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Overview: Sandra Postel

Sharing the Rivers

As pressure on fresh water increases, the need for co-operation between states to protect them and share them is growing. Here **Sandra Postel** reviews the global challenge and calls for a new ethic of river sharing.



Image: Crop burning adds to the environmental devastation at Muynak in the Aral Sea basin. © Marcus Rose/Panos Pictures

Just south of the US-Mexico border, the Cucapá, or "people of the river," have fished and farmed in the delta of the Colorado River for some 2,000 years. Today, they are a culture at risk of extinction. Just 40 to 50 families remain in the delta region. There is little work for the younger tribal members, and many have migrated to the cities. Traditionally, they ate fish three times a day, but now they are fortunate to have it once a week. Since their water is too salty to grow melons, squash, and other traditional crops, their diets have become less healthy. One expert on the Cucapá predicted a few years ago that "barring a miracle, you're seeing the last of them."

The reason for the Cucapá's precarious state lies in the neon lights of Las Vegas, the cotton fields of Arizona, and the swimming pools of Los Angeles. The Colorado River, the Cucapá's lifeblood, has been so heavily dammed and diverted in the western United States that it literally disappears into the desert before it reaches the sea. Seventy-five years ago, the American naturalist Aldo Leopold described the Colorado delta as a "milk-and-honey wilderness" teeming with wildlife. But that was before more river water was promised to seven U.S. states and Mexico than the river annually carried. Today, the delta is a desiccated place of mud-cracked earth, salt flats, and murky pools.

Unfortunately, what has happened to the Colorado is but an extreme example of a disturbing and widespread decline of the aquatic environment worldwide. Globally, water use has more than tripled since 1950, and the answer to this rising demand generally has been to build more and bigger water supply projects - especially dams and river diversions. Around the world, the number of large dams (those more than 15 metres high) has climbed from just over 5,000 in 1950 to about 38,000 today. More than 85 per cent of the large dams now standing have been built during the last 35 years.

This is a massive change in the global aquatic environment in a very short period of time. Many rivers now resemble elaborate plumbing works, with the timing and amount of flow completely controlled, like water from a faucet, so as to maximize the rivers' benefits for humans. As population and consumption levels grow, more and more rivers supply increasing volumes of water to cities, industries, and farms - but lose their vital ecological support functions in the process. The Nile of northeast Africa, the Ganges of south Asia, the Amu Dar'ya and Syr Dar'ya in the Aral Sea basin, the Huang He (Yellow River) in China, and the Colorado are among the major rivers that are each now so dammed, diverted, or overtapped that for parts of the year little or none of their freshwater reaches the sea.

Not surprisingly, aquatic systems are showing signs of deterioration, decline, and, in some cases, collapse. Fresh waters contain abundant animal life - including, for example, about 40 per cent of the 20,000 recognized fish species. According to some estimates, the total diversity of animal life per unit area of rivers is 65 times greater than that of the seas. But freshwater fish and other animal life are increasingly threatened by the destruction of their habitat. Dams, dikes, diversions, and levees eliminate vital floodplain habitat, change temperature and salinity conditions, alter the volume and timing of river flow, trap sediment and nutrients upstream, dry up wetlands, and block fish migration. In North America, the American Fisheries Society lists 364 species or subspecies of fish as threatened, endangered, or of special concern - the vast majority of them at risk because of habitat destruction. One of the most dramatic cases of river depletion has occurred in the Aral Sea basin of central Asia. Once the planet's fourth largest lake, the Aral has lost half its area and three fourths of its volume because of excessive diversions of its two major sources of inflow - the Amu Dar'ya and Syr Dar'ya - in order to grow cotton in the desert. Prior to 1960, the two rivers poured 55 billion cubic metres of water a year into the Aral. Between 1981 and 1990, their combined flow into the sea dropped to an average of 7 billion cubic metres, just 6 per cent of their total annual flow.



