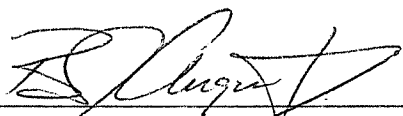




PO Box 1749  
Halifax, Nova Scotia  
B3J 3A5 Canada

Halifax Regional Council  
May 30, 2006

TO: Mayor Kelly and Members of Halifax Regional Council

SUBMITTED BY:   
Brad Anguish, P.Eng., PMP, MBA, Director  
Environmental Management Services

DATE: April 18, 2006

SUBJECT: Climate SMART - Adaptation Update

**INFORMATION REPORT**

**ORIGIN**

March 15, 2005, Regional Council

**BACKGROUND**

On March 15, 2005, staff introduced the Climate Change and Greenhouse Gas Reduction Strategies to Regional Council. Since then, staff has been back to Council on several occasions regarding the climate change mitigation (greenhouse gas emission reduction) components of Climate SMART as these were some of the more immediate priorities.

Staff now wish to update Regional Council on the climate change adaptation components.

## **DISCUSSION**

### **What is Climate SMART?**

Climate SMART (Sustainable Mitigation Adaptation Risk Toolkit), a leading edge collaborative partnership involving the public and private sectors was launched on March 30, 2004. It takes a comprehensive integrated approach to climate change mitigation and adaptation.

Key components of Climate SMART include:

- Corporate and Community Wide GHG Emission Plans
- Climate Change Risk Management Plan
- Climate Change Vulnerability Assessments
- Cost Benefit Analysis
- Communications and Outreach
- Collaborative Private and Public Sector Partnering

This report and attached Executive Summary and Power Point Presentation (May 9<sup>th</sup> COW) focuses on the Climate Change Adaptation issues.

The attached Executive Summary for Climate Change Adaptation Issues - Halifax Regional Municipality outlines HRM's vulnerability to global climate change, and HRM's priority adaptation options.

### **Why are we doing the Climate SMART project?**

Cleaner air through the climate change mitigation (ghg emission reduction) components and a safer, more resilient community through the climate change adaptation components.

## **BUDGET IMPLICATIONS**

Funding for the Vulnerability and Risk Management Plans are components of Climate SMART. Climate SMART has been funded overall through an innovative and collaborative approach.

A \$35,000 in-kind contribution from HRM has leveraged over \$500,000 in cash and in-kind contributions from the Federation of Canadian Municipalities (FCM) Green Municipal Enabling Fund; Natural Resources Canada; Nova Scotia Department of Energy; Environment Canada; and the Nova Scotia Department of Environment and Labour to complete Climate SMART.

### **Regional Plan**

Climate SMART directly supports the Regional Plan and the Functional Plan deliverables.

## **FINANCIAL MANAGEMENT POLICIES / BUSINESS PLAN**

This report complies with the Municipality's Multi-Year Financial Strategy, the approved Operating, Capital and Reserve budgets, policies and procedures regarding withdrawals from the utilization of Capital and Operating reserves, as well as any relevant legislation.

**ALTERNATIVES**

N/A

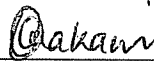
**ATTACHMENTS**

- Executive Summary - Climate Change Adaptation Issues Halifax Regional Municipality
- Power Point Presentation - Climate Change Adaptation Issues Halifax Regional Municipality

A copy of this report can be obtained online at <http://www.halifax.ca/council/agendasc/cagenda.html> then choose the appropriate meeting date, or by contacting the Office of the Municipal Clerk at 490-4210, or Fax 490-4208.

