Woodrow Wilson International Center for Scholars

ONE ISSUE TWO VOICES

WATER ABUNDANCE IN CANADA AND THE UNITED STATES: **Myth or Reality?**

G. TRACY MEHAN III + DAVID B. BROOKS

ISSUE 10

1 2

INTRODUCTION Drawing on expertise from both sides of the Canada-U.S. border, the Canada Institute's *One Issue, Two Voices* series is designed to stimulate dialogue on policy matters that are key to understanding the bilateral relationship. This tenth issue compares the facts on fresh water abundance in Canada and the United States and dispels significant misconceptions about the future of sustainable water in both countries. Authors David B. Brooks, senior fresh water advisor to Friends of the Earth, Canada, and G. Tracy Mehan III, former assistant administrator for water at the U.S. Environmental Protection Agency and environmental consultant with The Cadmus Group, Inc., are leading international environmental water experts. Together they cast a critical eye on the state of water policy and management in their respective countries.

There is no easy answer to the question of whether water abundance in Canada and the United States is a myth or a reality. Nonetheless, addressing the question is clearly critical both to enhancing and to building credibility in the bilateral

relationship, since water is a shared concern in terms of climate, culture, technology, governance, and supply and demand. Each author assesses the effectiveness of water policy in his country and describes the factors underlying the need for change.

Brooks depicts Canada as a laggard when it comes to water regulation, compared with the United States and most other OECD countries. He states that Canada's purported abundance in water is an outright myth, perpetuated by many politicians and much of the media, which allows governments to ignore the need for water policy. Brooks says that before Canada can even begin to achieve a sustainable water regime in the near future, it must first fully implement and enforce the recommendations of its 1987 federal water policy. Currently, Canadian water legislation is a patchwork of federal and provincial guidelines that results in jurisdictional turf wars and a "pass the buck" mentality. Brooks maintains that it is crucial for the federal government to overcome this institutional blockade before it can create functional and effective water policy in Canada.

In contrast to the shortage of Canadian water legislation and regulation, Mehan describes signs of progress in U.S. water management. One positive development is that water use has varied less than 3 percent since 1985, despite a growing population, as withdrawals have stabilized for the two largest uses—thermoelectric power and irrigation. He emphasizes that technology will be instrumental to future success in achieving sustainable water use. Desalination looks especially promising, given that only 2.5 percent of the world's water is fresh and suitable for human consumption. And, in some regions in the arid West, a variety of innovative recycling and conservation measures have been instituted. He points out, however, that such action is happening where explosive demand and limited supply make it imperative. Mehan also cites alarming facts, noting that 36 states anticipate water shortages in the next ten years, while no new, large reservoir projects are planned, and existing water storage is threatened by age and sedimentation.

Both authors agree that if Canada and the United States are to achieve and benefit from a sustainable water future, they must now redefine what constitutes proper water management. Without doubt, it will demand a major shift in emphasis from supply-side management to demand-side management in water policies and programs in both countries.

C. WARREN GOLDRING
Chairman
The Canada Institute on North American Issues
November 2008

1

G. Tracy Mehan III

WATER ABUNDANCE IN THE UNITED STATES: MYTH OR REALITY?

Early in 2008 I was invited to a New England college to discuss a topic ominously titled "Is Water the Next Oil?"[1] 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 vehicles 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. 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. Finally, 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 storm water 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 statutory 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.[2]

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.[3]

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."[4]

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 water 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 General Accounting Office (GAO, now the General Accountability Office) 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.[5] Under drought conditions, 46 states expected shortages in the same time frame. Increasing population and declining groundwater levels indicate that the freshwater 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.[6] It is an area of rapid population increase. A blue-ribbon committee of the National Research Council (NRC), part of the National Academies, 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

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

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 manmade structure on the Colorado River.[7] 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.

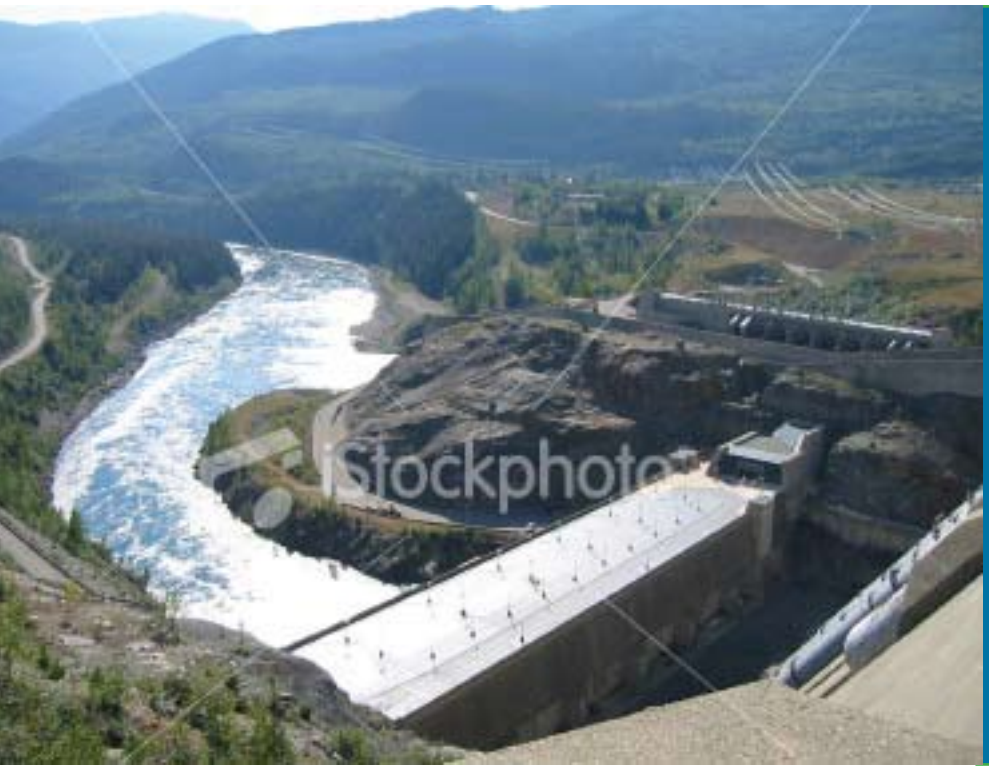
Notwithstanding its reputation for wretched excess, Las Vegas is an interesting case study illustrating the daunting challenges of transplanting a humid lifestyle to an arid land.[8] The Las Vegas Strip, home to many of the world's largest hotels, with fountains and a lake sufficiently large to stage 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.[9] Only 2.5 percent of the world's water is freshwater and suitable for human consumption. Cities from Algiers, Algeria, to Tampa, Florida, are therefore 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 used in the world. From 2000 to 2005, U.S. desalination capacity grew by roughly 40 percent, accounting for about 0.4 percent of freshwater 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, greater energy efficiency, and the increasing costs of alternatives. 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.[10]

