

# Groundwater footprint highlights challenging global water situation

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(Phys.org) -- Farmers are unsustainably exploiting groundwater in a number of important agricultural regions, according to a team of researchers led by Prof. Tom Gleeson of McGill's Department of Civil Engineering, in collaboration with researchers from Utrecht University in the Netherlands. Indeed, widespread groundwater depletion has recently been reported in aquifers (the underground sand, gravel or rock formations that hold groundwater) around the world. In a recent article published in *Nature*, the researchers estimate that approximately 1.7 billion people, most of whom reside in Asia, live in areas where groundwater resources and/or groundwater-dependent ecosystems are under threat.

By combining data of [groundwater](#) usage gathered from each nation, with global hydrology models, the researchers have developed a new way of measuring water use relative to supply in aquifers around the world. They call it the groundwater footprint. And like the ecological footprint, which has become the common measure for calculating human demands on the biosphere relative to its ability to regenerate, the groundwater footprint is designed as a location-based measure of the sustainability, or lack thereof, of human groundwater use around the planet.

A single example is telling. It takes about 140 litres of water to grow the coffee beans that go into your morning cup of coffee, whether the beans are grown on an arid plateau in Ethiopia or in a Columbian rain forest. But the effect of this water use on the supply of available water will be very different. Until now, there has been no way of quantifying the impact of such agricultural groundwater use in any consistent, global way.

By using aquifers as the scale for analyzing water budgets - the inputs and outputs of water from regions - the researchers have created a map of the globe, showing regional differences in the groundwater footprints. They suggest that the

groundwater footprint will offer water scientists, managers and policy makers an intuitive tool to better visualize groundwater depletion, suggest where groundwater could be used sustainably to increase agricultural yields and better manage groundwater sustainably within countries.

**More information:** To view the paper: [www.nature.com/nature/journal/full/nature11295.html](http://www.nature.com/nature/journal/full/nature11295.html)

Provided by McGill University

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