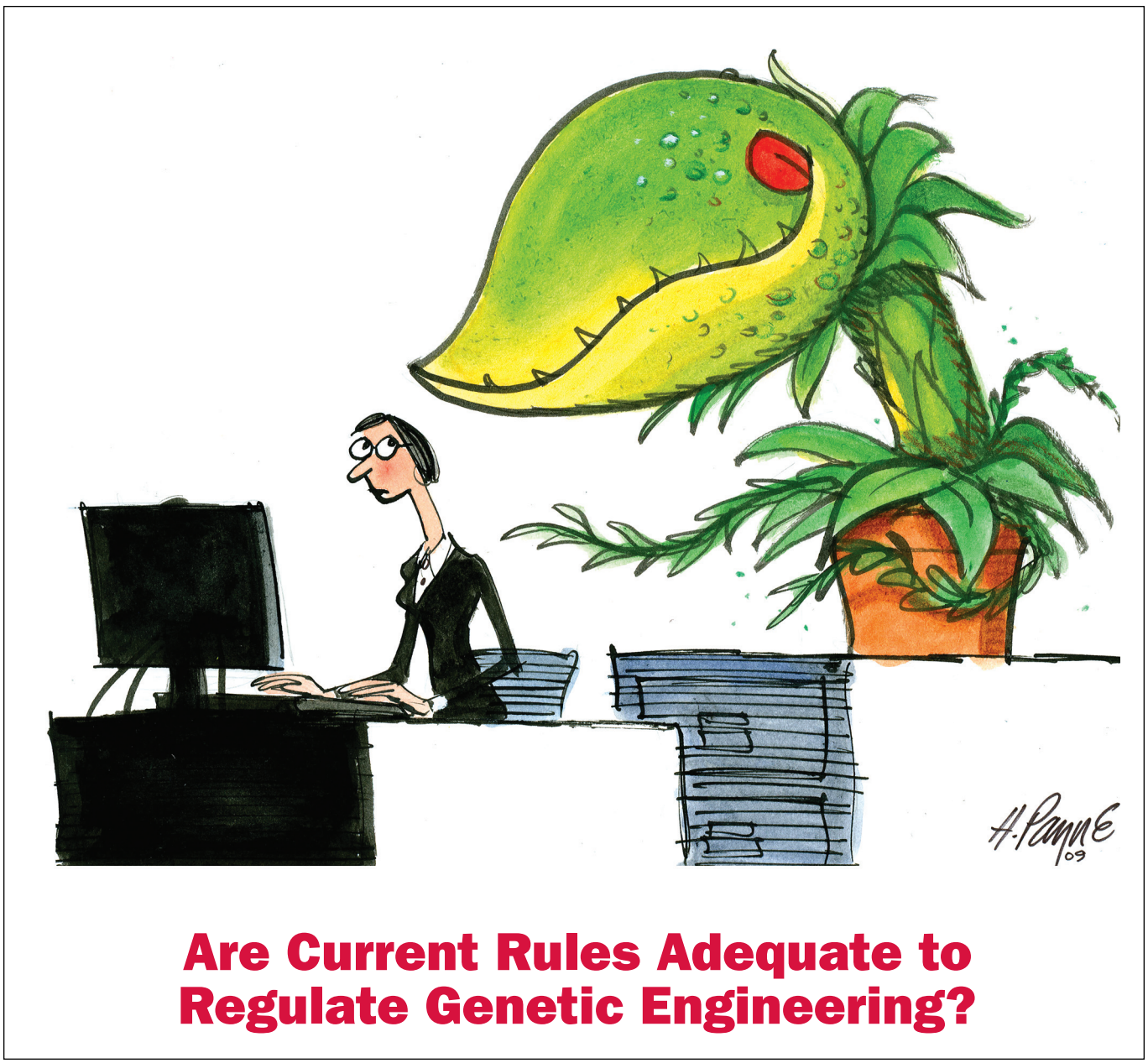
THE Environmental Forum®

Volume 26, Number 2 • March/April 2009

Advancing Environmental Protection Through Analysis • Opinion • Debate



Are Current Rules Adequate to Regulate Genetic Engineering?

