N·S·C·A·D UNIVERSITY

DALHOUSIE University

Environmental Planning
Studio 6

Plan 6600
Special Project Studio

Climate Change in the Halifax Regional Municipality

What does it mean to us and how can we respond?

Project Brief

Fall 2003

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Summary

The effects of climate change are becoming increasingly clear worldwide. In the Halifax Regional Municipality (HRM), we have already begun to experience the effects of intense storms. Sea level rise and storm surges are also of concern for the urban core of the municipality and its many small coastal communities. As planning students of the Nova Scotia College of Art and Design (NSCAD) and Dalhousie Universities, we were interested in answering the question: "How could HRM contribute to preventing and mitigating the effects of climate change through a regional plan?" Since HRM was gathering public input for a regional plan, due for adoption in 2005, this was an opportune time to understand climate change and contribute to the plan.

We collected current information on climate change and its effects on the region, government policy, best practices for prevention and mitigation, and case studies from other municipalities who had undertaken to deal with climate change. Through discussions at workshops, we developed a set of principles that could guide HRM. We discovered that prevention and mitigation responses were closely linked: communities and built form based on ecological principles were more adaptable, more resilient to climate change effects, and were most successful at preventing climate change.

A municipal plan for climate change should accord with provincial and federal initiatives. A regional pattern of self-reliant settlement clusters connected by transit corridors and embedded in open space would agree with the principles we had discovered through our work.

Introduction

The project was a collaborative effort by a team of senior NSCAD Environmental Planning students and Masters students enrolled in Dalhousie's Urban and Rural Planning Program. Our focus and immediate concern was with climate change, especially in light of HRM's coastal setting. We wanted to understand the implications of climate change for the municipality and how its effects would impact the urban fabric. This brief and the supporting documentation are our contribution to the HRM's call for public input to the regional plan. HRM is at the consultative stage of a regional planning process that began in 2001 and will be complete in 2005. Although we do make recommendations for policy and planning, it is not our intention to propose definitive answers but rather draw attention to issues relating to current policies and practices in HRM.

Climate Change

A majority of scientists now believe that the global climate is changing and that these changes are linked to human activity. Since the industrial revolution, we have been supplementing the naturally occurring greenhouse gases (GHGs) -- carbon dioxide, methane, nitrous dioxide and water vapour -- by burning fossil fuels, while removing vegetative sinks that reduce gas quantities. Other industrial processes are adding new greenhouse gases to the mix.[1] The effects of climate change vary globally, but in general, the average temperature is rising and wind and ocean currents are changing. Compared to other

[1] Harmony Foundation. *Climate Change: Community Action Workshop Manual*. Victoria: The Harmony Foundation, 2000, p12.

countries, the Canadian contribution to climate change is small; however, on a per capita basis, Canadians are the second largest contributors to greenhouse gas production after the US.[2]

Global Prevention and Adaptation

Representatives from more than 160 countries, including Canada, met in Kyoto, Japan in December 1997 to discuss agreement on reducing greenhouse gases. The result of the series of meetings in Japan was the Kyoto Protocol: a set of targets designed to reduce GHG emissions and push back the timeline for the anticipated doubling of atmospheric carbon dioxide.[3] The Protocol is a first step toward international agreement on preventing climate change. The Protocol would only become legally binding when it was "adopted by at least 55 countries, covering at least 55 percent of the emissions addressed by the Protocol".[4] Canada ratified the Protocol on December 17, 2002.[5] As of July 10, 2003, 111 countries had ratified or accessed the Kyoto Protocol, but total emissions reduction criteria had not been met.

It is important to understand that climate change has already begun, and despite measures to reduce greenhouse gas emissions, it will continue to occur.[6] Adaptation of human settlements to the effects of climate change, such as sea level rise, changes in water tables, and more intense storm events is becoming increasingly necessary.

