Simulating Daily Discharge of Mandovi River, West Coast of India

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A hydrological modelling framework was assembled for simulating the daily discharge of the Mandovi river on the Indian west coast. The modelling framework consisted of a digital elevation model called GLOBE (resolution ~ 1 km), a hydrological routing algorithm [1], and the SCS (Soil Conservation Service) Curve Number (CN) method. The rainfall forcing maps were obtained by a multivariate interpolation scheme to capture the sharp increase in rainfall on the windward slopes and the exponential decay in rainfall on the leeward side of the Sahyadri range on the west coast of India. The key result is that treating the windward and leeward sides separately by an *a priori*, subjective extraction of the ridge line can reduce the underestimation of rainfall that is common in data-sparse mountainous terrain [2]. Using the rainfall maps, a series of simulations (with and without the SCS method) was carried out to build the model parameterisation using three of 18 years of data (rainfall and discharge) during 1981–1998; the other 15 years were used to validate the model. Simulations with the SCS method include spatial and temporal variation of the SCS parameters such as CN and initial abstraction. In addition, we also make an attempt to objectively define different regimes during the monsoon season to better assess antecedent moisture conditions. The strength of our method lies in the low demand it makes on hydrological data. Apart from information on the average soil type in a region, the entire parameterisation is built on the basis of the rainfall that is used to force the model. The data and results suggest that the framework should work for other basins too on the Indian west coast. That the model does not need to be calibrated separately for each river is important because most of these basins are ungauged. Hence, though the model has been validated only for the Mandovi, its potential region of application is considerable.

Keywords: hydrological modelling; Sahyadri; Mandovi River; multivariate interpolation; SCS Curve Number.

References

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