Water's Worth
The U.S. Faces a Future of Scarcity

Vision Test
Eyeballing IRIS, the Toxics Bible

Regulating Climate
Should Obama Wait for Congress to Act?

Our Cup Runneth Dry

Henceforth, North Americans will have to give up their assumption of an easy abundance of water, transcend their fears of future scarcity, and manage their water resources sustainably with due regard for their full value — ecological, economic, and social

G. Tracy Mehan III

Early in 2008 I was invited to a New England college to discuss a topic ominously titled "Is Water the Next Oil?" In such a center for lively discussion, I offered a provocative answer: "If only it were."

In North America we do not prize water as highly as oil in terms of its price or the amount of money we invest in exploring, developing, drilling, transporting, refining, or pumping it out of the source and into the multiple uses operated by the average American household. We do not pay the full cost of maintaining our water infrastructure, much less account for the full value of water's ecological, economic, or social value in our water utility rates. We subsidize wasteful water projects and consumptive uses, as well as agriculture and ethanol — all energy-intensive enterprises.

G. Tracy Mehan III served as Assistant Administrator for Water at the U.S. Environmental Protection Agency from 2001 to 2003. He was Director of both the Missouri Department of Natural Resources and the Michigan Office of the Great Lakes. He is a Principal with the Cadmus Group Inc., based in Arlington, Virginia. This article and the accompanying sidebar are adapted from One Issue, Two Voices (Issue 10, November 2008), "Water Abundance in Canada and the United States: Myth or Reality?" which was published by the Canada Institute of the Woodrow Wilson International Center for Scholars.

We charge the same for water whether it is used for drinking or for swimming pools. We do not allow markets to function in a way that would, economically speaking, enable water to flow to the highest and best uses. We pave paradise, fill wetlands, encroach on flood plains, clear forests, and otherwise disrupt natural flow regimes and the water cycle. And we fail to treat runoff or stormwater as a valuable resource that should be retained on site, infiltrated into groundwater, or reused where feasible.

This paradox captures something of the difficulty in answering the question, Does North America have an abundance of water? The answer is obviously critical, given that water is not only essential for life on this planet but also has value to human beings in terms of climate, culture, technology, governance, and supply and demand. Whether North American water abundance is a myth or a reality, however, depends on many factors, both now and in the future.

Governance will remain a key variable in our drive for sustainable water management since the whole process is highly decentralized. In the United States, law and tradition place management of water quantity primarily in the hands of states, either individually or, if they negotiate an interstate compact that allocates water among them, then regionally. State laws break down into regulatory regimes of Prior Appropriation ("First in time, first in right" and "Use it or lose it") and Riparian Doctrine ("reasonable use"), in the arid West and the humid East, respectively.

There is also a federal common law of equitable apportionment, derived from Supreme Court decisions such as that governing the diversion of Lake

Michigan water at Chicago. The Commerce Clause of the Constitution has been interpreted to encompass water as a commodity in interstate commerce in some circumstances. Moreover, federal laws such as the Endangered Species Act and the Clean Water Act can substantively impinge on state prerogatives in the management of water.

The North American Situation Is Neither Dire nor Hopeless

Before exploring the myth or reality of water abundance in our hemisphere, it will be useful to look at true scarcity from a global perspective. According to the World Health Organization, an estimated 6 million people died in 2003, many of them young children, because of a lack of clean water and sanitation. An expert panel called it "a silent tsunami," given that as many poor people are dying each month from these causes as perished during the Southeast Asian tsunami of December 2004.

As we explore the ways North Americans should husband their precious water resources, we should also recognize that our situation is neither dire nor hopeless. We are blessed with vast resources, wealth, and ingenuity in terms of our ability to manage our natural resources and, we hope, ourselves too. One positive development in the United States is the finding that water use has varied less than 3 percent since 1985 as withdrawals have stabilized for the two largest uses, thermoelectric power and irrigation — a flattening out of water use despite a growing population and economy.

