



Agenda Item 4

AMAP HoDs April 2019/4.3/1

Washington DC, USA, 1-3 April 2019

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## Microplastics and Litter Work Plan

**Presented by Jennifer Provencher (Canada) and AMAP Secretariat**

**8 March 2019**

### Background

PAME is conducting a desktop study on marine litter in the Arctic region. The draft study report recommends developing a *regional action plan on marine litter in the Arctic*. It is further recommended that the action plan should include monitoring.

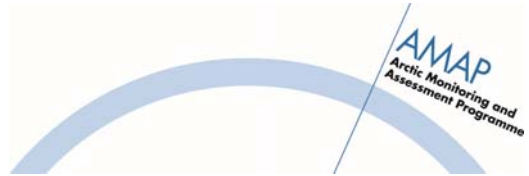
The document has been drafted by a group of experts on litter and microplastics from Canada, Denmark, Iceland and USA and has been presented to earlier AMAP HoDs and WG meetings.

At a telephone conference among AMAP Tracking HoDs on 14<sup>th</sup> February, a request was raised to update the document to address these topics:

1. The Terms of Reference for the work currently reads: *The programme should be designed to secure the necessary information that can quantify and document levels, trends and impact/effects of microplastics and litter in the Arctic marine environment*. Text should be added to emphasize that the work will be a phased approach. The long term goal is also to cover impacts/effects, but this should not be included in the current phase.
2. The text should clarify which parts of the monitoring guidelines that will cover litter, and which parts that will cover other size classes (and which).
3. The text should clarify the matrices (atmosphere, marine, terrestrial) that are covered.
4. Text on Community Based Monitoring (CBM) should be added.
5. The text should reflect that the work will be aligned with UNEP efforts within this area.

At the telephone conference, tracking HoDs also asked the AMAP Secretariat to invite the Sustaining Arctic Observing Networks (SAON) to provide information/expertise within this area.

Jennifer Provencher has been nominated to represent AMAP at planning group for the *International Symposium on Plastics in the Arctic and Sub-Arctic Region, Reykjavik, 21-23 April 2020*.



### Requests to HoDs:

1. Review and approve the work plan and formally establish the Expert Group
2. Identify Lead countries and Chairmanship
3. Discuss the nature of any cross-WG (AMAP, ACAP, CAFF and PAME) cooperation
4. Discuss the nature of the deliverable. Should this be a stand-alone document or for instance a chapter in the AMAP monitoring guidelines? Should this alternatively be a chapter in the anticipated *regional action plan*? Or a combination?



# Microplastics and Litter Work Plan

## 1. Background

Concern about microplastics and litter in the environment has been raised at global (CBD, UNEP, etc.) and regional (Arctic Council Ministerial, EU, OSPAR, Nordic Council) level. The *Working Group on Marine litter plastics and microplastics and its POPs and EDC components: Challenges and measures to tackle the issue* (UNEP) discussed the potential impacts of marine plastics on marine biodiversity and human health (November 2016).

The Nordic ministerial declaration (2017) on reducing the environmental impacts of plastics states that the Nordic countries aspire to be driving forces in efforts to promote a sustainable approach to the production, use, waste management and recycling of plastics, and has taken the decision to launch a programme to follow up this issue.

The declaration from the Arctic Council Ministerial (2017) note (...) *growing concerns relating to the increasing levels of microplastics in the Arctic and potential effects on ecosystems and human health.*

The Arctic Council Working Group *Protection of the Arctic Marine Environment* (PAME) is conducting a desktop study on marine litter in the Arctic region. The draft study report (3rd draft, 30th November 2018) recommends developing a *regional action plan on marine litter in the Arctic*. It is further recommended that *an Action Plan could consider the following areas, now or in the future:*

- *Knowledge Gaps*
- *Monitoring/Science*
- *Education and Outreach*
- *Removal Actions*
- *Actions to combat sea and land based sources.*

*Developing a monitoring program as part of, or parallel to, the development of a regional action plan is of great importance in gaining knowledge and information.*

Current knowledge on microplastics in the Arctic environment includes:

- Microplastic have been detected in sediments, seawater, sea-ice and biota in the Arctic.
- Most plastic particles found in the Arctic likely come from the southern, highly populated areas as there are few local sources. Nanoplastic may be coming from local sources due to lack of sewage treatment in most local communities; and larger pieces breaking down in the environment. Local traffic is another source. Although robust time trend data is unavailable, an increasing number of animals in the Arctic are being found in ingest and accumulate plastics.
- There is a lack of knowledge with regard to the health effects of plastic ingestion in Arctic animals and humans.



