

Working Towards Implementing Litter and Microplastics Monitoring at the Pan-Arctic Level



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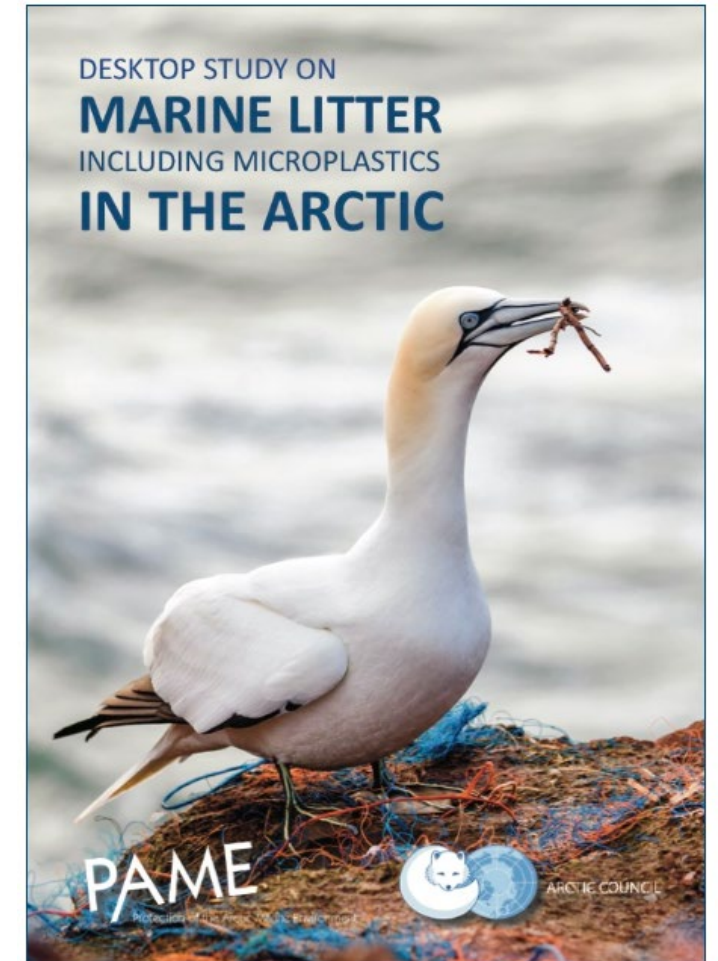
Status of Plastic Pollution science in the Arctic

PAME conducted the “Desktop Study on Marine Litter, including Microplastics in the Arctic” as part of the first phase of a Marine Litter Project included in the 2017-2019 Work Plan. The objectives of the Desktop Study are to:

- evaluate the scope of marine litter in the Arctic and its effects on the Arctic marine environment;
- enhance knowledge and awareness of marine litter in the Arctic;
- enhance cooperation by the eight Arctic States; and
- contribute to the prevention and/or reduction of marine litter pollution in the Arctic and its impact on marine organisms, habitats, public health and safety, and to reduce the socioeconomic costs litter causes.

Spatial and temporal trends of Litter and Microplastics in the Arctic due to a lack of standardized/harmonized data in the region.

No trend analysis available.



Arctic Monitoring and Assessment Program's (AMAP) – Litter and Microplastics Expert Group (LMEG)