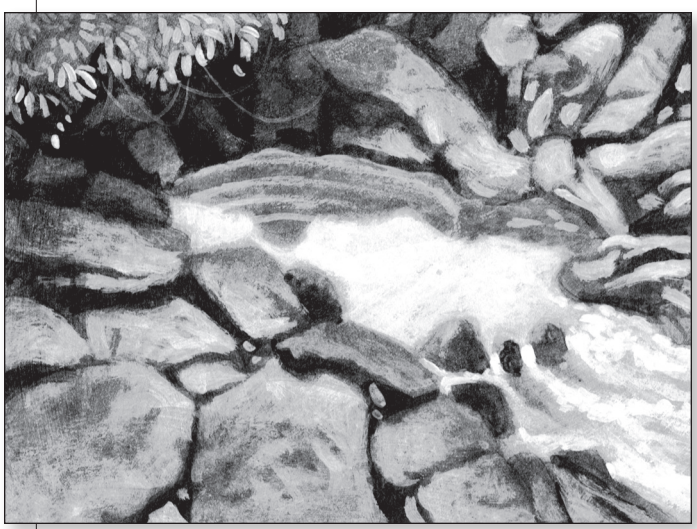
Debating the allocation of water to swimming pools, drinking water, trout streams, irrigation, or industrial uses is important; but it is not a matter of life or death in America or Canada as it is in southern Africa or parts of Asia. In fact, many of our problems stem from our affluence, not our want. "Absolute scarcity is not our problem," maintains Peter H. Gleick, president of the Pacific Institute for Studies in Development, Environment, and Security in Oakland, California, who views the matter globally. He believes that "there is almost no place on the planet where basic human needs for drinking, sanitation, cooking, and cleaning cannot be met with locally available resources."

What is true for the entire world is even more so for North America, although we aspire to ambitious standards of economic growth and personal lifestyle. Given our "exuberant" expectations, it is necessary to redefine proper water management to include demand-side management as much as the supply side, such as proper pricing of water and water services, treating wastewater as an asset, and emphasizing water efficiency, conservation, reuse, and recycling. "Demand is growing, and supply is pretty much staying static," says Wade Miller, executive director of the WateReuse Association in

Alexandria, Virginia, which focuses on reuse and recycling. And issues such as a changing climate, the increasing cost of basic infrastructure, and the energy required to collect, treat, and distribute water are additional confounding factors.

Getting the prices right will be necessary for purposes of maintaining water infrastructure and encouraging water efficiency. In the United States at least, we do not cover the full cost, either capital or operation and management, of our water infrastructure. We are only just beginning to advance to conservation-based pricing.

Technology will be instrumental to future success in achieving sustainability in water management. Desalination, microfiltration, reverse osmosis, and ultraviolet light are some of the approaches



that will, increasingly, be deployed to attain this goal in the face of droughts, climate change, population shifts, and the demands of either affluence or poverty. New technology will also facilitate the deployment of cost-effective distributed or decentralized systems to supplement traditional, large-scale treatment works.

Water and Climate Variability

The Government Accountability Office, Congress's investigative arm, surveyed state water managers in 2003 and found that, under normal or non-drought conditions, 36 states anticipated water shortages in localities, regions, or statewide in the next 10 years. Under drought conditions, 46 states expected shortages in the same timeframe. Increasing population and declining groundwater levels indicate that the fresh water supply is reaching its limits in some areas even as freshwater demand is increasing. The GAO also concluded that the building of new, large reservoir projects had tapered off and that existing water storage is threatened by age and sedimentation.

The current state of the science and actual conditions in watersheds throughout the nation indicate the wisdom of pursuing a "no regrets" strategy toward both mitigating and, even more important, adapting to climate variability and its inevitable impact on water supply and quality. Adaptation strategies offer immediate, tangible, cost-effective, and politically feasible ways of coping with climate change, no matter the ultimate cause or duration. Such strategies aim for resilience in the management of watersheds, water, and wastewater utilities in the communities they serve.

