

EUROqCHARM WP3

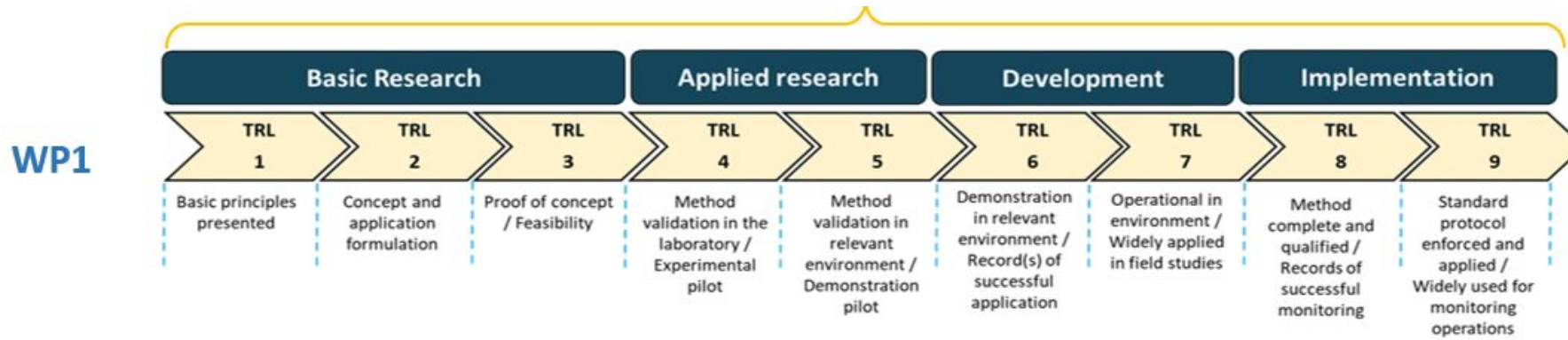
The purpose of WP3 is to internationally harmonize monitoring methods and data reporting so that they can be used by stakeholders to formulate and implemented monitoring, policy and legislation.

- **TASK 3.1.** WP1 / WP2 compiled/analyzed, **Recommended procedures /** methods for monitoring,
- **TASK 3.2.** Revision and the **optimization of monitoring strategies** (new indicators, atmospheric inputs, etc.)
- **TASK 3.3.** **Recommendations of standard procedures for policy /legislation; support to decision making**
- **TASK 3.4.** The **alignment of European procedures with global strategies and procedures**

Milestone 13 - **Optimized Monitoring Methods and strategies-Webinar (Month 30).**

Milestone 14 - **Global data synchronization- Webinar (Month 34, April 18th).**





Example: TRL summary table for applied methods in microplastic in solid compartments

	TRL	Survey design	Sampling	Sample preparation	Analytical detection	Plastic quantification	QA/QC	Data reporting
Basic research	1							
	2							Intl. databases
	3							
Applied research	4				MS-based techniques	Mass-based units		
	5	Sediment (MP < 100 μm)		Enzymatic / acid dig.			Field blanks	
Development	6				Hot needle		Air blanks	
	7	Sediment (MP > 100 μm)			Fluorometry (e.g., Nile Red)		Air filtrations systems, controls	Publications
Implementation	8	Beach/shores (MP > 1 mm)	Cores, grabs, spoons	Sieving/filtering, Density sep. KOH/ H2O2	Chemical ID with μFTIR/μRAMAN	Mass-based units (Meso)	Procedure blanks	
	9				Optical microscopy Chemical ID (ATR-FTIR, > 0.5 mm)	counts per sample Guidelines (shapes, etc.)		



