

Water: The Sacred Well

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Of Life and Faith

We all know that water is important. In fact, water may be the single most critical element of life, as it nourishes every species on the planet and is the primary material of all living things, at least on this planet. Looking close to home, our bodies are made up of about 65 percent water.

What about the religious view of water? In the Roman Catholic, or perhaps early Christian, theological view, water is made holy by virtue of a liturgical blessing, or by the individual blessing of some holy person. In contrast, in pagan, Native American, and other nature based religions, water is holy by virtue of its core place in nature and the fact that it is a key sustainer of life.

In Hindu theology, the possibility of life on Earth is due to the release of heavenly water, by Indra, the god of rain.

The Muslim faith, coming from a land where water was scarce, cherished water much more than the Christian. The Qur'an states that "Water is the source of all life." In the 7th century, the laws and codes of the then fledgling Muslim religion unambiguously articulated that access to fresh water is the right of all living beings. Water must be shared between man and beast, the Muslim rules of Sharia asserted.

Water on Earth and Human Use Thereof

Of this planet's water supply, 97% is seawater (i.e., saltwater), 2% is locked in icecaps and glaciers, with less than 1% readily accessible freshwater. Of the world's accessible freshwater, the vast majority is groundwater, lying below the Earth's surface.

Global water use has tripled since 1950. It currently amounts to 30% of the world's renewable supply. Of the water used by humans, 67% is used in agriculture, 23% in industry, and only 10% used in municipal/residential use.

Part of the world's water needs to be left to protect wetlands and other ecosystems, which serve the other life on this planet, not drawn for human use.

As we all know, this planet's freshwater is not equally distributed. China has almost 25% of the world's population, but only 6% of its water. In contrast, Canada, with only 1/2 of 1% of the world's population, has a great abundance of water. Some have dubbed Canada the Saudia Arabia of water.

Unmet Freshwater Needs

Per United Nations figures, about 1.2 billion people have no access to safe drinking water. Some two million children die each year from water-related disease.

In the year 2000, 36% of the African population did not have easy access to safe water. In parts of Africa, women and girls spend as much as three hours a day fetching water. In that same year, 20% of the Asia population and 14% of the Latin American population did not have easy access to safe water.

But some countries are making significant strides. In 1994, when the new democratic government came to power in South Africa, some 14 million of that nation's people lacked access to safe water. By 2001 that number had been reduced in half, to 7 million.

Peter Gleick, one of the co-founders of the Pacific Institute for Studies in Development,

Environment and Security, has calculated that 50 liters per day is the amount of water each individual requires to meet a minimum quality of life. This breaks down as 5 liters for drinking, 10 liters for cooking, 15 liters for bathing, and 20 liters for sanitation.

One third of the world's population lives on less than 50 liters of water per day. In Haiti and Gambia people live on an average of just 3 liters per day. In India the average person uses 31 liters per day. By contrast, most residents of the U.S. and Canada use at least 500 liters of clean water per day.

For all the billions of dollars that the World Bank has provided for water development projects, most of the benefits have accrued to multinational construction companies and the largest local industries. Under one percent of the bank's funding has been for providing water to thirsty people.

Causes of Shortages

Here are some of the significant causes of the freshwater shortages on Earth: (1) Population increases reduce the freshwater per person, if all else remains the same; (2) Pollution of water sources is on the increase in many places. Some cities in the developing world treat only 10% of their sewage. According to the U.N. Industrial Development Organization, industrial pollution is likely to increase four-fold by the year 2025; (3) Surface water and groundwater, such as in aquifers, is in many places being removed faster than it can be replenished; and (4) Much water routed for irrigation and municipal water systems is lost through leaking pipes and channels. These systems frequently suffer from deferred repairs and maintenance.

Word from the International Community

No mention of water appears anywhere in the U.N. Declaration of Human Rights. However, other rights, such as the right to a standard of living adequate for health, can be considered as implying a right to a basic amount of fresh water.

The Helsinki Rules on the Use of the Waters of International Rivers were adopted in 1966. They recognize that states are entitled to a reasonable and equitable share of the beneficial use of waters of an international drainage basin.

Agricultural Problems

Water losses in irrigation systems are enormously high due to: (1) lack of know how; (2) poor water management practices; (3) the failure to apply the user-pays principle; and (4) deteriorating infrastructure.

Most of the world's farmers still irrigate the way their ancestors did long ago, by flooding their cropland or channeling water through it by gravity. Worldwide, irrigation efficiency is estimated at less than 40 percent.

Some countries with water shortages have not banned or sufficiently taxed or otherwise burdened water hungry crops. For example, in India's state of Maharashtra, sugarcane is permitted, though it takes 50% of the water available for agriculture, though it takes only 10 percent of the cropland.

