Data-driven Subnational Decision-making in the Arctic: towards identifying the key issues.

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Arctic PASSION Research Poster, *based on ULAP Background paper "Data-driven Subnational Decision-making in the Arctic: Towards identifying the key issues"*

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ARCTIC PASSION
Pan-Arctic Observing System of Systems: Implementing Observations for Societal Needs

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This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No. 101003472

01. Arctic PASSION project

Arctic PASSION (Pan-Arctic Observing System of Systems: Implementing Observations for Societal Needs), the project of which this policy paper and related workshop are part, **contributes to addressing the remaining challenges while strengthening the sustainability of the earlier developments.** It is a Horizon 2020 project funded by the European Union and bringing together 35 institutions from across Europe and around the circumpolar North, led by Alfred Wegener Institute. **The project is to respond to the demand for faster access to observational data and services that are increasingly more reliable and diverse, and by that, to facilitate unrestricted access to the latest scientific observations. The goal is to enhance monitoring of ongoing environmental changes, reduce uncertainty in predicting future system changes, support risk assessment, inform and guide mitigation and adaptation measures and support sustainable development in the Arctic and beyond.** The core principle of the project is to involve Indigenous Peoples, local populations, decision-makers and a broad range of Arctic stakeholders in the co-creation of useful services. In addition, the project includes a number of pilot services that are potentially relevant for subnational decision-making, including, among others, a permafrost service, local atmospheric pollution forecast service, integrated fire risk management, noise pollution and impacts on marine living resources, and lake ice service. **See more at https://arcticpassion.eu/**

02. How does the Arctic PASSION support better data-driven decision-making?

- help to foster the outputs of the Arctic Science Ministerial Meetings (the meetings of Arctic and Arctic-interested ministers of science and relevant stakeholders), particularly regarding sustained funding for Arctic observations;
- consult with and inform Arctic policymakers and Indigenous People through dialogue within the Arctic Council, its working groups and Permanent Participants;
- maintain a close connection with the relevant European Union institutions;
- provide decision-making support on regional and local levels, through consultations with stakeholders.

03. Methodology

The current background paper is a *descriptive and conclusive report based on interviews with policymakers, science experts affiliated with governing authorities at national and subnational levels in the Arctic states, and scientists working in close cooperation with authorities.* Due to imposed operation limitations, the University of Lapland team carried out interviews with experts from every Arctic state, except the Russian Federation. The structure of the interview has been divided into the following sections:

1. The state of data-driven decision-making and planning in the region.
2. Community-based monitoring, local experience and traditional knowledge in the decision-making and planning.
3. National, interregional and international administrative and scientific cooperation in the decision-making and planning.
4. Knowledge gaps and vision to the future.
5. Future of cooperation of scientists and decision.

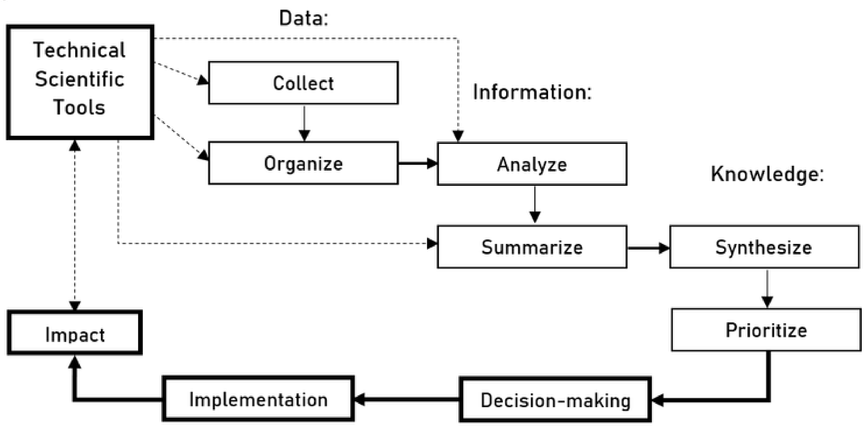
04. Interviews

Preliminary interviews were conducted with experts and officials from the following bodies:

- Regional Council of Lapland, Finland
- Lapland Centre for Economic Development, Transport and the Environment, Finland
- Finnish Environment Institute, Liitteri Portal
- Troms and Finnmark County, Norway
- Municipality of Tromsø, Norway
- The Government of Yukon, Canada
- The Government of Northwest Territories, Canada
- Alaska Centre for Climate Assessment and Policy, USA
- Ministry for Agriculture, Self-Sufficiency, Energy and Environment of Greenland
- Ministry for the Environment and Natural Resources of Iceland
- The Environment Agency of Iceland
- Westfjords Regional Development Office, Iceland
- Municipality of Akureyri, Iceland
- Municipality of Dalvik, Iceland
- Municipality of Siglufjordur, Iceland
- County Administrative Board of Norrbotten, Sweden

05. Data-Driven Decision-Making: What does it actually mean?

Data-driven decision-making (DDDM) is an ongoing cycle of making choices and taking actions based on the multiple sources of data reproduced and summarized into information and synthesized into applicable knowledge.