## 2. AMAP Expert on Microplastics and Litter. Terms of Reference

Despite the significant increase in available data on microplastic pollution and litter debris globally, including the Arctic, status reports lack standardization in methodology and reporting consistency. For macroplastics methodology exists in some regions (e.g. OSPAR). For microplastics there are at present no harmonised measurements, monitoring methods or environmental indicators. How the extreme environmental conditions of the Arctic might affect plastic transport and degradation processes is not yet known. Emerging knowledge from lower latitudes may not be transferable to the Arctic environment, so studies specific to Arctic conditions are needed.

The purpose of the project is to review existing knowledge and give advice on what an Arctic monitoring programme needs to cover and to design this. These topics are addressed in many fora, and the work should be built on information already existing in other programmes like HELCOM, ICES, OECD, and UNEP. It should in particular be noted that monitoring data for plastic litter on beaches in Europe have been collected under the OSPAR Convention since 2001.

Since plastic pollution is also very much a local problem in Arctic communities, monitoring guidelines and references need to be including community-based monitoring projects, to enable communities to do their own plastics monitoring and allow for the results to be comparable across the Arctic. Several such projects have been already initiated in the Canadian Arctic that can/should be drawn on with regards to effective methods.

The Expert Group should:

1. Design a program for the monitoring of microplastics and litter in the Arctic environment that is harmonized with OSPAR in particular for litter that is applicable throughout the Arctic, and in particular in regions where OSPAR does not apply. The programme should be designed to secure the necessary information that can quantify and document levels, trends and impact/effects of microplastics and litter in the Arctic environment.
2. Develop necessary guidelines supporting the monitoring program. The guidelines should include
  - a. The biotic as well as the abiotic environment;
  - b. Guidance on matrix and site selection;
  - c. Standardised sampling and analytical methods;
  - d. Quality Assurance (QA) procedures;
  - e. Data management and data reporting;
  - f. To the extent possible, standardised methods for the assessment process.
3. Formulate recommendations on these topics and identify those areas where new research and development is necessary from an Arctic perspective.

The work should take a phased approach; while *impact and effects* should be the long term goal for the work, the current phase should only cover abundance.



### 3. Monitoring guidelines. Table of contents

1. Importance of Standardized Monitoring Approaches (background on OSPAR, both the beach and seabird work to date)
2. Existing Frameworks for monitoring Plastics (i.e. OSPAR, NOAA, UNEP, etc.) and why we need something in the Arctic. (Most of Arctic not covered by OSPAR)
3. Abiotic compartments for litter and plastics monitoring targeted for discussion within this first work plan
  - a. Air
    - i. Summary of information to date
    - ii. Collection methods
      1. Field methods (surface, at depth, within the water column)
      2. Field blanks
      3. Lab blanks
      4. Processing of samples to separate plastics/litter from the matrix
  - b. Water (marine and freshwater)
    - i. Summary of information to date
    - ii. Collection methods
      1. Field methods (surface, at depth, within the water column)
      2. Field blanks
      3. Lab blanks
      4. Processing of samples to separate plastics/litter from the matrix
  - c. Sediments (aquatic and terrestrial sediments)
    - i. Summary of information to date
    - ii. Collection methods
      1. Field methods (grabs at depth, coring, beach samples)
      2. Field blanks
      3. Lab blanks
      4. Processing of samples to separate plastics/litter from the matrix



- d. Ice (from lakes and rivers, glacier cores, sea ice)
  - i. Summary of information to date
  - ii. Collection methods
    - 1. Field methods
    - 2. Field blanks
    - 3. Lab blanks
    - 4. Processing of samples to separate plastics/litter from the matrix
  
- e. Beaches
  - i. Summary of information to date
  - ii. Collection methods to be harmonized with OSPAR
    - 1. Site selections
    - 2. Transects
    - 3. Collection
    - 4. Identification of litter (visual and others)
    - 5. Identification of plastics (all size classes, including a discussion of what size classes it is appropriate to measure in these types of samples, including the limitations)
  
