

QUAKER ECO-BULLETIN

*Information and Action Addressing Public Policy
for an Ecologically Sustainable World*

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The Pending Water Crisis

by Bill Bliss



THE PROBLEM

Demand for Freshwater is Beginning to Exceed Supply

Worldwide, demand for water is increasing with population growth, but at a faster rate due to “improved” living standards—golf courses, pools, hot tubs, etc. Since 1950, *per capita* use of freshwater has trebled and the global rate of water withdrawal from surface and groundwater sources has increased almost fivefold. At the same time, the population of the earth has increased from 2.5 billion to 6.24 billion, reducing the worldwide *per capita* supply to 20% of that in 1950. And, water withdrawal rates are projected to at least double in the next two decades.

Agriculture claims more than two-thirds of all the water removed from rivers, lakes, streams, and aquifers to produce the food we eat; energy production and industrial processes use 23% of water withdrawn worldwide; and domestic and municipal use claims about 8%. There are wide variations between countries in average use of fresh water: Americans use an average of 92 gallons of fresh water daily; Europeans average 44 gallons; and Africans, 5 gallons per day.

Water, A Renewable Resource

The amount of water on Earth has not varied since prehistoric times, and only a very small portion of that is held as freshwater, suitable for drinking, growing crops, and satisfying the needs of all creatures. But freshwater is a renewable resource. Evaporation, fueled by the sun’s energy, lifts some 500,000 cubic kilometers (cu km) of water yearly into the atmosphere. (One cu km of water is 264 billion U.S. gallons!) While this half million cu km subsequently returns to earth, only 40,000 cu km falls on land. It is not all distributed evenly, and two-thirds runs off in floods. That leaves 14,000 cu km as a relatively stable source of supply. A large portion of that is still required to protect wetlands, deltas, lakes, and rivers.

Water Shortages Can Cause International Conflicts

Internationally, there are trouble spots where contention for water could, and may well, lead to war. The Tigris and Euphrates river basins supply Turkey, Syria, and Iraq. In the Middle East, the Jordan River basin supplies Israel and the West Bank, Jordan, and Lebanon. The Nile, the longest river on the

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Quaker Eco-Witness (QEW) promotes government and corporate policies to help restore and protect Earth's biological integrity. It works within and through the Religious Society of Friends for policies that enable human communities to relate in mutually enhancing ways to the ecosystems of which they are a part. This witness seeks to be guided by the Spirit and grounded in reverence for Earth's communities of life as God's creation.

QEB's purpose is to inform the **QEW** network to advance Friends' witness on government and corporate policy as it relates to the ecosystems that sustains us. Each issue is an article about timely legislative or corporate policy issues affecting our society's relationship to the earth.

Friends are invited to contact us about writing an article for *QEB*. Submissions are subject to editing and should:

- Provide background information that reflects the complexity of the issue and is respectful toward other points of view.
- Explain why the issue is a Friends' concern.
- Describe the positions of other faith-based and secular environmental groups on the issue.
- Relate the issue to legislation or corporate policy.
- Provide sources for additional information.

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planet, flows from Lake Victoria through Uganda and Sudan to Egypt and the Mediterranean. Its two main tributaries, the Blue Nile and the Atbara, both originate in Ethiopia. Tempers are rising over the need for water as the number of people in these regions is increasing.

In the U.S.A we too have conflicts, especially over the water in the Colorado River basin and the Rio Grande. Our arguments over water are resolved largely through litigation. Here too, population growth continues to lead to increased demand. The real crisis still lies ahead. For the long term, both internationally and domestically, we must have regional cooperation.

Solutions

Population Stabilization

Even if *per capita* demand for water were not increasing (which it is), the unsustainable rate of human population growth would soon lead to water shortages. Population stabilization is a key component of any efforts to alleviate the water crisis.

Conservation, Efficiency, And Technology

Making irrigation more efficient is a top priority. Worldwide, irrigation efficiency is less than 40 percent, that is, of the total water transported to irrigate the fields, only 40 percent benefits the crop. The rest is either returned to the stream or it evaporates.

Water and Life on Earth

Of Earth's total volume of water, only 2.5% is fresh water, and two-thirds of that is locked in glaciers and ice caps. A mere 0.77% of all water is held in lakes, rivers, wetlands, underground aquifers, soil pores, plant life, and the atmosphere. For perspective, if the world's total water supply were only 100 liters (26 gallons), our usable supply of fresh water would be only about 0.0003 liters (one-half teaspoon).

