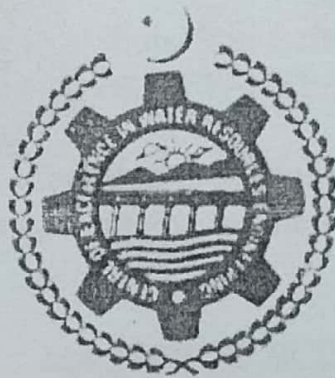


THESIS

ASSESSMENT OF HYDROPOWER POTENTIAL
USING GIS & REMOTE SENSING
(Case Study: Astore Basin)



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ABSTRACT

This study presents an approach for calculating the input data required for power potential studies with an aid of Remote Sensing & Geographic Information Systems (GIS) to expedite and optimize the process and finding the potential using GIS techniques. As in the past lack of planning caused serious environmental, political and technical problems, which can be overcome by developing better visualization techniques in GIS. This study is related to simulation of precipitation -runoff for Astore river basin, located in northern areas of Pakistan using the metrological data acquired from various national and international resources. Precipitation usually falls as snow in the winter or early spring in northern areas of Pakistan and water is temporarily stored as snowpack and much of the flow generated is because of the glaciermelt. Astore basin having area of 4015 Km² also having one of the highest peaks i.e. Nanga parbat. In past there were many studies conducted for estimating the power potential in untapped northern areas of Pakistan. The streams having flow data of limited periods, e.g. only data that is available is for Doyian. These data are not considered sufficient for the estimation of design floods and availability of water for hydropower generation for its sub-catchments. As a result, design flood and water availability for sub-catchments was estimated by imposing the flows of nearby streams which has catchment area and other conditions similar. There was a huge difference in the areas of Astore sub-catchments streams. It is well understood that the response of snowmelt and glaciermelt to stream flows in large catchments are hydrologically different as compared to small catchments. At the same time, climatic data of sufficiently long periods are available at nearby

stations like Astore, Bunji, Chilas, Kachura, Skardu etc. which could be helpful in relating with stream flows. It was logical to use a suitable watershed model to simulate streams flow values from climatic data. After examining different watershed models, the University of British Columbia (UBC) Watershed Model was selected to use for calibration of available data with climatic data at Astore basin at Doyian, from the calibrated models of Astore River at Doyian, the stream flow values from October 1998 to September 1999 are simulated. This study gives the simulated data for stream flows of sub-catchments, which is used to evaluate the hydropower potential of projects already identified in Astore Basin. This will open a new window for the design of different hydropower projects at these sites which were untapped and inaccessible in the past. This study will give a new vision to the professionals associated with design consultants and faculty engaged in the field of water resources and hydropower development. This research can also be used for the study of climatic change provided the expected weather patterns are designed in accordance with the possible changed climate. The study also incorporated ranking of sites by using power potentials and plant factors using GIS.