

Understanding Beijing's water crisis: changes in water footprint of Beijing 1997-2007

Topic: Sustainable production and consumption 2

Author: Zhuoying Zhang

Co-Authors: Hong Yang, Minjun Shi

Beijing is facing increasing water shortage due to population increase and economy growth. This study conducts a quasi-dynamic input-output analysis to examine the determinants of changes in Beijing's water resource pressure and the effectiveness of Beijing's efforts in dealing with water shortage during 1997-2007.

This paper firstly provides an empirical analysis on the evolution of Beijing's water footprint based on Beijing's input-output tables of 1997, 2002 and 2007. The results reveal a significant increase in Beijing's water footprint from 4,342 million m³ in 1997 to 5,904 million m³ in 2007. The combined analysis of "virtual water" and "real water" shows that the gap between resource availability and water demand increases from 373 million m³ to 2,173 million m³, implying intensified water crisis in Beijing during the past decade.

To identify the factors contributing to the changes in water footprint, a structural decomposition analysis, which quantifies the relative importance of contributing effects by means of a set of comparative static variations in key parameters of input-output tables, is incorporated. The contributing effects are decomposed into technological effects, economic system efficiency effects, scale effects and structural effects. The results indicate technological effects and structural effects are the principal contributors to offset water footprint increase, which confirms the effectiveness of Beijing's water-saving efforts. However, they are not powerful enough to reverse Beijing's exacerbating water condition due to the notably expanded consumption scale and the water-inefficiency oriented economic system development. This paper suggests that virtual water import can be a possible solution to ameliorate Beijing's water pressure. Nevertheless, the degradation in economic system efficiency induced by the overdependence on external virtual water import requires an attention.

This study enriches the understanding of Beijing's water crisis and provides insights into solutions of water shortage in the future.