Pioneering Solutions

In the early days of the American West, the U.S. government encouraged allocation of water resources on a first-come, first-served basis and promoted development with disregard for the environment. It was the rare observer—like explorer, geologist, and ethnologist John Wesley Powell—who could see the big picture. Powell advocated developing the West along "hydrographic basin" lines that transcend political boundaries.

Today, a water-basin approach to managing water is finally making inroads with policymakers in the United States. "A watershed's upland flora and fauna, biotic integrity, riparian area, stream structure, and hydrology are a single system in nature," says the Bonneville Environmental Foundation's Angus Duncan. "Disconnect the parts and the whole unravels."

Watershed science can serve as a kind of referee for competing interests guarding their own territory. We need to find an alternative to the fundamental mismatch between current institutions of river governance and the ecology of watersheds, Duncan says

Governors of Maryland, Pennsylvania, and Virginia, along with the mayor of Washington, D.C., the Chesapeake Bay Commission, and the administrator of the U.S. Environmental Protection Agency, have taken a giant step in that direction with a new interstate agreement: *Chesapeake 2000*.

The Chesapeake Bay is the largest estuary in North America, but ever since Captain John Smith described the bay in the early 1600s, its health has been in a steady decline, say Geoff Oxnam and John Page Williams of the Chesapeake Bay Foundation.

Over the years, the bay's waters have received multiple insults, including household waste, industrial pollution, agricultural runoff, and sediment pollution from development. Since its inception in 1967, the Chesapeake Bay Foundation has advocated state and federal response to the decline of the bay and spearheaded research and environmental outreach programs. Still, the bay is just barely holding its own. One of the most dire threats is harmful sprawl, which gobbles up open land in the watershed and increases the load of effluent entering the waters. *Chesapeake 2000* aims to reduce the rate of conversion of land for sprawl and preserve 20 percent of the land area of the watershed.

While watershed management may seem like an idea whose time has come, the Tennessee Valley Authority has been treating the Tennessee River and its tributaries as a single unit for over six decades, say Jack Davis and colleagues with TVA. From the start, in the 1930s, TVA has aimed to realize the full potential of the Tennessee River and its tributaries. To that end, TVA operates its 49 dams as a single unit balancing multiple uses, from navigation and flood control, to recreation.

TVA operates two types of dams, one on the river's major tributaries to regulate seasonal flows of water, another on the main channel of the river, primarily for navigation. Moreover, TVA allows a good deal of flexibility in its day-to-day operations to respond to variations in streamflow and rainfall. Finally, TVA's integrated system balances competing demands to support navigation, flood control, recreation, fishing, aquatic habitat, waste removal, and thermal cooling.

Ironically, at a time when population growth and economic development are sparking water wars even in water-rich regions, the integrity of the TVA system is being challenged. Several scenarios have been proposed, including splitting its responsibilities among several agencies or even privatization. To dismantle a successful and productive model would result in a waste of water and money, the authors say. Instead, TVA's integrated approach to river management should serve as a model for other regional watersheds coping with conflict over allocation of scarce water resources.

The Editors