

SENIOR ARCTIC OFFICIALS' REPORT TO MINISTERS

Reykjavik Ministerial, 20 May 2021



ARCTIC COUNCIL

Arctic Monitoring and Assessment Programme (AMAP)

MANDATE

The Arctic Monitoring and Assessment Programme's (AMAP) mandate is to monitor and assess the status of the Arctic region with respect to pollution and climate change issues by documenting levels and trends, pathways and processes, and effects on ecosystems and people, and by proposing actions to reduce associated threats for consideration by governments.

SUMMARY OF DELIVERABLES TO THE REYKJAVIK MINISTERIAL MEETING

- *Arctic Climate Change Update 2021: Key Trends and Impacts. Summary for Policy-makers*
- *POPs and Chemicals of Emerging Arctic Concern: Influence of Climate Change. Summary for Policy-makers*
- *2021 AMAP Mercury Assessment. Summary for Policy-makers*
- *Impacts of Short-Lived Climate Forcers on Arctic Climate, Air Quality and Human Health. Summary for Policy-makers*
- *Human Health in the Arctic 2021. Summary for Policy-makers*
- *Overview of AMAP Initiatives for Monitoring and Assessment of Plastic Pollution in the Arctic*
- *AMAP Litter and Microplastics Monitoring Plan*

PROJECTS AND ACTIVITIES 2021-2023

- Addressing Issues of Climate Change and its Impacts
- Addressing Contaminants and Human Health Issues

AMAP ACHIEVEMENTS 2019-2021

SUMMARY

The AMAP Working Group (WG) work plan for the period 2019-2021 is found in the *Senior Arctic Officials' Report to Ministers 2019*¹, and AMAP has, inter alia, undertaken the following work over the course of 2019-2021. This work was guided by the *AMAP Strategic Framework 2019+2*, which describes AMAP's mandate, mission, vision, guiding principles, strategic goals and implementation strategy.

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COVID-19 PANDEMIC

Based on multiple communications, the COVID-19 pandemic has had a major impact on Arctic research, leading to many delays, logistical challenges, cancellations, and postponement of expeditions and other field work. Arctic science experienced many lost opportunities and data gaps in 2020–2021 resulting from the disruption of monitoring and research efforts. While this has not significantly affected AMAP work in the past period, it is likely to have impact on future work.

ADDRESSING ISSUES OF CLIMATE CHANGE AND ITS IMPACTS

For 2021, the AMAP Climate Expert Group (CEG) has prepared a technical report, *Climate Issues of Concern*, which builds on the outcome of past work on changes in the cryosphere (including *AMAP Climate Change Update 2019*³ and *Snow, Water, Ice and Permafrost in the Arctic (SWIPA)* (2011⁴, 2017⁵) as well as prepares a foundation for expanding work on the impacts of climate change on ecosystems and societal impacts of climate change. The report contains an update of recent trends in Arctic climate parameters (e.g., air temperature and precipitation, permafrost temperature, snow cover, sea ice and land ice, tundra greenness, etc.). The report also contains an evaluation of how well the current climate models simulate several conditions (air temperature,

1 oarchive.arctic-council.org/handle/11374/2354

2 amap.no/documents/doc/amap-strategic-framework-2019/1802

3 amap.no/documents/doc/amap-climate-change-update-2019/1761

4 oarchive.arctic-council.org/handle/11374/699

5 hdl.handle.net/11374/2105

sea-ice extent, ocean sea surface salinity) in the Arctic. The report reviews the frequency and intensity of various types of extreme events in the Arctic, including extreme high temperatures, rapid sea-ice loss events, and widespread melt events on the Greenland Ice Sheet, as well as high-impact events such as wildfires and coastal flooding and erosion. The report also explores the evidence concerning the extent to which climate-related changes in the Arctic may be linked to severe mid-latitude weather events and climate. In preparation for expanded future work, the report contains an initial review of physical impacts of climate change on Arctic ecosystems and ecosystem feedbacks to climate, and also provides an initial consideration of climate impacts including extreme events on Arctic livelihoods and communities.

