FEDERATION OF CANADIAN MUNICIPALITIES

QUALITY OF LIFE IN CANADIAN COMMUNITIES

Growth, the Economy and the Urban Environment

THEME REPORT #3

Federation of Canadian Municipalities

The FCM Quality of Life Reporting System

President's message

Economic growth contributes to our quality of life, but it can also have unintended consequences.

We can see this in the environmental challenges created by Canada's booming urban economies during the late 1990s as detailed in this report, *Growth, the Economy and the Urban Environment*, the third in the current series of Quality of Life Reporting System theme reports.

The report finds that, although a growing economy and increasing population contribute to communities, they also have significant environmental consequences that must be managed and require a coordinated response by all orders of government. The report demonstrates the need for municipal, federal and provincial governments to work together to meet the challenges created by growth. Many of the challenges facing Canada's cities and communities are part of larger problems that cannot be addressed by municipal governments alone.

This is why FCM has long advocated that any new deal for cities and communities must include a new intergovernmental partnership. Municipal governments will continue to take the lead on issues that affect their communities, but we need the cooperation of all orders of government to find and deliver long-term solutions.

We are seeing signs of progress. The February 2005 federal Budget committed $600 million in gas tax revenue for municipal governments and an additional $300 million to FCM's Green Municipal Funds. The gas tax revenue can be used to upgrade water-treatment plants and improve and expand public transit. The additional $300 million to the Green Municipal Funds will help us to continue to support the kind of studies and projects that have so far leveraged more than $1.3 billion in investment while delivering significant environmental benefits.

Balancing environmental health and economic growth is one of the central challenges facing municipal governments as they strive to maintain quality of life in their communities. It is our hope that this report and others in this series will provide councils with the tools they need to manage these challenges successfully.

Our thanks to the 20 participating municipal governments for their support; to the FCM Standing Committee on Social Development for its contribution; and to the members of the Quality of Life Technical Team for their participation in preparing the report.

Ann MacLean
President, Federation of Canadian Municipalities

Chair's message

There is a national consensus in Canada that cities and communities are central to our continued prosperity and quality of life. We need vibrant, healthy communities to attract the skilled creative people so essential to Canada's success. The key to that health and vibrancy is sustainability.

This report, *Growth, the Economy and the Urban Environment*, is the third in a series of Quality of Life Reporting System (QOLRS) theme reports. It focuses on the challenge facing urban communities trying to balance economic growth and environmental health.

Environmental health is necessary for sustained economic vitality. We depend on a healthy environment for a liveable climate, clean water and air, sources of food and fibre and raw materials. If the health of our environment suffers, the quality of life in our communities will also suffer.

Communities must manage growth in a way that protects the natural environment, while ensuring that the quality of life we enjoy today is available to future generations. Municipal governments play a significant role in protecting the environment through their management of drinking water, sewage treatment, solid waste, pesticides, land use, transportation and energy planning.

While there has been progress, major environmental challenges continue to exist, and many of the issues examined in this report will come before municipal councils. Recent initiatives by the Government of Canada, such as the transfer of gas tax revenue to municipal governments, promise to make a significant contribution to helping municipal governments encourage sustainable development.

FCM's municipal members have already begun implementing strategies that will reduce the pollutants that cause smog and damage quality of life. FCM programs, including the Green Municipal Funds, Partners for Climate Protection and InfraGuide, support and enable the municipal sector and the Government of Canada to work in partnership to protect the environment.

This report and others in the series are intended to serve as planning tools for municipal governments dealing with these and other issues affecting quality of life in our communities. We hope it will help municipal governments balance the key determinants of quality of life: economic growth and environmental health.

My thanks to all those who assisted in the preparation of this report: FCM staff, the members of the Quality of Life Technical Team, and consultant Michel Frojmovic, Director of Acacia Consulting and Research.

Councillor Brenda Hogg
Chair, Quality of Life Reporting System

Figure 1 FCM QOLRS Indicators

Demographic & Background Information (DBI)	Affordable, Appropriate Housing (AAH)	Civic Engagement (CE)	Community and Social Infrastructure (CSI)	Education (ED)	Employment (EM)	Local Economy (LE)	Natural Environment (NE)	Personal & Community Health (PCH)	Personal Financial Security (PFS)	Personal Safety (PS)
DBI1 Population Growth	AAH1 30%+ Income on Shelter	CE1 Voter Turnout	CSI1 Social Housing Waiting Lists	ED1 Education Levels	EM1 Unemployment/ Employment Rates	LE1 Business Bankruptcies	NE1 Air Quality	PCH1 Low Birth Weight Babies	PFS1 Community Affordability	PS1 Young Offenders
DBI2 Household & Family Composition	AAH2 50%+ Income on Shelter	CE2 Women in Municipal Government	CSI2 Rent-Geared-to-Income Housing	ED2 Literacy Levels	EM2 Quality of Employment	LE2 Consumer Bankruptcies	NE2 Urban Transportation	PCH2 Teen Births	PFS2 Families Receiving EI/ Social Assistance	PS2 Violent Crimes
DBI3 Average Income	AAH3 Core Housing Need	CE3 Newspaper Circulation	CSI3 Social Assistance Allowance	ED3 Adult Learning	EM3 Long-Term Unemployment	LE3 Hourly Wages	NE3 Population Density	PCH3 Premature Mortality	PFS3 Economic Dependency Ratio	PS3 Property Crimes
DBI4 Renters & Owners	AAH4 Substandard Units	CE4 Volunteering	CSI4 Subsidized Child Care Spaces	ED4 Education Expenditures	EM4 Labour Force Replacement	LE4 Change in Family Income	NE4 Water Consumption	PCH4 Work Hours Lost	PFS4 Lone Parent Families	PS4 Injuries and Poisonings
DBI5 Population Mobility	AAH5 Changing Face of Homelessness	CE5 Charitable Donations	CSI5 Public Transit Costs	ED5 Classroom Size		LE5 Building Permits	NE5 Wastewater Treatment	PCH5 Suicides	PFS5 Incidence of Low Income Families	
DBI6 Foreign Born	AAH6 Vacancy Rates		CSI6 Social Service Professionals	ED6 Student / Teacher Ratio			NE6 Solid Waste	PCH6 Infant Mortality	PSF6 Children Living in Poverty	
DBI7 New Immigrant Groups	AAH7 Rental Housing Starts		CSI7 Private Health Care Expenditures	ED7 Post-Secondary Tuition			NE7 Ecological Footprint		PFS7 Income Gap	
DBI8 Language Spoken at Home	AAH8 Monthly Rent			ED8 Spending on Private Education			NE8 Recreational Water Quality			
DBI9 Visible Minorities										
DBI10 Aboriginal Population										

Figure 1 identifies the 72 indicators included in the Quality of Life Reporting System. Shaded cells refer to indicators falling under the theme of *Growth, the Economy and the Urban Environment.*

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The following technical annexes are available in the Quality of Life Reporting System section of FCM's Web site at http://www.fcm.ca:

QOLRS Theme Report 3—Technical Annexes.doc

Overview

The 2004 *Highlights Report* presented selected indicators from the QOLRS to show key changes in six quality of life factors from 1991 to 2001. The analysis relied on a framework FCM defined, based on the understanding that quality of life is enhanced and reinforced in municipalities that do the following:

1. Develop and maintain a vibrant local economy;
2. Protect and enhance the natural and built environment;
3. Offer opportunities for the attainment of personal goals, hopes and aspirations;
4. Promote a fair and equitable sharing of common resources;
5. Enable residents to meet their basic needs; and
6. Support rich social interactions and the inclusion of all residents in community life.

Quality of life in any given municipality is influenced by interrelated issues concerning the state of affordable, appropriate housing, civic engagement, community and social infrastructure, education, employment, the local economy, the natural environment, personal and community health, personal financial security and personal safety.[2]

Using this framework, the *Highlights Report* found that quality of life in the 20 communities was at risk and had deteriorated for a significant number of people between 1991 and 2001. While general improvements in rates of post-secondary education, employment growth and home-ownership suggested a positive picture overall, these improvements were offset by a growing income gap, changes to social programs and an increased strain on the urban environment. The *Highlights Report* also portrayed a roller-coaster period of severe economic decline between 1991 and 1996, followed by a general recovery in income levels, falling incidences of poverty and fewer housing affordability problems between 1996 and 2001. However, this recovery was only partial and was not shared equally by all households.

This report on *Growth, the Economy and the Urban Environment* provides greater detail on a narrower set of trends occurring during the same 10-year period that affected the local economy and the natural environment in the 20 QOLRS communities. As with previous reports, the focus is on trends affecting all municipalities. However, the report also notes variations within the 20 QOLRS communities and differences between trends in the QOLRS communities and those evident in the rest of Canada. A series of statistical charts and local stories from QOLRS member municipalities illustrate these trends.[3]

This report benefits from an overview by Dennis O'Farrell, Head, Environmental Reporting Research, National Indicators and Reporting Office, Environment Canada, which provides a discussion of the linkages that can be made between the kinds of growth trends seen in this report and the state of the environment.

[2] This definition was developed and endorsed by the QOLRS Technical Team, which includes representatives of FCM and each of the 20 QOLRS municipalities.

[3] A full set of tables and supplementary charts is located at http://www.fcm.ca/. Some caution is required when using the QOLRS to compare the 20 communities. For example, largely urban communities like the City of Vancouver have very different characteristics than regional municipalities with more suburban and rural areas.

Summary and Conclusions

A central challenge facing Canadian municipalities is managing population and economic growth. Growth in a community is of course healthy, but may not be environmentally sustainable. While a vibrant local economy is generally considered to be a positive feature of quality of life, there is a real risk that continuously expanding urban populations, increasing incomes and growing economic activity will result in increased pressure on the quality of air, water and soil. Municipal governments are increasingly required to consider substantive changes in the way resources are consumed and waste produced and managed in the context of economic growth. These changes are necessary in order to maintain quality of life for future generations.

This report discusses trends affecting the natural environment in 20 Canadian communities in the context of the population and economic growth that took place between 1991 and 2001. It places particular emphasis on environmental trends occurring during the second half of this decade, when economic growth was strongest. The report also explores the implications of these trends for municipal governments and identifies some of the initiatives municipalities are undertaking to manage growth and prevent harmful environmental consequences.

The indicators and trends presented in this report relate specifically to two of the six quality of life factors underlying FCM's Quality of Life Reporting System: developing and maintaining a vibrant local economy (Factor 1) and protecting and enhancing the natural and built environment (Factor 2). The report also benefits from an introductory section and other input provided by Environment Canada and from the results of the recently released *Ecological Footprint* report.[4]

Demographic, economic and environmental trends

The core of this report is a review of five sets of demographic, economic and environmental trends evident in the 20 QOLRS communities between 1991 and 2002.

The first trend, presented in Section 2, relates to higher household growth rates compared to population growth rates during the 1991–2001 period. While there were some exceptions, household growth generally corresponded with lower-density forms of residential development, such as detached and semi-detached housing, rather than multi-unit condominium or rental apartment buildings. In some cases, this contributed to suburban sprawl, increased infrastructure costs, traffic congestion, limited use of public transit and loss of downtown vitality.

A second set of well-defined trends, presented in Section 3, relates to construction activity, household income and employment growth in the 20 communities. These indicators were strongly divided into a period of weak growth during the first half of the decade and a period of strong recovery during the second half. As described by the FCM report, *Ecological Footprints of Canadian Municipalities and Regions*, income and economic growth are, in general if not necessarily, related to increased pressure on the urban environment.

Section 4 outlines trends in the collection and diversion of municipal solid waste between 1991 and 2002. While comprehensive and comparable time-series data were not available for all 20 QOLRS communities, the findings suggest that, despite consistent increases in waste recycling and diversion rates, increasing amounts of residential solid waste reached municipal landfills during this period.

[4] FCM, *Ecological Footprints of Canadian Municipalities and Regions* (2004), www.fcm.ca/qol3/eco.pdf

Sustained growth in solid waste placed pressure on municipalities to expand waste diversion programs and identify new waste disposal sites, contributing to degraded landscapes and increasing the risk of soil and water contamination.

Section 5 addresses trends in commuting patterns and air quality. Data available for the years 1996 and 2001 indicate that commuters continued to rely overwhelmingly on the automobile. Commuters travelled marginally longer distances between home and work, with those in most of the large population centres travelling farther than the Canadian average. While commuting trends were only partially responsible for air pollution, 1996 and 2001 also saw ground-level ozone concentrations consistently above acceptable levels. In addition, increasing numbers of smog advisories in several of the QOLRS municipalities presented serious health concerns.

Section 6 is devoted to a review of trends affecting the water supply and wastewater treatment in the 20 QOLRS communities. Findings based on Environment Canada's Municipal Water Use Database indicate that per capita water consumption in the 20 QOLRS communities increased slightly between 1991 and 1999, but remained well below the national average. In addition to placing a strain on important natural resources, growing demand for water requires increased investment in water infrastructure and systems to collect and treat wastewater. Wastewater treatment systems were generally able to keep pace with this growth, with a small, and declining, proportion of wastewater lacking at least secondary or tertiary treatment. At the same time, several municipalities reported repeated closures of recreational beaches due to water quality concerns.

Regional and big-city trends

Sections 2 through 6 focus on trends affecting the 20 QOLRS communities as a whole, with some comparisons to trends occurring in the rest of Canada. However, each section identifies significant variations in trends across regions or sizes of cities. In particular, the report notes differences between the two large urban centres of Vancouver and Toronto and the other 18 communities in terms of population growth, densities of new development and commuting patterns.

Challenges in measuring environmental data

A recurring sub-theme in this report is the challenge of adequately and consistently measuring environmental trends. These limitations extend to monitoring the density of development, solid waste collection and diversion rates and recreational water quality. In addition, some data available from national statistics sources—such as air quality and water consumption—are difficult to interpret or suffer from inconsistency in collection over time. This suggests an area for future work.

Implications for municipal governments

The scale and complexity of the challenge of managing growth to achieve sustainable development often place matters beyond the control of any one municipality. In fact, many of the measures needed to manage growth and protect the environment are the responsibility of provincial or federal governments. At the same time, municipalities play important and varied roles in this process. Municipal contributions include policies to limit the expansion of development and encourage higher-density forms of development, programs aimed at diverting solid waste from landfills, the implementation of transportation demand management initiatives and the promotion of water conservation.

