

## *Cities and Urban Issues*

Modern man is an urban dweller. While early cities were small and produced little longstanding impact on their immediate environments, modern cities are vast and in some cases create over a hundred kilometers of uninterrupted urban areas. Cities are dependent on surrounding lands for food and other resources. As urban areas have grown, the populations of the countryside are diminishing at rapid rates.

The 20<sup>th</sup> century saw a massive migration of people from the countryside to cities, particularly in the developed world. Before 2050, the developing world will also see cities surpass rural areas in terms of population.

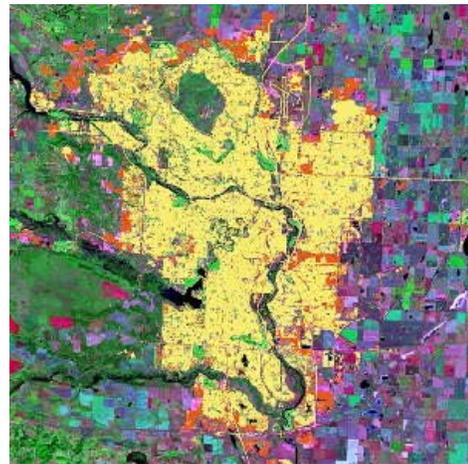
Urban sprawl encroaches on productive agricultural lands and pushes agriculture towards forested areas, leading to a general impoverishment of sustainable land cover use. This trend is still strong in the developing world, creating greater strain on fragile ecosystems, principally through:

- Conversion of forested land to agriculture;
- Destruction of fertile agricultural land;
- Destruction of wildlife habitat, particularly wetlands, in new urban areas;
- Development of shanty-towns with squalid living conditions in Third world.

In Canada, over 80% of the population lives in cities or urban areas, one of the highest percentages in the world. Most new immigrants settle in urban areas, making this number likely to grow. Canadian urban issues also include urban regulation and monitoring of land use.

A recent study in the United States shows that urban green space is diminishing at alarming rates. “American cities are losing their trees at a catastrophic rate. Satellite images comparing the tree cover of 448 urban areas show that urban areas have lost more than 20 percent of their trees in the last 10 years. The loss, announced at the National Urban Forest Conference, is more than just cosmetic. Trees shade and cool buildings, cleanse polluted runoff, and filter the air. American Forests, which commissioned the study, estimated the value of the ecosystem services once provided by those trees at \$234 billion.

The disappearance of urban forests is likely contributing to the rise of environmental and health problems such as asthma and flooding. Urban sprawl and highway construction are largely to blame. The study recommended that cities plant 1.7 billion trees over the next 10 years--which would replace a mere 10 percent of the canopy already lost.”<sup>1</sup>



Landsat satellite image of the metropolitan area of Calgary, Canada: urban land in 1990 is shown in yellow, while new urban growth from 1990-2000 is shown in orange, courtesy NASA

### ***“Hot” issues:***

- Urban sprawl;
- Loss of urban green cover;
- Security in urban contexts;
- Safe drinking water;
- Renewal of urban infrastructure.

<sup>1</sup> [http://www.enn.com/news/2003-09-30/s\\_8817.asp](http://www.enn.com/news/2003-09-30/s_8817.asp)

## Key Players

Provincial governments have the primary responsibility for municipalities in Canada. However, the federal government recently underlined that urban issues are central to Canada's future and that cities needed more help facing financial challenges. The 2004 budget included tax relief for cities in the form of GST reimbursements. Further tax relief, perhaps through a portion of gas taxes is expected in the near future. (<http://www.fin.gc.ca/budget04/brief/briefe.htm>)

The **Federation of Canadian Municipalities** is Canada's largest association of municipalities <http://www.fcm.ca/newfcm/Java/frame.htm>

**City of Toronto** <http://www.city.toronto.on.ca>

**City of Montreal** [http://www2.ville.montreal.qc.ca/portail\\_VM/accusomf.shtm](http://www2.ville.montreal.qc.ca/portail_VM/accusomf.shtm)

**City of Vancouver** <http://www.city.vancouver.bc.ca>

**City of Calgary** <http://www.calgary.ca>

An example of the growing coordination of municipal issues, even at the international level, is the **Association Internationale de Maires Francophones** <http://www.aimf.asso.fr>



*Skyline of Toronto, courtesy of York University*

## Space and Cities

There are two principle types of data used in relation to urban issues:

- high resolution (1m or less) optical data to obtain detailed information; and
- medium resolution (30m) multispectral optical data to make fine distinction among various land use classes.

