AIPG
professional geologists
in all specialties of the science

Water Resources

Water is the most important natural resource on the planet. Without it all life would perish and the earth would be nothing like it is today. According to the U.S. Geological Survey, many experts believe that we are transitioning from a mode of water-supply development to that of water demand management and conservation.[1] Why is there so much concern about a depleting water supply when 71% of our planet is covered by it?

Most of the water on the earth is found in the oceans, which contain a high concentration of salts (most notably NaCl) and other elements. Saltwater is not suitable for drinking because it actually induces dehydration Since only about 4% of the water on the entire planet is fresh, concerns over depleted water supplies become increasingly more obvious as population increases.[1] The real problem of having adequate water supplies, is having enough water available in populated areas.

Most of earth's freshwater supply is locked up in the form of ice in remote areas, and so is unavailable for use. As a result, we rely on surface and ground sources of water. The most important source of water is that which is contained in the pore spaces and cracks of rocks and soil, which geologists call aquifers. Aquifers are found in basins where the water table is exposed (lakes and ponds), or in streams of moving water especially in the arid west (see Fig. 1).

THE HYDROLOGIC CYCLE

Our supply of fresh water is constantly being renewed through the cycle of evaporation and precipitation scientists call the "hydrologic cycle." In this process, energy from the sun evaporates water from the ocean and land turning it into a vapor which enters the atmosphere and leads to formation of clouds.[3,6] During the evaporation process, solid particles such as salt and dirt are left behind. Precipitation from the clouds in the form of rain and snow falls on land and see where it is collected and stored in oceans, lakes, streams, and the ground.

The United States receives enough rain annually to cover the entire country to a depth of 30 inches. Unfortunately, the water is not evenly distributed.[2] The problem is that due to population increases, rising living standards, and industrial and economic growth, we are depleting surface- and ground-water supplies at a much greater rate than they are being replenished.[2]

The EPA estimates that each person in the United States uses 80-100 gallons of water for normal household activities in a 24-hour period. In 1995, 341 billion gallons of fresh water per day were withdrawn for domestic, agricultural, and industrial uses; roughly 75% from surface sources, and 25% from ground water sources.[3] Of the amount of water consumed each day, 2/3 was returned to the environment after use.[3] Many of AIPG members are actively involved in protecting, develop-ing, and understanding our water resources.