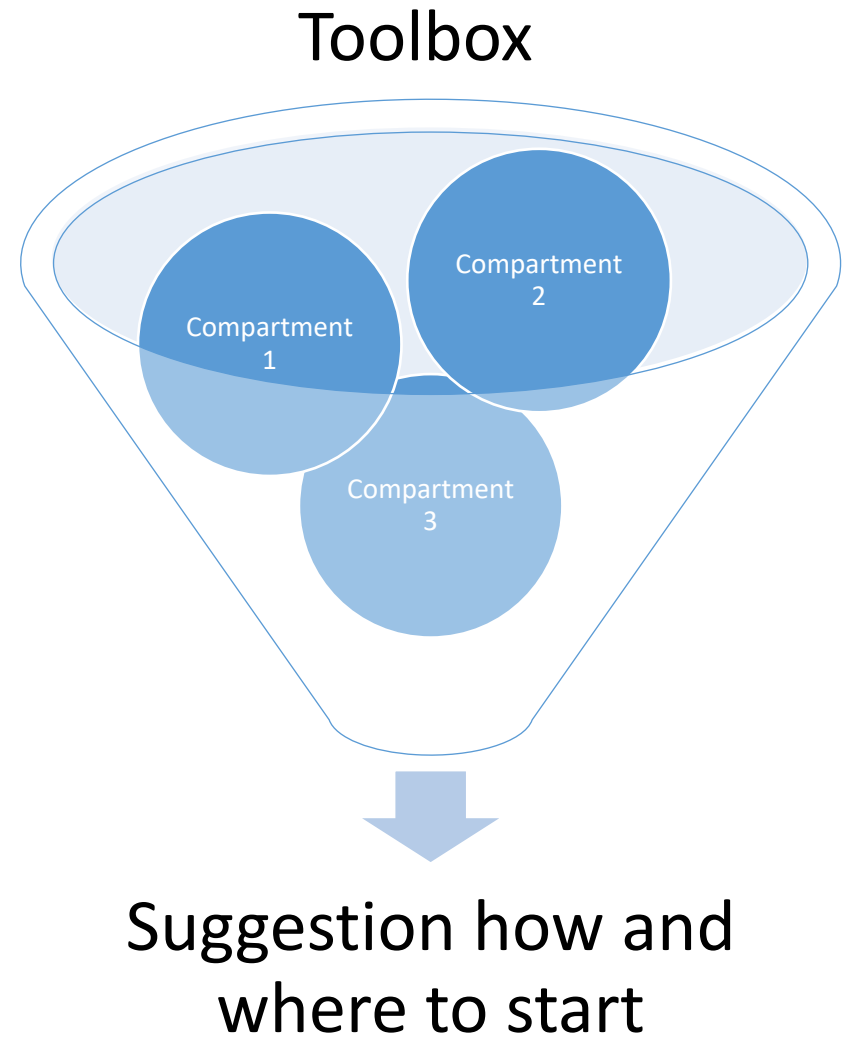
	Number of experts	General areas of expertise
Norway	12	Biota, sediments, soil, atmosphere, water, seabed, data, QAQC
Canada	8	Biota, sediments, soil, atmosphere, water, data, QAQC, community lead research
Kingdom of Denmark	6	Biota, sediments, atmosphere, water, data, QAQC, community lead research
Iceland	2	Biota, sediments, water, data, community lead research
Sweden	3	Biota, sediments
Finland	1	Biota, sediments
USA	1	Shorelines, biota, data, QAQC, community lead research
Germany	5	Biota, water, seabeds, QAQC, data
Italy	2	Biota, water, seabeds, QAQC

Monitoring guidelines vs Monitoring plan

Guidelines:
methodological details
(tools)