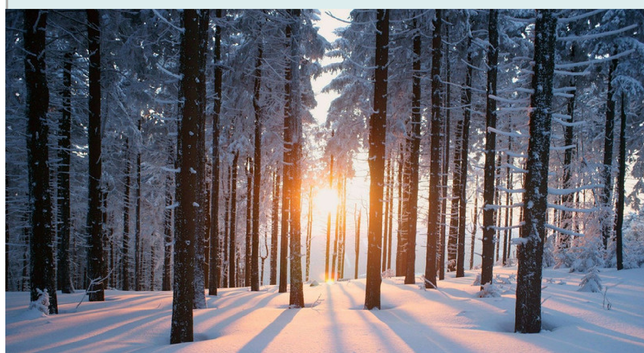


Source: https://cct.edc.org/sites/cct.edc.org/files/publications/DataFrame_AERA06.pdf

06. Traditional Knowledge: What does it actually mean?

Traditional Knowledge is a cumulative body of knowledge, practice, and belief, evolving by adaptive processes and handed down through generations by cultural transmission, about the relationship of living beings (including humans) with one another and with their environment.

Source: Berkes, F. (1999). Sacred Ecology: Traditional Ecological Knowledge and Resource Management. Taylor and Francis.



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Results: **Local, national and international data sources in subnational decision-making and planning**

For the municipalities with low population, small territory and/or limited scientific capacities, data-driven decision-making – including the collection and reproduction of scientific data – is a sphere for **intermunicipal cooperation with the purpose of mutually beneficial knowledge exchange.** Municipalities that are unable to fill existing knowledge gaps effectively seek to form partnerships with neighbouring municipalities in order to strengthen their collective scientific capacities. For instance, such an approach to increasing scientific capacities is utilized by Icelandic municipalities, especially in relation to intermunicipal projects like the construction of roads, pipelines, and tunnels. **In many cases, municipal authorities engage private stakeholders, such as consulting firms, to perform them with observations, monitoring, and evaluation.** That for example applies to the cooperation of Icelandic municipalities and firms like Landsnet and Environice, who mainly develop, analyze, and reproduce their own primary data rather than secondary data from other institutions. **Companies performing monitoring and analysis often develop their work on an in-situ basis and with a predominantly domestic focus.**

Some municipalities use the **results of interregional and international cooperation with neighbouring regions as a primary knowledge source**, including reports and surveys produced from domestic and international data sources. This is the case, for instance, in Canada's Yukon and Northwest Territories, and in Alaska. There, decision-makers benefit from **Quarterly Climate Outlook – a digital report on notable weather events and observed overall temperature averages and precipitation totals, developed jointly by Alaska Centre for Climate Assessment and Policy, US National Weather Service Alaska and Environment and Climate Change Canada (Federal Government department).** Moreover, Alaska, Yukon, Nunavut, Manitoba, Saskatchewan, and Alberta have ongoing cooperation on wildlife management, especially migratory species, in terms of data collection, reproduction and utilization in decision-making while taking into account features of individual municipalities and regions.

Except for the above-mentioned practices of using results of interregional and international cooperation, such as reports and outlooks, the preliminary research carried out by the authors of the current brief identified that **decision-makers use domestically-produced and maintained knowledge and data, but methodologies for analysis and reproduction are sometimes jointly developed via interregional cooperation or shared with neighbouring states.** This is the case in the management of shared waterways, like the Tornio river, flowing via Swedish Norrbotten and Finnish Lapland, where joint monitoring is necessary and carried out regularly.

Arctic regions, municipalities and stakeholders within these regions (e.g. Indigenous communities and the private sector) **produce data within specific decision-making processes or monitoring environmental and social changes of relevance for policy, business development or livelihood.** In Finnmark, for example, the aquaculture companies monitor algal blooms, and the county administration is working together with the industry towards establishing a joint database.

Some of the Arctic regions are dependent on international scientific involvement, for example, Greenland, which was and continues to be a relevant place for international scientific research and a significant source of information for not only Greenland's municipalities but also for the Arctic Council and Nordic Council of Ministers.

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Results:
Knowledge and data availability and accessibility gaps

Experts in Alaska emphasized that the region **has gone backwards in 'in situ' data, particularly with precipitation. Moreover, there appears limited integration for certain types of data at the federal level**, which is a challenge for Alaska with 340 different communities. The majority of communities have automated weather stations at the airports, but most of the weather/air information has been collected not by the communities themselves but by the US Federal Aviation Administration, which does not incorporate data into standard climate product/knowledge. **Because of the rapidly changing sea ice patterns and seasonality of sea ice, Alaskan scientists and decision-makers require more oceanographic data, especially characteristics of winter seasons. And as another knowledge gap affecting water management in Alaska, experts named lack of sufficient and continuously updating hydrologic information, especially related to water temperatures.**

Wildlife management is affected by a lack of extensive knowledge about the impacts of climate change on the distribution and abundance of species; about pests and invasive species, and the effects of their presence on the environment. Permafrost has been identified as an always-changing gap. Climate management is affected by a lack of better approaches to interpreting data rather than standardizing data. In Yukon, municipal and regional level experts face **difficulties related to the mapping of wetlands due to the absence of stable services functioning in the region.** Moreover, climate management in Arctic Canada has been affected by **too general reproduction of climate data, reflected in the absence of regionalization of climate models for further decision-making.**

The primary challenge for Greenland in terms of collecting and reproducing data for subsequent decision-making is the **geographical extent** that always has and will continue to put restrictions on the possibility of covering environmental and climatic parameters important for decision-making fully. That implies that the primary scientific gap existing nowadays in Greenland is the **lack of services, methodologies, and data collection techniques capable of covering the whole geographical extent of Greenland.**

The need for higher resolution of climate models and increased certainly has been mentioned in relation to adaptation planning and long-term risk management.

