



The Challenge of Sustainable Water

Water supplies around the world are already severely stressed. Population growth and global warming will only worsen those problems By JEFFREY D. SACHS

While oil shortages grab the headlines, water scarcity is creating at least as many headaches around the world. The most dramatic conditions are in Asia, where the world's two megacountries, China and India, are grappling with deepening and unsolved water challenges. China's great northern plain, home to more than 200 million people, is generally subhumid or arid and depends on unsustainable pumping of underground aquifers for irrigation. The Yellow River has been diverted to the point that it no longer flows to the sea. Meanwhile the water tables of Beijing and other large northern cities are falling dramatically as a result of pumping of groundwater.

Similarly, southern India is drought-prone, and southern states scramble after river flows that cross state boundaries. When the rains are poor, upstream states such as Karnataka turn off the water flow to downstream states such as Tamil Nadu, with brutal consequences for farmers and communities. In northern India, tens of millions of bore wells are depleting groundwater much faster than it can replenish, just as in China.

Such problems are, of course, not limited to developing countries. Scarce river flows are bitterly contested among U.S. western states and between the U.S. and Mexico. A considerable portion of U.S. agriculture in the Great Plains depends on the vast but depleting Ogallala aquifer.

Continued population and economic growth will put still greater pressures on freshwater supplies. At this point, further claims on rivers and aquifers are often a zero-sum game: more water for one region means increased water scarcity and ecological destabilization elsewhere.

Climate change will raise the tension even further. Hundreds of millions of people in China, India and other parts of Asia depend on river flows fed by melting glaciers in the Himalayas. Those glaciers are receding and many will disappear this century, and the water supply will disappear along with the glacier itself. Hundreds of millions of other people depend at least partly on snowmelt. Yet climate change will alter the timing of those flows even if the levels of snowfall remain the same. With warmer temperatures, the melting snows will fill

the rivers earlier in the spring and will be unavailable for the long, dry summers.

Climate change will also alter the patterns of precipitation and evaporation in ways that are still poorly understood. Dry places are likely to get drier; rainfall is likely to arrive in fewer but more concentrated episodes; and extreme weather events such as tropical cyclones are likely to increase in intensity. My colleagues at the Earth Institute at Columbia University, for example, have used both theoretical reasoning and 1,000 years of tree-ring data to argue that global warming will likely intensify droughts in the American West. Some evidence,

still heavily debated, suggests that warming surface temperatures in the Indian Ocean may be leading to droughts in parts of East Africa.

Solutions will not be simple. Yes, better pricing of water will lead to much greater efficiency. Drip irrigation can reduce the water demand of crops. Desalination can vastly expand water supplies, though at high energy costs. Water storage systems can spare farmers the misery of crop failures. But these solutions presuppose vast expenditures of capital, and such solutions do not automatically address the needs of the poor, who are unable to pay for that capital. Moreover, such solutions are often not commensurate with the scale of the challenge because they can bring huge adverse ecological consequences.

Securing water for a growing world will require the best of science, ecology, economics, ethics and international cooperation. With regard to climate change, the Intergovernmental Panel on Climate Change has done remarkable work in mobilizing the search for scientific consensus and possible solutions. A parallel effort on the science, technology and policy for water could prove to be of similar global benefit. SA

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