Municipal World

CANADA'S MUNICIPAL MAGAZINE SINCE 1891

JULY 2004

URBAN WATER DEMAND MANAGEMENT

Planning for an uncertain future

URBAN WATER DEMAND MANAGEMENT:

Planning for an uncertain future

Oliver Brandes and Tony Maas

The United Nations Year of Fresh Water did much to raise the profile of water crises around the world. Indeed, even in "water-rich" Canada, water resource experts and leaders at all levels of government are coming to grips with the fact that we are not insulated from concerns over the future of freshwater resources.

Canadian Challenges

In short, Canadians are facing an uncertain future. Many communities are, or may soon be, facing significant water supply challenges. More and more communities are experiencing seasonal droughts, problems with failing infrastructure, and growing concerns for the integrity of local aquatic ecosystems. According to Environment Canada, one in four municipalities reported water shortages between 1994 and 1999, yet water use in Canada remains among the highest in the world.

These challenges are compounded by the unknown impacts of global climate change on local water supplies. A recent report by Statistics Canada indicates that some of the country's major glaciers are shrinking to their smallest size in 10,000 years and water levels in the St. Lawrence are at their lowest in nearly a century. These water sources have been central to the health and development of Canadian cities, which are home to over 80 percent of the population.

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Mitigating the impacts of climate change will be a slow process. Climate experts are indicating we must be ready to adapt to these impacts. The International Panel on Climate Change (IPCC 1996) urged water managers to begin "a systematic examination of engineering criteria, operating rules, contingency plans and water allocation policies," and states with "high confidence" that "water demand management and institutional adaptation are the primary components for increasing system flexibility to meet uncertainties of climate change."

The message from Canadian water experts is similar – we must begin managing our water demands as an effective way of dealing with both the current reality and future uncertainty around urban water resources.

Supply and Demand

The "supply-side" approach has been the basic paradigm of water management throughout Canada and the industrialized world. The primary focus is securing sufficient water to meet forecast demand, a function of projected population and economic growth.

Demand-side management (DSM) is now gaining recognition as both an alternative and complement to supply-side solutions. DSM entails measures that influence the efficiency and timing of water use, such as low-flow toilets and fixtures, education, water reuse and conservation-based pricing structures. By increasing the number of tools available, DSM increases the flexibility for local water managers to deal with changing climatic, hydrological and financial conditions.

Under a DSM approach, decisions to build supply infrastructure are contingent on first investigating opportunities to lower demand. Fundamentally, it accepts that demand can be influenced, and that conservation options are often the lowest cost alternatives to meet increasing water requirements.

Increasing water use efficiency through DSM can mitigate many of the challenges associated with high levels of water use. Most importantly, it is a

valuable component of a long-term integrated water management strategy to balance competing needs for water. Despite this benefit, the extent to which DSM is applied to water management in Canada is limited.

POLIS Report

A recently released report by The POLIS Project on Ecological Governance at the University of Victoria, *What the Experts Think: Understanding Urban Water Demand Management in Canada*, identifies some of the reasons why DSM has not been widely adopted. It provides background on urban water DSM, and identifies what is necessary to shift from a "water on demand" view to a more holistic approach that recognizes the limits of local water supplies, their limited capacity to absorb pollutants, and the needs of aquatic ecosystems.

