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Consumption-based accounting of global grey water footprint

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Grey water footprint (GWF) was defined as the volume of freshwater that is required to assimilate the load of pollutants based on existing ambient water quality standard.The GWF turns the impact of pollution on water into a homogeneous unit: freshwater volume, making environmental impacts produced by pollutants discharged into waterbodies with different natural conditions can be compared.Global grey water footprint assessments have mainly be carried on using a bottom-up method to study the grey water used in the production process of different commodities.We for the first time account for the global grey water footprint with a consumption-based perspective. A global input-output model named the World Input-Output Database (WIOD) was used to study both internal and external grey water footprint covering 39 countries and 35 sectors. The results showed that the global GWF was 1507.9 km3 in 2009. China topped the list with 440.0 km3 of grey water footprint, accounting for nearly 30% of the global total freshwater to assimilate the pollutants generated to meet the consumption of its own population. The USA ranked the second with less than half of China's grey water footprint, at 214.8 km3. China was the largest net grey water exporter, while Japan, the USA, Germany, the UK, and South Korea were top 5 net grey water importer. The consumption-based accounting of GWF provides a solution towards water pollution control based on consumer responsibility.