Table 1: FCM QOLRS Members — 2004

Municipality[5]	Short Name used in QOLRS Tables and Charts	Province	Population (2001)
Vancouver (City)	Vancouver	British Columbia	545,670
Calgary (City)	Calgary	Alberta	878,870
Edmonton (City)	Edmonton	Alberta	666,105
Saskatoon (City)	Saskatoon	Saskatchewan	196,810
Regina (City)	Regina	Saskatchewan	178,225
Winnipeg (City)	Winnipeg	Manitoba	619,545
Windsor (City)	Windsor	Ontario	208,405
London (City)	London	Ontario	336,540
Sudbury (City of Greater)	Sudbury	Ontario	155,220
Waterloo (Regional Municipality)	Waterloo	Ontario	438,515
Hamilton (City)	Hamilton	Ontario	490,265
Halton (Regional Municipality)	Halton	Ontario	375,230
Peel (Regional Municipality)	Peel	Ontario	988,945
York (Regional Municipality)	York	Ontario	729,255
Toronto (City)	Toronto	Ontario	2,481,495
Niagara (Regional Municipality)	Niagara	Ontario	410,575
Kingston (City)	Kingston	Ontario	114,195
Ottawa (City)	Ottawa	Ontario	774,075
Quebec (Metropolitan Community)	CMQ	Quebec	674,700
Halifax (Regional Municipality)	Halifax	Nova Scotia	359,185

[5] While the 20 participants in the Quality of Life Reporting System are referred to throughout the report as either "municipalities" or "communities," they have different legal statuses. As described in Table 1, they are made up of 13 cities, six regional municipalities and one metropolitan community. A Guide to the QOLRS Geography, providing a more detailed description of these terms and associated issues, is available at http://www.fcm.ca.

Part 1 | Introduction and Overview[6]

Growth, the economy and the environment in Canadian cities

The 20 communities represented in the QOLRS illustrate a cross-section of experiences in urban Canada. The scope of concern here is large, comprising *physical* and *economic growth* and environmental and economic issues that are both local and global.

Physical growth is measured in terms of population, structures and land use, while *economic growth* is measured in terms of the value that can be quantified and the cumulative size of economic exchanges within a municipality. These types of growth are closely intertwined and linked to local as well as global environmental issues. Industrial operations and motor vehicle use within city boundaries can have a direct impact on the quality of the residents' environment. At the same time, a city's consumption requirements and the pollution and waste produced can have far-reaching effects across a region, a nation and the globe. Municipal wastewater discharges, for instance, represent one of the largest single effluent discharges, by volume, in the country.[7]

A global perspective on the role of municipalities with respect to the environment and the economy is important since cities and communities are connected by the movements of large amounts of materials and energy across ecosystems. These connections are economic as well as ecological. In fact, the connections are so strong that if significant solutions are developed at the urban level and shared among municipalities, the results will be felt nationally and globally. If, for example, all Canadian municipalities succeeded with increasing mass transit ridership by 20 per cent, while reducing the use of automobiles by the same amount, greenhouse gas emissions from automobiles for Canada as a whole would drop approximately 13 per cent.[8] How cities and communities are planned, constructed, maintained and managed will play a significant role in determining the degree of success to be achieved on sustainable development in Canada.

Sustaining quality of life by managing growth

Tracking environmental and economic sustainability in cities in the context of quality of life reveals two fundamental prerequisites: a healthy environment and a healthy economy. Whether the two can co-exist has been disputed in the past; however, taking a sustainable development approach means finding the means to optimize both.

The number of urban dwellers in Canada increased by 50 per cent, from 16 to 24 million, during the 1971 to 2001 period.[9] As a result, Canadian cities have experienced varying degrees of population growth as well as economic development. A few urban regions, like Greater Vancouver and the Greater Toronto Area, have had to manage a very rapid pace of growth. Communities across Canada have and will continue to experience the benefits that come with growth. These benefits include vibrant, diversified economies, higher educational institutions, arts, culture and recreational opportunities.

On the other hand, growing stresses on educational, cultural and environmental amenities in a continually expanding city can also lead to reduced quality of life. In turn, the ability to attract and retain highly trained, educated and creative entrepreneurs and employees may be reduced, which can call into question the long-term sustainability of economic growth in any given place.

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[6] This section was prepared by Dennis O'Farrell, Head, Environmental Reporting Research, National Indicators and Reporting Office, Environment Canada.

[7] Environment Canada, *State of the Environment Report*, "The state of municipal wastewater effluents in Canada" (Minister of Public Works and Government Services Ottawa, Canada, 2001) 1.

[8] Based on a rough calculation of a 20% drop in passenger-kilometres for automobiles, with this amount added to transit passenger-kilometres, and assuming CO_2 emissions per passenger-kilometre estimated for both modes with actual loads. The Royal Commission on National Passenger Transportation. *Directions: the Final Report of the Royal Commission*, vol. 2, ch. 7, "Environmental Effects of Intercity Passenger Transportation" (1992).

[9] N. Hoffman, G. Filoso and M. Schofield, *Rural and Small Town Analysis Bulletin*, vol. 6, no. 1, "The loss of dependable agricultural land in Canada" (Ottawa: Statistics Canada, 2005) 6.

BOX 1–ECOLOGICAL FOOTPRINT ANALYSIS

The complex relationships between growth and the natural environment are addressed in a recent FCM report, entitled *Ecological Footprints of Canadian Municipalities and Regions*. Ecological footprint analysis is a tool for assessing the sustainability of households, businesses and other organizations that make up a community. An ecological footprint is a measure of what people demand from nature; it shows how much biologically productive land and water they occupy to produce all the resources they consume and to absorb their waste.

The analysis of Canada's national ecological footprint shows that the average Canadian occupies 7.25 hectares of land and sea to support individual needs and wants (see Chart 1). While Canada's available bio-capacity is 14.2 hectares per-capita, the planet has only 1.9 hectares of productive land and sea available to meet the needs of each person. That means that Canadians' consumption patterns are well within their national bio-capacity but are more than three times higher than the level that could be supported for the entire population of the Earth.

Understanding the components of existing footprints allows for policy responses and changes in individual behaviour aimed at satisfying Canadians' needs and wants in more environmentally efficient ways. According to the report, higher household incomes are strongly associated with higher levels of consumption and larger footprints, although this relationship can be managed. A second critical factor is energy consumption; larger footprints are generally associated with higher energy consumption and more carbon-intensive fuel sources for electricity and heating. In fact, Canadians' energy demands make up the largest portion of the footprint (55 per cent).

The report identifies eight methods for reducing household footprints, three of which are captured by QOLRS indicators: driving less; walking, cycling, carpooling or using public transit more; and choosing a home closer to work. The other five, not captured by QOLRS indicators, include eating more organically, locally grown food; retrofitting homes or businesses to be more energy efficient; exploring renewable energy alternatives; buying green power from local utilities; and buying a more fuel-efficient vehicle.

The roles municipal governments will play in supporting these responses will help reduce the pressure of continued growth on the natural environment.

As communities continue to experience growth, they will face the challenge of doing so in a way that protects the natural environment while ensuring that the prosperity and quality of life enjoyed today is available to future generations. To achieve this objective, municipal governments need to manage growth with great care in order to preserve or even augment local amenities. This has been possible in cities like Vancouver, where higher-density development closer to the city centre, along with well-designed transit, can lead to a reduction in traffic congestion, greenspace loss as well as air and water pollution. However, growth will continue, and more innovative approaches for city living will have to be adopted to preserve high-quality lifestyles.

Municipal governments have responded to the need to sustain and expand investment in areas like solid waste management, public transit and wastewater treatment. They have also established policy measures to encourage individual and household behaviour regarding housing choice, commuting patterns, waste disposal and resource consumption. So far these efforts have met with some success, but uncertainties are lurking that could make the stakes much higher. How, for example, will coastal cities cope if sea levels

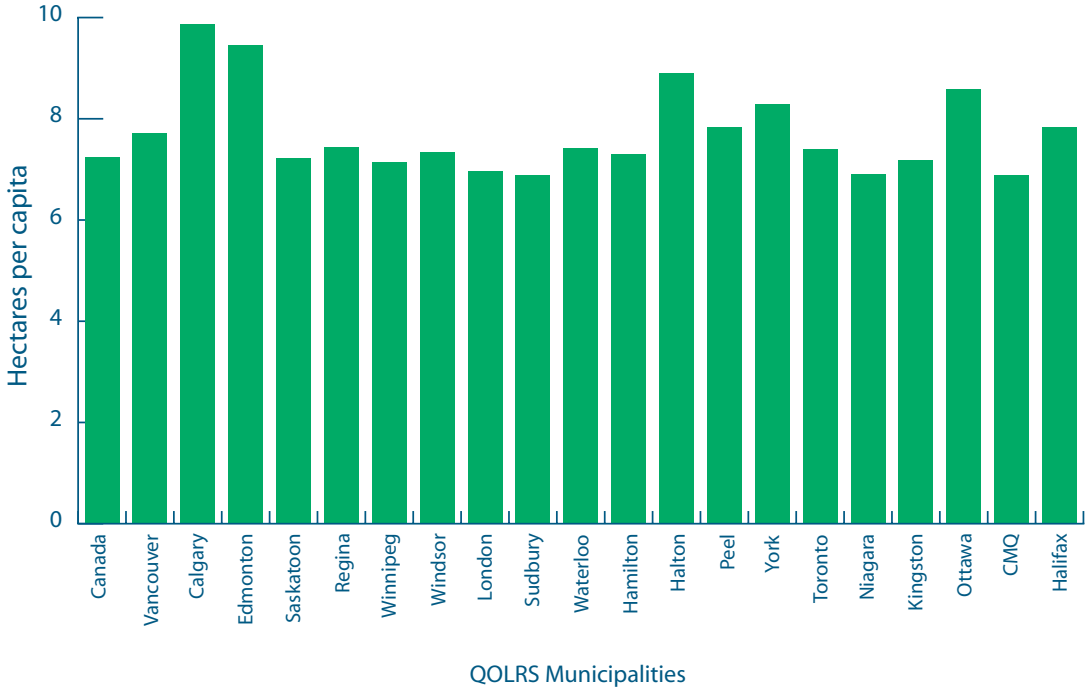
rise? Are we willing to continue to accept that urban smog is likely to be a contributing factor in some illnesses and premature deaths? Can cities limit the extent to which development takes place on prime agricultural land and natural habitats? While there has been progress, major environmental challenges of concern to all Canadians continue to exist. Many of these considerations will come before municipal councils.

The ecosystem services we depend on provide us with a liveable climate, clean water and air, sources of food and fibre, raw materials for various industries and the capacity to absorb and recycle waste into the system. The health of ecosystems can seriously affect their ability to provide these services, and so, in the long term, environmental conservation is a determinant for sustained, long-term economic vitality. The health of ecosystems is also an important requirement for the long-term well-being of human populations, as it is the basis of human life and human society anywhere (see Box 1 for a discussion of the Ecological Footprint). Environment Canada's recent move to establish a guiding policy based on a Competitiveness and Environmental Sustainability Framework is a direct recognition of the important link between a healthy natural environment and a vital economy.

Environment-economy links

A closer look at the environment-economy relationship highlights obvious pressure points with respect to energy use, material use, pollution and waste disposal. These factors need to be managed to reduce environmental stress. Working towards a growing economy may be necessary if the population is growing; however, this growth doesn't need to be excessively rapid or heavily dependent on increasing material and energy consumption. In fact, as has

Chart 1 Ecological Footprint of the QOLRS Communities, 2003



Source: Ecological Footprints of Canadian Municipalities and Regions, AMI – Anielski Management Inc., 2004

been done up to now, addressing the issues includes working to reduce material and energy consumption per person.

Looking at environmental, social, cultural and economic indicators together is an important strategy for addressing sustainability as a whole. An integrated perspective will encourage the search for integrated solutions. Development of complementary sets of indicators integrating these factors is a key direction for future work. The Ecological Footprint Analysis is one example of an integrated approach where indicators are weighted and combined according to a particular framework. This report represents an integrative approach where environmental and economic indicators are analyzed together.

With appropriate attention and work, the QOLRS, along with national indicators, will become more and more useful over time in helping to answer the following questions: how are Canadians managing the economies of their cities with respect to environmental health and how are they managing their environment and economies in cities to promote a high quality of life?

Part 2 | Population and Household Growth

This section focuses on the strong growth in the number of households that took place between 1991 and 2001 in the 20 QOLRS communities.

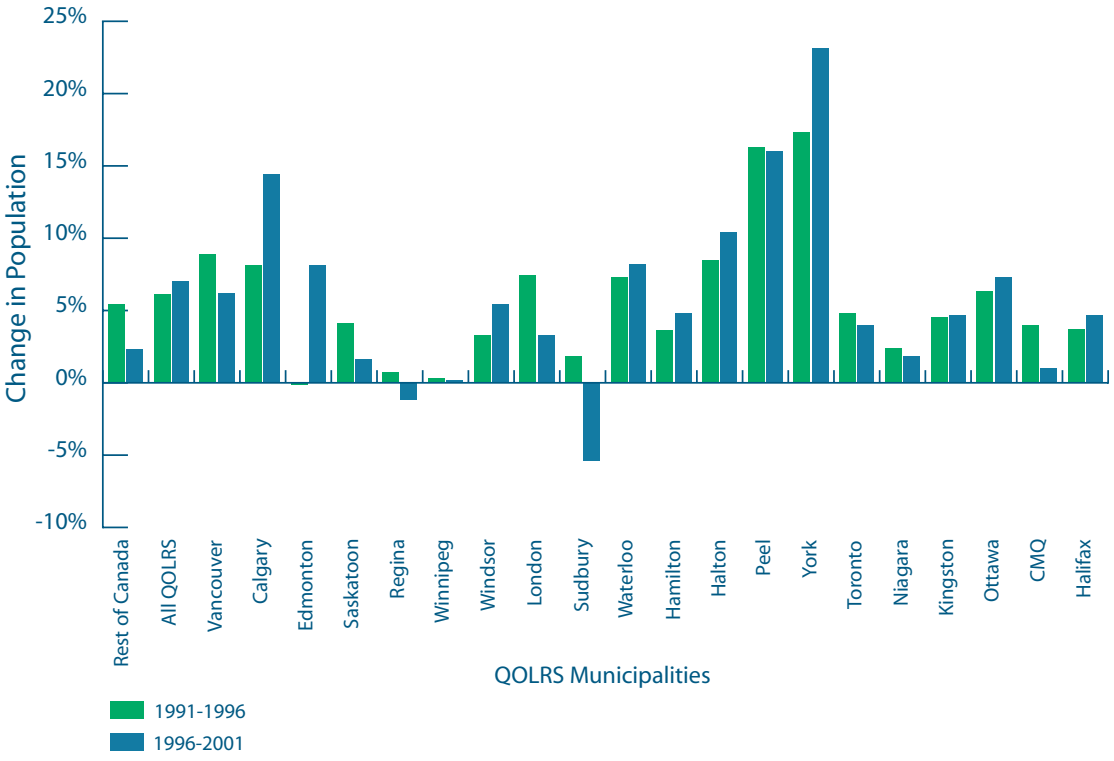
The indicators presented in this section show that the participating communities experienced increases in the number of households and a growing reliance on low-density forms of residential development (detached and semi-detached housing versus condominium and rental apartments). This trend is a driving force toward greater suburban sprawl. The resulting stress on the environment is likely to be heightened since the demand for land is growing faster than the already growing population. On a national scale, urban land use has doubled from about 15,000 square kilometres in 1971 to just more than 30,000 square kilometres in 2001.[10] This poses a challenge to sustainability.

