
WORKING TOGETHER HOLISTICALLY: A SYMPHONIC APPROACH TO WATERSHED MANAGEMENT

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Adam Smith, the 18th-Century philosopher generally credited with laying the foundation of modern economics, described the paradox of diamonds and water: how could it be that water, so essential to life, is so cheap while diamonds, used only for adornment, are very costly?

While I was still at the Office of Water at the U.S. Environmental Protection Agency (USEPA), our economists calculated the amount American households spent on soft drinks relative to drinking water and wastewater charges. On average, they spent \$707 a year on carbonated soft drinks and other, noncarbonated refreshment beverages. This compared with an average of \$474 a year per household spent on water and wastewater charges (these are based on 2001 figures).

United States (U.S.) households pay roughly six-tenths of one percent of income for water infrastructure charges, one of the lowest among developed countries. So at least in economic terms, our prices and expenditures hardly reflect the true value of water.

Yet, there are signs that cannot be ignored, signs that will usher in a water constrained era that will necessitate better management of both the supply side and the demand side of water policy. A 2003 survey of state water managers, by the U.S. General Accountability Office (GAO), indicated that, even under normal or nondrought water conditions, 36 states anticipate water shortages in localities, regions, or statewide within the next 10 years. Under drought conditions 46 states expect shortages over the next decade.

Moreover, increasing population and declining ground water levels indicate that the freshwater supply is reaching its limits in some locations while freshwater demand is increasing. The building of new, large reservoir projects has tapered off, and existing storage is threatened by age and sedimentation.

The U.S. Geological Survey (USGS) does report some good news in that U.S. water use overall has stabilized since 1985. However, fresh ground water withdrawals are up 14 percent as of 2000. Whereas surface water had provided 74 percent the public water supply in 1974, it is now down to 63 percent. And while self-supplied domestic water withdrawals, mostly wells, represents only 1 percent of total freshwater withdrawals, ground water makes up 98 percent of this category of use.

There are also challenges aplenty in terms of the quality of the water available to Americans for their use and enjoyment. As reported by state water programs for the year 2000, approximately 45 percent of waters assessed are not clean enough to meet basic uses such as fishing and swimming. Thirty-nine percent of assessed rivers, streams, and lakes are not safe for fish consumption due in many cases to air deposition (as in the case

of mercury), or contaminated sediments (as in the case of Polychlorinated Biphenyls (PCB's)).

The quality and quantity of surface water and ground water, as well as the overall integrity of the hydrologic cycle, are diminished by human activities on the land throughout the watershed. Diffuse, polluted runoff from parking lots, streets, sidewalks, golf courses, construction sites, and agricultural operations carry sediment, nutrients, oil, and other contaminants into rivers, streams, and lakes. Urban development reduces water infiltrating to ground water from 37 percent to approximately 15 percent because hard, impervious surfaces prevent it from seeping into the ground thus failing to filter out pollutants and replenish ground water.

A famous theologian once said that "Truth is symphonic." To comprehend the whole truth of a matter, you must harmonize or account for many different, but related, parts of a very complex piece. In view of the complexity of water management in the 21st Century, this is a compelling, useful metaphor.

Generally speaking, a parking lot might be 95 percent impervious. Even a residential lawn might be 40 percent impervious due to soil being compacted during construction and landscaping. So, it is easy to see that between 1982 and 1997 the percentage of developed watersheds (at the 8-digit Hydrologic Unite Code or HUC level) nearly doubled from 5.4 percent to 9.5 percent. That is, they had 15 percent or more of their area developed to urban land cover. Land consumption occurred at more than twice the rate of population growth nationally.

In addition to quantity and quality concerns, the disruption of the natural flow regime or hydrograph degrades the ecological integrity of our waters in terms of water temperature, channel geomorphology, and habitat diversity. Flow has been described as a kind of "master variable" with five critical components regulating ecological processes in river systems: the magnitude, frequency, duration, timing, and rate of change of hydrologic conditions. Thus, issues such as nonpoint source pollution, especially stormwater, urban development, surface water quality, and ground water supply all begin to collapse into one another.

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Given a growing population and expanding urban settlements and their concomitant impacts on water quality and supply, we need to assess, monitor, and manage our water resources comprehensively rather than compartmentally.

For too long we have focused on different aspects of water management in isolation of others. Just think of the ways our laws and our practice of water management has conceptualized water resources management:

- ◆ Water quantity versus quality
- ◆ Land versus water
- ◆ Chemical versus the physical and biological components of the ecosystem
- ◆ Supply versus demand management
- ◆ Political versus hydrological boundaries
- ◆ Point sources versus nonpoint sources of pollution

Overcoming these artificial categories cries out for a holistic approach drawing upon numerous disciplines in a collaborative, integrative mode of watershed or basin management.

At the risk of flogging this metaphor, it will be necessary for someone or some thing to “conduct” this symphony of stakeholders, jurisdictions, disciplines. Someone or some thing must “compose” or assemble partnerships across political jurisdictions, but within watershed boundaries, and demonstrate leadership in mobilizing the public, private, and not-for-profit sectors of society.

These partnerships, in turn, will drive progress toward appropriate water management regimes at multiple levels of society and our federal system of governance. Indeed, the federal government is a necessary partner, even a paramount one for large scale watersheds such as the Gulf of Mexico which encompasses 41 percent of the continental U.S.! But the federal government should be a limited partner in most basins due to the predominantly regional and local nature of many challenges, especially that of land development.

Alexis de Tocqueville, one Frenchman who will never go out of fashion in this country, toured America in the early 19th Century. His book, *Democracy in America*, is one of the most insightful studies of the American character and its democratic institutions, warts and all. He discerned the genius Americans displayed in forming voluntary associations, intermediate institutions that mediate between solitary individuals and large, centralized government. He captured this insight in this famous passage:

“Americans of all ages, all conditions, and all dispositions constantly form associations. They have not only commercial and manufacturing companies, in which all take part, but associations of a thousand other kinds, religious, moral, serious, futile, general

or restricted, enormous or diminutive. The Americans make associations to give entertainments, to found seminaries, to build inns, to construct churches, to diffuse books, to send missionaries to the antipodes; in this manner they found hospitals, prisons, and schools. If it is proposed to inculcate some truth or to foster some feeling by the encouragement of a great example, they form a society. Whenever at the head of some new undertaking you see the government in France, or a man of rank in England, in the United States you will be sure to find an association.”

Tocqueville’s concept of an association is a perfect fit with watershed management and the varieties of institutions suited to this task, be it local watershed associations or formal, interstate compacts and commissions. It allows for the building up of priceless social capital at multiple levels of society and government through authentic interaction of all interested stakeholders – private and not-for-profit as well as governmental.

Integrated watershed management, for it to be successful, must work socially and politically, not just hydrologically. So water managers will have to engage a wide array of stakeholders with endless patience, in a spirit of civic education, on the challenges of managing the waters of the U.S. for the benefit of humanity as well as the natural world.

It is time for water managers to pick up the baton, tap the lectern, and commence the symphony.

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