


Turning UP
the WATER
PRES

An aerial photograph of a crowded Indian festival, likely the Pushkar Fair. A large, ornate red chariot is being pulled through a narrow street. In the background, a white temple with a tall spire is visible. The street is filled with people and other smaller chariots. The image has a slightly faded, artistic feel.

How Population Growth Is Straining the World's Most Vital Resource

BY RUSSELL STICKLOR

SURE



*India's water
outlook is cause for alarm
not just because of
population growth but also
because of climate change-induced
shifts in the region's water supply.*

FOR MANY AMERICANS, INDIA — HOME TO MORE THAN 1.1 BILLION PEOPLE — SEEMS LIKE A WORLD AWAY. Its staggering population growth in recent years might earn an occasional newspaper headline, but otherwise, the massive demographic shift taking place on our planet is out of sight, out of mind. Yet within 20 years, India is expected to eclipse China as the world's most populous nation; by mid-century, it may be home to 1.6 billion people.

So what?

In a world that is increasingly connected by the forces of cultural, economic, and environmental globalization, the future of the United States is intertwined with that of India. Much of this shared fate stems from global resource scarcity. New population-driven demands for food and energy production will increase pressure on the world's power-generating and agricultural capabilities. But for a crowded India, domestic scarcity of one key resource could destabilize the country in the decades to come: Clean, fresh water.

STEPPING INTO A WATER-STRESSED FUTURE

From Africa's Nile Basin and the deserts of the Middle East to the arid reaches of northern China, water resources are being burdened as never before in human history. There may be more or less the same amount of water held in the earth's atmosphere, oceans, surface waters, soils, and ice caps as there was 50 — or even 50 million — years ago, but demand on that finite supply is soaring.

Consider that since 1900, the world population has skyrocketed from 1 billion to the cusp of 7 billion today, with mid-range projections placing the global total at roughly 9.5 billion by mid-century. And it only took 12 years to add the last billion.

Unlike the United States — which is a water-abundant country by global standards — India is growing weaker with each passing year in its ability to withstand drought or other water-related climate shocks. India's water outlook is cause for alarm not just because of population growth but also because of climate change-induced shifts in the region's water supply. Depletion of groundwater stocks in the country's key agricultural breadbaskets has raised water worries even further. Water scarcity is not some abstract threat in India. As Ashok Jaitly, director of the water resources division at New Delhi's Energy and Resources Institute, told me this past spring, "We are already in a crisis."

How the country manages its water scarcity challenges over the coming decades will have repercussions on food prices, energy supplies, and security the world over — impacts that will be felt here in the United States. And India is not the only country wrestling with the intertwined challenges of population growth and water scarcity.

TRANSBOUNDARY TENSIONS

Several of the world's most strategically important aquifers and river systems cross one or more major international boundaries. Disputes over dwindling surface- and groundwater supplies have remained local and have rarely boiled over into physical conflict thus far. But given the challenges faced by countries like India, small-scale water disputes may move beyond national borders before the end of this century. Looming global water shortages, warns a recent World Economic Forum report, will "tear into various parts of the global economic system" and "start to emerge as a headline geopolitical issue" in the coming decades.

This has become a national security issue for the United States. Any country that cannot meet population-linked water demands runs the risk of becoming a failed state and potentially providing fertile ground for international terrorist networks. For that reason, the United States is keeping close track of how water



relations evolve in countries like Yemen, Syria, Somalia, Pakistan, and Afghanistan. It is also one of the reasons water security is a key goal of U.S. development initiatives overseas. For instance, between 2007 and 2008, the U.S. Agency for International Development (USAID) invested nearly \$500 million across more than 70 countries to boost water efficiency, improve water treatment, and promote more sustainable water management.

MORE MOUTHS TO FEED, LIMITED LAND TO FARM

Water is a critical component of industrial processes the world over — from manufacturing and mining to generating energy — and shapes the everyday lives of the people who rely on it for drinking, cooking, and cleaning. But the aspect of modern society most affected by decreasing water availability is food production. According to the United Nations, agriculture accounts for roughly 70 percent of total worldwide water usage.

Global population growth translates into tens of millions of new mouths to feed with each passing year, straining the world's ability to meet basic food needs. Given the finite amount of land on which crops can be productively and reliably grown and the constant pressure on farms to meet the needs of a growing population, the 20th and early 21st centuries have been marked by periodic regional food crises that were often induced by drought, poor stewardship of soil resources, or a combination of the two. As



*Demand
for increased
agricultural
productivity is already
burdening water resources
here in the United States.*

demographic change continues to rapidly unfold throughout much of Asia and sub-Saharan Africa, the ability of farmers and agribusinesses to keep pace with surging food demands will be continually challenged. Food shortages could very well emerge as a staple of 21st century life, particularly in the developing world.

