Eau Canada

THE FUTURE OF CANADA'S WATER



Edited by Karen Bakker

EAU CANADA
Pg's 281-300
WATER EXPERIENCE
15
Pre Immersion



GRAEME MACKAY/HAMILTON SPECTATOR

Water conservation measures often rely on informal sanctions of community members and neighbours.

14
Moving Water Conservation to Centre Stage

Oliver Brandes, David Brooks, and Michael M'Gonigle

As with actors in a long-running play, Canadians speak from a well-worn script when it comes to discussing our uses of water. The script is performed automatically. When, as individuals, we want water, we simply say: "Turn on the tap." When, as a community, we want more houses or industry or agriculture, we simply tell our politicians: "Build more dams." Against a backdrop of thundering rivers, endless lakes, and towering glaciers, this national performance comes naturally. But the times, they are a-changin', and the old lines don't work as well as they used to.

A new script for water management is emerging. Instead of focusing on getting more and more, new technology and innovation are moving toward sustainable water management. Communities are demanding "no new dams" and are inspiring water managers to begin thinking creatively about how to deliver services, not just water. Society is beginning to recognize that the largest source of new water for Canadians won't be new at all but, rather, more efficient use of the water we already have. Recycling and conservation hold the potential to reduce use even further. Just as Amory Lovins (1985) taught us to think in terms of "negawatts" as we met new electicity demands by reducing electricity use, so we must learn to think in terms of "negalitres" as we meet new water demands by reducing water use.

But the success of this new script is by no means assured. The old approach, with its theme of "man over nature," is supported by a powerful myth concerning the abundance of Canada's fresh water. Society may be unwilling to move from a familiar past that promises abundance toward a new reality that demands its participation in the challenging dialogue required for a sustainable future.

Despite the myth of abundance and the power structure that supports it, we do not believe that Canada's old approach to fresh water will be viable for much longer. As emphasized in previous chapters, Canada may rank high in

per capita availability of water, but most of that water is found where Canadians are not (e.g., flowing to the Arctic) or is unavailable because it exists only as a slowly renewable stock in aquifers or lakes. Beyond this geographic mismatch, a diverse set of management "threats" conspire to challenge our illusion of limitless water (Environment Canada 2004). These include:

- *Infrastructure limits:* freshwater supply, wastewater collection, and treatment costs are outpacing available community resources (with estimates of unmet water and wastewater infrastructure ranging from $23 billion to $49 billion (NRTEE 1996; Environment Canada 2003).
- *Safety concerns:* the provision of water treated to drinking water standards is taxing management capabilities (as demonstrated in Walkerton and North Battleford).
- *Wild cards:* climate change (with attendant depletion of glaciers and longer periods of drought), ecosystem deterioration (including the widespread loss of wetlands), and new forms of pollution (such as waterborne endocrine disrupters, among others).

To support the ecological services that underpin our quality of life, Canadians must limit their demands for water and start protecting existing water sources. Responding to these threats requires changing behaviours and attitudes. But with change comes opportunity. The new script will be about innovation and new relationships with our surroundings. Opportunities include using technologies that ensure that our toilets use half the water they now use (or even no water at all); recycling our "waste" water and turning it into a source for other uses; and, in the urban area, turning expansive water-guzzling lawns into oases of native drought-resistant plants. Ultimately, our communities must be designed *for* water conservation not just retrofitted when we approach water limits.

This transformation does not just happen; fortunately, there are transitional steps. First, we gain time by changing from supply management to demand management. Then, we begin to address deeper concerns about the fundamental nature of the demands themselves. This moves us to a new stage – the "soft path," where water is viewed primarily as a service rather than as a product. Water conservation then moves to centre stage, triggering a fundamentally larger societal transformation. This transformation is about a new way of dealing with water, nature, and *ourselves* – ultimately, it is a form of participatory management called "ecological governance." Ecological

governance is the overarching framework for sustainability – in our metaphor, the theatre – where ecosystem health and processes are carefully considered at all levels of decision making, both upstream and downstream and throughout the watershed.

As shown in Table 14.1, the move from supply-side management to the soft path follows a spectrum of water management approaches that move us from compulsively *getting* more resources to thoughtfully *governing* resource uses. Such innovation is already under way in places as diverse as Australia, South Africa, Europe, Israel, Florida, and California. One need only think of the energy efficiency revolution of the 1970s to recognize a familiar pattern. Taken together, these sequential yet overlapping steps represent a strategy that ensures a paradigm shift from wasteful to sustainable consumption of fresh water in Canada.