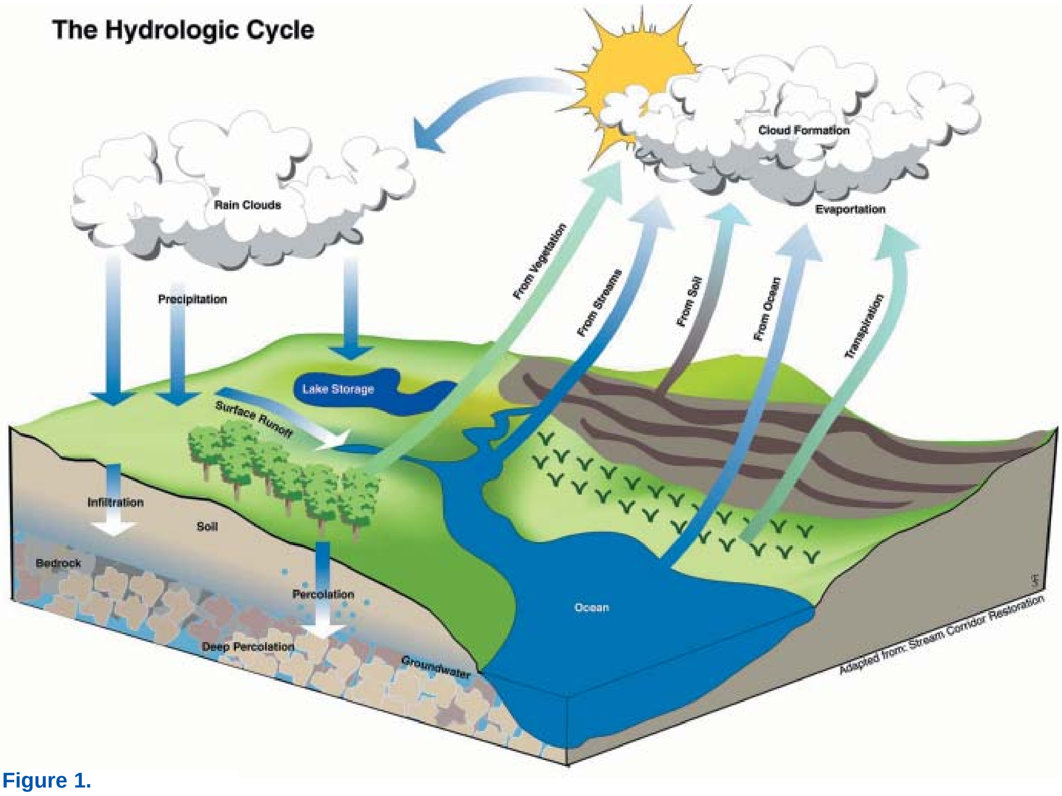


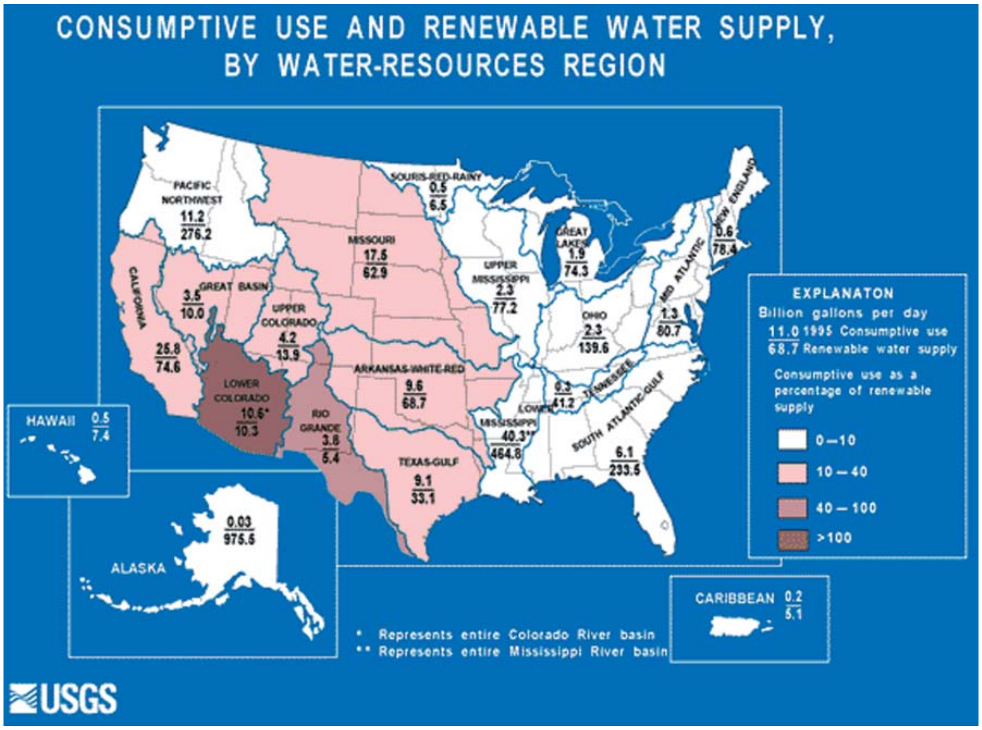
Figure 1.