Orange County, California, is also on the cutting edge of what is often called water recycling, reuse, or reclamation.[11] 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*



Technology will be instrumental to future success in achieving sustainability in water management.

Street Journal, yields 70 million gallons of water a day for 500,000 people a year. 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 commented: "If you like the idea [water recycling], you call it indirect potable reuse. If the idea revolts you, you call it toilet to tap."[12] 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 micro-filtration, reverse osmosis, ultraviolet light, and hydrogen peroxide, it provides indirect 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.[13]

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.[14] At that rate, the market value for 2008 should be in the range of $3 billion.

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.[15] 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 versus $474, based on 2001 data.[16] 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.[17] 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 (GATT), the North American Free Trade Agreement (NAFTA), 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 newcomers, 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

Manage or regulate the resource sustainably without regard to the policy debate over free trade, protectionism, or globalization.

departments, and land trusts. Private land trusts now protect an area in the United States more than sixteen times the size of Yellowstone National Park.

- 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—one blessed with magnificent natural resources.

NOTES

1. Business & Society Conference, Tuck School of Business at Dartmouth, January 17, 2008, Hanover, NH.

2. William K. Reilly and Harriet C. Babbitt, *A Silent Tsunami: The Urgent Need for Clean Water and Sanitation* (The Aspen Institute and the Nicholas Institute for Environmental Policy Solutions, 2005), 3.

3. S.S. Hutson et al., *Estimated Use of Water in the United States in 2000* (Reston, Va.: U.S. Geological Survey Circular 1268, 2004). For more detailed water-use information, see http://water.usgs.gov/watuse. Estimates of water use in the United States indicate that about 408 billion gallons per day (one thousand million gallons per day) were withdrawn for all uses during 2000.

4. Dr. Peter H. Gleick, "The 15th Abel Wolman Distinguished Lecture," The U.S. National Research Council of the U.S. National Academy of Sciences, April 23, 2008, p. 9 (manuscript in author's possession).

5. U.S. General Accountability Office, *Freshwater Supply: States' Views of How Federal Agencies Could Help Them Meet Challenges of Expected Shortages*, GAO-03-514 (July 2003), available at http://www.gao.gov/news.items/d03514.pdf.

6. Most of my discussion on the Colorado River and Basin draws from the recent report by the National Research Council, *Colorado River Basin Water Management: Evaluating and Adjusting to Hydroclimatic Variability* (Washington, DC: The National Academies Press 2007).

7. Associated Press, "Lake Mead May Dry Up by 2021," February 13, 2008, accessed at http://news.nationalgeographic.com/news/2008/02/080213-AP-lake-mead.html.

8. A surprising but informative source of my discussion of Las Vegas is George F. Will, "A City That Bets on Water," *Washington Post*, February 27, 2005, B07, available at http://www.washingtonpost.com/wp-dyn/articles/A54745-2005Feb25.html.

9. My discussion of desalination is derived from National Academies, *Report in Brief: Desalination: A National Perspective* (2007).

10. Neda Simeonova, "A Forward-Looking Approach: El Paso Water Utilities Explores Aggressive Reclaimed Water Programs," *Water & Wastes Digest*, April 2008, 24.

11. My discussion of the Orange County project relies heavily on Anjali Athavaley, "Sewer to Spigot: Recycled Water," *Wall Street Journal*, May 15, 2008, D1.

12. Elizabeth Royte, "A Tall, Cool Drink of … Sewage?" *New York Times*, August 10, 2008.

13. See http://ks.water.usgs.gov/Kansas/studies/reslab/pharmaceuticalsenv.html for monitoring results from the U.S. Geological Survey.

14. Neda Simeonova, "Today's Look at Tomorrow's Technology," *Water & Wastes Digest*, http://www.wwdmag.com/Membrane-Technology-Zone23, accessed August 19, 2008.

15. U.S. General Accounting Office, *Water Infrastructure Information on Financing, Capital Planning, and Privatization*, GAO-02-764 (August 2002), available at http://www.gao.gov/new.items/d)2764.pdf.

