

Impact of climate change on glacial sediment delivery to Norwegian rivers and consequences for hydropower operations

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Abstract The possible effects of climate change on sediment delivery from glaciers and the consequences for hydropower operations are discussed in this paper. Present climate change scenarios predict a rise in summer temperature of 2.5–4.0°C in Norway towards 2100, an increase in precipitation of 5–20% in the southwestern part of the country, and a general increase in the frequency of extreme rainfall events. Most of the glaciers will melt and sediment transport is likely to increase as a result of the melting. During the last decade, high summer temperatures and high precipitation have caused the highest volume of runoff and sediment load in the meltwater river flowing from the Nigardsbreen Glacier, since measurements began in 1968. A study of the subglacial morphology obtained from low frequency radio-echo soundings revealed that a number of depressions beneath the glaciers will form lakes when the glaciers disappear and act as sedimentation basins in the future rivers. The increased sediment delivery from the glaciers will thus not always increase the sediment input to downstream reaches. Changes in sediment delivery to hydropower stations will depend on the local conditions and the operation rules.

Key words bed load; climate change; glacial erosion rate; hydropower planning; sediment yield; suspended load; ungauged glacierised basins