Report Prepared by : Stephen King, Manager, Sustainable Environment Management Office, 490-6188

Financial Review :



Ferdinand Makani, MBA, CMA, 490-6902

## Climate Change Adaptation Issues - Halifax Regional Municipality

### Executive Summary

#### **Background**

The *Kyoto Protocol* established under the *United Nations Framework Convention on Climate Change* (UNFCCC) has set targets for reductions in greenhouse gas emission by developed countries. Regardless whether these targets are met, the level of emissions will still be such that climate impacts are expected in the foreseeable future. Anticipated changes in precipitation and temperature patterns, climate variability, sea level rise and extreme events (e.g. hurricanes, flooding, drought event) resulting from global climate change are likely to have significantly damaging effects. Consequently there exists a need to understand how our climate is changing; the potential impacts on HRM; and potential adaptation (i.e. risk reduction) measures that can be taken to maximize public health and safety and minimize economic, social and environmental losses. To date most research and study with respect to climate change has focused on understanding the types of changes that can be expected, and mitigation measures to reduce greenhouse gas emissions. However very little work has been undertaken to understand how regions or municipalities such as HRM might **adapt** to climate change. These adaptation measures can take many forms including planning tools, design tools, legal tools, infrastructure changes, and changes in behavioral patterns, etc. Accordingly, this “vulnerability assessment” has been undertaken through the ClimateSMART program as a *important first step in identifying vulnerabilities of HRM to anticipated impacts from global climate change, and thereby establishing a sound basis for the identification and implementation of appropriate adaptation (risk management) measures*. The intent of this vulnerability assessment is to identify HRM’s vulnerabilities to climate change, and identify priority options for adapting to climate change impacts through discussion with HRM stakeholders.

#### **HRM’S Vulnerability to Global Climate Change**

Halifax Regional Municipality (HRM) is vulnerable to climate change due to its coastal location and the significant role played in the economy played by HRM in transportation; health services; forestry; and fishing. The majority of HRM’s infrastructure and population is based on the coastline and the municipality has numerous areas of susceptibility to coastal erosion and inundation.

Based on Environment Canada modeling climate change impacts on HRM are predicted to include:

- an increase in mean temperature from 2° to 5°C; more days above 30°C; longer heat waves;
- a decrease in days with temperatures below –10°C;
- longer frost free season;
- increase in precipitation by up to 12% and an increase in rainfall intensity;
- a rise in sea-level of between 50 and 88 cm; and
- increase in peak wind speeds associated with tropical cyclones.

This vulnerability assessment has determined that a number of key HRM sectors or socio-economic aspects have the potential to be *significantly impacted* by the above climate changes including:

- coastal zones;
- communities, including aboriginal communities;
- infrastructure;
- water resources;
- human health;
- fisheries;
- forestry and agriculture; and
- environment/ecosystems.

The assessment identified a total of 35 broad impacts across the sectors/aspects.

In order to provide initial prioritization for discussion with HRM business unit managers and representatives, the project team undertook a qualitative risk assessment following Canadian Standards Association (CSA) standards, namely: *CAN/CSA- Q634-M91 – Risk Analysis Requirements and Guidelines*, and *CAN/CSA -Q850-97 – Risk Management: Guidelines for Decision-Makers*. Risk was expressed general interpretation of risk based on non-numerical expression of probability and consequence for both socio-economic considerations and environmental considerations. These risks were then integrated to provide an overall risk for the identified impact. The results of the risk assessment indicated the following **high risks** (i.e. highly probable significant impact):

- **Coastal Zones:** significant impacts on human settlement, coastal infrastructure, and wetlands/ecosystems from sea level rise/storm surge.
- **Communities/Infrastructure/Transportation:** significant impacts on transportation infrastructure and patterns from extreme events, particularly impacts on insurance and property values and impacts on port and harbour operations.
- **Water Resources :** significant impacts on water supply and water supply infrastructure such as dams from changes in precipitation patterns and rise in temperature.
- **Human Health :** significant potential increase in vector and water borne disease from seasonal changes in weather patterns.
- **Fisheries :** potential for change in migration patterns and commercial fishing resulting in significant socio-economic impacts.
- **Agriculture/Forestry :** possible improvement in conditions but also significant risk of increase in disease and pests.
- **Environment :** significant impacts on terrestrial and aquatic biodiversity and associated ecosystems.
- **Aboriginal Communities:** potential of significant impacts on use of natural resources.

