THESIS

FLOOD RISK ANALYSIS OF SELECTED HIGH HEAD HYDROPOWER PROJECTS IN PAKISTAN

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ABSTRACT

The problem of floods and their computation is one of the main concerns of hydrologists and engineers. Optimal development water resources necessity design and construction of hydraulic structures such as dams, barrages, etc. For the economic design of a structure which passes flood water, the estimation of design flood is very essential, so that the design is safe. Flood frequency analysis is the commonly used approach for estimation of design flood, particularly for small and medium structures when data record of sufficient length is available, then flood frequency analysis can be based on the record alone. The main objective of the present study was to re-evaluate the flood risks of four selected high head hydropower projects by using flood frequency analysis technique utilizing up-to-date hydrologic and hydraulic data.

The Gumbel, Pearson Type-III, Log Pearson Type-III, Normal and Log Normal distributions were applied to the four selected high head hydropower projects namely Bunji, Doyian, Phander and Basho Hydropower projects. Moreover, the flood frequency analysis was also carried out by using computer software DESIGN FLOOD for re-evaluation of flood risks.

The main conclusions of the study are that the Gumbel distribution best fitted the observed data for flood frequency analysis as compared to other distributions and the Hazen formula the most suitable for plotting the data for frequency analysis. Historical information should be given due weightage in identifying the outliers in a sample. The

reliability of the mean annual flood increases with the length of record. Short periods of record do not define it closely.

It is recommended that all the floods occurring in a particular year should be considered as potential floods i.e. the frequency analysis should be carried out for the partial duration series. Similar studies should be carried out for other high head hydropower projects for re-evaluation of flood risks by utilizing up-to-date hydrologic and hydraulic data.