

QnAs with Peter H. Gleick

National Academy of Sciences member Peter Gleick is co-founder and president of the Pacific Institute for Studies in Development, Environment, and Security in Oakland, California, where he explores new ways of thinking about water issues. His creative insights have resulted in the biennial book series *The World's Water*, a MacArthur Fellowship award in 2003, multiple appearances as an expert witness before Congress and the courts, and the 2010 book *Bottled and Sold: The Story Behind Our Obsession with Bottled Water*. Peak water, the concept introduced in his PNAS Inaugural Article (1), became one of the *New York Times*' "Words of the Year" in 2010. The following year, Gleick and the Pacific Institute were awarded the 2011 US Water Prize. Recently, Gleick spoke with PNAS about peak water, the soft water path, and how climate change will affect our global water supply in predictable and unpredictable ways.

PNAS: Why did you become interested in water issues?

Gleick: My interest in water grew out of a broader interest in environmental issues. I grew up, perhaps ironically, in New York City, a place with not a lot of natural environment. However, Central Park is an incredible bird magnet during migration, and my father and I used to spend many hours wandering around this little piece of green in one of the largest urban concentrations in the world. I also grew up in the '60s, when the environmental movement was really beginning to take shape. That led to energy, and energy led me to water. In the end, water is connected to everything we care about: the environment, energy, human health, ecosystems, food production. It's a wonderful way to integrate a lot of global and critical issues.

PNAS: Most of us use water every day. How does such widespread use affect the average person's view of water issues?

Gleick: Precisely because we use it every day, I think deep down people care about water. It's a special resource. It differs, in people's minds, from oil or iron or rare earth minerals, which makes it easier to get the public involved in decisions about water. When we think about water just as something that comes out of our taps, we risk missing the bigger picture, which is the



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role that water plays in environmental health, human rights, and the global climate. So, part of the challenge around water is shifting the mindset from "this is a simple commodity" to "this is a global resource of global importance." A lot of the work I've done tries to change the way we think about water.

PNAS: Can you explain the concept of peak water?

Gleick: Peak water is an effort to redefine the way we think about limits to water use and availability. At the simplest level, water is a renewable resource. However, that doesn't mean there aren't limits to our ability to use water or limits to the environment's capacity to absorb insults to the hydrologic cycle.

PNAS: Have any resources hit or passed a peak?

Gleick: We argue that a number of renewable resources are at their peak, like the Colorado River, the Nile, and the Yellow River. There are a number of places where it seems we've clearly passed the point of peak ecological water, defined as the point when water use causes more harm than it provides benefit. The best example is the Aral Sea. During the Soviet era, all of the water was used to grow cotton, and the sea

started to dry up. Evaporation exceeded inflow, the water got saltier and saltier, and all 24 species of fish endemic to that area are now extinct.

PNAS: Where are our water conservation efforts best directed?

Gleick: I've spent a lot of time thinking about what I call the soft path for water, which is a more comprehensive way of thinking about water policy and management. The soft path doesn't mean no infrastructure; it means smarter and more effective infrastructure. It also means rethinking demand and efficiency. The good news is that there is potential for improving water efficiency in every sector of the economy. Anywhere we use water, we could do the things we want by using less water. In doing so, we save water, we save energy, we save money, and we save the environment. There's evidence we are already moving toward a soft path; we are improving water efficiency, and we are changing the structure of our economy to do more with less water. This is the consequence of enormous effort on the part of water managers, individuals, appliance manufacturers, and companies to reduce water pollution and reduce demand for water. Those savings are the result of big things, like the Clean Water Act, and little things, like smarter toilets and washing machines.

PNAS: Which areas of the United States do you predict will be most water-stressed in this century?

Gleick: The Western United States has always been water-short compared with the Eastern United States. However, even places we used to think of as relatively water-rich can no longer assume that they will have an unlimited supply of freshwater. For example, in the last few years, we've seen growing disputes over water between the states of Alabama, Georgia, and Florida. We now worry about water in places we didn't before. That's an indication that peak water limits, population growth, and economic development are all beginning to run together. There's no doubt in my mind that climate change is going to make these problems more complicated. We can no longer assume that the future is going to look like the past.

Phil Downey, *Freelance Science Writer*

1. Gleick PH, Palaniappan M (2010) Peak water limits to freshwater withdrawal and use. *Proc Natl Acad Sci USA* 107:11155–11162.