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Effectiveness of complex physics and DTM based distributed models for flood risk management of the River Tone, UK

JONG-SOOK PARK[1], QIWEI REN[2], YANGBO CHEN[2], IAN DAVID CLUCKIE[1], MICHAEL BUTTS[3] & DOUGLAS GRAHAM[3]

1 *School of Engineering, Swansea University, Singleton Park, Swansea, Wales SA1 8PP, UK*
j.park@swansea.ac.uk

2 *Department of Water Resources & Environment, Sun Yat-Sen University, Guangzhou, 51027, China*

3 *DHI, Agern Alle 5, DK-2970 Horsholm, Denmark*

Abstract This study investigates the effectiveness of an existing complex physics-based fully distributed model (MIKE SHE) and a DTM derived distributed model used to provide a better understanding of flood risk, in particular the hydrological impact of land-use change in the catchment of the River Tone in the South West region of the United Kingdom. Sustainable catchment management must consider the impact of remarkable floods in the context of recent and forecast climate change. These distributed models are implemented in order to reflect the physical and hydrological features of the catchment and to aid the evaluation of catchment flood response subject to a variety of land-use management practices. The findings can contribute to a better understanding of integrated water and land-use management when considering increasingly more extreme events that can cause damage to property and adversely affect livelihoods, creating local tensions and demands for more immediate and effective action in flood risk management. The River Tone is an integral part of the world renowned Somerset Levels that make up one of the UK's largest wetland habitats.

Key words model effectiveness; fully distributed model; MIKE SHE; flood risk management (FRM); whole catchment modelling (WSM); land use change; measurement uncertainty