



A Climate Change Strategy for the Credit Watershed

John Kinhead
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Outline

- Context
- CC impacts and implications
- Updating the future
- Challenges
- A suggested strategy



Context

- Successfully responding to the challenges of climate change will require the unprecedented resolve of public and private sectors
- Dealing with CC should be viewed as complementary to managing growth and building a sustainable future
- CVC has an important role to play



Climate Change Impacts Great Lakes Region

Water Supply and Pollution

- Decline in water levels of the Great Lakes and inland lakes
- Pressure for increased water withdrawals; more user competition
- Reduction in groundwater recharge
- Increased urbanization could threaten the flood absorption and pollution reduction capacity of wetlands and floodplains
- Increased surface soils and bank erosion; water quality impairment

Life, Property and Infrastructure

- More extreme and frequent storms together w/ a decrease in pervious area will increase risks to human life, property and infrastructure
- Water-related infrastructure will require upgrading
- Decreased navigation depths; longer season; increased dredging
- Reduction of hydropower potential; need to pursue alternatives



Climate Change Impacts

Rivers, Streams, Lakes and Fish

- Cold water species replaced by cool water and warm water species
- Increased invasions of non-native species
- Longer periods of thermal stratification and DO depletion in lakes
- Increased winter-kill in shallower lakes
- Increased bioaccumulation of contaminants in the aquatic food chain

Wetlands

- Increased evaporation could shrink inland wetland habitats
- Seasonal and event-related changes in hydrology will impact breeding of birds and amphibians
- Reduction in flood absorption and pollution attenuation capacity

Forests, Woodlots and Wildlife

- Forest species will move northward
- Increased risk of insect infestations
- Increase in resident bird populations could reduce food supply for migratory songbirds
- Growth of some resident mammal populations



Climate Change Impacts

Agriculture

- Longer growing season and increased heat units might benefit soybean, corn and wheat; benefits potentially offset by higher ground-level ozone
- More frequent & severe rainstorms could adversely impact planting and harvesting
- Increased climate variability a problem for tender fruit and vineyards
- Warmer summers could reduce appetite and weight gain in livestock
- Increased risk of insect infestations

Human Health

- Decrease in cold-related morbidity offset by increase in heat-related morbidity
- Increased incidence / severity of respiratory problems
- Potential increase in waterborne and insect borne diseases - crypto, giardia, Lymes and West Nile



THE CASCADING EFFECTS OF CLIMATE CHANGE ON GREAT LAKES WATER RESOURCES

CLIMATE CHANGES IN THE GREAT LAKES REGION DURING THE TWENTY-FIRST CENTURY

Warmer: Average temperatures rise 5-20°F (3-11°C) in summer, 5-12°F (3-7°C) in winter.

Seasonal shifts, overall drier: Little change in annual average, but higher temperatures = more evaporation = drier, especially in summer and fall.

More extremes: More extreme downpours, dramatic increases in extreme-heat days, more droughts.

Growing season: Lengthening by several weeks, but varying across region.

Lake levels drop: More evaporation and declining ice cover likely to lower lake levels.

MORE WATER AT THE WRONG TIME

More run-off in winter and spring from rain-on-snow events and in summer from intense downpours causes more flooding and erosion.

Extreme run-off could increase heavy metal pollution, sedimentation, high nutrient levels, and toxic organisms.

Increased spring flooding delays planting; intense summer downpours and more run-off leads to soil erosion and fertility losses.

Heavy storms could increase shore and bank erosion; lower lake levels and less ice cover could decrease bluff failures and ice damage.

More moisture and warmer winter temperatures boost agricultural, forest, and other pests' survival and reproduction.

Flooding and shoreline erosion damage private property and public infrastructure, affecting the construction, real estate, and insurance industries.

Beach closures due to public health hazards from toxic algal blooms and other organisms would affect the important recreation and tourism industries.

Soil fertility losses, combined with an increase in pests, create higher costs and losses for the agriculture and forestry industries.

Additional resources would be required to maintain, repair, and upgrade flood response infrastructure, manage run-off, and recover from flood damages.