16. For detailed calculations, see G. Tracy Mehan III, "Investing in America's Water Infrastructure," Keynote Address to the Schwab Capital Markets' Global Water Conference, Washington, D.C., April 15, 2003, notes 3 and 4, available at http://www.epa.gov/water/speeches/041503tm.html, accessed August 19, 2008.

17. Congressional Budget Office, *Future Investment in Drinking Water and Wastewater Infrastructure*, November 2002, ISBM 0-16-01243-3.

David B. Brooks

WATER POLICY IN CANADA: THIRTY YEARS OF RETREAT FROM RESPONSIBILITY

IS CANADA RICH IN WATER? MYTH AND COUNTER-MYTH

Most Canadians believe they live in one of the most water-rich nations on earth. Many politicians and much of the media perpetuate this view. They repeat the notion that Canada has 20 percent of the world's fresh water. The correct figure is 7 percent—roughly equal to Canada's 7 percent share of the world's land mass. Canada's purported abundance in water is a myth—yet it becomes part of the reason why governments believe they can ignore the need for water policy.

We must challenge the myth. Only a small part of our water is located close to those regions where most of us live. Nearly half of Canadian water drains either to the Arctic Ocean or to Hudson Bay.[1] An estimated 12 percent of Canada is covered by lakes and rivers, but only 3 percent in inhabited regions. The Great Lakes rank among the 15 largest lakes in the world, but the bulk of their volume is a stock left over from the melting of continental glaciers; only about 1 percent is renewed each year. As Professor David Schindler from the University of Alberta and winner of the first Stockholm Water Prize has written: "While Canada has a large freshwater 'bank account,' the interest rate is very low."[2]

Should we discard the myth? Not entirely. Canada receives nearly 3000 cubic kilometers (about 720 cubic miles) of renewable fresh water every year, about the same as China or Indonesia, but dwarfed by Russia's 5000 (1200) or Brazil's 8000 (1920). The United States is not far behind Canada with nearly 2500 (600).[3] Though neither is rich in water, both are much better off than much of the world.

There is a further problem with notions of water wealth and poverty. The world's water crisis is not water to drink but water to grow food.[4] By far the bulk of global water withdrawals are for agriculture—80 percent or more in many nations. Canada is at the low end, with only 8 percent of its withdrawals for agriculture,[5] and the United States in the middle with 42 percent.[6] What moderates these differences is trade—not trade in water, but trade in commodities. Given that one metric ton (2.2 tons) of grain requires around 1000 metric tons (2200) of water (whether from rain or irrigation), sensible traders will want to move grain, not water.

LEGISLATION AND REGULATION OF WATER IN CANADA

Canada is a laggard in terms of water regulation compared with the United States and most other OECD countries. These countries back up legislation by monitoring both water quality and water quantity and by enforcing relevant standards. In contrast, Canadian water legislation is a patchwork of federal and provincial guidelines that results in inefficient fragmentation, jurisdictional turf wars, and a "pass the buck" mentality. The general rule is that provinces have primary power over water resources in most of Canada, whereas the federal government has primary power in the territories, on First Nations reserves, and for transboundary issues. There are many areas of shared responsibility. For example, the *Fisheries Act* and the *Canadian Environmental Protection Act* give the federal government wide powers to protect water quality. However, the Canadian federal government has been more reluctant to intervene than have central governments in most other federal states around the world.

Canada has actually had a federal water policy since 1987 when a report entitled *Currents of Change* was tabled in the House of Commons.[7] It is quite a good policy, but the majority of its recommendations have never been implemented, and most of those that were implemented have not been enforced. Certainly none of them have been adapted to new issues that have emerged in the last two

decades. Several excellent studies urging a stronger federal commitment to water policy have been published in the years since 2000, but they have been largely ignored.

ISSUES THAT REQUIRE IMMEDIATE ACTION

Research and Monitoring Capabilities

The federal government has not only neglected those areas where there is clear federal responsibility but has cut the research and monitoring budgets for water. The number of laboratories dealing with water issues has dwindled and the network of hydrometric monitoring stations has been cut. What used to be a world-class set of institutions in the 1980s is not capable today of tracking water quantity and quality. Canada now lacks the basic data to measure its water resources and to price them on a cost-recovery basis.

During the era of heavy federal budget cutting in the late 1990s, Environment Canada, which has much of the mandate for federal water policy, was not so much attacked as committed suicide. In a misguided attempt at self-protection, it announced that it was a scientific ministry, not a policy one. The department failed to realize that budget cutters might take the view that any research worth doing should result in profitable activities, and could therefore be funded by private, not public, sources. If it is to manage water effectively, Canada must restore its water monitoring and water research capabilities.

Mapping and Assessing Groundwater

Thanks to past research, we know quite a lot about surface water in Canada, but little about groundwater—even though a quarter of us depend on it for drinking water, and many farms and industries pump large volumes every day.[8] How much do they pump? We don't really know. All we know under most provincial regulations is how much their licenses permit them to pump. The recently revised agreement for managing the Great Lakes (the Great Lakes Compact—formally an inter-state agreement but informally also including Ontario and Québec) made it clear that any policy conclusions on boundary and transboundary waters must be tentative until groundwater basins are mapped with something approaching the accuracy of surface water basins.

