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Influence of Check Dams on Flood and Erosion Dynamic Processes of a Small Watershed in the Loess Plateau

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As an important soil and water conservation engineering measure, check dams have been constructed on a large scale in the Loess Plateau of China. However, their effects on runoff and sediment processes in the basin are still unclear. In this study, the hydrodynamic processes of the Wangmaogou watershed located in the Loess Plateau were simulated, and the influence of check dams on the flood and erosion dynamic processes in this watershed were also evaluated. The results showed that the check dams obviously reduced the flood peak and flood volume and mitigated the flood process. After the dam system was completed, the flood peak and flood volume were reduced by 65.34% and 58.67%, respectively. The erosion dynamic distribution of the main channel in the small watershed was changed to different extents by the different dam type combinations, and the erosion dynamic parameters of the channel decreased most after the dam system was completed, when the velocity and runoff shear stress of the outlet section were reduced by 10.69% and 31.08%, respectively. Additionally, the benefits of sediment reduction were most obvious after the check dam system was completed, with the sediment discharge in the watershed being reduced by 83.92%. The results of this study would provide specific implications for construction and management of check dams in the Loess plateau.