

Estimation of Small Hydropower Potential Using Remote Sensing and GIS Techniques in Pakistan

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Abstract : Energy demand has been increased manifold due to increasing population, urban sprawl and rapid socio-economic improvements. Low water capacity in dams for continuation of hydrological power, land cover and land use are the key parameters which are creating problems for more energy production. Overall installed hydropower capacity of Pakistan is more than 35000 MW whereas Pakistan is producing up to 17000 MW and the requirement is more than 22000 that is resulting shortfall of 5000 - 7000 MW. Therefore, there is a dire need to develop small hydropower to fulfill the up-coming requirements. In this regards, excessive rainfall, snow nurtured fast flowing perennial tributaries and streams in northern mountain regions of Pakistan offer a gigantic scope of hydropower potential throughout the year. Rivers flowing in KP (Khyber Pakhtunkhwa) province, GB (Gilgit Baltistan) and AJK (Azad Jammu & Kashmir) possess sufficient water availability for rapid energy growth. In the backdrop of such scenario, small hydropower plants are believed very suitable measures for more green environment and power sustainable option for the development of such regions. Aim of this study is to estimate hydropower potential sites for small hydropower plants and stream distribution as per stream network available in the available basins in the study area. The proposed methodology will focus on features to meet the objectives i.e. site selection of maximum hydropower potential for hydroelectric generation using well emerging GIS tool SWAT as hydrological run-off model on the Neelum, Kunhar and the Dor Rivers' basins. For validation of the results, NDWI will be computed to show water concentration in the study area while overlaying on geospatial enhanced DEM. This study will represent analysis of basins, watershed, stream links, and flow directions with slope elevation for hydropower potential to produce increasing demand of electricity by installing small hydropower stations. Later on, this study will be benefitted for other adjacent regions for further estimation of site selection for installation of such small power plants as well.

Keywords : energy, stream network, basins, SWAT, evapotranspiration

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