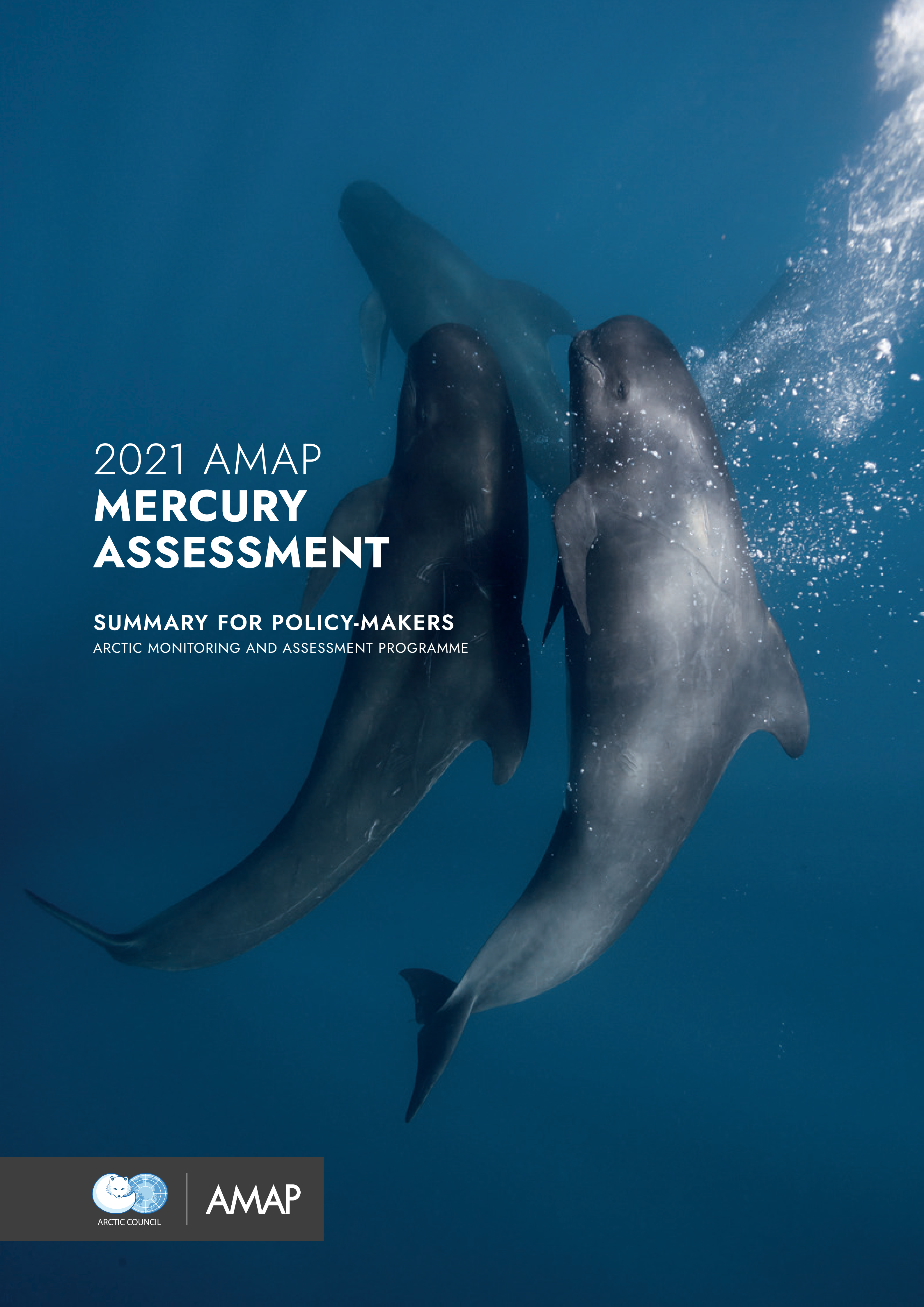


2021 AMAP **MERCURY ASSESSMENT**

SUMMARY FOR POLICY-MAKERS

ARCTIC MONITORING AND ASSESSMENT PROGRAMME

ARCTIC COUNCIL

AMAP

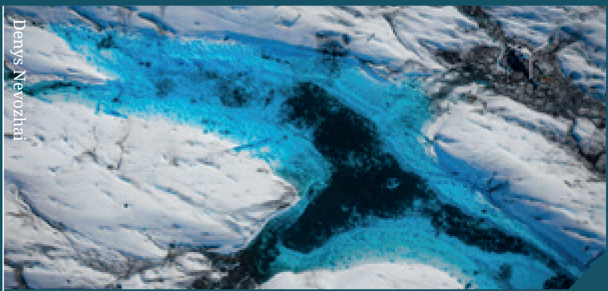
KEY FINDINGS

1

Mercury from anthropogenic emissions around the world continues to travel to the Arctic environment. Atmospheric levels in the Arctic are generally decreasing, while both increasing and decreasing trends of mercury in Arctic biota have been observed over the last two decades. Decreasing trends in air may be linked to either lower emissions from regions nearer the Arctic, or the effects of climate change, or both. The inconsistent trends in biota are due to complex environmental processes, some of which are also associated with climate change.

2

People living in the Arctic remain among some of the most exposed human populations globally to mercury, and some Arctic wildlife face high and critical levels of exposure. Geographic hotspots and some highly exposed species, particularly among marine mammals and seabirds, are a cause for concern.

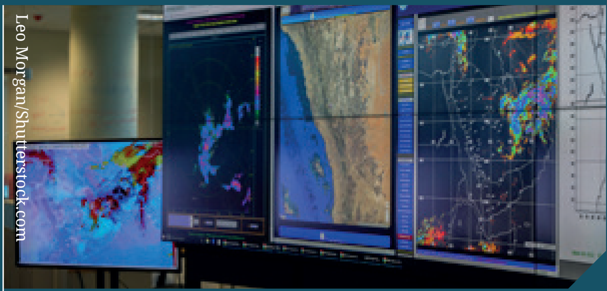


3

New research has increased our understanding of the sources of mercury and how it moves through Arctic ecosystems. In particular, we have a clearer understanding of the long-range transport of mercury, the processes by which it is deposited in the Arctic, how it moves through tundra and permafrost, and how inorganic mercury is transformed into more toxic methylmercury in the Arctic.