Mirroring the growing burden on farmland will be a growing demand for water resources for agricultural use — and the outlook is not promising. According to a report from the International Water Management Institute in Sri Lanka, “Current estimates indicate that we will not have enough water to feed ourselves in 25 years’ time.”

As one of the world's largest agricultural producers, the United States will be affected by this food crisis in multiple ways. Decreased food security abroad will increase demand for food products originating from American breadbaskets in California and the Midwest, possibly resulting in more intensive (and less sustainable) use of U.S. farmland. It may also drive up prices at the grocery store. Booming populations in east and south Asia could affect patterns of global food production, particularly if severe droughts spark downturns in food production in key Chinese or



Indian agricultural centers. Such an outcome would push those countries to import huge quantities of grain and other food staples to avert widespread hunger — a move that would drive up food prices on the global market, possibly with little advance warning. Running out of arable land in the developing world could produce a similar outcome, says Upmanu Lall, director of the Columbia Water Center at Columbia University.

DRAINING THE AQUIFERS

Demand for increased agricultural productivity is already burdening water resources here in the United States, especially below the ground. The High Plains Aquifer (also known as the Ogallala Aquifer) is one of the largest groundwater reservoirs on the planet. It helps water crops on roughly 20 percent of America's irrigated





land and stretches some 800 miles from South Dakota and Wyoming to New Mexico and Texas. Once considered inexhaustible, the aquifer's waters are showing increasing signs of strain in both quantity and quality.

Roughly 12 billion cubic meters of water are withdrawn from the Ogallala each year, far exceeding natural rates of groundwater recharge in some agriculture-intensive states that sit atop the aquifer. "We certainly aren't coming to the bottom of the well, so to speak," says Mark Burbach, an environmental scientist at the University of Nebraska. "But the level of groundwater declines in many parts of Nebraska is indisputable — and could even be viewed as alarming."

CHANGING TASTES OF THE DEVELOPING WORLD

Economic modernization and population growth in the developing world could affect global food production in other ways. In many developing countries, rising living standards are prompting changes in dietary preferences: More people are moving from traditional rice- and wheat-based diets to diets heavier in meat. Accommodating this shift at the global level results in greater demand on "virtual water" — the amount of water required to bring an agricultural or livestock product to market. According to World Water Council, 264 gallons of water are needed to produce 2.2 pounds of wheat (370 gallons for 2.2 pounds rice), while producing an equivalent amount of beef requires a whopping 3,434 gallons of water.

In that way, the growing appeal of Western-style, meat-intensive diets for the developing world's emerging middle classes may further strain global water resources. At the end of the day, it simply takes far more water to produce the food an average Westerner eats than it does to produce the traditional food staples of much of Africa or Asia, says Frédéric Lasserre, a professor at Quebec's Laval University who specializes in water issues.

THE LURE OF DESALINATION

As concerns over water resources have grown around the globe, so too have proposed solutions, which range from common sense to absurd. Towing icebergs into the Persian Gulf or floating giant bags of fresh water across oceans to water-scarce countries are among the non-starters. But more moderate versions of those ideas are already being put into practice. These solutions showcase the power of human ingenuity — and reveal just how desperate some nations have become to secure water. For example, India is doing business with a company out of tiny Sitka, Alaska, laying the framework for a water-export deal that could see huge volumes of water shipped via supertankers from the water-rich state of Alaska to a depot south of Mumbai. Depending on the success of this arrangement, moving bulk water via ship could theoretically become as commonplace as trans-oceanic oil shipments are today.

There is far greater potential, however, in harnessing the water supply of the world's oceans. Perhaps more than any other technological breakthrough, desalination offers the best chance to ease our population-driven water crunch because it can bolster supply. Although current desalination technology is not perfect, admits Eric Hoke, an associate professor of environmental engineering at the University of California-Los Angeles, it is already capable of converting practically any water source into water that is acceptable for use in households, agriculture, or industrial production.



*Desalination
technology
may not be able to
produce water in
sufficient scale — or cheaply
enough — to accommodate
the growing need for
agricultural water.*



Distances between supply and demand would be relatively short, considering that 40 percent of the world's population — some 2.7 billion people — live within 60 miles of a coastline.

Although desalination plants are already up and running from Florida to Australia, the jury is still out on the role desalination can play in mitigating the world's fresh water crisis. Concerns persist over the environmental impact seawater-intake pipes have on marine life and delicate coastal ecosystems. Another question is cost: Desalination plants consume enormous amounts of electricity, which makes them prohibitively expensive in most parts of the world. Desalination technology may not be able to produce water in sufficient scale — or cheaply enough — to accommodate the growing need for agricultural water. “Desalination is more and more effective [in producing] large quantities of water,” notes Laval University's Lasserre. “But

the capital needed is huge, and the water cost, now about 75 cents per cubic meter, is far too expensive for agriculture.” Although desalination might be “a good solution for cities and industries that can afford such water,” Lasserre predicts it “will never be a solution for agricultural uses.”

