



Flood frequency analysis including historical data: A case study for catchments in Norway

Kolbjorn Engeland and Erik Holmqvist

The Norwegian Water Resources and Energy Directorate, Oslo, Norway

There is a need to estimate design floods for areal planning and the design of important infrastructure. A major challenge is that most flood time series are much shorter than the required return periods of 200, 500, or 1,000 years. Such estimates are therefore based on extrapolation, and the estimation uncertainty is large. The aim of this study is to investigate if the use of historical information improve design flood estimation. Annual maximum floods from streamflow stations were combined with historical flood information indicating water levels for the largest floods in the last two to three hundred years. The aim of this study is to assess the added value of using historical data for flood quantile estimation and how the added value depends on data availability and the estimated length of the historical period. A Bayesian approach was used and we investigated data from two location in Norway. The results show that there is added value in using historical information. The largest improvements is seen when the magnitude of the historical floods is known, and when the length of the systematic record is short. If the historical flood sizes are not known, whereas the number of floods above a perception threshold is known, the added value is the greatest when the perception threshold is relatively high. It is also recommended to set the length of the historical period to be the time span from the first historical event to the end of the historical period plus the average time spacing between the historical events.