Agricultural Solutions

With technologies and methods available today, farmers could cut their water needs by 10 to 50 percent. Reducing irrigation needs by just 15 percent would free up enough water to double the world's supply for municipal/ residential use.

Surge irrigation, which automatically releases water at pre-established intervals, has been widely adopted in the drier parts of Texas. It has cut water use by 15 to 50 percent, while also cutting pumping costs. In the Texas Plains, farmers typically have recouped their investment within the first year.

Another new sprinkler system, known as low energy precision application (or LEPA), offers

even greater water savings. LEPA sprinklers deliver water closer to the crops. They have efficiencies as high as 95%. Costs are typically recovered in 2 to 7 years, depending on the situation.

Because of these new, more efficient irrigation systems, the average annual rate of depletion of the Ogallala aquifer has fallen 88% in recent years.

Modern Israeli farms are conserving water by highly automated drip systems, which they call “feeding the plant with a teaspoon.” These are about 95% efficient. However, drip irrigation today represents only 1% of world irrigation.

In developing countries without significant funds for technologically advanced irrigation systems, stone lines, also known as bunds, deep planting holes, and terracing, are three methods to improve the efficiency of irrigation.

Water used in cities and towns can be used for a second time on farms, after partial treatment, particularly for crops that are not eaten raw. For example, Israel reuses 70% of its municipal wastewater on agriculture after only partial treatment. A key to safe reuse is preventing untreated industrial effluent, which often contains heavy metals, from mixing with domestic wastewater.

The Political Economy Research Center, based in Bozeman, MT, finds that when the price of agricultural water increases by 10 percent, its usage goes down by 20 percent.

Industrial Problems

According to the U.N. Industrial Development Organization, industrial activity is likely to consume twice as much water by 2025. In many industrial countries, industries account for over 50% of total water demand. However, most of the water used is used for cooling, processing and other activities that may heat or pollute the water, but do not use it up. The Worldwatch Institute predicts China will be the first country in the world that will have to

restructure its economy, particularly its industries, to respond to water scarcity.

Industrial Solutions

With technologies and methods available today, industries could cut their water needs by 40 to 90 percent. As most water used in industry is heated and/or polluted, but not used up, it can be recycled and reused in the factory or plant. If industries could cut their water usage 50%, as a world-wide average, the amount of water available for municipal/residential use would be more than doubled.

So far, the main impetus for industrial water recycling has come from pollution control laws, rather than water scarcity. As it turns out, the most effective and economical way to comply with pollution requirements is often to recycle and reuse the water a number of times.

Japan, the U.S., and the former West Germany are among the countries that have achieved striking gains in industrial water productivity. Between 1973 and 1989 Japanese industries cut their use of water by 24 percent while increasing their output per cubic meter of water by over 300 percent. In the U.S., industry's total water use has fallen 36 percent since 1950, while industrial output has increased 3.7 fold. U.S. industry now uses water about 17 times, on average, before discharging it.

Unfortunately, few developing countries are yet giving industries the incentives they need to adopt more efficient water practices. Thus, there is an excellent opportunity for water savings in this area.

Municipal/Residential Use – Conservation

In 1989, the Mexican government adopted a strict set of nationwide efficiency standards for household plumbing fixtures and appliances. They require toilets, the biggest water guzzler in the house, to use no more than 6 liters per flush, and they set maximum limits for showers, faucets, dishwashers, and washing machines as well. Within seven years, per person water

usage has been cut 17 percent nationwide.

San Jose, California, pushed a massive retrofit campaign. Water saving devices were distributed door-to-door to some 220,000 households. Diligent canvassers made at least 3 attempts to talk with residents about the importance of installing the devices. As a result, 90 percent of the target households cooperated and water use dropped 10 to 17 percent in the households.

In the U.S., all new residential toilets sold since 1994 have to be, by law, high efficiency, low-flow installations. They use only 30 percent of the water per flush of earlier toilets.

Many communities are encouraging Xeriscape landscaping. It draws on a wide variety of attractive, indigenous, drought tolerant plants, shrubs and ground cover. A Xeriscape yard typically requires 30 to 80 percent less water than a conventional one, and can reduce fertilizer and herbicide use as well.

Many environmentalists urge, to encourage conservation, that the unit price of water, per household or organization, rise steeply after a certain threshold of water needed for human sustainability is exceeded.

Municipal/Residential Use – Waste Reduction

Water waste is easy to find. Toilets in Toronto, Canada, are flushed more than twenty times per person, per day. Californians have roughly 560,000 swimming pools.

Los Angeles plans to be reusing 40 percent of its municipal wastewater within twenty years. Long-term plans in Tucson, Arizona, call for reclaiming wastewater to meet 19 percent of the community's total water needs.

St. Petersburg, Florida, is the only major U.S. city to reuse all of its wastewater and discharge none to surrounding lakes and streams. That city has two water distribution systems, one that

delivers fresh water for drinking and most household uses, and another that distributes treated wastewater for irrigating parks, road medians, and residential lawns, and for serving other functions that do not require drinking quality water. Reclaimed water costs only 30 percent as much as the drinkable supply.