“With multi-temporal analyses, remote sensing gives a unique perspective of how cities evolve. The key element for mapping rural to urban land use change is the ability to discriminate between rural uses (farming, pasture forests) and urban use (residential, commercial, recreational). Remote sensing methods can be employed to classify types of land use in a practical, economical and repetitive fashion, over large areas. [The change in land use from rural to urban is monitored to estimate populations, predict and plan direction of urban sprawl for developers, and monitor adjacent environmentally sensitive areas or hazards. In the developing world, temporary refugee settlements and tent cities can be monitored and population amounts and densities estimated.]”<sup>2</sup> In major Canadian cities, space data can be a useful support to urban planning, particularly when data is regularly acquired and processed, to track changes over time. In purely urban contexts, the most useful data is high resolution optical data such as that available from US commercial systems (Ikonos, Quickbird).

The City of Montreal has recently begun using RADARSAT data to monitor changes in urban land use. The project called SIGMA<sup>o</sup> is a geomatics system designed for updating urban land-use maps and is built on RADARSAT-1 imagery in fine resolution mode (10 m). It was developed by scientists from two leading universities in Canada and is being commercialized by Syntex Inc., a Canadian geomatics company, through financial assistance from the CSA and the Government of Quebec.<sup>3</sup>

Applications of space data for urban issues:

- Ecological Aspects / Landscape Metrics
- Urban Information and Decision Support Systems
- Change Detection Analysis
- Road Extraction Techniques / Traffic Applications
- Radar and Thermal Applications
- Special Applications
- Extraction of Height and Density
- Monitoring Urban Land Cover Dynamics and Urban Growth
- Vulnerability of Urban Areas to Natural Hazards
- New Information Extraction Strategies [*Jürgens 2003*].<sup>4</sup>

### Issues for the CSA:

- Solid partnerships required at provincial and local levels to develop and promote useful applications;
- Limited resources available;
- Sustainability of projects;
- Most relevant space-based data is from US commercial programs (what role for RADARSAT in this context?).

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<sup>2</sup> [http://www.ccrs.nrcan.gc.ca/ccrs/learn/tutorials/fundam/chapter5/chapter5\\_19\\_e.html](http://www.ccrs.nrcan.gc.ca/ccrs/learn/tutorials/fundam/chapter5/chapter5_19_e.html)

<sup>3</sup> [http://www.pggq.gouv.qc.ca/geoinfo/num\\_e/fev03\\_e/fev03\\_5\\_e.htm](http://www.pggq.gouv.qc.ca/geoinfo/num_e/fev03_e/fev03_5_e.htm)

<sup>4</sup> <http://www.cig-acsg.ca/files/CIG/a13.pdf>

**Related Themes:**

Natural & Technological Disasters  
Environmental Factors Affecting Health  
Sustainable Water Resources  
Weather  
Great Lakes-St-Lawrence  
Sustainable Forestry  
Sustainable Agriculture  
Security and Surveillance  
GMES

**References:*****Basic Information:***

Environmental Quality in Canadian Cities: the Federal Role, National Round Table on the Environment and the Economy, 2003

[http://www.nrtee-trnee.ca/eng/programs/Current\\_Programs/Urban\\_Sustainability/Urban-SOD-Report/Chapter1\\_e.htm](http://www.nrtee-trnee.ca/eng/programs/Current_Programs/Urban_Sustainability/Urban-SOD-Report/Chapter1_e.htm)

Effects of urbanization on biodiversity in Canada, in: Biodiversity in Canada: a science assessment for Environment Canada, Environment Canada 1994

<http://www.eman-rese.ca/eman/reports/publications/biodiv-sci-asses/biodiv11.htm>

***Latest update:***

International Centre for Sustainable Cities <http://www.icsc.ca/index.html>

***Closer look:***

Urban Affairs e-library, Centre for Urban & Community Studies, University of Toronto

<http://www.urbancentre.utoronto.ca/elibrary.html#>

*World Urbanization Prospects*, the 2003 Revision, United Nations, New York 2004

[http://www.urbancentre.utoronto.ca/pdfs/elibrary/UN\\_World\\_Urbanization\\_Trend.pdf](http://www.urbancentre.utoronto.ca/pdfs/elibrary/UN_World_Urbanization_Trend.pdf)

SATTERTHWAITE, David, *The ten and a half myths that may distort the urban policies of governments and international agencies*, 2002 <http://www.urbancentre.utoronto.ca/pdfs/elibrary/IIEDMyths.pdf>

*New Satellite Maps Provide Planners Improved Urban Sprawl Insight*, Science Daily, June 2001

<http://www.sciencedaily.com/releases/2001/06/010605072451.htm>

*NASA uses a "Sleuth" to predict urban land use*, NASA March 2004

<http://www.gsfc.nasa.gov/topstory/2004/0322sleuth.html>

K. Wayne Forsythe, *The 4<sup>th</sup> International Symposium – Remote Sensing of urban areas: outcomes and future directions*, Ryerson University, Toronto

<http://www.cig-acsg.ca/files/CIG/a13.pdf>