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[Home](#) > How Access to Clean Water Prevents Conflict

How Access to Clean Water Prevents Conflict

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In Brief:

The number of people with improved access to safe drinking water is growing. According to UNICEF, since 1990, an additional 1.8 billion people are using an improved source of drinking water. Yet many people are living with water scarcity, particularly in Africa. The solutions highlighted here are just a few of the possible responses. Safe drinking water and sanitation in schools may serve as a way to keep girls in school, increasing their economic opportunities, and eventually, the health of their own children. Innovative ways to finance water entrepreneurs could open up an avenue for new investments and improve sustainability. Strengthening regional institutions, promoting scientific dialogue, and harnessing social capital can help to facilitate cooperation and reconciliation. Appropriate investments in water use, sanitation, and conservation are essential to reducing vulnerability among the poor, to ensuring sustainable development, and to promoting security in a period of climate change.

Key Concepts:

- One of every eight people alive today lacks access to an improved source of drinking water. About 2.5 billion people do not have access to basic sanitation. More children die from diarrhea caused by dirty water and lack of sanitation than malaria, measles, and HIV/AIDS combined.
- A study of the available water needed to grow enough food to meet the 2015 Millennium Development Goal to halve hunger suggests there is enough water in sub-Saharan Africa if on-farm water losses can be eliminated.
- Innovative financing schemes can provide access to private capital and complement the funds from government institutions, improving water quality and reducing the price.
- Social media technologies such as Facebook that harness social capital offer a mechanism for managing climate risk through integrating local communities in decision-making processes.
- International cooperation over water resources can play an important role in sustaining peace and can allow policymakers to depoliticize relations and to build trust and confidence.

For most of the two hundred thousand years or so of human existence, we used but a small fraction of the earth's freshwater resources. It has been only a few thousand years since humans first learned to exert any control over water by channeling it for irrigation and supply for cities. In a geological heartbeat, however, we have reached the point where we now use half of the world's freshwater for our own consumption, leaving minimal amounts for ecosystem functioning. Agriculture uses the most water—about 70 percent globally—with population growth, shifts to higher meat consumption, and the use of grain in biofuels driving increased demand.¹ It is fairly common in some areas to use 70 percent of annual flows and, in a few cases, to use as much as 120 percent or more by drawing on fossil groundwater. By extracting groundwater, reducing lakes and rivers beyond the rate of replenishment, and polluting the freshwater that we do have, we are quickly depleting our available supplies.

About a third of the world's current population lives in water-scarce conditions, and this situation is projected to get considerably worse. The United Nation's Food and Agriculture Organization predicts that, by 2025, 1.8 billion people will be living under conditions of absolute water scarcity, and two-thirds of the globe's people will be living under stressed

conditions, which means there will be less than 1,700 m³ of available water per person.² This translates into a lack of access to clean drinking water, which, in turn, causes diarrhea and a variety of other waterborne diseases. About 1.6 million people die from diarrhea every year, 90 percent of whom are children under the age of five, the most vulnerable. More children die from diarrhea than malaria, measles, and HIV/AIDS combined. Most of these children live in Asia and Africa.

In many of the maps on these topics, the same countries keep showing up as challenged in one way or another. David Grey and Claudia Sadoff hypothesize that this is no accident, but a function of “difficult hydrology”; the more difficult the hydrology, the greater the poverty and the lower the levels of water security.³ Difficulty, in this context, is defined by a high degree of rainfall variability and extreme weather along with “massive” water-related disease burdens.

They describe three types of hydrologic typologies: “countries that have harnessed hydrology, those hampered by hydrology, and those that are hostage to hydrology.” Least-developed nations are often in this latter category, which requires a comparatively higher degree of investment and management capacity. Without the infrastructure or capacity to deal with high degrees of climate variability, these countries are subject to catastrophic events that may cause significant and regular GDP setbacks of 10 percent or more, unreliable food supplies, disease caused by unsafe water, and undependable electricity supplies.

