

## **Evaluation of the effects of underlying surface change on catchment hydrological response using the HEC-HMS model**

**CHENG YAO<sup>1</sup>, LU CHANG<sup>2</sup>, JIE DING<sup>3</sup>, ZHIJIA LI<sup>1</sup>, DONG AN<sup>1</sup>  
& YUXIA ZHANG<sup>1</sup>**

*1 College of Hydrology and Water Resources, Hohai University, Nanjing 210098, China*  
[yaocheng@hhu.edu.cn](mailto:yaocheng@hhu.edu.cn)

*2 Wuxi Water Resources Bureau, Wuxi 214002, China*

*3 Institute of Water Resources Management, Hydrology and Agricultural Hydraulic Engineering, Leibniz University Hannover, Hannover D-30060, Germany*

**Abstract** Due to rapid population growth, China, and urbanization, the Dongwan catchment, with a drainage area of 2856 km<sup>2</sup> and located in Henan Province, has been subjected to considerable land-use changes since the 1990s. Distributed or semi-distributed models have been widely used in catchment hydrological modeling, along with the rapid development of computer and GIS technologies. The objective of this study is to assess the impact of underlying surface change on catchment hydrological response using the Hydrologic Engineering Center's Hydrologic Modeling System (HEC-HMS), which is a distributed hydrological model. Specifically, 21 flood events were selected for calibrating and validating the model parameters. The satisfactory results show that the HEC-HMS model can be used to simulate the rainfall–runoff response in the Dongwan catchment. In light of the analyses of simulation results, it is shown that the flood peaks and runoff yields after 1990 moderately decrease in comparison with that before 1990 at the same precipitation level. It is also indicated that the underlying surface change leads to the increased flood storage capacity after 1990 in this region.

**Key words** HEC model; change of underlying surface; rainfall–runoff response; Dongwan catchment; hydrological model