

## Real and virtual water transfers in a Coupled Human-Water System Dynamics

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In China, a large amount of water is transferred among regions to mitigate regional water scarcity. Water can be relocated through water transfer projects and virtually, embodied water for the production of traded products. Here, we explore whether such water redistributions can help mitigate water stress in China. In this talk, a full inventory is investigated for physical and virtual water transfers at a provincial level in China. Our results show that, at the national level, physical water flows because of the major water transfer projects amounted to 4.5% of national water supply, whereas virtual water flows accounted for 35% (varies between 11% and 65% at the provincial level). Furthermore, our analysis shows that these transfers help mitigate water scarcity in several water-receiving regions, but they exacerbate water stress for the water-exporting regions of China. Future water stress in the main water-exporting provinces is likely to increase further based on our analysis of the historical trajectory of the major governing socioeconomic and technical factors and the full implementation of policy initiatives relating to water use and economic development. Improving water use efficiency is key to mitigating water stress, but the efficiency gains will be largely offset by the water demand increase caused by continued economic development. We conclude that much greater attention needs to be paid to water demand management rather than the current focus on supply-oriented management. In a coupled human-water system, human should rely on not only built water infrastructure ("grey" infrastructure), but also ecosystem-based "green" infrastructure to mitigate water scarcity.

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