ADDRESSING CONTAMINANTS AND HUMAN HEALTH ISSUES

Persistent Organic Pollutants (POPs): The *AMAP Assessment 2020: POPs and Chemicals of Emerging Concern Influence of Climate Change* examines the new observational evidence for previously hypothesized impacts of climate change and associated ecosystem changes on levels of POPs in the Arctic. Potential effects of climate change on POPs in the Arctic were first addressed by AMAP in 2002, and later in joint AMAP/UN Environment Programme (UNEP) work in 2011. Understanding climate change effects on contaminant sources, pathways and fate is critical for valid interpretation of temporal trends, including those used to evaluate effectiveness of actions to reduce pollution, including the *Stockholm Convention Effectiveness Evaluation* process. The assessment also includes an overview of Indigenous community involvement in POPs research and recommendations to enhance this participation.

Mercury: The *AMAP 2021 Assessment of Mercury in the Arctic* provides an updated analysis of trends and effects of mercury in the Arctic in relation to environmental processes that are also undergoing change in response to climate change, and also considers Indigenous perspectives on and contributions to mercury research and monitoring. The results of the assessment are framed so as to be of use in the context of effectiveness evaluation of the Minamata Convention. This assessment updates the previous AMAP mercury assessment from 2011 and builds on recently completed work, including the AMAP contributions to the *Technical Background to the UN Environment Global Mercury Assessment (GMA) 2018*.

Human Health and Contaminants: The *AMAP 2021 Assessment of Human Health in the Arctic* provides an updated analysis of biomonitoring data on contaminant trends in Arctic human populations, and new information on health implications of contaminant exposure, risk assessment methods and experiences with risk communication. The assessment also includes a first review of dietary changes in Arctic populations in recent years and some of the consequences, including in relation to dietary exposure to POPs and mercury as well as nutritional implications. The report builds on previous AMAP assessments in 2015¹, 2009², 2002³, and 1998⁴.

Plastic Pollution / Litter and microplastics: AMAP has undertaken a number of initiatives in support of the Icelandic Arctic Council Chairmanship priority on plastic pollution in the Arctic marine environment. In 2019, AMAP established the Litter and Microplastics Expert Group (LMEG) with the purpose to address pollution from plastics within the mandate of AMAP. This Expert Group developed detailed technical guidelines for monitoring litter and microplastics in various environmental compartments, including in air, water, sediments, soils and biota in terrestrial, freshwater and marine environments. These guidelines are an important input to the Arctic Litter and Microplastics Monitoring Plan, also developed by AMAP. AMAP began to assess litter and microplastics as part of the AMAP assessment on

1 hdl.handle.net/11374/1703

2 hdl.handle.net/11374/702

3 hdl.handle.net/11374/710

4 amap.no/documents/doc/amap-assessment-report-arctic-pollution-issues/68

*Chemicals of Emerging Arctic Concern*¹ (CEAC, 2017) and was involved in the preparation of the *PAME Desktop Study on Marine Litter including Microplastics in the Arctic*².

Air Pollution with a focus on Short-lived Climate Forcers (SLCFs): The *AMAP 2021 Assessment: Arctic climate, air quality, and health impacts from short-lived climate forcers (SLCFs)* updates previous AMAP work on this topic, addressing SLCFs and co-emitted air pollutants in a more holistic manner. It presents new observational data together with updated information on emissions trends. The assessment also includes a first assessment of open biomass burning including wildfires. New emissions scenarios have been developed and utilized by modelling groups to investigate impacts of SLCFs on Arctic climate, ecosystems and human health and to evaluate implications of possible emissions reduction strategies. The same scenarios are used in an Organization for Economic Co-operation and Development (OECD) assessment of the economic benefits of air quality improvements in Arctic Council countries, also due to be published in 2021. The work has been coordinated to bridge scientific and policy-related activities under the Arctic Council (AMAP, EGBCM, ACAP) with those under other relevant fora including the *Convention on Long-Range Transboundary Air Pollution* (CLRTAP), OECD and the EU-funded *Action on Black Carbon in the Arctic*. Additional follow-up work is being considered under the AMAP 2021-23 workplan. The Icelandic Arctic Council Chairmanship continued the priority established under the Finnish Chairmanship to address SLCFs. AMAP's work on short-lived climate forcers (SLCF) therefore supports and is well coordinated with the work of the Arctic Council's *Expert Group on Black Carbon and Methane* (EGBCM)

CONTRIBUTING TO INTERNATIONAL CONVENTIONS

The contaminants-related activities of AMAP, including those addressing human health, support activities under a number of international processes including the Stockholm and Minamata Conventions. AMAP data and information on temporal trends of POPs in air, biota and human media were provided for use in the WEOG (Western Europe and Others Group) regional component of the Stockholm Convention evaluation of global POPs monitoring data. The WEOG assessment is part of the *Stockholm Convention Effectiveness Evaluation* due to be completed in 2022. Information on the presence of chemicals of emerging Arctic concern from monitoring/screening studies as well as data regarding their chemical properties has also been provided for use in reviews of new chemicals under consideration for listing under the Convention, and to other bodies such as the *European Chemicals Agency*. AMAP work on climate change and SLCFs includes scientific results communicated to the IPCC for possible use in preparation of its AR6 report, to the 25th UNFCCC, and has been extensively coordinated with activities under other international processes including CLRTAP as well as work by OECD, WMO, IMO, CCAC, etc.