The Colorado River, to take one example, provides water for millions of people from San Diego to Denver and many cities and towns in between. It is an area of rapid population increase. A blue-ribbon committee of the National Research Council, part of the National Academy of Sciences, reviewed data in the area from tree-ring studies, which provide a long-term picture of weather and climate patterns dating back 300 to 800 years. Stream gauges, in contrast, extend back only 100 years. The tree-ring data indicate that average annual water flows vary more than had previously been thought. Extended droughts are not uncommon, and future droughts may be longer and more severe because of an evident regional warming trend. According to the NRC, the preponderance of the evidence suggests that rising temperatures will reduce the river's flow and water supplies.

In 1922, when the Colorado River Compact was originally established to allocate water between upper and lower basin states, negotiators assumed that there would be greater average river flow each year. But the tree-ring data reconstructions show that the years from 1905 to 1922 were exceptionally wet ones, hardly the basis for sustainable calculations of water availability for the long term. Since 1990, Arizona has increased its population by 40 percent, and the state of Colorado by 30 percent. Clark County, Nevada, home to Las Vegas, doubled its water consumption between 1985 and 2000, even in the face of improved water conservation efforts.

Las Vegas gets its water from Lake Mead, America's largest artificial reservoir. It is half full, as is Lake Powell, another artificial structure on the Colorado River. Most disturbing, researchers at the Scripps Institution of Oceanography believe that there is a 50 percent chance that Lake Mead will run dry by 2021, and a 10 percent chance that it will run out of usable water by 2014, depending on the worsening of the drought and on increases in water use.

Notwithstanding its reputation for wretched excess, Las Vegas is an interesting case study illustrating the daunting challenges of transplanting a humid lifestyle to an arid land. The Las Vegas Strip, home to many of the world's largest hotels, with fountains and a lake sufficiently large to stage pirate battles, demonstrates the benefit of water reuse and recycling — an increasingly attractive option given the scarcity and price of water and water treatment. The average hotel room uses 300 gallons of water per day, but almost all of it is recycled. The Strip accounts for barely 1 percent of Nevada's water use but generates 60 percent of its economic output. In another measure, Las Vegas started paying $1 per square foot to remove Kentucky bluegrass or turf and, in 2005, saved 2.8 billion gallons of water on this score alone. Water consumption has actually declined, despite unceasing population growth from 2002 to 2004. Meanwhile, agriculture consumes 90 percent of the state's water — pointing to the possibility of water transfers and substantial profits for farmers who, at some point, want to retire.

Will Technology Save Us?

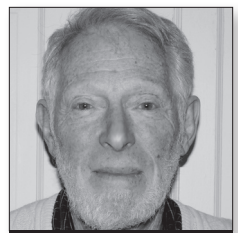
Desalination, a technology that removes salt from seawater or brackish groundwater, is a promising approach to water reclamation or treatment despite outstanding questions with regard to financial, environmental, and energy issues. Only 2.5 percent of the world's water is fresh water and suitable for human consumption. Cities from Algiers to Tampa are pursuing desalination as a solution to water scarcity. The NRC has noted that, in 2006, worldwide online desalination capacity was roughly 10 billion gallons a day, or 0.3 percent of the total freshwater use. From 2000 to 2005, U.S. de-

The Visible Hand as Well

Tracy Mehan's position on water policy reflects two key ideas: that the market will define economic efficiency, and that the least government is the best government. Both ideas have wide currency in the United States.

From the time of Confederation in 1867, Canadians have expected their governments, both federal and provincial, to play a more activist role than have Americans. Their implicit reasoning accepts the market's invisible hand, but believes most systems work better with two hands — the second one being that of government.