While monitoring trends in the density of development is important to understanding growth's impact on the environment, this section also points out the challenges involved in its measurement. Land use and land-cover data and indicators will need to be improved to provide more detailed measures of habitat and agricultural land losses to urban growth. New national indicators and monitoring programs are being investigated and will be made available for municipalities to track this situation more effectively.

Household growth

The 2004 FCM *Highlights Report* illustrated how the overall population of the 20 QOLRS communities grew at nearly twice the rate of the population of the rest of Canada. The report also described the very

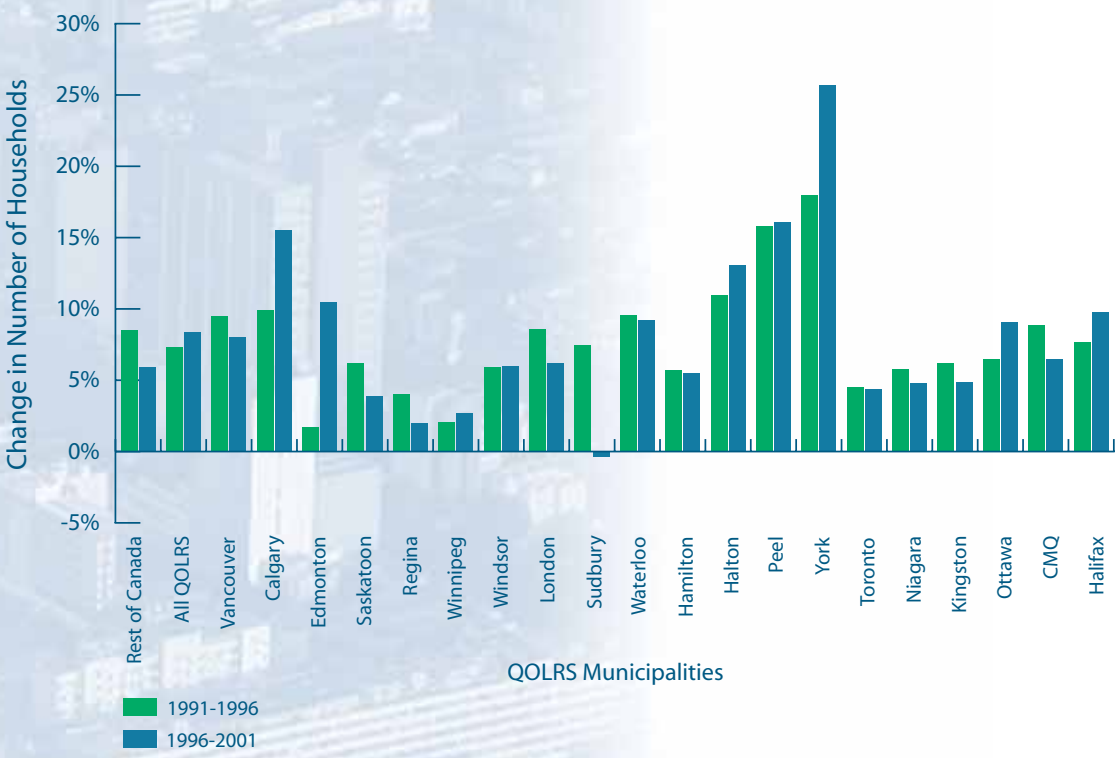
Chart 2 Population Growth – Total Population Growth, QOLRS Municipalities – 1991-1996 and 1996-2001



Source: Statistics Canada, 1991, 1996, 2001 Census

[10] N. Hoffman, G. Filoso and M. Schofield, *Rural and Small Town Analysis Bulletin*, vol. 6, no. 1 "The loss of dependable agricultural land in Canada" (Ottawa: Statistics Canada, 2005) 67.

Chart 3 Household Growth – Total Household Growth, QOLRS Municipalities, 1991-1996, 1996-2001



Source: Statistics Canada, 1991, 1996, 2001 Census

uneven distribution of this population growth, with six of the 20 communities growing at rates lower than the rest of Canada and two experiencing net population loss. This section focuses on the growth in the number of households in the QOLRS communities.

Charts 2 and 3 show how household growth took place at consistently faster rates than overall population growth. As a result, all 20 communities experienced positive household growth during the 10-year period.[11] Strong household growth in the QOLRS communities was linked to a decrease in average household size, which fell from 2.7 people per household in 1991 to 2.6 in 2001. Shrinking household size was the direct result of factors such as an aging population, significant growth in the number of singles living on their own and more households with fewer or no children, described in more detailed in QOL Issues Report 1, *Incomes, Shelter and Necessities*.

Lower-density residential development

The strong growth in the number of households translated into greater demand for new housing. Less clear is whether this demand was for higher- or lower-density forms of development. On the one hand, more households of a smaller size necessarily imply a lower population density, as individual housing units accommodate fewer people. At the same time, household growth led by seniors, middle-aged singles and couples without children could be expected to translate into demand for

[11] While Sudbury experienced negative household growth between 1996 and 2001, this was offset by strong household growth between 1991 and 1996, which contributed to overall household growth for the 10-year period.

smaller homes, including condominiums or apartments in multi-unit buildings, requiring less land per unit.[12] These forms of housing would result in higher densities of development, such as condominium and rental apartments.

There is a direct relationship between the density of development in and around Canadian cities and pressures placed on the natural environment. Respondents to the 2003 Quality of Life Survey of 20 Canadian municipalities raised concerns about lower-density development. Box 2 provides examples from four municipalities.

The perceptions outlined in Box 2 are reinforced by Chart 4, which presents a set of trends related to new housing construction. A significant positive trend in terms of sustainability was seen in the two largest urban centres in the QOLRS, Vancouver and Toronto. This was characterized by small and diminishing demand for lower-density housing types, falling from the 20–25 per cent range to closer to 15 per cent of all new housing starts. This suggests more intense use of available land in these two cities, both of which are built out to their boundaries and are focused on intensification of existing neighbourhoods. New residential development in the cities of Calgary, Edmonton, Saskatoon and Regina also showed a trend towards a stronger reliance on higher-density forms of housing, such as condominiums and rental apartments.

Nevertheless, the overall trend for all 20 QOLRS communities for the 10-year period reflected a shift towards lower-density development. While this trend reversed somewhat between 1996 and 2001, the proportion of new construction dedicated to detached and semi-detached housing grew from close to 50 per cent of all starts in 1991 to just under 65 per cent in 2001. The dominance of lower-density housing construction was particularly evident in Ontario municipalities. With the notable exception of Toronto, construction of lower-density dwellings accounted for 75 per cent or more of all new housing starts in Ontario municipalities in 2001.

BOX 2–THE ECONOMIC AND ENVIRONMENTAL CONSEQUENCES OF LOW-DENSITY DEVELOPMENT

The following is a sampling of issues common to many of the 20 QOLRS communities.

Edmonton's population is expected to grow by 10,000 people in the coming year and by nearly 50,000 in the next five. In mature or redeveloping areas of the city, the need for and cost of infrastructure replacement are important issues to be addressed.

Regina is concerned about high levels of residential development in new subdivisions in the city's outer ring. Regina has a high percentage of home ownership, while an aging population and declining birth rates contribute to an increase in relatively small households. This presents a challenge in maintaining population densities in mature and older neighbourhoods.

Issues related to suburban sprawl in London include retail expansion on city outer limits causing deterioration of the downtown core, expanding urban development causing erosion of agricultural land and the natural environment, and demands for new infrastructure in areas that are inefficient and expensive to service.

Peel Region is concerned about several issues related to sprawl and the density of development. These include the following:

- peak-hour transportation gridlock resulting in unnecessarily long commutes;
- declining use of public transportation and increased vehicle use, resulting in increased carbon monoxide emissions and an increasing incidence of moderate and poor air quality days;
- increased infrastructure costs due to low-density suburban development;
- loss of downtown and city-centre vitality;
- the loss of prime agricultural land and encroachment of other natural areas, notably the Oak Ridges Moraine; and
- the continuing development of neighbourhoods that do not promote active lifestyles.

[12] In contrast, evidence from communities in southern Ontario, such as Hamilton, suggest that these groups may also remain in their housing over time or even purchase larger homes.

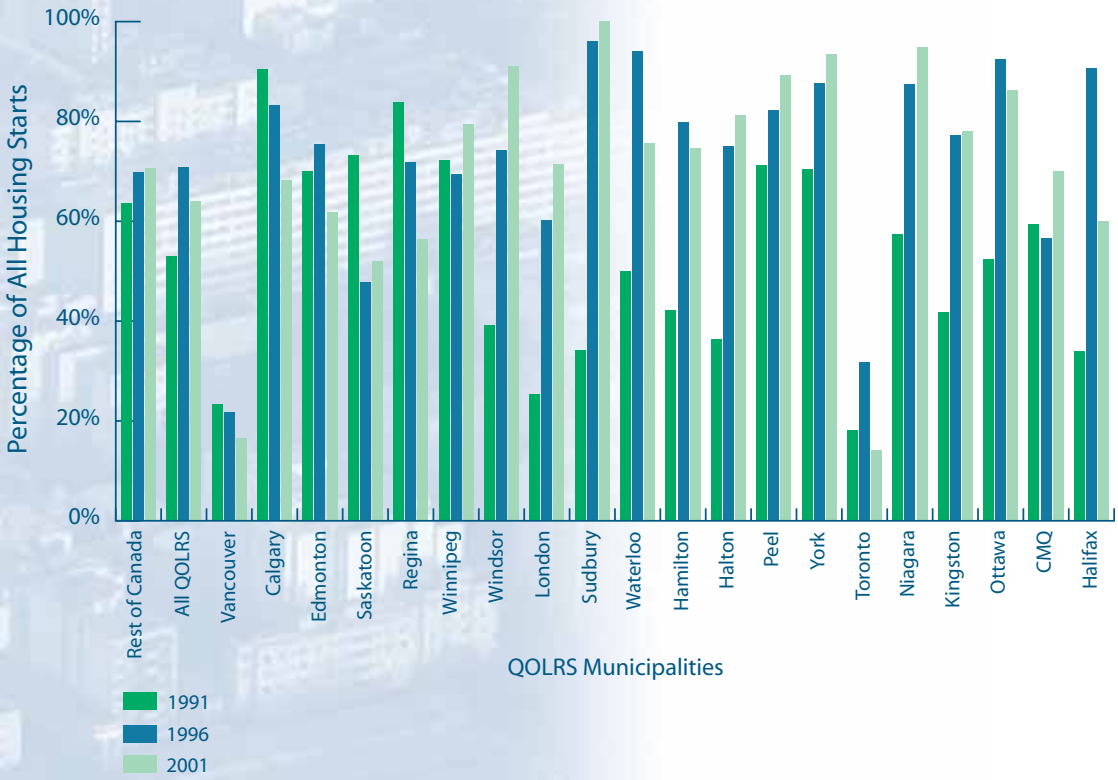
Measuring urban density and sprawl

Despite the importance of understanding trends affecting the density of residential development, discussions of density and sprawl are constrained by significant methodological difficulties. The definition of land area included in calculations of density is the principal challenge. Municipalities rely variously on the following definitions of developed land area:

- Total municipal area—the full extent of the corporate boundary;
- Developable area—excluding farmland, watercourses and other lands not designated for development; and
- Residential parcels—limited to areas with residential land-use designations and excluding municipal roads and other rights of way.

A second challenge is comparing the change in densities over time within a given municipality. This is typically due to limited data availability or changes in the formula used to measure density. Some municipalities do not measure density at all or have only recently begun to do so.

Chart 4 Lower Density Housing as a Percentage of All New Housing Starts, QOLRS Municipalities – 1991, 1996, 2001[13]



Source: Canada Mortgage and Housing Corporation, Starts and Completions Survey, 1991, 1996-2001

[13] "Lower-density" refers to detached and semi-detached housing and townhouses; "higher-density" refers to condominium and rental housing.

Implications for municipal governments

Municipalities responding to the 2003 FCM QOL survey described various policies put in place to address the issue of low-density development, principally zoning bylaws. Survey respondents indicated that official plans or other urban policies have been established to encourage "smart" growth. The following are examples of measures several municipalities are putting in place.

The City of Edmonton has approved implementation of recommendations contained in a long-term plan, *Smart Choices for Developing Our Community*. This document sets out strategies to manage growth through redevelopment, reinvestment and building on existing infrastructure. Plan Edmonton, the city's municipal development plan, ensures balanced growth through several strategies. The plan supports contiguous development adjacent to existing development in order to: accommodate growth in an orderly and efficient fashion; promote intensification of development around transportation corridors and employment areas; and support increased densities of land use through infill development that is sensitive to existing development.