Though water assessments are generally rather bleak, the important question is whether or not countries can implement necessary efficiency improvements and invest in new sources of supply. Not surprisingly, water scarcity is tied to poverty and economic development. In particular, poor countries have limited ability to invest in water resources, leading to economic water scarcity. Although water assessments are generally bleak, there are a surprising number of relatively low-cost fixes that can dramatically improve access to clean water and safe sanitation.

Solution: Water, Sanitation, and Hygiene in Schools

There are about one million schools around the world, but less than half have access to clean drinking water and sanitation.⁴ Yet hand washing in schools can cut diarrhea by 30 percent. In China, a program to promote hand washing in primary schools saw a 54 percent drop in days absent. The consequences of the lack of available water are felt beyond health. When families don't have access to a nearby improved water source, then someone must go get it. In Bangladesh, when water was available within a 15-minute walk, school attendance increased by 15 percent, compared to areas where fetching water required a walk of an hour or more. Two-thirds of the water carriers are women, and another 18 percent are children, mostly girls. These activities directly affect girls' opportunity for an education, since in many areas they drop out of school when old enough to fetch water for the family. Economic growth can increase by an additional 0.3 percent for every 10 percent increase in female literacy.

While there is still a long way to go in providing water, sanitation, and hygiene—known as WASH—in all schools, more development agencies are paying attention. UNICEF, the lead UN agency installing water and sanitation in schools, reports that the number of countries implementing WASH in school programs almost doubled between 2002 and 2008, from 47 to 88 countries. Demonstration programs report some challenges, such as the need to continue monitoring schools to ensure best practice, but there are also encouraging signs that these programs can have a high payoff. Costs can range quite broadly, depending on local conditions. If a water supply is nearby, chemical treatment can sanitize it for a few pennies, while wells can cost from \$2,500 to \$20,000 or more but can serve thousands of people. In some villages in the Kisumu area of Kenya, pumps installed for schools have been made available to the rest of the community for a small fee. This fee raises enough money to cover operations and maintenance of the well, and also uniforms and books for AIDS orphans at the schools.

Solution: Innovative Financing for Safe Drinking Water

Funding for pumps in schools often comes from foreign donors, underscoring the fact that there is not nearly enough domestic funding, concessionary financing, or grants to improve water access in local communities. One solution is to create innovative financing schemes to access private capital and complement the funds from government institutions, improving quality and reducing the price. Some entrepreneurs like Naandi Community Water Services are already doing this to meet the needs of small communities in India, which faces grave water issues.⁵ The country has 4 percent of the world's water availability and 15 percent of the world's population. About 31 percent of India's 806 million people living in rural areas do not have access to a clean water source.⁶

Beginning with a single pilot project in 2005, Naandi has sought to provide clean water using small-scale water purification kiosks. Each kiosk serves about 3,000 people with initial financing of roughly \$15,000 per kiosk. Naandi now

has over 500 small-scale water purification kiosks operating, serving approximately 1.5 million people in five states.⁷

A crucial innovation took place last year, when Naandi spun off its water program to form a social venture firm called Naandi Community Water Services (NCWS), which builds safe drinking water kiosks in poor villages and sells the water to cover its costs and generate a small return. NCWS follows a hybrid model: it arranges the funding for the equipment through grants or public funds, and the water centers are the property of the village. Once installed, however, the water centers rely on user fees: To cover operational costs, NCWS charges between 60 and 120 rupees (U.S.\$1.3–2.6) per family per month, a nominal and affordable price for poor families.

Naandi Community Water Services has formed a joint venture with Danone Communities, the social innovation arm of Groupe Danone. NCWS aims to scale up its program to reduce overhead and reach more people at lower cost. By 2015 NSWC hopes to have as many as 2,200 plants operating, bringing safe drinking water to up to 6.6 million people across India. Another group doing similar work in India, Water Health International, is working with the same model in Ghana, Bangladesh, and the Philippines.

