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Hydrological response of streamflow to climate change and human activities in the Yanhe River Basin, China

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The Yanhe River Basin (YRB), located in the Loess Plateau, China. Because of climate change, population growth and fast economic development, the regional water environment has changed obviously, and the surface runoff has decreased. The YRB contributes significantly to the total sediment yield in the Yellow River. In order to control the severe soil erosion in the YRB, a great number of water and soil conservation measures including terracing, afforestation, and construction of sediment-trapping dams have been implemented since the 1950s. It is important to assess the impact of climate change and human activities on the hydrology and water resources of the YRB and to provide a scientific basis for future water resources allocation. The nonparametric Mann-Kendall test and the Pettitt test are used to identify trends and change points in the streamflow records. The SIMHYD hydrological model is used to assess the streamflow response to climate change and human activities in the YRB in this study. The results show that the change points in streamflow occurred in 1972. The streamflow in the YRB has decreased by 35% from 1972 to 2003 compared with the period from 1952 to 1971. Both climate change and human activities are main factors to affect the changes of streamflow in the YRB. The impact of human activites is greater than climate change after 1972. The climate effects accounted for about 38% of total streamflow changes, and the effects of human activities on streamflow accounted for about 62% in the YRB.