A major emphasis of Regina's development plan is to reduce the expansion into neighbouring municipalities and to maintain population in the city's central area. The development plan prohibits "leapfrog" development, supports the preservation of agricultural land and establishes density targets that support efficient use of infrastructure, schools and transportation services. Other policies provide incentives for residential conversion in the downtown area and new-home and model-housing construction in designated inner-city neighbourhoods.

Peel Region's Official Plan contains a "2021 Regional Urban Boundary," which divides the region into an urban system and a rural system. Development within the urban system is intended to be phased-in within the context of growth management strategies prepared by the region's lower tier municipalities.

BOX 3–PUTTING DENSITY IN PERSPECTIVE

One hectare (10,000 square metres) of residential lots, excluding roads and other municipal rights of way, can accommodate roughly 25 single-family detached homes on lots of 390 square metres each. This type of housing would include a total population of approximately 65, assuming 2.6 persons per household. The *Net Population Density* would be 65 persons per hectare, while the *Net Dwelling Density* would be 25 dwelling units per hectare.

Respondents to the 2003 FCM municipal survey provided a snapshot of density measures. Edmonton (62.3 persons per hectare), Peel (62.5 persons per hectare) and Ottawa (64.9 persons per hectare) each relied on relatively similar definitions of net population density. However, most measures were generally not comparable due to substantial variations in the methodologies used by different municipalities (see Annex 1).

Urban growth within the rural system is directed to three "Rural Service Centres." The region is also engaged in various growth management initiatives that will create policies to guide urban development and ensure a consistent response to growth pressures. In particular, there is a need to maintain a firm urban boundary in the face of rapid population and employment growth pressures and to develop nodes and corridors in the Greater Toronto Area to increase population densities and public transit ridership as well as to reduce traffic congestion.

York Region's Official Plan calls for the creation of compact, well-designed communities in order to protect agricultural lands, rural countryside and green spaces. To achieve this objective, the region has recognized the need to direct a significant portion of its growth to existing urban areas. A key part of this strategy is the creation of a system of regional centres linked by rapid transit in regional corridors. Developing regional centres and corridors will require working closely with local municipal partners and the

private sector, as well as the people of York Region and provincial and federal governments.

Ontario municipalities will soon work within a new development policy environment as a result of steps taken by the provincial government in 2004. Bill 136, the proposed *Places to Grow Act*, will enable the province to designate any area of land as a growth plan area and to establish a growth plan. Municipalities will be required to ensure their official plans conform with these growth plans. Bill 135, the *Greenbelt Act*, now in law, protects, valuable natural resources and outlines where growth should not occur with the creation of a permanent, protected greenbelt area of continuous countryside in south-central Ontario.

Part 3 | Income and Economic Growth

This section begins with a discussion of trends in local economies and then moves to a review of indicators of household income growth. The economic and income growth evident during the 1996–2001 period, following a five-year period of economic stagnation, suggests a strong expansion of consumer power. Without observed changes to consumer behaviour and improvement in municipal practices, among other factors, sustained economic expansion and income gains may well have contributed to even greater pressures on the environment than those that were evident.

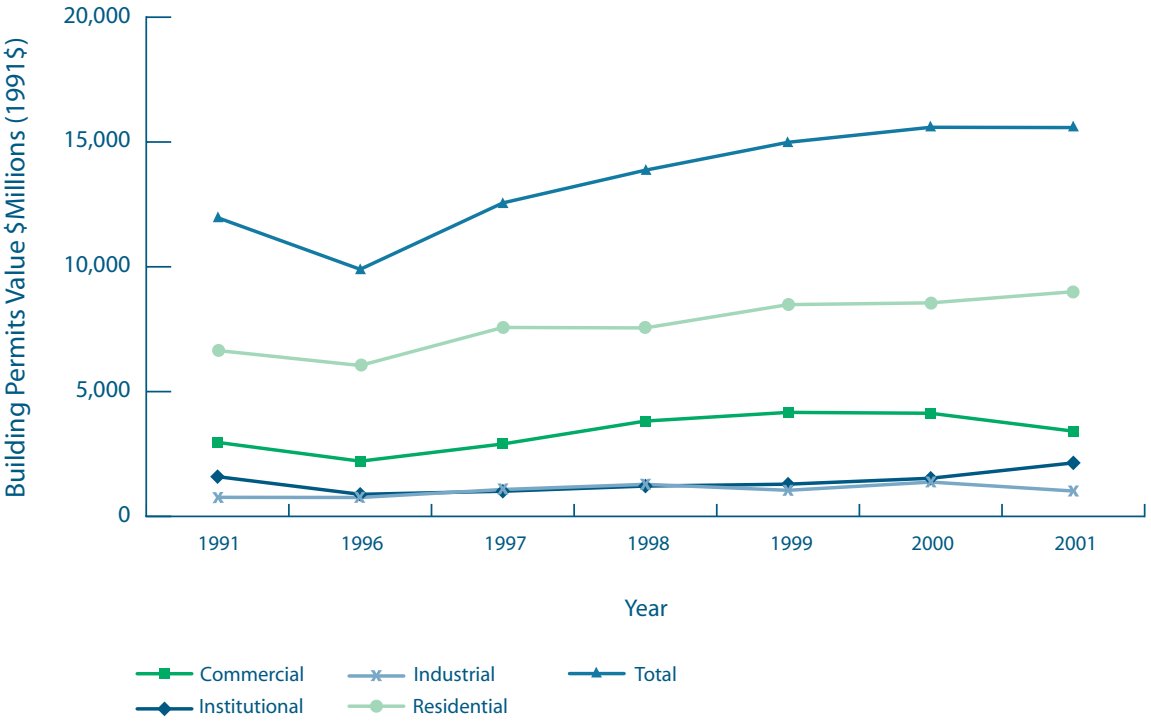
Major economic turnaround

One indicator of local economic activity measured by the QOLRS is the change in the annual value of building permits issued by municipal governments. The trends in local construction activity shown in Charts 5 and 6 reflect the overall roller-coaster effect prevalent among other economic indicators described in the 2004 *Highlights Report*. Negative real growth between 1991 and 1996 was dominated by substantial declines in the two largest construction sectors—residential and commercial development. The decline in the value of building permits in the QOLRS communities during this period was more severe than in the rest of Canada.

The period of contraction was followed by a strong revival between 1996 and 2001, with the value of construction in the QOLRS communities increasing at more than twice the rate of that in the rest of Canada (see Chart 6). This five-year period of construction growth was led by a sustained increase in the value of residential building permits, which grew each year between 1996 and 2001.

The strong cyclical growth pattern in local economies is also evident in the form of employment growth. As described in Chart 7, 1991–1996 employment growth in the QOLRS communities grew at half the

Chart 5 Building Permits – Value of Building Permits ($Millions), 1991$, by Permit Type, QOLRS Municipalities – 1991, 1996-2001



Source: Statistics Canada, Building & Demolitions Permits Monthly Survey, 1991, 1996-2002

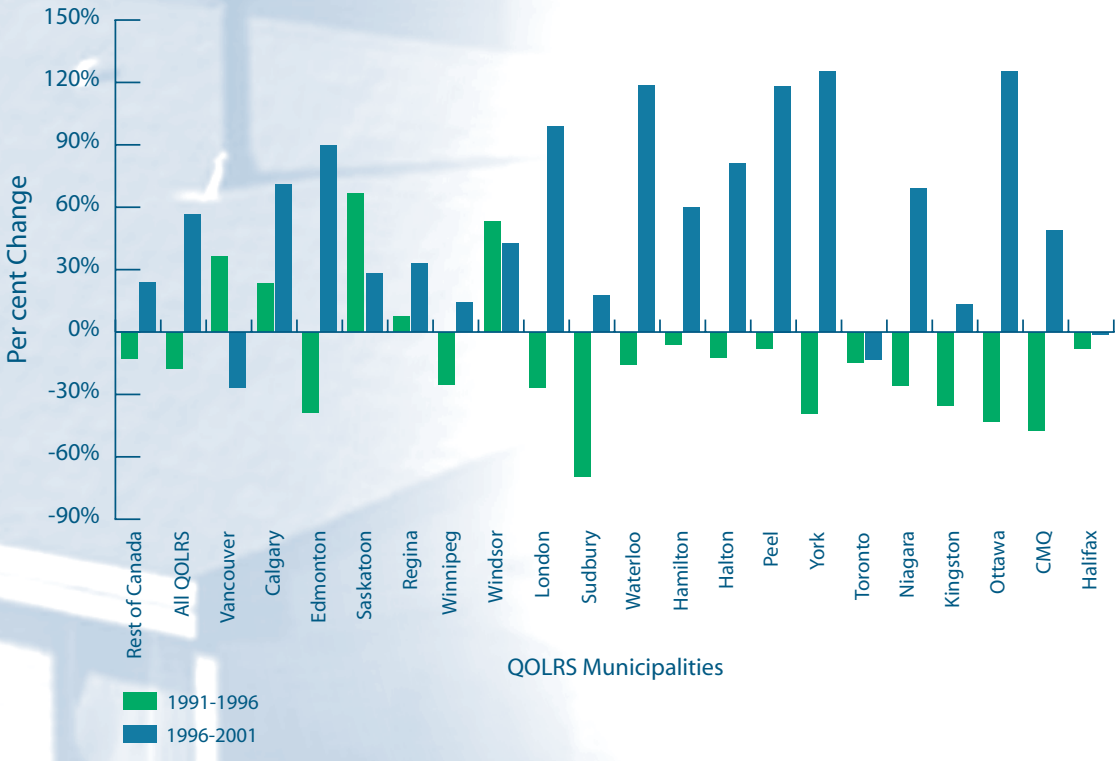
rate occurring in the rest of Canada, but at nearly twice the rate of the rest of Canada during the second half of the decade. As with building construction, employment growth in the QOLRS communities took off during the 1996–2001 period, expanding at a rate nearly nine times faster than in 1991–1996.

Median household incomes

Chart 8 shows a notable contrast in the direction of household income growth between the two halves of the 1990s. Nineteen of the 20 communities experienced positive median household income growth during the second half of the decade, following income contraction in all 20 communities between 1991 and 1996.

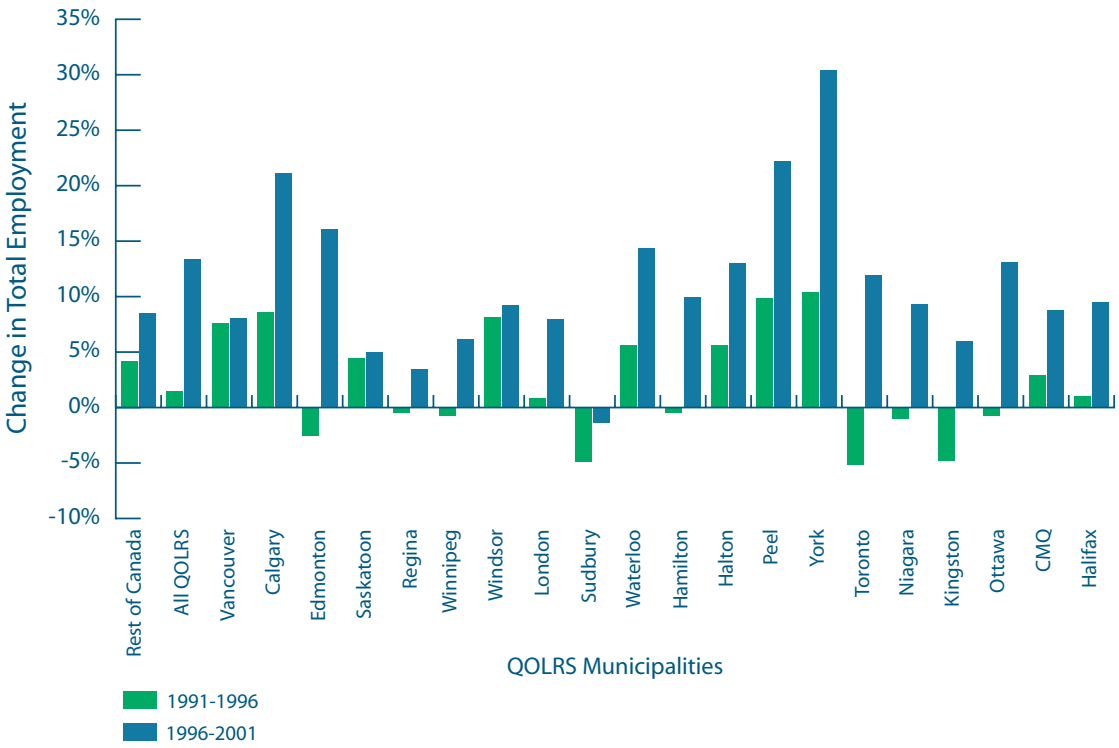
Communities that experienced rapid expansion of residential construction activity during the 1996–2001 period (Calgary, Edmonton, Waterloo, Halton, York, Peel and Ottawa) also experienced higher income growth during this period. Households in the prairies and in smaller communities like Sudbury and Kingston had the weakest income gains, consistent with relatively weak residential construction activity. The story was somewhat different in the two largest urban centres; income growth among households in Vancouver and Toronto was relatively high during the second half of the decade, while household growth and construction activity were relatively weak during the same period.