4

We are seeing the effects of climate change on the environmental behaviour of mercury in the Arctic, although large uncertainties remain regarding the long-term implications for the exposure of wildlife and people to mercury. The clearest evidence of the effects of climate change relate to the release of mercury from thawing permafrost and melting glaciers. Changes to the distribution of species is also changing mercury exposure in food webs.



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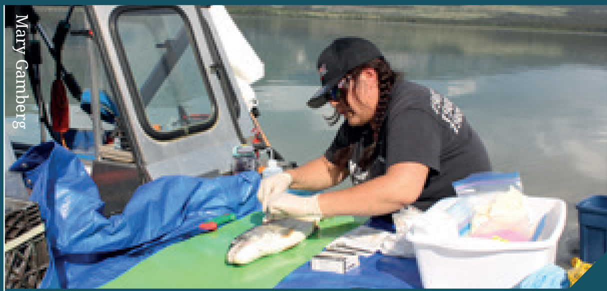
5

Modelling indicates that stringent but feasible controls on global mercury emissions can reduce future Arctic mercury concentrations over both the near term and the medium term. Despite uncertainty inherent in modelling, it shows the importance of not delaying even modest emission reduction policies. Reducing 'new' anthropogenic emissions is key to reducing the build-up of mercury in the environment.



Mary Gamberg

6

Measurements of mercury concentrations in the Arctic will make an important contribution to assessments of the effectiveness of the Minamata Convention. A large number of long-term time series of mercury in air and biota are available from sites around the Arctic. These time series cover the last 20 years or more, allowing for comparisons before and after the adoption of the Minamata Convention. AMAP is therefore well placed to contribute to assessments of the effectiveness of the convention.

Minamata-Kiara Worth

7

The contribution of Indigenous Peoples has been critical to core Arctic research and to the development of global agreements on contaminants such as the Minamata Convention. Active collaboration between Indigenous Peoples and scientists has led to important contributions to mercury research and monitoring in the Arctic.

KEY TO SYMBOLS:

- OBSERVED
- PROJECTED
- NEW FINDING
- UPDATED FINDING
- KNOWLEDGE GAP
- REINFORCING MESSAGE

INTRODUCTION

Mercury pollution threatens the health of wildlife and human populations in the Arctic. It is a global environmental contaminant with both natural and human sources. Much of the mercury in the Arctic is carried to the region by air and ocean, where it accumulates in food chains, resulting in high levels of mercury in top predators. People, especially Indigenous Peoples and other Arctic residents for whom marine mammals make up an important part of their diet, are at risk from high levels of exposure.

Concerns about the risks posed by mercury to human health and the global environment led to the 2013 Minamata Convention on Mercury, which came into force in 2017. The Convention creates a global regulatory framework, introducing controls on mercury mining, emissions to air, land and water, and the phase-out of mercury use in a number of products and processes.

The Arctic Monitoring and Assessment Programme (AMAP) has produced scientific assessments of mercury in the Arctic since 1998. The latest assessment *AMAP Assessment 2021: Mercury in the Arctic*, from which this summary is derived, updates the 2011 AMAP assessment that focused solely on mercury, as well as information presented in recent AMAP assessments of contaminant effects on Arctic wildlife (2018), and also introduces the latest information on mercury and human health in the Arctic.

Information produced by AMAP, and the involvement of Indigenous Peoples and Arctic countries, were crucial in the negotiations leading up to the Minamata Convention, the preamble of which references "the particular vulnerabilities of Arctic ecosystems and Indigenous communities".

The Convention mandates ongoing assessment of its effectiveness, which requires monitoring of mercury pollution. This latest assessment from AMAP provides current scientific information and context that the international community will need to understand the impact of the Convention on the Arctic environment and people, and identifies additional research needed to minimise these impacts of mercury.

THE MINAMATA CONVENTION, AMAP AND THE ARCTIC

The adoption of the Minamata Convention on Mercury in 2013 marked a breakthrough in the international effort to address mercury pollution. The UN treaty, which entered into force in August 2017, is the first global agreement to control emissions of mercury, including by phasing-out its use in many products and by requiring Parties to control, and where feasible, reduce mercury emissions from coal-fired power plants, coal-fired industrial boilers, non-ferrous metals production, waste incineration and cement clinker production. All Arctic Council member states apart from the Russian Federation are Parties to the Convention.

The work of AMAP, Arctic scientists and, importantly, Arctic Indigenous Peoples played a significant role in the establishment of the Minamata Convention. The preamble to the Convention specifically refers to the "particular vulnerabilities of Arctic ecosystems and Indigenous communities".

Under Article 22 of the Convention, Parties shall, beginning no later than 2023, evaluate the effectiveness of the Convention. Work is underway to establish arrangements for this effectiveness evaluation that includes a provision for "comparable monitoring data on the presence and movement of mercury and mercury compounds in the environment as well as trends in levels of mercury and mercury compounds observed in biotic media and vulnerable populations".

The Arctic monitoring and assessment work of AMAP, which is underpinned by national monitoring programmes, has been recognized as one of the best examples of a regional mercury monitoring system that can help assess the effectiveness of the Minamata Convention. AMAP is therefore well positioned to continue to support the Convention's further implementation.

Ann Eileen Lennert

WHY MERCURY IS A CONCERN IN THE ARCTIC

AMAP has been tracking mercury pollution in the Arctic for the past 30 years. Despite minimal emissions from human sources within the region, the transport of contamination from outside the region means that mercury levels in the Arctic have increased by a factor of 10 over the last 150 years, although some trends have become more variable in the past three decades.

The rapid warming of the Arctic as the global climate changes is altering how and how much mercury is transported, deposited and cycled through the atmosphere, oceans, soils and vegetation in ways that are difficult to forecast.