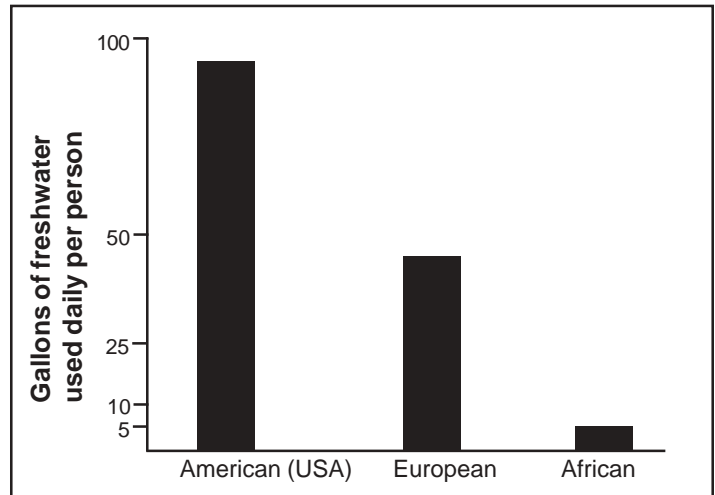
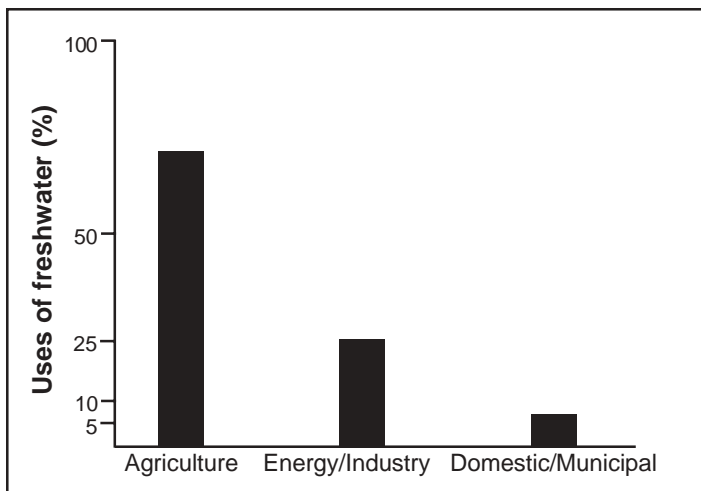
Earth's hydrological cycle ensures that this vital supply of freshwater is available by continuously collecting, purifying, and distributing fresh water. This natural recycling and purification process will continue to provide enough fresh water as long as we don't overload it with slowly degradable and nondegradable wastes or withdraw it from underground supplies faster than it is replenished. Unfortunately, we are doing both. The impact of these behaviors on a given population's access to fresh water will vary, because fresh water is unevenly distributed on the planet. The United States is fortunate: with 4 percent of the world's population we have 8 percent of the fresh water. China, on the other hand, has 22 percent of the world's population but only 7 percent of the world's fresh water.

All our fresh water is from aquifers, groundwater, rivers, lakes, and rainwater collected in reservoirs and dams. If cheap energy is available, we desalinize salt water. Unlike energy—where there are alternatives to fossil fuels: solar, wind, geothermal, and biomass—there are no substitutes for fresh water. Without it land-based life as we know it would disappear.

—Sandra Lewis

For More Information

Gretchen C. Daily, Ed. *Nature's Services: Societal Dependence on Natural Ecosystems*. Island Press
G. Tyler Miller, Jr. *Living in the Environment*. Ninth Edition, Wadsworth Publishing



Evaporation and transpiration by the crops themselves use up about half the withdrawals from watercourses for agricultural use. Increasing efficiency by a tenth would free up enough water to roughly double domestic water use worldwide.

There are major technological successes in improving efficiency. Farmers in Texas are using “surge irrigation,” a technique of alternating flows to distribute the water more uniformly. Israelis, living in a country that’s half desert, have come up with drip irrigation, often achieving 95 percent efficiency. **If users of water for irrigation were charged the true costs, there would be a great impetus to adopt more efficient methods.**

“Animal agriculture where feed grain is irrigated is highly water-intensive. A kilogram of hamburger or steak produced by a typical California beef cattle operation uses some 20,500 liters of water.” (Sandra Postel in *Last Oasis*). By my calculations, this amounts to 615 gallons for a quarter pound hamburger. That should make vegetarians out of all of us!

Also, if we can capture even a small portion of the freshwater runoff lost by flooding, putting it back into aquifers instead of letting it run off lawns and pavement into storm sewers, it would greatly alleviate the pending crisis. We pump petroleum long distances. If we get desperate, why can’t we capture the floodwater from Houston, clean it up, and pump it into the Ogallala aquifer?

Recycling

The impetus for recycling in industry has come from pollution control laws and the desire to cut costs. When a ton of steel can take 280 tons of water, a ton of paper as much as 700 tons of water, and manufacturing a new car can take 39,000 gallons, discarding this water is costly. By cooling, treating, and purifying, and then recycling, water losses and costs are greatly reduced.

Reuse

Municipalities discard water as sewage. (The State of Michigan discharged 48 billion gallons of raw or partially treated

sewage into Michigan waters in the year 2000.) Properly treated it can be redirected and safely used in irrigating agricultural lands. At least 1.2 million acres in some 15 countries are being irrigated with municipal wastewater. Most of the wastewater constituents are nutrients—nitrogen, phosphorus, and potassium—that belong to the soil anyway.

Repair

Chronic leaks in pipelines consume 29 percent of the water in many aging city supply systems. Every year more water mains crack or fail. The Environmental Protection Agency predicts more frequent water and sewage pipeline leaks and breaks.