Chart 6 Building Permits – Growth in Real Value of Building Permits (1991$), QOLRS Municipalities – 1991-1996, 1996-2001



Source: Statistics Canada, Building & Demolitions Permits Monthly Survey, 1991, 1996-2002

Chart 7 Employment – Change in Total Number of Employed Persons, QOLRS Municipalities – 1991-1996 1996-2001



Source: Statistics Canada, 1991, 1996, 2001 Census

Chart 8 Income Growth – Median Household Income (1990$), QOLRS Municipalities – 1990, 1995, 2000

Source: Statistics Canada, 1991, 1996, 2001 Census

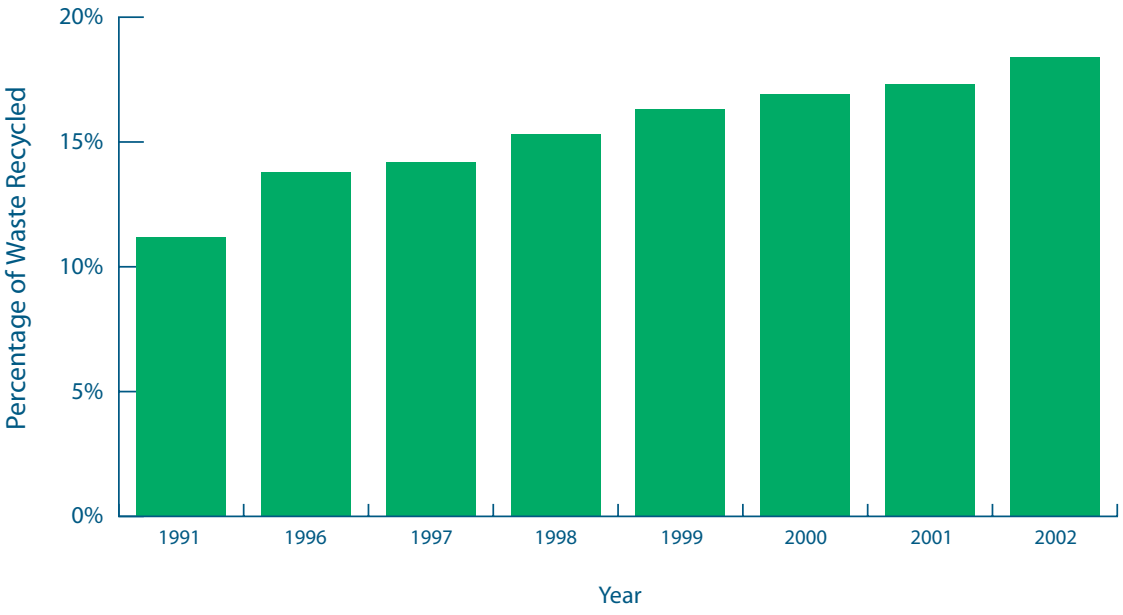
Part 4 | Municipal Solid Waste Management

This section relies on data measuring the change in total and per-capita volumes of solid waste generated and diverted in the QOLRS communities between 1991 and 2002. Indicators presented in this section are based on responses to FCM's municipal survey conducted in 2003. Nineteen of the 20 communities participating in the survey were able to report on solid waste data for either 2001 or 2002. However, a smaller number were able to report on 1996, while relatively few were able to provide 1991 data.[14]

The key finding is that, while municipal waste diversion programs succeeded in slowing down the rate at which solid waste was sent to landfills, the total volume of waste increased (see Glossary of Terms in Box 4). Information on recycling and re-use shows improvements during the latter half of the 1990s, but this is overshadowed by the overall growth in disposal rates during this period.

Increasing volumes of solid waste generated by households and businesses place financial pressure on municipalities faced with the need to expand waste diversion programs and identify new landfill sites. In addition, the sustained demand for expansion of waste disposal facilities risks degrading landscapes and increasing soil and water contamination.

Chart 9 Residential Waste Recycled as a Percentage of Total Waste Collected, QOLRS Average – 1991, 1996-2002



Source: Federation of Canadian Municipalities, Municipal Survey Database, 2003

[14] QOLRS solid waste data were collected from 19 Canadian communities. London is excluded from this analysis of waste management. However, national comparisons of municipal waste generation and diversion are difficult because the types of materials municipalities include in waste diversion measurements vary significantly. A national team established in 2000 has developed generally accepted principles (GAP) for measuring municipal waste flow in a consistent manner. The GAP protocol was finalized for wide application and adoption in early 2001. Information on the GAP is available at http://www.csr.org.

BOX 4–GLOSSARY OF SOLID WASTE TERMS

Municipal Solid Waste: There are varying interpretations of municipal solid waste management terminology. This report addresses the residential component of municipal waste management.

Waste Collection: refers to all waste the municipality collected from dwellings where residential activities (food preparation, gardening, etc.) are the source of the waste. This includes waste collected for the purposes of recycling or other diversion programs.

Waste Recycling: refers to the process whereby a material (e.g., glass, metal, plastic, paper) is diverted from the waste stream and put back into the manufacturing process. Municipal waste recycling includes curbside collection of recyclables from single-family and multi-family residences, as well as residential drop-off of recyclables at depots.

Waste diversion: includes a much broader set of municipal actions aimed at reducing the amount of waste entering landfills. In addition to recycling, waste is diverted through municipal leaf and yard waste collection programs, curbside collection of household organics, drop-offs of household organics at depots, municipally sponsored backyard composting and product reuse initiatives.

Waste disposal: includes all municipal solid waste disposed to a landfill or incinerator.

For a complete glossary of terms, see the 2003 Manual on Generally Accepted Principles (GAP), available at http://www.csr.org/CSR_National/GAP/GAP%202%20MSW%20Manual%20-%20Nov%2012.pdf

Per-capita residential waste collected

One measure of solid waste management is the amount of waste collected from individual households on an annual basis for both disposal and diversion. The majority of communities responding to the 2003 FCM municipal survey reported an increase in per-capita waste collected from 1996 to 2002, with total volumes of solid waste disposed and diverted rising marginally from 337 kg per person per year in 1996 to 345 kg by 2002.[15]

Of the 13 municipalities reporting solid waste data for both 1996 and 2002, per-capita volumes increased in eight, were unchanged in one, and fell in only four.[16] It is important to note that the municipalities showing a decrease or no change in per-capita waste collection were also among the largest by population, including Vancouver, Calgary, Toronto and York Region. Per-capita volumes of residential waste collected for disposal and diversion between 1991 and 1996 declined in six of seven reporting municipalities.

Municipal waste recycling and diversion programs

Throughout the 1990s, municipalities responded to the challenge of managing solid waste by expanding recycling and other waste diversion programs. Charts 9 and 10 provide greater detail of the success of QOLRS municipalities in achieving greater recycling and diversion rates. Curbside recycling rates grew steadily from 11 per cent of total waste collected in 1991 to more than 18 per cent by 2002. Similarly, waste diversion rates, which include recycling as well as leaf and yard waste collection, hazardous waste collection and organics composting programs, grew from 20 per cent of all waste collected in 1991 to just less than 32 per cent by 2002. Box 5 provides an overview of waste diversion programs that QOLRS municipalities introduced for a wide array of products, including hazardous waste, plastics and organics.

Volume of waste disposed

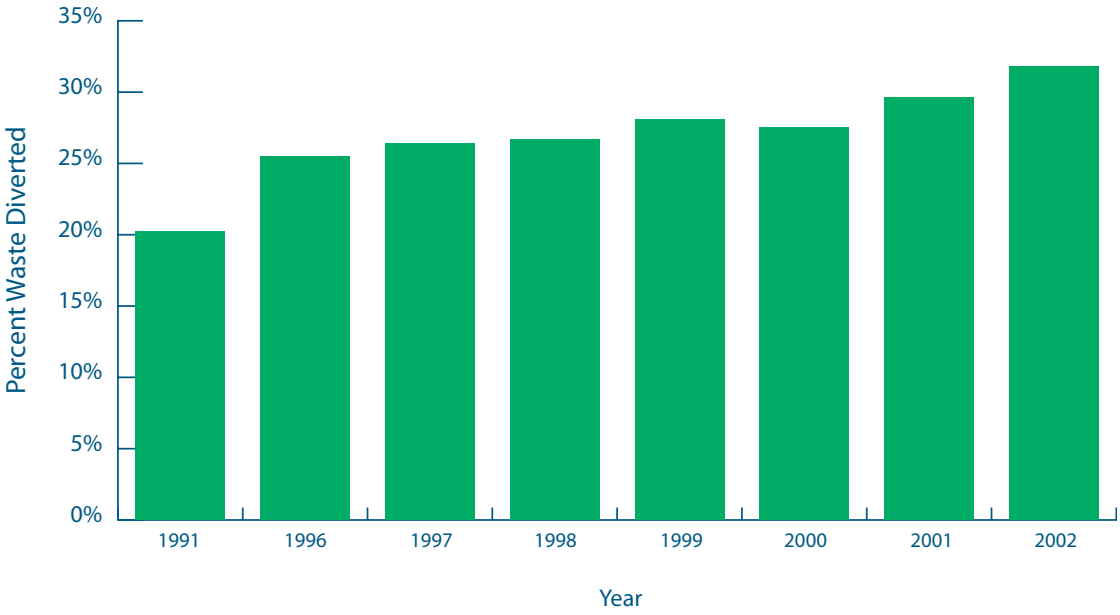
Chart 11 compares the annual volume of residential waste collected to the volume of residential waste disposed to municipal landfills from 1996 to 2002. Disposal rates grew significantly more slowly than collection rates during this period. While the amount of waste disposed to landfills grew by 49 per cent between 1996 and 2002, total waste collected by the reporting municipalities, including waste collected for recycling and other forms of diversion, grew by 64 per cent. This indicates progress in the implementation of municipal recycling and other waste diversion programs. However, the increased rates of recycling

[15] The suggestion that each resident is generating more waste needs to be made with caution. In some cases, these figures may be influenced by expanding municipal collection programs rather than increased volumes of waste produced by individual households.

[16] Per-capita figures for reporting municipalities are presented in the Technical Annex at http://www.fcm.ca.

and diversion presented in Charts 9 and 10 reduced, but could not fully offset, the greater levels of residential waste generated.

Chart 10 Residential Waste Diverted as a Percentage of Total Waste Collected, QOLRS Average – 1991, 1996-2002



Source: Federation of Canadian Municipalities, Municipal Survey Database, 2003

BOX 5–THE EXPANSION OF MUNICIPAL WASTE DIVERSION PROGRAMS

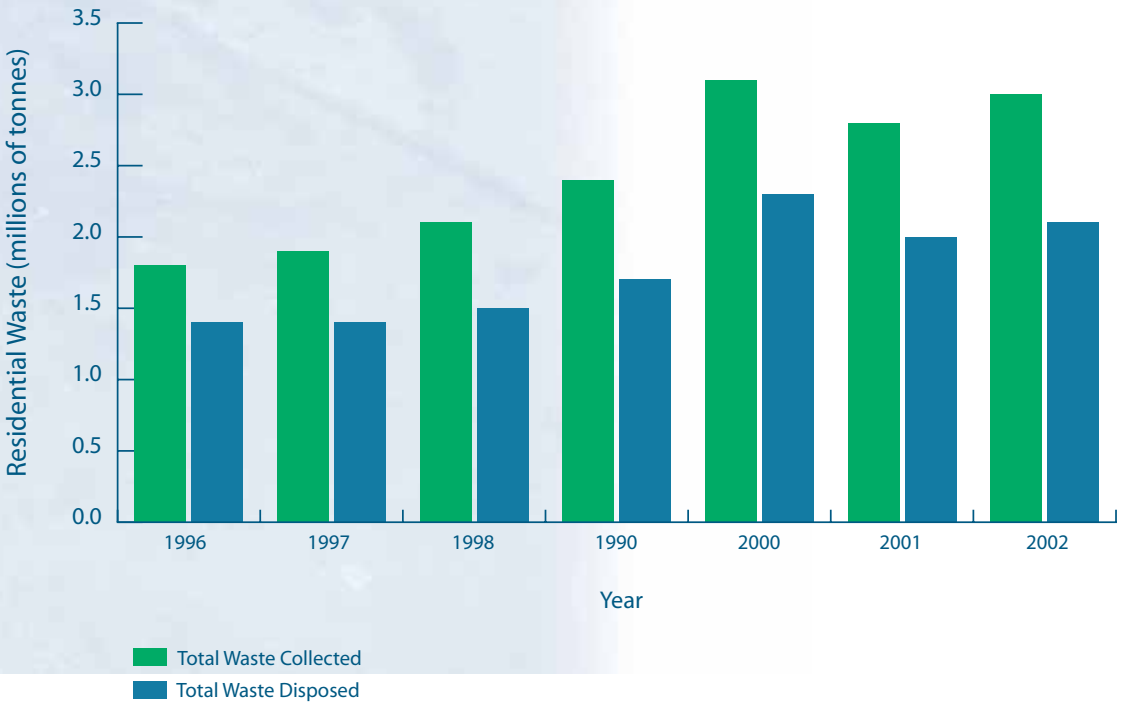
Streaming of Recycled Waste: Several municipalities—including Halifax, Niagara, Ottawa, Peel, Toronto and Windsor—reported streamed curbside recycling programs, with fibres/paper/cardboard in one box and metals/glass/plastic in a separate box.

Hazardous Waste Diversion: Many cities have put in place permanent depots open to the public to accept hazardous waste as well as mobile hazard waste collectors and designated hazardous waste collection days. Several municipalities noted electronics and computer equipment recycling as recent additions. Proper collection, recycling and disposal of electronics is important because they have a high turnover, low recycling rate and frequently contain hazardous materials.

Plastics Recycling: Municipalities reported expanding their collection of various plastic waste products for recycling. Gable or polycoat plastics, generally used for milk containers and juice boxes (tetrapaks), were a common addition. This type of plastic presents a challenge, as it generally needs to be recycled separately. Several municipalities reported adding stiff plastic containers (HDPEs) through expanded recycling programs.

Composting: Many municipalities have initiated pilot, demonstration or full kitchen organics curbside collection programs. Most cities now collect leaf and yard waste at the curbside at specific times. Most cities have also added Christmas tree chipping programs. Many municipalities also subsidize or sell backyard composters. The City of Toronto began implementing a Source-Separated Organics (SSO) program in 2002. York and Niagara Regions reported gradually implementing similar SSO programs on a region-wide basis.

