

Development of National Scale Hydropower Resource Assessment Scheme Using SWAT and Geospatial Techniques

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Abstract : The Department of Energy of the Republic of the Philippines estimates that the country's energy reserves for 2015 are dwindling- observed in the rotating power outages in several localities. To aid in the energy crisis, a national hydropower resource assessment scheme is developed. Hydropower is a resource that is derived from flowing water and difference in elevation. It is a renewable energy resource that is deemed abundant in the Philippines - being an archipelagic country that is rich in bodies of water and water resources. The objectives of this study is to develop a methodology for a national hydropower resource assessment using hydrologic modeling and geospatial techniques in order to generate resource maps for future reference and use of the government and other stakeholders. The methodology developed for this purpose is focused on two models - the implementation of the Soil and Water Assessment Tool (SWAT) for the river discharge and the use of geospatial techniques to analyze the topography and obtain the head, and generate the theoretical hydropower potential sites. The methodology is highly coupled with Geographic Information Systems to maximize the use of geodatabases and the spatial significance of the determined sites. The hydrologic model used in this workflow is SWAT integrated in the GIS software ArcGIS. The head is determined by a developed algorithm that utilizes a Synthetic Aperture Radar (SAR)-derived digital elevation model (DEM) which has a resolution of 10-meters. The initial results of the developed workflow indicate hydropower potential in the river reaches ranging from pico (less than 5 kW) to mini (1-3 MW) theoretical potential.

Keywords : ArcSWAT, renewable energy, hydrologic model, hydropower, GIS

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