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Department of Environment
Wildlife and Research

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CAHS

Mackenzie Anne Clifford Martyniuk

Impacts of contaminants on the environment, country food resources, and Nunavimmiut health and food security



Nunavik research centre (NRC)



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NRC team



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Ecotoxicologist



Mandates of the NRC

- **Projects address Nunavik priorities and concerns**
 - Collaborate with hunters, fishers, trappers, and local organizations
- **Prioritize capacity-building opportunities for community members and youth**
 - Participation in sample collection
 - Training in monitoring techniques
 - School demonstrations and summer student opportunities
 - Paid youth scientific internships
- **External collaborations**
 - Academic institutions, regional, federal, and provincial governments, as well as other research centres

Research supports the development of Makivvik's environmental policy work



Transport of contaminants to the Arctic

Most sources of contaminants do not originate in the Arctic

- Long-range atmospheric transport from industrialized regions
 - Deposition in soil, water, and ice
 - The Arctic environment becomes a “sink” for contaminants

Local sources

- Former military sites
- Landfills and waste burning
- Spills during fuel delivery
 - 3 times per year by boat
- Mines
 - 2 operational and 1 under federal impact assessment review

SOURCES

ARCTIC

Effects of contaminants in the environment

- **Terrestrial fauna**
 - Habitat loss with mining operations
 - Modify nutrient cycling and reduce vegetation quality
 - Effects individual condition and alters food web dynamics
- **Aquatic fauna**
 - Change water and sediment quality
 - Consequences for benthic invertebrate communities (important fish prey resources) and fish spawning
- **Terrestrial and aquatic fauna**
 - Bioaccumulation and bioamplification
 - Impacts on physiological mechanisms leading to systemic dysfunction, altering species viability
 - Eventual changes to necessary behaviours and ultimately survival, modifying predator-prey dynamics and ecosystem stability



Effects on Inuit health and food security

- **Inuit have higher contaminant burdens than Southern or non-Indigenous populations**
 - Exposure through frequent consumption of traditional foods and food preparation methods
 - Negative health consequences across all systems
- **Diminishes food security**
 - Store bought foods incredibly expensive in the Arctic
 - Country foods are an essential source of nutrients
 - Most nutrients in the same tissues (e.g. mattaq) where contaminants are most concentrated
- **Disrupts cultural practices**
 - Traditional food is linked to Inuit identity, community, and overall well-being
- **Balanced messaging is essential**
 - Must develop culturally appropriate messaging that balances the benefits of country food consumption with the risks of contaminant intake



Contaminants research in Nunavik

Community-driven research

Kuujjuarusiq Arctic charr monitoring
Training for fish die-off investigation

In house analytical laboratory
ICP-MS
DMA

New contaminant monitoring techniques

Using fish eye lenses to document lifetime trends of Hg and Se accumulation

Long-term datasets

Koksoak fish study (Hg)
Arctic charr Hg monitoring in the Koroc

Critical minerals research

Strange Lake environmental baseline studies

Emerging contaminants

Documenting PFAS in Nunavik country foods
Effects of Nunavik wastewater treatment on aquatic watershed health

Impacts of climate change

Marine phycotoxins in the Arctic (team of 35+ Canadian and 20+ Nordic researchers)

NRC
contaminants
projects



Inuit representation in contaminant policy

- Efforts are aimed at reducing or eliminating the production, release, and exposure to contaminants

