



Activity 3:
A3 – Support for and harmonisation of regional work on Descriptor 10 (marine litter)

HELCOM BLUES

Monitoring of microlitter

Monitoring strategies and recommendations

Compilation on reported methods

Initial discussions on harmonised approaches



BLUES



Co-funded by the
European Union



Universität Hamburg
DER FORSCHUNG | DER LEHRE | DER BILDUNG



LATVIJAS
HIDROEKOĻĀGIJAS
INSTITŪTS



HELCOM



Monitoring of marine litter in MSFD, OSPAR, HELCOM

Descriptor 10:

Properties and quantities of marine litter do not cause harm to the coastal and marine environment

- D10C1 Litter on the coastline, in the surface layer of the water column, and on seabed
- D10C2 Micro-litter on the coastline, in the surface layer of the water column and in seabed sediment
- D10C3 Litter and micro-litter ingested by marine animals
- D10C4 species affected due to litter (entanglement)



Monitoring of marine litter in MSFD, OSPAR, HELCOM

D10C2 Micro-litter on the coastline, in the surface layer of the water column and in seabed sediment

Micro-litter shall be monitored in the surface layer of the water column and in the seabed sediment and may additionally be monitored on the coastline.

Micro-litter shall be monitored in a manner that can be related to point-sources for inputs (such as harbours, marinas, waste-water treatment plants, storm-water effluents), where feasible.

Reference units:

amount of micro-litter per category in number of items and weight in grams (g)

- per square metre (m²) for surface layer of the water column

- per kilogram (dry weight) (kg) of sediment for the coastline and for seabed

→ Technical Group on Marine Litter TG-ML

→ TG-ML microlitter group

Commission Decision (EU) 2017/848 of 17 May 2017





Monitoring of marine litter in MSFD, OSPAR, HELCOM

OSPAR Regional Action Plan on Marine Litter

Common indicators (assessment):

beach litter

seabed litter

litter in fulmar stomachs

Indicator development:

microplastics in sediment

→ Intersessional Correspondence Group on Marine Litter ICG-ML

→ Microplastic expert group MPEG





Monitoring of marine litter in MSFD, OSPAR, HELCOM

HELCOM PRESSURE / HOLAS

Indicator development:

macrolitter – beach litter

macrolitter – floating litter

macrolitter – biota

macrolitter – seafloor

microlitter – water column

microlitter – beach and bottom sediments

→ HELCOM Expert Network on Marine Litter

→ HELCOM BLUES (DG Env MSFD)





Recommendations on monitoring by MSFD

- R1: Ongoing assessment of the environmental status
- R2: Monitoring programs have to be coordinated, compatible, coherent, consistent and comparable
- R3: Monitoring should build upon and integrate already established monitoring programs
- R4: Data and information resulting from the monitoring programs should be made available for interoperable use
- R5: Monitoring programs need to adapt with appropriate reaction to changes in the marine environment
- R6: Monitoring should be linked to assessment needs (flexible monitoring design)
- R7: Taking into account the differences in scientific understanding for each descriptor

Zampoukas et al. 2014:
Technical guidance on monitoring for the Marine Strategy Framework Directive. Report EUR 26499 EN,
JRC-IES. EUR Scientific and Technical Research Series.

A3





Method survey - microlitter

Existing or planned approaches for monitoring of microlitter were reported by all 9 countries (DE, DK, EE, FI, LT, LV, PO, RU, SE) providing

- 11 datasets for seabed sediment monitoring and
- 9 datasets for surface water monitoring



Method survey - microlitter

Requested information covered:

- status of the monitoring (established / planned)
- availability of monitoring data
- sampling strategy
- sample treatment
- particle identification / analysis
- QA / QC measures





Method survey – microlitter in seabed sediments

- status of the monitoring

established **4**

planned **5**

not planned yet **2**

- availability of monitoring data

available **2**

processed **3**

not available **6**



Method survey – microlitter in seabed sediments

- sampling strategy

number of stations	<10	6	≥10	5		
replicates per station	1	7	2	2	3	2
sample volume (ml)	500-1000	3	100-500	4	<100	2
sampling device	grab	8	corer	4		
sampling depth (cm)	0-3	4	0-5	5	0->5	2
storing material	glass	9	ziplock	1	aluminium	1
storing temperature	rt	2	+4 to -4°C	4	<-18°C	4

A3





Method survey – microlitter in seabed sediments

- sample treatment I – digestion of biogenic organic material

sample volume (ml)	<100	5	≥100	3	
sample condition	wet	6	dry	1	
digestion scheduled	prior	5	after	3	
digestion solution	H ₂ O ₂ + enzymes	5	KOH + NaClO	2	Fentons 1
digestion temperature (°C)	rt	3	30 - 50	5	>50 1
stirring	yes	6	no	2	



Method survey – microlitter in seabed sediments

- sample treatment II – density separation

pre-treatment	sieving	2	freeze drying	1	none	7	
density solution	NaI	3	ZnCl ₂	4	NaWO ₄	3	NaCl 1
density (g/cm ³)	<1.5	1	1.5-1.6	2	>1.6	7	
device	funnel	8	column	2			
settling time (h)	<1	2	24	6			



Method survey – microlitter in seabed sediments

- particle identification I

lower cut-off size (μm)	100	4	50 - 63	5	10	1		
upper cut-off size (μm)	5000	9						
dimensions	yes	10	no	0				
shapes	fragments	10	fibers	10	spheres	6	films	4
colours	yes	7*	no	2				

*partly only for particles $>200 \mu\text{m}$



Method survey – microlitter in seabed sediments

- particle identification II

visual	all	4	>200 μm	3	>1000 μm	2
hot needle test	yes	3	no	6		
Nile red staining	yes	3	no	6		
spectroscopically	yes	8	no	2		
polymer identification (%)	20 – 50	2	50-100	1	100	3
identification method	FTIR	4	Raman	3	pyrGC-MS	0



Method survey – microlitter in seabed sediments

- QA/QC measures

false positives (blanks)	yes	10	no	0
reference samples	yes	3	no	6



Method survey – microlitter in seabed sediments

- further analyses / parameters

dry weight	yes	8	no	1
organic matter content	yes	3	no	6
grain size distribution	yes	3	no	6



Method survey - microlitter

A3

