

The urgency to adopt the One Health framework for pollution and pandemic management in the Arctic: Svalbard as a case

Policy Brief prepared jointly by ArcSolution, ICEBERG, and ILLUQ

The Arctic

The Arctic is home to about seven million people, of which about one million are Indigenous with traditional livelihoods such as reindeer herding, fishing and hunting. The Arctic covers extensive land and sea areas of the Northern Hemisphere and hosts unique and vulnerable ecosystems. The Arctic changes rapidly, affected by climate warming, long-range contaminant transport, permafrost thaw, increased human activities (e.g. resource extraction, tourism, and shipping), as well as existing and newly emerging infectious diseases. These changes already have significant impacts on the inhabitants of the Arctic. (Berner et al. 2024)



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We urge policy-makers to adopt the One Health approach for pollution management and pandemic preparedness in the Arctic. The One Health framework supports integrated adaptation strategies in the Arctic region that account for interconnected human, animal, and environmental health. The One Health approach considers local and Indigenous perspectives to improve health and well-being in the Arctic.

Recommendations for reducing pollution- and pandemic-related risks in Svalbard and in the Arctic.

- Familiarise yourself with the One Health approach – interconnected human, animal and environmental health. Increase communication with national and international bodies across the Arctic.
- Establish, maintain and make public a comprehensive pollutant monitoring system across the Arctic as well as an associated database. Expand efforts to collect accurate data on emissions and occurrence of Chemicals of Emerging Arctic Concern. Expand efforts to predict the likely release of pollutants from secondary sources, particularly from thawing permafrost.
- Provide resources to improve community health in the Arctic, focusing on zoonoses and infectious diseases transmitted between animals and humans. Support surveillance of emerging threats, the development of epidemiological disease models, and new approaches to integrate health data with climatic, environmental and pollution data.

BOX 1 Three projects – one location – Svalbard

Svalbard is a Norwegian archipelago situated between mainland Norway and the North Pole. It is a joint study site for three international projects funded under Horizon Europe - ArcSolution, ILLUQ and ICEBERG. All three projects study Arctic pollution in a participatory approach and aim to develop solutions. Svalbard is well-suited for these studies because of its remote location and the research infrastructure it provides. Like much of the Arctic, Svalbard is experiencing climate change along with rising tourism and shipping activity, developments that are likely to influence the exposure to contaminants and zoonotic diseases (Andersen-Ranberg et al. 2024). Svalbard also shows the highest permafrost temperatures in the Arctic (Romanovsky et al., 2010), leading to increased risk of thawing due to climatic warming.

Reference: Romanovsky, VE, Smith, SL. & Christiansen HH (2010) Permafrost Thermal State in the Polar Northern Hemisphere during the International Polar Year 2007-2009: a Synthesis. *Permafrost and Periglacial Processes*, 21, 106-116.

Andersen-Ranberg E, Nymo IH, Jokelainen P et al. Environmental stressors and zoonoses in the Arctic: Learning from the past to prepare for the future. *Sci Total Environ*. 2024 Dec 20;957:176869.

What is One Health?

The One Health concept recognises that human, animal and ecosystem health are interrelated and interdependent in complex ways (Fig. 1). Each component is so complex that it requires multi-agency and transdisciplinary collaborations. For example, human health encompasses mental, physical, cultural and social well-being. Linking the components in holistic approaches requires that human health experts, veterinarians, wildlife health practitioners, ecologists, other environmental specialists and policy-makers work closely to achieve optimal results. (Berner et al. 2024)

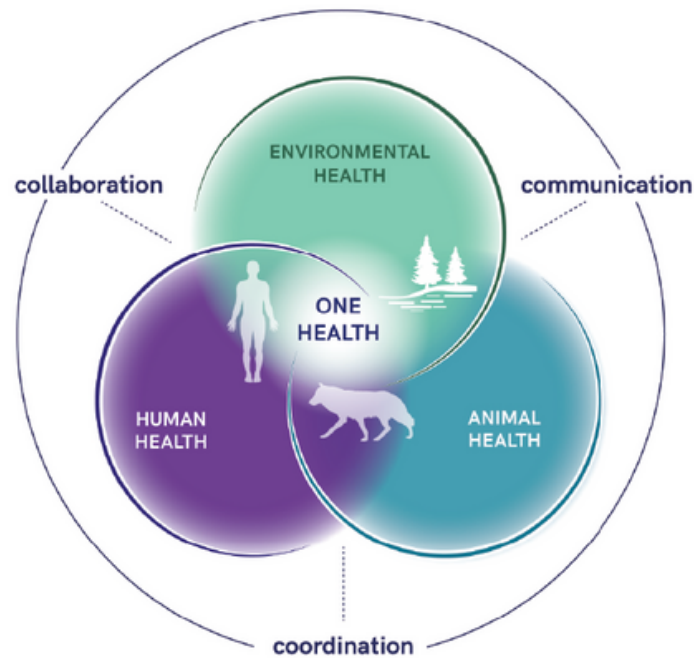


Figure 1. One Health in the Arctic. Credit: ArcSolution project

Why is One Health cooperation in the Arctic urgent?

