

Water Management in Nunavut:

Challenges and Opportunities for Small and Remote, Northern Communities



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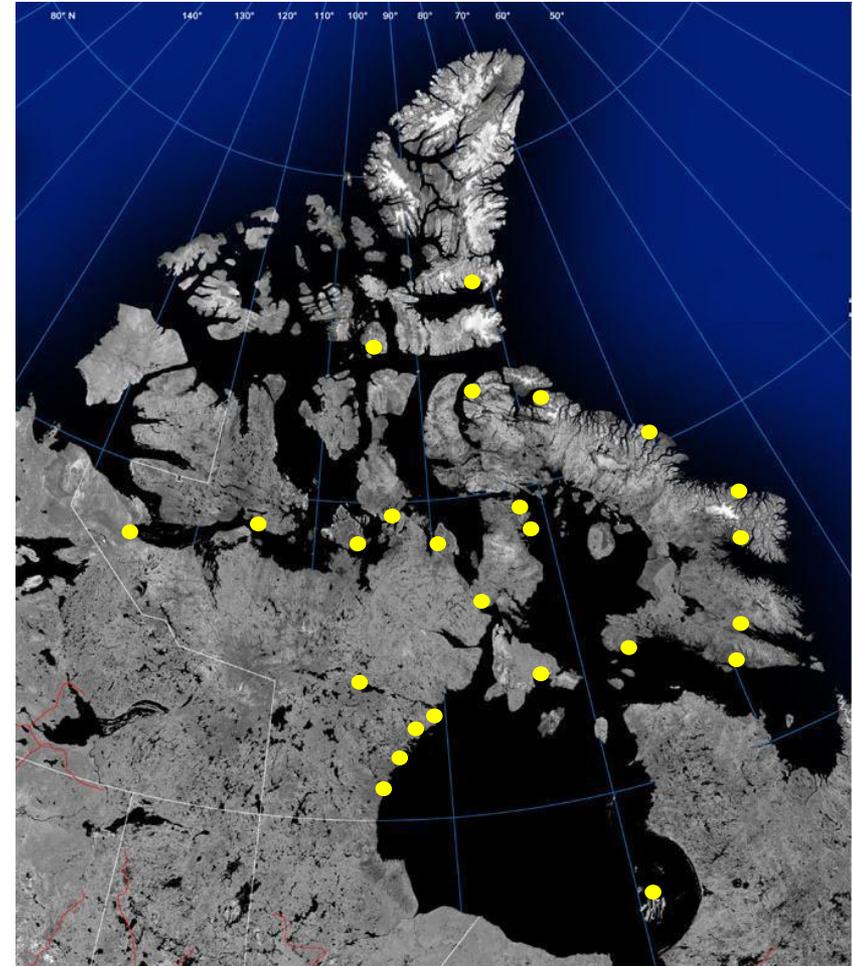
Outline

- Background
- Challenges for water & waste management
 - Population Increase
 - Increased Development
 - Climate Change
 - Regulatory Changes
- Opportunities



Background

- 25 small & isolated communities
 - No road or rail connection
 - Only year-round access is by air
- Nunavut's area is ~20% of Canada's land mass
- ~36,000 inhabitants
 - ~ 0.1% of Canada's population
- Municipalities are non-tax based (except Iqaluit)





Water Management

Potable Water systems:

- Sources are surface water
- Most communities have trucked water delivery
 - 4 of 25 communities have a combination of piped and trucked distribution
- Treatment
 - About 2/3 of communities employ some form of filtration
 - All systems chlorinate drinking water
 - Only a few systems employ UV



Wastewater Technology

- Trucked wastewater service and ***passive*** wastewater treatment in most communities
 - 4 of 25 communities use some form of mechanical treatment.
 - All 4 utilize a combination of trucked and piped water collection.
- ***Passive*** systems employed:
 - Waste Stabilization Ponds (Lagoons)
 - Tundra wetlands
 - Combination of *lagoons/wetlands*



Challenges - Population Increase

- Annual average growth rate in Nunavut from 2006-2014 was 2.3%.
 - This is approximately double the national average over the same time period.
- Growth in communities more rapid than water and waste systems can accommodate.
 - Strain on existing infrastructure and services
 - Growth of some communities will outpace annual recharge of source water making these sources unsustainable over the long-term.



Challenges – Increased Development

- Currently no development is upstream of a watershed supplying a community's potable source water
- No source water protection legislation currently in place in Nunavut.
- Increased development may result in increased industrial inputs to wastewater
 - How will a changing composition of wastewater affect existing wastewater systems?



Challenges – Climate Change

- Source Water Security
 - Source type, volume, quality
- Infrastructure resiliency and adaptability
 - “Leaking” lagoons – cannot rely on permafrost berms to remain impervious
 - Permafrost degradation
 - Infrastructure settling
- Increased intensity and number of storm events
 - Changing precipitation and weather patterns
 - Storm surges carrying sea water into upstream drinking sources
 - For example: Kugaaruk, Nunavut in 2011



Challenges – Regulatory Changes

- More Stringent Regulations
 - May require adopting more technologically advanced systems
 - Are there licensed operators? Capacity gap?
 - Historically, mechanical systems in Nunavut have faced significant complications.
 - Increased O&M costs – Is this affordable?
- Regulatory applicability
 - Some regulations limit the effectiveness of northern systems
 - Limited consideration for treatment “wetlands” (i.e. end-of-pipe)



Opportunities

- Technology
 - Can water/waste management be improved with simple technologies to augment current practices?
 - Wastewater
 - Multi-year retention lagoons
 - Increased wetland retention
 - Aeration
 - Water
 - Green technologies to decrease O&M costs?
 - Simple to operate multi-barrier systems?



Opportunities

- Infrastructure Planning
 - Infrastructure location
 - Place water intake lines in low-risk areas
 - Choose locations less susceptible to permafrost degradation (i.e. for construction of lagoons)
- Infrastructure design/construction
 - Design systems to mitigate against future risk
 - “Lining” of lagoons
 - Size facilities to accommodate population increases, or design with future expansion in mind.
 - Design systems to be more resilient to climate change



Opportunities

- Research to inform policy/regulation development
 - CCME's 5-year window for research into factors affecting MWW treatment in the Far North.
 - Information is critical to develop appropriate regulations
 - Ensure regulations are suited for the technologies employed in the North.
- Policy/Legislation Development
 - Source water protection legislation
- Build Capacity
 - New regulations may require more advanced systems
 - Need to ensure licensed operators are available



Summary

- Water management in Nunavut faces pressures from population increase, development, climate change and a changing regulatory environment.
- Opportunities to improve water management in Nunavut:
 - Ensure infrastructure is properly planned and designed
 - Incorporate suitable technology – augmenting systems is better than changing to new technologies
 - Close the capacity gap – either through system design or training
 - Gather research to work with regulators on developing appropriate policies and regulations.

Thank You!