Relatively long Arctic food chains result in mercury biomagnifying in some species at the top of the food chain. Because certain high trophic-level species, including marine mammals, form an important part of the traditional diet in some Arctic communities, Indigenous and local people in the region face some of the highest dietary exposures to mercury worldwide.

It is well-established that mercury exposure is linked to adverse health effects in people and wildlife, including neurological and cardiovascular impairments. Studies of Arctic populations have been influential in uncovering these relationships.

For example, human biomonitoring in the Faroe Islands found that children exposed to methylmercury in the womb showed decreased motor function, attention span, verbal abilities and memory. A study of child development in Nunavik found mercury exposure was associated with lower IQ, poorer comprehension and reasoning, and increased risk of attention problems. In adults, exposure has been linked to acceleration of age-related mental decline. There is also some evidence of mercury exposure leading to poorer cardiovascular health, such as high blood pressure, although findings from studies in the Arctic have been inconsistent.

For biota, most species of marine mammals, birds, fish and invertebrates in the region are at low or no risk for health effects from mercury exposure, according to the most recent research. However, geographic hotspots and highly exposed high trophic-level species exist in the region, and mercury remains a cause for concern for some populations of birds and long-lived Arctic marine mammals, including polar bears, pilot whales, narwhals, beluga and hooded seals. In an assessment of studies of a total of 3,500 individuals, across different marine mammal species, age groups and regions, around 6% were judged to be at high or severe risk of health effects from mercury exposure. Similarly, several seabird populations were found to have concentrations of mercury that exceed toxicity benchmarks.

WHAT'S HAPPENING TO **MERCURY LEVELS IN THE REGION?**

Globally, emissions of mercury from human activities have risen in recent years. Emissions of mercury to the atmosphere were estimated to be around 20% higher in 2015 than in 2010. These anthropogenic emissions make up around 30% of total annual global emissions, while emissions from natural sources contribute less than 10%. The remainder is from the re-emission of mercury previously deposited to soils, vegetation and surface ocean waters; much of this is also originally from human sources. Reducing 'new' anthropogenic emissions is therefore the key to reducing the build-up of mercury in the environment, where it can recycle for many decades before it is slowly removed from the system.

However, the picture in the Arctic is complicated. Rising global anthropogenic emissions are not reflected at air monitoring sites in the region, most of which show declining concentrations. This may be because mercury emissions from major source areas that are closest to the Arctic, such as North America and Europe, have declined in recent years, whereas those in more distant regions, particularly Asia, have increased. Climate change may also be a factor, as changes to vegetation and snow cover in the Arctic can alter the uptake and re-emission of mercury. In ocean waters, areas associated with elevated mercury concentrations appear to reflect patterns in aquatic mercury transport and chemistry rather than direct deposition from the atmosphere.

There are several sets of processes that influence the potential risk posed to living things in the Arctic from mercury exposure. Firstly, mercury is transported to the Arctic by the atmosphere, oceans and rivers, where it adds to historic contamination and cycles in Arctic water, soils, sediments, ice, plants and animals. The main forms of mercury transported via the atmosphere are inorganic. Aquatic systems transport both inorganic and organic mercury and a linkage between the organic methylmercury levels in the ocean and wildlife hot-spot areas has been detected.

The assessment provides updated information on, among other things, long-range transport and deposition processes, and summarises advances in our understanding of how atmospheric mercury is transferred to tundra, deposited on glaciers and stored in permafrost, and delivered to the Arctic Ocean. Important new findings relate to the importance of tundra vegetation in the uptake of gaseous mercury from the atmosphere.

Another set of processes controls the conversion of inorganic mercury into methylmercury, a neurotoxicant which bioaccumulates and biomagnifies within food webs. Since the 2011 AMAP assessment, our knowledge has increased regarding the processes that convert inorganic mercury to methylmercury, and which influence its uptake, bioaccumulation and biomagnification. For example, genes within micro-organisms have been discovered which control mercury methylation in thawing permafrost. In addition, our understanding of the role of dissolved organic matter in controlling the methylation and bioaccumulation of mercury has also significantly advanced.