One of the goals of One Health cooperation in this region is to prevent the Arctic from a future pandemic. The Arctic is largely affected by climate change, pollution and zoonotic diseases, loss of biodiversity. It is also a region with limited access to public health services, including food safety control, meat market hygiene and the availability and use of personal protection equipment. These circumstances make the Arctic and its population vulnerable and potentially more susceptible to future pandemics. The important Arctic science and trans-governmental collaboration is threatened by geopolitical developments (Sonne et al., 2024). Solutions are urgent as the Arctic is warming up to four-times faster than other places in the world. This warming is transforming the Arctic environment at unprecedented speed, risking social and economic imbalances and highlighting the need for updated scientific assessments as the basis for political action. (Sonne et al. 2024)



Longyearbyen, August 2025. Credit: Arja Rautio

What is happening to the Arctic and the Svalbard environment under climate change?

Arctic permafrost degradation can become a secondary source of harmful chemicals such as polycyclic aromatic hydrocarbons (PAHs) and persistent organic pollutants (POPs) as well as ancient viruses and bacteria, the latter potentially frozen for millennia. Projections under high emission scenarios suggest that near-surface permafrost in coastal and low-lying areas could thaw before the end of this century. Permafrost thaw can also contribute to unstable slopes, an elevated risk of landslides, increased flooding as well as river and coastal erosion. (Gartler et al. 2025)

The transport of POPs and Chemicals of Emerging Arctic Concern (CEACs) and their deposition on Arctic glaciers, ice, and in oceans is relatively well studied, while fewer studies explore the impacts of the release of contaminants. Melting glaciers have also been shown to become a secondary source of contaminants, leading to the release of POPs and PAHs into receiving waters. A significant reservoir of man-made per- and polyfluoroalkyl substances (PFAS) is found in the upper layers of Svalbard's ice caps, which could be mobilized and transported to rivers near northern communities. (Muir et al. 2025)

The expansion of economic development in a warming Arctic has the potential for increasing emissions and new sources of CEACs and for the introduction and spread of diseases in the Arctic. The predicted expansion of agriculture and aquaculture could lead to increased use and emissions of pesticides not previously used. Increases in commercial activity and tourism are likely to bring more people to the Arctic, increasing the risk of diseases. Increased industrial chemical use, e.g. fire-fighting foams, flame retardants, lubricants and plastic additives, is likely to occur following the expansion of infrastructure such as airports, seaports, mining, and oil and gas development (Fig. 2). (Muir et al. 2025)

Northward migrating wildlife, such as fish, birds and small mammals are carriers that bring various pathogens to the Arctic. Invasive fish and whale species also contribute to the biotransport of industrial chemicals and their own diseases. (Sonne et al. 2024)