A New Script: Changing from Supply to Demand Management

Although attitudes and policies are slowly changing, as witnessed by various local efforts to be "water wise," the old paradigm of supply management still dominates. This approach is predicated on large, centralized infrastructure with physical components (dams, reservoirs, pumping stations, and networked pipes) and corresponding institutional components (large-scale, hierarchical government agencies, rigid legal systems, and engineering firms). Supply management flourished in a time when dams were viewed as symbols of modernization. The Hoover Dam still draws tourists to celebrate the first "megadam" – or what India's first president referred to as "temples of modernity."

The Hoover Dam was built at the beginning of an era of engineering megaprojects that were fuelled by the promise of better lives and eternal progress. The dominant belief was in "supply management," the idea that nature was to serve our needs and that we could ensure this not by adjusting to the rhythms and cycles of the seasons but, rather, by channelling nature so that we could have water wherever and whenever we wanted it.

Underpinning supply management is the philosophy that water is not a limiting factor to growth and that the only real constraints are technological ability and the financial cost of the infrastructure needed to harness, store, and deliver water. Future growth is modelled on extrapolations from past and current consumption patterns, which, in turn, set in motion engineering plans to increase capacity to meet anticipated future needs. This historic

TABLE 14.1

A spectrum of water management approaches

Policy	Dominant discipline	Range of policy choice	Fundamental question	Planning process	Outcomes
Supply management	Engineering	Low: infrastructure based	How can we find new resources to meet future projected needs for water based on past trends in water use and population growth?	Planners model future growth, extrapolate from historic patterns of consumption, plan for an increase in capacity to meet anticipated future needs, then locate and develop a new source of supply to meet that need.	Construction: dams, pipelines, canals, wells, desalination
Demand management	Economics	Medium: short-term cost-benefit driven	How can we reduce demands for water to conserve the resource, save money, and reduce environmental impacts?	Planners model growth and account for a comprehensive efficiency and conservation program to maximize use of existing infrastructure. Increasing capacity would be a final option as part of a least-cost approach.	Water as an economic good; technical fixes; efficiency gains
Soft Path	Social sciences with physical limits	High: based on self-reflective political processes	How can we deliver the *services* currently provided by water in new ways that recognize the need for long-term "system" changes to achieve social sustainability?	Planners describe a desired sustainable future state (or scenario) based on economic and demographic variables and then "backcast" to devise a feasible and desirable path to that future with sustainability built into the economic, political, and sociocultural choices made along the way.	Ingenuity, new options, habits, and patterns of use

SOURCE: Adapted from Brooks and Wolfe (2004) and Brandes et al. (2005).

pattern of ever-increasing capacity – typically underwritten by government subsidies that reinforce the belief that water is not a valuable resource – does little to provide incentives for efficiency, let alone to encourage conservation. Though supply management has given Canadians a wealth of water access, the financial costs of new water supply are almost doubling every decade (Serageldin 1995), and preliminary evidence is that the environmental costs are mounting even faster (Postel and Richter 2003). This cycle of use-build-use-build embeds past water habits (and waste) into future planning even as the reality of ecological limits becomes apparent.

Demand management offers an alternative approach, which seeks simultaneously to save money, conserve water resources, and reduce environmental impacts. Demand management has gained recognition in a number of resource fields, including energy and transportation. With new technologies and institutions, we can use less water but still achieve the same benefits from household, industrial, commercial, and agricultural water use. Low-flow fixtures, drip irrigation, reuse and recycling technologies, consumer education, and pricing and regulatory initiatives can all help to "manage demand."

Developing (and maintaining) new power plants, highways, and pipelines is costly. Avoiding new infrastructure expenditures and reducing consumer demand offers real potential. Most water policy experts believe that cost-effective savings of 20 percent to 50 percent of water use are readily achievable (Brandes and Ferguson 2003; Brooks and Peters 1988; Postel 1997; Tate 1990; Vickers 2001). Cost effectiveness is often masked because users get water at less (typically much less) than its full cost. As a result, their incentive to improve water use efficiency is limited. Even "full cost accounting" ignores the non-monetary environmental effects of water supply and disposal. If these costs were taken into account, the cost effectiveness of efficiency improvements would be even greater.

