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Water Stress in Sub-Saharan Africa

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August 7, 2006

Introduction

Sub-Saharan Africa suffers from chronically overburdened water systems under increasing stress from fast-growing urban areas. Weak governments, corruption, mismanagement of resources, poor long-term investment, and a lack of environmental research and urban infrastructure only exacerbate the problem. In some cases, the disruption or contamination of water supply in urban infrastructures and rural area has incited domestic and cross-border violence. Experts say incorporating water improvements into economic development is necessary to end the severe problems caused by water stress and to improve public health and advance the economic stability of the region.

What is water stress?

Water stress refers to economic, social, or environmental problems caused by unmet water needs. Lack of supply is often caused by contamination, drought, or a disruption in distribution. In an extreme example, when Côte D'Ivoire split four years ago between the rebel-led north and government-ruled south, the conflict led to unpaid water bills, which precipitated a dangerous health threat in the region, increasing the risk of water-borne diseases such as cholera. Some analysts believe the disruption of distribution was a political ploy to put pressure on the rebel-led north.

While water stress occurs throughout the world, no region has been more afflicted than sub-Saharan Africa. The [crisis in Darfur](#) stems in part from disputes over water: The conflict that led to the crisis arose from tensions between nomadic farming groups who were competing for water and grazing land—both increasingly scarce due to the expanding Sahara Desert. As Giordano says, "Most water extracted for development—drinking water, livestock watering, irrigation—is at least in some sense 'transboundary'." Because water sources are often cross-border, conflict emerges.

Why is sub-Saharan Africa more vulnerable to water stress than other regions?

Insufficient infrastructure is a major reason. In a January 2006 UN research paper that assessed global progress on water quality, [P.B. Anand](#), an environmental economist at Britain's Bradford Centre for International Development, noted a significant regional disparity in sanitation infrastructure [between sub-Saharan Africa and other regions \(PDF\)](#).

Another disparity is evident within the sub-continent: Of the 980 large dams in sub-Saharan Africa, around 589 are in South Africa, whereas Tanzania, a country with nearly the same land mass and population, only has two large dams. [Jonathan Lautze](#) of Tufts University says, "If you look at all of Africa, disproportionate quantities of storage are destined for a few countries like South Africa and Egypt. Generalized regional or continental figures may fail to fully reflect how dire the situation really is in many countries and how much potential for development there is." The UN Environment Program (UNEP) compares water scarcity and quality today with a projection for the future: Currently, access to safe water in sub-Saharan Africa is worse than any other area on the continent, with only 22 percent to 34 percent of populations in at least eight sub-Saharan countries having [access to safe water](#). The UNEP projects that in the year 2025, as many as twenty-five African nations—roughly half the continent's countries—are expected to suffer from a greater combination of [increased water scarcity and water stress](#).

Where are water problems most acute?

South Africa, Namibia, Botswana, and northern sub-Saharan Africa, in particular the strip across the continent along and north of the Sahel region in West Africa, suffer the most, says [Mark Giordano](#) of the International Water Management Institute in Colombo, Sri Lanka. But Nigeria is also having trouble meeting the UN's Millennium Development Goals (ensure environmental sustainability, combat malaria, improve maternal health, reduce child mortality, eradicate extreme poverty and hunger, etc. by the year 2015) because numerous water projects in the country [have been abandoned](#); high levels of pollution are contaminating available surface water that is abundant but undrinkable. And despite substantial revenue from energy reserves, Ethiopia, Angola, and Niger also suffer from water stress.

Do national boundaries affect water stress?

Yes. When colonial boundaries were drawn, residents were separated from resources, especially water. As Lautze and Giordano discuss in this [2005 Natural Resources Journal article](#), with the manifestation of colonialism emerged the concept of the nation-state, and national boundaries were drawn as a byproduct of transboundary waters. For example, the Niger basin became transboundary in the colonial period because both the French and British empires shared the water resources, whereas the Senegal river basin was solely under French colonial rule until Guinea gained independence in 1958, which internationalized access to the Senegal river basin.

How do transnational water laws affect water stress?

Giordano believes that transboundary water laws contribute to a history of conflict and resolution in sub-Saharan Africa; "There are still agreements in place which emanated from earlier governments (colonial or minority rule)," he says, "which could be argued to exacerbate tensions between states." Giordano and Lautze agree that the Nile Basin (1929 and 1959) and South Africa/Lesotho (1986) have fostered conflict between states. The 1959 Nile Basin agreement preserved British colonial interests in Sudan after Egyptian independence in 1922 and declaration of the Egyptian Republic in 1953, but Egypt and Sudan are the only actors with power in the allocation of Nile resources. The agreement neglects the role of Ethiopia, Tanzania, Uganda, and Rwanda in the governance of transboundary Nile resources.

