IWRM2018-98
8th International Water Resources Management Conference of ICWRS

Village-level Supply Reliability of Surface Water Irrigation in Rural China: Effects of Climate Change

Yanrong Li (1) and Jinxia Wang ()

(1) Beijing Research Institute of Commercial Machinery, All China Federation of Supply and Marketing Cooperatives, China (liyr.12b@igsnrr.ac.cn), (2) China Center for Agricultural Policy, School of Advanced Agricultural Sciences, Peking University

Surface water, as the largest part of water resources, plays an important role on China's agricultural production and food security. Surface water supply contains more than 90% of the total water supply for irrigation in almost half of all provinces in China. Besides, surface water is vulnerable to climate change. For instance, climate change can at least explain 65% of the declining runoff in the Yellow River. Despite more and more scholars begin to study the impacts of climate change on surface water supply, empirical analysis on this aspect is still very limit. In terms of surface water supply reliability, there are few works that address status of it, especially with data from large scale village survey and associating it with climate change.

This paper aims to examine the status of the supply reliability of surface water irrigation, and discusses how it is affected by climate change in rural China. Specifically, this study focused on the following questions: how much reliable of surface water supply in rural area in China? Whether climate change influences reliability of surface water supply? If yes, how can we quantify this influence? The field data we used in this study was collected from a nine-province field survey during 2012 and 2013. The nine provinces contain six Northern provinces (Hebei, Henan, Shandong, Jiangsu, Anhui and Jilin) and three southern provinces (Jiangxi, Guangdong and Yunnan). Climate data are offered by China's National Meteorological Information Center which contains temperature and precipitation in the past 30 years. A Tobit model (or censored regression model) was used to estimate the influence of climate change on supply reliability of surface water irrigation.

Descriptive results showed that, surface water supply reliability was 74 percent in the past 3 years. Econometric results revealed that climate variables significantly influenced the supply reliability of surface water irrigation. Specifically, temperature is positively related with surface supply reliability; but precipitation negatively influences surface supply reliability. For instance, increasing temperature by 0.5° will reduce the supply reliability of surface water irrigation by 1.1% (reducing from 62.4% to 61.3%). If the temperature continues to increase, the supply reliability will be further reduced. In the future, if the temperature increases by 2°, the supply reliability will be reduced by 3.8% (reducing from 62.4% to 58.6%). When precipitation increases by 25%, the supply reliability can be increased by 10.7% (increasing from 62.4% to 73.1%). However, reducing precipitation by 25% will result in reduction of supply reliability by 14.7% (reducing from 62.4% to 47.7%). Besides, climate influence differs by seasons. In a word, this paper improves our understanding of the impact of climate change on agriculture irrigation and water supply reliability in the micro scale, and provides a scientific basis for relevant policy making.