- 4. Biotic compartments for litter and plastics monitoring
  - a. Bivalves
    - i. Summary of information to date
    - ii. Collection methods
      - 1. Site selections
      - 2. Species
      - 3. Processing of samples
  
  - b. Fish
    - i. Summary of information to date
    - ii. Collection methods

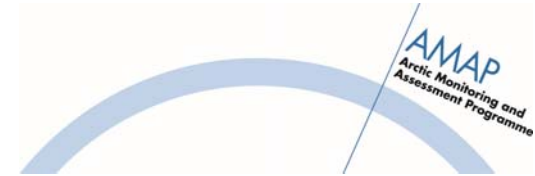


1. Site selections
    2. Species
    3. Collection
    4. Processing of samples
  - c. Birds
    - i. Summary of information to date
    - ii. Collection methods
      1. Site selections
      2. Species
      3. Collection
      4. Processing of samples
  - d. Mammals
    - i. Summary of information to date
    - ii. Collection methods
      1. Site selections
      2. Species
      3. Collection
      4. Processing of samples
5. Cross cutting issues
  - a. Brand audits examples and QA procedures
  - b. Plastic processing once they are removed from different matrices
    - i. Identification of litter (visual and others)
    - ii. Identification of plastics (all size classes, including a discussion of what size classes it is appropriate to measure in these types of samples, including the limitations)
    - iii. Clean environments for processing, which will differ by matrix
  - c. Data treatment, management and reporting



- i. Data treatment, presentation and availability of data in standalone studies (recommendations for authors wanting their data to contribute to such assessments, see Provencher et al. 2017 *Analytical Methods* for an example from seabirds)
  - ii. Data management (national databases, other databases, data archiving, who is managing and ensuring the data is accessible)
  - iii. Data sharing and archiving (where does this data go? Both within single studies, and beyond)
- d. Polymer Identification, methods
- e. Other, if identified



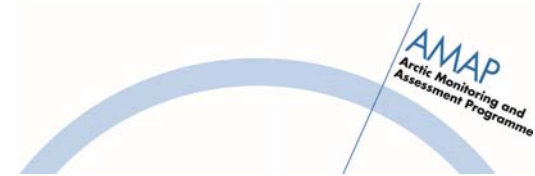


#### 4. Monitoring guidelines. Authorship

Expert Group leadership: Norway and ???

	Lead(s)	Contributing authors	Litter (>5mm)	Micro, nano, and other fractions (≤5mm)
1. Importance of Standardized Monitoring Approaches		Peter Murphy (USA)	X	X
2. Existing Frameworks for monitoring Plastics		Peter Murphy (USA)	X	X
3. Abiotic compartments for litter and plastics monitoring targeted for discussion within this first work plan				
a. Air		Liisa Jantunen (Canada) Pernilla Bohlin Nizzento (Norway)		X
b. Water (marine and freshwater)	Amy Luscher (Norway)	Jesse Vermaire (Canada) Peter Ross (Canada)	X	X
c. Sediments (aquatic and terrestrial sediments)	Amy Luscher (Norway)	Jesse Vermaire (Canada) Kerstin Magnusson (Sweden) Maria Granberg (Sweden)	X	X
d. Ice (from lakes and rivers, glacier cores, sea ice)	Gunnar Gerdtz (Germany) Melanie Bergmann (Germany)	Rachel Obbard (USA)	X	X

	Ilka Peeken (Germany)			
e. Beaches	Lise Langård (Norway) Runar Mathisen (Norway)	Peter Murphy (USA), Louise Feld (Denmark) Tahzay Jones (USA)	X	X
4. Biotic compartments for litter and plastics monitoring				
e. Bivalves		Chelsea Rochman (Canada) Amy Luscher (Norway)		X
f. Fish	Jennifer Provencher (Canada), Geir Wing Gabrielsen (Norway)	Chelsea Rochman (Canada) Sjurdur Hammer (Faroes) Bjørn Einar Groesvik (Norway) Tanja Kögel (Norway)	X	X
g. Birds		Mark Mallory (Canada) Sjurdur Hammer (Faroes) Hillary Burgess (USA)	X	X
h. Mammals		Cristina Fossi (Italy)	X	X
5. Cross cutting issues				
a. Brand audits examples and QA procedures		Chelsea Rochman (Canada)	X	
b. Plastic processing once they are removed from different matrices			X	X



c. Data treatment, management and reporting		Peter Murphy (USA)	X	X
d. Polymer Identification, methods		Chelsea Rochman (Canada)	X	X
e. Community Based Monitoring		Jennifer Provencher (Canada)	X	X
f. Other, if identified				

