

THESIS

**HYDROLOGICAL ANALYSIS FOR THE SELECTION OF MOST
PROMISING HYDEL POTENTIAL SITE AT PANJKORA RIVER**



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ABSTRACT

Water system planners, designers and managers always need more and more precise information on stream flows for project planning, development of dam and optimum utilization of water supply design. Estimation of floods is required for design and economic assessment of number of engineering structures, including spillway of dam, flood protection bunds and bridges etc.

When flow records are not available at a site, a preliminary estimate may be made from relation between the catchment characteristics and floods. The physical characters like catchment area, channel slope, mean elevation and channel length are measured from general topographic maps.

The Panjkora River is the main tributary of Swat River. It raises high in the Hindu Kush at lat. 35.45, flows south through Upper Dir and Lower Dir Districts and joins the Swat River near Chakdara, Malakand. The project is located in Dir region. The gated weir site lies at latitudes $34^{\circ} 45' 30.15$ E and longitude $71^{\circ} 48' 12.19$ N.

The present research will focus on the lower part of the Panjkora River with construction of gated weir and the diversion of flows by means of a tunnel to generate substantial hydropower (Run of the River Plant).

The length of the measured data in this study was about 4 years from year 2001 to 2004 at Zulam Bridge (2 km upstream from Shigo) and from year 2005 to 2009 at Koto (30 km upstream from Shigo). The flow series was generated with the help of statistics techniques using the available long term data of nearby catchment.

The objectives of the study were hydrological analysis of Panjkora River, estimate the gross head and net head to evaluate the hydel potential of the site. Two alternatives were selected to obtain the most promising hydel potential site.

In order to achieve the sustainable flow for uninterrupted power supply a flow duration curve was plotted with the help of flow series generated from the long term flow data of nearby catchments. This extended flow series was adopted for estimation of power with Q_{90} (90% availability of flow).

Estimation of peak discharge was important for making the hydropower structures safe due to flooding at proposed site. The peak flood at proposed gated weir site was calculated by the method of frequency analysis.

The selection of most viable potential site was made by analyzing two different options with respect to hydrology, net head available and tentative cost per mega watt. The selected option will produce about 24 MW power.