



TEN STRESSES ON THE PLANET

Loss of Fresh Water

Over 97 percent of all water on Earth is salt water, leaving only 2.5 percent as fresh water. Most of Earth's fresh water is either bound in ice caps (70 percent), present in the soil, or in deep underground aquifers. Less than one percent of fresh water is accessible for direct human uses either in surface water or ground water shallow enough to be tapped at an affordable price.ⁱ

Overconsumption and contamination are altering Earth's freshwater ecosystems to a greater extent than terrestrial ecosystems.ⁱⁱ Major rivers, such as the Colorado, the Nile, the Ganges, and the Yellow River in China, are used so extensively that little of their water reaches the sea.ⁱⁱⁱ Worldwide, the drinking water of two billion people is contaminated by animal waste and chemical pollution.

CONSUMPTION

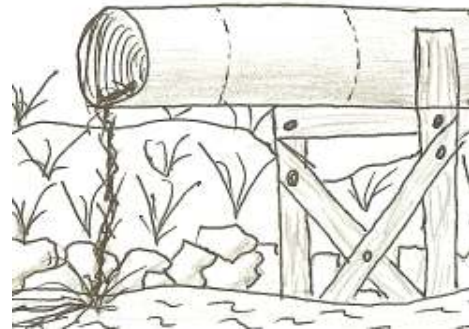
Ogallala Aquifer, the largest aquifer in the US, stretching from Texas to South Dakota, is being drained eight times faster than it can be recharged.^{iv} The amount of acreage supported by the Ogallala Aquifer reached its peak in 1978 and fell 20 percent in less than a decade. In India, almost all water withdrawals are proceeding at double the rate of recharge, causing a drop in aquifers of three to ten feet per year—more than in any other nation. In many areas of the world, groundwater is called “fossil water” because it is not renewable. Three-fourths of the water supply of Saudi Arabia is considered to be fossil water.^v

Between 1900 and 1995 global water consumption rose six-fold, or almost double the population growth.^{vi} Agriculture currently accounts for about 75 percent of the world's freshwater consumption.^{vii} Under current irrigation practices, it takes 1000 tons of water to produce a ton of wheat, at least 15,000 tons to produce a ton of beef, and nearly that much to produce a ton of cotton.^{viii} According to the Millennium Ecosystem Assessment of 2005, the world's freshwater supply cannot sustain current, much less future, demand.^{ix} The freshwater supply in 36 nations in Africa, Asia, and the Middle East is not sufficient to meet grain production needs.^x

Such extensive water use has been made possible by two technologies: electric pumps (for groundwater) and dams. In 1950 there were 5,270 large dams worldwide; in 2000 there were more than 36,500.^{xi} In the US only two percent of rivers run unimpeded by dams.^{xii} In the long-term, dams are only temporary because they will fill up with silt. Where soil erodes easily, as in China, dams can fill with silt at 2.3 percent per year.

CONTAMINATION

According to the EPA, agriculture is responsible for 70 percent of river and stream pollution.^{xiii} In the US, where about half of the public water systems get water from underground, the EPA found more than 50 percent of wells sampled to be contaminated with nitrates from agricultural and lawn fertilizer, manure, sewage sludge, or septic tanks.



These sources of nitrogen also release phosphorus, which can cause eutrophication in lakes and slow moving rivers. Excess phosphorus stimulates excessive growth of algae, which, when it dies, uses up the available oxygen in the water. Lakes become green and foul smelling, devoid of fish, and unfit as a source of drinking water. This phenomenon has long been a problem in the Great Lakes and Europe and is now occurring in South America and Southeast Asia. The mineral phosphorous naturally cycles through the soil, to plants, and then to animals many times before reaching the ocean sediments in a process that might take millions of years. But since humans began mining phosphorous, the cycle has speeded up so that the amount of the mineral in the biosphere has almost quadrupled.^{xiv}

Another serious contaminant from agriculture is pesticides, which run off fields into streams and seep into ground water. More than one-third of Iowa's population consumes water contaminated with pesticides, including cancer-causing xylene and toluene.^{xv}

Dangerous toxins are also emitted from industries and urban sewage treatment facilities. The chemical industry is the largest generator of industrial hazardous wastes. Metal fabrication and battery manufacturing emit heavy metals. Even the "clean" high tech industry has used organochlorine solvents that have seeped into groundwater, causing cancer, miscarriages, and birth defects.^{xvi} In recent years, scientists have detected chemicals in the water from personal care products and pharmaceuticals that the sewage treatment facility did not break down.

Contamination of fresh water affects both humans and wildlife. As many as 1.2 billion people lack access to clean drinking water. More than five million die of waterborne disease each year.^{xvii} (See Toxic Chemicals for types of contamination.) Pollutants, as well as low water levels and warm water from industries, are contributing to the extinction of fish. Scientists now believe that the extra limbs found on frogs and toads in the Midwest may be due to the use of fertilizers.