The Canadian Role in Prevention and Mitigation

The Canadian Government released the National Action Program on Climate Change on November 21, 2002. The program was conceived through extensive consultation with provincial and territorial government representatives, industrial and environmental organizations, and the public. The Program is a strategy to help Canada meet its Kyoto Protocol commitments. Funding of 3.7 billion dollars was initially committed to climate change programs in the transportation, energy, industry and construction sectors of the economy and in the federal government's own operations. Prime Minister Jean Chretien announced on August 12, 2003 that the Government of Canada would commit an additional one billion dollars to cover initial implementation costs of the National Action Program.[7]

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[2] Michael Grubb et al. *The Kyoto Protocol: A Guide and Assessment*. London: The Royal Institute of International Affairs, 1999, p28.

[3] The National Secretariat on Climate Change Municipalities Table**.** *Municipal Risks Assessment: Investigation of the Potential Municipal Impacts and Adaptation Measures Envisioned As A Result Of Climate Change*. Retrieved October 20, 2003 from http://www.nccp.ca/NCCP/pdf/municipal_risks.pdf

[4] Government of Canada. *Canada and the Kyoto Protocol*. Retrieved September 27, 2003 from http://www.climatechange.gc.ca/english/whats_new/overview_e.html

[5] Government of Canada. *Taking Action on Climate Change*. Retrieved September 28, 2003 from http://www.climatechange.gc.ca/english/publications/announcement/news_release.html

[6] The National Secretariat on Climate Change Municipalities Table. *Municipal Risks Assessment: Investigation Of The Potential Municipal Impacts And Adaptation Measures Envisioned As A Result Of Climate Change*. Retrieved October 20, 2003 from http://www.nccp.ca/NCCP/pdf/municipal_risks.pdf

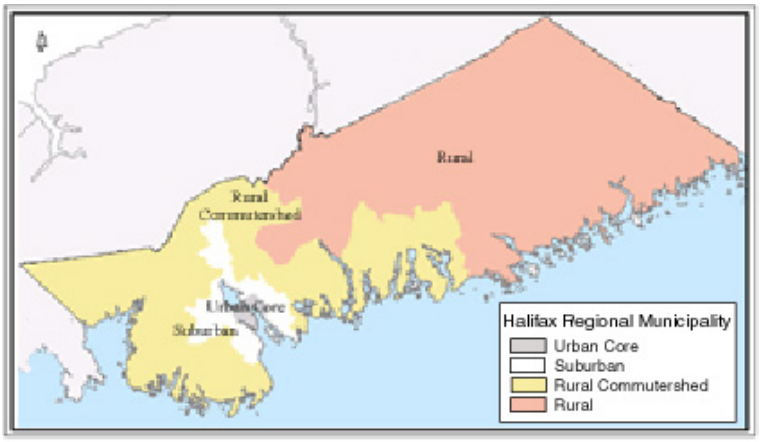
[7] Government of Canada. *Taking Action on Climate Change*. http://www.climatechange.gc.ca/english/publications/announcement/news_release.html

The Role of Municipalities

The effects of climate change will be felt intensely in urban areas because of the concentration of population, industry and infrastructure. Much of the responsibility for implementation of the federal government action plan lies with municipal and regional governments. Municipalities such as HRM are responsible for transportation and land use planning that shape future development, for efficient use of energy resources, and for helping individuals to make appropriate decisions about reducing greenhouse gas emissions and adapting to climate change. Many Canadian municipalities, including Halifax, are making efforts to reduce emissions and mitigate climate change effects. A summary of recent and current efforts in HRM regarding climate change is provided in the Appendix.

Local Considerations

Halifax Regional Municipality's long, rugged coastline, forested hills, lake areas, suburbs and urban core are home to approximately 40 percent of Nova Scotians. Two hundred communities fall within HRM's 5,577 square kilometre area.



http://www.region.halifax.ns.ca/regionalplanning/Region/Region.html

The region has seen significant economic, tourist and residential growth over the past 30 years. HRM is the fastest growing region in Nova Scotia: it experienced a population growth of 26 percent from 1971 to 2001, from 264,421 to more than 359,000 residents.[8] The suburban and rural commutershed areas have experienced the most significant population increase. The population is expected to increase by another 100,000 residents by the year 2026. [9]