1 hdl.handle.net/11374/2115

2 hdl.handle.net/11374/2389

OTHER ACTIONS IN SUPPORT OF THE ICELANDIC CHAIRMANSHIP PRIORITIES

Another Icelandic Arctic Council Chairmanship priority is to improve the utilization of living marine resources, and Iceland is leading the development of a project on *Blue Bioeconomy in the Arctic*. AMAP is contributing to this project, mainly by providing information from recent AMAP work on *Adaptation Actions for a Changing Arctic* (2017a¹, 2017b² and 2018³) and *Arctic Ocean Acidification*⁴ (2019).

INCREASE INTERNATIONAL COOPERATION ON SUSTAINING OBSERVING

Sustaining Arctic Observing Networks (SAON)

SAON was established in 2011 following the Nuuk Declaration as a joint effort of the Arctic Council and the International Arctic Science Committee (IASC) to increase international cooperation on observing in the Arctic.

In its strategic plan from 2018, SAON identified as one of its goal the development of a roadmap to a well-integrated Arctic Observing System. In the period, SAON has developed the Roadmap for Arctic Observing and Data Systems (ROADS) to set a course towards systematically defining the needed observing and data systems and to specify how the various partners and players are going to collectively work towards achieving that system. Observations and data systems should serve multiple sectors and data user groups and ideally address priorities at the intersection of Arctic community-identified needs, regionally-identified cross-sectoral needs and those of the global observing programs. Shared benefit of the observing system is a guiding principle of ROADS, and the term “Shared Arctic Variables” has been developed to label variables that serve these multiple purposes.

In the period, the SAON Arctic Data Committee has initiated a series of workshops under the title Polar to Global Online Interoperability and Data Sharing Workshops.

AMAP appoints the Chair of SAON on behalf of the Arctic Council, and the SAON Secretariat is hosted by the AMAP Secretariat.

World Meteorological Organization (WMO)

AMAP has been engaged in WMO’s activities mainly through participation in the Executive Council Panel on Polar and High Mountain Observations, Research and Services (EC-PHORS).

1 oarchive.arctic-council.org/handle/11374/2112

2 oarchive.arctic-council.org/handle/11374/2078

3 oarchive.arctic-council.org/handle/11374/2078

4 oarchive.arctic-council.org/handle/11374/2171

AMAP WORK PLAN FOR 2021-23

The *AMAP Strategic Framework 2019+*, including its guiding principles and strategic goals, continues to provide strategic direction for AMAP work to be undertaken under its work plan for 2021-2023. AMAP's work reflects the long-term commitment of the Arctic Council to monitor and assess changes in the levels of pollution and climate change and their impacts on Arctic ecosystems and human populations. AMAP assessments are intended to inform sound evidence-based policy- and decision-making, as well as serving the information needs of other relevant bodies and stakeholders. The *AMAP Strategic Framework 2019+* outlines mechanisms to ensure the appropriate operationalization of AMAP's strategic goals and the evaluation of AMAP's achievements and implementation.

The work plan reflects near-term priorities for the period 2021-2023 identified by AMAP and considers timing and allocation of resources, the needs and requirements of the Arctic Council as well as relevant international organizations and processes that use AMAP results in their work.

The work plan takes note of incoming Russian Federation Chairmanship priorities, both on Arctic climate and pollution, the latter in particular by addressing radioactivity and marine plastics.

As outlined in the *AMAP Strategic Framework 2019+*, achieving enhanced understanding of Arctic change and its impacts through inclusive partnership with Indigenous Peoples and local residents is of utmost importance. Hence, engagement of Indigenous Knowledge and Traditional and Local Knowledge will be emphasized. In addition, the work plan also recognizes the potential contributions of Observers to its work, and AMAP has initiated an informal dialogue with Observers in order to facilitate and strengthen Observer engagement in AMAP work.