VS

Monitoring plan:
Prioritisation



266 pages



24 pages

An ecosystem approach to monitoring *physical* litter and microplastics



Mammals

Birds

Fish

Invertebrates



Shorelines

Aquatic sediments

Atmospheric deposition

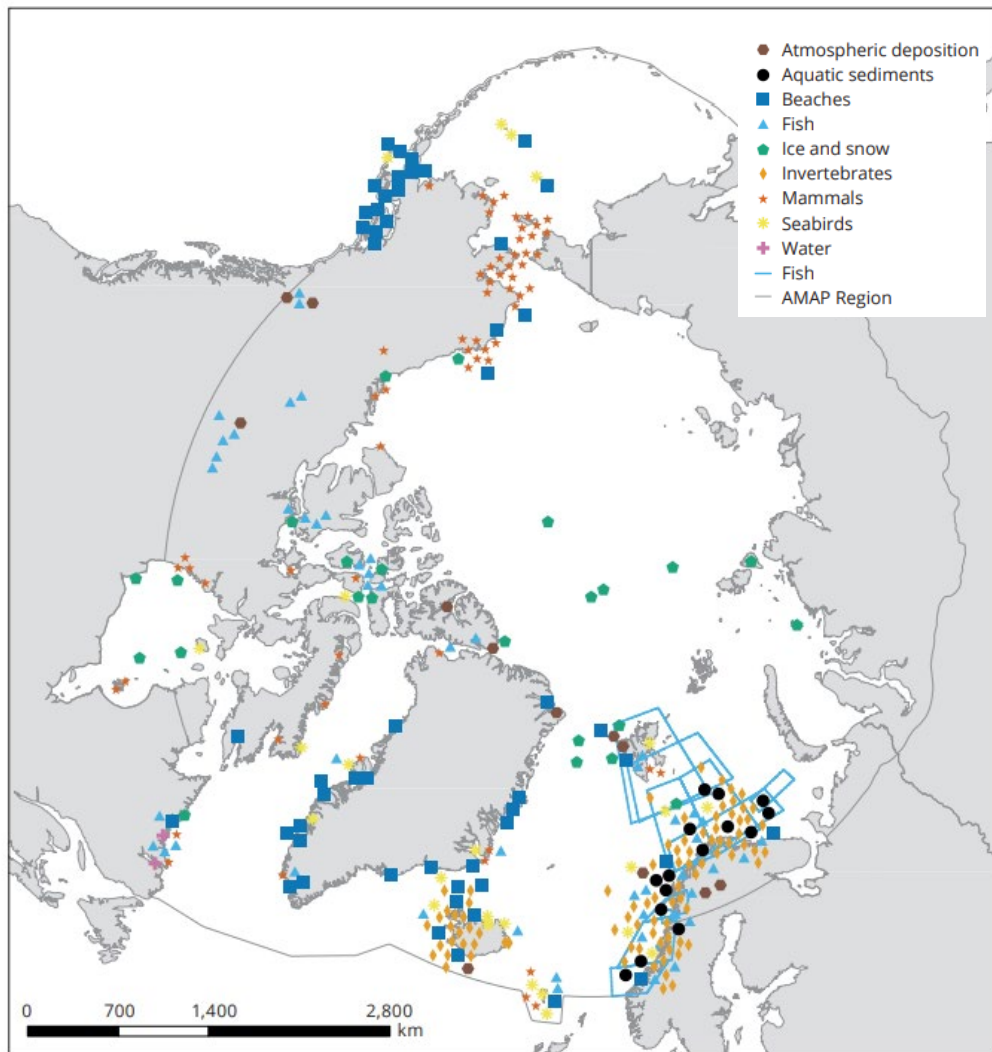
Snow/ice

Water (freshwater and sea)

