

GIS-Driven Analysis for Locating Suitable Areas for Renewable Energy

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Abstract : Renewable energy is becoming increasingly important in today's world due to its significant impact on the green economy, ecology, environment, and climate change. Renewable energy sources, such as solar and wind, are clean and sustainable, making them an ideal solution to reduce carbon emissions and mitigate the effects of climate change. The Karabakh region is located in the South Caucasus and covers an area of approximately 11,500 km². The region has a mountainous terrain, which can affect the availability of wind and solar resources. The Karabakh region has significant wind power potential, particularly in its mountainous areas where wind speeds are typically higher. According to a study conducted by the European Commission Joint Research Centre, the average wind speed in the Karabakh region is between 4 and 6 meters per second (m/s) at a height of 50 meters above ground level (AGL). However, wind speeds can be higher in some areas, reaching up to 10 m/s in some mountainous areas. The region also has significant solar power potential, with an average of 2,000 to 2,200 hours of sunshine per year. The region's high altitude and clear skies make it particularly suitable for the development of solar power projects. In this research, the application of satellite images, solar radiation, wind speed and direction, as well as various other materials to determine suitable areas for alternative energy sources, is investigated. The methodology for selecting suitable locations for solar and wind energy consists of four main parts: identification of factors, evaluation of factors, data preparation, and application of suitability analysis. At the end of the research, the territory of the Kalbajar and Lachin districts is suitable for wind energy. The southern plain part of Karabakh is highly evaluated in terms of solar energy potential, especially Jabrayil district. Generally, outcomes taken from this research are essential data for increasing of rational using natural resources, as well as combating climate change.

Keywords : GIS, remote sensing, suitability analysis, solar energy, wind energy

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