. Renewable energy can play a unique role by supplementing the existing energy resources at local level and providing the desired diversity in power generation resources for uninterrupted supply. In this study a GIS based methodology for wind and solar energy farms site selection were developed for Khyber Pakhtunkhwa (KPK) using fuzzy logic as a multi-criteria decision analysis technique. The physical, environmental and planning economic constraints criteria were identified for each source of energy based on literature review and national legislations and guidelines. The priority site identified for wind energy are Katlang, Mardan, Sam Ranizai, Pir Baba and Totalai tehsil, and the assumed total capacity were about 1855 MW. For solar energy half of Mardan district, southern part of Sam Ranizai tehsil, Totalai and Gagra tehsil were found suitable for solar farm installation with total assumed capacity for solar energy of 3820 MW. Katlang tehsil and northern areas of Mardan district were found suitable for hybrid energy systems. Since there was no study conducted in site suitability for wind & solar farm in the KPK this study will be useful for decision makers and investors to look into the possibility for installation of wind/solar/hybrid energy systems. This proposed methodology can also be adopted at National/international level for other renewable energy systems as well.