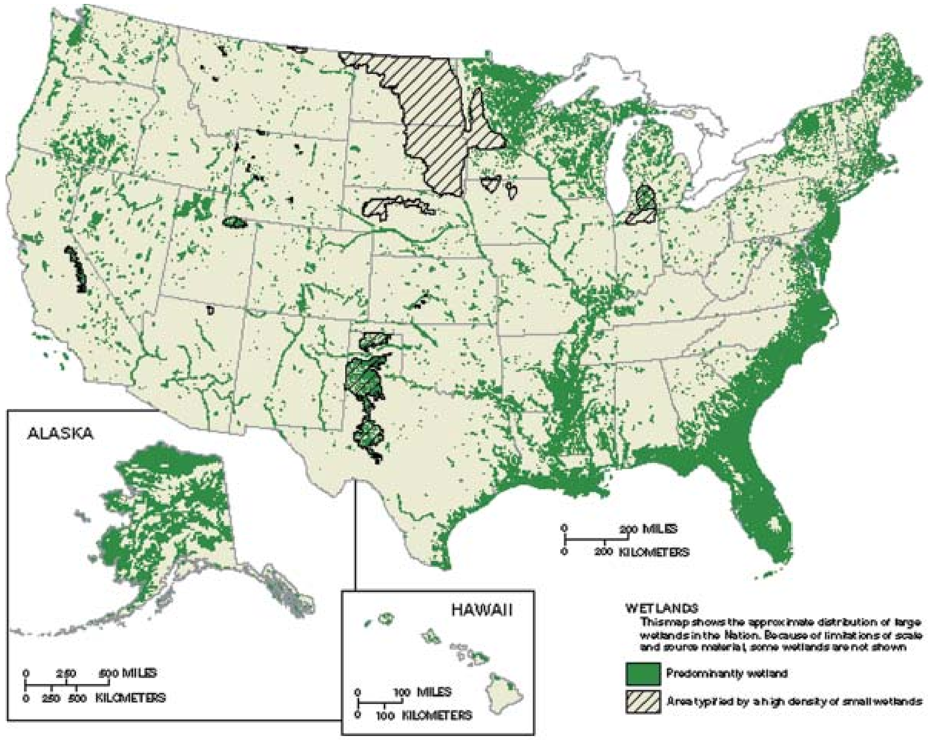
WATER CONSERVATION AND WETLANDS

Wetlands are special areas where surface water collects or ground water discharges, saturating the area for an extended period of time, but not necessarily indefinitely. Some common examples of wetlands are marshes, swamps, and bogs. Of the 221 million acres of wetlands that existed when the first European colonists arrived, only 103 million acres remain today.[4] Wetlands have been drained or changed to accommodate the development needs of our ever-growing and expanding population. Wetlands improve water quality by filtering harmful polutants from ground water and surface water; they are an important spawning and nursery habitat for fish and other wildlife; they provide recreational opportunities including hunting, fishing, bird watching, and nature photography; and they provide effective natural flood control.

The formation an dlocation of wetlands are due to geologic factors including underlying soil type, topography, geomorphology, and hydrology. Throughout geologic time (measured in millions of years) wetlands have formed, migrated, and disappeared as a result of natural processes. In recent years, artificial wetlands have been constructed to treat water either from remediation systems used to clean up environmentally contaminated sites, or as a component of waste-water treatment systems, or to restore a hydrologic regime.

Geologic understanding is essential to the accurate assessment and evlauation of existing wetlands and to the effective design and construction of artificial wetlands. A realization of these benefits has prompted increased interest in their regulation. Section 404 of the Clean Water Act (1972) affords the Federal Government some control over wetland activity and alteration.[5] The American Institute of Professional Geologists (AIPG) believes that qualified geologists with the appropriate training and experience must be included in an interdisciplinary approach to drafting legislation, regulations, or policies regarding the definition, conservation, or drafting legislation, regulations, or policies regarding the definition, conservation, or construction of wetlands, as well as the actual investigation, design, and construction of wetlands.





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5. Wetlands, http://wetlands.fws.gov

6. http://www.epa.gov/seahome.groundwater/src/cycle.htm#cycle (accessed on April 28, 2003).