Task 3.1, Assessing WP2 (Inter Laboratory Study) outcome (linking ILS with TRLs)

Classification in different categories with specific criteria that use the number of numerical observations (per each method), and scores (z'-score, Wells & Cofino, 1987) obtained by the laboratories

reports on applied methods

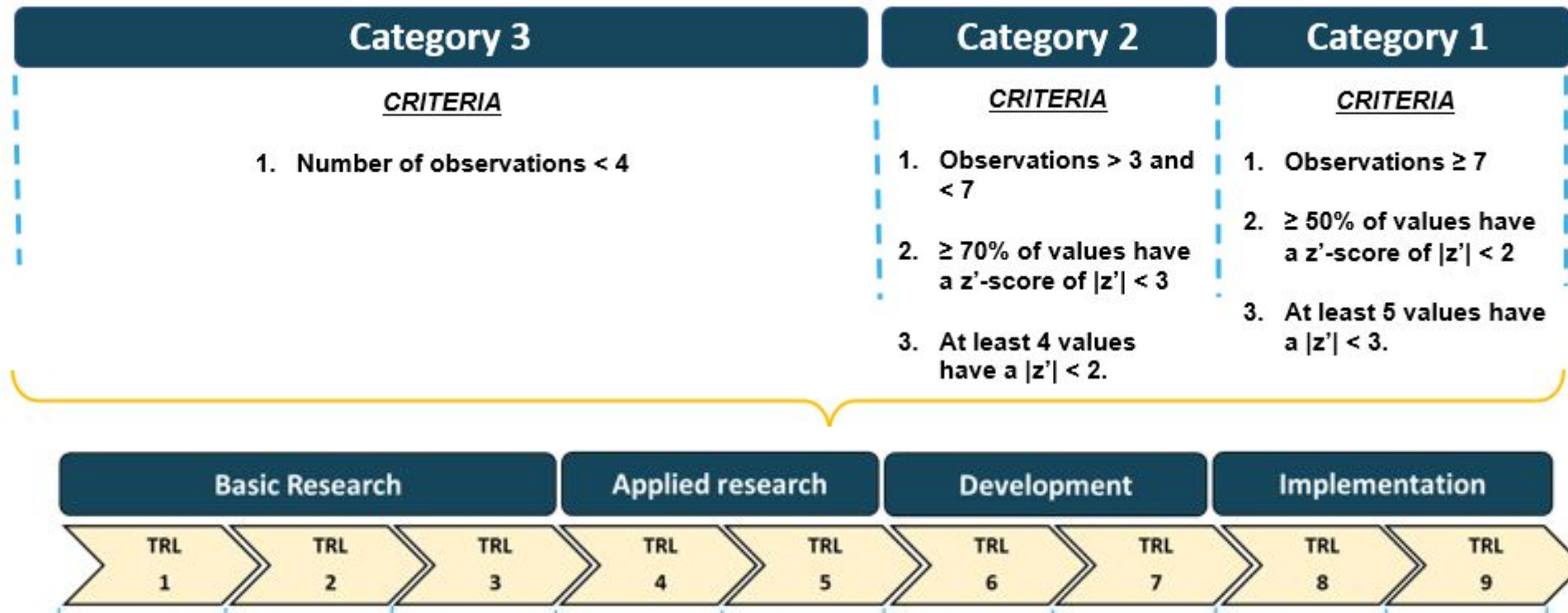


aggregation



combination with Z-scores

WP2



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TASK 3.2: Optimising of monitoring strategies to improve the MSFD ML monitoring

WP3.2 builds on:

- Discussions held during the project EUROqCHARM,
- Outputs from other EUROqCHARM Work Packages (WP1 and 2, task WP3,1),
- Existing reports dedicated to monitoring strategies (EU projects CLEAN ATLANTIC, PBMPA, INDICIT, ANDROMEDA, etc.),
- An analysis of outputs from ongoing EU projects on ML (low cost, Andromeda, Nautilus), helping RSCs to attain GES (HELCOM BLUES; Marine litter Med II)
- Regional Sea Convention (RSCs) documents/ Regional Action Plans (OSPAR, Barcelona Convention, HELCOM, BSC, AMAP)
- MSFD documents (Updated guidance for MSFD protocols),
- UN documents (GESAMP, 2019, UNEA5, 2021, IMDOS)
- Relevant scientific literature.

