

Real Time DNA Sequencing for Monitoring Arctic Marine Microbial Ecosystem Services

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All biological systems utilize nucleic acids (DNA or RNA) to record genetic information, enabling comprehensive, universal monitoring of ecosystems with these molecules. New technologies for rapid, accurate, on-site sequencing of DNA and RNA have been developed over the last decade that are changing the way we monitor for pathogens, invasive species, contraband materials, and changing ecosystems. In the Arctic, monitoring of environmental change by Inuit has taken place for thousands of years. By combining techniques in natural sciences with Indigenous knowledge in a “two-eyed seeing” approach, scientists and Arctic communities are working together to co-develop monitoring programs that are appropriate for the scale of issues faced by the Arctic in the 21st century. Working with Indigenous Guardians and community members in Chesterfield Inlet, Nunavut, we are piloting a program to monitor the natural attenuation of marine oil spills using Nanopore sequencing technology, enabling on-site detection of marine microbes that degrade oil. We will report here on a workshop to be held in March 2024 to provide training in sample collection, DNA sequencing, and data analysis, alongside traditional ecological knowledge provided by local knowledge holders. Knowledge co-production with community members during the workshop will ensure that the results support Indigenous sovereignty.