Solution: Crowdsourcing to Meet the Challenge of Climate Change

As important as these public-private partnerships are in providing access to clean water, they cannot tackle the scale of the water crisis likely to be brought on by climate change. Global warming has already led to climate-induced migration in increasingly arid regions like the Middle East.⁸ In tropical and subtropical regions, rainfall averages may increase, and be subject to great variability, leading to more days with extreme temperatures, more rain falling in bigger events, and longer periods between rainfall.⁹ The timing of these effects is particularly important because crop yield reductions can be severe if the weather is too hot or dry during flowering.

Africa is expected to be particularly hard hit. A study by Marcus King and Ralph Espach¹⁰ identified countries' exposure to climate change based on five criteria: drought, flood, storm, one-meter storm surge, agriculture, and water scarcity. Eleven of the 14 countries identified as "most vulnerable to political and/or humanitarian crises as a result of climate impacts" are in Africa, with nine in north or central Africa. Areas that are already marginal for production could become completely unsuitable and, because Africa already has extensive areas of water scarcity, countries there will have a very hard time coping. Studies suggest yield declines up to 50 percent¹¹ with net declines in total production across sub-Saharan Africa of perhaps 12 percent. Some scenarios foresee increases of 15 to 26 percent in the number of people who are malnourished,¹² from a current base of about 850 million people.

Historically, governments have employed supply-side strategies to deal with climate impacts on water availability. This has been the case throughout the Middle East and North Africa where highly centralized government ministries have augmented their diminishing water supplies through dam construction, tapping fossil groundwater, inter-basin water transfers, and desalination.¹³ However, countries could create alternatives for promoting climate adaptation by harnessing social capital and local knowledge and creating warning systems and action plans.

Each season, farmers make decisions about planting types and crop varieties. While farmers are often the first to notice changes in temperature and rainfall, studies from Ethiopia show they are, nonetheless, slow to undertake adaptation measures.¹⁴ In order for farmers to cope with climate-change impacts on the agricultural sector, they require access to better information about changing weather patterns, and information about farming techniques to better manage water.

Web-based social media technologies such as Facebook and Twitter can be used for crowdsourcing to harness social capital. They can offer a mechanism for managing climate risk through integrating local communities in decision-making processes and finding out what they need. This will help ensure that responses are appropriate. Communicating early warnings through these channels can help farmers plan for climate variability and hence reduce their vulnerability through the use of water saving options such as using organic soil amendments, diversifying and rotating crops, converting cropland to pasture, or switching from annual to perennial crops.¹⁵

They can also confirm information obtained from macro sources. During periods of drought, for instance, such technologies could be used to fill information gaps about water availability and quality. Some applications have been developed to track food prices and community stress levels. Already in the water services sector, organizations such as Next Drop have created platforms for people to use mobile phones to report breaks in service and to track problems in water delivery. Such crowdsourcing technologies are rapidly becoming widespread, even in remote areas, and empower individuals to play an active role in governing their access to water services. The next step is to extend them to the climate sector.

The Famine Early Warning Systems Network (FEWS NET), sponsored by USAID, is a network that supplies highly sophisticated and targeted early warning data on emerging food security problems in Africa, Central America, Afghanistan, and Haiti. FEWS NET is currently focused on policymakers. However, its use of short- and medium-term, agro-climatic monitoring and price tracking could be very useful to NGOs, extension services, and farmers, whose perspectives, in turn, would be valuable to ministries and development agencies. On-the-ground data from these sources, using crowdsourcing technologies on mobile phones, could strengthen and validate FEWS NET's information and bring critical information to a new audience.

Solution: Institutionalized Cooperation: The Jordan Basin

The spread of knowledge will have significant benefits. For example, a recent study suggested that sub-Saharan Africa could halve its hunger levels if water were used more efficiently on farms.¹⁶ The diffusion of ideas and information also points to the need for broader international cooperation to deal with water scarcity.

