# Strategies and challenges for sanitation technology and sewage treatment in the high north

*A NorCan seminar: Network for capacity building in water sanitation and health in the Arctic*

**Co-convenors:** Petter D. Jenssen & Roland Kallenborn (Norwegian University of Life Sciences)
Nicholas Ashbolt (University of Alberta)

Globally, circumpolar regions are seeing the most dramatic climate change related impacts, which particularly impact High North communities. Changes include retreat of sea- and land fast ice coverage, increased erosion at coast-lines, loss of permafrost damaging buildings and piped infrastructure as well as ecosystem changes. However, these changes will also make the region increasingly accessible for economic development, e.g., resource extraction and tourism. Thus, the local communities and municipalities in the circum-Arctic regions are facing tremendous challenges when it comes to adjustments in infrastructure and planning of new technological solutions on restricted budget frames. While often not critically evaluated for alternatives, drinking water and sanitation installations and sewage handling procedures are central to community level infrastructure development plans along with the ever-increasing demand on energy for industrial developments.

Today, wastewater treatment systems in Arctic regions range from the application of mechanical treatment plants to passive treatment systems consisting of waste stabilization ponds (WSPs), natural or engineered wetlands, and composting or bucket toilets. In many of the poorer communities' human excreta/wastewater receives no treatment. "Honey buckets" are often used for excreta collection prior to disposal directly into the receiving environment. Melting permafrost zones add increasing vulnerability to physical structures and community-based water services, which are compounding problems resulting from sociological changes in the High-North. Poor sanitary conditions often combined with inadequate water supply give rise to (enteric, skin and respiratory) health problems that compound with Arctic environmental health issues. Hence, rural water and sanitation is one of the identified health-related priorities also acknowledged by the Arctic Council (http://www.arcticcouncil.org/index.php/en/documents).

Discharge of wastewater into the vulnerable ecosystems in the Arctic may also require different technologies or system designs than those used in warmer climates. Currently, limited information exists about wastewater handling facilities in the Arctic, resulting in considerable uncertainties about the performance and environmental sustainability of existing or potentially different future systems. Changing paradigms aspiring to closed-loop systems and economies also need to be considered for water and sanitation services, such as resource recovery for energy, nutrients and water – yet many institutional and governance barriers inhibit this change.

This seminar invites experts and colleagues with relevant scientific and administrative expertise for strategic discussion on possible solutions for decentralised sanitation technologies under the harsh climate conditions of the Arctic.

**Program**

Time and location: June 22

**0900h** Welcome by Petter Jenssen

**0910h** Environmental challenges in the High North:
R. Kallenborn, Norwegian University of Life Sciences

**0930h** Health risk issues connected to water and sanitation in the high north:
N. Asbolth , University of Alberta

**0950h** Social issues connected to implementation of better water and sanitary solutions for the High North:
A Cook. The technical University of Denmark

**1010h – 1030h** health break

**1030h** Challenges and possibilities with centralized wastewater treatment systems in the High North:
H. Ratnaweera, Norwegian University of Life Sciences

**1050h** Challenges and possibilities with decentralized wastewater treatment systems in the High North: P. D. Jenssen Norwegian university of Life Sciences

**1120h** Dry toilets for cold climate: M. Kelova, Norwegian University of Life Sciences

**1140h** Greywater treatment in cold climate: A. Heistad, Norwegian university of Life Sciences

**1200h – 1300h** health break with food

**1300h** Membrane filtration for greywater treatment in cold climate:
N. Faisal, Norwegian University of Life Sciences

**1320h** Solar energy supply for year round heating of treatment plants and buildings in cold climate.
P. Heyerdahl, Norwegian University of Life Sciences

**1340h – 1430h** Panel discussion: Requirements and future perspectives

**1430h** Conclusions, adjourn