SUSTAINING OUR WATER RESOURCES

AN IMPENDING WATER CRISIS?

FROM THE PRESIDENT

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PRESIDENT

I want to thank Richard Engberg and Joan Rose for their insightful article, which thoroughly covers legality of water rights and their evolution in this country. In particular, Richard and Joan nicely discuss our nation's attempt to control water quality throughout the country. In an effort to add to their message, I will discuss the priority of utilization of water, a declining resource, in this article. It is imperative that our members participate in this discussion, for water, along with oxygen, represents the core of life itself.

We tend to focus on short-term challenges out of necessity—we need to overcome them first to get to the lasting, long-term solutions. An example of this is the process of corporate and institutional planning where we tend to focus on a three- or five-year plan instead of considering further into the future. Thinking in the short term is not adequate when it comes to addressing our national water issue. I speculate that, during this century, water could become the single most critical issue our country and our world faces. We need to start thinking now, for the long term, in order to prevent a total water crisis.

To set the background for this article I want to include a few measures or statistics from the Food and Agricultural Organization of the United Nations (UN FAO) to provide some perspective about the growing water issue both locally and globally (see *fao.org/water/en* for more information):

- The daily drinking water requirements per person are two to four liters; however, it takes 2,000 to 5,000 liters of water to produce a person's daily food supply in developed countries.
- UN FAO estimates the world's growing population will require about 50 percent more food by 2030 compared to 1998; in the last 30 years, for instance, food production has increased by more than 100 percent.
- UN FAO estimates irrigated land in developed countries will increase by 34 percent by 2030, but the amount of water used by agriculture will only increase by about 14 percent, thanks to improved irrigation practices.

Human population growth, urbanization and expansion, and greater agricultural use, among other factors, will not only reduce water availability per person but will most likely adversely affect biodiversity.

Other major factors that limit water availability include rainfall, temperature, evaporation rates, soil quality, vegetation type, and water runoff. In the U.S., we are fortunate that we have substantial water per capita, as indicated in Table 1 compared to some of the African and Middle-Eastern countries. In fact, a handful of U.S. states (i.e., 17 western states) have water rights, which allow these states to deal with the allocation of water, a valuable resource, in a more structured and organized way. Water allocation does not imply implicit use or best practice. If water resources continue to diminish, however, there could be a time in the next century during which water plans and laws may be highly regulated. In the eastern part of our country, for the extremely large population centers, we have already outgrown natural water supplies and have had to build reservoirs to supplement normal fresh water resources.

SOURCES AND USES OF WATER

In the U.S. currently, water utilization differs greatly based on the sector. For instance, industry utilizes 48 percent of the water, agriculture utilizes 38.7 percent of the water, and domestic use accounts for 13.34 percent. These percentages vary dramatically around the world, but Europe's level of water utilization is the closest to our nation's use. The sources of water for these sectors merit further discussion. We tap into aquifers through wells, for instance, as a primary water source. Aquifers provide approximately 23 percent of our water in the U.S. However, when we withdraw water from aquifers, we withdraw it at such a rate that replenishment via groundwater sources often

TABLE 1. Annual water availability per capita for seven regions with water problems (annual water availability per capita of less than 1 million liters per year) and for the U.S. (adapted from Pimentel et al., 2004).

REGION	WATER AVAILABILITY PER CAPITA (thousands of liters per year)
Egypt	40
West Bank	126
Jordan	255
Saudi Arabia	300
Israel	376
Syria	440
Kenya	610
U.S.	1862

occurs too slowly. Some of the major examples of aquifers in the U.S. is the Ogallala Aquifer and parts of Arizona. The Ogallala Aquifer, which underlies parts of Nebraska, South Dakota, Colorado, Kansas, Texas, Oklahoma, and New Mexico has decreased 30 percent in size since 1950, which has resulted in lower water production and, thus, utilization. In fact, water removal from the Ogallala Aquifer is three times faster than its recharge or replenishment rate. Many aquifers throughout the U.S. are being withdrawn far too often—more than 10 times faster than their recharge rate.

THE COMPACT—A MODEL OF EFFECTIVE WATER RESOURCE MANAGEMENT IN THE GREAT LAKES

One example of effective water resource management on a regional scale has been formulated in the last 10 years—the Great Lakes–St. Lawrence River Basin Water Resources Compact (the Compact), a regional agreement shared by the U.S. governors from eight Great Lakes states and two Canadian provinces, (Ontario and Québec). This agreement outlines a shared responsibility to protect and conserve Great Lakes water resources. In the fall of 2008, this agreement was finally ratified by all eight Great Lakes states and the Canadian provinces, approved by the U.S. Senate, and signed into law. The Compact is unique in that it provides the most comprehensive water use protection for the Great Lakes in perpetuity. This agreement closes the door on exporting our Great Lakes water outside the region and establishes protections against unsustainable water use in their region. The Compact is important because it allows people who reside in the Great Lakes basin to maintain control of the water resources. The Compact:

- Considers the Great Lakes, their tributaries, and groundwater to be one ecosystem subject to the same environmental standard;
- Establishes protection of the ecosystem and economies that depend on the Great Lakes, which is a priority everywhere in the basin; and,
- Ensures that every Great Lakes state and territory will have the same set of rational protections in regard to water resources in the basin.

The Compact protects the Great Lakes from future harm regarding competing interests and demands for water resources by implementing a stable, effective management program. The Compact is also heavily enforced, which sets this agreement apart from other agreements. Simply, the Compact guarantees long-term management, protection, and sustainability of Great Lakes water resources, thereby ensuring that they are protected for generations to come.

THE FUTURE OF WATER RESOURCES

The diminishing water resources and sources of water, particularly in the Western U.S. and other arid parts of North America, if not properly maintained, will negatively impact many sectors, such as agriculture, wildlife, forestry, fisheries, and the human environment, just to name a few. For example, the drastic drainage of more than half of U.S. wetlands, which contained 45 percent of federally listed endangered or threatened species, has severely disrupted ecosystems and the populations of organisms they support.

In a paper I recently read on the topic of water resources, the authors recommend the following priorities for utilizing water more wisely in an effort to protect these resources and their sources for the future. These priorities include:

- Targeting the farming or agriculture industry with incentives to conserve water (agriculture consumes 70 percent of the world's freshwater);
- Implementing water-conserving irrigation practices, such as drip irrigation, to improve water utilization efficiency;
- Reducing or eliminating water subsidies that encourage the wasteful use of water by farmers, industry, and the public;
- Implementing World Bank policies for the fair pricing of fresh water;
- Protecting forests, wetlands, aquatic, and other natural ecosystems to enhance the conservation of water; and,
- Controlling water pollution to protect public health, agriculture, and the environment.

WATER AND WILDLIFE

I hope this article has presented some factual information in regard to our world's water issues including the significance of increased water consumption and challenges associated with water allocation among multiple, and competing, sectors. In preparation for this article, I enjoyed sifting through the primary literature for papers on this topic. However, in my search, I came across few, if any, papers on water and wildlife. Though I understand that there are powerful and conflicting water needs, it is important to remember that wildlife needs are important as well, and that they should be seriously considered in decisions about water use and allocation. For instance, how do we make sure there is enough water left to support wildlife and their habitats? In my opinion, long-term planning is the answer, in addition to the inclusion of all sectors and their needs at the decision-making table. ■