Naturfoto-Online/Alamy Stock Photo

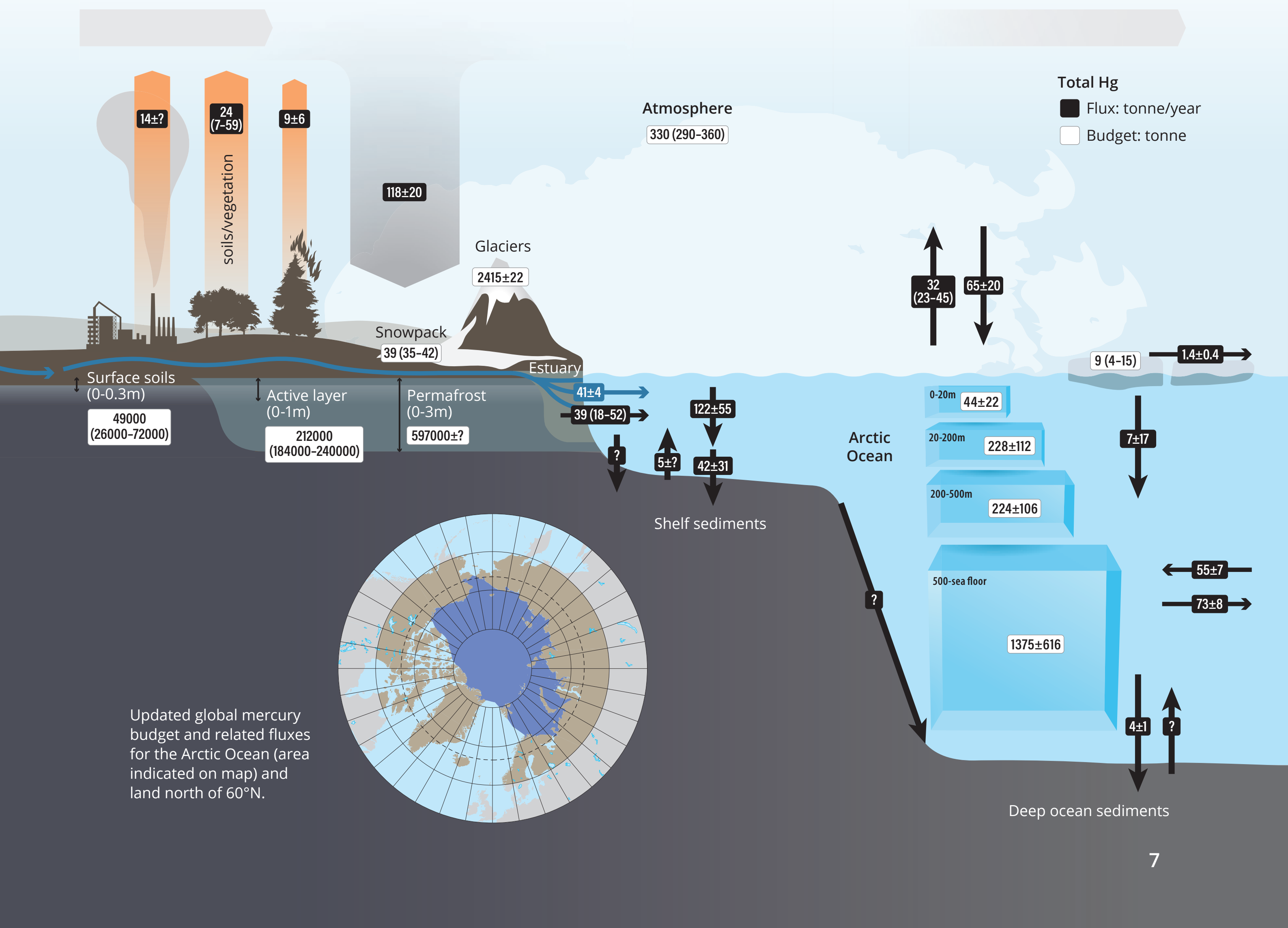
One of the more significant discoveries since the last assessment, however, has been of a methylmercury enrichment layer at shallow depths in parts of the Arctic Ocean. For reasons that are unclear, this layer is much shallower than layers found in other oceans and is habitat for zooplankton and other lower-trophic level marine life. The uptake of this methylmercury by these marine biota could explain the longstanding mystery of why marine mammals in the western Canadian Arctic have higher mercury levels than those in the east.

There has been little research into the uptake of mercury in Arctic food webs, although the length of food chains in the region tends to lead to elevated methylmercury concentrations in top predators, and there is some evidence that cold, low-productivity ecosystems result in higher biomagnification of methylmercury. Mercury bioaccumulation can vary between and within species, depending on factors including diet, migration and growth rates. However, most of the mercury in higher trophic species is present in the form of methylmercury.

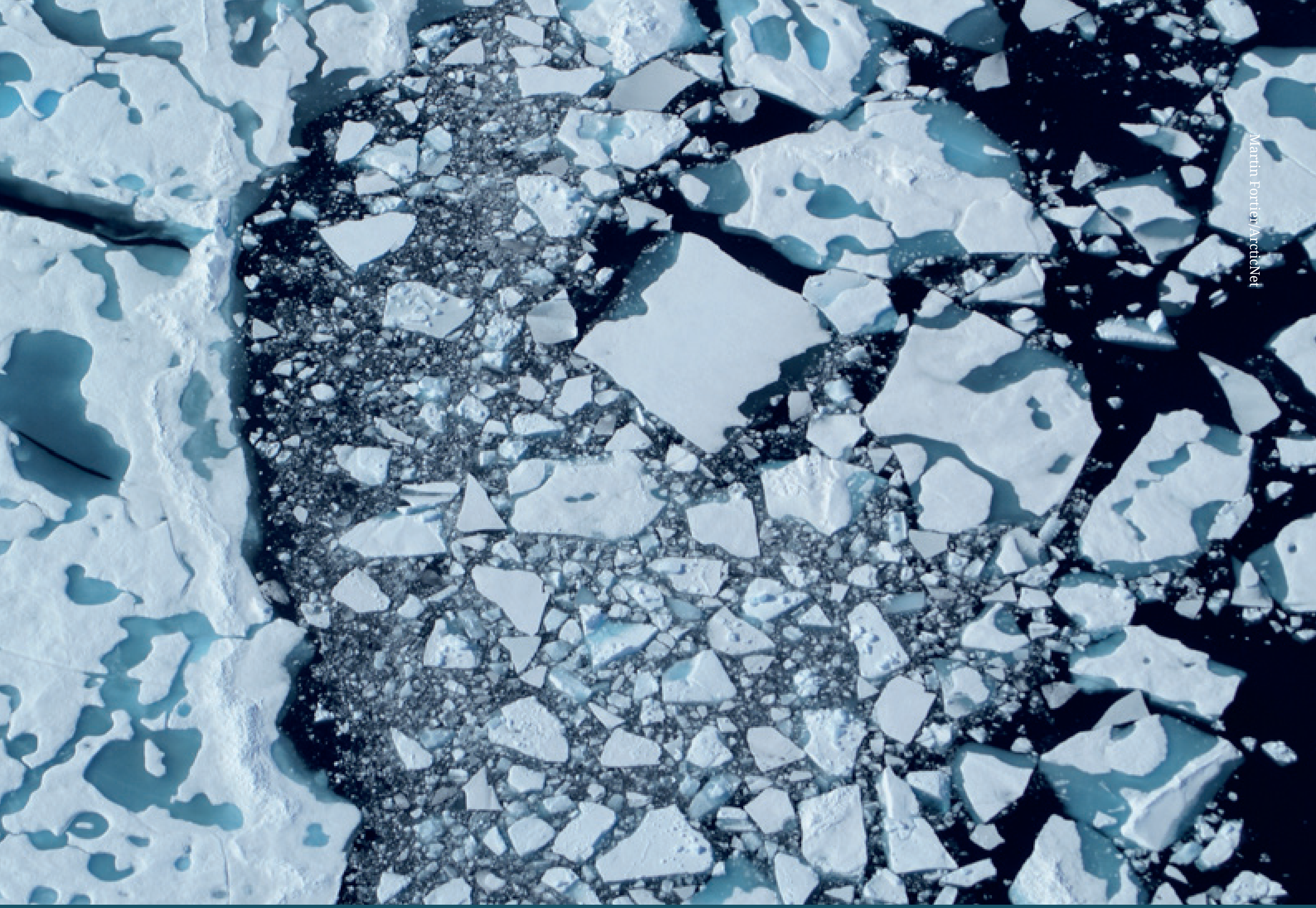
The evidence of changes over time in mercury loads among Arctic wildlife is inconsistent. Of 77 statistically robust time series of mercury concentrations in Arctic biota collected within the last 20 years, 44 showed an increasing trend, 32 showed a decreasing trend, and one showed no change. Studies of polar bear and pilot whale populations found significant increases in some populations, while some ringed seal and beluga whale groups studied showed declining levels.

