

# **There Is a Looming Global Fresh Water Shortage**

*Will the World Run Out of Fresh Water?*, 2012

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Water shortages have always plagued humanity, but in the modern age, the potential for serious depletions of fresh water reserves are increasing. The global population is growing significantly, and more and more people are suffering from poor access to drinking water. The majority of the world's water is being utilized by industry and agriculture, leaving less than 10 percent for human consumption. While humanity can flourish on the water available, not enough is being conserved to ensure that present populations and future generations have enough to drink. Pollutants, agricultural waste, and a shared ignorance of the importance of conserving water are all leading to the depletion of fresh water supplies. Humanity must be made aware of the implications of degrading water stocks, and governments, farmers, and citizens in general must act to preserve fresh water for a sustainable future.

Water, simply put, makes the existence of the human race on this planet possible. With few exceptions, water has always been a natural resource that people take for granted. Today, the situation has changed.

The World Bank reports that 80 countries now have water shortages and 2 billion people lack access to clean water. More disturbingly, the World Health Organization has reported that 1 billion people lack enough water to simply meet their basic needs.

Population growth and groundwater depletion present the two most significant dangers to global water stability. In the last century, the human population has increased from 1.7 billion people to 6.6 billion people, while the total amount of potable water has slightly decreased. Much of the population growth and economic development experienced in the last fifty years has been supported by subterranean water reserves called groundwater. These nonrenewable reserves, an absolutely essential aspect of the modern world, are being consumed at an unsustainable rate.

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## **The Present Supply of Water and Its Use**

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Humanity has approximately 11 trillion cubic meters of freshwater at its disposal. Groundwater aquifers contain over 95% of this water, while rain, rivers, and lakes make up the remaining 5%. Approximately 1,700 m<sup>3</sup> [cubic meters] of water exists for every person on the planet, an alarming low number. According to the Water Stress Index, a region with less than 1,700 m<sup>3</sup> per capita is considered "water stressed".

The global supply is not distributed evenly around the planet, nor is water equally available at all times throughout the year. Many areas of the world have seriously inadequate access to water, and many places with high annual averages experience alternating seasons of drought and monsoons.

Water usage differs highly between developing countries and developed ones. Developing countries use 90% of their water for agriculture, 5% for industry, and 5% for urban areas. Developed countries use 45%

of their water for agriculture, 45% for industry, and 10% for urban areas.

In the last century water usage per person doubled, even as the total population tripled, creating a situation today where many areas of the world are consuming water at an unsustainable rate.

The industrial sector accounts for 22% of global water consumption; this number will grow in the coming decades as the developing world industrializes.

## Demand for Water Is Rising

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The agricultural sector, by far the largest consumer of freshwater resources, accounts for 70% global consumption. Irrigation consumes most of the water in the agricultural sector, and has become an integral part of modern civilization because of access to groundwater aquifers. Once farmers were freed from relying on rain to water their crops, highly efficient commercial farming became increasingly common. This innovation also underpinned the Green Revolution, which dramatically increased crop production throughout the third world in the 1960s. Unfortunately, water is being drawn from many of these aquifers faster than it is being replaced.

The industrial sector accounts for 22% of global water consumption; this number will grow in the coming decades as the developing world industrializes. The needs of industry tend to take precedence over agriculture for simple economic reasons. 1,000 tons of water will produce 1 ton of wheat, which is worth \$200. 1,000 tons of water in the industrial sector, however, will generate \$14,000 worth of goods. On a per ton basis, industry creates 70 times more wealth. Despite its economic benefits, intense water use by industry has led to serious pollution that is beginning to create problems worldwide.

The residential sector uses the remaining 8% of the total water supply. Although this sector only accounts for a small percentage of overall use, it always takes precedence over industry and agriculture. In the last fifty years the world's urban population has exploded, and by 2010 50% of the people on the planet will live in cities. In addition to the simple increase in population, per person consumption of water has risen. As more people begin utilizing modern luxuries like flush toilets, showers, and washing machines, the demand created by the residential sector will increase dramatically.

## Pollution Poisoning Water Supplies

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The companion of modernization has always been pollution. In developing countries that are just entering the industrial age, water pollution presents a serious problem. According to United Nations Environmental Program (UNEP), "in developing countries, rivers downstream from major cities are little cleaner than open sewers". The UNEP also reports that 1.2 billion people are being affected by polluted water, and that dirty water contributes to 15 million child deaths every year. In recent years, scientists have become aware of the problems involved with the contamination of groundwater. Aquifers move very slowly, so once they are polluted it takes decades or centuries for them to cleanse themselves.

Water pollution is reaching epic proportions. In the U.S. 40% of rivers and lakes are considered too polluted to support normal activities.

Food production contributes significantly to water contamination. When nitrogen fertilizer is applied to a field, the water runoff will contain excess amounts of nitrates. Nitrates have been shown to have a very harmful effect on plant and animal life, can cause miscarriages, and can harm infant development. The industrial livestock business also presents a serious danger to water systems. The disposal of vast amounts of animal feces destroys nearby ecosystems and is very hazardous to humans.

Water pollution is reaching epic proportions. In the U.S. 40% of rivers and lakes are considered too polluted to support normal activities. In China 80% of the rivers are so polluted that fish cannot survive in them. In Japan 30% of groundwater has been contaminated by industrial pollution. The Ganges River [in India], which supports around 500 million people, is considered one of the most polluted rivers in the world. And the list goes on ...