LIST OF INDIVIDUAL PROJECTS AND ACTIVITIES

Addressing Issues of Climate Change and its Impacts

Lead/co-leads: n/a

WG partners: Parts of the work connect to other Arctic Council WGs, specifically CAFE, ACAP and EGBCM (effects of climate change on ecosystems and ecosystem feedbacks to climate, including SLCFs).

Other partners: Observers such as the World Meteorological Organization (WMO) and the Intergovernmental Panel on Climate Change (IPCC).

Rationale and overall objective: It is clear that climate change is having widespread and immediate impacts on Arctic ecosystems and societies, but to develop measures to mitigate these impacts and create adaptation strategies, further information is needed on a smaller, more regional scale. Recent AMAP work that focused primarily on the physical changes in the cryosphere will be expanded to document the impacts of these and other climate-related changes in the Arctic, both in relation to ecosystems and ecosystem feedbacks to climate and to Arctic societies. AMAP climate work is becoming more integrated and will take a two-pronged approach. This will include drawing clearer linkages between climate-related physical changes and their impacts on various aspects of Arctic communities and societies, including the impacts of climate change and associated extreme events on infrastructure, livelihoods and economy, human health and well-being, and ecosystem services. Indigenous and other communities in the Arctic will be important participants in this work.

The results of this work will be useful for helping communities to develop adaptation and potential mitigation measures. In this area, some additional work on SLCFs not completed during the last Chairmanship will also continue.

Understanding Climate Change Impacts on Arctic Ecosystems and Associated Climate Feedbacks

Climate change is altering Arctic ecosystems and biodiversity. These changes feed back to the climate system, with a potential to dampen or accelerate local to regional changes in climate and greenhouse gas emissions. The resulting impacts on ecosystem services, livelihoods and well-being will have far-reaching consequences for Arctic communities and beyond. The objective of this activity is to assess how climate change affects Arctic ecosystems and climate feedbacks to inform strategies for adaptation and resiliency.

The work will address how:

- Climate change impacts fundamental ecosystem properties and trigger ecosystem perturbations. Emphasis will be on how climate change could erode resilience, making Arctic ecosystems more prone to abrupt changes and tipping points, as well as changes over longer time periods. Assessments will encompass marine, coastal, freshwater and terrestrial ecosystems.
- The capability of ecosystems to regulate climate are impacted by climate induced changes. This entails feedbacks related to a range of mechanisms, including storage and release of carbon, hydrological fluxes and surface albedo.
- Climate-induced changes impact Indigenous Peoples, local communities and livelihoods, and how ecosystem-based adaptations could reduce the vulnerability of Indigenous Peoples and local communities to impacts.

PPs will be engaged in developing the project, identifying questions to be answered and how Indigenous Peoples and Indigenous Knowledge will be included.

Main activities: The activity Understanding climate change impacts on Arctic ecosystems and associated climate feedbacks will have these steps:

- **Step 1** – Preparatory Activities (2021): Co-design and prepare a detailed plan describing the topics, relevance, available datasets, methods, case studies and assessment products.
- **Step 2** – Implementation (2021-2023): Products might include reports, scientific articles, special journal issues, policy-summaries and communication products.
- **Step 3** – Follow-up (2023-2025): Joint AMAP/CAFF science assessment and Summary for Policy Makers.

A separate AMAP activity will review the impacts of climate change and associated extreme events on various aspects of Arctic societies, as described above. Activities on wildfires are coordinated with ACAP, CAFF and EPPR, while activities on climate impacts on human health and permafrost/methane hydrates related to human dimension work is coordinated with SDWG.

Timeline: A report on societal impacts of climate change in the Arctic is planned for 2023. Timelines are described under Main activities, above.

Funding: Participating national experts will have national support.

Addressing Contaminants and Human Health Issues

Lead/co-leads: n/a

WG partners: Parts of the work connect with that of other Arctic Council WGs, specifically ACAP (chemicals and SLCFs), CAFF (pollution effects on biota; litter and microplastics), EPPR (radioactivity, wildfires), PAME (marine litter and microplastics), SDWG (human health), and EGBCM (SLCFs).