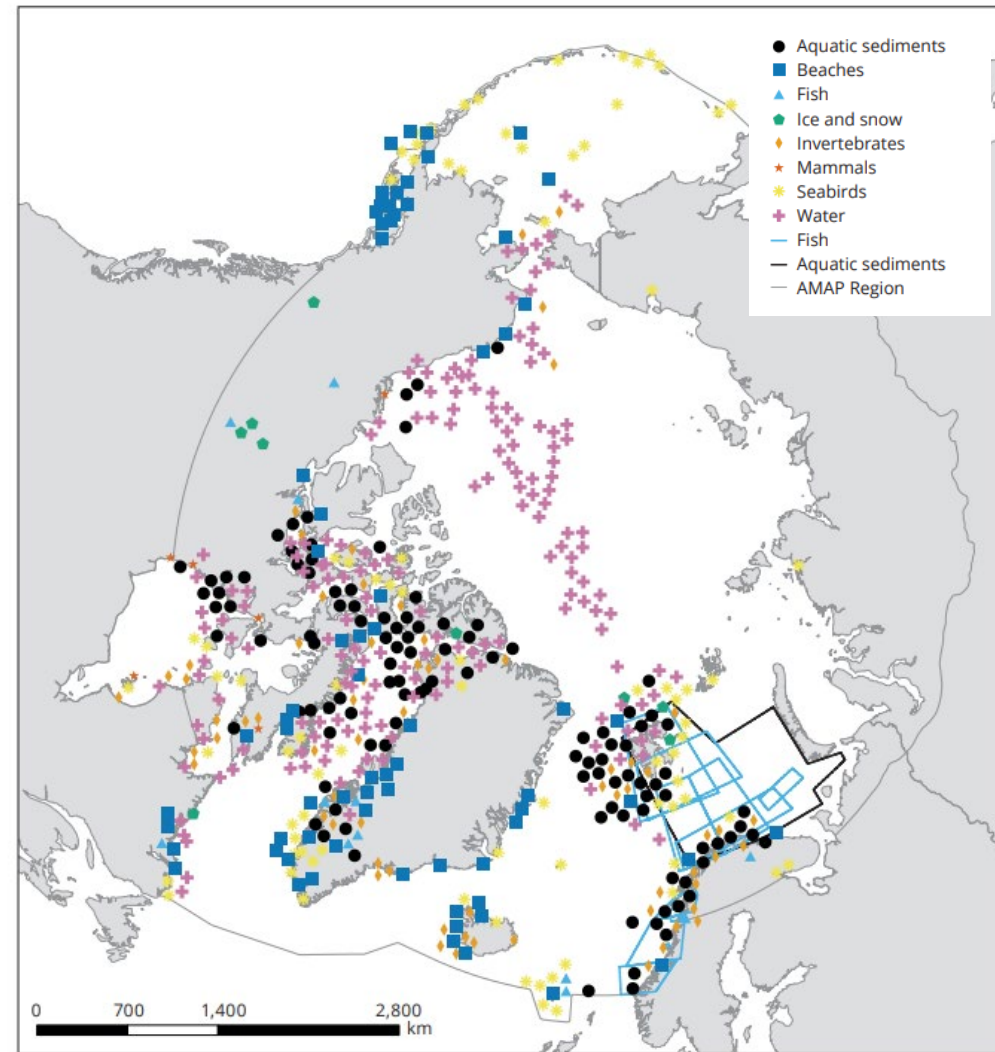
Terrestrial soils

Seabed

Existing monitoring programs



Existing litter and microplastics data



AMAP monitoring guidelines: -Recommendations on 3 levels

For sediments:



	1 st level (must do)	2 nd level (should do/develop)
Monitoring	<ul style="list-style-type: none"> – Visual analysis of microplastics content – Size categories 300 µm – 1 mm and 1 -5 mm. – Categories for shapes and colour. – Analysis on polymer ID of a selection of relevant microplastics particles ≥300 µm. 	<ul style="list-style-type: none"> – Point source studies. – Visual analysis and polymer ID of microplastics particles ≥100 µm.
Research	<ul style="list-style-type: none"> – Automated analysis on polymer ID of microplastics <100 µm. – Determination of deposition areas and microplastic fate processes. – Mass-based units for microplastic contents. – Strategies for sampling shoreline and beach sediments for microplastic analysis. 	

Monitoring plan - prioritisation

- Standardized or harmonized protocols implemented
- Accumulation of litter and/or microplastics documented
- Historical data available in several Arctic regions
- Based on currently available methods
- Low effort to establish sampling
- Methods aligned with litter and microplastic monitoring outside the Arctic, ensuring that Arctic data can be utilized in future broader international or global assessments.



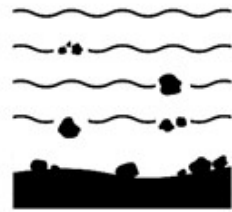
AMAP priority recommendations for monitoring



Priority 1
Immediate trend
monitoring



Water



Aquatic sediments



Beaches/shorelines



Seabirds

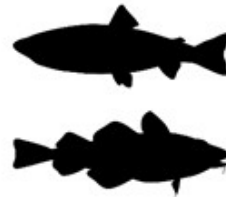
Priority 2
Initial baseline
mapping and future
trend monitoring