FUTURE CONCERNS

According to Justus von Liebig's law of the minimum, the amount of life in a given environment is limited by the material need that is shortest in supply. Many scientists believe that fresh water will be the limiting factor for humans.^{xviii} The UN's *Global Environment Outlook* projects that demand for fresh water will rise by 50 percent in the developing world and 18 percent in industrialized countries by 2025. At the same time, climate change is shrinking the glaciers that provide drinking water for nearly one-third of humanity. Of all the environmental security issues facing nations, an adequate supply of clean water may be the most important.^{xix}

Water is unequally distributed over the earth and unequally consumed. The average American uses 2500 cubic yards of water per year, four times as much as the average Swiss and 70 times as much as the average Ghanaian.^{xx} By 2025, two-thirds of the world's population is expected to be water stressed.^{xxi} The Middle East and Africa are already water-poor, and most Asian countries are likely to have severe water problems by 2025.^{xxii} The Arab-Israeli wars have been fought partly over water. Conflicts over water are likely to increase in the years ahead.

WHAT IS BEING DONE?

The UN General Assembly has declared 2005-2015 the International Decade for Action: Water for Life with a goal of reducing the number of people without access to safe drinking water by

half. This involves protecting water resources from contamination and ending the unsustainable exploitation of water resources.^{xxiii} Also many nonprofit organizations are forming in response to water issues. The Blue Planet Project, a global initiative fighting for water justice, works to secure water rights for all, develop sustainable solutions to the exploitation of water resources, and protect freshwater sources.^{xxiv} One of its goals is a treaty that would secure water as a public resource worldwide.^{xxv}

Many experts see reclamation and reuse of wastewater for agricultural, industrial, and even potable uses as a way of increasing water supply. Irrigation systems can channel treated urban wastewater to agricultural areas. In Israel, 50,000 acres of land are irrigated in this fashion.^{xxvi} Singapore now treats domestic wastewater with membrane technology and UV disinfection and then reuses it for drinking water. The city's goal is to become water self-sufficient.

In the US, the Clean Water Act has been very effective in cleaning up rivers and lakes: 66 percent are now safe for swimming compared to 36 percent in 1970. Other promising efforts are being carried out by regional collaborations, such as a California program to halt degradation of the San Francisco Bay-Delta system, which is used for irrigation and drinking water and receives much of the state's agricultural runoff. Eighteen state and federal agencies have cooperated to develop a 30-year plan for long-term sustainability of the estuary.^{xxvii}

ⁱ "Human Appropriation of the World's Fresh Water Supply," www.globalchange.umich.edu, 1/4/06

ⁱⁱ Vitousek, et al, *Science*, June 1997

ⁱⁱⁱ Steiner, Richard, *Seattle Post-Intelligencer*, 5/30/04

^{iv} Finnigan, William, "Leasing the Rain," *New Yorker*, 4/8/02

^v Vitousek, et al, *ibid.*

^{vi} *The Amicus Journal*, Winter 2000

^{vii} "Implementation of the Montevideo Program III for the Period 2000-2005," UN Environment Program, December 2005

^{viii} Leslie, Jacques, "Running Dry," *Harper's Magazine*, July 2000

^{ix} <http://news.bbc.co.uk>, 2005

^x Steiner, Richard, *ibid.*

^{xi} *The Amicus Journal*, Winter 2000

^{xii} Vitousek, et al, *ibid.*

^{xiii} *Biocycle*, June 1998

^{xiv} Bennett, Alena & Carpenter, Steve, "P Soup," *WorldWatch*, 2002

^{xv} Sanford, Cynthia & Oosterhout, Joe, "Protecting Groundwater," *The National Voter*, June/July 1991

^{xvi} Sachs, Aaron, *WorldWatch*, January/February 1999

^{xvii} Leslie, Jacques, *ibid.*

^{xviii} Erlich & Erlich, *Healing the Planet*, 1991

^{xix} Vitousek, et al, *ibid.*

^{xx} Erlich & Erlich, *ibid.*

^{xxi} UN Environment Programme GEO team, "GEO: Global Environment," accessed 1/9/08,

www.grida.no/geo/geo3/english/267.htm

^{xxii} "Human Appropriation of the World's Fresh Water Supply," *ibid.*

^{xxiii} Water for Life, The United Nations, www.un.org/waterforlifedecade, accessed 6/27/06

^{xxiv} Barlow, Maude, "Water in the 21st Century," Illahee lecture series, Portland, Oregon, 3/22/06

^{xxv} Blue Planet Project, www.blueplanetproject.net, accessed 6/27/06

^{xxvi} Hinrichsen, D., Robey, B., and Upadhyay, U.D., *Solutions for a Water-Short World. Population Reports*, Series M, No. 14. Baltimore, Johns Hopkins School of Public Health, Population Information Program, December 1997

^{xxvii} Peterson, Ralph, "International Water and Waste Water Trends and Development," 8/27/03