

# Moving to a sustainable future for water

By Peter H. Gleick



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**Water is the driving force of all nature; a more sustainable future can only be achieved by concerted actions on water starting now.**

**T**he history of humanity is written in water. Freshwater resources have played a central role from the very evolution of *Homo sapiens* to the current local and global environmental challenges facing society. We now stand at a crossroads, facing two very different possible futures. One path leads to the familiar, dystopian visions of the future of societal collapse, ecological disaster, and a new dark age of poverty, misery, and despair. The other leads to a sustainable future, where the planet's ecological health is restored and protected, human population and economic growth stabilize, and demands for natural resources are brought into balance with resource availability. Neither future is inevitable, and the path we take depends on decisions and choices made today.

Modern humans evolved hundreds of thousands of years ago into a species capable of thriving in diverse water and climate conditions. When these conditions allowed, our early ancestors spread across the globe from their ancestral home in Africa. The first great empires of ancient Mesopotamia, China, and the Indus Valley were built along the major rivers of the world that permitted the earliest intentional agriculture capable of supporting growing populations. These cultures learned how to manipulate and control the hydrological cycle, built the first dams, aqueducts, and irrigation systems, and created the first water laws and institutions. They also fought the first wars over access to and control of water.

A clear transition in the relationship between humans and water occurred when populations started to outgrow their local water resources and when scientific and technological advances radically increased our ability to manipulate the waters around us. Thus started the water age that we live in,

when scientists discovered water's physical and chemical properties, how Earth's hydrological and climatological cycles functioned, the nature of water-related diseases, and the importance of healthy ecosystems. We have also witnessed the invention and deployment of modern water delivery and treatment technologies, the success of the Green Revolution that together with massive irrigation provides food for growing populations, and even the launching of sophisticated instruments out into the solar system and beyond, often looking for water.

But our age has also been witness to growing unintended consequences of our water policies: the impoverishment of natural ecosystems by overuse or contamination of water; the failure to provide safe and affordable water and sanitation for all; the disproportionate impacts of water poverty and water-related diseases on poor and marginalized communities, especially girls and women; growing violence over access to and control of water; and now, the rapidly expanding threat of human-caused climate change with impacts on every aspect of modern life, including especially, water.

We're in a transition to a new age of water<sup>1</sup>. I believe this transition can lead to a positive, sustainable future for water because I see both a growing awareness of water problems as well as the testing and implementation of smart, effective solutions. The form of these solutions comprises what I have described as the 'soft path for water'<sup>2</sup> which requires rethinking how we deal with water supply and demand, an acknowledgement of the human right to water as well as its economic and ecological values, and improvements in water institutions that manage water, food, energy, and climate in an integrated manner. In particular, we must move away from the outmoded assumption that providing water supply requires taking more from ecosystems, rivers, lakes, and groundwater and instead look to sophisticated wastewater collection, treatment and reuse, stormwater capture, and the possibility for desalination of brackish and ocean waters. Singapore and

Israel today recycle and reuse more than 85% of their wastewater. California reuses around 20% and has plans to greatly expand reuse. Despite high economic and environmental barriers, desalination can produce water for high-valued uses in water-short regions.

Another key is to rethink the long-standing assumption that as populations and economies grow, demand for water must inexorably grow as well. It does not have to be that way. There is vast potential to improve water-use efficiency and do more of what we want with less water: water-using appliances and industries are far more efficient today than a few decades ago; farmers are growing more food with irrigation systems and crop choices that use much less water than traditional methods. Renewable energy systems use far less water than fossil-fuel plants. As a result of technological and behavioural changes, total water withdrawals in the United States decreased more than 20% between 1980 and 2015, despite continued increases in population and the economy<sup>3</sup>.

Finally, the soft path for water requires improving the resilience and design of water management in ways that meet both human and ecosystem needs. Successful strategies include guaranteeing a basic water requirement to all; providing minimum flows for the environment; improving wastewater treatment and water quality; and decommissioning and removing dangerous and damaging dams to restore rivers and fisheries. Smarter management of water systems can also reduce emissions of greenhouse gases by cutting the energy required to collect, move, treat, and use water.

I know that we can move to a more sustainable water future. If we fail to do so, it won't be because we couldn't. It will be because we didn't. The choice is ours.

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## Competing interests

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