



Unravelling the factors influencing flooding over the last 60 years in the Wei River Basin, China

Lingtong Gai (1,2), Jantiene E.M. Baartman (1), Manuel Mendoza-Carranza (3), Fei Wang (2,4), Coen J. Ritsema (1), and Violette Geissen (1)

(1) Soil Physics and Land Management Group, University of Wageningen, P.O.Box 47, 6700 AA Wageningen, the Netherlands(lingtong.gai@wur.nl), (2) Institute of Soil and Water Conservation, Chinese Academy of Science and Ministry of Water Resources, Yangling, Shaanxi 712100, China, (3) El Colegio de la Frontera Sur, ECOSUR Unidad Villahermosa, Km 15.5 carretera a Reforma s/n, Ranchería Guineo 2a Sección 86280, Villahermosa, Tabasco, México, (4) Institute of Soil and Water Conservation, Northwest A&F University, Yangling, Shaanxi 712100, China

Flood hazard has become a growing concern in the Wei River Basin in China due to the extensive damage to private and public property under the pressure of extreme meteorological events and human intervention in the river basin. A better understanding of the influence of topographic, climatic and especially anthropogenic factors on hydrological discharge and flooding are important for flood regime and water resources management. This study is aiming at answering the questions why, where, when, and how flooding occurs. While most studies focus on single flood events, we aimed at unravelling a multitude of factors contributing to flooding over a decadal timespan. To be able to do this, we used conditional inference tree analysis, a promising method not often applied in hydrological studies. This method allows to rank all the influencing factors by its contribution to the occurrence of flooding therefore to identify the most important ones and spatially important subcatchments leading to flooding on both yearly and monthly bases in the basin. Dam construction period was identified as the most important factor (why) affecting flooding, followed by the elevation of the river outlet. The subcatchment farthest upstream in the basin (where) contributed the most to the discharge at the downstream floodplain. We then analyzed the impact of the periods of dam construction on the precipitation-discharge relationship using cross-correlation and double mass curves analysis, respectively. The results showed a smaller effect of dam construction on the time lags (when) between precipitation and discharge than on the effect of reducing the quantity of discharge (how).