Atmospheric deposition



Invertebrates



Fish

Priority 3
Sampling and
measurement
development
needed



Seabeds



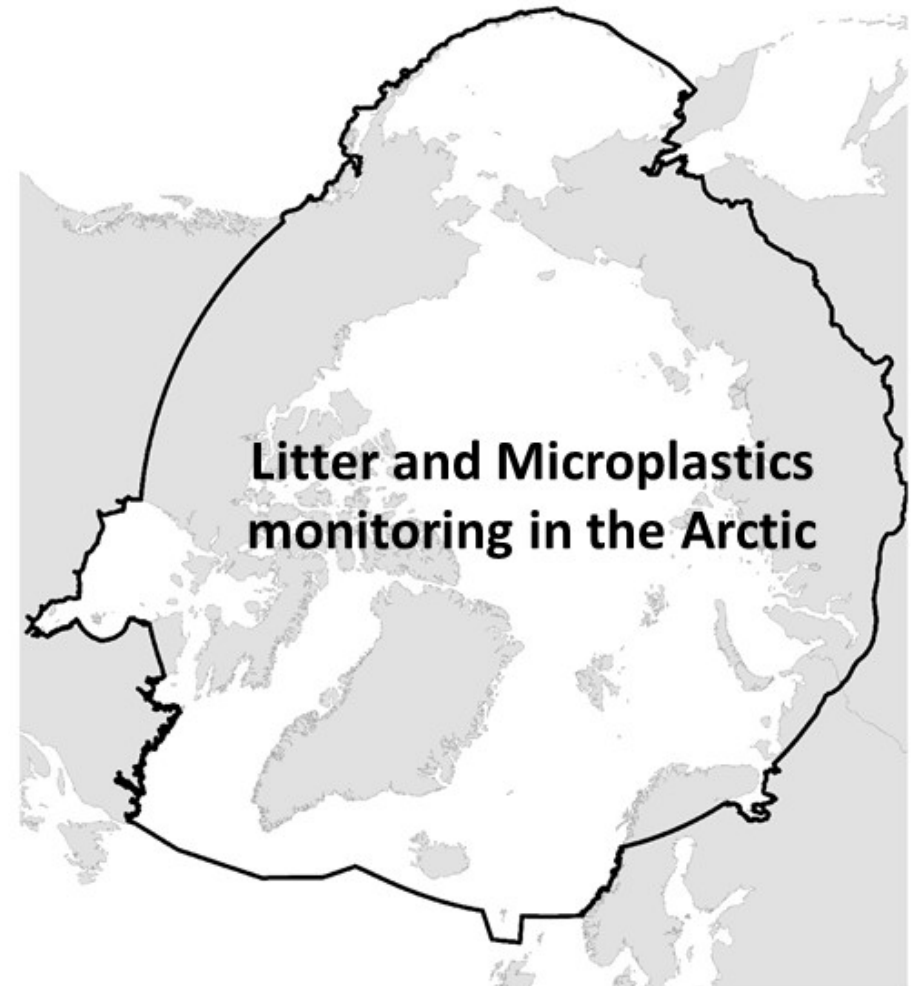
Ice/snow



Terrestrial soils



Mammals

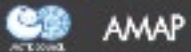


First ecosystem level assessment and plan!