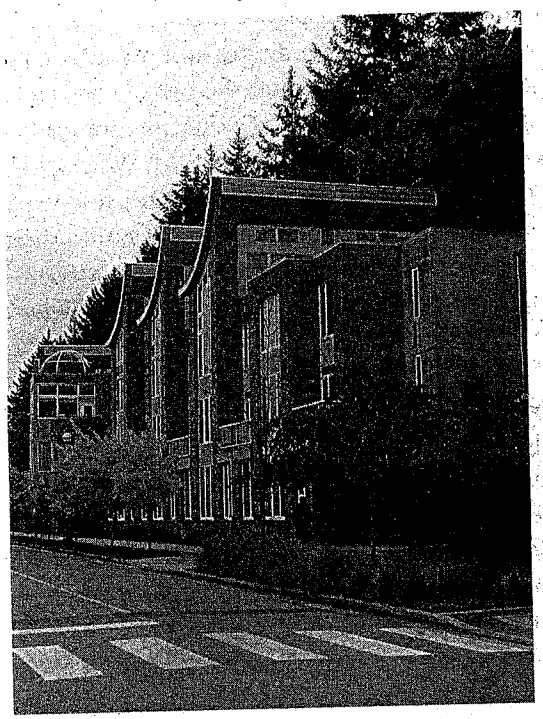
A recent state-wide study in California profiles a compelling example of the potential savings possible with demand management. The Pacific Institute (Gleick et al. 2003) reports that total commercial, industrial, residential, and institutional water use could be cost-effectively cut by at least 30 percent using "off-the-shelf" technologies. This improvement can be achieved more quickly and cleanly than can any new supply project now under consideration. They emphasize that "the potential for conservation and efficiency improvement in California is so large that even when the expected growth in the state's population and economy is taken into account, no new water-supply dams or reservoirs are needed in the coming decades" (Gleick et al. 2003, 1).

There are examples of community-wide demand management in Canada, and they are slowly becoming more common. For example, Cochrane, Alberta, reduced water consumption by 15 percent by giving away toilet dams, low-flow showerheads, and faucet aerators, with the result that the city was able to defer a multimillion-dollar pipeline. Port Elgin, Ontario, avoided a $5.5 million expansion of its water treatment plant by spending $550,000 to install 2,400 residential water meters and, by establishing an intensive conservation program (Boyd 2003, 51; CWWA 2005). Many smaller-scale examples are also emerging. For instance, the C.K. Choi building at the University of British Columbia harnesses multiple demand management technologies that, together, significantly reduce water use.

A whole galaxy of water efficiency and conserving measures exist. Some demand management measures, including composting toilets, drip irrigation,

BOX 14.1

The C.K. Choi Building, University of British Columbia



Significant water savings are realized through a series of features. Composting toilets installed in this project do not require water for flushing (and therefore eliminate sanitary waste). City water is generally only required for the low-flow lavatory faucets (spring-loaded to further reduce waste) and kitchen sinks. Irrigation of site planting material is provided solely from collected rain water (stored in an 8,000-gallon subsurface cistern) and recycled grey water from the building. Projected water usage is approximately 300 gallons per day – a reduction of over 1,500 gallons of potable water per day.

and greywater reuse and recycling are recent technologies. Others, such as cisterns and rain barrels, are much older but can have a significant impact on water use. Demand management measures are not only about technologies but also about innovative practices, such as xeriscaping[1] and "water star" product labelling. "Carrots" and "sticks," such as conditional funding, rebates, tax benefits, mandatory plumbing requirements, and pricing schemes that penalize excessive water use, are also among the measures used to manage demand. Table 14.2 provides a list of some of the water demand management measures that are commonly used in North America.[2]

A Fresh Approach to "New" Water

Making conservation the next best source of "new" water requires regulators and water resource managers to assess the risks associated with new technologies and to build demand management infrastructure into future systems. This entails long-term planning and a comprehensive approach, all of which require specific and extensive government leadership and action.

Fundamentally, demand management necessitates an integrated approach that considers surface water and groundwater, source and wastewater, and energy. The process must involve water users in planning the appropriate mixture and timing of measures to ensure that they suit local conditions. There is no silver bullet. A diversity of measures must be used strategically and comprehensively to reap the full benefits. For example, a rebate (incentive) for replacing water-inefficient appliances should be supported with a public education program to help instil a conservation ethic in water users. Such a program should, in turn, be supported by a new water rate (pricing) structure that increases water rates according to volume used or time of use (where "smart meters" are installed).

Demand management is a major step forward, but it is only the first step. Most importantly, it does not pay close attention to the differences between efficiency and conservation. In the simplest terms, efficiency is a means and conservation an end. In most cases, efficiency will allow for some conservation, but it may also "serve as permission to consume" (Moezzi 2002). Think of the simple task of watering lawns: efficiency dictates the use of low-flow sprinklers, but with ever more lawns to water, sprinklers become just a better way to keep doing something we should no longer be doing in the first place. In contrast, conservation suggests planting greenery that does not require watering at all.