A deliverable on optimized monitoring strategies is available, improved after the 7IMDConference and a dedicated EUROQcharm/ MSFD-TGML meeting (1-2 March, 2023)



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T 3.2: A review of ongoing EU international initiatives

MARINE LITTER INITIATIVES									
NAME	DESCRIPTION	ACTIVITIES				INDICATORS			
GPML	Unep/ Worldwide	■	■	■	■	■	■	■	■
GOOS	Global Ocean Observing	■	■	■	■	■	■	■	■
MSFD/ TGML	EU Technical group Marine	■	*	■	■	■	■	■	■
Sea datanet	Pan european infrastructure for	■	■	■	■	■	■	■	■
UNEP /MAP	Regional sea convention,	■	■	■	■	■	■	■	■
OSPAR	Regional sea convention, UNEP	■	■	■	■	■	■	■	■
HELCOM		■	■	■	■	■	■	■	■
ICES	International council for the	■	■	■	■	■	■	■	■
EEA	European Environmental Agency	■	■	■	■	■	■	■	■
AMAP	Arctic Monitoring Action Plan	■	■	■	■	■	■	■	■

DATA COLLECTION FRAMEWORKS and DATABASES									
NAME	DESCRIPTION	ACTIVITIES				INDICATORS			
Litterbase	Marine litter references and	■	■	■	■	■	■	■	■
Tide	Trash Information and data for	■	■	■	■	■	■	■	■
GGGI	Global Ghost Gear Initiative	■	■	■	■	■	■	■	■
ODIMS	OSPAR data repository	■	■	■	■	■	■	■	■
ICES/DATRAS	ICES database for sea floor litter	■	■	■	■	■	■	■	■
DOME	ICES database for microplastics	■	■	■	■	■	■	■	■
MEDITIS	Mediterranean International	■	■	■	■	■	■	■	■
INFO RAC	UNEP MAP database	■	■	■	■	■	■	■	■
AWARE	Dive Against Debris program	■	■	■	■	■	■	■	■
COASTS	Coastal Observations &	■	■	■	■	■	■	■	■
EMODNET	EU marine litter data repository	■	■	■	■	■	■	■	■

ACTIVITIES	
coordination	compilation
analysis	data acquisition

INDICATORS	
beach/shoreline	Surface
seafloor	microplastics/
Harm	Riverine inputs
Atmospheric inputs	

- MSFD monitoring:** Criteria defined within MSFD (COM DEC 2017/848/EC), reporting guidance in Article 8),
- litter deposited **on beaches**, on the **water surface**, on the **seafloor** (D10C1)
 - On **microplastics** (D10 C2)
 - On **litter ingested by indicator species** (D10C3, secondary criteria)
 - Other **interactions between litter and organisms** (e.g. entanglement, D10C4, Secondary criteria)



T 3.1 & T3.2: A review and analysis of monitoring constraints and strategies

TYPE OF CONSTRAINTS	METHODOLOGICAL	ENVIRONMENTAL	BIOLOGICAL	LOGISTICAL	ETHICAL
MICROPLASTICS, D10C2	Relevant protocols are available	Data is representative of the state of the environment	The use of ingested litter by animals may be biased (selective ingestion)	cost is reasonable	Sampling cannot be destructive for habitats
	Protocols have been referenced, tested, compared and validated	Data is representative of the compartment (beach litter may not be 100% marine)	specific measurement on a particular type of Microplastics must be possible (e.g. pellets).	Opportunistic approach must be favoured if the data is of good quality	ingestion of litter by rare species is not possible
	The existence of bias in the measurement (contamination) is limiting	The results must enable areas to be categorized	Targets species for ingested microplastics must have a large distribution	Good logistical practices and common approaches are necessary (Manta trawl, etc.)	The protection status of the species must be examined.
	Factors that can interfere with the results must be controlled	The main categories must be measurable		The sampling conditions is the simplest possible.	Sampling by destruction of protected species is prohibited.
	Data is collected according to validated procedures.	Sources can be evaluated (rivers, tourism , SUP, etc.)			
	Reproducibility and representatively must be guaranteed	Large scale comparability is necessary			
	Data must be able to detect spatial and temporal trends,				
	Standardization and harmonization must be reached				

Example: monitoring constraints and strategies for Microplastics (D10C2)



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T 3.2: Critical questions and gaps surrounding ongoing monitoring within MSFD

Beaches/shorelines

- The improvement of beach litter could concern a larger coverage, better defining the sites
- Accumulation areas not inventoried.
- Some variation in applied item list in different regional protocols
- Mesoplastic has not been considered by MSFD until now,