Nowhere has this two-handed approach been more evident than with fresh water, where water allocation has not so much followed development as led it. At times, government's hand has been too heavy, as when farming was promoted in areas that should have been left as rangeland. However, in recent years, government's hand has been too light, and Canadians have experienced adverse effects on human health, losses in viable ecosystems, and unsustainable rates of withdrawal.



David B. Brooks

The Canadian approach is arguably better than that of the United States. Water occupies an awkward position between a commodity and the commons. All uses of water have some aspects of a commodity and, in most, some aspects of a human right or an ecological necessity. No other natural resource exhibits so many externalities and such widespread evidence of market failure.

When water use exhibits major aspects of a commodity, the approaches described by Tracy Mehan are appropriate, at least as a starting point. However, they immediately lead to two questions:

First, those approaches have been urged for at least the past half century. Why has it been so difficult in the United States to implement them? Analysis of governance should be as much about what does not, as what does, get done.

Second, how will we reach decisions for those uses of water not easily evaluated by market processes? Imaginative analytical methods show that services provided by our ecosystems are real and of definable value to the economy.

Both of these questions are profoundly political — in the non-pejorative sense of the word. Solutions should be informed by economics but also shaped by other disciplines and mediated through public consultations.

We cannot achieve sustainable water management in North America simply by adjusting the micro elements of today's practices — full-cost pricing, life-cycle analysis, etc. Those adjustments are needed, but, we also need macro changes in water management. Since about 1980 water withdrawals in the United States have been declining, and Canada seems to be following a similar course. Despite governmental neglect and water prices that barely cover pumping cost, a more efficient, equitable, and environmentally satisfactory water future seems to be within reach — if only we could grasp it.

David B. Brooks is Senior Advisor – Fresh Water for Friends of the Earth Canada.

salination capacity grew by roughly 40 percent, accounting for about 0.4 percent of fresh water used in this country.

The NRC recommends an ambitious research project to address issues such as the effects of waste products of desalination. It also notes that

the cost of this technology is decreasing because of less-expensive membrane technologies and greater energy efficiency; meanwhile, the cost of alternatives increases. With their lower energy costs, water transfers between uses and conservation will become cost competitive. Thus, the decision to use desalination will be a local decision, dependent on the circumstances. For instance, El Paso, Texas, is using desalination as part of its overall program, which also includes conservation and water reclamation.

Orange County, California, is also on the cutting edge of water recycling, reuse, and reclamation. With an expected increase in water demand of 16 percent by 2030, it has implemented an ambitious system which, as described by Anjali Athavaley of the *Wall Street Journal*, yields 70 million gallons of water a day for 500,000 people. It cost $481 million to build, and it takes $29 million per year to operate.

Elizabeth Royte, the author of *Bottlemania: How Water Went on Sale and Why We Bought It*, wryly comments, "If you like the idea [of water recycling], you call it indirect potable reuse. If the idea revolts you, you call it toilet to tap." Humor aside, Orange County's project is a state-of-the-art system that starts with treated wastewater and serves up what is essentially distilled water. Using microfiltration, reverse osmosis, ultraviolet light, and hydrogen peroxide, it provides potable water that is pumped into a groundwater basin, where it takes a year to move through sand, gravel, and clay to a drinking-water well. Jim Cook, who chaired the NRC's 1998 committee on reclaimed water, says that Orange County's final product is cleaner than its groundwater supply.

The technologies that make water recycling possible may also gain support because of their ability to remove pharmaceuticals and endocrine disrupters from the public water supply (for example, compounds in birth control pills or in plastics). Both of these pollutants have been detected by the U.S. Geological Survey at trace levels in water supplies throughout the country.

Technology may not be a sufficient condition for successful water management in the 21st century, given the importance of pricing and of sustainably managing the landscape in a watershed. But it will certainly be a necessary condition because of the growing economy, constant population shifts, affluent lifestyles, droughts, and climate variability, all of which will continue to put pressure on a limited supply of potable water. Not surprisingly, the market for membrane technologies grew to $2 billion in the United States in 2007, with an average annual growth estimated to be more than 8 percent.

Water Trumps Oil?