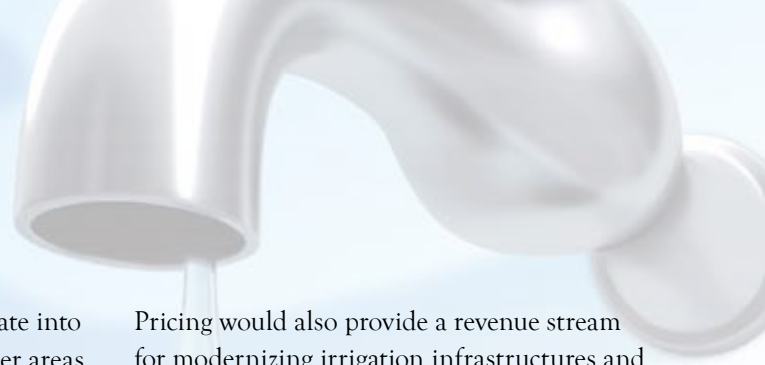
Nevertheless, desalination's promise of easing future water crunches in populous coastal regions gives the technology game-changing potential at the global level. “Desalination technology,” says Columbia University's Lall, “will improve to the point that [water scarcity] will not be an issue for coastal areas.”

A GLASS HALF FULL

With the world population projected to grow by at least 2 billion during the next 40 years, water will likely remain a chief source of global anxiety deep into the 21st century. Because water plays such a fundamental role in everyday life across every society on earth, its shared stewardship may become an absolute necessity.

Take India and Pakistan's landmark Indus Waters Treaty of 1960, which is still in effect today. The agreement — signed by two countries that otherwise can't stand each other — shows that when crafted appropriately and with enough patience, international water-sharing pacts can





help defuse tensions over water access before those tensions escalate into violence. Similar collaboration on managing shared waters in other areas of the world — a process that can be a bit bumpy at times — has proven successful to date.

Meanwhile, more widespread distribution of reliable family planning tools and services across Latin America, sub-Saharan Africa, and Asia will also be needed if the international community hopes to meaningfully address water scarcity concerns. Better access to healthcare and family planning tools would empower women to take greater control over their reproductive health and potentially elevate living standards in crowded parts of the developing world. Smaller family sizes would help decelerate population growth over time, easing the burden on water and soil resources in many areas. The key is ensuring such efforts have adequate funding. The United States recently pledged \$63 billion over the next six years through its Global Health Initiative to help partner countries improve health outcomes through strengthened health systems, with a particular focus on improving the health of women and children.

Putting a dent in the global population growth rate will be important, but it must be accompanied by a sustained push for conservation — nowhere more so than in agriculture. Investing in the repair of a leaky irrigation infrastructure could help save water that might otherwise literally slip through the cracks. Attention to maintaining healthy soil quality — by practicing regular crop rotation, for example — could also help boost the efficiency of irrigation water.

The most enduring changes to current water-use practices may have to come in the form of pricing. In most parts of the world, including parts of the United States, groundwater removal is conducted with virtually zero oversight, allowing farmers to withdraw water as if sitting atop a bottomless resource. But as groundwater tables approach exhaustion, the equation changes; as Ben Franklin famously pointed out, “when the well’s dry, we know the worth of water.”

The key, then, is to establish the worth of water before this comes to pass. Smart pricing could encourage conservation by making it less economical to grow water-intensive crops, particularly those ill-suited to a particular climate. “Some crops being grown should not be grown . . . once the true cost of water is factored in,” says Nirvikar Singh, a University of California-Santa Cruz economics professor who focuses on water issues.

Pricing would also provide a revenue stream for modernizing irrigation infrastructures and maintaining sewage systems and water-treatment centers, further bolstering water efficiency and quality both in the United States and around the globe.

To be sure, implementing a pricing scheme for water resources — which have been essentially free throughout history — will be unpopular in many parts of the world. It’s natural to expect some pushback from the public as water managers and governments take steps to address the 21st century water crunch. But given the resource’s undeniable and universal value on an ever-more crowded planet, few options exist aside from using the power of the purse to push for more efficient water use.

In the end, however, water pricing must be combined with greater public value on water conservation — we must not flush water down our drains before using it to its full potential. Whether that involves improving the water-transportation infrastructure, recycling wastewater, taking shorter showers, or turning to less water-intensive plants and crops, steps big and small need to be taken to better conserve and more equitably divide the world’s water to irrigate our farms, grow our economies, and sustain future generations.

Because water plays such a fundamental role in everyday life across every society on earth, its shared stewardship may become an absolute necessity.

— Russell Sticklor works with the Woodrow Wilson Center’s Environmental Change and Security Program in Washington, D.C., and is pursuing a master’s degree in international affairs at George Washington University.