Names in yellow have been identified, but not contacted

## 5. Timelines

### Provisional Timeline

<i>Timing</i>	<i>Event*</i>	<i>Objectives</i>
Spring 2019	Monthly teleconferences	Detail plans and timelines Finalise and agree on table of contents Identify lead authors and agree responsibilities
Maj 2019	First workshop (Copenhagen, TBD) (Follow the CAFF workshop in Reykjavik on March 25 <sup>th</sup> 2019)	Present and discuss draft 0 (first contributions) Agree on next steps
June-September 2019	Compilation of relevant data and information. Compile and review relevant scientific and grey literature	
October-November 2019	Drafting	
1. December 2019	First version ready	
January/February 2020	Second workshop (Venue to be determined)	Drafting group meeting Finalise monitoring guidelines
March 2020	Second version ready	
April 2020	National and external review	
May 2020	Third version ready	
May-June	Technical editing	
July-September 2020	Production	Editing, graphical production, layout
January 2021	Approval by AMAP HoDs	
Spring 2021	Presentation to Arctic Council Ministerial	

## **6. Workshop spring 2019. Draft agenda**

Venue: TBD

Date and time: TBD

Day 1

09:00–18:00

Meeting of experts from Denmark, Faroe Islands, and Greenland

Day 2

09:00–18:00

- 1 Opening of meeting, welcome and adoption of agenda.
- 2 Monitoring guidelines, version 0. Report from the lead authors: Status of the individual chapters.
- 3 Break-out groups, individual chapters.

Day 3

09:00–18:00

- 1 Reporting from break-out groups.
- 2 Planning of next period. Next steps.

## 7. Identified experts

Contacted:

- Canada: Jennifer Provencher
- Denmark: Jakob Strand, Louise Feld (Lis Bach, Katrin Vorkamp)
- Iceland: Halldor Palmar Halldorsson, Hermann Dreki Guls
- Norway: Geir Wing Gabrielsen
- Sweden: Åsa Andersson
- USA: Peter Murphy, NOAA

To be contacted:

- Italy:
  - Cristina Fossi (Università di Siena, [fossi@unisi.it](mailto:fossi@unisi.it))
- Germany:
  - Gunnar Gerds (AWI, [gunnar.gerds@awi.de](mailto:gunnar.gerds@awi.de))
  - Ilka Peeken (AWI, [Ilka.Peeken@awi.de](mailto:Ilka.Peeken@awi.de))
  - Melanie Bergmann (AWI, [Melanie.Bergmann@awi.de](mailto:Melanie.Bergmann@awi.de))
- Sweden:
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  - Kerstin Magnusson (IVL, [kerstin.magnusson@ivl.se](mailto:kerstin.magnusson@ivl.se))
- Norway:
  - Amy Lusher (NIVA, [amy.lusher@niva.no](mailto:amy.lusher@niva.no))
  - Bjørn Einar (Havforskningsinstituttet, [bjoern.einar.groesvik@hi.no](mailto:bjoern.einar.groesvik@hi.no))
  - Lise Langård (Miljødirektoratet, [Lise.Langard@miljodir.no](mailto:Lise.Langard@miljodir.no))
  - Pernilla Bohlin Nizzetto (NILU, [Pernilla.Bohlin.Nizzetto@nilu.no](mailto:Pernilla.Bohlin.Nizzetto@nilu.no))
  - Runar Mathisen (Miljødirektoratet, [runar.mathisen@miljodir.no](mailto:runar.mathisen@miljodir.no))
  - Tanja Kögel (Havforskningsinstituttet, [Tanja.Kogel@nifes.no](mailto:Tanja.Kogel@nifes.no))
- USA:
  - Tahzay Jones (US National Park Service (Alaska), [Tahzay\\_Jones@nps.gov](mailto:Tahzay_Jones@nps.gov))
  - Hillary Burgess (COASST (Coastal Observation and Seabird Survey Team), [hkb10@uw.edu](mailto:hkb10@uw.edu))
  - Rachel Obbard (Thayer School of Engineering at Dartmouth College, [Rachel.w.obbard@dartmouth.edu](mailto:Rachel.w.obbard@dartmouth.edu))

## 8. Resource needs

It is anticipated each country provide the necessary resources for their experts to contribute to the assessment.