Floating litter

- Limitations exist, notably on the implementation of protocols (e.g. rough seas, visibility, etc.).
- Limitations also exist on the significance of measurements, not stable over time,

Sea floor litter

- The significance is limited to trawlable areas, no data on shallow/ deep-sea /rocky bottoms,
- Some technical limit of trawling (e.g. robustness)
- A better harmonization of the procedures is necessary

Microplastics

- Measurements of microplastics on beaches / sediments are almost non-existent
- the protocols suffer from analytical limitations(for small particles)

Ingested litter

- No indicator species met the criteria in the Baltic and Black Seas.
- No indicator species for Microplastics (research ongoing)

Entanglement

- Abandoned and Lost fishing gear is not specifically addressed, Indicators are less mature
- Some limits in the Interpretation of the results (low prevalence, dead animals only, etc.)

Reporting

- Still many questions about harmonization of measures (e.g. compatibility of type of trawl used),
- Collection procedures may also, differ from one region to another, due to RSCs protocols



T 3.2 PRIORITIES: *Implementing the existing monitoring scheme must include*

- The search for systematic accumulation areas to redefine the monitoring strategy of the different indicators
- Models must also be considered, to develop an Europe specific models for litter transport.
- Inputs of litter and microplastics to European seas should be prioritised.
- Possible new data collection scheme (e.g. litter from fishing through permanent observers onboard fishing vessels), could support a new monitoring approach.
- There is a need to better understand the atmospheric inputs and transboundary transportation
- Input of marine litter during exceptional events in Europe (storms, flooding, etc.) must be evaluated
- The transport of species on plastics at sea (rafting) is a priority issue in terms of impacts and associated risks, must be monitored
- The “weight” and significance of the measurements in each of the compartments must be better understood. Amounts and impact of ML are different on beaches (e.g. aesthetic impact), on the sea floor (Entanglement, ingestion, colonisation) and at the surface (entanglement, ingestion by top predators, transport of species at risk over long distances, impact on navigation and fishing).
- Focusing on groups of categories corresponding to particular activities or impacts is also important (e.g.. focus on lost or abandoned nets in fishing grounds; Single-Use Plastics in the context of reduction measures)



T 3.2 : RECOMMENDATIONS (Partial list)

MSFD Criteria / Indicator	Actual situation	GAP	Proposed recommended methods/changes/modifications	Deadline
D10C1 (beach litter)	Visual survey	Limited number of sites	Drone applications	Medium term
D10C1 (beach litter)	Visual survey	Automation	Drone applications/ automatic data treatment	Medium term
D10C1 (Beach)	Visual surveys	Accumulation areas (Hot spots) not inventoried	Boat/Drone/ aerial surveys, with appropriate sensors (visual or Near Infrared Range) to optimize sampling schemes and list priority areas	Medium/long term
D10C1 (floating)	Visual surveys	Limited sampling	Encourage Member states to implement regular monitoring of floating litter	Third MSFD cycle (2024-2030)
D10C1(floating)	Visual surveys	No baseline and thresholds for floating litter, SUPs and Fishing gear	Define baselines and thresholds for floating litter, SUPs and fishing gear to monitor the efficiency of reduction measures	Third MSFD cycle (2024-2030)
D10C1(beach and floating)	Visual surveys	No consideration to riverine inputs	Implement monitoring if riverine inputs of litter (in estuaries), coordinate with WFD	Third MSFD cycle (2024-2030)
D10C1 (floating and seabed)	ALDFG	No specific monitoring of ALDFG	satellite detection of tagged nets or FADs, acoustic detection of immersed gear to limit losses, easy recovery.	Long term
D10C1 (sea bed)	Trawling	Limited sampling of rocky bottoms, limited depths, destructive approach	Develop imaging tools and automated data treatment to better sample sea bed (types of Bottom, depth)	Partly Started (Emodnet), Next MSFD cycle
D10C1 (sea bed)	Different List of litter categories	Seabed list of categories is different from the new EU-TGML joint List	Harmonisation of lists/ conversion table is needed	Started / short term
D10C2 (microplastics)	No monitoring of microplastics i sediment and beaches	Critical knowledge and monitoring gap, while sediment is a sink for microplastics	Implementation of a sediment microplastic dedicated monitoring, ideally coupled with the monitor of chemicals	Short term

