



Hydrological Responses to Climate Change and to LUCC in Asian Arid Zone

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The arid Asian zone is one of the most sensitive areas to the global climate change. For instance, the temperature has been rising at a rate of 0.39K/10yrs in the arid northwestern China during the past an half of century, being 2.78 times of the global average. In the arid Asian zone, water resource is a key factor restricting the socio-economic development and threatening the ecological security. Under the global warming conditions, water resource systems of the arid Asian zone are most likely becoming increasingly vulnerable, especially under the projected increasing population and expanding economy in arid Asian zone. Hydrological data from glacier-supplied rivers in the Tian Shan Mountains for example show that the runoff has been increasing primarily as a result of rising temperature that caused increases in ice melting. But, the decreasing trend of surface runoff in low-elevation basins is undeniable and the decreasing trend is attributable to the increasingly intensified human activities. Specifically, increasingly intensified water consumption for irrigation and the associated massive constructions of water conservancy projects were responsible for the decreasing trend of runoff. And, the decreasing trend has been severely jeopardizing the ecological security in the lower reaches of the arid river basins. In arid northwestern China, about 85% of the water resources are formed in high elevations and the glacier-melting contribution to runoff has been doubled since 1980's. Approaching to the turning point of glacier-melting supplies to runoff will pose a great threat to socio-economic sustainability and to ecological security. The turning point refers to the transition from increasing runoff to decreasing runoff within glacier-melting supplied watersheds under warming climate.