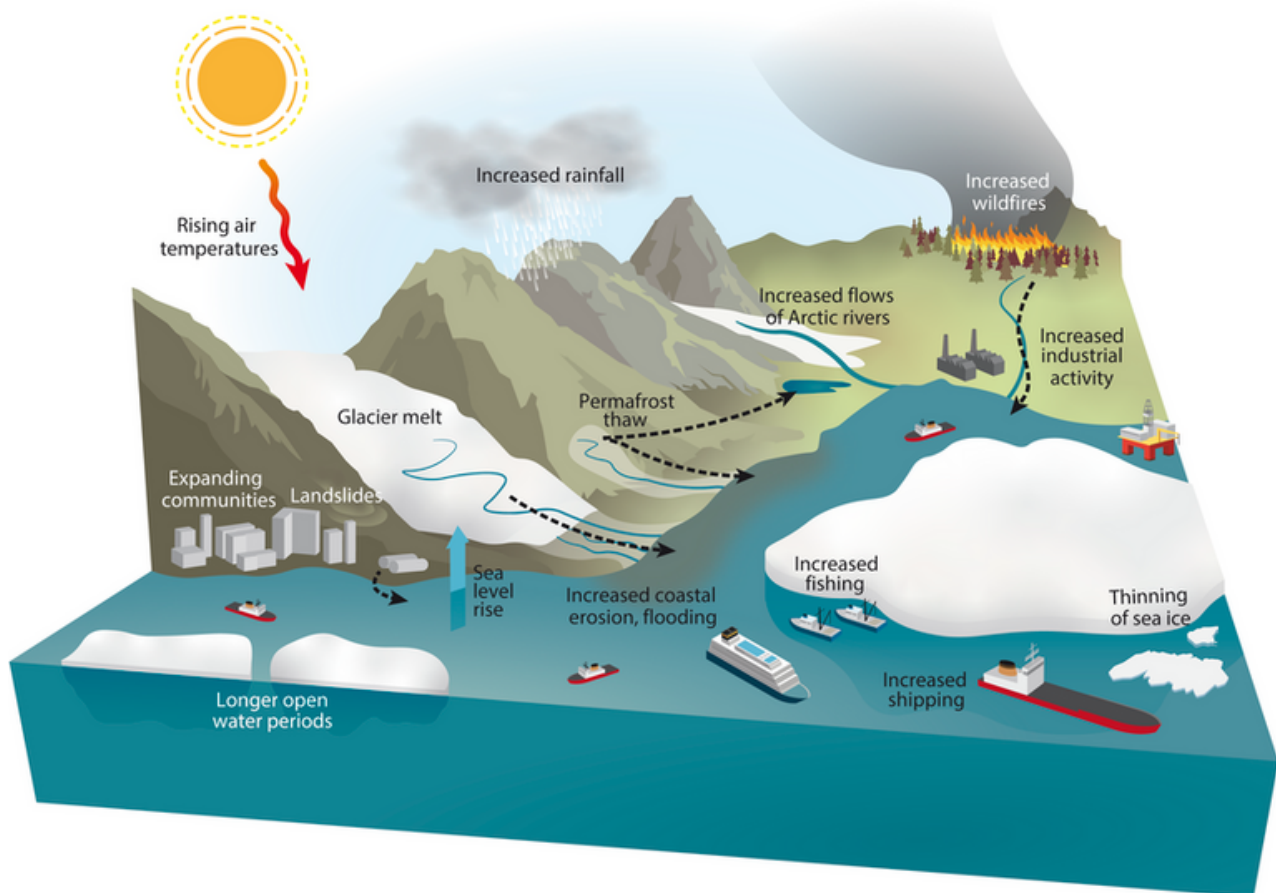


Figure 2. Schematic of the key changes in climate and infrastructure in the Arctic, which may contribute to local and secondary sources of POPs and CEACs in the Arctic environment (Muir et al. 2025) – open access under a Creative Commons licence.

What are key hazards and risks in Svalbard?

Infrastructure failure is perceived as the most critical hazard in Svalbard. Longyearbyen is located between steep mountainsides, thus landslides and rockfalls can considerably impact buildings and infrastructure. Much of the former mining town constructions were built for temporary use, with an expected lifetime of about 30 years. Their long-term use now requires costly adaptations, as much of the older housing infrastructure is still in use but undergoing deformations. Another major concern related to permafrost thaw in Longyearbyen and expressed by members of the public is access to clean drinking water. The main local freshwater source, Isdammen (the Ice-Dam reservoir), is in a permafrost area that could possibly thaw. Therefore, people are worried about potentially severe consequences for their health and well-being (Fig. 3). (Gartler et al. 2025)

