



Assessment of global grey water footprint of major food crops

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Agricultural production is one of the major sources of water pollution in the world. This is closely related to the excess application of fertilizers. Leaching of N and P to water bodies has caused serious degradation of water quality in many places. With the persistent increase in the demand for agricultural products, agricultural intensification evident during the past decades will continue in the future. This will lead to further increase in fertilizer application and consequently water pollution.

Grey water footprint is a measure of the intensity of water pollution caused by water use for human activities. It is defined as the volume of water that is required to assimilate a load of pollutants to a freshwater body, based on natural background concentrations and water quality standards. This study conducts a global assessment of grey water footprint for major cereal crops, wheat, maize and rice. A crop model, Python-based EPIC (PEPIT), is applied to quantify the leaching of N and P from the fertilizer application in the three crops on a global scale with 0.5 degree spatial resolution. The hotspots of leaching are identified. The results suggest that, based on the definition and method of grey water footprint proposed by the World Water Footprint Network, the grey water footprint in many parts of the world has exceeded their total water resources availability. This indicates the seriousness of water pollution caused by agricultural production. However, the situation may also call for the development of a realistic measurement of grey water footprint which is more pertinent to water resources management. This paper proposes some alternatives in measuring grey water footprint and also discusses incorporation of grey water footprint assessment into water policy formulation and river basins plan development.