Quantifying Non-Renewable Groundwater Return-Flow and Re-Use in Global Irrigation

Objective

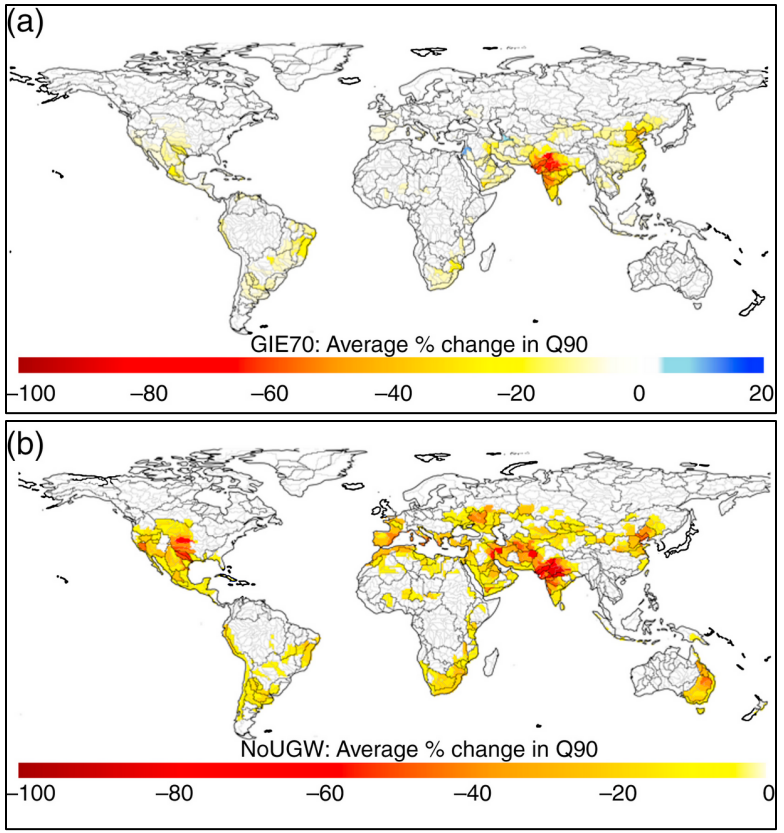
Quantify importance of irrigation return flow to downstream water supply.

Approach

Global hydrological model tracks flow and re-use of non-renewable groundwater pumped for irrigation but 'lost' to percolation and run-off. Assess impact of less irrigation return flow by increasing irrigation efficiency (less water loss), and by using less non-renewable groundwater.

Impact

- Inefficient use of irrigation water leads to large amounts of groundwater entering the surface water supply via agricultural runoff, where it can be re-used for irrigation downstream.
- Reducing irrigation return flow leads to reduced water supply downstream in major irrigated-agriculture river basins around the world.
- Higher efficiency cannot eliminate the need for non-renewable sources for global irrigation water.



Percent change in annual river low flows (lowest 10%) with (a) increased irrigation efficiency, and (b) no non-renewable groundwater use. Both decrease river low-flow values significantly in many major river basins, due to reduced return flow from groundwater irrigation water into the surface water system.

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