

Evaluation of design flood estimates with respect to sample size

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Estimation of design floods forms the basis for hazard management related to flood risk and is a legal obligation when building infrastructure such as dams, bridges and roads close to water bodies. Flood inundation maps used for land use planning are also produced based on design flood estimates. In Norway, the current guidelines for design flood estimates give recommendations on which data, probability distribution, and method to use dependent on length of the local record. If less than 30 years of local data is available, an index flood approach is recommended where the local observations are used for estimating the index flood and regional data are used for estimating the growth curve. For 30-50 years of data, a 2 parameter distribution is recommended, and for more than 50 years of data, a 3 parameter distribution should be used. Many countries have national guidelines for flood frequency estimation, and recommended distributions include the log Pearson II, generalized logistic and generalized extreme value distributions. For estimating distribution parameters, ordinary and linear moments, maximum likelihood and Bayesian methods are used. The aim of this study is to re-evaluate the guidelines for local flood frequency estimation. In particular, we wanted to answer the following questions:

- (i) Which distribution gives the best fit to the data?
- (ii) Which estimation method provides the best fit to the data?
- (iii) Does the answer to (i) and (ii) depend on local data availability?

To answer these questions we set up a test bench for local flood frequency analysis using data based cross-validation methods. The criteria were based on indices describing stability and reliability of design flood estimates. Stability is used as a criterion since design flood estimates should not excessively depend on the data sample. The reliability indices describe to which degree design flood predictions can be trusted.