Coastal Climate Change Adaptation: An Opportunity for the Nova Scotia Towns and Municipalities

Presentation by: Jennifer Graham, Ecology Action Centre
Ecology Action Centre

- Coastal
- Marine
- Energy
- Food
- Transportation
- Built Environment
- Wilderness
Why we are here....

- Many challenges facing coastal communities
- Add climate change to the mix
- Provincial coastal and climate change initiatives
- Municipalities want information and support
- Provide information and resources....
trying to stop the sea......

Overtopping dyke in Avonport
...letting the coast do the work

Dyke near Noel, protected by salt marsh
Nova Scotia’s coast

Defining the coast:

- The interface between land and sea
- High mixing, productivity, biodiversity and sensitivity
- Living coasts are dynamic and always changing

NS facts:

- 13,300 km of coastline*
- 70% of Nova Scotia’s population lives on the coast*  

(*from State of Nova Scotia’s Coast Report)
How we use the coast

- Working waterfronts
- Public access
- Residential development
- Tourism
- Recreation

NS facts:

- 14% of jobs in NS are in coastal and ocean related sectors.
- 43% of visitors to Nova Scotia visit beaches
- 30% new construction in Municipality Queens was on coastal lots (2000-2004)
Pressures on the coast

- Conflicts between changing expectations and uses of coast and traditional views of the coast

Consequences...
- Habitat loss (especially wetlands)
- Inappropriate development
- Degrading water quality
- Property at risk
- Reduced public access
Coastal change...

Figure 3. The role of shore cliffs in building other coastal features in Nova Scotia. Shore cliffs (1) provide the anchor and sediment source for building barrier beaches (2), spits (3), tidal flats (4), and marshes (5,6) (Natural Resources Canada 2007b).
Trying to stop the change...
...makes it everybody’s problem
Add climate change....

Expected impacts:

- Storm surges and floods
- Accelerated erosion
- Changes in precipitation
- Sea level rise
- Contamination of wells
- Loss of sea ice

Flooding at Rissers beach (2009)

Sediment wash over Seaforth Beach (2009)
Rising Costs from natural disasters

- Hurricane Juan (2003): over $100 million in damages
- Beaubasin, NB, storm surge (Jan 2000): $1.6 million in damages

“Our industry is liable by contract to assume risks before we know what they are. A changing climate poses a particular challenge as future weather-related risks are estimated based on historical trends which are no longer good indicators;” (Tremblay, IBC 2008)
What is province doing?

- Sustainable Coastal Development Strategy (public consultation May/June 2010)
- Draft NS Coastal Strategy (completion date: 2010)
- Draft NS Water Strategy (stakeholder consultation May/June 2010)
- Regional Adaptation Collaboration (RAC)
- Integrated Community Sustainability Plans (ICSP)

Flooding at Peggy’s Cove (2009)
Municipalities and climate change

How will be affected:

- Rising costs of damaged infrastructure
- Protection and repair
- Public safety
- Water quality and sewage
- Liability
- Public expectation

Flooding at Lockeport (2009)

Road washed out Western Head (2009)
Adaptation

….. getting ready for the changes in our climate that have begun to happen, and will occur slowly .....like rising sea levels, as well as being prepared for catastrophic events like major storms
Adaptation principles

1. Public safety
2. Ensure water quality and quantity
3. Protect buildings and roads
4. Let the coast do the work
1. Public safety

<table>
<thead>
<tr>
<th>Level</th>
<th>Adaptation measure</th>
<th>Relevance to Climate Change</th>
<th>Example</th>
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</thead>
<tbody>
<tr>
<td>Low</td>
<td>Identify known <strong>flood risk and erosion areas</strong></td>
<td>Reduces infrastructure losses and human safety risks of sea level rise, storm surge and flooding</td>
<td>Annapolis Royal, Antigonish</td>
</tr>
<tr>
<td>Med</td>
<td>Develop <strong>emergency measures plans</strong></td>
<td>Proactive planning and capacity building addressing specific needs of community increases resilience and ability to respond to extreme climate events and flooding</td>
<td>Annapolis Royal, Colchester County</td>
</tr>
<tr>
<td>High</td>
<td><strong>LIDAR Flood risk mapping</strong></td>
<td>Can give detailed information about flood risk areas, and vulnerability assessments</td>
<td>Truro, HRM, PEI, NB</td>
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</table>
Example

- Annapolis Royal flood risk mapping (low-tech solution)

  - town partnered with CARP (Clean Annapolis River Project)
  - Combined: scientific projections of sea-level rise + topography maps + models of tidal flow through high tide conditions
  - Identified potential risk zones for tidal surge flooding

From: Adapting to Climate Change in Atlantic Canada. What Organizations Are Doing Today to Prepare for Tomorrow (2010)
## 2. Ensure water quality and quantity

