

Model reveals best approach to get people to conserve water in different areas

August 22 2017, by Bob Yirka



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(Phys.org)—A team of researchers from several institutions in Australia has developed a model that sheds light on the social factors involved in getting users to cooperate on water conservation efforts. In their paper

published in the journal *Nature Human Behavior*, the group describes the factors they used to build their model and what it revealed.

Throughout history, humans have been pulling [water](#) from rivers, lakes and streams to drink and to grow crops. More recently, humans have found it possible to access underground sources and have tapped into those, as well. Historically, there has been enough water to suit needs, but most scientists agree that is about to change. Underground water reservoirs such as aquifers are being depleted, and will soon run dry if something does not change. In this new effort, the researchers looked at the [social factors](#) involved when people in areas where water is likely to become scarce are pressed to cooperate in water [conservation efforts](#).

To create their [model](#), the researchers chose three real-world locations that are believed to be at risk: the Murray–Darling Basin in Australia, the Punjab on the India/Pakistani border and California's Central Valley in the U.S. They analyzed historical and physical data from all three regions, along with information from sources describing measures previously taken to coax such water users to conserve water, such as the Sustainable Groundwater Management Act in California.

The group also added factors that account for social norms using cultural theory (grid–group or plural rationality)—all to answer three basic questions. The first involved revealing the relationship between those seeking to monitor [water usage](#) and their enforcement abilities, and the degree to which farmers and other water consumers complied. The second sought to better understand how [social norms](#) are involved in resource conservation efforts; the third was to find out which of the three regions under study was most likely to succeed in their efforts.

The model showed that punishing water abusers in cooperative cultures such as in the Punjab was reasonably effective, whereas in places like the U.S. and Australia, the best approach appeared to involve inserting

cooperative role models into a region who could persuade others to adopt conservation efforts.

More information: Juan Carlos Castilla-Rho et al. Social tipping points in global groundwater management, *Nature Human Behaviour* (2017). [DOI: 10.1038/s41562-017-0181-7](https://doi.org/10.1038/s41562-017-0181-7)

Abstract

Groundwater is critical to global food security, environmental flows, and millions of rural livelihoods in the face of climate change. Although a third of Earth's largest groundwater basins are being depleted by irrigated agriculture, little is known about the conditions that lead resource users to comply with conservation policies. Here we developed an agent-based model of irrigated agriculture rooted in principles of cooperation and collective action and grounded on the World Values Survey Wave 6 (n = 90,350). Simulations of three major aquifer systems facing unsustainable demands reveal tipping points where social norms towards groundwater conservation shift abruptly with small changes in cultural values and monitoring and enforcement provisions. These tipping points are amplified by group size and best invoked by engaging a minority of rule followers. Overall, we present a powerful tool for evaluating the contingency of regulatory compliance upon cultural, socioeconomic, institutional and physical conditions, and its susceptibility to change beyond thresholds. Managing these thresholds may help to avoid unsustainable groundwater development, reduce enforcement costs, better account for cultural diversity in transboundary aquifer management and increase community resilience to changes in regional climate. Although we focus on groundwater, our methods and findings apply broadly to other resource management issues.

Citation: Model reveals best approach to get people to conserve water in different areas (2017, August 22) retrieved 10 April 2024 from <https://phys.org/news/2017-08-reveals-approach-people-areas.html>

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