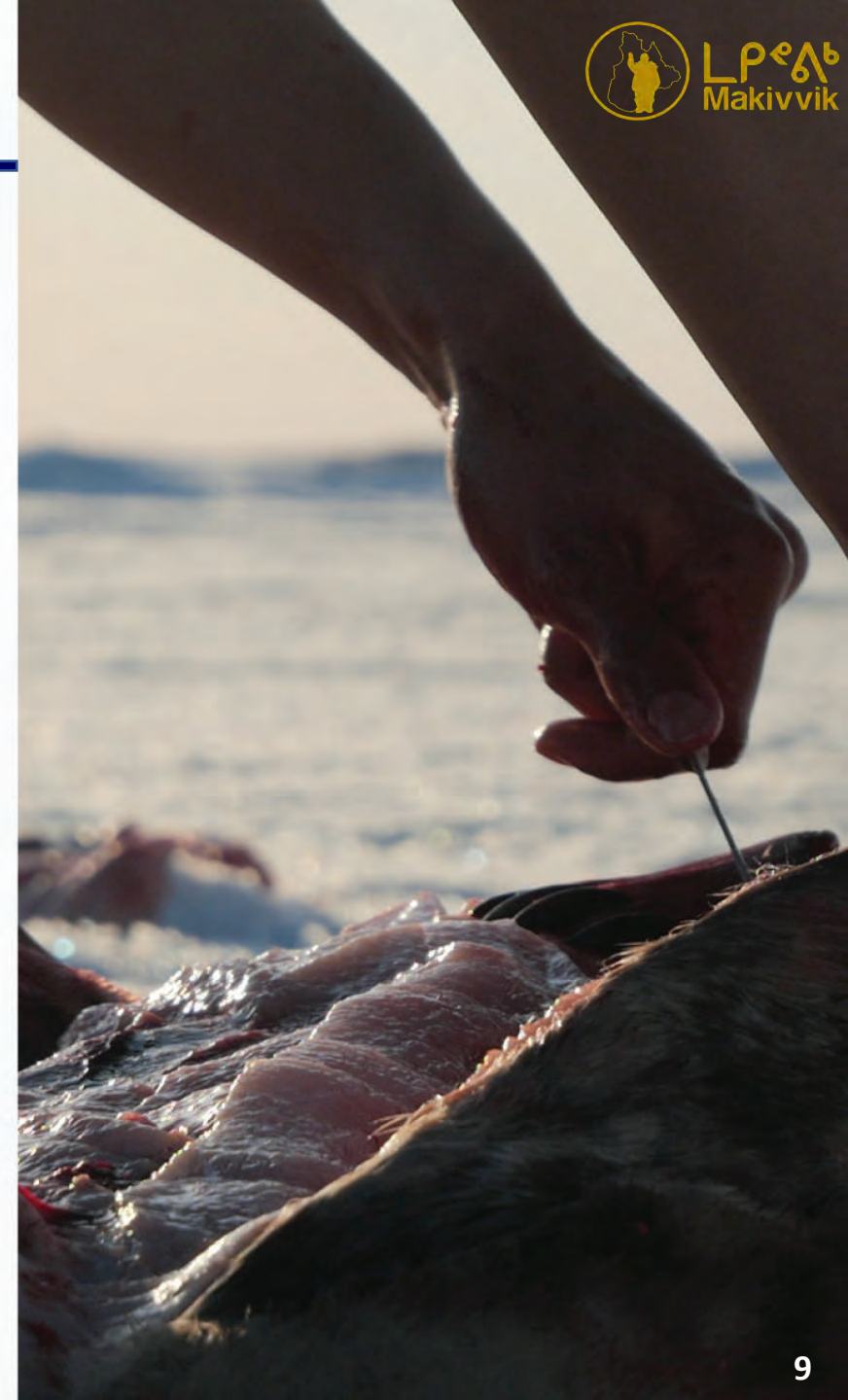
Regional, provincial, and national

- Makivvik and the NRC
- Inuit Tapiriit Kanatami (ITK)
 - Federal policies and discussions
- Northern Contaminants Program (NCP)
 - Help define research priorities

International

- United Nations Assembly for the Environment
 - Inuit Circumpolar Council (ICC)
- Arctic monitoring and assessment program (AMAP)
- Conference of parties (COP)
 - Minamata and Stockholm Conventions

Addressing local impacts requires coordinated global action



- **Sources of contaminants do not originate in the Arctic**
 - Addressing local impacts requires coordinated global action
- **Negative consequences for health**
 - Have been linked to adverse health effects in terrestrial and aquatic wildlife and humans
 - Contaminants increase food insecurity and harm cultural practices
- **Research is continually evolving**
 - Contaminants of historical concern remain relevant today, while emerging contaminants pose additional risks to ecosystem health and traditional practices
 - Country food messaging must balance awareness of contaminant risk with nutritional benefits of traditional foods to support dietary choices





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thank you

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