National Safe Water Drinking Act

Experience shows that Canada needs a nationally legislated drinking water act based on federal-provincial agreement and backed with enforcement. We also need to develop

systems for graywater recycling and minimum standards for wastewater disposal keyed to the size and locations of communities. Some people have died, hundreds have been sickened, and many will suffer lifetime effects as a result of tainted water, notably in Walkerton, Ontario, and North Battleford, Saskatchewan. The problems stemmed from ideologically based deregulation without adequate time to prepare local governments for their increased responsibilities. For example, the laboratory that tested samples of water from Walkerton's treatment plant did identify the presence of the deadly strain of E. coli, but it was under no obligation to alert anyone.

This national water act should also respond to the deplorable conditions in many remote and First Nations communities—Inuit, Indian, and Métis. Far too many of these communities live with chronic water problems and boil-water advisories. The problem is not insufficient federal funding to build the necessary infrastructure but lack of funding to train local staff to operate it and to do the monitoring to maintain water quality standards.

BILATERAL ISSUES WITH THE UNITED STATES

Canada and the United States share the longest border in the world—and, inevitably, they share large lakes and rivers too. A century ago they recognized the need for some way to manage these areas jointly and without resort to lengthy legislative or judicial processes. Therefore, the two countries passed the *Boundary Waters Treaty Act* of 1909, and that in turn allowed for the creation of the International Joint Commission (IJC) as the body tasked with responsibility for managing treaty provisions.

The International Joint Commission and the Boundary Waters Treaty

The IJC is often praised in discussions on water policy and, to some degree, emulated in other countries. However, in recent years its role in settling transborder water disputes seems to have diminished. One illustration is Devil's Lake, a shallow lake in the farmlands of North Dakota that frequently overflows its banks during spring runoff. In 2005 the state built artificial drains to take the excess water from the lake and direct it, ultimately, to the Red River, which flows across the border into Manitoba. Clearly, the drains change the rate and timing of flows across the border, but that interference does not initiate a reference to the IJC. Back in the first decade of the last century, when the Boundary Waters Treaty was being negotiated, Canada saw the potential in constructing dams on transboundary rivers in the western provinces, so it insisted that changes in *quantity* of water be exempted from automatic reference to the IJC. Changes in the *quality* of the water do, however, create an automatic reference to the IJC. As a result, the Manitoba government and the environmental groups that oppose the Devil's Lake drains are forced to search for quality effects to make their case, even though the quantity effects are obvious.

On the eve of its centennial, perhaps it is time to reopen the Boundary Waters Treaty in order to close gaps in its authority. However, there are risks in doing so. Many people believe that American authorities have come to regret the basic framing of the treaty. As it stands, it is based on "equal and similar rights to use," not a formulation based on population and economic size—a change that would favor the United States. That risk may explain why the government of Canada appears reluctant to support Manitoba (and several U.S. states) in asking that Devil's Lake be referred to the IJC.

Canada is the biggest diverter in the world of water within its own boundaries. Mega-projects in eastern Canada and in British Columbia have focused on the generation of hydroelectricity, and, in the Prairie provinces, on providing water for irrigation.

Diversions

Canada has been cavalier in approving large-scale water diversions, with little regard for their environmental effects or their

Canada, like the United States, needs to shift the emphasis in water policies and programs from supply to demand—to how best to manage water efficiency and water conservation.

implications for First Nations communities.[9] In fact, Canada is the biggest diverter in the world of water within its own boundaries. Mega-projects in eastern Canada and in British Columbia have focused on the generation of hydroelectricity, and, in the Prairie provinces, on providing water for irrigation. Once considered the epitome of progress, these projects are increasingly being challenged for their limited economic benefits and high environmental costs. The criticism is intensified because much of the hydropower, aluminum, and agricultural output are sold to the United States.

Despite the objections, two such mega-dam complexes are under consideration: The Romaine River in Quebec for hydroelectricity for aluminum smelters, and Agrivision Corporation's drought-proofing dams in Saskatchewan for irrigation water. One precedent offers hope that these proposals will not proceed to construction. In 1994 a cross-border environmental campaign killed the contract for the New York Power Authority to buy power from Hydro-Québec's proposed Great Whale complex.

Bulk Exports of Water

A recent report by the Montreal Economic Institute is only the latest of many claims that big profits are to be made from the sale of bulk water to other countries.[10] Yet careful researchers find little possibility that the export of water would even pay back its costs.[11] The only people who really need more water are farmers, and they require vast quantities—and expect to get it cheaply.

The notion of exporting Canadian water, particularly to the United States, has little public support. According to a 2004 poll, 80 percent of Canadians do not want their water sold in bulk.[12] The Canadian public is confused over this issue and perceives exports of water to the United States to be a threat. Yet the situation is straightforward: the federal government, through its constitutional authority over navigable waters, whether in lakes, rivers, or streams, controls the export of bulk water. In contrast to bottled water—which, as a tariff good, is covered under NAFTA—the export of bulk water is not specifically dealt with in NAFTA. If this export is so unpopular, it leads to the obvious question: Why does the federal government not legislate an outright ban on the export of bulk water? If it fears that such a ban would run afoul of some provision in NAFTA or a ruling from the World Trade Organization, the government could make the broader declaration that it will oppose any interbasin transfer of water in or from Canada. Given the geography of the continent, such a position would all but preclude bulk exports.

MAJOR ISSUES IN NEED OF DEBATE

What policies should Canada develop for managing its water in the future? The 1987 federal water policy document provides a good base from which to start, although it desperately needs updating. For example, the document says little about groundwater. The more important changes, however, would take the policy in new directions.