While water has rarely been a source of international conflict, it has nevertheless proven challenging for policymakers to cooperate on water issues in regions ravaged by conflict.¹⁷ Water is a key contributor to civil conflict, particularly in sub-Saharan Africa. Between 1980 and 2005, there were 21 civil conflicts, 16 of which involved water. In five, water was the sole contributor.¹⁸ A study by Solomon Hsiang and colleagues examined the connection between the El Niño/Southern Oscillation (ENSO) and conflicts between 1950 and 2004.¹⁹ They found that the likelihood of new civil conflict in the tropics doubles from 3 to 6 percent in El Niño years, when the climate is warmer and dryer, versus La Niña years. El Niño year conflicts account for 21 percent of all civil conflicts in this period, suggesting a causal relationship between drought and conflict.

Political obstacles to technical or scientific cooperation have often made obsolete the notion that water can serve as a driver of political cooperation. But creating formal mechanisms for scientific or technical cooperation in the aftermath of conflict can, however, play an important role in sustaining peace and allowing for policymakers to depoliticize relations and to build trust and confidence. Several mechanisms exist for deepening technical cooperation. First and foremost, where water is an underlying source of political tension, political leaders can include water within the final peace settlement. The 1994 Jordan-Israel Peace Treaty is one of only a small number of peace agreements that has included a section specifically devoted to water-related matters.²⁰ Specifically, Annex II of the treaty calls for both sides to engage in bilateral and regional cooperation to increase water supplies and to exchange relevant information on water resources.

Second, states can create joint water committees or commissions through separate water negotiations or as part of the peace agreement. The Jordan-Israel Peace Treaty designated a joint water committee comprised of three members from each country. Joint water committees or commissions help to institutionalize cooperation and build trust among the parties by requiring frequent, regular meetings and data collection, and by providing a venue for conflict resolution.²¹ Overall, during the 1990s, the number of water treaties establishing permanent basin commissions increased between 50 and 80 percent from the previous decade.²²

Third, frequent interaction among scientists and water managers can also deepen cooperation and sustain peace. Regular meetings build trust by providing opportunities for direct communication between commissioners in which hydrological and meteorological data are exchanged. In fact, the Jordan-Israel treaty formally institutionalized "unofficial" meetings that had been taking place between Israeli and Jordanian water managers during the 1970s and 1980s. The infamous "picnic table talks," where Israeli and Jordanian water managers would meet at the confluence of the Jordan and Yarmuk rivers to discuss water allocations and flow rates, had already begun to nurture an environment in which both sides came to understand the others' political and technological constraints.²⁰

The creation of the Joint Water Committee has served as another confidence-building measure and allowed for both sides to continue to cooperate over water even as political relations between Israel and Jordan began to deteriorate after 2000. Furthermore, owing to the trust that had accrued among the water experts even in the face of a serious drought throughout the last decade, the parties have continued to work together to find solutions to uphold the treaty.

Conclusion

Human security issues in areas vulnerable to water problems and climate change look set to grow, although there is some progress being made. The number of people with access to safe drinking water is growing. The rate of child mortality before age five is declining. Poverty rates in many places are lessening. Many people living with or threatened

by water scarcity, particularly in Africa, face economic water scarcity, which is more easily correctable than physical scarcity. There are a variety of tools and techniques available to enhance agricultural production, even in some of the most challenging areas. This suggests that while the situation is problematic, it is not hopeless—the right responses could make a major difference in the lives of many people. The solutions highlighted here are just a few of the possibilities that can give hope.

The traditional meaning of security in the United States and other developed countries has been safety from external threats. However, for many poor countries, security takes on a broader meaning that includes a secure livelihood, freedom from want and hunger, and safety from internal threats—in other words, human security. If the global community embraced human security in this broad sense, it could proactively address the most salient security challenges in a focused, sustained, and balanced manner before they have the opportunity to metastasize into threats to international security. This would reduce the potential need for humanitarian operations and commitment of military forces.

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