The HRM Regional Planning Committee was formed in 2003 to identify and address key planning concerns for the future growth of the region.[10] In the first stages of the regional planning process, the committee identified five major themes: economy, settlement patterns, environment, transportation and Halifax Harbour. Though climate change is not among the main themes addressed in the HRM Regional Planning Process, we believe it could be considered within each of the themes. The vision statement guiding the regional planning process is:

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[8] Halifax Regional Municipality. *Regional Planning*. Retrieved October 10, 2003 from http://www.region.halifax.ns.ca/regionalplanning/Region/Region.html

[9] Ibid

[10] Halifax Regional Municipality. *Regional Planning*. Retrieved September 27, 2003 from http://www.region.halifax.ns.ca/regionalplanning/Region/Region.html

"HRM will adopt a broad regional plan which, throughout the next 25 years, will guide its physical development in a way that promotes healthy, vibrant, sustainable communities."[11]

In the Halifax Regional Municipality, potential climate change effects, or environmental phenomena include:

- rising sea levels,
- coastal flooding and erosion,
- more frequent and more intense storms with storm surges,
- increased precipitation in the winter,
- drier summers and falling water tables, and
- saltwater intrusion in groundwater.[12]

Damage to houses, buildings, roads, bridges and other types of infrastructure in coastal and low-lying areas is likely. Impacts on natural resources include increased forest fires, forest dieback from pests and disease and changes to fish habitat.

The potential for damage to buildings and infrastructure in severe storms became clear to residents of Halifax after Hurricane Juan in September 2003. Source: http://mikoga.image.pbase.com/u14/chris_green/small/21879189.treesandpowerlines2.jpg

We believe that it is necessary to include climate change prevention and mitigation strategies in the regional plan. Policy and physical planning initiatives at the municipal level can take important steps toward preventing and adapting to climate change, recognizing protection of community health as a priority.

The Studio Project

The purpose of the studio project was to provide the HRM Regional Planning Committee with a brief containing suggestions and recommendations for the future development of Halifax Regional Municipality in the face of climate change. Concept maps, illustrations, and stories support the planning team's suggestions. Appendices contain collected background material on climate change, related prevention and mitigation techniques, and case studies of application of these techniques.

A team of eleven students from the planning programs at the Nova Scotia College and Design and Dalhousie Universities carried out the project during the fall of 2003. As suited to the scope of the studio, the project work was a qualitative examination of climate change prevention and mitigation at the

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[11] Halifax Regional Municipality. *Directing the Action: Getting to Goals and Objectives Regional Planning Workbook*. September 2003.

[12] Norm Catto. "Climate change and Atlantic Canadian Communities". 2003. Available: http://www.dal.ca/~cciarn//workshops/3/presentations/Catto.pdf

municipal level. Although we focused on the current core area and suburbs in our research, suggestions and policies would apply to the entire HRM.

To prepare background reports, studio team members collected information from journals, books, and current websites to document:

- current knowledge of climate change, in particular the predicted impacts of climate change in the Maritime region;
- international and national policy on climate change and how it influences municipal government policy and planning;
- best practices for reducing emissions and mitigating the effects of climate change at the local level; and
- case studies of local government response to climate change in other areas of the country and the world.

Once background material was gathered, the students organized and conducted a public workshop with community members. We shared a summary of the information we had found concerning climate change, then posed the question: “What should HRM look like in 2028”? Participants divided into small groups to consider the question and then provided suggestions in written and graphic form. The suggestions are presented thematically in the Appendix: “Public Workshop: Results and Background”.



Workshop images. Photos: Krista Koval

Following the workshop we agreed on general principles for the regional plan informed by:

- suggestions by participants at the public workshop,
- best practices for preventing and mitigating climate change,
- potential climate change effects in HRM, and
- the experiences of other municipalities implementing climate change considerations.

Results

The following sections answer three questions: If climate change considerations were included in a regional plan,

- What are the general principles that should guide development in HRM over the next 25 years?
- What might a resident's life be like in 2028?
- What might HRM look like in 2028?