Increased risk of vector-borne (e.g., ticks, mosquitoes) and water-borne (e.g., *Cryptosporidium*) diseases would require greater education, surveillance, prevention, and response from the public health system.

LESS WATER WHEN IT'S NEEDED

Higher summer temperatures increase evaporation, making drought conditions more frequent and likely more severe.

Decreased summer stream flow and warmer stream and lake waters affect fish and other aquatic organisms.

Lake levels likely to drop as evaporation increases and ice cover shortens.

Intense summer downpours may not alleviate dry conditions but can increase pollution in lakes; algal growth leading to oxygen depletion may increase.

Decreased soil moisture in summer due to more evaporation and less rainfall penetration affects plant growth and soil processes.

Less rain infiltration, decreased summer stream flow, and lower lake levels reduce groundwater recharge.

Crops currently not irrigated may need it; those already irrigated may need more. Long-lived perennials such as fruit trees are especially vulnerable to greater variability in moisture and temperature.

Greater demand for water and summer shortages increase water extraction, lower the water table, and drive up costs; more conflicts over water allocation likely.

Warmer water, pollution, "dead zones," and changes in aquatic food webs, species, and productivity would affect recreational and commercial fisheries.

Threat of wildfires may increase and forest composition may change, affecting bird and animal species, recreation, and the timber industry.

Lower lake levels would affect recreational boating, hydropower generation, and shipping; require more dredging; and force changes to shore facilities and water infrastructure.

IMPLICATIONS

POSSIBLE SOCIETAL IMPACTS

The future isn't what it used to be!

- CC is happening faster than we thought
- Impacts and implications may/will be more significant
- The past is not a good predictor of the future



What if?

- As CC impacts are felt in more vulnerable areas of the world, the GTA (Great Lakes Region) is likely to become a desired destination for environmental and economic refugees. Current pop'n projections don't factor this in.
- How will this compromise existing legislated protections against sprawl, loss of agric. lands, overexploitation of resources, and degradation of natural heritage systems?
 - Places to Grow
 - Greenbelt
 - Oak Ridges
 - Niagara Escarpment
 - Boundary Waters Treaty / GL Charter



The Future

- It is no longer appropriate to assume that past climatic and hydrologic conditions will continue into the future. Adaptation based on historical experience, rather than projected future conditions of variability and change, is likely to increase the extent of vulnerability and risk.

(IPCC, June 2008)



The Challenges

- Lack of a collective sense of urgency
- Inadequate coordination
- Underweighting of adaptation imperatives
- Political and corporate inability to simultaneously strategize about and act on the economy and environment



How much time do we have?

- Ask any scientist or economist and they will tell you the science is clear, the economics are clear, – climate change action should have been taken yesterday, but it may not be too late if we take it today.

(UN Secretary General, July 2007)



Need for better coordination

- North American traditions and institutions have encouraged a decentralized response framework where change tends to be reactive, unevenly distributed, and focused on coping with rather than preventing problems.

(IPCC, June 2008)



Putting adaptation on the agenda

- Even if GGH emissions were immediately reduced, global warming will continue and its environmental and societal impacts will increase for many years to come. (IPCC, 2007)
- At the present time senior governments are clearly focusing their policy and monetary resources on mitigation.
- Most adaptation must, of necessity, occur at the local level.
- Adaptation must be made a shared priority and resourced accordingly.



Linking economy and environment

- Climate change is the defining issue of our generation. (Premier of Ontario, June 2007)
- Only a Green Strategy can get us out of this economic crisis. (Exec. Director, UNEP, Nov 2008)
- Today's economic stimulus packages must be designed with a view to larger objectives around global sustainability. (Bill Gates, Dec 2008)



CVC Climate Change Strategy

CVC will facilitate action on climate change through:

- Assessing threats and vulnerabilities
- Identifying adaptive needs, priorities and opportunities
- Assisting development of appropriate adaptive measures
- Reducing its own ecological footprint
- Reaching out to and educating stakeholders
- Supporting urban and rural stewardship
- Effectively using its plan input, plan review, regulatory and land securement powers
- Tracking progress, recognizing leaders, and holding others accountable



Questions?