TABLE 14.2

Water demand management measures

General categories	Specific examples
Sociopolitical strategies	Information and education Water policy Water use permits Landscaping ordinances Water restrictions Plumbing codes for new structures Appliance standards Regulations and by-laws: • Turf limitation bylaws • Once-through cooling system bans
Economic strategies	Rebates for more efficient technologies (e.g., toilets, showers, faucets, appliances, drip irrigation) Tax credits for reduced use Full-cost recovery policies High-consumption fines and penalties Pricing structures: • Seasonal rates • Increasing block rates • Marginal cost pricing • Daily peak-hour rates • Integrated sewer and waste water charges
Technological strategies	Metering Landscape efficiency Soil moisture sensors Watering timers Micro and drip irrigation Cisterns Rain sensors Efficient irrigation systems Soaker hoses Leak detection and repair Water audits Pressure reduction System rehabilitation Efficient technology: • Dual-flush toilets • Low-flow faucets • Efficient appliances (dishwashers/ washing machines) Recycling and reuse: ranging from cooling and process water to greywater for toilets or irrigation, to treating and reclaiming wastewater for reuse.

SOURCE: Adapted from Brandes and Ferguson (2003, 40).

To translate the new script from a selection of individual demand management efforts into a complete shift in social behaviour, it is necessary to implement a set of measures. Universal metering and conservation-based pricing are important cornerstones to any demand management program. As other authors in this volume have demonstrated, water exhibits negative price elasticity, which means that, as prices go up by a certain percentage, rate of use falls – but not necessarily by the same percentage.[3] As anyone who has eaten at an "all-you-can-eat" buffet can attest, a flat rate leads to over-consumption. A comparison of Canadian cities shows reductions in water use of up to 70 percent when water is priced by volume rather than by a flat rate (Brandes and Ferguson 2003; Campbell 2004; Cantin, Shrubsole, and Alt-Ouyahia 2005). Indeed, for maximum conservation benefits, prices should *increase* with the volume taken (increasing block rate) so long as this can be done fairly, without penalizing poorer families.

Social marketing is another component of a comprehensive approach to managing demand. Conventional education programs that focus merely on disseminating information fail to address the true barriers to behavioural change. Social marketing invests time and effort at the outset in order to address these barriers from program design to implementation (McKenzie-Mohr 2004). Ontario's Region of Durham, for example, took this approach in its outdoor water efficiency program. The program started in 1997 with the region employing summer students in a community-based social marketing program to work with homeowners to reduce residential lawn watering. The result was a 32 percent reduction in peak water demand over a three-year period (Maas, 2003, 16).

Water reuse and recycling technologies also present opportunities to reduce water use and to promote water sustainability. They are particularly useful in regions with physical supply limitations, such as the Okanagan Basin in British Columbia and the dry grasslands of southern Alberta. Typical applications include using treated municipal wastewater to irrigate non-food crops, urban parkland, landscaping, and golf courses. Though water recycling is not always the cheapest option when only direct accounting costs are included, lifecycle costing may show long-term economic benefits. About 80 percent of the cost of typical sewage systems goes to collection and only 20 percent to treatment. Over the longer term, we can save money by capturing and recycling stormwater and wastewater locally. In addition, by diverting treated wastewater to irrigation, would-be pollutants become valuable fertilizers, rivers and lakes are protected from contamination, crop production

increases, and reclaimed water becomes a reliable, local supply. Unfortunately, conventionally trained sanitary engineers emphasize the linear approach to managing water and sewage – use, collect, treat, and then dispose of waste. And the benefits of closing the cycle – use, collect, treat partially, and then use again – go unrealized (Postel 1997, 128, 134).

At present, water reuse and recycling in Canada are practised on a relatively small scale, and the sophistication varies regionally, depending on the availability of water supplies and regulatory flexibility (Schaefer, Exall, and Marsalek 2004). Renzetti (2005) shows that the net rate of water reuse or recirculation in Canadian manufacturing has hardly changed between 1981 and 1996. Reuse and recycling can be a powerful component of demand management, especially in areas where water demands are rapidly increasing, or where there are conflicts among users. Israel, for example, treats 70 percent of its urban wastewater, which is then used for agricultural irrigation (Gleick 1998).

Overcoming the Implementation Gap

Options such as conservation-based pricing, social marketing, and reuse-recycling act synergistically. As prices reflect a "truer" cost of the resource and citizens understand the importance of using alternatives, recycling-reuse options become more economically and socially feasible, spurring innovation and technological advance. This relationship creates a cycle of opportunity.

Despite the success stories outlined above, demand management remains on the periphery of Canada's current water management strategies. Glen Pleasance of the Canadian Water and Wastewater Association's Water Efficiency Committee notes that "fewer than 20 percent of Canadian municipalities have established demand-side management plans" (Cantin, Shrubsole, and Alt-Ouyahia 2005, 3). A study in Ontario notes that, although individual demand management measures are being implemented, supply management still predominates. For example, only one in five of the Ontario municipalities studied had a DSM plan or strategy in place (de Loë et al. 2001, 57, 66). This lack of planning reflects the persistence of the myth of water abundance and results in the entrenchment of a host of barriers, such as outdated plumbing codes, largely free use of groundwater, and artificially low water prices[4] that block more widespread implementation of water demand management (Brandes and Ferguson 2004, 44; Nowlan 2005).