Based on our work, we recommend that regional planning policies be informed by a framework of principles for sustainable settlement pattern, transportation, and infrastructure. In order to give the reader a sense of how these principles would play out in everyday life, we also present a scenario illustrating a day in the life of an HRM resident in the year 2028. Finally, concept maps of the suburban and core areas would indicate land use patterns, including the open space network, regional settlement pattern and transportation routes.

HRM must plan for climate change, but addressing the essential objectives of reducing greenhouse gas production and adapting to the predicted effects of climate change may involve some compromise for the residents of HRM. While approaches such as concentrating growth and building efficient transit must be considered in efforts to meet current and future greenhouse gas reduction targets, they must also be weighed against the desire for residents to have a range of housing options, transportation options, and ready access to surrounding open spaces. Including consideration of sustainability and greenhouse gas reduction in a regional plan requires the municipality and its residents to apply an integrated approach that requires a deep commitment to community health and the environment.

Our background work shows that sustainable communities are more resilient and adaptable to the effects of climate change. In the end, the challenges that climate change presents may prompt us to create healthier communities.

What are the general principles that should guide development in HRM over the next 25 years?

- Generally, municipal decision making should be consistent with a **regional climate change plan** that accords with provincial and national plans.
- HRM should support and encourage residents' efforts to prevent and mitigate climate change.
- Considerations underlying development type and location should be based on a '**green space master plan'** to protect carbon sink capacity, and to conserve and restore environmental services and natural habitat. The green space plan would include open space, parkland, wetlands, and agricultural land. Environmental services are those natural structures and processes which provide us with carbon sinks, green infrastructure, buffering from storm events, clean water, active transportation pathways (walking and biking) and recreational uses.
- Response to sea level rise in coastal areas should be based on scientific research and high resolution mapping of the coastline to **identify vulnerable areas.** Subsequent **response to climate change** should acknowledge the role of natural coastal structures, such as barrier beaches and salt marshes, in buffering land areas from sea level rise impacts.
- An integrated transportation network based on **high-speed regional transit** should connect community clusters in the region to each other and to the current core area; HRM policies should encourage transit use and discourage single occupancy vehicle use.
- **Decentralized settlement clusters** should be focused on nodes in the regional transit network; development around nodes should be arranged to provide reasonable walking distances to transit nodes.
- Settlement clusters are **compact, mixed-use development** grown from existing communities; clusters emphasize reliance on local resources. Emergency services, essential services, amenities and employment should be decentralized to the community clusters.
- Expansion of settlement areas should be restricted by **encircling open space;** where growth exceeds the designated boundaries, new centres should be developed.

- **Infrastructure servicing** for development should be based on ecological cycles. Services should be decentralized. Services should be at a neighbourhood scale: community green energy generation, natural waste processing and district heating and cooling, for example.
- **Compactness** should be achieved through development that fills 'in' and builds 'up'. The order of priority for intensifying development should be to:
    1. **Rehabilitate** existing built form
    2. **Infill** existing serviced areas
    3. **Subdivide** lots within existing development
- Development should favour **adaptive reuse** of structures.
- Density increases should be balanced by thoughtful consideration of valued **cultural heritage**, **sense of place, and environmental services**.
- **Site planning, architectural design and building standards** should be based on energy and resource efficiency. Development should ensure solar access for all residents through appropriate building siting and height restrictions.

What might a resident's life be like in 2028, if climate change considerations were included in a regional plan?

A Day in the Life…

It was an early Monday morning in September and John had just returned from a working vacation in China. Still suffering from jetlag, he finished his breakfast and noticed that the clock showed 8:00. "Oh, no - it's time to go - I'd better have a shower."

He lived in a small apartment building, a five minute walk to the local rail terminal. His community of Newcastle had grown around an existing bus station almost twenty years ago. What he liked most about the place were the parks that connected the transit terminal to the many businesses and shops throughout the town. The used bookstore down Morningside Drive was his favourite haunt: when he had time, he spent hours there.