Shifting the Policy Focus from Supply to Demand

Since the earliest use of water for irrigation and the construction of aqueducts, water policy has meant little more than greater supply—extending pipelines, constructing dams, drilling deeper. Though remarkably successful at getting water to cities, factories, and farms, this approach has had its day. Capital costs per cubic meter of new supply are doubling every decade, environmental effects are more severe, and the adverse effects of mismanagement on indigenous peoples are no longer acceptable. Moreover, a quarter of Canadian communities already face water problems,[13] with the percentage rising yearly. Technological advances may help; in recent years, for instance, there has been a rapid fall in the cost of desalination, to about

$1 per cubic meter (264 gallons)—plus piping—only double what Canadians and Americans already pay (and far below what people pay in most nations). However, the real opportunities lie with demand-side opportunities—efficiency and conservation.

Canada, like the United States, needs to shift the emphasis in water policies and programs from supply to demand—to how best to manage water efficiency and water conservation. There are many ways to increase efficiency in water use. Studies of specific areas and sectors typically find cost-effective savings of one-third or more.[14] Low-flow toilets cut water use per flush by three-fourths, and automated irrigation systems that turn water on and off in accord with soil-moisture probes cut typical water use by half. Payback periods depend on pricing schemes—almost all water in Canada is subsidized to some degree—but most efforts to increase water use efficiency are far cheaper than the cost of new sources of supply. Despite low water prices, Canada has made progress in the last decade: for example, the number of Canadian households with low-flow showerheads increased by 50 percent, and the number with low-flow toilets tripled.[15] Market forces have also affected water use. A comparison of Canadian cities in 1999 showed that people living in cities that charge a flat rate for water use 70 percent more than do people living in cities that pay per unit of volume. A typical Calgarian, who was not likely to be metered, used 339 litres (90 gallons) each day, whereas a typical Edmontonian, who probably did have a meter, used only 195 (52).[16]

The United States is the world's greatest per capita user of water, with Canada a close second. Greater efficiency alone will not suffice; we must also conserve. Efficiency refers to reductions in the quantity of water to achieve a given task, as with watering lawns with low-flow sprinklers; conservation refers to changes in the nature of the task, as with planting greenery that does not require watering. Apart from the 50 liters required for each person every day for drinking, cooking, and sanitation, there are many substitutes for human uses of water: we can eat vegetable proteins rather than meat; we can use graywater to flush our toilets. For the most part, the demand for water is not for water itself, but for the services it provides: cooling, moving, cleaning. If we regard water as a bundle of services, not as a commodity, we will find many more options to satisfy demands.[17]

Instituting the Public Trust Doctrine

Canada should adopt the public trust doctrine for water management—an approach that obliges governments to manage water in ways that support long-term use for the entire public. In developing this argument from English common law, Joseph Sax has stated that the public must have the legal right to require its governments to provide water quantity and assure its quality.[18]

This doctrine is now used in a number of states to protect the public interest in water, and courts have been imaginative in applying it to new situations. Unfortunately, the doctrine is largely unknown in Canada. The Canadian government should look at this approach, not only for the benefit of Canadians but equally for its use in the growing number of cross-border issues involving protection of water quantity and quality.

Water for Ecosystems

Most water policies in Canada continue to be designed as if all available water can be extracted for human uses, with little recognition that much of the water in lakes, rivers, and underground must be left in place to provide natural services ranging from sanitation to habitat protection.[19] Intact ecosystems provide economic values for society well above the private values achieved after land is converted to "more productive" uses.[20]

Discussions about water use between Canada and the United States will always be truncated so long as only human uses of water are considered. The two governments should create a bilateral committee to review existing research and to select a set of tools to establish the level of water that must remain in place. The resulting report will provide a common method for establishing the volume of water that cannot be withdrawn for private or for public purposes, and, where dams already exist, the timing and volume of water releases to protect ecosystems downstream.

CONCLUSIONS

Historically, water use has grown in step with economic growth. Since about 1980, however, water withdrawals in the United States have been stable or even in decline, and Canada seems to be following a similar pattern: water withdrawals did not increase during the first half of the

1990s.[21] What has happened between then and now is not known because of the lack of monitoring. 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.

Part of the credit for stabilizing water withdrawals must be given to provincial, municipal, and community groups that have filled some of the gaps left by the absence of federal initiatives. For example, "river keepers" in several provinces give non-governmental agencies a role in managing major waterways. The expanded role given to the Conservation Authorities in Ontario, the creation of a Ministry of Water Stewardship in Manitoba, and the new institutions developed under Alberta's Water for Life program all offer significant promise for the future. In contrast, there has been so little action at the federal level that, in the mid-1990s, a "Where's Water?" task force had to be formed to determine who was doing what. [22]

Canada must build on and enforce its 1987 federal water policy to ensure that the nation can achieve a sustainable regime for water within a few years. What is getting in the way of improved water policies? The same thing that gets in the way of any significant policy reform: institutional barriers that inhibit more effective policies; and power relations that support those barriers. It is time that the federal government overcame those barriers—and the sooner it does, the cheaper it will be.

NOTES

1. Statistics Canada, Human Activities and the Environment—Annual Statistics 2003 (Ottawa, 2003).

2. David Schindler, "Foreword," in Karen Bakker, ed., *Eau Canada: The Future of Canada's Water* (Vancouver: UBC Press, 2007), xiv.