### **HRM's Priority Adaptation Options**

The findings of the vulnerability assessment were presented to HRM business unit managers for comment and advice on prioritization. From the input received the following priorities were identified:

1. The need to provide innovative and responsive funding for climate change adaptation projects.
2. Implementation of community outreach and education on climate change to encourage broad-based participation and prepare stakeholders for possible risk management measures.
3. Assemble and disseminate up to date climate hazard mapping and asset inventory for each business unit.
4. Incorporate climate change as a risk into the integrated risk management program being implemented by HRM.
5. Develop a life cycle assessment management system that includes climate change for built assets and groundwater in particular.
6. Work toward inter-governmental collaboration, communication and coordination which integrates HRM's activities with federal and provincial climate change activities and clarifies lines of responsibility.

The assessment highlights the need for additional data from other jurisdictions including the federal and provincial governments as well as universities and non-governmental organizations to facilitate decision making. These data needs include:

- Downscaling of climate change modeling;
- Detailed digital elevation model of the vulnerable areas of HRM to ensure full integration into HRM's regional plan;

- Assessment of the costs of climate change on the economy of HRM and the benefits of implementing priority adaptation options;
- Development of a monitoring program and indicators to track changes in water quantity and quality;
- Design regional planning criteria based on forecasting including climate change;
- Improve understanding of coastal changes in response to climate change; and
- The development of cost estimates to assess impact on HRM budget of various adaptation options.



# Presentation to Regional Council Adapting to Climate Change in HRM



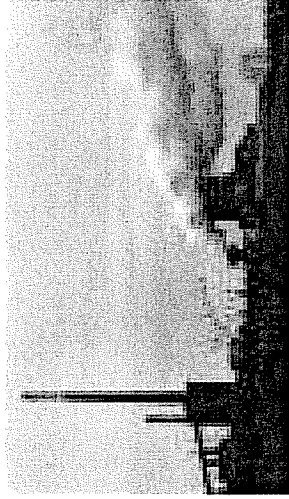
May 30, 2006



# Climate SMART

## Mitigation

- GHG Emissions Plans
- Corporate and Community
- Cost Benefits
- Communications



## Adaptation

- Risk Management Plan
- Vulnerability Assessments
- Cost Benefits







## How Vulnerable is HRM?

- Sea level is expected to rise.
- Potential for an increase in extreme events.
- Old and aging infrastructure.
- Coastal based economy.





# Vulnerability Assessment

Seeks to achieve three primary outcomes:

- Identify the degree of future risks induced by climate change.
- Identify the key vulnerable sectors and areas.
- Provide a basis for designing adaptation strategies and their implementation.



# Sectors Impacted

- Coastal Zones
  - ✦ Erosion
  - ✦ Flooding
- Communities/Infrastructure/Transportation
  - ✦ Damage from extreme events
  - ✦ Port and harbour operations





## Sectors Impacted (cont'd)

- Water Resources
  - Water supply
  - Salt water intrusion
- Human Health & Safety
  - Vector and food borne disease
  - Capacity of health system
  - Physical safety





## Sectors Impacted (cont'd)

- Fisheries and Marine Resources
  - Water quality and temperature
  - Changes in fish distribution
- Forestry and Agriculture
  - Increase in production
  - Change in pests and disease



## Sectors Impacted (cont'd)

- Environment
  - Habitat loss
  - Changes in biodiversity
- Aboriginal Communities
  - Water quality/quantity
  - Changes in traditional uses






# High Risk Impacts

- Coastal zones/storm surge.
- Damage to infrastructure due to extreme events.
- Port and harbour operations.
- Water quantity impacts.
- Vector and water borne diseases.





# Example Adaptation Responses

- Develop vulnerability mapping.
- Protect or relocate critical infrastructure.
- Incorporate climate change risk management in business and land use planning.
- Revise design criteria.







# Example Adaptation Responses

- Expand water conservation and watershed protection.
- Improve adaptive capacity of emergency management and health system.
- Develop monitoring programs.






# Priorities

- Innovative and responsive funding.
- Community outreach; HRM in-reach.
- Hazard and risk mapping.
- Integrate climate change as a risk in business plans.
- Life cycle assessment approach.
- Better intergovernmental collaboration, communication and coordination.





## Tasks to be Completed

- Climate modeling for HRM.
- Vulnerability/Hazard atlas.
- Impacts on design criteria, e.g. hydrological modeling.
- Tools and guidance related to climate change, e.g. risk management; communications

