INTEGRATING COASTAL SCIENCE INTO REGIONAL IMPACTS ASSESSMENT AND LOCAL DECISION-MAKING TO BUILD COMMUNITY RESILIENCE IN THE CANADIAN ARCTIC

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Project 1.2 Coastal Vulnerability in a Warming Arctic

Co-leaders: Don Forbes, Wayne Pollard, Trevor Bell

Project 1.2 Sub-Group
Research Nodes:

McGill University
Memorial University
University of New Brunswick
Natural Resources Canada
Land uplift or subsidence and impact on sea-level rise
Memorial University & NRCan

Drowned thermokarst lake basins,
Sachs estuary

Records of sea level history?

Martha’s Point
Sachs Spit
Hamlet
Sachs River
Estuary

Drowned thermokarst lake basins,
Sachs estuary

Records of sea level history?
• relative sea level history
• lake isolation method
• sediment cores through ice
• marine and freshwater diatoms
• radiocarbon ages

T. Bell, D. St-Hilaire, I.R. Smith, D.L. Forbes
Memorial University, NRCan
Biological Research Objectives:

1- Survey nearshore sedimentary environments and their associated biota in vicinity of Sachs Harbour NWT

2- Impacts of climate change and coastal erosion on benthic communities
Shallow mobile sand apron:
- low diversity
- ice scoured

Deep thermokarst lake basins:
- highest diversity if well aerated
- anoxic basins in inner estuary (brine exclusion)
Shoreline changes – Hamlet of Sachs Harbour

• accretion at “Landing Beach”
• retreat at cliffs to east and west

QuickBird, pansharpened, Aug 2, 2003
Contains material © DigitalGlobe
Coastal geomorphology

1- Coastal erosion rates & processes
2- Impacts of storms and climate change
Objectives:

1- To characterize the nature and distribution of ground ice in permafrost along the Southern Beaufort Sea coast

2- To determine how climate change will impact coastal erosion
Thaw slumps on Herschel Island
- in areas of massive ice
- monitoring the evolution of these thaw slumps over time
- no. increased 160% in 50 yrs

Cores taken to measure ice and carbon content

Couture, 2005
Analysis of Coastal Hazards Affecting Communities and Development in the Mackenzie Delta, NWT

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Biophysical science

Integrated impacts analysis ⇒ IRIS

Local decision-making ⇒ Adaptation

Community resilience
Resilience

“The capacity of a system to absorb disturbance, undergo change and still retain essentially the same function, structure, identity, and feedbacks.”

Source: Resilience Alliance (www.resalliance.org)
An Adaptive Cycle

Gunderson and Holling (2002)

K. Parewick, N. Catto, et al.
Memorial University of Newfoundland
Source: Berkes et al., 2003, adapted from Gunderson and Holling (2002)
Many thanks to...
the people of Sachs Harbour and Tuktoyaktuk

and
GNWT Municipal and Community Affairs
Natural Resources Canada & PCSP
Environment Canada
Canadian Space Agency
Aurora Research Institute
Parks Canada
RCMP (Tuktoyaktuk)
Centre for Community Enterprise
Chevron Canada
Northern Scientific Training Program
Climate Change Impacts and Adaptations Program
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