As in many other regions, **the climate models and predictions are seen as lacking sufficient resolution and certainty to allow for a more robust basis for adaptation planning (e.g. changes to North Atlantic circulation and their local consequences, impacts of climate change on aquaculture).** A number of projects have been implemented to address this challenge. For many sectors, **the lack of long-time data sets at locally, and regionally relevant resolution was mentioned as a shortcoming, as it would contribute to better policy-making and reporting on the progress of SDGs (for regions and municipalities, but also for local businesses).** The Norwegian Arctic counties also **struggles with obtaining appropriate information about historical and current Sámi land use, as historical, long-term data are often unavailable. Exchange of information with Russia has always been a challenge, and now it has become impossible, and it is important for many aspects related to the shared Barents Sea. Information serving better marine spatial planning is expected to become increasingly important in the future with the rise of blue economy and more extensive use of the oceans.**

The environmental management in the region is affected by poor knowledge about **terrestrial environment monitoring, lack of division of habitats following the importance and extinction criteria and insufficient awareness of biodiversity matters related to reindeer grazing and of effects of grazing on wetlands conditions. Moreover, water management is affected by the lack of its own fish counting systems.**

The environmental and climate management in the state is affected by a **lack of extensive knowledge on land use and the effects of climate change on land use, primarily the use of different types of soil, grasslands, and wetlands. Insufficient knowledge of potential consequences of introducing different types of trees (invasive/non-invasive) to the Icelandic forestation processes. At the municipal level in the Northeast region of Iceland, much attention has been paid to the gap related to awareness about the newest technologies in waste disposal and services for carbon emissions reduction.**

In the interviews, most decision-makers emphasized that a common challenge for the science-policy nexus is **overly complex format of knowledge produced by scientists.** Decision-makers without scientific background find it difficult to analyze and understand provided information. Additional work on simplifying information by analyzing secondary sources, which is time-consuming, especially when the decision should be fast and effective.

Results: **Community-Based Monitoring, Traditional Knowledge and Local Decision-making in the Arctic**

There have been **numerous attempts to bring together TK and scientific information** in the hope of arriving at a better understanding of the Arctic human-natural systems and the transformations they undergo, as well as making better and fairer decisions.

The challenges for TK and scientific knowledge interplay remain significant. **The two systems represent different ways of knowing, with TK being a holistic system anchored in community spirituality and history, and thus, specific TK insights may be misunderstood if not placed within this broader knowledge environment.** Some scientists are still concerned and lack methodological toolkit to properly engage with TK, while traditional knowledge-holders are often skeptical about working with scientists.

Lack of trust and dedicated human, time and financial resources raises barriers on both sides. TK is also the knowledge that may be owned by a community or a given person, which may constitute another barrier for TK-science interaction. **Clearly, for science and decision-making to benefit from TK, it is usually important to engage in a meaningful manner with knowledge-holders, rather than simply make use of the TK-based information.**

Projects dedicated to improving Arctic observation have increasingly involved community-based observation and traditional knowledge. It is one of the goals of the Arctic PASSION. Earlier, the KEPLER project advanced the cooperation with reindeer herders from different Arctic regions in order to verify the remote sensing snow and ice data. Another good example is PISUNA project, which established a network of local natural resource experts in Greenland in cooperation with the Greenlandic governmental agencies.

Governance structures and processes in North America appear to be often more experienced and exposed to working with traditional knowledge compared to the situation on the European side of the Arctic. There are usually stronger legal requirements related to land claims agreements, co-management structures, as well as to resource and environmental regulations. There is also a tradition among scientists and officials of engagement with traditional knowledge holders. A good practice is to involve knowledge-holders as co-producers and experts rather than simply as informants.

Just as there are difficulties in bringing together scientific and traditional knowledge, bringing traditional knowledge into decision-making is often a challenge. **All interviewees highlighted that they make efforts to facilitate broad participation and acquire information from different sources and that they see clear positive inputs of that engagement into the understanding of the situation and in decision outcomes. However, in some cases there are no robust procedures and methodologies for integrating scientific and traditional knowledge at the subnational decision-making level, in terms of reporting, acknowledging inputs and weighting different information sources.**

There are very few examples of community-based monitoring programmes established or supported by local and regional authorities. There are, however, areas where the authorities rely on community and Indigenous observation and knowledge, in particular with regard to traditional livelihoods, spiritually important sites, reindeer herding or hunting.

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