3. Peter Gleick, ed., The World's Water: 2002–2003: The Biennial Report on Freshwater Resources (Washington, DC: Island Press, 2002).

4. Mark W. Rosegrant, Ximing Cai, and Sarah A. Cline, *World Water and Food to 2025* (Washington, DC: International Food Policy Research Institute, 2002); United Nations, *Water for People; Water for Life* (New York: UNESCO World Water Assessment Programme, 2003).

5. Canadian data in these tables are distorted by the 80 percent reported for "industrial" withdrawals, most of which is cooling water for power plants—a nonconsumptive use that has only minimal effects on water quantity and quality.

6. Gleick, *The World's Water*, Data Section, table 2.

7. P. H. Pearse, F. Bertrand, and J. W. MacLaren, *Currents of Change*, Final Report of the Inquiry on Federal Water Policy (Ottawa: Environment Canada, 1985).

8. Linda Nowlan, "Out of Sight, Out of Mind? Taking Canada's Groundwater for Granted," in Bakker, ed., *Eau Canada*, 55–84.

9. Frederic Lasserre, "Drawers of Water: Water Diversions in Canada and Beyond," ibid., 143–62.

10. Marcel Boyer, *Freshwater Exports for the Development of Québec's Blue Gold* (Montreal: Montreal Economic Institute Research Paper, August 2008).

11. J. Owen Saunders and Michael M. Wenig, "Whose Water? Canadian Water Management and the Challenges of Jurisdictional Fragmentation," in Bakker, ed., *Eau Canada*, 119–42. Rational discussions about bulk water exports all make exceptions for water transfers between communities located on opposite sides of the border and for emergency situations such as firefighting. Quantitatively, such exceptions are insignificant.

12. IPSOS-Reid poll, 2004.

13. Environment Canada, *Threats to Water Availability in Canada* (Ottawa: National Water Research Institute 2004).

14. P.H. Gleick et al., *Waste Not, Want Not: The Potential for Urban Water Conservation in California* (Oakland, Cal.: Pacific Institute for Studies in Development, Environment, and Security, 2003).

15. Statistics Canada, Households and the Environment Survey, *The Daily* (Catalogue 11-001-XIE, July 11, 2007), 6–8.

16. Oliver M. Brandes, with Keith Ferguson, *Flushing the Future? Examining Urban Water Use in Canada* (Victoria, BC: POLIS Project on Ecological Governance, University of Victoria, 2003); Ian Campbell, "Toward Integrated Freshwater Policies for Canada's Future," *Horizons* 6, 4 (2004): 3–7.

17. David B. Brooks, "Beyond Greater Efficiency: The Concept of Water Soft Paths," *Canadian Water Resources Journal* 30, 1 (2005): 83–92; Oliver M. Brandes and David B. Brooks, *The Soft Path for Water in a Nutshell*, rev. ed. (Ottawa: Friends of the Earth Canada, and Victoria, BC: POLIS Project on Ecological Governance, 2007).

18. Joseph Sax, "The Public Trust Doctrine in Natural Resource Law: Effective Judicial Intervention," *Michigan Law Review* 68 (1970): 473–566; available online at www.bepress.com/ils/iss4/, last accessed October 17, 2008.

19. Sandra Postel and Borton H. Thompson, "Watershed Protection: Capturing the Benefits of Nature's Water Supply Services," *Natural Resources Forum* 29, 2 (2005): 98–108; M. Falkenmark and J. Rockström, *Rain: The Neglected Resource*, Swedish Water House Policy Brief 2 (Stockholm: Stockholm International Water Institute, 2005).

20. Millennium Ecosystem Assessment, *Ecosystems and Human Well-Being: Wetlands and Water Synthesis* (Washington, DC: World Resources Institute, 2005).

21. Gary Wolff and Peter H. Gleick, "The Soft Path for Water," in Gleick, ed., *The World's Water*, 1–32.

22. Rob de Loë and Reid Kreutzwiser, "Challenging the Status Quo: The Evolution of Water Governance in Canada," in Bakker, ed., *Eau Canada*, 85–104.

TRACY MEHAN'S RESPONSE TO DAVID BROOKS

Reading David Brooks' excellent piece on water policy in Canada, which converges with mine in its emphasis on the demand side as much as on the supply side, I am reminded how difficult it is—in the absence of drought or extreme water shortages over an extended period of time—to implement either regulatory or market measures to facilitate sustainable water management. Given the relatively small population, extensive land mass, plentiful water resources, and general prosperity of Canada, one gropes for an effective means of mobilizing society in the service of proactive measures to avoid future economic or ecological problems.

Australia is on the cutting edge of sustainable water management in so many ways, driven by historic drought and climate variability of biblical proportions. It is no surprise, then, that the Aussies excel at utility governance, asset management, sustainable cost recovery, water trading, efficiency and conservation, as well as technological and managerial innovation, all at a level far beyond anything found in the most arid parts of North America.

The innovative approaches I described in my own article occur west of the 100th Meridian in the arid states of the Union. Water reuse and recycling in California, turf buy-back efforts in Las Vegas, water trusts in Oregon—these things are happening where explosive demand and limited supply make them imperative.

The great Scottish economist Adam Smith captured the paradox, not of oil and water which I proffered in my essay, but of diamonds and water, in his classic book *An Inquiry into the Nature and Causes of the Wealth of Nations* (1776), published the same year as the signing of America's Declaration of Independence:

> *Nothing is more useful than water; but it will purchase scarce anything; scarce anything can be had in exchange for it. A diamond, on the contrary, has scarce any value in use; but a very great quantity of other goods may frequently be had in exchange for it.*[1]

Thus, diamonds, which are for mere adornment, are valued more highly than water, which is essential for life on this planet. Extreme shortages and high demand—the laws of supply and demand as it were—seem to override such paradoxes in the end.