Methylmercury levels in many human populations in the Arctic are elevated, largely as a result of the consumption of some of these high trophic-level marine species. However, diets are changing among Indigenous Peoples and local communities in the region, with traditional diets becoming increasingly supplemented by store-bought foods. This shift is reducing human exposure to methylmercury, but it is also associated with a poorer and less healthy diet overall, with lower levels of beneficial vitamins and fatty acids, due to the intake of imported processed food. It also has implications for food security and for the cultural identities of these communities.

Despite this transition away from country foods that can be high in methylmercury, recent analysis of mercury exposures found that Inuit in the Arctic remain exposed to some of the highest levels of methylmercury worldwide.



Updated global mercury budget and related fluxes for the Arctic Ocean (area indicated on map) and land north of 60°N.



HOW IS CLIMATE CHANGE INFLUENCING MERCURY IN THE ARCTIC?

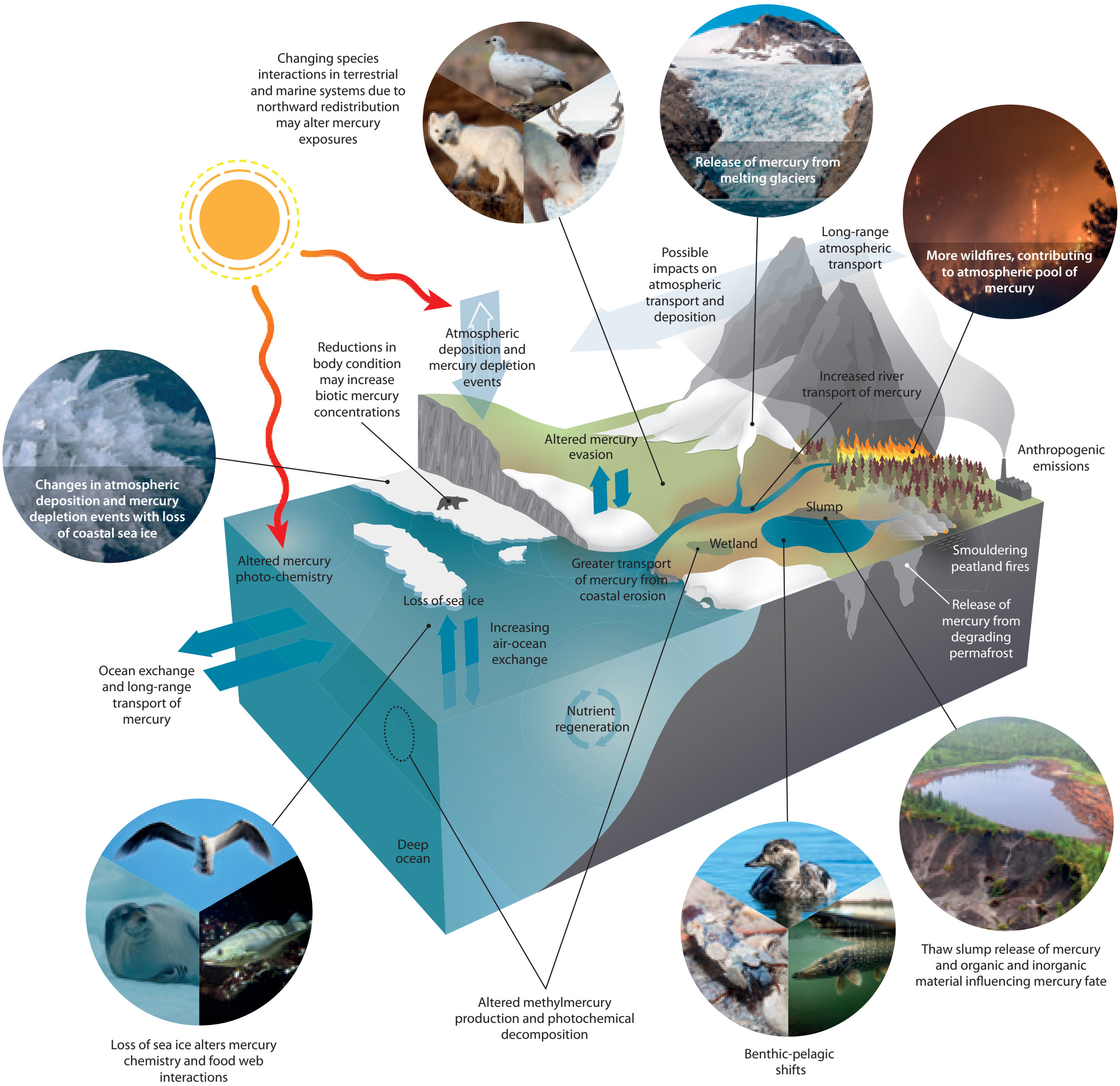
The Arctic is particularly sensitive to climate change, with air temperatures having risen at more than twice the rates seen elsewhere. This is thought to have occurred partly because of a feedback mechanism that includes reductions in sea ice and more open water, allowing the sea surface to absorb more solar radiation, which leads to higher temperatures and further loss of sea ice.