Chart 11 Solid Waste – Residential Waste Collected and Disposed (After Diversion), All Reporting QOLRS Municipalities – 1996-2002



Source: Federation of Canadian Municipalities, Municipal Survey Database, 2003

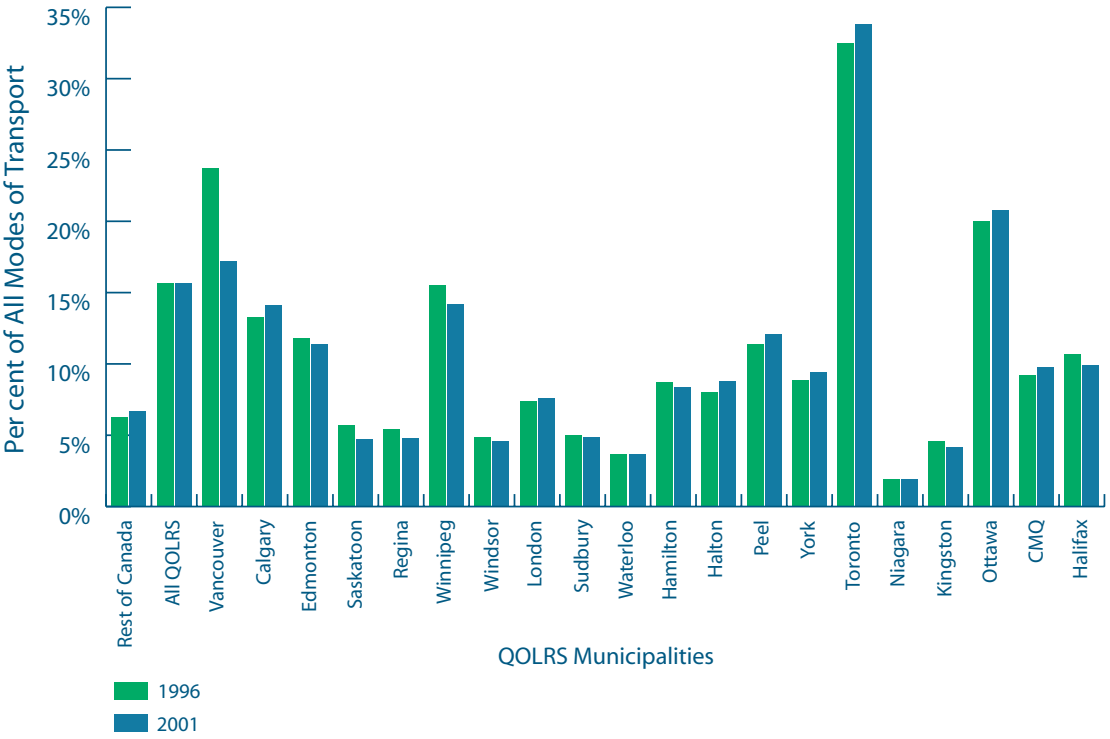
Part 5 | Transportation and Air Quality

This section presents a series of indicators measuring trends in commuting patterns between 1996 and 2001 and a review of air quality trends between 1991 and 2002.

QOLRS data suggest the continued dominance of the vehicle as the preferred method of commuting. National estimates of commuting behaviour provided by Environment Canada show a trend toward larger, less-efficient vehicles. These trends tend to overwhelm progress in improving the overall energy efficiency and the emissions by passenger vehicles on the road. While commuting trends are only partially responsible for air pollution, the 1996–2002 period also coincided with elevated concentrations of ground-level ozone. In addition, increasing numbers of smog advisories in several of the QOLRS municipalities signalled health risks.

While the QOLRS does not currently monitor health trends associated with air pollution, this is an issue of particular concern for the elderly, children and those with respiratory and cardiac problems. A large body of research shows that air pollution can lead to premature death, more emergency room visits and higher rates of absenteeism. The Ontario Medical Association blames air pollutants for more than 1,900 premature deaths in the Province of Ontario each year.[17]

Chart 12 Urban Transportation – Proportion of Commuters Using Public Transit, QOLRS Municipalities – 1996, 2001



Source: Statistics Canada, 1996, 2001 Census. 2001 Vancouver data lower due to impact of transit strike on census results.

[17] Source: Ontario Clean Air Alliance, http://www.cleanair.web.net/media/oct1802.html

Car-dominated commuting patterns

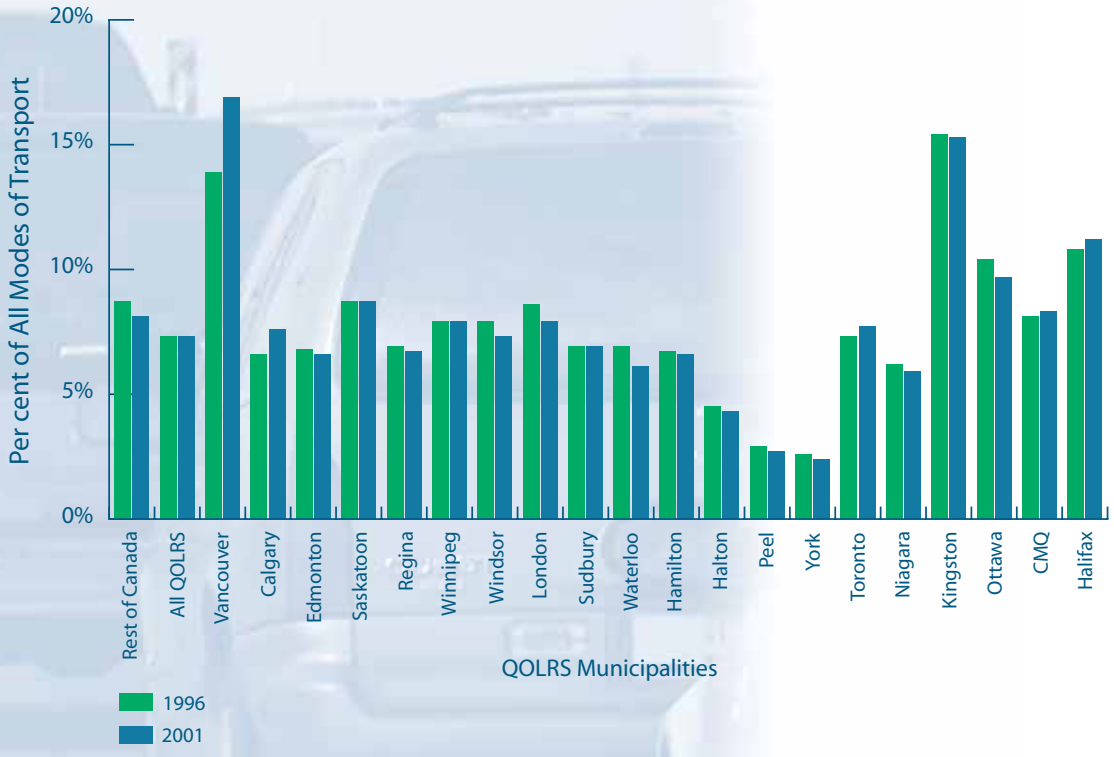
Charts 12 and 13 show the proportion of commuters relying on public transit, cycling and walking in 1996 and 2001. Two observations are evident. First, there is little reliance on modes of transportation other than the car. Second, this pattern did not change significantly. Instead, private-vehicle use continued to account for close to 80 per cent of all commuting trips in most municipalities, with the exception of three cities—Vancouver, Ottawa and Toronto.

The proportion of commuting trips on foot or by bicycle fell in 14 of the 20 municipalities between 1996 and 2001 and remained below the average for the rest of Canada. Reliance on walking and bicycling was weakest in Peel, York and Halton, three municipalities that also experienced the highest growth in population, income and employment. Factors affecting the level of walking and cycling include population density, settlement patterns, location of workplaces in relation to places of residence, cost and service level of transit, availability of safe and convenient pathways and bike lanes, climate and lifestyle choices.

Commuting distances

Chart 14 presents the distribution of commuting distances in 2001. The majority—close to 60 per cent of commuters in the QOLRS communities—drove between 5 and 30 km per commute, typically representing travel within city boundaries, but well outside the immediate area of residence. Commuting

Chart 13 Urban Transportation – Proportion of Commuters Walking or Cycling, QOLRS Municipalities – 1996, 2001



Source: Statistics Canada, 1996, 2001 Census

trips involving distances of greater than 30 km were most common in Southern Ontario municipalities such as Hamilton, Halton, York and Niagara. Long-distance trips accounted for 10 to 20 per cent of all commutes in these municipalities. Six cities—Vancouver, Saskatoon, Regina, Windsor, London and Kingston—stood out as having the greatest proportion of short commutes (under 5 km). The relatively small geographic size of these cities was one factor. Vancouver was the only one with a significant reliance on public transit.

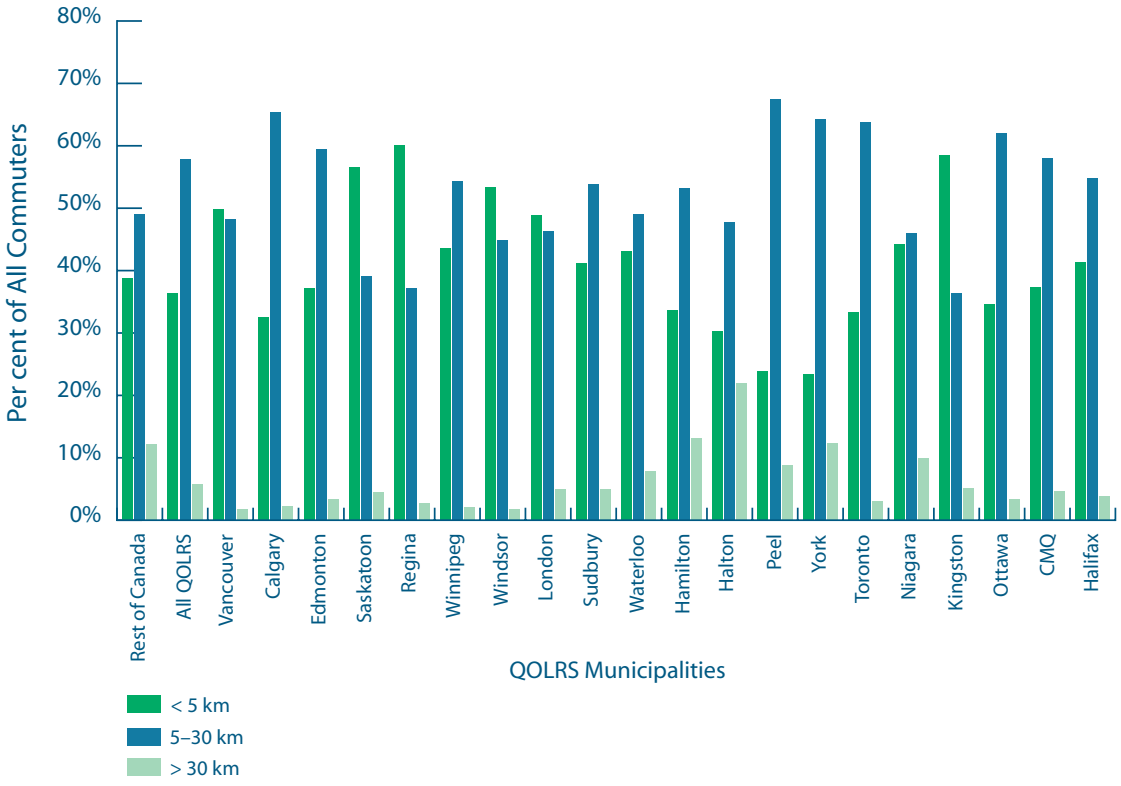
As with commuting methods, Chart 15 suggests that median commuting distances were generally unchanged over the five-year period.

Commuting distances in 14 of the 20 QOLRS municipalities were shorter than the national average, although commuters in some of the most populous municipalities—including Toronto, Calgary, Peel, York and Ottawa—travelled farther than the average Canadian.

Air quality

The 2004 *Highlights Report* introduced the theme of air quality, focusing on ground-level ozone. This section expands on the analysis of ground-level ozone and considers a broader range of air pollutants (see Box 6 for descriptions). Environment Canada's *Environmental Signals* report[18] indicates that ambient levels of several pollutants (NOx, SO_2, CO, total suspended particles) generally decreased or remained

Chart 14 Urban Transportation – Commuting Distances Travelled to Work, QOLRS Municipalities – 2001



Source: Statistics Canada, 2001 Census

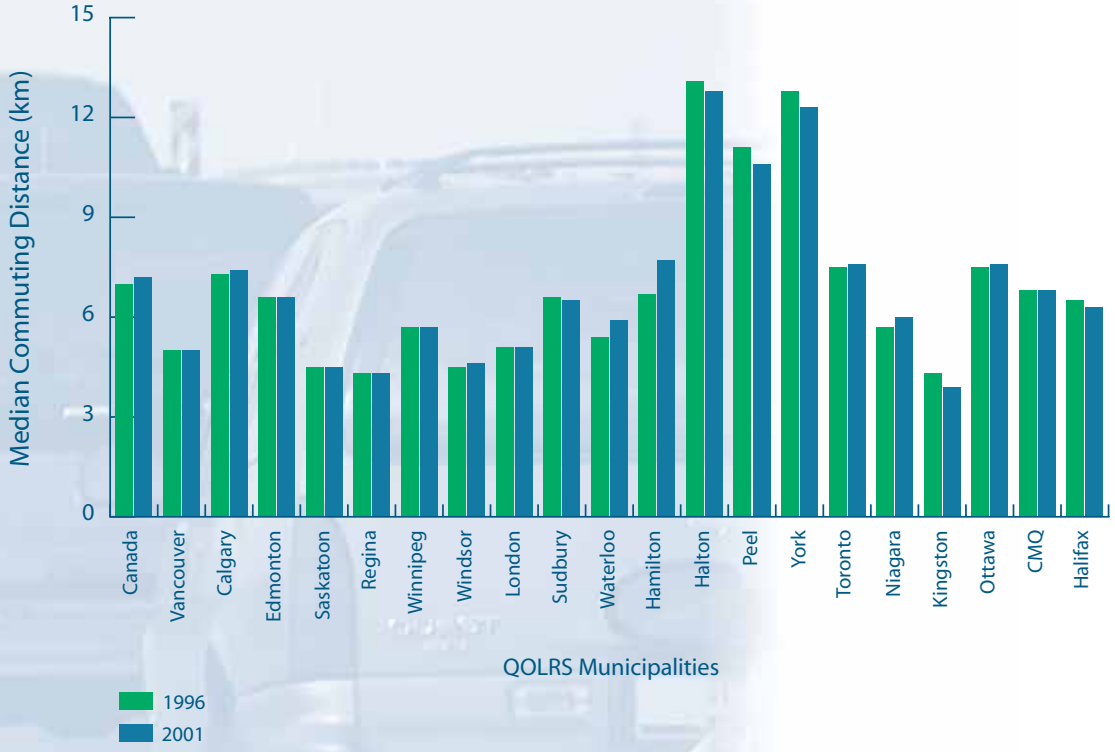
[18] Environment Canada, *Environmental Signals, Canada's National Environmental Indicator Series* (Ottawa: 2003) http://www.ec.gc.ca/soer-ree/English/Indicator_series/

low across Canada over the past 20 years. These improvements followed various actions taken during the last few decades, such as changes to the composition of gasoline, most notably the removal of lead, and reductions in the sulphur content of diesel fuel. Measures have also been successfully put in place to reduce vehicle emissions through a combination of catalytic converters, enforced emission standards and improved vehicle inspection and maintenance programs.