Progress to limit our supply-side reliance has been slow. A more comprehensive approach to managing demand is only possible with all stakeholders – government, business, and civil society – working to make the necessary structural changes. As a first step, we must recognize that demand management is the key to unlocking society's potential to address long-term prosperity and water sustainability. As Sandra Postel (1997, 191) notes, demand management is a "last oasis ... large enough to get us through many of the shortages on the horizon, buying time to develop a new relationship with water systems and to bring consumption and population growth down to sustainable levels."

Expanding the Script: Water Soft Paths

Demand management can bring about significant *incremental* improvements in water management. Ultimately, however, it will not lead to a sustainable future that ensures enough water for ecosystems and for human beings. As Sachs (1998) states, "An increase in resource efficiency alone leads to nothing unless it goes hand-in-hand with an intelligent restraint on growth ... efficiency without sufficiency is counter-productive; the latter must define the boundaries of the former." Water soft path approaches offer a more holistic and comprehensive approach to water management than what we have now. They begin from the premise that sustainability is essential, and they differ fundamentally from conventional (or hard path) water planning in several ways. The most important difference between the two approaches is the way water is perceived: the soft path approach perceives water not as an end product but, rather, as a service or a means of accomplishing certain tasks, such as cooking, sanitation, or food production (Brooks 2005).

BOX 14.2

Vernon, British Columbia: Closing the Loop

The City of Vernon in British Columbia has embraced reuse-recycling as both a water treatment method (through its reclamation process) and as an alternative source of supply. Annually, it uses one billion gallons of treated wastewater to irrigate 2,500 acres of agricultural, recreational, and forestry land. The result of this program is that, since 1977, there have been virtually no discharges of the city's municipal effluent into Okanagan Lake, and water demands that might have been withdrawn from local water sources have been reduced.

SOURCE: Cohen, Neilson, and Welbourn (2004); Waterbucket.ca (2005).

Asking Why Instead of How

Aside from ecological requirements for water, only a few uses – most obviously drinking – require water as the end product. Within a soft path approach the objective is to satisfy demands for services rather than to supply water per se. The demand management approach focuses on "how" – how to do the same with less water; whereas the soft path focuses on "why" – why use water to do this in the first place? The question is not *how* to improve the efficiency of crop production with new irrigation systems but, rather, *why* irrigate instead of using rainwater harvesting and other techniques that multiply the effectiveness of rain-fed agriculture? Or, even more fundamentally, *why* grow crops in areas where the ecosystems are not suited to them?

Other changes follow from this shift in orientation. Most important, while demand management approaches focus on making technological and some institutional changes in order to improve water use efficiency, soft path approaches focus on broader changes that conserve natural resources and alter how water efficiency calculations are made. The demand management approach can indicate how to produce a tonne of paper with less water, for example, but it cannot suggest how the pulp and paper industry could reduce water use by decreasing production. Demand management can indicate how to produce food with less water, but it cannot suggest a reduction in meat consumption that would save significantly more water.

Clearly, the soft path involves much more than choices about efficiency: it also involves social choices and cultural values (Wolfe and Brooks 2003). Soft paths provide the macro complement to the microanalysis provided by demand management. Demand management focuses on short-term operational choices for specific projects and systems; soft paths focus on long-term planning for entire societies. Demand management can indicate what will or will not "pay off" but cannot predict water use in a future "conserving" society. This is where soft path analysis and soft path strategies are most instructive.

From Approach to Policy

Demand management and soft paths are complementary. Together they can serve both our economy and our environment. The methodology for the soft path analysis is relatively well developed, and it can be summarized in terms of four underlying principles – treating water as a service, ensuring ecological sustainability, conserving quality as well as quantity, and "backcasting" in order to develop policy.

Unlike the standard benefit-cost (or cost-effectiveness) analyses commonly used in demand management, the soft path approach to analysis does not claim to be "objective." Soft path analyses and strategies are explicitly normative, establishing the values of sustainability and equity as social goals and promoting the changes in technology, institutional structures, and personal consumption patterns needed to achieve these goals.

The soft path is a long-term approach to water management. It takes time for change to take root; it especially takes time to rebuild physical and institutional infrastructure to permit local reuse and recycling and to promote changes in demands for water-intensive services. And such change

BOX 14.3

Soft path principles for water management

Treat water as a service rather than as an end in itself

Except for a few relatively small human uses, such as drinking and washing (and water reserved to support ecosystems), a soft path approach does not view water as a final product; instead, it views water as a means of accomplishing specific tasks, such as sanitation, attractive yards, or agricultural production. When water is viewed as a service, managers don't focus exclusively on traditional technologies and infrastructure: they also promote education and social marketing, local reuse and recycling, urban redesign for conservation, and different modes of farm management. Changing practices and behaviour will offer a wide range of ways to reduce water use while maintaining desired services.

