



**MARLICE 2022**

II International Forum on Marine  
Litter and Circular Economy



**AEBAM**  
ASOCIACIÓN ESPAÑOLA  
DE BASURAS MARINAS

**MARLICE 2022. SUMMARY OF SESSIONS**

# **MONITORING AND ASSESSMENT**



**MARLICE 2022**  
II International Forum on  
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Seville 18 – 20 May



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**2021  
2030** United Nations Decade  
of Ocean Science  
for Sustainable Development

# MONITORING AND ASSESSMENT



AQUARIUM OF SEVILLE - GUADALQUIVIR ROOM



19/05/2022



10:00-13:00

Chairperson: Marisa Fernández - Head of Department, CETMAR

## DESCRIPTION

Marine litter monitoring is an essential step to assess the state of the environment, understand the sources and pathways and to establish measures and evaluate their effects. Significant progress has been made during the last few years to establish robust methodologies and criteria to monitor marine litter in different compartments. However, a number of gaps and drawbacks still remain to be tackled. To tackle these issues, the session “Monitoring and Assessment” included a keynote speech setting the scene and advances developed at EU level (George Hanke), presentations of monitoring approaches for three compartments, beach, surface marine waters and seafloor litter (Marta Martínez, Manuel Arias and Jesús Gago) and the results of a global mapping of marine litter (Carmen Morales). After the presentations, a round table and an open but guided debate addressing key pre-defined questions followed.

## CHAIRPERSON

PhD. Marisa Fernández  
Cañamero

 CETMAR

 Head of Department



## SECRETARY

PhD. José Luis Gómez  
Gesteira

 Centro Tecnológico del Mar -  
Fundación CETMAR

 Technician





# PROGRAMME

(See the available presentations of this session by clicking on the presentation title)

## 10:00 -10:05 h - Introduction and objectives

Marisa Fernández - Head of Department, CETMAR

## 10:05 -10:25 h - Keynote speech

Georg Hanke PhD - European Commission Joint Research Centre, Directorate D Sustainable Resources

Water and Marine Resources Unit

## 10:25 -10:40 h - Shoreline Monitoring

Marta Martínez Gil - Head of Area - Subdirectorato General for Sea Protection - Directorate General for the Coast and the Sea. Ministry for Ecological Transition and the Demographic Challenge. Spain.

## 10:40 -11:55 h - Floating litter

Manuel Arias - Earth Observation Scientist, Instituto de Ciencias del Mar (ICM-CSIC) / Marine Sciences Institute (ICM-CSIC)

## 10:55 -11:10 h - Seafloor litter

Jesús Gago - Researcher, Spanish Institute of Oceanography

# SPEAKERS

PhD. Georg Hanke

European Commission

Joint Research Centre  
Directorate D Sustainable  
Resources Water and Marine  
Resources Unit



Ms. Marta Martínez-Gil Pardo de Vera

Ministry for Ecological  
Transition and the  
Demographic Challenge

Head of Area -  
Subdirectorato General for  
Sea Protection - Directorate  
General for the Coast and  
the Sea



Mr. Manuel Arias Ballesteros

Marine Sciences Institute  
(ICM-CSIC)

Earth Observation Scientist



11:10 -11:25 h - Mapping global marine litter  
Carmen Morales - Researcher, University of Cadiz


11:25 -11:50 h - Coffee break

11:50 -12:50 h - Round table and open debate

12:50- 13:00 h - Wrap-up

SPEAKERS

PhD. Jesús Gago Piñeiro


 Spanish Institute of  
Ocenography

Researcher



PhD. Carmen Morales  
Caselles

 University of Cadiz

 Researcher





## Meeting objective - Expected output

The main objective of the session was to share key and critical aspects related to monitoring the presence of marine litter in different compartments, identify needs and gaps in knowledge and technology, and compile recommendations for future actions, collaborative work and technological developments.



