

IMPACTS OF CLIMATE CHANGE ON WATER RESOURCES IN CHINA AND ADAPTATION STRATEGIES

JIANYUN ZHANG^{1, 2}, GUOQING WANG^{1, 2}

1. STATE KEY LABORATORY OF HYDROLOGY-WATER RESOURCES AND HYDRAULIC ENGINEERING, NANJING HYDRAULIC RESEARCH INSTITUTE, NANJING 210029, CHINA

2. RESEARCH CENTER FOR CLIMATE CHANGE, MINISTRY OF WATER RESOURCES, NANJING 210029, CHINA

Abstract: Climate change is becoming an environmental issue of utmost importance, challenging existing water resource management practices in many ways. China is in shortage of water resources due to uneven distribution in space and time although total water availability in China ranks No. 6 in the world. Water issues in the context of climate change have attracted more attentions from both China's central government and local authorities. Variation trends of recorded runoff of the major rivers were detected and contributions of climate change and human activities to changes in runoff were identified by using statistical methods and hydrological simulation approaches. Based on multiple GCMs projections, the impacts of climate change on water resources of China were investigated. Results show that the recorded runoff from 1951~2010 presented decreasing trends for major rivers in north China (e.g. Yellow River, Hai River, etc) while runoff of southern rivers exhibited higher availability with an insignificant trend. Recorded runoff in the Hai River during 1980~2010 decreased by 44%~78% compared to previous mean level during 1950~1979, among which climate change including precipitation decrease and temperature rise, contributed approximately 20%~30% of total runoff reduction. Runoff decrease for the Huang River mainly occurred in the middle and lower reaches, human activities including soil and water conservation measures in the Loess Plateau, played a principle role in runoff reduction, which was accountable for about 60% of changes in runoff. Based on ensemble mean of 18 GCMs projections, temperature over China will probably continue to rise at a pace of about 0.24-0.42 °C/10a in the next decades while precipitation is estimated to undergo no significant change. Different climate scenarios are associated with different changes in water resources. Annual water resources over China as a whole will probably increase by approximately 3–10% by 2050, yet still characterized by quite uneven spatial and temporal distribution. The prevailing pattern of “dry north and wet south” in China is likely to be exacerbated under global warming. Strategies to improve adaption capacity and build resilience to climate change should focus on water saving, utilization of non-conventional water sources, constructing water controlling projects and highlighting public education to improve awareness of climate risks, implementing integrated water resources management and planning based on impact assessments.

Key words: climate change, water resources, China