The structure of global virtual water trade network

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International trade has caused global "virtual" transfers of water resources embodied in products and services, which can be treated as a virtual water trade network. This study aims to uncover structural characteristics of this network to provide policy suggestions on global water conservation. We integrate complex network analysis and input-output analysis to identify "hot spot" industries within the global virtual water trade network. In particular, primary suppliers are major industries directly withdrawing water resources. Primary demanders are major industries both directly and indirectly inducing water usage throughout global supply chains. Primary centers are major industries acting as transfer hubs of embodied water resources. We use the concepts of demand-driven and supply-constrained strongest paths (SPs) to identify those hot spots based on the direct requirement matrix and direct supply matrix of a hybrid water-multi-regional input-output (HW-MRIO) model. The HW-MRIO model is constructed based on the Eora MRIO model and its water satellite account. Industries with direct water withdrawals are expressed in cubic meters of virtual water in the HW-MRIO model, while the other industries without direct water withdrawals are expressed in US dollars to maintain the completion of global supply chains. Important nodes and links in this network are identified to represent industries and inter-industry trade flows that are critical and relevant to decision making on global water conservation.