This rapid warming is causing profound changes to the Arctic's physical environment and to its ecological processes, including the distribution of existing species and invasion of new ones. These changes have consequences for how mercury moves through Arctic ecosystems, bioaccumulates in species and biomagnifies in food webs.

Since the last AMAP mercury assessment, substantial empirical, experimental and modelling evidence has emerged of how climate change affects the behaviour of mercury in the Arctic. This evidence supplements hitherto largely theoretical predictions.

This evidence shows that climate change is affecting a number of processes that influence levels of mercury in the Arctic environment and in its biota. These include the transportation of mercury to and within the Arctic, the extent to which mercury is converted by bacteria into the more toxic methylmercury, the biological uptake of methylmercury, and its transfer through food webs.

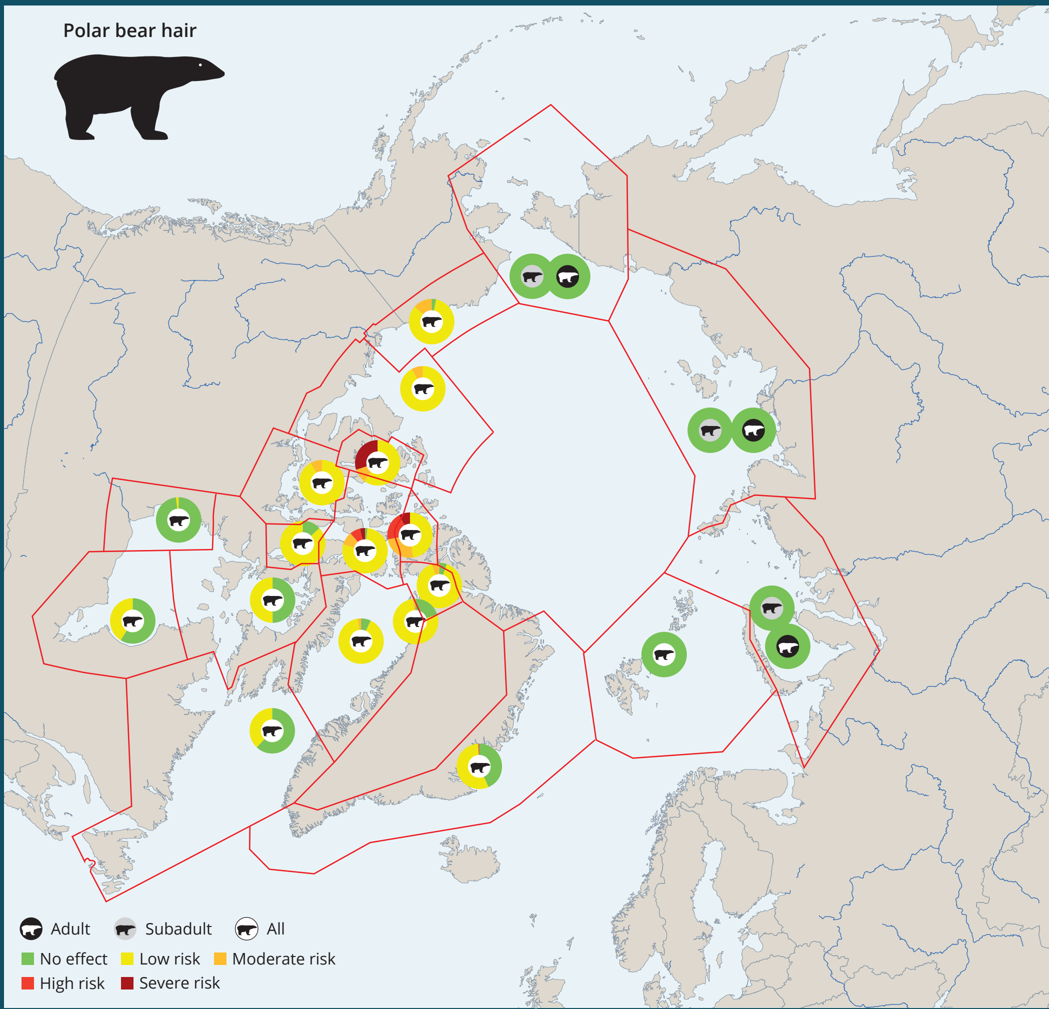
Warmer temperatures and increased storms are thawing permafrost, melting glaciers and eroding coastlines. The clearest evidence of the effects of climate change on the movement of mercury



Climate change is affecting:

Mercury Transport	Mercury Chemistry	Mercury Bioaccumulation
Melting of snow and ice and permafrost thaw increases mercury transport from terrestrial catchments Increasing severity and frequency of wildfires add mercury to the atmosphere Climate impacts atmospheric mercury deposition and re-emission from surfaces	Changes in cryosphere may alter seasonal evasion or retention of inorganic mercury in terrestrial and aquatic environments Warmer temperatures may enhance methylmercury production in thawed permafrost and nearshore marine or lake sediments Sea ice loss may enhance photochemical breakdown of methylmercury in seawater	Benthic-pelagic shifts in diet can enhance mercury bioaccumulation in pelagic species Climate influences mercury concentrations in biota; but effects are complex and difficult to predict Changing food web interactions and body condition affect mercury concentrations in animals

Fernando Ugarte



Proportion of polar bear in different sub-populations that are at risk of mercury-mediated health effects.

within the Arctic is from mercury transport from terrestrial catchments. Permafrost, in particular, is an important global reservoir of mercury; the thawing of permafrost in the Arctic could mobilise vast amounts of mercury. However, it is unclear how, when and whether this mercury will be released. The increasing severity and frequency of wildfires within and beyond the Arctic may also be adding to atmospheric mercury concentrations but, again, the long-term implications are not well understood.

Climate change is also affecting how living organisms absorb and process mercury and its compounds. The spread of vegetation as the region warms – known as Arctic greening – may increase how much atmospheric mercury is accumulated in plants and soils. Warmer temperatures can increase the rate at which bacteria in freshwater and marine sediments, and in tundra soil, convert inorganic mercury into methylmercury. Changes in the ranges and abundance of species due to warmer temperatures may change mercury exposures because of differences in mercury concentrations among prey.

