

## **A study on the restriction of water scarcity to the development of Beijing-Tianjin-Hebei urban agglomeration**

Topic: Environment-Extended IO Analysis at City Level

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The Beijing-Tianjin-Hebei region (the BTH region) is a densely populated, economically developed and industrial-intensive region in Northern China and it is of an important strategic position in National economic development. However, in the meantime, the BTH region is facing severe water scarcity which has been the foremost problem that constraints its development towards the world-class urban agglomeration. This study intends to provide a scientific assessment on the level of water scarcity in the cities of the BTH region and investigate its restriction to regional development through quantifying the economic loss caused by water scarcity.

Firstly, the scarcity of water for production of the 13 cities in the BTH region is evaluated by calculating shadow prices in the framework of input-output optimization. The water price is the marginal contribution of unit water resources to social and economic development in the optimized condition and it reflects the real value and the extent of water scarcity without administrative influences. The results show that the water scarcity reflected by shadow price has significant sectoral and regional heterogeneities in the BTH region. Southern Hebei is under the severest water scarcity and its water scarcity has been worsening during 2000-2016. Then the economic loss caused by water scarcity is obtained based on the comparison between the input-output optimizations with and without water constraint. The results indicate that cities in Hebei, especially in Southern Hebei, bear the highest economic loss due to water scarcity and thus the water scarcity in Southern Hebei should attach more attention. Besides, this study also points out that the water scarcity in the BTH region is underestimated by actual water price and the scarcity of agricultural water use in the BTH region is mostly underestimated. A rational pricing mechanism for agricultural water use properly reflecting water scarcity is recommended to be established to enhance water conservation in Hebei. The results of this study contribute to a deeper understanding on the restrictive impacts of water scarcity on regional development and can provide scientific references for relevant policymaking in the BTH region.