Ensuring ecological sustainability

Soft paths recognize ecosystems as legitimate users of fresh water; therefore, environmental constraints are built in from the start in order to limit the amount of water withdrawn from natural sources and to establish conditions on the quality of water returned to nature. Every soft path must be tested for its effects on the environment, and any option that puts sustainability at significant risk must be rejected.

Conserving quality as well as quantity

High-quality water is critical to human health, but water quality requirements vary with end-use. A contaminant that is toxic for one use may be benign or even beneficial for another. We don't want animal waste in our drinking water, for example, but we eagerly seek it for gardens and farms. Yet, in most of Canada, we irrigate with drinking water. For both economic and physical reasons, it is almost as important to conserve the quality of water as it is to conserve its quantity. We only need small quantities of high-quality water (mainly for household purposes and special industrial tasks), but we

need huge quantities of low-quality water (mainly for irrigation on farms and cooling at generating stations and industrial plants). Soft path policies are designed from the start to match the quality of water supplied to the quality required by the end-use. The key is to cascade water systems, ensuring that wastewater from one use becomes input for another use – from a washing machine to a garden, or from an industrial cooling system to make-up water for boilers.

Looking ahead by working backwards

Soft paths require a set of policy changes and program plans that will, over time, move society toward water sustainability. How that route is built comprises another unique characteristic of the soft path. Traditional planning starts from the present and projects forward toward the future. Soft path planning does just the reverse. Through a technique called "backcasting" – in contrast to "forecasting" – a sustainable and attractive future state concerning water sources and uses is defined. We then work backward from our vision of this future state to identify policies and programs that will connect us to it.

SOURCE: Brandes and Brooks (2005).

requires community action and engagement, which can only begin with a vision of a water future that is both sustainable and equitable. The environmental and social costs – in habitat loss, decline in security of supply, watershed degradation, and infrastructure expense – of continuously increasing our demand for water are too great to ignore.

A New Theatre: Toward Ecological Governance

Water policy cannot be neatly separated from the rest of our economy. The process of moving to efficiency and to conservation-based approaches to water management must include recognizing that this will discomfort entrenched interests and will displace workers in some industries. However, the longer we remain fixated on past practices and status quo options, the more intense this upheaval will be. Regardless of long-term economic, social, and environmental benefits, sustainable water management will only emerge within the context of larger social changes and fundamental political commitments. Beyond the decisions and rules made by government, other participants – in particular, business and civil society – will be critical if we are to move ecological principles from the periphery to the core of decision making and, ultimately, make water management truly sustainable.

Confronting inertia and the many institutional barriers that block widespread water conservation is part of what can be called "ecological governance" – a form of governance in which ecological sustainability is incorporated into the very fabric of government, industry, and civil society.

Ecological governance addresses the way individual and collective decisions are made within watersheds and, more broadly, within the ecosystems that support all human life. As demand management becomes more long term, integrated, and comprehensive, people will begin to interact differently with the landscape and so create a soft path that embodies a different relationship to water. In the process, we find ourselves shifting from "managing the natural environment" in response to unsustainable human demands to "reshaping human governance" to fit within ecological limits.

The soft path approach to water management is part of a larger debate about the future of government regulation, in which people are asking how policy and practice can be more responsive to the innovative potential now demanded by citizens and regulators. In response, a new approach, often referred to as "democratic experimentalism," is emerging: "innovative regulatory strategies that seek to combine local deliberative experimentation with central coordination and rolling improvements in performance standards" (Karkkainen 2002, 998). Ecologically based democratic experimentalism requires

BOX 14.4

Principles of Ecological Governance

Ecological governance includes:

- embedding ecosystem values and considerations within the decision-making processes (including economic calculations) of government, business, and the public
- taking uncertainty seriously so that future consequences are reflected in flexible processes that extend decision making beyond the electoral cycle, calculations beyond short-term returns on investment, and personal values beyond isolated consumer preferences
- experimenting with new approaches to legal regulation, resource management regimes, and jurisdictional designs that can inculcate ecological thinking into decision making
- enhancing the ability to make explicit sociopolitical choices at the macroeconomic level in order to "shift" the demand curves rather than just move along them.

SOURCE: Brandes et al. (2005).

governance systems to begin to acknowledge their role within the natural world and to develop new techniques to strengthen human-environment relationships. However, the provision of local responses that promote innovation and that allow for experimentation under provincial and/or national coordination allows for the possibility of making comprehensive social changes.