However, it is difficult to untangle and isolate the effects of these various drivers, because they are complex and interact with each other. The effects of climate change are also uneven across the Arctic, over different time periods and between and within species, further complicating efforts to understand and forecast the impacts on Arctic ecosystems.

INDIGENOUS PEOPLES' AND LOCAL COMMUNITIES' CONTRIBUTIONS TO AND PERSPECTIVES ON MERCURY RESEARCH AND MONITORING

Observing and understanding the Arctic environment and its wildlife and vegetation did not begin with scientific monitoring. The knowledge of Arctic Indigenous Peoples about the world around them, passed down through generations and constantly evolving, has been the basis for their survival, their culture and their sense of locality.

Since scientific monitoring began, however, Indigenous Peoples and local communities have played an important role; in several Arctic countries, research on contaminants and mercury exposure would not be possible without their involvement. Also, the value of Indigenous Knowledge and local knowledge is being increasingly recognised by scientists and governments in the Arctic and beyond, and the involvement of Indigenous Peoples and local communities in decisions about research activities has improved their outcomes and risk management and communication.

The assessment documents examples of Indigenous contributions to mercury research and monitoring activities from over 40 Arctic projects across the circumpolar Arctic. Those initiatives include collections of fish and wildlife in sampling programs dating back to as early as the 1970s and community-driven projects to monitor local contaminant priorities. Indigenous Peoples have also participated in human biomonitoring and health studies over the last several decades. These studies have assessed trends of mercury and identified some of the socio-ecological factors of importance that affect those trends and ultimately how mercury impacts the health of the people.

New digital tools are being developed to document Indigenous Knowledge and field observations, but current efforts are particularly directed to Indigenous self-determination in Arctic research, as well as a co-production of knowledge approach, where Indigenous knowledge holders are equitably engaged together with scientists in research and monitoring activities.

How Arctic Indigenous Peoples and local communities are affected has been and continues to be important in building a picture of mercury contamination and in driving national and international regulation. The role of Indigenous Peoples was particularly important in the negotiations that led to the Minamata Convention, helping to put a human face to the threat posed by mercury contamination.

The use of Indigenous Knowledge and Local Knowledge in environmental research and monitoring and associated decision-making processes is part of the mandate of the Arctic Council and its working groups, including AMAP.

Alex Whiting

Bryan Goff

HOW IS MERCURY EXPOSURE LIKELY TO CHANGE IN THE FUTURE?

Mercury concentrations in the Arctic are affected by a combination of factors, including contemporaneous levels of global anthropogenic emissions, natural emissions of mercury, and how past natural and human-caused emissions have been stored, reemitted and recycled through the environment. Estimating future mercury concentrations is therefore complex. It involves an assessment of potential changes both in levels of pollution – driven by economic activity, energy use, regulations and technology use – and of changes to the Arctic climate and environment.

These changes – which are inter-related and sometimes offsetting – will affect concentrations in the Arctic atmosphere, ocean and within food webs over different timeframes. Atmospheric concentrations in the Arctic can be expected to respond to changes in mercury emissions within months, while changes to concentrations in the Arctic Ocean will lag significantly, over years and decades, and be influenced to a greater degree by biological, chemical and geological processes.

For example, the loss of sea-ice caused by climate change will allow for greater evaporation of mercury from the Arctic Ocean, leading to lower concentrations in surface waters. Conversely, increased river run-offs will add more mercury to the ocean. More extensive wildfires and the thawing of permafrost will both increase the re-emission of mercury. On the other hand, Arctic greening will increase the deposition of mercury.

Modelling carried out for the 2021 AMAP Mercury Assessment shows that future controls on mercury emissions around the world, consistent with ambitious policy implementation trajectories under the Minamata Convention, could lower mercury in the Arctic environment in the coming decades. However, delays to introducing controls on emissions could have a substantial impact on mercury concentrations.

Specifically, after controlling for uncertainties in emissions and depositions, the model projections suggest that the difference between the most stringent controls and a scenario where no action is undertaken could be as high as 36% in mercury concentrations in Arctic Ocean surface waters by 2050. The modelling indicates that even modest delays in action to reduce mercury emissions would have significant adverse effects on concentrations in the Arctic, suggesting that delaying implementation of controls on mercury pollution from 2020 to 2035 could lead to 5% more mercury in surface waters by 2050.

WHAT SHOULD POLICY-MAKERS CONSIDER IN RESPONSE TO THE CHALLENGES OF MERCURY POLLUTION IN THE ARCTIC?

- Future concentrations of mercury in the Arctic environment will be substantially influenced by future global anthropogenic emissions. While less than 2% of these mercury emissions are from within the Arctic, Arctic Council member states and observer countries account for around 44% of global human-made emissions. Arctic Council members and observers are therefore well-placed to show global leadership under the Minamata Convention, and also regionally.
- Parties to the Minamata Convention are required to evaluate the effectiveness of the Convention. Given its explicit reference of the vulnerability of Arctic populations to mercury pollution, enhanced and more harmonized monitoring of exposure pathways and risks to human and wildlife populations in the region is needed.
- Climate change is altering how mercury is transported to and within the Arctic, and how it accumulates and cycles through the Arctic environment and living creatures. These changes are complex, inter-related and difficult to predict. The interconnected nature of mercury contamination and climate change requires efforts at both the science and policy levels to mitigate both challenges facing the Arctic which will also require interdisciplinary research approaches and funding to support them.
- To better differentiate between the above-mentioned drivers of the observed long-term trends of mercury in the Arctic, there is a need to supplement existing monitoring programs with ancillary data that enables better analysis of cause-effect relationships. This information will be critical for policy-makers who try to direct resources in a cost-efficient manner and for evaluating the likely consequences of already-implemented or planned policy and management action. To the extent possible, these studies should be conducted with the involvement of the various stakeholders who are best placed to influence the identified drivers.
- The development of collaborative processes and partnerships between Arctic Indigenous Peoples, local communities, and scientists, including equitable engagement of Indigenous Peoples, is key to the success of long-term research, monitoring and risk management and communication in the region. Such processes depend on good communication practices and transparency, ethical research guidelines and sustained funding.

