

Is freshwater supply more dependent on good governance than geography?

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A photograph of a tap locked off. (Pixabay CC0) Credit: Pixabay

Is freshwater supply more dependent on good governance than geography? Scientists have analysed 19 different characteristics critical to water supply management in 119 low per capita income countries and

found that vulnerability is pervasive and commonly arises from relatively weak institutional controls.

The study, conducted by researchers based at Washington State University (WSU), USA, and Stanford University, USA, sought to identify freshwater supply vulnerabilities using four broad categories; endowment (availability of source water), demand, infrastructure and institutions (e.g. government regulations).

The results are published today, Oct. 23, 2015, in the journal *Environmental Research Letters*.

"We've spent years developing this framework that addresses water [vulnerability](#) beyond just endowment and demand" explains Julie Padowski, the lead author, now at WSU. "Our team's expertise spanned hydrology, law, chemistry and economics, and this gave us a very interdisciplinary view of water supply issues."

The researchers used publicly available data to create unique vulnerability 'fingerprints' for 119 lower per capita income countries (less than \$10,725 per person GDP) based on 19 different endogenous and exogenous characteristics affecting water supply vulnerability.

Their results showed that institutional vulnerability is common—occurring in 44 of the countries—and that 23 countries showed vulnerabilities in all four categories. Surprisingly, many geographically disparate nations have similar water supply vulnerability 'fingerprints', suggesting that sharing experiences could be useful for shaping actual water supply management strategies within and across nations.

"The common occurrence of institutional vulnerability in our sampled nations is really interesting" continues Padowski. "It's something that

hasn't been well-quantified at this scale—and adds weight to the argument that it's not just how much water we have, it's how we manage it that's really important."

The study reports that Jordan is the most vulnerable of these countries, identifying 5 of the 19 characteristics measured as being 'critically' vulnerable. The findings also show that Turkmenistan is also highly vulnerable, which came as a surprise to the researchers.

"Turkmenistan is a country that has historically shown few, if any, reasons for concern in other country-level water vulnerability indices. Only by including this broader array of characteristics do we see that this nation not only has institutional vulnerability, but must deal with added (exogenous) vulnerability derived from their dependency, both in terms of quality and quantity, on water originating outside their borders", added Padowski.

"While this paper offers insights into water supply vulnerability in poorer nations, the study does only focus on the most critical aspects of water supply management", concludes Padowski.

"In reality, our assessment isn't a perfect representation of each system because we're only able to capture a portion of the many and varied human and natural characteristics that are important to freshwater supply. However, given the data available, we hope that our findings will help provide some valuable insights into the management-related causes of water vulnerability."

More information: 'Assessment of human-natural system characteristics influencing global freshwater supply vulnerability' *Environmental Research Letters* 10 104014 , Oct. 23, 2015, iopscience.iop.org/1748-9326/10/10/104014.

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