



Estimating flood exceedance probabilities in estuarine regions

Seth Westra and Michael Leonard

School of Civil, Environmental and Mining Engineering, University of Adelaide, Australia (michael.leonard@adelaide.edu.au)

Flood events in estuarine regions can arise from the interaction of extreme rainfall and storm surge. Determining flood level exceedance probabilities in these regions is complicated by the dependence of these processes for extreme events. A comprehensive study of tide and rainfall gauges along the Australian coastline was conducted to determine the dependence of these extremes using a bivariate logistic threshold-excess model. The dependence strength is shown to vary as a function of distance over many hundreds of kilometres indicating that the dependence arises due to synoptic scale meteorological forcings. It is also shown to vary as a function of storm burst duration, time lag between the extreme rainfall and the storm surge event. The dependence estimates are then used with a bivariate design variable method to determine flood risk in estuarine regions for a number of case studies. Aspects of the method demonstrated in the case studies include, the resolution and range of the hydraulic response table, fitting of probability distributions, computational efficiency, uncertainty, potential variation in marginal distributions due to climate change, and application to two dimensional output from hydraulic models. Case studies are located on the Swan River (Western Australia), Nambucca River and Hawkesbury Nepean River (New South Wales).