IAHS2017-104
IAHS Scientific Assembly 2017

Long-term evolution in environmental flow in the East River, South China

Kairong Lin, Shuhao Liu, Wenjing Li, and Kangming Wang
Department of Water Resources and Environment, Sun Yat-sen University, China (linkr@mail.sysu.edu.cn)

The East River, one of the tributaries of the Pearl River, serves as the critical water source for Guangdong Province and the District of Hong Kong in China. In this study, the change trend and change points of flow at three main gaging stations in the East River were analyzed using the nonparametric Mann-Kendall test and Pettitt-Mann-Whitney change-point statistics. Environmental flow changes in the East River were quantified by using both the Indicators of Hydrologic Alteration (IHA) parameters and eco-statistics, such as ecosurplus and ecodeficit. It was found that the change trend for annual median flow in the East River increased over the past 60 years, with the major change occurring sometime between 1970 and 1974. IHA analyses showed that the magnitude of monthly flow decreased during the flood period, but increased greatly during the dry period. The median date of the one-day minimum flow moved ahead, and the duration of low pulse for the East River was reduced significantly because of reservoir construction and operations. The IHA-based Dundee Hydrological Regime Alteration Method analysis indicated that all three stations have experienced a moderate risk of impact since 1974. The eco-statistical analyses showed that the majority of the flows appeared to be ecosurplus at all three locations after 1974, while flows with less than 30%, or higher exceedance probability, had ecodeficit in the summer flood period due to heavy reservoir operations.