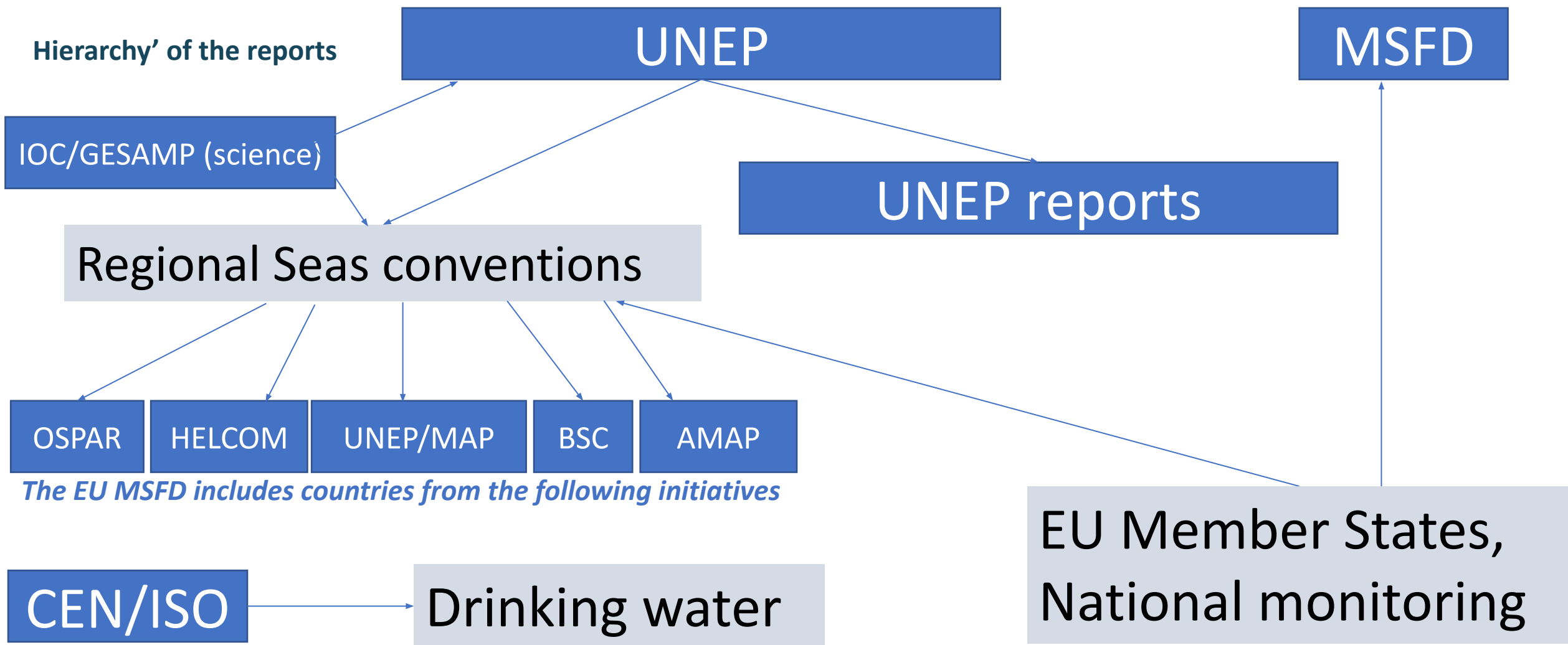


T 3.2 : RECOMMENDATIONS (Partial list)

