

Impact of human activities on hydrological drought in a semi-arid catchment of northern China

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In this paper, a case study on the evolution of hydrological drought in non-stationary environments is conducted over the Laohahe catchment in northern China. Using hydro-meteorological observations during 1964-2009, meteorological and hydrological droughts are firstly analyzed with the threshold level method. Then a comprehensive analysis on the changes within the catchment is conducted on the basis of hydrological variables and socioeconomic indices, and whole period is divided into the undisturbed period (1964-1979) and disturbed period (1980-2009). A separating framework is further introduced to distinguish droughts induced by different causes, i.e. the naturalized drought and human-induced drought. Results showed that drought duration and deficit volume in naturalized conditions are amplified two to four times and three to eight times respectively when human activities are involved. For the two dry decades 1980s and 2000s, human activities have caused several consecutive drought events with rather long durations. These results reflect the considerable impacts of human activities on hydrological drought, which could provide some theoretical supports for local drought mitigation and water resources management.