Over the last few years, tremendous controversy has raged in the southeastern United States among Georgia, Alabama, and Florida over the allocation of water on two interstate watersheds they have in common. This unpleasantness is driven, again, by historic drought patterns which may or may not persist. To date, despite mediation efforts by the U.S. Secretary of Interior, there has been no meaningful action either to allocate water among the states—thus effectively forcing each jurisdiction into a de facto cap-and-trade program with resulting efficiencies and conservation of water—or to undertake, individually, local water-saving measures, as are common in the western United States. Apparently, the drought in the Southeast has not been sufficiently punishing for a sufficient amount of time. The tragedy of the commons persists, in the absence of necessity, compulsion, good governance, and the exercise of political will.

One legal commentator has suggested that the U.S. Congress should undertake an apportionment or allocation of major interstate rivers by delegating the job to an independent commission, similar to that used in recent military base closings.[2] After adequate deliberations, study, and scientific and public consultation, it would make a proposal which Congress must either accept or reject *in toto.* The aim of this exercise is to exclude politics from the process as much and for as long as possible, thereby raising the ante sufficiently by delaying an all-or-nothing vote to the very the end. It worked for politically sensitive base closings, with their negative impact on local economies and employment. Maybe it can work to resolve some of the "water wars" on America's interstate waters.

Until the well runs dry, it will take some very creative social, economic, and political strategies, including

Until the well runs dry, it will take some very creative social, economic, and political strategies, including sustained civic education and strategic communication, to bring about a water regime that is sensible, forward-looking, and sustainable for the long haul.

sustained civic education and strategic communication, to bring about a water regime that is sensible, forward-looking, and sustainable for the long haul.

In both the United States and Canada, the renewed interest in protecting and sustaining the Great Lakes may provide a new beachhead from which to expand to a more generalized approach to water efficiency and conservation in what is perceived by many as an extremely water-rich region with no worries at all. Yet, given the sensitive nature of that aquatic ecosystem, the citizenry's almost sacramental regard for those waters, and the need to polish up the region's bona fides on the matter of sustainable water management—if only to bolster its political and legal case against potential water diversions out of the basin—this particular case may provide a strategic opportunity to implement the new regime.

I would raise a caution relative to David Brooks's call for adoption of the Public Trust Doctrine—a common law doctrine. If it is implemented by court decision, it brings with it the vagaries of ad hoc decision-making, rogue judges, and evidentiary uncertainty at trial. Whether adopted by court decision or legislative enactment, it is not self-executing, requiring greater specificity in implementation.

A systematic legislative approach, with implementing regulations and technical guidance, implemented through permits or other administrative mechanisms, is far superior. Rather than ceding more powers to judicial adversarial proceedings, it would be better to challenge legislative bodies to do the hard, painstaking work of writing good laws which are more predictable and carry more political legitimacy with the citizenry. It is not that I oppose the doctrine per se. I simply do not know what it means in practice without more precise judicial or legislative detailing. I fear a roving commission for judges in an area that is technically very challenging and has such broad social and economic consequences.

Finally, Dr. Brooks' proposal to extend the reach of the International Joint Commission (IJC) to water *quantity* issues has merit, but contradicts American political, policy, and legal traditions that still defer to state authority in these matters. It would be a very heavy lift, politically speaking, in the U.S. Congress.

NOTES

1. See Book 1, chapter 4, paragraph 13, "Of the Origin and Use of Money."

2. James L. Huffman, "The Federal Role in Water Resource Management," article in press for publication by the *New York University Environmental Law Journal,* available on the website of the Breaking the Logjam project at http://www1.law.nyu.edu/conferences/btl, accessed October 23, 2008. Huffman is the Erskine Wood Sr. Professor of Law, Lewis & Clark Law School, Oregon.

DAVID BROOKS' RESPONSE TO TRACY MEHAN

It is difficult to argue with Tracy Mehan's positions on water policy from the perspective of the United States. They reflect two key ideas: that the market will determine the greatest economic efficiency and that the least government is the best government.

Canada is not just a colder and perhaps straighter version of the United States. From the time of Confederation in 1867, Canadians have expected their governments, both federal and provincial, to take a more forceful role in achieving their goals. The implicit reasoning seems to accept the importance of capitalism's invisible hand, but simultaneously believes that most systems work better with two hands—the second one being that of government. Nowhere has this two-handed approach been more evident than in the case of water supply, where water allocation and use have not so much followed development as led it and stimulated it. When the two hands are reasonably balanced, the results have generally been positive. True, at times, the government hand has been too heavy, with the result that farming was promoted in areas of the southern prairies that should have been left as open range, and huge benefits have been granted to energy-intensive industry. In recent years, however, the government's hand has been too light, and we have seen adverse effects on human health, losses in ecological habitat, and unsustainable demands placed on our water resources.

Nevertheless, the Canadian approach is arguably better designed to recognize that, for purposes of governance, water occurs awkwardly 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—a right that exists because of water's general role in maintaining the ecological well being and its specific role in maintaining human health. Further, because of its biological and its physical natures, no other natural resource exhibits so many externalities—impacts that are not reflected in formal market transactions and are better described as market failures.