Personal Action - What You Can Do

Stop the wastefulness of letting rainwater flow off your driveway and grass lawn into the street and sewer, gathering pollution as it goes. Return it to the ground and aquifer by planting native prairie grasses that have deep roots, which transport the water well below the surface. If possible, carve out a small collection basin. Install water-saving devices in your home, and join other environmentalists in urging your local government to promote use of these devices. The Greater Boston area reduced usage by 16% in a four year period!

Friends and Public Policy

Friends Committee on National Legislation’s Statement of Legislative Policy Part IV, “We seek an Earth Restored...,” states that FCNL advocates that “the U.S. Government develop policies that provide: ... regional and international cooperation to conserve and allocate diminishing water resources” and urges the federal government to participate in environmental restoration by “strengthening and enforcing laws and regulations to protect, efficiently use, and clean up water resources and sufficiently funding their implementation.”

This language is good, but it does not emphasize the urgency of the problem. As stated above, contention for scarce water resources leads to hostilities. Friends have recognized the link between our energy policy and peace. Perhaps FCNL can incorporate this issue as well into its “Peaceful Prevention of Deadly Conflict” legislative priorities plan.

Education

Many people are unaware of where the water they use every-day comes from, where it goes after use and what are the environmental impacts of securing the local water supply. Friends can often be more effective in providing education and taking action to address local water (and other environmental) issues by working with other faith groups in their community.

For example, the Ann Arbor Meeting has an active environmental committee that has launched the Washtenaw [County] Interfaith Environmental Network (WIEN), which includes members from local Jewish and Christian congregations. WIEN will host an all-day forum on water problems in our county

and state in October at Michigan Friends Center. Representatives from the Michigan Environmental Council in Lansing (who oversee our state legislature), the Huron River Watershed Council (the Huron River flows through Ann Arbor on its way to Lake Erie) and the county's wastewater (sewage) disposal system will lead the discussion. We anticipate 60 attendees from our county and adjacent counties.

For More Information

Sandra Postel, *Last Oasis, Facing Water Scarcity*. W.W.Norton
Marq de Villiers, *Water, The Fate of Our Most Precious Resource*.
Mariner Books
Senators of the State Of Michigan, "Great Lakes Conservation Task
Force, 2002 Final Report"

The "last oasis" of conservation—efficiency, recycling, and reuse—is large enough to get us through many of the shortages on the horizon, buying time to develop a new relationship with water systems and to bring consumption and population growth down to sustainable levels.
— from *Last Oasis* by Sandra Postel

The Green Revolution

Hailed as the solution to feeding a growing world population, the Green Revolution of the 1960's introduced high-yielding "miracle seeds" and modern industrial agricultural methods to developing countries to replace their traditional farming practices. As with much of our technological "progress," the implementation occurred without sufficient testing and without considering all possible effects.

Seemingly simple, traditional farming was composed of many complex interacting systems: ecosystems, social systems, and hydrological systems. The crops grown were a mix of drought resistant varieties, watered by rainfall or human and animal-powered irrigation systems. They were purposely selected for a higher biomass yield for straw, animal feed, and manure. The organic matter provided moisture retention in the soil. Water conservation was built into the indigenous farming methods. Traditional crops and methods had been time-tested over centuries. The complex of interrelated systems were in harmony with one another and sustainable over the long term.

On the other hand, the modern varieties were so successful largely due to the use of chemical fertilizers and pesticides and controlled irrigation. In fact, the new monoculture crops *required* chemicals and irrigation. Drought resistance had been bred out of them.

The new methods were also dependent on fossil fuels to power tractors and pumps. Investments in equipment and supplies favored the wealthier farmers and displaced those not so well off. With a shift from labor intensive to energy intensive work, fewer jobs were available. The society was disrupted.

Also disrupted was the hydrological cycle. The old methods of irrigation were inefficient in terms of how much water could be applied to the land, but were quite efficient in terms of crop yield per unit of water. Most importantly, the water drawn from the aquifers was naturally replenished by rainfall without lowering the water table.

The millions of powerful diesel and electric pumps sunk into aquifers to provide water for the Green Revolution were considered highly efficient in terms of gallons per hour. But no consideration was given to whether water withdrawal was consistent with groundwater recharge. As a result, water tables are falling in scores of countries across the world.

So how do we feed the billions and recharge our natural water stores?

In a speech commemorating his 1970 Nobel Prize, Green Revolution agricultural scientist Norman E. Borlaug recognized the water problems of the Green Revolution and suggested a complementary "Blue Revolution," in which "water-use productivity must be wedded to land-use productivity. New science and technology must lead the way."

Maybe so, but perhaps we should also pay some attention to those traditional, indigenous, inefficient farmers.

—Kim Carlyle

For More Information

"Lessons from the Green Revolution," Peter Rosset, Joseph Collins, and Frances Moore Lappé; March/April 2000, *Tikkun Magazine*
The Green Revolution Revisited and the Road Ahead, speech by Norman E. Borlaug
Water Wars: Privatization Profit, and Pollution, Vandana Shiva, 2002, South End Press