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<td><strong>Low</strong></td>
<td><strong>Education</strong> of public/homeowners</td>
<td>Builds knowledge base, support and capacity to deal with climate change impacts</td>
</tr>
<tr>
<td><strong>Med</strong></td>
<td><strong>Storm water management</strong> to encourage absorption and recharge</td>
<td>Minimizes pollutant and nutrient overloading of coastal waters, slow down runoff</td>
</tr>
<tr>
<td><strong>High</strong></td>
<td><strong>Mandate or provide incentives:</strong> septic tank pump outs and repairs, water harvesting</td>
<td>Can minimize runoff and pollution of coastal waters</td>
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Example....
Incentives and Rebates:

• NS Environment Home Environment Assessment Program (2006-2010) (rebates for pump outs, grants for repair of septic systems)

• City Guelph, ON (2010) offers rebates and grants for several water saving devices (i.e. $2000 rebate toward purchase and installation of home rainwater harvesting systems)

• The IBC/Wingham ON Rain Barrel Pilot Project (2010) offers 3000 free rainbarrels to residents to reduce water runoff and sewer backups)
### 3. Protect buildings and roads

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<td><strong>Low</strong></td>
<td>Establish <strong>buffers</strong> along the coast: setbacks, rolling easements</td>
<td>Reduces infrastructure losses, mitigates erosion and flooding, allows coast to change naturally, allows for public access</td>
<td>Kings County, HRM and Cow Bay</td>
</tr>
<tr>
<td><strong>Med</strong></td>
<td><strong>Relocation</strong> of buildings away from shore, <strong>adjust construction</strong> methods (stilts, temporary structures)</td>
<td>Reduces infrastructure losses and human safety risks of sea level rise, storm surge and flooding and erosion</td>
<td>Pointe Du Chene, NB, Parks and boardwalks (ie. Cole Harbour trail)</td>
</tr>
<tr>
<td><strong>High</strong></td>
<td><strong>Hardening</strong>/armouring to protect critical infrastructure (roads, buildings)</td>
<td>Temporary, last response option as buffer against sea level rise, storm surge, erosion</td>
<td>Causeway between NB and NS, wharves and buildings</td>
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Buffer examples....

Setbacks – no build zones

- *Kings County*: no removal vegetation in lakeshore setbacks (65’)
- *HRM*: 30m from all water bodies (ocean, wetland, watercourse); 60m in Cow Bay (highly erodible zone); 2.5m vertical setback

Rolling Easements – allow for any type of land use activity except for holding back the sea
Incorporating the coast in redevelopment...

**Project:** renovation of Perkpolder, a ferry terminal in the Netherlands

http://www.comcoast.org

Existing ferry terminal

Artist impression of potential redevelopment
4. Let the coast do the work

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<td>Low</td>
<td><strong>Plant more vegetation</strong> along waterways and throughout region</td>
<td>Stabilization of shoreline protects from storm surge and erosion, and absorption of runoff</td>
<td>Dune stabilization Sable Island (marman grass)</td>
</tr>
<tr>
<td>Med</td>
<td>Allow coastal habitats to <strong>migrate</strong> (through setbacks, easements, land purchases, land exchanges)</td>
<td>Living coasts allow for natural protection against sea level rise, storm surge, flooding</td>
<td>Ducks Ultd: doing no maintenance of coastal empoundments, NSNT,</td>
</tr>
<tr>
<td>High</td>
<td><strong>Coastal realignment</strong> of engineered structures - salt marsh restoration</td>
<td>Restores living habitat to protect from sea level rise, reduce negative effects of armouring</td>
<td>Cheverie, NS</td>
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Example...

Cheverie Creek: Salt Marsh Restoration

Original culvert

Replacement culvert

Saltmarsh after restoration
How to choose?

- Technical considerations
- Cost (of doing something versus doing nothing)
- Benefits
- Capacity
- Implementation consideration

Erosion warning Pugwash

Weymouth flooding – Jan 2010
How to start....

- Start adaptation committee
- Start with your ICSP and MPS
- Gather information - what has been done
- Risk assessment - what is vulnerable?
- Decide accepted level of information needed
- Do cost benefit analysis for adaptation
- Build partnerships & involve the community
- Make wise decisions about development now!
Resources

- Canadian Federation of Municipalities (green grants/partners in climate change program)
  http://www.sustainablecommunities.fcm.ca/partners-for-climate-protection/

- Climate Change Adaptations for Land Use Planners
  http://adaptation.nrcan.gc.ca/projdb/pdf/178b_e.pdf

- Maine Resources Guide for Land Use Planning

- Community Climate Change Adaptation Info Booklet:
  www.clean.ns.ca/ccc

- Safeguarding Coasts and Estuaries
  http://ncseonline.org/CMS400Example/uploadedFiles/o1_NEW_SITE/3_Solutions/WHPRP/Adaptation2009/NWF_coastal_adaptation.pdf
Conclusion

- Don’t wait for provincial and federal governments Act now!
- Figure out risks and best measures - and involve community!
- Prevention is cheaper - so is letting the coast do the work!!
how to find me:

Jennifer Graham
Coastal Coordinator, Ecology Action Centre
902-442-5046
costal@ecologyaction.ca