Central to this concept is the need for regional and national coordinating bodies to share their knowledge with those facing similar problems. This information pooling increases the efficiency of public administration and heightens its accountability by involving citizens in decisions that affect them. The experimentalist approach helps institutions to adapt and to grapple with persistent problems that limit sustainability (Dorf and Sabel 1998). It entrenches adaptive management – a process of learning-by-doing – and facilitates solutions that have been adapted to meet local needs. This allows for the flexibility needed in the face of uncertain markets and a changing climate (Moench, Caparian, and Dixi 1999).

The French water parliament system is a leading example of this type of "new" governance. In France, the government has shifted its focus from centralized control to facilitating local action. It has done this by devolving authority to a system of local management authorities who operate on a watershed level. These "water parliaments" take the watershed as the starting point for sustainable water management. Local authorities develop plans tailored to local conditions, while the government, having clear directives and objectives, guides and supports the process on a national level (da Motta et al. 2004, 37). In a country as large and diverse as Canada, this type of "nested" planning and coordination is a promising option for effectively governing our water resources (Brandes et al. 2005).

Commitments to such watershed approaches are emerging in Canada. Examples range from the conservation authorities in Ontario to more recent institutional arrangements, such as the Fraser Basin Council and various provincial water strategy commitments, including a clear "watershed approach" in Alberta and Quebec. These developments suggest the potential for the ongoing transformation of Canadian water governance. However, if this type of approach is to take root, then Canada needs to make a more serious commitment to it than it has done to date. Learning from the experiences of Australia, South Africa, and Europe could go a long way toward moving the Canadian effort forward.

Conclusion

In the short term, a serious commitment to demand management will stave off the need for most new water supplies. That window must be used to initiate a conversation concerning our attitudes toward water and to begin adjusting our physical and institutional infrastructure toward soft path options that treat water as a service rather than as a product. Ultimately, we have to "shift our paradigm" – not a trivial task – from a focus on "getting" to one of "governing." And we must do this not just for water but for all natural resources. Complementary policies for water demand that management, water soft paths, and watershed-based institutions all fit comfortably within the framework of ecological governance. Ecological governance, thus, is the catalyst for innovation that would promote a system based on efficient, equitable, and sustainable alternatives to today's linear, extractive, and far from sustainable patterns of natural resource use.

Happily, and in contrast to much of the world, we in Canada have a remarkable natural endowment as well as the economic capital and the human capabilities to make changes to ecological governance in a gradual way. What remains to be seen is whether we have the sense and the political will to do so, for the time available is limited. To return one last time to our metaphor, the new theatre of ecological governance will have no audience: we will all be on stage.

NOTES

"From the Greek word *xeros*, meaning dry, Xeriscaping designs draw on a wide variety of attractive indigenous and drought-tolerant plants, shrubs, and ground cover to replace the thirsty green lawns found in most suburbs. A Xeriscape yard typically requires 30-80 percent less water than a conventional one, and can reduce fertilizer and herbicide use as well. One study in Novato, California, found that Xeriscaped landscaping cuts water use by 54 percent, fertilizer use by 61 percent, and herbicide use by 22 percent" (Postel 1997, 159).

2 Good resources for a detailed discussion of the many options available for reducing water use include Vickers (2001); Gleick et al. (2003); American Water Works Association, http://www.awwa.org; Water Wiser, National Water Efficiency Clearinghouse, http://www.waterwiser.org; Canadian Water and Wastewater Association, http://www.cwwa.ca; Canadian Council of the Ministers of the Environment (CCME), http://ccme.ca.

3 The elasticity of water to price is always negative, but the extent of the reaction varies with the use. Typically, for a home, the percentage decrease of water use for drinking, cooking, and cleaning will be less than the percentage increase in price, but the percentage decrease in use for irrigating lawns, cleaning sidewalks, and washing cars will be greater than the percentage increase in price.

4 The lack of appropriate withdrawal charges is one of the primary causes of artificially low retail prices for water. These low prices create a chain of overconsumption, starting with primary users such as industry, farmers, and municipalities. Low withdrawal prices eventually result in water utilities overcapitalizing. With the increased capacity of supply water, utilities then have an incentive to maintain low prices and high levels of use to ensure that capacity is maximized (Brandes and Ferguson 2004, 44).

REFERENCES

Boyd, D.R. 2003. *Unnatural Law: Rethinking Canadian Environmental Law and Policy*. Vancouver: UBC Press.

Brandes, O.M., and D.B. Brooks. 2005. *The Soft Path for Water in a Nutshell*. Victoria, BC: POLIS Project on Ecological Governance.