When he arrived at the terminal, a train had just left, so he had to wait 10 minutes for the next one to depart. The rail terminal was an integrated transportation centre used to bring people from outside the peninsula into the downtown area. It was also the place where people could transfer between rail and bus service. This made the terminal extremely busy. Even at night there were still many buses and trains operating. He entered the train and sat down, connected his Palm Pilot to the outlet on the train and began downloading the Herald. The top news got his attention immediately: "The public hovercraft between Bedford and the North End began operating yesterday." "This is great," he thought, "I'll have to go and try it." The train was quiet, except for a child talking to his mother loudly. They were discussing yesterday's floor hockey game so excitedly that he began thinking about his own childhood. The train started and he looked out the window. For as long as he could recall, he had loved to see the trees disappearing from the window one by one, forming a vivid green blur in front of his eyes as the train sped along. In the distance he noticed the white blades of the community's wind generators turning slowly in unison.

The train reached South End Station right on schedule at 8:45. He walked out of the terminal and headed towards his downtown office, passing through a walking district, a car-free zone inaugurated in 2007 by

HRM as a response to climate change caused by traffic emissions. Even though cars no longer produced harmful emissions, it had become so much a part of the city that it was retained - it had become a symbol of Downtown Halifax.

Photo: Krista Koval

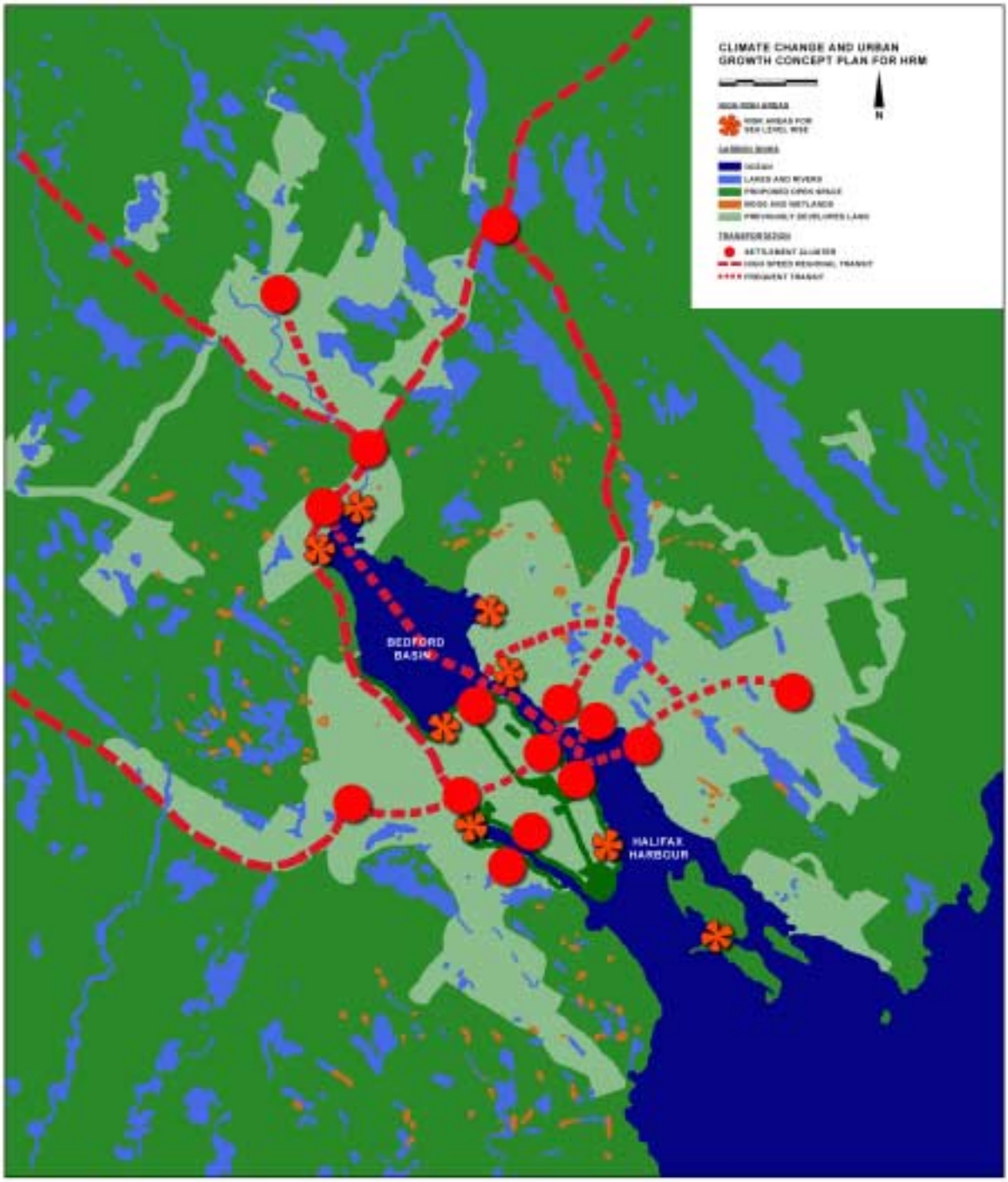
“I would like to get some plants and flowers on the top of my building too,” he thought as he walked the treed boulevard and looked up at the rooftop gardens.

