

A regional inventory of water demand and water pollutant discharge in the Yangtze River and China as a whole based on an inter-regional input-output analysis model

Topic: Water input-output analysis

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In this study, a regional inventory model that described water demand and water pollutant discharge while including the effects of hidden flows was developed based on inter-regional input-output analysis model. This model is based on regional model in the City of Chongqing (Okadera et al., 2006) , and then applied to Changjiang River and China, which is currently suffering from water shortages caused by rapid economic growth. This study has analyzed the structure of water demand and water discharge in Changjiang River and China with the some indexes (i.e. water consumption, virtual water or water footprints, and COD discharge). The results calculated using the model generated here, which were consistent with previously published data, indicated that China's economy depends heavily on the Changjiang Middle Area for water demand and water pollutant discharge. Furthermore, the calculated results demonstrate that water demand and pollutant discharge are impacted by hidden flows in the Changjiang Middle Area that occur as a result of export to foreign countries, North and South China and the Changjiang Lower Area. Taken together, the results of this study suggest that it is especially important to conserve water in the Changjiang Middle Area to ensure sustainable development throughout China. In addition, these findings indicate that it is necessary to scientifically verify current levels of water resource storage and promote the development of effluent treatment facilities and nitrogen and phosphorous circulation systems in the Changjiang Middle Area. Furthermore, the estimated impacts of extra-regional hidden flow in foreign countries that were identified in this study indicate that China must depart from an export-dependent economy to maintain sustainable growth. However, the model used here must be refined to more accurately define the extra-regional hidden flow that exists in other countries so that better estimates of the impact of trade on water use can be made. Moreover, given that there are many trade-offs involved in balancing economic growth with water resource shortages, food availability, energy availability and global warming, these findings indicate that it would be useful to develop an international/interregional model that enables integrated evaluation of water demand, water pollutant discharge, food and energy consumption and CO₂ emission. Finally, methodologies that enable the development of such a model are discussed herein.