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Catchment Descriptor Equations For Extreme Floods in Data-Sparse Central India

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The state of Maharashtra and the Godavari and Krishna basins form much of central India and have a combined population of over 140 million people and, due to the summer monsoons, flooding is a regular occurrence and a perennial problem. However, there are fewer than 130 publicly available gauging stations to cover 550,000 km2 of land and over 9100 km of river channel. In the UK, the median annual maximum flood (QMED) can be estimated using a model based on digital catchment descriptors which reflect the hydro-climatological and physical properties of the river basin (Kjeldsen *et al.*, 2008) This method has been modified for these Indian basins using open source, freely available data sources to characterise the hydrological, geological and topographical characteristics of gauged subcatchments. The catchment descriptors developed include area and slope, as well as some land use/cover characteristics from WWF and FAO.

Cluster analysis was performed to allow for flexibility in the number of models developed, since, unlike the UK, there is a much greater variation in the climate/hydrology of the region. Although the method selected two as the optimal number of regions, no specific hydrological or geographical indicators could be seen to obviously explain this.

Additionally, a distribution selection test was performed using a substantially larger set of stations than any previously published study, suggesting that either Pearson Type III or Generalised Pareto could be selected as a good extreme value distribution for flood frequency curves. The catchment descriptors were obtained for the drainage areas for each of the CWC hydro-observation stations in the regions, and then stepwise linear regression was implemented to obtain the optimal model forms for the final catchment descriptor equations. Model and sampling error were better elicited using spatial correlation to lead to locally similar errors.