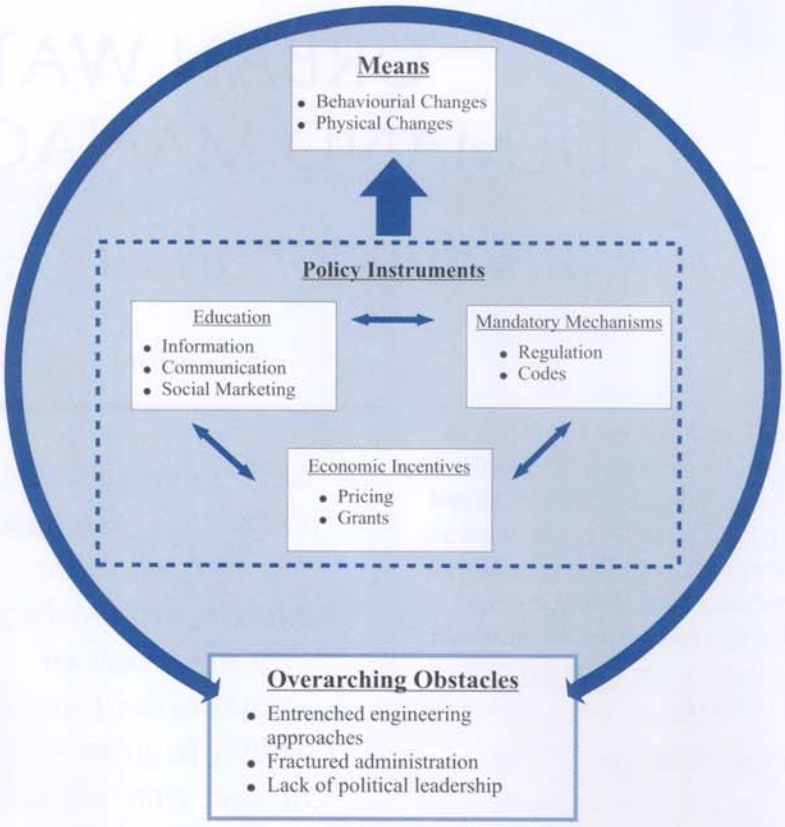
Drawing on an extensive set of interviews with Canadian experts in the field of water resource management, the report synthesizes their views into a comprehensive analysis. The overarching message is clear, freshwater resources in Canadian cities are critical, and although the solutions are local by nature, they deserve national attention and serious consideration.

The study divides the process of DSM into two categories of activities: providing the *means* for reducing demand, and creating *policy instruments* to motivate these means. For the purposes of the report, means are viewed as both changing the water use behaviour of individuals and institutions, and making physical changes to increase water use efficiency. Policy instruments for motivating these changes are grouped into three categories: education, economic incentives, and mandatory mechanisms.

The report notes that the synergistic nature of the policy instruments makes the process of implementing an effective DSM program complex. The framework presented in Figure 1 is a conceptual model of the DSM approach that illustrates the relationship among the policy instruments, and their (potential) combined influence on the means.

Figure 1

Conceptual model of the DSM approach



It also points to a third and critical dimension of DSM – some of the overarching obstacles that pose major barriers to its widespread adoption.

Means for Reducing Demand

The goal of behavioural change is to modify water use activities to reduce existing levels of wastage and inefficiency. Entrenched values and habits of water managers and users are major barriers to fundamentally modifying water use behaviour, making behavioural change difficult to achieve and often unreliable over the long-term.

Physical measures for reducing demand focus on technology to increase efficiency or reduce water losses. Opportunities range in scale from individual households, institutions and industries, to municipal water and wastewater networks. Examples include water-efficient fixtures, leak repair, and water reuse. According to the experts, the technological capacity required to increase urban water use efficiency is established. What is lacking is the motivation.

Policy Instruments

Education can raise awareness of the need and potential for water conservation. However, education alone is not considered sufficient to motivate the behaviourial and physical change that will reduce water demand. It must, therefore, be supplemented by other motivating factors.

Economic incentives, particularly pricing signals, are often considered the most effective DSM policy instrument. Often touted as an easy answer to our excessive water use, the issue of water pricing is contentious. Pricing reform requires that policy makers address difficult policy issues such as social equity, long-term financing of water systems, and privatization of water utilities.

Water experts generally agree that the lack of a strong pricing stimulus is the prominent barrier to reducing water demand. Nevertheless, many also note that pricing is not a "silver bullet" solu-

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tion, but works best as part of an integrated policy package.

In addition to education and economic incentives, a package to motivate behavioural and physical changes would include mandatory or "command and control" mechanisms, such as building and plumbing codes and regulations. Current building and plumbing codes fail to promote the use of water-efficient fixtures, and generally do not promote water reuse. Furthermore, in most provinces, regulations limit the potential for wastewater reclamation and reuse.

Overarching Obstacles

The experts note that a number of overarching administrative and institutional obstacles exist that pose major barriers to DSM. These include entrenched, supply-side engineering approaches, fragmented administration of water management among various agencies and levels of government, and a lack of political leadership on water issues.

Many of these obstacles are not specific to DSM, or even the field of water resource management, but are symptomatic of limitations in the decision-making processes and misguided institutional priorities affecting the environment generally.