After taking his coat off at the office, his boss called him in for a meeting. "John," his boss said, "We have a new project that I would like you to work on. We need to prepare a site plan for an adaptive reuse development in downtown Dartmouth." Ms. Grace, the company’s CEO, told him that the job was a joint project with a Toronto firm, so he would have to spend the afternoon teleconferencing.

John left the office in the early afternoon to prepare for the teleconference, which he could organize from the comfort of his own home. On his way home he walked along the waterfront. He had heard about the effects of Hurricane Patricia but as yet hadn't seen the damage first hand. He heard that the harbour had experienced a strong storm surge. He saw many people on ships busy repairing the minor damage. He recalled Hurricane Juan, twenty-five years prior. “That was terrible,” he thought. Now many of the new buildings and structures were set back from the water. A green corridor along both sides of the harbour and the Bedford Basin was lined with beaches and cycling and walking trails.

On the ride home, John decided to stop by the Newcastle hospital to visit a friend who was ill. He turned around and disappeared into the crowd.

What might HRM look like in 2028?



Annotated Bibliography: selected references

Web Sites

www.city.toronto.on.ca (City of Toronto)
The web site for the City of Toronto is a useful tool for residents, businesses, visitors and anyone who is interested in the city's planning initiatives and programs. The "Accessing City Hall" and "Living in Toronto" links are most useful for those in planning or related fields. Environmental action programs such as the Toronto Atmospheric Fund, the Smog Summit, and Toronto Pedestrian Charter are also accessed through this link.

www.city.vancouver.bc.ca (City of Vancouver)
This web site provides an overview of planning and policy initiatives that the City of Vancouver is proposing and/or implementing. Figures relating to Climate Change, mitigation, and prevention practices for pollutants and projects incorporating greenhouse gas reduction techniques are found here.

www.davidsuzuki.org (David Suzuki Foundation)
This web site provides information on Kyoto and what it means to Canadians. It offers information on impacts and possible solutions. It outlines seven main factors in the fight to reduce greenhouse gas emissions: transportation, electricity, industry, buildings, landfills, green leaders, and opportunities for change. The web site also gives a brief overview of the history of fuel use and marks the industrial revolution as the point at which human-derived greenhouse gases began to overload the natural carbon cycle.

www.gov.edmonton.ab.ca/planning_dev/planning_policy_services_branch/smartchoices (Smart Choices for Developing our Community)
This web site explains how transit-oriented development could be used to address land-use and transportation pressures in Edmonton. The comprehensive research and analysis of how transit oriented development could work to relieve some of the growth pressures expected in Edmonton provides a useful example for the HRM.

www.london.gov.uk (City of London, England)
The City of London web site provides links to the Mayor's Publications, London Issues, London Assembly, and Media Centre. London Issues is most useful for residents and planners, providing information related to crime, policing and emergencies, culture, economic policy, education, environment, equality and diversity, health, housing and homelessness, international planning and development, sustainability, and transportation.