Rationale and overall objective: The aim is to inform policy-and decision-makers in the Arctic Council States, PPs and others, including Observer States and Organizations, on issues relating to contaminants and human health (both regionally and globally). This includes work requested by SAOs and Ministers to support further development and implementation of the Stockholm Convention, the Minamata Convention, CLRTAP, and work connected to the UNFCCC/IPCC as well as UN Sustainable Development Goals (SDGs): #2 on food security, #3 on ensuring healthy lives, #6 on access to safe drinking water, and #13 on action to combat climate change and its impacts.

Main activities: An updated assessment of radioactivity issues of concern is planned for 2023. The assessment will describe the main sources of artificial radionuclides to and within the Arctic and the recent trends in activity concentrations of anthropogenic radionuclides in the Arctic environment. It will also provide new information about radioactive waste handling and decommissioning. It will report on the sources and recent trends in activity concentrations of naturally occurring radionuclides in the Arctic environment and will finally address possible effects that climate change might have on radioactivity in the Arctic.

Activities regarding human health include assessing impacts of climate change on health, further consideration of dietary transitions and their impacts and participating in coordinated work on effects of contaminants. AMAP is preparing work on the interaction between climate change, contaminants, and human and animal health, including zoonotic diseases. Parts of this work are under development in cooperation with SDWG.

Contributions from POP/mercury trend work as well as the human health monitoring are an important part of the planned input to the *Stockholm Convention Effectiveness Evaluation*.

AMAP work on SLCFs will continue and complete ongoing work. It is coordinated with activities under other bodies; it feeds into the work of the EGBCM and ACAP, and supports related work under CLRTAP bodies and other relevant groups concerned with air pollution and climate change.

In the period 2021-23, there will be focus on updating guidelines associated with contaminants monitoring to address contaminants of emerging Arctic concern and new approaches to monitoring, as well as the implementation of monitoring for litter and microplastics. In addition, work will be undertaken to identify knowledge gaps when it comes to physical and chemical effects of litter and microplastics on biota.

The AMAP Secretariat is working with PAME on work to implement an ecosystem-based approach to marine assessment and management. The AMAP Secretariat will also follow the work of the International Council on the Exploration of the Sea (ICES), the North Pacific Marine Science Organization (PICES) and PAME WG on the Integrated Assessment of the Central Arctic Ocean (WGICA).

Timeline: The activities are part of a coordinated plan for activities with deliverables in 2023. The updated assessment of radioactivity issues of concern is planned for 2023. Initial work on climate contaminants and health is planned to be delivered in 2022.

Funding: Participating national experts will have national support.

AMAP ADMINISTRATION

The AMAP Secretariat supports the meetings of the AMAP WG and the AMAP Heads of Delegations (HoDs) and intersessional activities that follow from these. The AMAP Secretariat manages information on specific AMAP activities, supports the AMAP EGs, including work associated with arrangement of meetings and the production of deliverables. The AMAP Secretariat also manages AMAP's relations with the Arctic Council and the Arctic Council Secretariat (ACS), and with other external organizations.

Secretariat staff currently comprises an Executive Secretary and four Deputy Secretary positions, and an Administrative Officer. The AMAP Secretariat Office is in Tromsø, Norway, in office space shared with the ACS and the Indigenous Peoples' Secretariat (IPS). Core funding for the AMAP Secretariat is provided by Norway with additional contributions from other countries and funding bodies.

AMAP COMMUNICATIONS AND OUTREACH

One of AMAP's strategic goals is to inform its target audiences by producing sound evidence-based, policy-relevant assessments, communications, and outreach products for use in policy- and decision-making processes as well as raising awareness in the general public. AMAP will work closely with other Arctic Council Working Groups, Permanent Participants, governments, Observers, educational institutions, the media, and other organizations to promote AMAP results. (*AMAP Strategic Framework 2019+*).

To that end, AMAP produces:

- peer-reviewed scientific and technical reports that target scientific and educational communities. These reports provide validated documentation for statements and conclusions communicated in AMAP deliverables to Arctic Council Ministerial meetings;
- Summaries for policy makers, consisting of a summary of the scientific reports, accompanied with science-based recommendations for policy makers; and,
- Science-based fact sheets, infographics, films and interactive presentation of the environmental status in the Arctic.

AMAP work is translated into other languages and provides the basis for a large number of scientific journal publications. AMAP work is presented at international conferences and other events. AMAP continues to upgrade and further develop AMAP website services.

AMAP will routinely evaluate the ways in which information on climate and pollution issues is consolidated and delivered. For climate issues, the rapid changes may point to a need for more frequently updated products, and there are deliberations on preparing shorter summaries on climate issues of concern.