Environment Canada's *Environmental Signals* report also indicates that concentrations of ground-level ozone in Ontario, Quebec and the Atlantic provinces have remained consistently above the Canada-wide standard since the early 1980s, partly reflecting sustained growth in vehicle use in heavily populated areas. High levels have been recorded mainly in the Quebec City–Windsor corridor and, to a lesser extent, in the southern Atlantic region and the Lower Fraser Valley of British Columbia.

Air quality data available from the QOLRS for the 1991–2001 period reflect these national trends. Concentration levels of several key air pollutants fell to well within acceptable levels during this period, despite corresponding population and economic growth. Chart 16 illustrates the example of annual average concentrations of Sulphur Dioxide (SO_2), which were well within the acceptable standard.[21]

Chart 15 Urban Transportation – Median Commuting Distance, QOLRS Municipalities – 1996, 2001



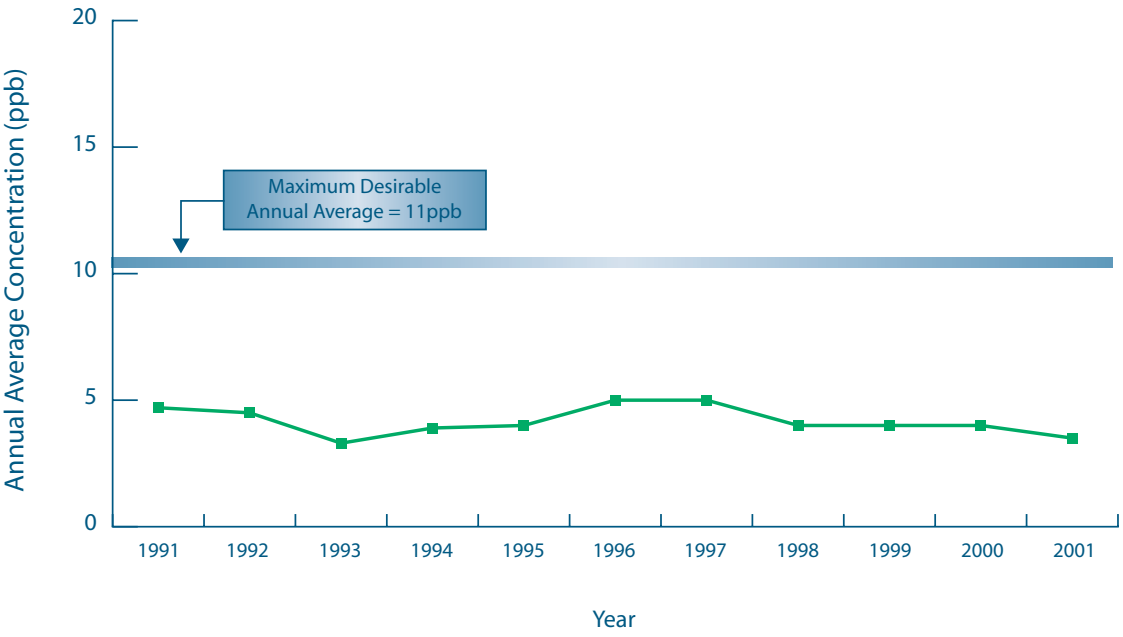
Source: Statistics Canada, 1996, 2001 Census

[21] The QOLRS also provides data on one-hour peak concentrations of a range of air pollutants. With the significant exception of ozone, none of these pollutants exceeded its one-hour peak maximum acceptable concentrations.

BOX 6–SOURCES AND HEALTH EFFECTS OF AIR POLLUTANTS

Sulphur dioxide (SO_2) is the result of the combustion of fossil fuels, mainly coal and fuel oil in thermal power plants. Domestic coal burning and vehicle emissions also contribute to high ambient concentrations. Sustained exposure to concentration levels exceeding national standards can result in reduced lung function, respiratory symptoms and diseases, irritation of eyes, nose and throat and premature mortality. Sulphur dioxide deposits acid and is a source of corrosion, haze and damage to vegetation.
Ground-level ozone (O_3) is formed in the lower atmosphere by nitrogen oxides[19] (NOx) and volatile organic compounds (VOC), which react in the presence of heat and sunlight. As a result, ozone is typically a summertime pollutant and a chief component of summertime smog. Motor vehicle emissions are the single largest source of the pollutants that produce ozone. High concentrations of ozone are also the result of industrial activity or power generation. Significant amounts of ozone and ozone-forming compounds are carried into Canada from the United States. It is estimated that more than 50 per cent of Ontario's ground-level ozone comes from American states.[20] During periods of widespread elevated levels, ozone can irritate respiratory systems, aggravate asthma and chronic lung diseases, such as emphysema and bronchitis, and may cause permanent lung damage. Ozone is also damaging to vegetation.
Particulate matter (PM) sources include fossil-fuel combustion for heating and cooking, diesel-fuelled engine combustion and many industrial processes. More than 90 per cent of fine particulates emitted from stationary sources are combined with SO_2. Smaller particles in the range of 10 to 2.5 micrometres (PM_{10} and $PM_{2.5}$) are most likely to cause adverse health effects by reaching lower regions of respiratory tracts. Particulate matter is also damaging to vegetation, contaminates soil and contributes to poor visibility.
Source: Environment Canada, http://www.ec.gc.ca

Chart 16 Air Quality – Annual Average Sulfur Dioxide (SO2) Concentration (ppb), Median of All QOLRS Municipalities – 1991-2001



Source: Environment Canada, National Indicators & Assessment Office, National Air Pollution Surveillance Network, 1991-2001

[19] Nitrogen oxides (NOx) is the generic term for a group of highly reactive gases, all of which contain nitrogen and oxygen in varying amounts.
[20] More information on ozone is available at http://www.airqualityontario.com/science/pollutants/ozone.cfm.

While concentrations of air pollutants such as SO_2 were well within acceptable ranges in Canadian cities, ground-level ozone presented a challenge. Identified as a concern in the 2004 *Highlights Report*, Chart 17 shows that concentrations of ground-level ozone between 1991 and 2001 were consistently at or above the maximum acceptable annual average in all of the QOLRS communities, except Regina and Vancouver.

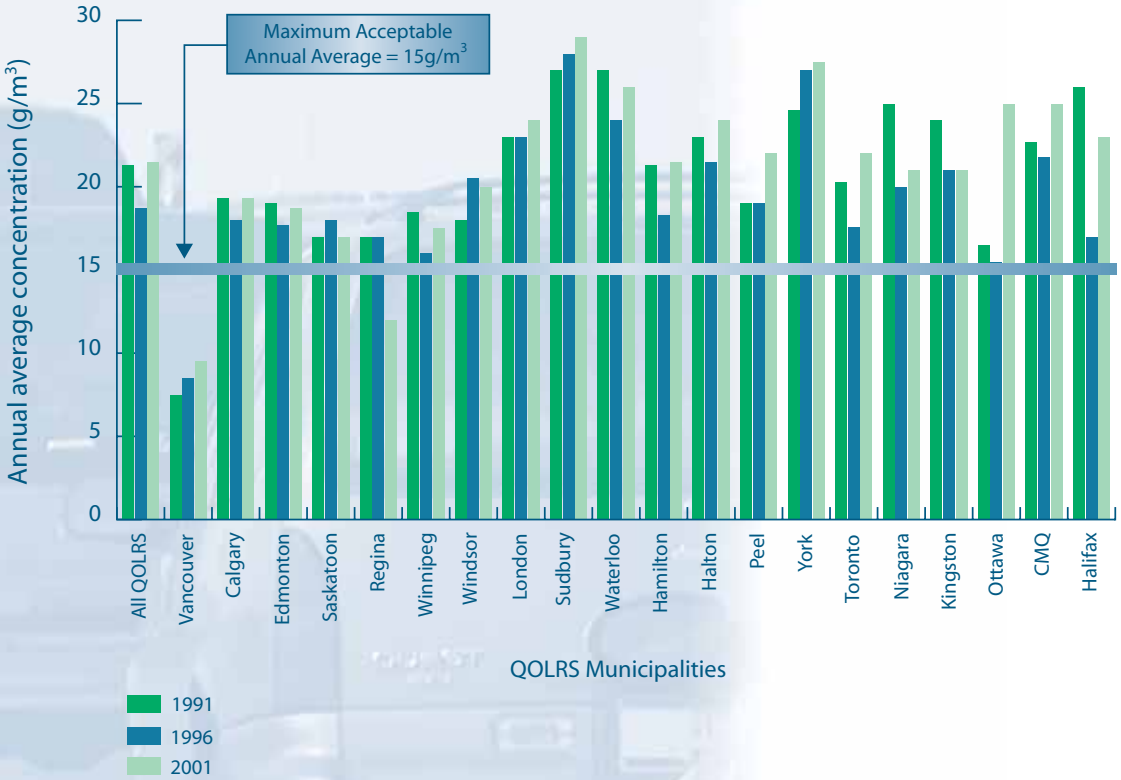
Chart 18 and Table 2 describe the number of smog advisories reported in several QOLRS communities between 1991 and 2002 (see Box 7 for a discussion of smog). These data generally reinforce the trends presented in Chart 17. While smog advisory data from the QOLRS are available for only 13 municipalities, these show a steady increase between 1996 and 2001.[22]

Implications for municipal governments

Many sources of air pollution are located well outside municipal boundaries, often originating outside Canada. Clearly, managing air quality requires actions beyond the scope of any one municipal government.

At the same time, individual municipalities and local residents are in a position to have a direct impact on improving air quality.

Chart 17 Air Quality – Annual average ozone (O3) concentration (g/m^3), QOLRS Municipalities – 1991, 1996, 2001



Source: Environment Canada, National Indicators & Assessment Office, National Air Pollution Surveillance Network, 1991-2001
Halifax data are for the years 1991, 1996 and 1998
Saskatoon data are for the years 1992, 1996 and 1999
York data are for the years 1991, 1996 and 2000

[22] Available 1991 data show no smog advisories, though this is due, in part, to the limited monitoring systems in place at the time. The significant jump in advisories between 2000 and 2001 is due, in part, to changes in notification procedures put in place by the Province of Ontario, as described in Box 7.

BOX 7–SMOG AND SMOG ADVISORIES

"Smog" refers to a combination of ground-level ozone and fine airborne particulate matter that often appear as haze. The particles are what give smog most of its colour and affect visibility. The main purpose of a smog advisory is to warn people with breathing difficulties to avoid or minimize their exposure to outdoor air. Provincial ministries generally issue smog advisories based on an air quality index value. For example, smog advisories in Ontario are issued when there is a high probability of a smog day occurring within the next 24 hours.

Since May 1, 2000, as part of its new Air Quality Ontario initiative, Ontario's Ministry of the Environment has provided earlier notification of poor air quality. In May 2001, the ministry adopted the policy of issuing a smog advisory immediately if a smog day occurred without warning and weather conditions conducive to elevated smog are forecast to continue for six hours.
Source: www.airqualityontario.com

Municipal governments in Canada are increasingly turning towards Transportation Demand Management (TDM) and Transportation Management Associations (TMAs) to address the issue of air quality. TDM is based on introducing a combination of incentives and disincentives, such as restricting vehicular traffic use on main arteries, encouraging car pooling, encouraging the use of public transit and taxing cars entering city limits. TMAs are non-profit, member-controlled organizations aimed at providing sustainable transportation solutions as well as improved mobility and accessibility in a specific development area. TMAs provide a framework from which TDM programs are promoted, applied and managed.

TDM measures include promoting more intensive land use through higher-density development to permit more walking, cycling and transit-oriented development; expanding public transit services as a convenient and affordable alternative to vehicles; and offering a network of bikeways connecting homes to workplaces, shopping, schools and recreation. One example is the *Smart Commute Initiative*, originally

Table 2—Air Quality-Number of days citizens received smog advisories, Select QOLRS Municipalities-1996-2002

Year	Calgary	Edmonton	Windsor	Sudbury	Waterloo	Hamilton	Halton	Peel	York	Toronto	Niagara	Quebec	Halifax
1996	0	0	n/a	n/a	5	3	2	3	2	3	n/a	0	0
1997	0	0	n/a	1	6	6	2	2	2	5	n/a	0	0
1998	0	0	n/a	2	8	8	3	3	3	7	n/a	0	0
1999	0	0	n/a	2	9	9	5	5	5	9	n/a	0	0
2000	0	0	4	n/a	4	3	3	3	3	3	n/a	0	0
2001	0	0	25	10	20	21	7	7	7	20	n/a	0	0
2002	0	0	24	3	19	20	10	9	9	18	21	0	0

Source: FCM Municipal Survey Database, 2003

called the Greater Toronto Area (GTA) Travel Demand Management Program. At the core of this proposal is the establishment of GTA-wide carpooling van and car-sharing programs, along with the development of a string of Transportation Management Associations across the GTA.

Municipalities can also reduce the level of traffic congestion by ensuring a high standard of road quality and redesigning traffic management plans to maximize the flow of vehicular traffic.

Chart 18 Air Quality – Average Number of Smog Advisories for Municipalities Reporting Air Quality, Select QOLRS Municipalities – 1996-2002

Source: FCM Municipal Survey Database, 2003

Part 6 | Municipal Water Supply and Water Quality

This section addresses three identified issues related to municipal water and wastewater: changes in residential water consumption, levels of wastewater treatment and recreational water quality.

Municipal water use accounts for approximately 11 per cent of all surface water and groundwater withdrawn in Canada. Environment Canada's 2003 *Environmental Signals* report emphasizes that Canadians are among the world's greatest users of water, consuming twice as much as people in industrialized countries outside North America. While national per-capita municipal water consumption declined by four per cent between 1991 and 1999, the total volume of municipal water consumed by Canadians increased by five per cent due to the growing population.