When water use exhibits major aspects of a commodity, as it does for most industrial and agricultural uses, and even for the delivery of treated water to urban areas, the approaches described by Tracy Mehan are appropriate, at least as a starting point. However, they immediately lead to two key questions:

- First, Mehan's recommendations are not new. They are mostly the same as those suggested by groups such as Resources for the Future which have been around since the 1960s. Why has it been so difficult in the United States, one of the most neo-liberal societies in the world, to get them implemented? Studies of governance should be as much about what does *not* happen as what does happen. Why do federal and state governments in the United States stray so far from their principles when it comes to water?

- Second, just how—to what extent, by whom, in what areas—will market principles be applied for those aspects of water that are not deemed appropriate for market-based allocation or not easily evaluated by market processes? The issue here is not commodification of ecology. Imaginative economic methods show that services provided by our ecology are real and of definable value to the economy.

The Canadian approach is arguably better designed to recognize that, for purposes of governance, water occurs awkwardly between a commodity and the commons.

It would seem that these issues should focus on drinking water, but they do not. The most efficiency-intoxicated economists accept the fact that some people will have to be provided with household water either free or at very low cost. However, the quantities involved are so small, and the means to build subsidies into pricing structures for drinking water so well known, that any community that does not satisfy the basic needs of its residents for good-quality water is either incompetent or corrupt. Rather, it is in making water available for industry, agriculture, non-basic needs in cities, or even recreation that those issues come to a head. The volumes demanded by those uses are large enough, and the processes potentially polluting enough, to cause serious ecological damage in both the near and the long term.

Both of the questions listed above are profoundly political—in the best, non-pejorative sense of the word. They require political solutions, ones that are informed but not determined by economics and that have been shaped through consultation with the public.

We cannot look toward sustainable water management in North America simply by adjusting the micro elements of today's practices—full-cost pricing, life-cycle analysis, cost-effective demand management. All those practices can help, but, to protect ecosystems and yet maintain high qualities of human life and economic development, we need macro changes in the way in which we view water. Technology and economic approaches must be designed to achieve the goals we set for water management, rather than water management adjusting to technology and economics. The starting point for such a change in perspective is a determination that the ecological sustainability comes first; withdrawals or releases that threaten sustainability can no longer be tolerated. As Canadian novelist Margaret Atwood has said, the economy is a wholly owned subsidiary of the environment.

NOTES

1. Karen Bakker, "The 'Commons' versus the 'Commodity': Alter-Globalization, Anti-Privatization and the Human Right to Water in the Global South," *Antipode* 39, 3 (2007): 431–55.

2. David B. Brooks, "Water as a Human Right in North Africa and the Middle East: What Is New and What Is Not; What Is Important and What Is Not," *International Journal of Water Resources Development* 23, 2 (2007): 227–41.

About the Authors

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 Watertown, Massachusetts, environmental consulting firm The Cadmus Group Inc., based in Arlington, Virginia. He is also an adjunct professor at the George Mason University School of Law. Mehan may be contacted at gmehan@cadmusgroup.com.

DAVID B. BROOKS spent 14 years with the International Development Research Centre and is now senior advisor—fresh water for Friends of the Earth Canada. His main research interests lie in the linkages between environmental protection and the use of minerals, energy, and water. He is also working on a book about "soft" alternatives to conventional water management in Canada and across the world. Dr. Brooks has been elected to the International Water Academy based in Oslo, Norway.

THE WOODROW WILSON INTERNATIONAL CENTER FOR SCHOLARS is the living, national memorial to President Wilson established by Congress in 1968 and headquartered in Washington, D.C. It is a nonpartisan institution, supported by public and private funds, engaged in the study of national and world affairs. The Wilson Center establishes and maintains a neutral forum for free, open and informed dialogue. The Center commemorates the ideals and concerns of Woodrow Wilson by providing a link between the world of ideas and the world of policy and fostering research, study, discussion and collaboration among a full spectrum of individuals concerned with policy and scholarship in national and world affairs.

Woodrow Wilson International Center for Scholars
Canada Institute

THE CANADA INSTITUTE is an integral program of the Woodrow Wilson International Center for Scholars. The Center is a nonpartisan institution, supported by public and private funds and engaged in the study of national and world affairs.

The aim of the Canada Institute is to increase knowledge about Canada in the policy-making community, to focus on current U.S.-Canada issues and common challenges, and to keep an eye on the future, looking ahead to long-term policy issues facing the two countries in a variety of areas. The Canada Institute brings together top academics, government officials, and corporate leaders to explore key questions in the bilateral relationship through seminars, conferences, research projects, and publications.

Woodrow Wilson International Center for Scholars
One Woodrow Wilson Plaza
1300 Pennsylvania Avenue, NW
Washington, DC 20004-3027
canada@wilsoncenter.org
T (202) 691-4270
F (202) 691-4001
WWW.WILSONCENTER.ORG/CANADA

The Canada Institute on North American Issues

THE CANADA INSTITUTE ON NORTH AMERICAN ISSUES, incorporated in 2002 and affiliated with Operation Dialogue, was founded to conduct research on cross-border topics and encourage dialogue among key government, corporate, and academic institutions in Canada, the United States, and Mexico. CINAI, based in Toronto, is chaired by C. Warren Goldring.

31st Floor, TD Tower
66 Wellington Street
Toronto, Ontario M5K 1E9
T (416) 815-6772
WWW.THECANADAINSTITUTE.CA