



Yankee Ingenuity

In the United States, drought is a familiar visitor, though in the past five years some might say it has worn out its welcome. Until recently, the federal government treated drought like other natural disasters, such as tornadoes and earthquakes, with emergency response and relief. Recent droughts, from the West to the Southeast, however, have revealed the inadequacies of such short-term, reactive responses.

State organizations, scientific panels, and federal agencies have begun to consider integrated risk-management approaches, says Donald Wilhite of the National Drought Mitigation Center. The U.S. Department of Agriculture has been designated the lead federal agency for drought, and Congress has created a National Drought Policy Commission. Wilhite says that if we experience a few wet years, however, support for the new paradigm may evaporate. "It is critical for the scientific community and the public to hold policymakers to this commitment," he says.

Although we live on the most water-rich planet in the universe, most of the water is either too salty, or too dirty, for human use. The solution is to imitate nature's miraculous hydrological cycle by developing new technologies to refine and deliver purified and desalinized water, says Ronald Linsky with

the National Water Research Institute. In Orange County, California, for instance, micro-filtration techniques and disinfection with ultraviolet light can turn wastewater from a sewage treatment plant into drinking water.

Yet spot shortages of freshwater are a recurrent fact of life. In the western United States, where 35 percent of the water consumed comes from groundwater, farmers have historically had the right of prior appropriation of groundwater—that is, first come, first served—with the caveat, use it or lose it. Today, much of the available groundwater is pumped for irrigated agriculture, a practice that is often wasteful. In the meantime, population growth in urban centers is making it profitable to pump water long distances from the source. These changes are putting pressure on the aquifer, but also on legal doctrines that were designed to protect them, say political scientists Jeff Ashley and Zachary Smith. While some states lag behind, others are proving existing law can evolve along with changing usage. Arizona, for example, passed a Groundwater Management Act in 1980 that has substantially reduced overdrafting in the state.

Not only does human intervention in the hydrologic cycle—from dams to irrigation to destruction of adjacent lands—deplete surface and groundwater supplies, it has also upset the

delicate balance of aquatic ecosystems. Today, the rate of damage far exceeds the rate of restoration, says Virginia Tech biologist John Cairns Jr. Cairns argues that we have an ethical duty to restore these damaged ecosystems, preferably on the ecoregion level, for the benefit of humans and the biota.

Protecting endangered species is one aspect of environmental stewardship. Yet the Endangered Species Act, which has become one of the most powerful environmental laws ever, is flawed in many ways, says James Hansen, a congressman from Utah. Specifically, it is devoid of economic considerations. Hansen introduced, and Congress passed, a bill to authorize federal cost-sharing for recovery programs targeting endangered fish. As a result of federal support and interagency cooperation, endangered fish such as the Colorado pikeminnow and the razorback sucker are on the road to recovery.

As these examples show, human intervention in the natural hydrological cycle can result in degradation of water resources, but human ingenuity, when appropriately targeted, can ensure adequate water supplies while restoring water resources and protecting the environment.

The Editors