Image: Ataturk Dam in Eastern Turkey. © M.McEvoy/Panos Pictures

Wetlands in the Aral basin river deltas have shrunk by 85 per cent. Twenty of the 24 native fish species have disappeared, and the fish catch, which totalled 44,000 tons a year in the 1950s and supported some 60,000 jobs, has dropped to zero. Low river flows have concentrated salts and toxic chemicals, making water supplies hazardous to drink and, along with the lack of sanitation services, contributing to rampant disease. The population of Muynak, a former fishing town, has dropped from 40,000 several decades ago to just 12,000 today. The 28,000 people who have fled are "ecological refugees" in the truest sense. The Aral Sea disaster shows vividly how damage to economy, social stability, and human health can follow close on the heels of ecosystem destruction.

As water supplies increasingly fall short of needs, competition for water is increasing not only between the human economy and the natural environment, but between and within countries. A new politics of scarcity is emerging as farms and cities, states and provinces, and neighbouring countries compete for a limited or shrinking pool. Three principal forces conspire to make water scarcity a potential source of conflict: the depletion or degradation of the resource, which shrinks the 'resource pie', population growth, which forces the pie to be divided into smaller slices; and unequal distribution or access, which means some get larger slices than others.

Much of the tension and strife over water scarcity to date has occurred within countries, but the potential for hostility or conflict between countries exists as well. Unique among strategic resources, water flows easily across political boundaries. Many countries depend on river water from upstream neighbours for a substantial portion of their surface supplies. Particularly in the face of population growth and rising water demands, these countries can become highly vulnerable to decisions by upstream countries to siphon off more water for themselves. According to Thomas Homer-Dixon of the University of Toronto, co-director of the project on Environmental Change and Acute Conflict, the evidence suggests that "the renewable resource most likely to stimulate interstate resource war is river water."

River basins most likely to be hot spots for hostility are those in which the river is shared by at least two countries, water is insufficient to meet all projected demands, and there is no recognized treaty governing the allocation of water among all basin countries. Examples of such potential hot spots include the Ganges, the Nile, the Jordan, the Tigris-Euphrates, and the Amy Dar'ya and Syr Dar'ya.

Egypt may be more vulnerable than any other country to a reduction in river water flowing into its territory. The nation depends on Nile water for 97 per cent of its surface supplies. With a population of 60 million climbing by 1 million every nine months, some 2.5 million hectares of cropland totally dependent on irrigation, and a current water demand that is very near the limits of the total supply, any cutoff of Nile flow would be highly disruptive, if not disastrous. Until recently, Egypt was at minimal risk of suffering such reductions, except, of course, from drought. But Ethiopia, which controls 86 per cent of the Nile's total flow, is now intent on developing water resources for its own economic advancement. If Ethiopia were to use Nile water to irrigate even half of its potentially irrigable area, flows downstream to Egypt could be reduced by some 9 billion cubic metres per year - equal to 16 per cent of Egypt's current annual Nile supply.



Image: Former fishing port at Aralsk on the Aral Sea. The sea is now 40 miles away. © Steve Percy / Panos Pictures

When downstream countries are relatively less powerful than water-controlling upstream countries, conflict may be unlikely, but social and economic insecurity - which, in turn, can lead to political instability - can be great. For example, as the weaker riparian, Bangladesh will almost certainly not choose to go to war with India over the Ganges. But the nation suffers greatly as the last in line to receive the river's water. Likewise, Syria and Iraq remain vulnerable to Turkey's massive dam-building upstream on the Euphrates River.

Achieving more sustainable patterns of water use and restoring and maintaining the integrity of river systems is going to take the deployment of new technologies, policies, and management strategies. More effective water pricing and water marketing, for example, can create incentives to use water more efficiently and to allocate it more sensibly. Along with the setting of water-efficiency standards, such incentives can encourage greater use of the brace of conservation technologies that are on the shelf, but underused.

Greater co-operation both within and between countries is also urgently needed - not only to avert conflict, but to protect the aquatic environment that underpins regional economies. At least 214 rivers flow through two or more nations. At the moment, however, international law offers little concrete help in resolving water disputes between nations, and says virtually nothing about protection of water ecosystems. It is largely up to governments, with public involvement, to hammer out water-sharing agreements that are equitable and ecologically sound. Much work remains to be done, but there are hopeful signs of co-operation in such places as the Aral Sea and Nile basins.

Water is the basis of life. Reconciling humanity's growing demands on freshwater systems with the protection of their vital life-support functions ranks among the most critical challenges in the decades ahead. It will require, most fundamentally, a new ethic of sharing water - both with each other and with nature as well.

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