## Food Scarcity from Lack of Water

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According to the International Food Policy Research Institute (IFPRI), if current water consumption trends continue, by 2025 the agricultural sector will experience serious water shortages. The IFPRI estimates that crop losses due to water scarcity could be as high as 350 million metric tons per year, slightly more than the entire crop yield of the U.S. This massive water crisis will be caused by water contamination, diverting water for industrial purposes, and the depletion of aquifers. Climate change may also play a part. The Himalayan glaciers, which feed the rivers that support billions of people, are shrinking in size every year. Their disappearance would cause a major humanitarian disaster.

The greatest danger to global food security comes from aquifer depletion. Aquifers are an essential source of water for food production, and they are being overdrawn in the western U.S., northern Iran, north-central China, India, Mexico, Australia, and numerous other locations. Additionally, many aquifers are contaminated each year by pollution and seawater intrusion.

Despite their importance, data on underground water reservoirs remains imprecise. There is little evidence regarding how many aquifers actually exist, and the depth of known aquifers is often a mystery. However, it is clear that water from these sources takes centuries to replenish, and that they are being consumed at a highly unsustainable rate.

## Water as a Source of Conflict

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According to the UNEP, there are 263 rivers in the world that either cross or mark international boundaries. The basins fed by these rivers account for 60% of the world's above ground freshwater. Of these 263 rivers, 158 have no international legislation, and many are the source of conflict.

Water has always been a central issue in the Arab-Israeli situation. [Former Israeli Prime Minister] Ariel Sharon once said the Six Days War actually began the day that Israel stopped Syria from diverting the Jordan River in 1964. Decades later, the Egyptian military came close to staging a coup against Egyptian president Anwar Sedat, who had proposed diverting some of the Nile's water to Israel as part of a peace plan.

The Nile River, which runs through Ethiopia, Sudan, and Egypt, exemplifies the potential for future water conflicts. The banks of the Nile River support one of the most densely populated areas on the planet. In the next fifty years the number of people dependant on the Nile could double, creating a serious water crisis in the region. The Nile is not governed by any multilateral treaties, and Egypt would not shrink from using military strength to guarantee its future access to water.

While a global water crisis has the potential to tear international relations at the seams, it also has the potential to force the global community into a new spirit of cooperation.

The potential for water conflicts are less likely outside the Middle East, but never the less there are many problematic areas. The Mekong River is the lifeblood of South East Asia, but it begins in one of the most water poor countries on Earth: China. The Indus River separates Pakistan and India, and aquifer depletion by Indian farmers has one of the highest rates in the world. U.S.-Mexican relations are already strained over water use on their mutual border. The Niger River basin in West-Central Africa runs through five countries. Surging populations coupled with decreasing rainfall in the region seriously threaten water security for millions of people.

Although the specter of international water wars can seem very real, in the last 50 years there have only been 7 conflicts over water outside the Middle East. While a global water crisis has the potential to tear international relations at the seams, it also has the potential to force the global community into a new spirit of cooperation.

## Better Water Management and Less Consumption

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The oceans contain 97% of the world's water. Desalination technology transforms the vast amount of salt water in the Earth's oceans into freshwater fit for human consumption. There are approximately 7,500 desalination plants in the world, 60% of which are in the Middle East. The global desalination industry has a capacity of approximately 28 million m<sup>3</sup>, less than 1% of global demand. Desalination is an expensive and energy intensive technology, and currently only wealthy countries with serious water shortages consider it a viable option. However, a recent innovation using nanotechnology has the potential to decrease the cost of desalination by 75%, making it a more viable option.

While irrigation accounts for approximately one third of all global water consumption, numerous studies have shown that approximately half of the water used in irrigation is lost through evaporation or seepage. Drip irrigation technology offers a far more water-efficient way of farming. Drip irrigation techniques involve using a series of pipes to distribute water in a very controlled manner. By using this method farmers have the ability to give their crops the exact amount of water needed. Despite its many benefits, drip irrigation is not being widely implemented. While the technology is not sophisticated or expensive, it is beyond the means of the poorest farmers who need it most. It is also not being used by many farmers in water-rich countries because the potential savings are less than the cost of implementing the technology.

In many countries water shortages are exacerbated or even caused by governmental mismanagement, political infighting, and outright corruption.

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political infighting, and outright corruption. International organizations like the World Trade Organization (WTO) often suggest that privatization of water management services would alleviate many of these problems. It has been shown that privatizing utilities frequently increases efficiency, innovation, and maintenance. However, privatization rarely has an effect on corruption, and often disadvantages the poor.

Other technical solutions like rainwater capture, water-free toilets, and water reclamation offer people the possibility of effective conservation. Market-oriented solutions such as water tariffs, pricing groundwater, and increasing fines against industries that pollute could be adopted. There are also a number of viable trade solutions. Freshwater could be traded internationally by using pipelines and enormous plastic bags. Despite this plethora of potential solutions, there is no substitute for simply consuming less.

## Working Toward a Sustainable Future

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In the coming decades, water crises will likely become increasingly common. If the population continues to grow at a rate of 1 billion people every 15 years, the Earth's capacity to support human life will be severely strained. Population growth notwithstanding, the current supply of water is being degraded by pollution, overdrawing, and climate change. It is not too late to guarantee a safe supply of water for everyone alive today and for all future generations; although to do so would require an unprecedented level of international cooperation, trust, and compassion.

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### Source Citation

Alois, Paul. "There Is a Looming Global Fresh Water Shortage." *Will the World Run Out of Fresh Water?* Ed. David M. Haugen and Susan Musser. Detroit: Greenhaven

Press, 2012. At Issue. Rpt. from "Global Water Crisis Overview." *ArlingtonInstitute.org*. 2007. *Opposing Viewpoints In Context*. Web. 25 June 2013.

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**Gale Document Number:** GALE|EJ3010467215