The expert group plan two workshops, the first in Copenhagen in May 2019.

Anticipated travel costs per person \$1200 USD to be covered by each country.

### Resource Requirements (incomplete)

	2019	2020	2021
	USD	USD	USD
<b>Identified requests:</b>			
Co-lead (Norway)	*	*	*
Co-lead (To be identified)	*	*	*
KNE/lead authors	*	*	*
Spring 2019 and 2020 workshops/drafting meetings	**	12000	
Production of report, including technical editing			40000
Cooperation with other groups	x	x	
QA activities			
Risk communication			
C&O activities			
<b>Total Need</b>	<b>0</b>	<b>12000</b>	<b>40000</b>
<b>Available funding:</b>			
National funding	x	x	x
<b>Total Available</b>			
<b>Balance (available minus need)</b>			

### Overall project balance

\* Covered (or assumed covered) by national commitment; not included in 'total need'.

\*\* Denmark has offered to host the workshop in 2019.

## **9. Communication plan**

The monitoring guidelines will be presented to the Arctic Council Ministerial meeting in spring 2021.



## 10. Sources and references

AMAP, 2017. *AMAP Assessment 2016: Chemicals of Emerging Arctic Concern*. Arctic Monitoring and Assessment Programme (AMAP), Oslo, Norway. xvi+353pp:  
<https://www.amap.no/documents/download/3003/inline>

*OSPAR monitoring guidelines:*

- *CEMP Guidelines for monitoring marine litter washed ashore and/or deposited on coastlines (beach litter):* <https://www.ospar.org/documents?d=37514>
- *CEMP Guidelines on Litter on the Seafloor:* <https://www.ospar.org/documents?d=37515>
- *Coordinated Environmental Monitoring Programme (CEMP) Guidelines for Monitoring and Assessment of plastic particles in stomachs of fulmars in the North Sea area:*  
<https://www.ospar.org/documents?d=35083>

*Plastic in the European Arctic;* Ingeborg G. Hallanger and Geir W Gabrielsen. Kortrapport / Brief Report. Norsk Polarinstitutt / Norwegian Polar Institute 2018.

*Arctic sea ice is an important temporal sink and means of transport for microplastic;* Ilka Peeken, Sebastian Primpke, Birte Beyer, Julia Gütermann, Christian Katlein, Thomas Krumpfen, Melanie Bergmann, Laura Hehemann & Gunnar Gerdt. NATURE COMMUNICATIONS | (2018) 9:1505

*First detection of plastic microfibers in a wild population of South American fur seals (Arctocephalus australis) in the Chilean Northern Patagonia;* D.J. Perez-Venegasa, M. Seguelc, H. Pavésd, J. Pulgarb, M. Urbinae, C. Ahrendtb, C. Galbán-Malagónb. Marine Pollution Bulletin 136 (2018) 50–54.

## 11. Relationship with UNEP

Communication with UNEP ([heidi.savelli@un.org](mailto:heidi.savelli@un.org)), email 18<sup>th</sup> February 2019:

In relation to monitoring of marine litter and microplastics, we have supported the work of the GESAMP Working Group 40 that has developed Guidelines for the monitoring and assessment of plastic litter in the ocean.

An overview can be found here:

[https://papersmart.unon.org/resolution/uploads/un\\_environment\\_science\\_-\\_marine\\_plastics\\_guidelines\\_synopsis\\_18-03553\\_002.pdf#overlay-context=information-documents-second-adhoc](https://papersmart.unon.org/resolution/uploads/un_environment_science_-_marine_plastics_guidelines_synopsis_18-03553_002.pdf#overlay-context=information-documents-second-adhoc)

The full report will be released during the UN Environment Assembly in Nairobi. We are planning to convert it into training materials as well including online resources as well as a trainer of trainers programme (regional levels initially which will support the establishment of national monitoring programmes in the longer run) which will be rolled out this year through some of the regional seas programmes.

I copy Dr Peter Kershaw, Chair of GESAMP and the WG. This group will continue looking at e.g. nano plastics.

We are also in the process of developing monitoring methodologies (compiling/mapping) for freshwater – in particular for rivers with the view to support the development of action plans and actionable projects in riverbasins.