Future Directions

Beyond outlining and discussing some of the many challenges that limit the adoption of DSM as a central approach to urban water management, the POLIS report provides future directions to overcome many of these overarching obstacles.

Developing institutional capacity to design, implement and administer effective DSM programs is critical. This requires broadening beyond the traditional supply-side orientation in resource management by taking a more "ecologically innovative" approach to technology and engineering, as well as incorporating "social scientific" techniques that influence the demand side.

To instill a lasting "water ethic" in Canadians will demand greater emphasis on effective, long-term education programs. Such programs include additions to school curricula, on-going professional seminars and workshops, and explicit statements in government policy.

In conjunction with these programs, water prices and rate structures must be established that better reflect the true costs of water. These pricing systems must also ensure equitable access to potable water and encourage water conservation.

Regulatory changes must also be made. Provincial governments should amend building and plumbing codes to mandate a variety of water-efficiency measures, including support for the reuse of wastewater.

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private sector with government sector employees, can occur when two or a group of municipalities creates a regional utility.

Creating utilities can also increase the use of fees to offset high property taxes.

Fees must have a close nexus to the service being provided. This is case law. A fee for services offered, not rendered, as a per square foot fee for fire service, could significantly reduce property taxes. (This would require a legislative change in Wisconsin and is part of the Alliance agenda for change.) In addition, the fees would shift the burden to all property owners, allowing for discrimination of the fees based on inventory and height of building, relieving homeowners from the subsidization of large institutions and manufacturing properties.

Regional utilities for garbage, recycling and landfill siting could also bring savings, and again be funded by fees. Road ploughing and maintenance is another possibility.

Concentrating on service levels and efficiency instead of governmental incorporation allows for total creativity. Consolidation of municipalities is less likely to allow for the kind of creativity that contract law can accommodate.

Conclusions

If social justice issues and issues such as the "free rider" described by Samuelson are not considered, there is likely to be more calls for, if not more, government consolidation. But it need not be. Both conservatives and liberals should consider the package described in this article: regional revenue sharing, inclusionary zoning and utility regional service delivery. Zoning law changes would reduce the need for school busing. Revenue sharing would reduce the need to consolidate or annex property. Regional utilities would reduce property taxes and increase efficient allocation of costs.

In the end, it isn't whether Samuelson or Tiebout are right. It's about better government and better service to the taxed public in the 21st century. *MW*

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Funding transfers from federal and provincial governments to municipalities should be conditional on the incorporation of DSM measures at the local level. Ultimately, funding should be designated specifically for DSM programs.

New approaches to planning are needed to engage the public in water management, coupled with the explicit commitment to water efficiency in community plans. More generally, water policy and management must move beyond today's utilitarian and anthropocentric orientation to include a broader commitment to ecosystem health and integrity.

Finally, the shift to DSM will require informed leadership at all levels of government. Facilitating this informed leadership entails an active contribution from Canadian water experts.

Conclusion

Where the water problem is "shortage," the most flexible, cheapest, and most environmentally acceptable solution will not be an increase in supply, but a reallocation of existing uses and improvments in efficiency. In the same vein as energy conservation in the 1970s, water conservation must become a part of a diversified risk management portfolio.

This means acting now to develop innovative regulatory instruments and decision-making processes that integrate the environment and hydrological reality into today's policies. Conservation and managing demand will provide lasting and reliable changes to our water footprint, and therefore must become recognized as a long-term community-planning tool for growing cities in an uncertain future. *MW*

Note: Since this article was submitted to *Municipal World*, The POLIS Project published a third report in this series, *The Future in Every Drop: The Benefits, Barriers, and Practice of Urban Water Demand Management in Canada*. Co-authored by Oliver M. Brandes and Keith Ferguson, *The Future in Every Drop* provides the "prescription" for Canada's ailing urban water systems by setting out detailed action plans for all levels of government to implement demand management in Canada. Copies of *What the Experts Think: Understanding Urban Water Demand Management in Canada* and *The Future in Every Drop: The Benefits, Barriers, and Practice of Urban Water Demand Management in Canada* are available online at <www.waterdsm.org>. Copies may also be requested by email at <polis@uvic.ca> or by phone at (250) 721-6388.

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