Successful transboundary water laws have historically been multilateral and focus on joint management and development of resources. Bilateral agreements—such as those in the Nile, Orange, and Inkomati river basins—have proved to be less effective solutions because they focus on water allocation and how to divide limited flows. Allocation is a process of economically dividing water supplies as opposed to developing and maintaining sustainable water resources for future use. Historically, multilateral agreements further development of sustainable water resources: Such laws govern the Lake Chad, Niger, Okavango, Senegal, and Volta basins and include most or all riparian states (of, on, or relating to the banks of a natural course of water) with the intention of promoting economic development through investment to reduce economic water scarcity.

Experts say that regardless of a country's water abundance or scarcity, development is the only means to ease future water stress. According to Lautze, it was easier for him to take a long shower (water flowed well all the time) in South Africa than Ethiopia, even though Ethiopia is one of the most water-abundant countries in Africa and South Africa is one of the water-poorest. "Differences in natural water endowments may not be the major issue," Lautze says. "This presence or absence of water development can be considered to affect water stress [rather] than natural constraints in sub-Saharan Africa."

What is the relationship between water stress and economic development?

Experts say improving water and sanitation programs is crucial to spurring growth and sustaining economic development. Because it takes time to develop these programs, a paradox emerges: Poor economies are unable to develop because of water stress, and economic instability prohibits the development of programs to abate water stress. A [2005 report \(PDF\)](#) commissioned by the governments of Norway and Sweden says that in Kenya, the 1999-2000 drought produced a 16 percent decline in gross domestic product (GDP). Developments in water storage could have prevented that drought from significantly affecting Kenya's economy. Hydropower can also spark economic development. According to Giordano, "Some [transboundary water agreements] also play a clear role in fostering development, for example, by facilitating investment in hydropower and irrigation."

What is the role of agriculture in water stress?

Agricultural development has the potential to improve African economies but requires extensive water supplies. These [statistics](#) from the Water Systems Analysis Group at the Institute for the Study of Earth, Oceans, and Space at the University of New Hampshire reveal the urgent need for sustainable agricultural development:

- ❖ About 64 percent of Africans rely on water that is limited and highly variable;
- ❖ Croplands inhabit the driest regions of Africa where some 40 percent of the irrigated land is unsustainable;
- ❖ Roughly 25 percent of Africa's population suffers from water stress;
- ❖ Nearly 13 percent of the population in Africa experiences drought-related stress once each generation.

Another aspect of water-related stress is the relationship between water, soil, and agriculture. [Pedro Sanchez](#) of the Earth Institute at Columbia University says 96 percent of agriculture in Africa is rain-fed, but soil nutrient depletion is a more pressing problem than drought in sub-Saharan Africa. Development of soil nutrients as opposed to only allocation of water resources to supply agricultural production is the most effective means to relieve agricultural water stress in the long-term, Sanchez says.

What is the impact of water stress on public health?

Experts say that regions that suffer from water stress serve as catalysts for the spread of disease. In a global study conducted by the United Nations, unsafe water is responsible for around 80 percent of diseases and 30 percent of deaths in developing countries throughout the world. In Africa, which accounts for 90 percent of global cases of malaria, water stress plays an indirect role in curing malaria because it impedes the human recovery process. The New York Times recently reported that Angola, despite heavy foreign investment in its oil sector, is enduring a cholera epidemic among its poor [linked to shoddy water quality and sanitation](#).

What can be done to help alleviate water stress in Africa?

Improved access to quality water is a long-term goal that requires more than humanitarian funds.

- ❖ Because sub-Saharan Africa is subject to more extreme climate variability than other regions, it needs improved water storage capacity. Some experts say that large dam projects would create a more sustainable reserve of water resources to combat the burden of climate fluctuations, but other disagree, stating the harmful environmental impact of large dams.
- ❖ Many experts say more water treaties are needed. Lautze says that transboundary water agreements have cultivated international cooperation and reduced the "probability of conflict and its intensity."
- ❖ Better donor emphasis on water development is needed. Giordano is concerned that global environmental issues are upstaging Africa-specific issues of water development.
- ❖ Small-scale agricultural improvements also offer a solution to water stress, including the harvest of water in shallow wells, drip irrigation for crops, the use of pumps, and other technological innovations.

Sanchez says, "The key thing is the concept of green water as opposed to blue water. Blue water is the water we see in streams. Green water is the water we don't see in the soil, and green water accounts for two-thirds of the water supply." Farmers can [access green water](#) through drip irrigation (systems that slowly and consistently deliver water to plant's root system), supplemental irrigation (supplementary to natural rainfall rather than the primary source of moisture during periods of drought) and rainwater harvesting (the collection of rainwater for crops, which reduces reliance on irrigation). Crops can grow poorly even during periods of rainfall, and most farms in Africa suffer from nitrogen and phosphorus depletion in soil. One way to assuage water stress in terms of food scarcity is to increase water-holding capacity with organic fertilizers that would increase availability and efficacy of green water.