

Canadian Municipal Water Conservation Initiatives

INTRODUCTION

Many Canadian municipalities have adopted water conservation or water efficiency programs. Different initiatives have been employed, as no one program suits every municipality, and they have proven successful in reducing water demands and saving capital and operating costs.

In order to provide information about these programs, the Intergovernmental Committee on Urban and Regional Research (ICURR) commissioned a survey of municipalities and case study summaries of selected projects. The work was undertaken by the Centre for Water Resources Studies at the Technical University of Nova Scotia.

The survey results describe success in terms of reduction in water demand or water flows, but contain limited information about costs or cost savings associated with the initiatives. The case studies clearly illustrate that investment in water efficiency programs, in the context of long-range water management planning, can be highly cost-effective.

METHODOLOGY

The first step involved creating a list of Canadian municipalities known to have undertaken water conservation initiatives. Each municipality was then contacted to introduce it to this project and seek its collaboration. A survey questionnaire was sent to 102 municipalities, and follow-up calls were made as necessary to interpret or elaborate on information in the questionnaire. A total of 65 municipalities responded.

From the results of the survey, the consultants selected 12 municipalities as case studies based on the following criteria:

- Availability of information about the costs and results of a municipality's water conservation initiatives.
- Willingness to provide further information and review the completed case study.
- Representation of a range of geographical regions, community sizes, motivations for conservation and conservation initiatives.

FINDINGS

The survey revealed the following:

- 60 per cent (39) were fully metered and 19 per cent (12) had no metering.
- 85 per cent (55) had carried out infrastructure initiatives, such as leak detection and repair (43); installation of new or updated water meters (36); new or updated computerized water-use monitoring equipment (21) or pressure reducing valves (10).
- 60 per cent (39) had a retrofit program, with the majority having one or more of the following components: toilet dams, low-flow showerheads, faucet aerators or washers.
- Approximately 80 per cent (52) promoted exterior water-use conservation, including water restrictions (37), public education (35), advertising (30), xeriscaping demonstrations (14), efficient sprinkler promotions (10) and rain barrel promotions (2).
- 42 per cent (23) of 61 municipalities that provided information on rate structure reported using a flat rate (this was not considered to be a water conservation incentive), followed by 21 per cent (13) declining block; 18 per cent (11) increasing block; 11 per cent (7) constant and 8 per cent (2) base rate plus consumption cost.
- 35 per cent (36) had introduced laws, bylaws and regulations or ordinances as part of water conservation initiatives.
- 87 per cent (57) had promoted public awareness, with distribution of print material (brochure, information package) with the print media being the most popular approach.
- 65 per cent (42) promoted water conservation in schools, primarily through school visits, field trips to water and/or wastewater treatment facilities, distribution of water awareness kits, poster contests and water conservation videos.
- 68 per cent (44) indicated that water conservation initiatives were beneficial to their wastewater treatment systems, with most (33) able to delay expansion or construction of facilities.

Some of the programs described in the 12 case studies employ a combination of water efficiency initiatives. Winnipeg, for example:

- Created a computer database in 1993 that records customer billing information.
- Undertook infrastructure improvements, including leak detection and repair and calibration of pumping station water meters.
- Initiated a retrofit program.
- Partnered in the Manitoba Advanced House, which includes low-flow fixtures and technology and landscaping with low water-use plants and shrubs (Xeriscaping).

- Surveyed industrial consumption to determine additional strategies that could be pursued.
- Made a major commitment to public awareness and information programs, which represented the largest single element in Winnipeg's water conservation budget.

This program not only targeted the public, but also included employee education to encourage water efficiency in municipal departments.

Annual costs for Winnipeg's water conservation program averaged about \$680,000 for the period 1993 to 1995. Water sales for the period 1990 to 1994 decreased from 88 to 76 billion litres per year, or by about 13 per cent. As some initiatives were not introduced until 1994 or later, further reductions are likely to have occurred.

As a result of these measures, Winnipeg expects to defer construction of a second 160 km (100 mi.) aqueduct, at a cost of \$300 to \$400 million, and to defer development of additional surface or groundwater sources.

Other municipal water conservation initiatives have focused more on a single initiative. For example, Barrie has concentrated on a universal retrofit program. When introduced in 1995, it was the largest of its kind delivered anywhere in Canada. The program provides fixtures and fittings free of charge, which Barrie has promoted through a public awareness campaign. Costs to implement the program in year one totalled close to \$1.7 million, or about \$380 on average per retrofitted household.

As a result of the initiative, average water consumption decreased from 900 to 630 L/household/day (237 to 166.4 gal./household/day). Analysis of data also provided support for a hypothesis that savings of 20 per cent or greater were achievable with a 90 per cent confidence level. A 20 per cent reduction corresponds to 62 L/capita/day (16.3 gal./capita/day). Savings of this magnitude exceed Barrie's target of reducing water use in participating households by 50 L/capita/day (13.2 gal./capita/day) by 25 per cent.

By investing in water conservation and a \$20 million water treatment plant upgrade, Barrie was able to avoid spending \$43 million on an immediate upgrade to accommodate flows based on traditional water use. Barrie anticipated it would be able to delay a \$23 million investment in expanding its plant for three to five years.

CONCLUSIONS

The survey, case studies and a review of relevant literature gave rise to several conclusions. In general, they show that water conservation programs are successful in reducing water consumption, as well as achieving savings in capital and operating costs. Such programs can be highly cost-effective and should be integrated into long-range water supply planning.

Any municipality embarking on a water conservation program should clearly identify its objectives and potential benefits. When moving ahead with program development, it is important to recognize differences between water conservation and water efficiency, and between water conservation measures and water conservation incentives.

Metering has proven to be a primary component of an effective water conservation program. As well, a consumption-based price structure which is dependent on metering can result in significant reductions in water consumption, provided the fee structure is based on realistic prices and appropriately selected to address local circumstances. Inclusion of wastewater charges in water bills has proven to be another significant incentive in reducing water consumption.

Residential retrofit programs can accomplish significant reductions in water demand, depending on the degree of consumer participation and whether toilet retrofits are permanent replacements or kits. As well, municipal infrastructure initiatives, such as leak detection and repairs, meter calibration and retrofitting municipal buildings, can be cost-effective water conservation measures.

Municipal regulations can provide important incentives to encourage adoption of conservation measures related to exterior water use (water sprinkling restrictions) and installation of meters and water-conserving fixtures in new developments.

Water conservation provides infrastructure advantages. It can reduce hydraulic loads on wastewater treatment plants and on-site sewage systems, plus it can reduce pollutant discharges to the environment.

Public information is an essential component of any water conservation program. The corresponding strategy should specify the purpose and target audience for a public education campaign, and appropriate measures for delivering the intended message. School programs and demonstration projects can be important elements of such a campaign.

Finally, collaboration with other agencies, businesses, service clubs, community organizations and the media can enhance municipal programs by providing human, financial and other resources, and other valuable input.

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ICURR's major objective is to foster communication between policy makers across Canada working in the fields of urban, rural and regional planning, economic development, public administration and finance, housing, recreation and tourism, transportation and the environment.

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For more information about ICURR, see <http://www.icurr.org/>. (English and French, retrieved August, 2007).

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