www.nccp.ca (Canada's National Climate Change Process)
This website outlines the role municipalities can/will play in the move to reduce greenhouse gas emissions. It explains the level of control or influence municipalities have within the different sectors, including transportation, building codes, greenways, waste, recycling, infrastructure, and energy use. It also suggests ways the municipality can intervene at the local level to encourage more ecologically sustainable practices.

www.tc.gc.ca (Transport Canada)
A huge challenge for the transportation sector is learning to balance increasing mobility needs with the negative effects these increased demands place on the environment. This report examines the trends and pressures facing the transportation sector and explores them in more detail in relation to the issues of climate change, including actions proposed by all levels of government to address greenhouse gas emissions.

www.usgbc.org (United States Green Building Council)

The United States Green Building Council web site is a comprehensive source of material on green building design, innovation and principles. The site has a comprehensive 'Links' page that identifies dozens of related associations, practices and technologies.

Books and Articles

Amorosi, Thomas ; Buckland, P; Dugmore, A.; Ingimundarson, J.; McGovern, T. “Raiding the Landscape: Human Impact in the Scandinavian North Atlantic.”, *Human Ecology*. New York, 1997.

This article addresses the ecological perspectives of past land uses in medieval North Atlantic Viking settlements in Iceland, Greenland and adjacent islands. The research demonstrated how, as early as AD 1500, land use patterns of these settlements either destroyed or crippled their natural environment as well as their local marine and terrestrial resource economies.

Barton, Hugh, ed. Sustainable Communities: The Potential for Eco-neighbourhoods, London: Earthscan, 2000.

The book is a collection of essays by scientists, planners and designers examining the nature of current settlements and discussing strategies for the development of communities based on ecosystems. The book presents case studies and evaluates eco-neighbourhoods around the world. It examines the practical meaning for communities of incorporating an ecosystems perspective. Departing from a packaged approach to sustainability that sets out rules to follow, writers suggest principles and tools for decision making to create sustainability within communities.

Canadian Climate Impacts and Adaptation Research Network Atlantic Region (C-CIARN). *Climate Change Adaptation in Atlantic Canada: Proceedings of C-CAIRN Atlantic’s Third Workshop*. Charlottetown, PEI. June 2003.

This document is a summary of the research that was presented at a Climate Change Adaptation conference in Charlottetown, Prince Edward Island during the summer of 2003. The conference was hosted by the Canadian Climate Impacts and Adaptation Network (C-CIARN). These proceedings give an overview of ideas and material discussed during the symposium by the many researchers currently studying recent considerations of climate change. These proceedings include numerous strategies that municipalities could consider when developing regional plans that aim to protect communities and their infrastructure.

City of Vancouver Planning Department. *Southeast False Creek Policy Stat*ement. October 1999.

This document, which is also available on the City of Vancouver web site, highlights the processes, ideas and implementation strategies identified for the Southeast False Creek community. This community is designed to be a ‘model sustainable community’ for the City and will set a precedent for future development and growth.

Environment Canada. *Canada Country Study Volume VI: Responding to Global Climate Change in the Atlantic Region*. Atmospheric Science Division, Atlantic Region. 1997.

Environmental experts from many backgrounds collaborated to bring together all relevant information on climate change and adaptation while highlighting priority areas throughout the six sub-regions of Canada. This document is especially useful because it highlights regional climate sensitivities and current knowledge gaps that municipalities need to consider when developing regional plans.

Fletcher Marsden, Catherine. *Practices for Sustainable Communities*, CMHC, 2000.

Practices for Sustainable Communities is a comprehensive, yet readable compilation of sustainability practices for Canadian communities. It contains useful, succinct background information on sustainability principles and policy development. Detailed information is provided on sustainability practices: for community built form, for incorporating natural systems in community design, and for infrastructure selection and design. Practice summaries and case studies help the reader to understand how principles are applied in an integrated manner.

Pacey, Elizabeth. *Historic Halifax*. Willowdale, Ontario: Hounslow Press, 1988.

Historic Halifax is a collection of photos with annotations describing the city's registered heritage properties. The architectural merit of the registered properties is explained and historical personages or events associated with the buildings are identified. The organization of the material corresponds generally to the geography of the city.

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