### **Monitoring of Marine Litter. Marine Strategy Framework Directive - *George Hanke, EU JRC***

George Hanke presented an overview of current situation in EU regarding marine litter monitoring in the framework of the MSFD implementation and the efforts and progress made by MS. The work done by the MSFD technical group on Marine Litter was illustrated as well as the different documents and resources developed to provide guidance on monitoring. The importance of marine litter data and metadata in terms of providing quantitative evidence to analyze trends and support the selection and prioritization of measures was highlighted. For that purpose, quality controlled, representative, comparable and sustainable data is needed. MSFD criteria and state of the art for marine litter monitoring on beach, sea surface, seabed, microlitter ingestion and entanglement were presented as well as results of MS reporting on the maturity of Marine Litter monitoring. An important outcome is the Join List of Categories developed by the JRC to overcome the lack of comparability when analyzing litter data. The list was adopted by EU MS in 2019 and a manual and online catalogue has been published. The list is being implemented by EU MS.



## Beach Litter Monitoring - *Marta Martínez-Gil* , MITERD

Marta Martinez-Gil presented an overview of the regulatory framework coming from EU, Regional Sea Conventions and Spanish legislation relevant for marine litter monitoring. The Spanish Monitoring Strategy was also presented pointing out the state of the methodologies implemented for the different compartments. The progress made in Spain since the end of the 90s until the setting up of the official Beach Litter Monitoring Programme was illustrated making emphasis on the approach of “one data for multiple purposes” (Marine Strategies, OSPAR and Barcelona Conventions). Results on abundance and composition from 2012 until 2021 were discussed as well as the methodologies to analyze trends and to estimate the origin of beach litter. The results of beach litter in the different marine demarcations in relation to the ambitious GES threshold of 20 items/100 m were presented highlighting how ambitious is the proposed level and informing about a more pragmatic approach adopted by MS involving more realistic intermediate objectives of significant reduction in marine litter but a final goal of achieving the established threshold in the long term. The contribution of citizen science to complement the official monitoring programs was highlighted.







### Floating litter - *Manuel Arias, ICM-CSIC*

Manuel Arias introduced relevant strategies, frameworks and programmes concerning monitoring of floating litter. In regards to MSFD, the recommended methodology consists on human driven visual observation of floating litter. A harmonized approach for the quantification of floating marine litter by ship-based observers is proposed. Monitoring of floating litter should follow a specific protocol agreed on EU scale within the MSFD implementation process. In Spain, the MITERD monitors floating marine litter with the support of the Spanish Oceanographic Institute, that carry out it as a complementary activity to the observation of birds and cetacean campaigns. The drawbacks of visual inspection from ships were discussed: inaccurate and limited by operators onboard, observation of very narrow paths, non-systematic, requirement of substantial use of maritime asset. The need to introduce complementary remote sensing and automated tools for systematic monitoring of floating litter was emphasized as they are cost-effective and able to cope with the observational needs, both in space and time. Pros, constraints and instruments associated to current Platforms, Technologies (Mast-based instruments, Drones, Airplanes and Satellites) as well as examples of current applications were presented as well as their technological readiness. Substantial progress has been done in the last 5 years and currently, there are more than 20 combinations of remote sensing technologies and algorithms able to report on marine litter, but most of them are still in early stages of the R&D process.



## Seafloor litter - *Jesus Gago. IEO-CSIC*

Jesús Gago introduced the principal impacts of marine litter as well as relevant marine strategies, frameworks and programmes regarding monitoring of seafloor litter (MSFD, RSC, ICES). The Twilitter App ([twilitter.herokuapp.com](https://twilitter.herokuapp.com)), a tool developed by the IEO in the frame of CleanAtlantic project to analyze twitter data and assess the interest of the citizen on the impact of marine litter was presented. The existence of legislation in several aspects (from plastic bags to single use items) has generated a need to establish monitoring programs that in the case of seafloor litter are based in the litter incidentally collected during fisheries survey cruises. The final objective is to determine the effectiveness of the measures to tackle the problem.

