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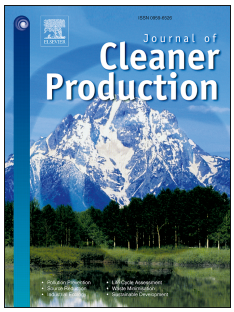

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Water footprint of Jing-Jin-Ji urban agglomeration in China

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Abstract

A rapidly expanding economy and increasing water demand for agricultural and industrial production is placing enormous stress on water quantity and the aquatic environment in Northern China, especially the so-called Jing-Jin-Ji (Beijing-Tianjin-Hebei) urban agglomeration, home to over 110 million people producing 10% of China's overall GDP. Several studies have focused on energy consumption, air pollution, CO_2 emissions and regional blue water footprint (WF) following release of the Jing-Jin-Ji Integration Strategy by the China government in 2013. However, a comprehensive assessment distinguishing blue, green and grey WF amongst different industrial sectors, ascertaining how WF transfers internally and beyond the region and final demand consumption is not available. We consider this to be crucial in understanding and addressing the deteriorating water situation in the Jing-Jin-Ji. In this study, we quantified the WF and virtual water flow on a sectoral basis for the year 2010 through coupling the multi-regional input-output model (MRIO) with WF assessment. The results showed that Beijing and Tianjin are net importers of green, blue and grey water from Hebei and other China provinces to support their needs. Conversely, Hebei exports all WF colors to Beijing, Tianjin and other provinces in China, and more than 60% of WF is transferred as virtual water. For the overall Jing-Jin-Ji region a small amount of blue water (2,086 million m^3) is exported, but huge amounts of green water (15,573 million m^3) and grey water (30,620 million m^3) are outsourced. A "Virtual Water Strategy" is one measure which could alleviate water stress at the regional scale, with consideration of financial compensation from water receiving regions made to water supplying regions in the context of achieving water management targets. We also found that physical water transfer to Jing-Jin-Ji could not balance virtual blue water exports, not to mention compensating for internal water