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# Comparison of conceptual and hydrodynamic models for designing optimal usage of flood storage areas in Huai River, China

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Due to complex climatic and geographical conditions, Huai River Basin is highly exposed to flooding, especially in its middle section. In this situation and with concern for the importance of regional development, Chinese authorities implemented storage areas to ensure the safety of important downstream locations such as the city of Bengbu. However, this approach is at the expense of local interests of population living in these storage areas. Different operation strategies of storage areas lead to different consequences of downstream flood risk at Bengbu city and inundation damages in the storage areas. Hence, these are conflicting objectives, concerning different stakeholders that need to be engaged in the process of implementation.
Previous research carried out at middle section of Huai river, concluded that operational strategies can be clustered in two groups, depending on whether the largest storage area is completely used or not. In order to analyse possible improvements of these operational strategies, this study is focused on providing more detailed inundation picture with three types of models, in which the 1D-river model was coupled with different model representations of the storage areas: 1) conceptual reservoir model developed in previous study, 2) terrain-based reservoir model, and 3) 2D hydrodynamic model. These representations are then tested with an optimization algorithm that uses gate operations as decision variables (controlling the flooding of the storage areas), resulting in different flood inundation damage and requiring different computational time. Although with higher computational time, the terrain-based reservoir model and 2D hydrodynamic model have a better representation of flood inundation than conceptual model, which is beneficial in providing more relevant information for storage areas planning and development.