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Application of a hydrological model based on the REW approach to the Collie River Basin, Western Australia.

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CREW (the Cooperative Community Catchment model based on the Representative Elementary Watershed approach) (Lee *et al.*, 2005), has been applied to the Collie River Basin. While applying CREW, the river basin is divided into a number of sub-catchments, also known as REW's, according to the Strahler order of the network. The Collie River Basin is characterised by strong spatial gradients in precipitation, potential evaporation and vegetation cover. The precipitation in the Collie River Basin varies from 1200mm/y in the west down to 600mm/y in the east. Potential evaporation is in the range of 1400-1600mm/y. During the process of implementing CREW to the Collie River Basin, some refinements had to be made. First to derive the REW's based on the Strahler order, a model in PCRaster, a free GIS software package, was written to derive these sub-watersheds. Due to the high spatial variability of precipitation in the catchment, a heterogeneous precipitation field was applied in the model. The differences of the results using a homogeneous and heterogeneous precipitation field have been illustrated, and it has been shown that the latter produced better results for the streamflows. Three cases have been tested where the catchment is discretized into 1, 5 and 27 REWs. It is shown that using more REWs does not necessarily improve the results. The results for 5 REWs are obviously an improvement comparing with just 1 REW. Increasing the number of REWs further to 27 REWs does not bring out significant improvement. Based on the results and the modifications made to CREW, it can be said that the model still requires further improvement; however the peaks in the Collie River are reasonably well simulated. So CREW can be applied to a catch-

ment like the Collie River Basin. By using a top-down analysis and the CREW model, a better understanding about the hydrological system and hydrological processes has been obtained. Moreover, it helps to see patterns and thresholds in a system, without the use of complex modelling.