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RECOMMENDATIONS

Based on the findings of this AMAP assessment, the AMAP Working Group recommends the following steps:

1 INCORPORATING KNOWLEDGE INTO PROCESSES SUPPORTING POLICY-MAKING:

Arctic Council member states continue and where appropriate expand mercury monitoring in the region to provide the information necessary to inform Arctic policy- and decision-making and **support activities including Minamata Convention effectiveness evaluation** and UN ECE Air Convention (Convention on Long-Range Transboundary Air Pollution).

Specifically, this should include: enhanced geographical coverage; sample matrices, including seawater; and river inorganic and methylmercury. This monitoring should be designed to support feasible and cost-effective management strategies. Monitoring and decision-making should involve the close participation and equitable engagement of Indigenous People and Local Communities.

2 REAFFIRMING CALLS FOR ACTION ON MERCURY:

Arctic Council member states and observers strengthen efforts to reduce primary emissions of mercury and continue to support the further implementation of the Minamata Convention. Implementing global action to reduce mercury emissions and releases is the key to reducing mercury environmental contamination in the Arctic, and therefore reducing adverse impacts on Arctic wildlife and human populations.

Arctic States, in addition to taking action on global emissions, consider taking independent actions to address existing mercury sources within the Arctic region that have the potential to contaminate local food resources, in particular traditional foods that are consumed by Indigenous Peoples and other Arctic residents.

Emissions sources may be exacerbated by the direct and indirect impacts of climate change, including increased human activity, permafrost degradation, flooding and increasing occurrence of wildfires. Addressing these sources is therefore part of a wider strategy to mitigate the impacts of climate-change related phenomena that add to threats to Arctic ecosystems, and Indigenous Peoples' and other Arctic residents' food security and safety.

3 EXTENDING THE KNOWLEDGE BASE ON MERCURY IN THE ARCTIC:

Governments of Arctic States and observer countries, and international and national research funding agencies:

Expand studies considering the impact of climate change and related ecosystem changes on long-range transport of mercury to the Arctic and its cycling and fate in the Arctic. Of particular importance are further investigation of methylmercury production in Arctic marine environments, particularly in zones which enhance uptake in the food web, and improved modelling of climate change influences on processes that affect mercury transport and fate in order to evaluate source-receptor impacts.

Encourage interdisciplinary research that reflects the complexity of physical, chemical and biological processes including multidisciplinary studies evaluating the long-term consequences of climate change and other drivers on biota exposure to mercury, and the cumulative effects of mercury and other environmental contaminants and stressors resulting from climate change and other drivers of anthropogenic origin.

Continue and extend the geographical scope of long-term contaminant monitoring programmes, including continued temporal trend monitoring of mercury in Arctic air and biota, with enhanced program designs to resolve effects of local environmental processes from anthropogenic drivers. Continuing and expanding biomonitoring to improve understanding of key human and wildlife exposure pathways to mercury and track potential health risks in the context of the impact of climate change on food security and safety is also a priority in this context.

Promote increased co-production of knowledge by supporting further development of partnerships between Indigenous Peoples and scientists, using best practices, for research and monitoring of mercury in the Arctic. Engaging with other stakeholders, such as local government and public health authorities is also essential, to ensure that information relevant to policy- and decision-making at the local scale is acted on in an effective manner.

ADDRESSING NEW FINDING

REINFORCING MESSAGE

ADDRESSING KNOWLEDGE GAPS

AMAP, established in 1991 under the eight-country Arctic Environmental Protection Strategy, monitors and assesses the status of the Arctic region with respect to pollution and climate change. AMAP produces science-based policy-relevant assessments and public outreach products to inform policy and decision-making processes. Since 1996, AMAP has served as one of the Arctic Council's six working groups.

The basis for this summary, the **AMAP Assessment 2021: Mercury in the Arctic** report, is one of several reports and assessments published by AMAP in 2021. Readers are encouraged to review this, and the reports below, for more in-depth information on climate and pollution issues:

- *AMAP Assessment 2020: POPs and Chemicals of Emerging Arctic Concern: Influence of Climate Change*
- *AMAP Assessment 2021: Impacts of Short-lived Climate Forcers on Arctic Climate, Air Quality, and Human Health*
- *AMAP Assessment 2021: Human Health in the Arctic*
- *AMAP Arctic Climate Change Update 2021: Key Trends and Impacts*

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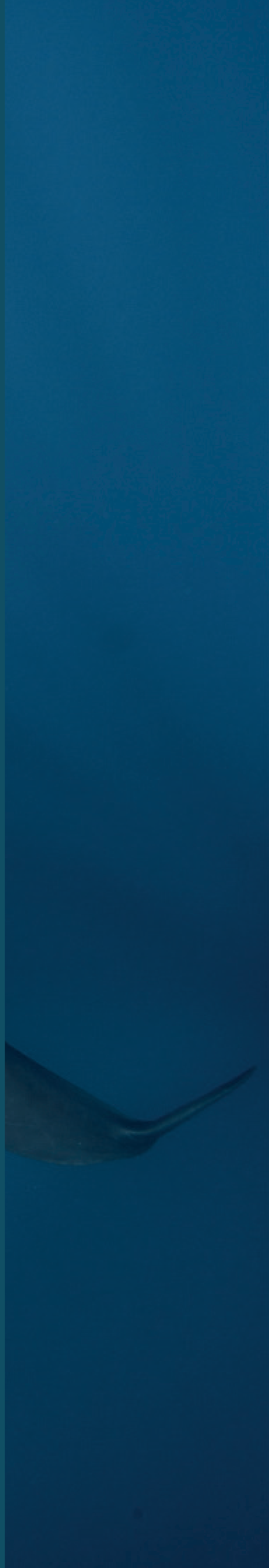

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