In addition to placing a strain on a valuable natural resource, the growth in demand for water means that more wastewater is produced. As discussed in Section 1, municipal wastewater represents one of the largest single effluent discharges in the country. Inadequately treated municipal wastewater poses a serious threat to human health and water quality as it can contain any combination of disease-causing pathogens, decaying organic waste and dozens of harmful chemicals. These have the potential to place aquatic life and drinking water systems at risk. Inadequately treated wastewater can also lead to the closure of recreational beaches, reducing access to important quality of life amenities.

Water quality at a national level is difficult to measure due to data and monitoring limitations. An initiative to compile water quality indices for individual watersheds will provide a national picture of the state of the environment as early as 2006.[23]

Per-capita water consumption

Close to 98 per cent of the population of the QOLRS communities was connected to a municipal water supply system in 1999. In addition to serving their populations exceptionally well by global standards, municipalities are able to maintain water services, suggesting a high rate of infrastructure investment in the face of substantial population growth.

Chart 19 presents per-capita municipal water consumption data for 1991, 1996 and 1999 in the 20 QOLRS communities, accounting for residential, commercial, institutional and industrial uses. In contrast to the declining national average, per-capita water consumption for all QOLRS communities increased slightly between 1991 and 1999, although substantial variation across the communities was apparent. Despite this overall increase, the QOLRS average remained well below the national average.

Factors affecting per-capita water consumption include the following:

- Average household incomes, with higher incomes related to higher water consumption;
- The presence of water-intensive industries, which tend to increase per-capita figures substantially;
- Climate, with warmer weather correlated with increased consumption;
- The age of the municipal infrastructure, as older pipes leak more water before it is even consumed; and
- The effectiveness of water conservation programs initiated by the community.

Treating municipal wastewater

Chart 20 describes the percentage of the population of the QOLRS communities who are served by a municipal sewage collection system that provides either no wastewater treatment or provides primary treatment only. Less than 10 per cent of the wastewater produced in the QOLRS communities received less than secondary or tertiary treatment in 1999, which is down significantly from 17 per cent in 1991. This was also much less than the 22 per cent of the total Canadian population connected to a sewer system and not benefiting from either secondary or tertiary treatment in 1999.[24] Furthermore, most municipalities with large volumes of wastewater

[23] QOLRS municipal water and wastewater data are based on the Municipal Water Use Database (MUD), compiled by Environment Canada and available for the years 1991, 1996 and 1999. MUD data are based on a voluntary response from municipalities and are collected at the municipal level, not at the level of individual water plants.

[24] Environment Canada, *Environmental Signals* (2003).

receiving neither secondary nor tertiary treatment—Vancouver and Windsor in 1996 and 1999; Saskatoon, Kingston and Ottawa in 1991—relied on primary treatment systems rather than no treatment at all.[25]

Recreational water quality

Recreational water quality data collected as part of the 2003 FCM municipal survey are available for 10 municipalities, nine of which are in Ontario.[26] Five of these share access to Lake Ontario (Halton, Peel, Toronto, Niagara and Kingston).

Despite improvements in wastewater treatment, Table 3 suggests that recreational water quality suffered from some deterioration. It should be noted, however, that wastewater treatment is only one of several factors influencing the quality of recreational water along a shoreline.

Implications for municipal governments

Municipal governments play an important role in securing adequate water supply and water quality. A key role, requiring the support of the federal and provincial/territorial governments, is maintaining

Chart 19 Municipal Water Supply – Daily Total Water Consumption (L/person/day), QOLRS Municipalities – 1991, 1996, 1999

Source: Environment Canada, Municipal Water Use Database, 1991, 1996, 1999
No 1991 data for Calgary, Edmonton, Saskatoon, Regina or Winnipeg.

[25] Wastewater treatment data for individual municipalities are available in the Technical Annex at http://www.fcm.ca.

[26] Several municipalities reported either not having any recreational water bodies (Calgary, Edmonton, Regina, Saskatoon, Winnipeg and London), or that data on beach closures were not collected by the municipality and were therefore unavailable (Vancouver, CMQ). No data were provided by the cities of Hamilton and Ottawa.

an adequate level of investment in physical infrastructure. Municipalities monitor both drinking water quality and recreational water quality. The latter includes regular beach water sampling in the summertime and public pool inspections throughout the year. Municipalities can also influence the behaviour of individual households and businesses by promoting conservation measures and correct pricing (see Box 9).

Environment Canada's *Environmental Signals* report highlights several issues relevant to municipal governments:

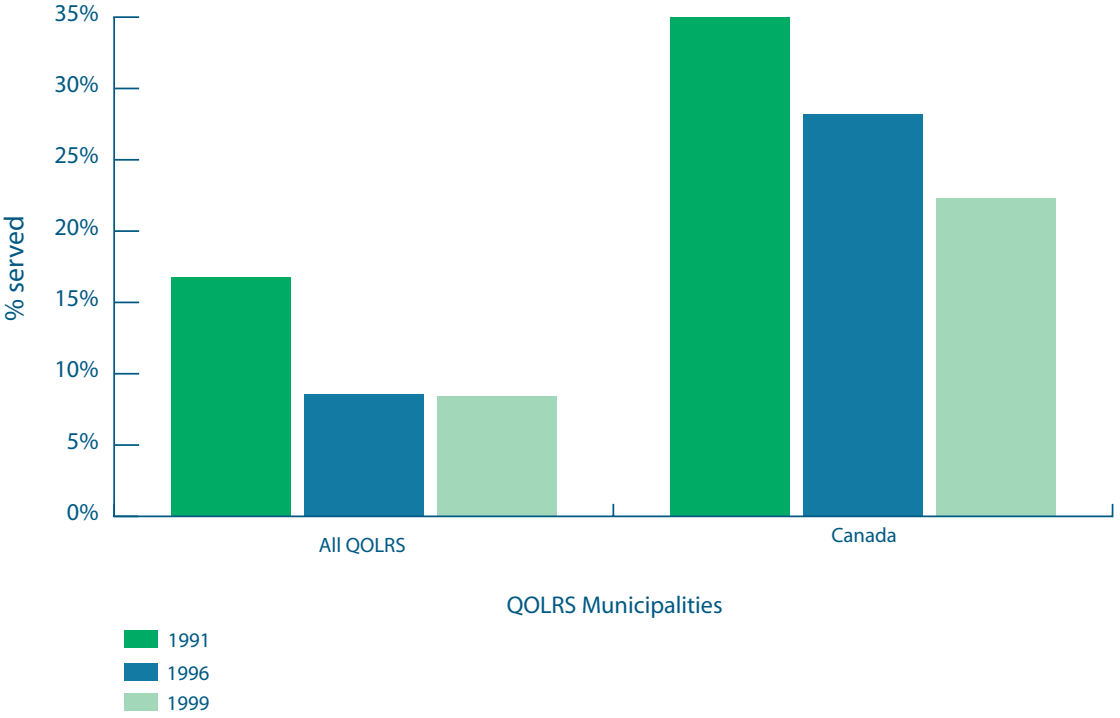
BOX 8–DEFINITION OF WASTEWATER TREATMENT

Primary Treatment: Removal of 20–30 per cent of organic waste and separation of sludge by screening and settling.

Secondary Treatment: Use of biological treatment to remove 80–90 per cent of organic waste.

Tertiary Treatment: Advanced chemical or biological-chemical treatment to remove 95 per cent or more of organic waste.

Chart 20 Population Served by Sewage System With Access to No Treatment or Primary Treatment Only, QOLRS and National Averages – 1991, 1996, 1999



Source: Environment Canada, Municipal Water Use Database, 1991, 1996, 1999.
Measured as percentage of the population serviced by a centralized municipal wastewater collection system but not served by either secondary or tertiary wastewater treatment facilities; wastewater is either untreated or receives primary treatment only.

Table 3—Recreational Water Quality-Recreational Water Body Closures, Reporting QOLRS Municipalities, 1991, 1996-2002

Year	Average	Sudbury	Waterloo	Windsor	Halton	Peel	York	Toronto	Niagara	Kingston	Halifax
1991	0.0	0	0	0	n/a	n/a	0	n/a	n/a	0	n/a
1996	10.3	0	0	0	34	2	1	21	n/a	0	36
1997	9.3	0	0	0	35	2	2	14	n/a	0	30
1998	10.9	0	0	0	28	4	3	22	18	0	34
1999	10.8	0	0	0	28	2	1	34	10	0	33
2000	14.4	0	0	0	30	2	6	45	17	0	44
2001	14.2	0	0	3	35	1	6	42	12	0	43
2002	13.5	0	2	2	37	n/a	5	26	8	0	43

Source: FCM Municipal Survey Database, 2003. Note: The Province of Ontario standardized the measurement of quality to the use of E. Coli counts only, after 1998. In addition, there is no consistent application of provincial standards. Halton and Toronto use the Ministry standard, while others use their own, lower, standards based on federal guidelines or other information.

BOX 9–WATER USE EFFICIENCY IN YORK REGION

Water for Tomorrow is York Region's water use efficiency program, which includes the following activities:

- Residential/commercial retrofit program;
- Industrial, commercial and institutional water audits of the region's larger users;
- Leakage reduction in all nine area municipalities;
- Broad-scale public education and school curriculum modules;
- Summer water use reduction program; and
- York Children's Water Festival.

The program is currently saving more than 22.4 million litres of water daily, equal to eight per cent of York Region's current water demand and enough water to service a town of 84,500 people.

- Considerable investment is needed to upgrade an aging water supply and wastewater management system. For example, about one in four (26 per cent) of Canadian municipalities reported water shortages at one time or another between 1994 and 1999, due to drought, infrastructure problems or increased consumption.
- Successful reduction in per-capita water consumption can avoid or delay the need to invest in more distant and expensive water supplies and can delay the need for wastewater treatment plants.
- Water conservation programs designed to reduce per-capita water demand include pipe leakage reduction, water conservation in public facilities, installation of water-efficient flush toilets, public education campaigns and metering with full-cost pricing.[28]

[27] User fees still cover only a portion of the cost of delivering water and wastewater services, while fee structures do not encourage conservation. If water rates do not reflect full cost of water supply, firms and individuals are less likely to invest in water-efficient technologies. Per-capita consumption in non-metered households in Canada was 50 per cent higher than metered households. However, only 57 per cent of Canada's municipal population was metered in 1999, an increase from 52 per cent in 1991.

Annex 1: Definitions of Density in Selected Communities

Municipality	Gross Density	Net Density	Comments
Edmonton	Total population or number of dwelling units *divided by* total land area.	Total population in residential areas *divided by* area of residential-assessed parcels within these residential areas, excluding non-residential-assessed parcels, roadways and laneways.	Density is not officially measured. Significant portions of the city are undeveloped agricultural lands, which reduce the gross density. Net density available for 1999 only.
Regina	Total population or number of dwelling units *divided by* total developed area.	Total population or number of dwelling units *divided by* total residential land.	
London	Number of dwelling units *divided by* area of residentially designated lands, including roads, schools, parks, churches, libraries and other uses permitted under the Official Plan residential land use policies.	Number of dwelling units *divided by* area of lands used for residential lots and blocks only.	Total dwellings derived from Census information may include dwellings located within land use designations other than "residential".
Peel	Total population or number of dwelling units *divided by* total land area	Total population *divided by* area of land within the parcel fabric boundaries, excluding right-of-ways and non-residential land uses.	Densities for lower tier municipalities are Brampton 77.97, Caledon 12.78, Mississauga 79.60.
Ottawa	Total population or number of dwelling units divided by urban land area.	Total population *divided by* area of residential land, excluding non-residential lands.	
CMQ	Total population *divided by* total area **OR** total population divided by total length of roads.	Total population *divided by* area of developed land, excluding quarries, agricultural lands, woodlands, water courses and lakes.	Net density measured since 2001 only.

The QOLRS is a voluntary initiative, made possible by the participation and funding support of the 20 member municipalities. FCM also gratefully acknowledges the financial support of Human Resources and Skills Development Canada in this project.

FCM's Quality of Life Reporting System

The Quality of Life Reporting System (QOLRS) is a collection of hundreds of variables measuring changes in social, economic and environmental factors using information derived from a variety of national and municipal data sources. These variables are structured into 10 indicators providing demographic background information and 62 indicators of changes in the quality of life in 20 Canadian communities between 1990 and 2002.

The 20 communities participating in the QOLRS account for 40 per cent of Canada's total population. These communities comprise some of Canada's largest urban centres and many of the suburban municipalities surrounding them, as well as small and medium-sized municipalities, in seven provinces (see Table 1).

By providing a method to monitor quality of life at the local level, the QOLRS ensures that municipal government is a strong partner in formulating public policy in Canada. Developed by FCM and municipal staff, each report is also intended to serve as a planning tool for municipalities. Each report considers quality of life issues from a municipal perspective and uses data segregated by actual municipal boundaries, not by Census Metropolitan Area (CMA), as is often the case in other studies.

The reporting system is equally important as a tool for community organizations, research institutes and other orders of government, allowing them to

- identify and promote awareness of issues affecting quality of life in Canadian municipalities;
- target policies and resources aimed at improving quality of life more effectively;
- support collaborative efforts to improve quality of life; and
- inform and influence decision-makers across Canada.

Previous reports were published in 1999 and 2001. The third, current round of reports features a *Highlights Report* that was released in April 2004[1], followed by three thematic reports that build on the findings of the *Highlights Report: Incomes, Shelter and Necessities* (2004), *Dynamic Societies and Social Change* (2005) and this report, *Growth, the Economy and the Urban Environment* (2005). QOLRS indicator tables and reports are available at http://www.fcm.ca.

Federation of Canadian Municipalities

The Federation of Canadian Municipalities (FCM) has been the national voice of municipal governments since 1901. The organization is dedicated to improving the quality of life in all communities by promoting strong, effective and accountable municipal government. FCM membership includes Canada's largest cities and regional municipalities, small towns, rural municipalities and the 19 provincial and territorial municipal associations.

FCM gratefully acknowledges the financial support of Environment Canada and Human Resources and Skills Development Canada in this project.

[1] Federation of Canadian Municipalities, *Quality of Life Reporting System, Highlights Report 2004* (Ottawa: 2004).