Current approaches include Sea-Floor-IBTS (combination of existing trawling programs for the assessment of fish stocks), Sea-Floor-ROVs (Video protocols) and Sea-Floor (carried out by Divers). In Spain, the MITERD monitors seafloor litter with the support of the Spanish Oceanographic Institute through the demersal trawl campaigns aimed at the evaluation of the state of the demersal and benthic ecosystem that in addition collect marine litter data following agreed protocols. These approaches were presented and discussed.





## Mapping of marine litter at global level - Carmen Morales, UCA

To illustrate marine litter at global level, Carmen Morales presented the results of a study that analyzed a huge amount of data of macro litter from initiatives worldwide. An increasing amount of data from research institutions as well as citizen science is being generated but in different formats, criteria and units which makes it difficult to compare them and therefore take advantage of the data generated. They are not comparable and interchangeable and they cannot integrate and be used so there is an urgent need to harmonize. The study compiled and analyzed millions of data of macro litter from initiatives worldwide with the aim of gaining knowledge on the marine litter ranking of 7 types of aquatic ecosystems: nearshore, open, river waters, river beds, deep seafloor, nearshore seafloor, and shoreline. She highlighted the challenge of data comparability: harmonization, data cleaning, overlooking & miss-identification, geographical bias, etc. A conversion tool for harmonizing litter categories has been created including 112 litter categories of the harmonized JML. The study identified the 10 top litter items in aquatic systems, and found that the top 10 items represent ~75 % of total litter and the Top 4 items represent ~45 % of total litter. Waste from take-out consumption dominates global litter, followed by those resulting from fishing activities. Sea-based activities contribute at minimum 22% to marine litter.



## QUESTIONS FOR DEBATE

*Comparability of monitoring procedures/technologies used for monitoring marine litter in the different compartment. What aspects could be improved and how?*

- Comparison of methodologies is more feasible at local scale but it turns out more complex at higher scale. Passing from a local scale to a global one needs technical and “diplomatic” work to agree on standards.
- Different compartments have very different levels of monitoring maturity.
- Great progress has been made on beach litter monitoring programmes along the last decade in the frame of MSFD, regarding data collection, compilation by EMODnet, normalization and analysis, identification of top items timely to create SUP Directives, threshold value setting up and assessment method.
- Floating litter monitoring is much less developed. Information is available from different datasets but not comparable because of different approaches, target sizes and coverage.
- For seafloor monitoring, different methodologies are being applied (visual, imaging, trawling) with the shallow seafloor being a specific case. As there are areas where trawling is not allowed or cannot be done because of the seafloor morphology, other approaches such as imaging from AUVs and HOVs are becoming more important although more work is needed to align the ways data are collected
- There can't be too many methodologies. Harmonization is needed and it has to be made as simple as possible. For a given compartment, methodologies should be able to be compared to each other.
- Limitations of each kind of monitoring make comparisons difficult. Some kinds of opportunistic monitoring have limitations.
- Methodologies have to be adapted to the different development levels around the world and adapted to the local realities and needs.
- Need for better training for observers/samplers, as well as unifying monitoring criteria. Same observers should cover the same areas.
- Good data collection is the base of any monitoring program.



***How can technologies support wider and cheaper monitoring and how could they be integrated in the monitoring programmes?***

- The main objective of technology development is improving monitoring, not making it cheaper.
- Technology is not a replacement for current existing programs, it aims to fill gaps and can make some observations systematic and increase its geographical cover (f.i. EEZ).
- Remote sensing is a complement to current programs that increases the study area. Information acquired through this approach is useful for finding areas of study and intervention.
- New technologies can help in complex environments (e.g. image recognition for seafloor litter). These technologies can also help in other kinds of environmental research.
- Technology can support the performance of larger and better monitoring campaigns that improve on individual ones, as well as supplementing the work of observers.
- Apps can significantly improve citizen science contributions.
- Some technologies (e.g. drones) can be useful for preventive measures towards avoiding litter getting into the sea.

