Distinguishing the impacts of climate change and human activities on streamflow in the Baiyangdian Lake catchment, North China

Chuanzhe Li, Jia Liu, Qingtai Qiu, Yang Wang, and Fuliang Yu
State Key Laboratory of Simulation and Regulation of Water Cycle in River Basin, China Institute of Water Resources and Hydropower Research, Beijing, China (azhe051@163.com)

Baiyangdian Lake is the biggest natural freshwater wetland in North China. Because of climate change, population growth and fast economic development, water environment of the Baiyangdian Lake catchment has changed obviously, and it has experienced severe water shortage and water level decline in recent decades.

The purpose of this paper is to predict the dynamic water level tendency in Baiyangdian Lake in the future and to provide a scientific basis for future water resources allocation. It is important to study the change on streamflow from long series data in this basin and to provide a scientific basis for understanding the influence mechanism on annual streamflow and the evaluating of the influence degree. Two non-parametric methods, Mann-Kendall test and Pettitt test, are employed to detect change trend and change point in annual streamflow for the period of 1956 to 2015. Both sensitivity-based method and water balance model are used to analyse the effects of hydrological response to climate change and human activities. The results show that the impact on streamflow is more sensitive to precipitation than potential evapotranspiration (PET). The change point on annual streamflow occurred in 1979. Both climate change and human activities are main factors to affect the change of streamflow. The impact of human activites is greater than climate change after 1979. The effect of climate change account for about 38% of total streamflow change, and the effect of human activities on streamflow account for about 62%.