THESIS

INFLUENCE OF SNOW-MELT-RUNOFF ON STREAM FLOWS

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ABSTRACT

EFFECT OF SNOW-MELT ON STREAM FLOWS

This study is related to significance of snow-melt on hydrology and runoff generation in the Kunhar river basin in Northern Pakistan. The objective of this research is to find out the effect of snow-melt in Kunhar river, using the rainfall, discharge and snow survey data.

The Kunhar river is a major tributary of the Jhelum river in the Western Himalayas of Pakistan. The basin area is about 2,340 Km^2 with an elevation range from 800 to 5300 m above sea level. The watershed has a seasonal snow-cover which develops from early November onward, reaching a maximum depth in March or April. Also, the snow pack increases greatly at upper elevations.

Total discharge data at three gauging stations at Kunhar river basin, is available, from 1961-1968 i.e. at Naran, Khanian and Garhi-Habibullah and rainfall data is also available at Battakundi, Naran and Balakot.

On subtracting the base flow from total discharge, runoff is calculated and from this runoff rainfall (converted to cumecs) is subtracted to find out the snow-melt volume. Using this snow-melt volume against maximum snow water equivalent at different snow courses at Naran and Shogran areas, the relationships are developed. The snow courses situated at higher

elevations give good results in these relationships. In this way the volumetric snow-melt contribution in the Kunhar river can be calculated from these relationships, if the maximum accumulated snow water equivalent data is available for the months May-September i.e. snow-melt season.

The snow courses situated at lower elevations, when used to develop a relationship between M.A.W.E. at these snow courses and snow-melt at Naran, Khanian and Garhi Habibullah gauging stations give unsatisfactory results. The reason is the early melting of snow on these lower elevation snow courses. If the M.A.W.E. at different snow courses at Naran and Shogran areas are available then this study can be useful for the estimation of snow-melt contribution at Naran, Khanian and Garhi Habibullah gauging stations.

This study is useful for the design of projects like power generation, water supply, irrigation and construction of spurs to avoid the damaging effects of floods in the Kunhar river.

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