Sustainable Earth: Water

**Rio+20 highlights the global effort needed to safeguard one of the world's most important resources.**

BY BRIAN HANDWERK, FOR NATIONAL GEOGRAPHIC NEWS

CLEAN WATER IS essential for life, but most people in the developed world don't think much about the water they use for drinking, food preparation, and sanitation. In developing nations, however, the search for safe drinking water can be a daily crisis. Millions of people die each year, most of them children, from largely preventable diseases caused by a lack of access to clean water and proper sanitation.

[Sandra Postel](http://environment.nationalgeographic.com/environment/freshwater/freshwater-hero-sandra-postel/), director of the Global Water Policy Project and the National Geographic Society's [freshwater](http://environment.nationalgeographic.com/environment/freshwater/about-freshwater-initiative) fellow, said freshwater scarcity presents a growing problem to be addressed during the [United Nations Conference on Sustainable Development](https://sustainabledevelopment.un.org/rio20) (Rio+20) in Brazil from June 20 to 22. "It manifests itself in the depletion of groundwater, and the drying up of rivers and lakes upon which people depend for irrigation to grow their food," she said. "The intersection of water scarcity, food security, and a changing climate on top of it all raises a suite of water concerns that urgently need to be addressed."

Much progress is possible. In fact, due to the dedicated efforts of governments and NGOs since the 1992 Earth Summit, safe drinking water has been made available to some 1.7 billion people around the world, with projects ranging from modern piped plumbing to rainwater collection and storage.

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But an estimated 880 million people still don't have regular access to [clean water](http://environment.nationalgeographic.com/environment/freshwater/freshwater-crisis). "And we haven't made nearly as much progress on sanitation," Postel said. "Something like 2.7 billion people are without adequate sanitation, so that challenge still looms very large." Policymakers will struggle to lower both numbers even as the planet's population rises by an expected three billion over the next 50 to 75 years.

About 5,000 children die each day due to preventable diarrheal diseases such as cholera and dysentery, which spread when people use contaminated water for drinking or cooking. A lack of water for personal hygiene leads to the spread of totally preventable ailments like trachoma, which has blinded some six million people.

Water woes also trap many low-income families in a cycle of poverty and poor education—and the poorest suffer most from lack of access to water. People who spend much of their time in ill health, caring for sick children, or laboriously collecting water at distances averaging 3.75 miles (6 kilometers) a day are denied educational and economic opportunities to better their lives.

Competition can be fierce for this precious commodity. Agriculture claims the lion's share of freshwater worldwide, soaking up some 70 percent, and industrial uses consume another 22 percent. Watersheds and aquifers don't respect political borders and nations don't always work together to share common resources—so water can be a frequent source of international conflict as well.

Day-by-day demand keeps growing, further draining water sources, from great rivers to underground aquifers. "We're going deeper into debt on our groundwater use," Postel said, "and that has very significant impacts for global water security. The rate of groundwater depletion has doubled since 1960."

Some of Earth's groundwater is fossil water, created when Earth's climate was far different. Today such water is as finite as petroleum. Other aquifers are renewable. "But we're pumping many of them out faster than precipitation is recharging them," Postel explained. "This is the case underneath the breadbasket of India, underneath the wheat and cornfields on the plains of north China, under California's Central Valley. We need to bring withdrawals into balance with recharge."

Humanity's growing thirst also poses a major problem for aquatic ecosystems. "When we take water from rivers, floodplains, and watersheds, those ecosystems bear the brunt of water scarcity and begin to be degraded or disappear," she said. "And that also creates a cost to us, not just to nature, because we also depend upon those ecosystems."

**The Path to Solutions**

The silver lining, Postel noted, is that many opportunities exist to use the water we do have more productively. Change begins with more efficient management of water resources.

"Seventy percent of all the water we use globally is for agriculture, so that's where we first have to become a lot more efficient through methods like drip irrigation and growing crops that are more suitable to the local climate," Postel said. "We still have too few incentives for farmers to use water more efficiently. Farmers are good businesspeople; they respond to incentives that affect their bottom line."

The United National General Assembly has recognized "the right to safe and clean drinking water and sanitation as a human right that is essential for the full enjoyment of life and all human rights." Making that right become a universal reality, and providing each person on the planet with affordable access to the 20 to 50 liters of daily water required to sustain life, is a clear goal for the decades ahead.

Sustainable Agriculture

**Sustainable agriculture helps the environment, but there are concerns about its efficiency.**

Sustainable agriculture takes many forms, but at its core is a rejection of the industrial approach to [food](http://environment.nationalgeographic.com/environment/sustainable-earth/food) production developed during the 20th century.

This system, with its reliance on monoculture, mechanization, chemical pesticides and fertilizers, biotechnology, and government subsidies, has made food abundant and affordable. However, the ecological and social price have been steep: erosion, depleted and contaminated soil and [water](http://environment.nationalgeographic.com/environment/sustainable-earth/water) resources, loss of biodiversity, deforestation, labor abuses, and the decline of the family farm.

Ecologically Beneficial

The concept of sustainable agriculture embraces a wide range of techniques, including organic, free-range, low-input, holistic, and biodynamic.

The common thread among these methods is an embrace of farming practices that mimic natural ecological processes. Farmers minimize tilling and water use, encourage healthy soil by planting fields with different crops year after year and integrating croplands with livestock grazing, and avoid pesticide use by nurturing the presence of organisms that control crop-destroying pests.