Brandes, O.M., and K. Ferguson. 2003. *Flushing the Future? Examining Urban Water Use in Canada*. Victoria, BC: POLIS Project on Ecological Governance.

—. 2004. *The Future in Every Drop: The Benefits, Barriers, and Practice of Urban Water Demand Management in Canada*. Victoria, BC: POLIS Project on Ecological Governance.

Brandes, O.M., K. Ferguson, M. M'Gonigle, and C. Sandborn. 2005. *At a Watershed: Ecological Governance and Sustainable Water Management in Canada*. Victoria, BC: Project on Ecological Governance.

Brooks, D.B. 2005. Beyond Greater Efficiency: The Concept of Water Soft Paths. *Canadian Water Resources Journal* 30 (1): 83-92.

Brooks, D.B., and R. Peters. 1988. Water: The Potential for Demand Management in Canada. Ottawa: Science Council of Canada.

Campbell, I. 2004. Toward Integrated Freshwater Policies for Canada's Future. *Horizons* 6 (4): 3-7.

Cantin, B., D. Shrubsole, and M. Ait-Ouyahia. 2005. "Using Economic Instruments for Water Demand Management: Introduction." *Canadian Water Resources Journal* 30 (1): 1-10.

Cohen, S., D. Neilsen, and R. Welbourn, eds. 2004. *Expanding the Dialogue on Climate Change and Water Management in the Okanagan Basin, British Columbia*. Final Report, 1 January 2002 to 30 June 2004. Ottawa: Climate Change Action Fund.

CWWA [Canadian Water and Wastewater Association]. 2005. Water Efficiency Experiences Database. http://www.cwwa.ca/WEED/Results_e.asp.

da Motta, R.S., A. Thomas, L.S. Hazin, J.G. Feres, C. Nauges, and A.S. Hazin. 2
Economic Instruments for Water Management: The Cases of France, Mexico and Br
Northampton, MA: Edward Elgar.

de Loë, R.C., L. Moraru, R.D. Kreutzwiser, K. Schaefer, and B. Mills. 2001. Demand-
Management of Water in Ontario Municipalities: Status, Progress, and Oppc
nities. *Journal of the American Water Resources Association* 37 (1): 57-72.

Dorf, M., and C.F. Sabel. 1998. A Constitution of Democratic Experimentalism. *Col*
bia Law Review 98 (2): 267-473.

Environment Canada. 2003. *A Primer on Fresh Water: Questions and Answers*. 5th
Ottawa: Environment Canada.

—. 2004. *Threats to Water Availability in Canada*. Burlington, ON: National Water
search Institute, 128.

Gleick, P. 1998. Water in Crisis: Paths to Sustainable Water Use. *Ecological Applicatio*
(3): 571-79.

Gleick, P., D. Haasz, C. Henges-Jeck, V. Srinivassan, G. Wolff, K. Cushing, and A. Ma
2003. Waste Not, Want Not: The Potential for Urban Water Conservation in C
fornia. Oakland, CA: Pacific Institute for Studies in Development, Environm
and Security.

Karkkainen, B. 2002. Adaptive Ecosystem Management and Regulatory Penalty Defau
Toward a Bounded Pragmatism. *Minnesota Law Review* 87: 943-98.

Lovins, A. 1985. Saving Gigabucks with Negawatts. *Public Utilities Fortnightly*, 19-26

Maas, T. 2003. *What The Experts Think: Understanding Urban Water Demand Managem*
in Canada. Victoria, BC: POLIS Project on Ecological Governance.

McKenzie-Mohr, D. 2004. Community-Based Social Marketing. http://www.cbs
com.

Moench, M., E. Casparian, and A. Dixi. 1999. *Rethinking the Mosaic: Investigations i*
Local Water Management. Boulder, CO: Nepal Water Conservation Foundation a
Institute for Social and Environmental Transition (ISET).

Moezzi, M. 2002. The Predicament of Efficiency. ACEEE (American Council for an
ergy Efficient Economy). http://enduse.lbl.gov/Info/ACEEE-Pred.pdf.

Nowlan, L. 2005. *Buried Treasure: Groundwater Permitting and Pricing in Canada*.
ronto: Walter and Duncan Gordon Foundation.

NRTEE [National Round Table on the Environment and the Economy]. 1996. *State*
the Debate on the Environment and the Economy: Water and Wastewater Services
Canada. Ottawa: NRTEE.

Postel, S. 1997. *Last Oasis: Facing Water Scarcity*. New York: W.W. Norton and Compa

Postel, S., and B. Richter. 2003. *Rivers for Life: Managing Water for People and Natu*
Washington, DC: Island Press.

Renzetti, S. 2005. Economic Instruments and Canadian Water Use. *Canadian Water*
sources Journal 30 (1): 21-30.