***How to link monitoring results with the implementation of mitigation measures? What is required for a feedback mechanism that enables a quantitatively informed and iterative system of measures, enabling the efficient reduction of marine litter?***

- A better connection between science and policy is needed to move from monitoring data to measures.
- Currently there's a need to be selective on data and improve the focus of monitoring programs.
- Item detection must be linked to measures about that item.
- Monitoring must help decision making. There's a time gap between monitoring and results that should be bridged.
- Measures have to be defined once there's information, not before.
- In order to evaluate measures there's a need to improve the knowledge on how litter moves between compartments and the time it takes from source to sink.
- Even if radical measures are taken some items would still keep appearing for a time.

*How to improve coordination/collaboration among the various levels of governance and other partners (e.g. NGOs, citizens' group, crowd sourcing, academic institutions)? What mechanism are/should be put in place to incorporate e.g. citizen science and crowd sourcing initiatives into monitoring programmes?*

- Citizen science (CS) is a valuable complement to official monitoring programs and can potentially greatly increase the study area. Item lists applied must be homogeneous.
- Even if CS is potentially interesting, precautions must be taken. Data must be properly collected, well organized and structured.
- CS tools must be kept simple, and involved organizations must receive training and feedback.
- Opportunistic data can be interesting in some compartments in order to increase the monitoring scope.
- How can CS be coordinated globally? Apps are a great tool to globally coordinate CS, but data processing is needed.
- CS will be of great importance towards the new global agreement on plastic.
- Some beach cleaning corporate campaigns are a hindrance to proper monitoring due to lack of data taking.
- Once monitoring results are available, measures have to be developed.
- There are great difference at the global level on data availability. Less developed countries can't be left behind.
- Open source information on litter distribution will be freely available for communities with difficulties to access information. The EU also provides free data that can be useful for these communities"





## Conclusions

Speakers were asked ahead of the session to identify the current gaps and challenges in monitoring of marine litter. From their collective input the following items were identified, roughly grouped in three categories, prospectively named Methodology, Technology and Mitigation

- **Methodology:** Significant progress has been made in the last few years regarding development of methodologies and criteria for MSFD implementation. Further harmonization and guidance development is ongoing especially for floating and seafloor litter. However, stress was made into the harmonization of different monitoring methodologies at the international level, the need for the development of guidance materials for the application of the methodologies, as well as the need for leadership from international bodies in the harmonization process. An important outcome to overcome the lack of comparability when analyzing litter data has been the Join List of Categories (JRC). The list is being implemented by EU MS and beyond and a manual and online catalogue has been published
- **Technology:** The application of technology to marine litter monitoring created a great deal of interest for its potential as well as concern regarding its application in practical terms. The need for developing new methodologies adapted for emerging technologies was mentioned, as well as how data management would be undertaken with the incorporation of these technologies. New monitoring tools coming from these technologies would also present the challenge on how to interoperate with them and the existing databases and reporting practices. Appreciations were also made regarding the design of new monitoring tools and how it would be desirable that they are as simple, cheap and quick as possible. Other observations were made regarding the limits of remote sensing approaches for Marine Litter monitoring, such as the impossibility of detecting microplastics, which makes this technology only effective towards the monitoring of macroplastics and large accumulations of ML.
- **Mitigation:** Finally, speakers also identified as a key challenge for the future how to effectively and efficiently link information coming from monitoring programs to practical measures to fight against marine litter. In this regard, it was mentioned that monitoring programs should help identify the sources, as well as its life cycle, in order to act as early as possible against it. Questions were also raised regarding the suitability of current initiatives in this regard, and on how monitoring and assessment can better support mitigation measures aimed at marine litter.

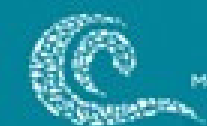












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