MSFD Criteria / Indicator	Actual situation	GAP	proposed recommended methods/changes/modifications	Deadline
D10C3/New indicators/criteria, Link with D2 (Non indigenous species)	No record of rafted species at risk	Collection of data on rafted organisms, their possible toxicity and mode of invasion has become critical.	A dedicated plastic database collecting information on the colonization of plastics will provide historical records, evaluate trends and support risk assessments. Options include a new database or links with existing databases on invasive species, on a global scale	Medium/long term
New indicators/ criteria (link with Descriptor 8)	No assessment of plastic related chemicals	Need information on risk caused by additives in the marine environment	Implementation of the monitoring of plastic additives (Phtalates, plasticizers, dyes, etc.) in various compartments of the marine environment. Could be linked to the implementation of Descriptor 8 (chemicals) of the MSFD	Must be considered by Descriptor 8
Data	No harmonization of large scale databases	Global monitoring (International Marine Debris Observing system) needs harmonization of data and coordination	<ul style="list-style-type: none"> - Link EU MSFD databases (EMODNET, database on ingested litter, etc.) with databases from Regional Seas Conventions (ODIMS, DATRAS, INFORAC, Helcom database, etc.), - Link EU MSFD databases with international databases such as G20 database on microplastics, GOOS observing system, National databases on beach litter (NOAA, CSIRO, SOA), microplastics (NOAA, CSIRO, SOA), seabed litter (JAMSTEC, SOA) and with UNEP digital platform 	<p>Medium term</p> <p>Harmonize with global initiatives</p>



Task 3.3. Recommendation of standard measuring procedures for policy/legislation



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Integration/ comparison of the various approaches

Relevant reports

Comparison

Systematic review (WP1)



AMAP
MSFD
OSPAR
HELCOM
GESAMP / UNEP



✓	!	!
✓	✓	✗
!	!	✗
✓	✓	!
✓	✗	✓

Most often used methods, (NOT necessary the best methods)!
 SWOT analysis
 TRL assessment



Relevance to MSFD (examples)

Compart.	size	recommendation (MSFD)	Outputs from WP1	comments
Sub littoral sediments	Micro	Sample collection		
		<p>Separate samples to monitor two size classes (1-5 & 100 µm – 1mm), 5cm of the surface sediment.</p> <hr/> <p>1-5mm: Use a metal spoon or trowel. Collect top 5cm of sand within a metal 50 cm x 50 cm quadrat, store the sample in metal / glass containers.</p> <p>100µm-1mm: collect top 5cm of sand, metal spoon, in total 250ml, stored in metal or glass containers.</p>	<p>No separation between 5mm-1mm and 1mm – 20µm.</p> <hr/> <p>Most studies used scoop/shovel/spoon (39%), grab or buckets (24%), followed by sediment corer (20%).</p>	 

Compart.	size	recommendation	Output from WP1	comments
surface	Macro	Sample collection and analysis		
		<p>Visual monitoring is recommended, new methods s (e.g. spectroscopy, imaging) should be considered.</p> <hr/> <p>Floating marine macro litter (FMML) must be classified according to an agreed set of litter categories</p>	<p>Most studies used visual surveys (Net in 37% of studies). Most samples were identified (visual) following guidelines</p>	 



Conclusions

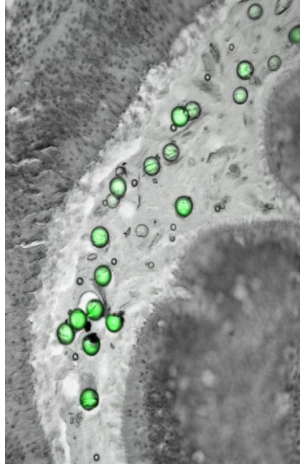
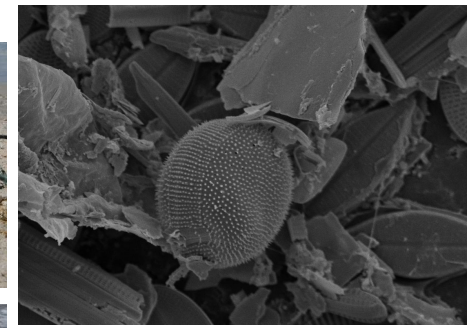
Macro: Monitoring guidelines are mostly established for macro litter within the MSFD. Methods are consistent with the outcome of the systematic review (EuroQCharm, D1.1)

Micro: No always clear guidelines to assess / monitor the microplastic contents within the MSFD (sample processing and analysis). Some protocols seem mature (e.g., Northern Fulmars, OSPAR, 2010).

Small micro & Nano: Impossible to assess / monitor the content in any environment, due to the lack of data and analytical methods.



THANK YOU



Credit: Thomais Vlachogianni



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