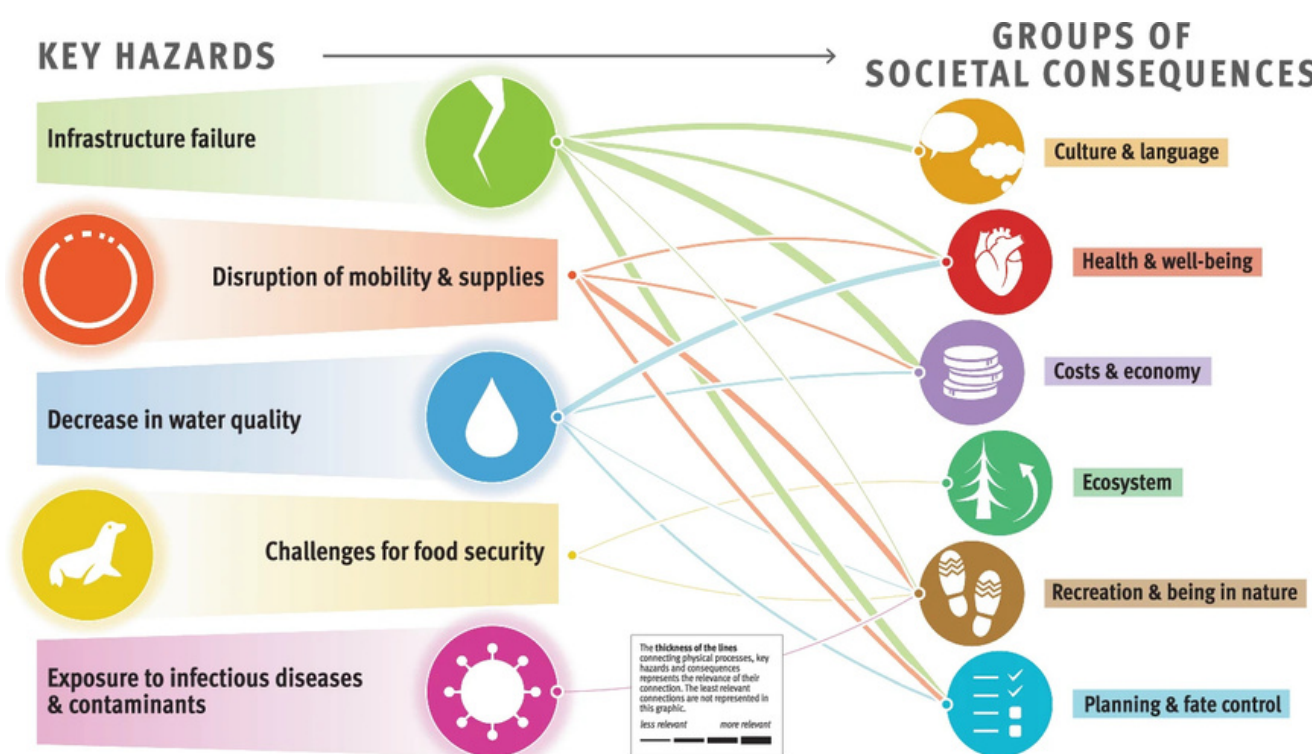


Figure 3. Local risk graphic for Longyearbyen, Svalbard (Gartler et al. 2025) - open access under a Creative Commons licence.

BOX 2 Pollutants of concern in Svalbard

Svalbard is a hub for many scientific studies in various disciplines. Svalbard, including its main town Longyearbyen with about 2600 inhabitants. During the consultancy meeting hosted by the three projects ArcSolution, ILLUQ and ICEBERG in August 2024, local residents and stakeholders identified the following issues and pollutants as priorities for environmental monitoring and policy action: (1) Diesel from the power plant (airborne particulates and hydrocarbons) and combustion by-products e.g., polycyclic aromatic hydrocarbons (PAHs), dioxins, and soot/black-carbon; (2) mining waste; (3) microplastics, rubber particles and expanded polystyrene (Styrofoam); (4) plastic additives e.g. phthalates, bisphenol A and flame retardants; (5) heavy metals including lead from hunting ammunition; and (6) drinking water contaminants — both chemical and microbial — that may pose chronic or acute health risks. Furthermore, pharmaceuticals were mentioned (e.g., antibiotics, hormones, analgesics) that enter the sea, with concerns about bioaccumulation in fish and potential human health impacts via seafood consumption.

Reference: Consultation Report: Insights from Longyearbyen for ILLUQ, ICEBERG, and ArcSolution. 2024. <https://zenodo.org/records/15395307>

BOX 3 Specific infectious diseases of concern in Svalbard

Lyssavirus (*Rabiesvirus*; *RABV*). Rabies in Arctic foxes on Svalbard appear disproportionately affected by climatic factors in comparison to red foxes. Canine rabies vaccination and human post-exposure treatment are expensive and logistically challenging to deliver in many Arctic communities.

Brucella spp. *Brucellosis* is present in the Arctic ecosystem around Svalbard, with antibodies detected in several Arctic animals e.g. polar bears, ringed seals, harp seals, and hooded seals. Even in countries that are declared officially free of *brucellosis*, like Norway, *Brucella* spp. has been found among marine mammals.

Echinococcus multilocularis. *E. multilocularis* in Arctic foxes in Svalbard is genetically closely related to those found in Arctic foxes from Yakutia, Russia. A climate favouring either year-round or just increased seasonal presence of rodents close to human habitations in Svalbard would also favour the establishment of *E. multilocularis* infection in domestic dogs, and the potential for subsequent spill-over to humans would therefore increase.

In addition, avian flu is an emerging pathogen in the Arctic including Svalbard, where its HPAI strain has been detected in Arctic foxes. It not only affects wild seabirds but may become recombinant and spill-over to marine mammals, including seals and potentially polar bears. Thus, in principle, it could be a zoonosis of concern to local hunters and wildlife biologists.

Reference: Andersen-Ranberg E, Nymo IH, Jokelainen P et al. Environmental stressors and zoonoses in the Arctic: Learning from the past to prepare for the future. *Sci Total Environ.* 2024 Dec 20;957:176869. doi: 10.1016/j.scitotenv.2024.176869.

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