A 2002 GAO survey of several thousand utilities indicated that 29 percent and 41 percent of water and wastewater systems, respectively, were not generating enough revenue from user rates and other local revenue sources to cover their full cost of service. Roughly one-third deferred maintenance because of insufficient funding, had 20 percent or more of their pipelines nearing the end of their useful life, and lacked the basic plans for managing their capital assets.

On average, American households pay more for soft drinks and non-carbonated beverages than they do for water and wastewater charges — $707 annually versus $474, based on 2001 data. The Congressional Budget Office stated in a 2002 report that U.S. households were paying, on average, only 0.5 to 0.6 percent of their incomes for water and sewer bills. Clearly, Americans have been able to live with or simply ignore the paradox of oil and water. They will not be able to do so any longer.

Henceforth, Americans — nay, all North Americans — will have to give up their assumption of an easy abundance of water, transcend their fears of future scarcity, and manage their water resources

sustainably with due regard for their full value — ecological, economic, and social. They should consider these suggestions for bringing about a new dispensation for sustainable water management in North America:

• Get the prices right. Water and wastewater utilities should strive to achieve full-cost pricing of water and its supporting infrastructure. Beyond that, pricing should also be encouraged as a demand-side management tool — that is, conservation-based pricing. If a community or service area has low-income citizens or customers who need assistance, subsidies should be targeted only toward them, and not the majority who are capable of paying what is necessary to sustain capital assets and adequate operation and management costs.

• Research and development into new technologies, distributed systems, energy efficiency, and low-impact or non-structural solutions to stormwater runoff merit increased funding. This R&D, a legitimate federal responsibility, has been ignored for too long.

• Manage or regulate the resource sustainably without regard to the policy debate over free trade, protectionism, or globalization. These issues are distractions from the hard work of environmental stewardship. The General Agreement on Tariffs and Trade, the North American Free Trade Agreement, and the Commerce Clause of the U.S. Constitution do not prohibit reasonable regulation to protect natural resources as long as the rules apply equally to all comers, domestic or foreign. It is protectionism and discrimination that is prohibited, not environmental or natural resources protection.

• Establish economic and environmental rules to allow for market transfers between agricultural users (often 80 percent or more of water consumption in western states) to more productive uses. Water trusts and organizations such as Trout Unlimited need to be fostered to allow environmental interests to play in these emerging markets.

• Withdraw all subsidies for water development or treatment except to support low-income citizens in hardship cases. Subsidized water, crops, and ethanol production are all contrary to sustainable water management.

• Protect the landscape, both rural and urban, through reforestation, removal of exotic species, restoration of native grasslands, low-impact development, Green Infrastructure, and other means of reducing impervious surfaces. These measures will protect or restore flow regimes, reduce nonpoint source pollution, and treat stormwater runoff as a resource to be conserved for the water cycle. They can also reduce treatment costs for utilities. To be successful, this area requires creative new partnerships with land protection agencies, local parks departments, and land trusts.

• Corporations must recognize the business case for sustainable water management and partner with governments and local utilities to improve water efficiency, conservation, and water reuse. Such partnerships present an excellent initiative to be led by the governors and premiers in the Great Lakes region consistent with the spirit of the new Great Lakes–St. Lawrence River Basin Water Resources Compact and the 2005 Great Lakes–St. Lawrence River Basin Sustainable Water Resources Agreement (the latter signed by governors and by Canadian premiers).

• Another urgent need for investment at the federal, state, and provincial level is in robust water quality and quantity monitoring, data gathering, and "downscaling" of global climate models to the local watershed scale. This information will allow water managers to better adapt to climate variability, plan for uncertainty, and build resilience into their water management planning processes.

These suggestions are not exhaustive, and there are many other ideas for moving our society toward sustainable water management. They do, however, build on markets, better information, incentives, and the classic principle "First, do no wrong." They recognize that government failure has been as big a problem as market failure. They are, in short, designed to start rather than end the conversation we need to have regarding water management on this continent. •