

Study of Suspended Sediment Transport in the Dokriani Glacier Melt Stream

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Abstract

Estimation of sediment load from the glacierized basins is very important for planning, designing, installation and operation of hydro-power projects including management of reservoirs. In the present study, assessment of suspended sediment concentration, load, yield and erosion rate has been made for a highly glacierized Dokriani Glacier basin located in the Garhwal Himalayas. Mean monthly concentration in the month of June, July, August and September were observed to be 452, 933, 965 and 275 ppm, respectively. Mean monthly sediment concentration in the months of July and August was found about two times that of June and about three times that of September. A very high quantity of sediment load has been observed from the study basin. Seasonal distribution of sediment load shows that on average 3607, 18733, 20951 and 1794 tonnes is transported in June, July, August, and September, resulting in 45085 tonnes during ablation period. Both sediment concentration and load were found maximum in the month of August followed by July. About 88% of the total sediment load is transported in the months of July and August. Poor relationship is found between suspended sediment concentration and load with discharge.

Sediment yield for the melt period is computed to be about 2800 t km 'yr', which is comparable with glacierized basins in the Pamir region. The erosion for Dokriani glacier basin is estimated to be about 2.0 mm for the ablation period, which is higher than the erosion rate reported by other investigators for the glacierized basins in Europe. Average percentage of clay, silt and sand was found to be 1.4, 67.3 and 31.3%, indicating maximum content of silt followed by sand. There was no very significant variation in the content of clay, silt and sand in the suspended sediment during the ablation period.

This report presents the status of the sediment studies carried out in the Himalayan region including the both lower altitude region and high altitude region. Processes associated with

sediment production in the mountainous region have also been described with an emphasis on the glacierized region. Suspended sediment concentration and load observed in the Dokriani Glacier melt stream near the snout of the glacier has been computed. Sediment yield from this glacier is found to be very high as compared with other Himalayan basins. Attempts have been made to correlate sediment concentration and load with glacier melt runoff. Poor relationship is found between these variables. Analysis of suspended sediment particle size has indicated that average percentage of clay, silt and sand was found 1.4, 67.3 and 31.3%, indicating maximum content of silt followed by sand. There was no significant variation in the content of clay, silt and sand was found during the ablation period. Both sediment concentration and load were poorly correlated with discharge. However, relationship between discharge and sediment load was improved when monthly data were used.