OVERVIEW OF AMAP
INITIATIVES FOR
**MONITORING AND
ASSESSMENT OF PLASTIC
POLLUTION IN THE ARCTIC**

ARCTIC MONITORING & ASSESSMENT PROGRAMME



4 page summary



AMAP
**LITTER AND
MICROPLASTICS**

MONITORING PLAN
ARCTIC MONITORING & ASSESSMENT PROGRAMME



24 page Monitoring Plan



AMAP
**LITTER AND
MICROPLASTICS**

MONITORING GUIDELINES
ARCTIC MONITORING & ASSESSMENT PROGRAMME

Version 1.0



266 page technical guidelines

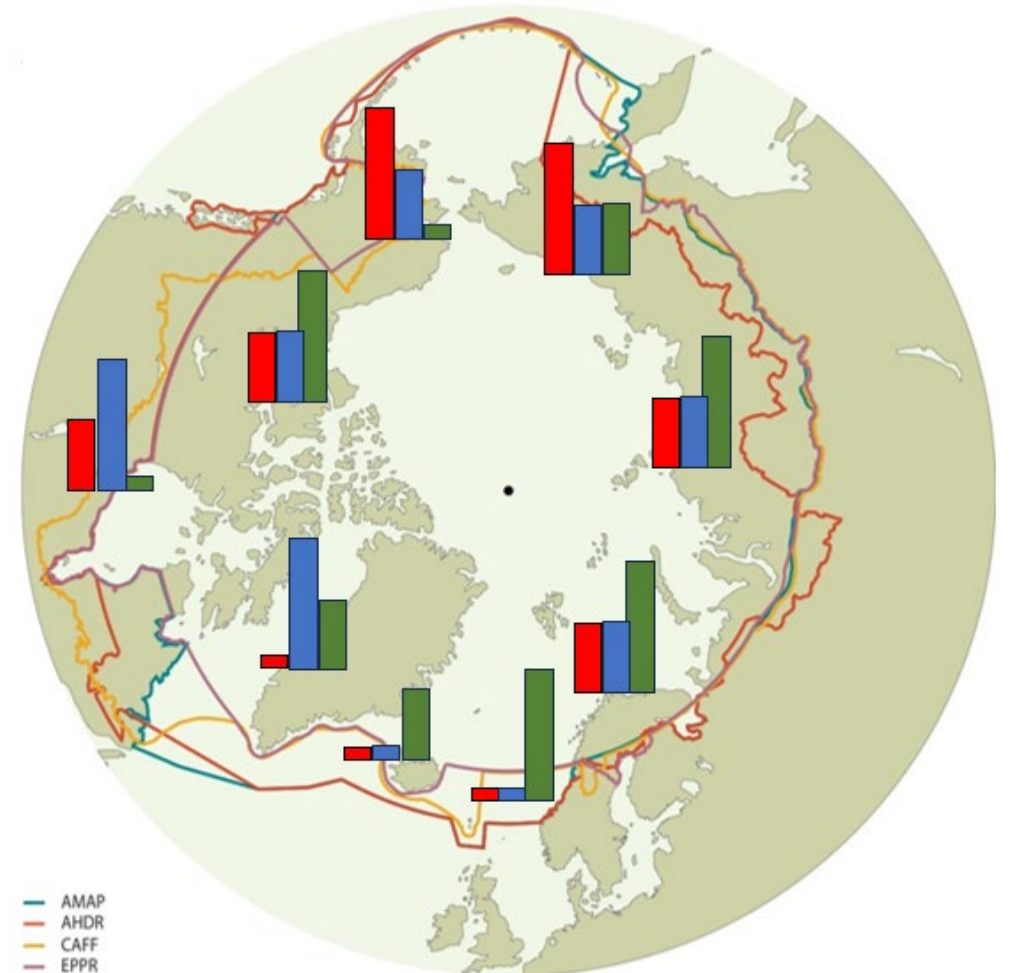
But, sometimes reports are limited....



- Special Collection of *Arctic Science* (<https://cdnsiencepub.com/topic/as-litter-microplastics>)
- Now online, all Open Access

Papers in the Special Issue	
An ecosystem-scale litter and microplastics monitoring plan under the Arctic Monitoring and Assessment Programme (AMAP)	Provencher et al. 2022
Microplastics in the <u>atmosphere and cryosphere</u> in the circumpolar North: a case for multicompartment monitoring	Hamilton et al. 2022
The power of multi-matrix monitoring in the Pan-Arctic region: plastics in <u>water and sediment</u>	Martin et al. 2023
Monitoring litter on Arctic and subarctic <u>shorelines</u> : current status and next steps for monitoring programs	Pollet et al. 2023
Status and future recommendations for recording and monitoring litter on the Arctic <u>seafloor</u>	Grøsvik et al. 2023
Monitoring litter and microplastics in Arctic <u>mammals and birds</u>	Lusher et al. 2022
Microplastics in Arctic <u>invertebrates</u> : status on occurrence and recommendations for future monitoring	Grøsvik et al. 2023
Current efforts on microplastic monitoring in Arctic <u>fish</u> and how to proceed	Kögel et al. 2023
Monitoring of microplastic pollution in the Arctic: recent developments in polymer identification, quality assurance and control, and data reporting	Primpke et al. 2023
Plastics as a carrier of chemical additives to the Arctic: possibilities for strategic monitoring across the circumpolar North	Hamilton et al. 2023
Future monitoring of litter and microplastics in the Arctic—challenges, opportunities, and strategies	Provencher et al. 2023

Observation – Collection – Handling/management – Analysis



Thanks for
listening!