Beyond growing food, the philosophy of sustainability also espouses broader principles that support the just treatment of farm workers and food pricing that provides the farmer with a livable income.

Overcoming Challenges

Critics of sustainable agriculture claim, among other things, that its methods result in lower crop yields and higher land use. They add that a wholesale commitment to its practices will mean inevitable food shortages for a world population expected to exceed 8 billion by the year 2030. With increased efficiency of sustainably farmed lands, [advocates hold](https://www.nal.usda.gov/afsic/sustainable-agriculture-definitions-and-terms#top) that sustainably farmed lands may be as productive as conventionally farmed ones.

**Sustainable Energy**

At Rio+20 the challenge is to power our planet without ruining it.

BY BRIAN HANDWERK, FOR NATIONAL GEOGRAPHIC NEWS

THE ENERGY POWERING our wired world is easily taken for granted. But about one in five people still lack access to affordable modern electricity for lighting or heating. Two times that number, about three billion people, still heat and cook with fuels like wood, dung, coal, or charcoal. These people suffer ill health, including some two million annual deaths, from bad air quality caused by burning such fuels in poorly ventilated buildings.

The lack of access to modern energy, particularly acute in parts of Asia and sub-Saharan Africa, is a serious hurdle to all types of [sustainable](http://environment.nationalgeographic.com/environment/sustainable-earth/water) development. "Energy is the currency of modern communications, education, sanitation, and health care," said [Sally Benson](http://pangea.stanford.edu/research/bensonlab/sallybenson/index.html), director of Stanford University's Global Climate and Energy Project and adviser to National Geographic's [Great Energy Challenge](http://environment.nationalgeographic.com/environment/energy/great-energy-challenge/). "So there is a short-term imperative to provide energy access to the developing world," she added, spotlighting a major challenge for the United Nations Conference on Sustainable Development (Rio+20) in Brazil from June 20 to 22.

In nations like China and India, people *are* rapidly gaining access to power—which presents another problem. "Demand is growing at a rapid pace as a result of the developing world growing richer and the growing middle class there," Benson explained. "That's a good thing in terms of human quality of life. But it also means that by perhaps 2050 we'll need double the energy that we use today." Benson stressed that meeting this enormous demand will require new ways of thinking about energy. "We need to create another energy system as big as the one we have today, which was developed over 150 years, and we have a very short time to do that. And the resources underpinning this enormous, complex system—fossil fuels—won't allow us to meet demand by simply doubling today's existing system. We need to bring on new energy resources," she said.

Part of the problem is that much of the world's reserve of cheap and easily accessible fossil fuels has already been burned. The means to bring more of these limited resources to market, including mining Canadian oil sands, sinking deep [ocean](http://environment.nationalgeographic.com/environment/sustainable-earth/oceans) wells, and hydraulically fracturing rock—"fracking"—to release natural gas, likely carry higher costs for both the environment and the economy. Meeting the world's enormous energy demands [sustainably](http://environment.nationalgeographic.com/environment/sustainable-earth/cities) will be one of this century's great challenges.

In the world of developed energy infrastructure, newly exploited natural gas deposits, which burn cleaner than other fossil fuels, can be part of the picture in the short to medium term, Benson said. Growth in renewable energy sources also has her even more excited for the future.

"There's been enormous progress in solar and wind," Benson explained. "These technologies are much cheaper and more reliable than they used to be. In certain circumstances they are cost-competitive today, when located in the right places."

Benson believes that the historic knock on renewables, their excessive cost, is becoming less of an issue. The remaining challenge, she said, is creating a renewable-heavy system that can deliver the kind of "always on" energy required in today's world. "I'm optimistic that we can achieve high penetration of renewables by load shifting (leveling out periods of peak and low demand), improving storage, and using natural gas to provide flexible power when needed," she said.

In the developing world, sustainable energy options may often be the best choice to enable the "energy poor" to quickly begin reaping the benefits of power. Mini solar panels can fuel computers, windmills may drive irrigation, and medical testing and treatment can come online even in villages far from established power centers.

"Much like the cell phone has enabled some countries to jump ahead in access to communication, rather than slowly building landline-based systems, generation at the point of use may allow people to leapfrog ahead in terms of energy accessibility," Benson said.

**Looking Ahead** Today's energy use is also impacting the world of the future. Industrialized countries produce some 60 percent of the world's greenhouse emissions, the major contributor to anthropogenic-driven climate change. This impact may be eased with a shift away from fossil fuels to less carbon-intensive sources of energy—and by simply using energy more wisely.

"There are huge opportunities throughout the developed world to reduce energy use by more efficient transportation, and more efficient heating and cooling," Benson said. "There is a lot we can and need to do in places like the U.S. and parts of Europe to significantly decrease the energy intensity of the economy while maintaining a high quality of life."

UN Secretary-General Ban Ki-moon is spearheading a [Sustainable Energy for All](http://www.sustainableenergyforall.org/) program aimed at creating sustainable progress for the critical energy issues of both the developing and developed world.

One goal is to ensure that all people have access to modern energy at affordable prices, breaking a cycle of poverty and sparking economic growth among the poorest of the poor. The initiative also strives to double the efficiency of energy use around the world, and double the contribution of renewable energy in the global energy mix by 2030—two vital keys to creating a sustainable future for our increasingly energy-hungry world.