At a relatively modest cost of \$2.1 million, the Massachusetts Water Resource Authority's leak detection program cut system-wide demand in the greater Boston area by about 10 percent. Cities in different parts of the world have saved up to 25 percent of their water through the repair of leaking pipes.

Municipal/Residential Use – Water Transfers

In the year 2000, 89 billion liters of water were bottled and traded globally. Barges carry loads of fresh water to the Bahamas, while tankers deliver water to Japan, Taiwan and Korea. If plans to establish a European Water Network are realized, alpine water could be flowing into Greece and Spain by the end of this decade. The world trade in water is about a one billion dollar industry.

One up and coming way to transfer water is by use of gigantic water bags, which float and are tugged to their destination. At current prices, water bag shipments are an acceptable alternative for poorer nations that can not come up with the millions or billions of dollars of up-front capital to establish systems of providing clean water from local sources, or even to upgrade existing systems that are in disrepair.

Among the most aggressive plans is to draw down melt-water from Greenland's mammoth glaciers and sell it to any nation that pays the price. These ice sheets are three times the size of Texas and over two miles thick.

Environmentalists who oppose large-scale water transfers don't complain about bottled water, for even if the most aggressive forecasts for future sales are met, the amount of the world's water supply transferred by these products will be minimal – less than one percent of the

available freshwater.

When the government of the Canadian province of British Columbia passed a law barring large-scale transfers of its water to foreign countries, it was sued for \$10 billion in damages by the Sun Belt Water Co. of Santa Barbara, California, which wanted to ship some of that province's water to California by water bag. This suit, made possible under the NAFTA rules, is still being litigated.

Municipal/Residential Use – Desalination

Desalination technology has made progress in recent years, due to the development of exceptionally sophisticated membranes that permit passage only of water with a specific chemical makeup from one side of the desalination system to the other.

Desalination still ranks among the more expensive water supply options. Turning ocean water into drinking water is about twice as expensive as the average cost of urban water supplies today. However, that is down from a 4 to 1 cost differential a decade ago.

Kuwait has no lakes or rivers, so depends on desalination for virtually its entire water supply. Currently, desalted water provides 70 percent of Saudi Arabia's drinking water needs. After a desalination expansion is completed, virtually all of that nation's water will come from this technology.

In addition to the Middle East, desalination is also used in places such as Trinidad, Tobago, and Tampa Bay. There are 12,000 desalination plants worldwide, desalinating 5 billion gallons of water daily. But that is still a small slice of the world's daily water usage, much less than 1 percent.

Municipal/Residential Use – Privatization?

With the advent of globalization, community control of water is being eroded and private

exploitation of water is increasing. That course has been pushed by institutions such as the IMF. Out of 40 IMF loans disbursed in 2000, 12 had requirements for partial or full privatization of a water supply.

The two largest companies in the water industry are both French. They are Vivendi and Suez. One or the other of them does business in 120 countries, and between them they have a 70 percent share of the world water market. Since March, 1999, when it bought U.S. Filter, Vivendi has been the largest water company in North America. There is one American firm among the second tier water firms, that being Bechtel.

There have been instances where the local populace has been unhappy with privatization and has forced the private company out. In Buenos Aires, Argentina, the people did this by, en masse, refusing to pay their water bills. In Cochabamba, Bolivia, the people did this through mass demonstrations, some of which were violent, and mass strikes that shut the city down. There were some deaths and thousands of casualties, but the will of the people prevailed. In Grenoble, France, the people did it through the courts, after showing the water contracts were facilitated by bribes to public officials.

While I am not arguing for privatization, under proper conditions, private management of water does not have to be bad for a community. Such conditions would probably have to include the following: (1) spelling out the improvements the private manager must produce and on what schedule; (2) guaranteeing basic levels of water for all, whether particular households can pay or not, with free clients subsidized by either the government, through its taxes, or by those who use large volumes of water; (3) agreed upon maximum profits; and (4) frequent reviews by the government/community with termination of the agreement if the private company has failed to fulfill its obligations.

Closing Remarks

Water is the basis of life. Our stewardship of it will determine not only the quality, but also the staying power of human societies.

What rights, with regard to water, should people have? Water rights, as a natural right, do not originate with the state; they evolve out of a given ecological context of human existence. If we recognize that people have a right to life, then we must recognize that they have the right to the resources necessary to sustain it, such as water. Thus, a certain minimum amount of clean water should be available to all, whether they can afford to pay something for it or not.

Measures to conserve water and use it more efficiently are currently the most economical and environmentally sound water supply options available, at least for most of the world.

As they say in India, each of us is responsible for the Kumbh – the sacred water pot.

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