



Flood risk evaluation from an insurance perspective – A case study of India

Bharath Raja (1), Dronamraju Santhosh (1), and Petr Punčochář (2)

(1) Impact Forecasting, Aon Consulting Pvt., Ltd., Bangalore, India (bharath.r@aon.com), (2) Impact Forecasting, Aon, Prague, Czech Republic (Petr.Puncochar@aon.com)

Worldwide, floods are the most frequently observed natural catastrophes that lead to considerable damages to both life and property. Financial losses due to the damages caused by natural catastrophes are in most places largely uninsured, in both developing and developed countries. Determining losses due to different flood types and/or even other perils can help to evaluate the cost of mitigation as well as quantify the structure and the cost of insurance and reinsurance protection. In general, the concept of catastrophe models consisting of hazard, exposure, and vulnerability components is of prime importance to estimate projected losses. In the present study, a probabilistic approach to flood loss estimation is presented from an insurance perspective and tested on a river basin prone to flooding in South India. Hazard is estimated by determining the flood extent and inundation depths for different return periods along a river network using a 2D hydrodynamic model – TUFLOW (BMT WBM). The exposure reflects the financial liability within the area of interest such as industrial parks, warehouse, commercial districts, public infrastructure etc. The vulnerability is determined by developing a relationship between property value and flood levels. To arrive at probabilistic flood hazard, a large number of flood events are generated using advanced statistical processing based on copulas. A vine copula approach using block maxima of streamflow values is used to generate synthetic events and subsequently; the losses corresponding to each of the generated events are estimated. The key outcome of such an approach is the potential flood loss profile expressed as an exceedance probability (EP) curve. Uncertainties associated with determining flood magnitudes and flooding extents for different return periods and their effect on the estimated loss is also evaluated.