

Plastic at the Coast - Sources, state and monitoring

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2. Impacts of plastic litter
3. Plastic litter on the coast
4. EU - Marine Strategy Framework Directive (MSFD)
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1. Marine litter - Background

- Marine litter is any persistent, manufactured or processed solid material discarded, disposed of or abandoned in the marine and coastal environment.
- Marine litter consists of items that have been made or used by people and
 - deliberately discarded into the sea or rivers or on beaches;
 - left by people on beaches and shores;
 - brought indirectly to the sea with rivers, sewage, storm water or winds;
 - accidentally lost, including material lost at sea in bad weather (fishing gear, cargo).

1. Marine litter - Background

- Clothes/textile
- Food waste (organic)
- Glass/ceramics
- Paper/cardboard
- Rubber
- Processed/worked wood
- Metal
- Chemicals
- Artificial polymers/plastics are responsible for approx. 70–90% of all litter found ¹
- Approximately 80% of all litter originates on land
- This land-based litter is of particular concern for coastal ecosystems where it represents 60–80% of litter on beaches ²

When we talk about marine litter, we are largely talking about plastic from land-based sources.

¹Fleet et al., 2021

²Serra-Gonçalves et al., 2019

2. Impacts of plastic litter - Environmental

Size of plastic litter particles

Macro



25 mm

Entanglement



Meso



5 mm

Ingestion

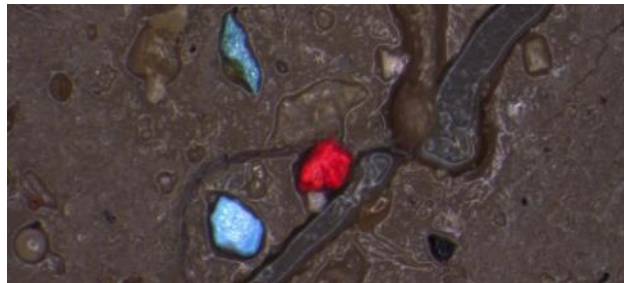


Large
Micro



1 mm

Small
Micro
To
Nano



82% of 296 demonstrated impacts on wildlife were caused by plastic.¹

¹Wagner and Lambert, 2018

2. Impacts of plastic litter - Socioeconomic

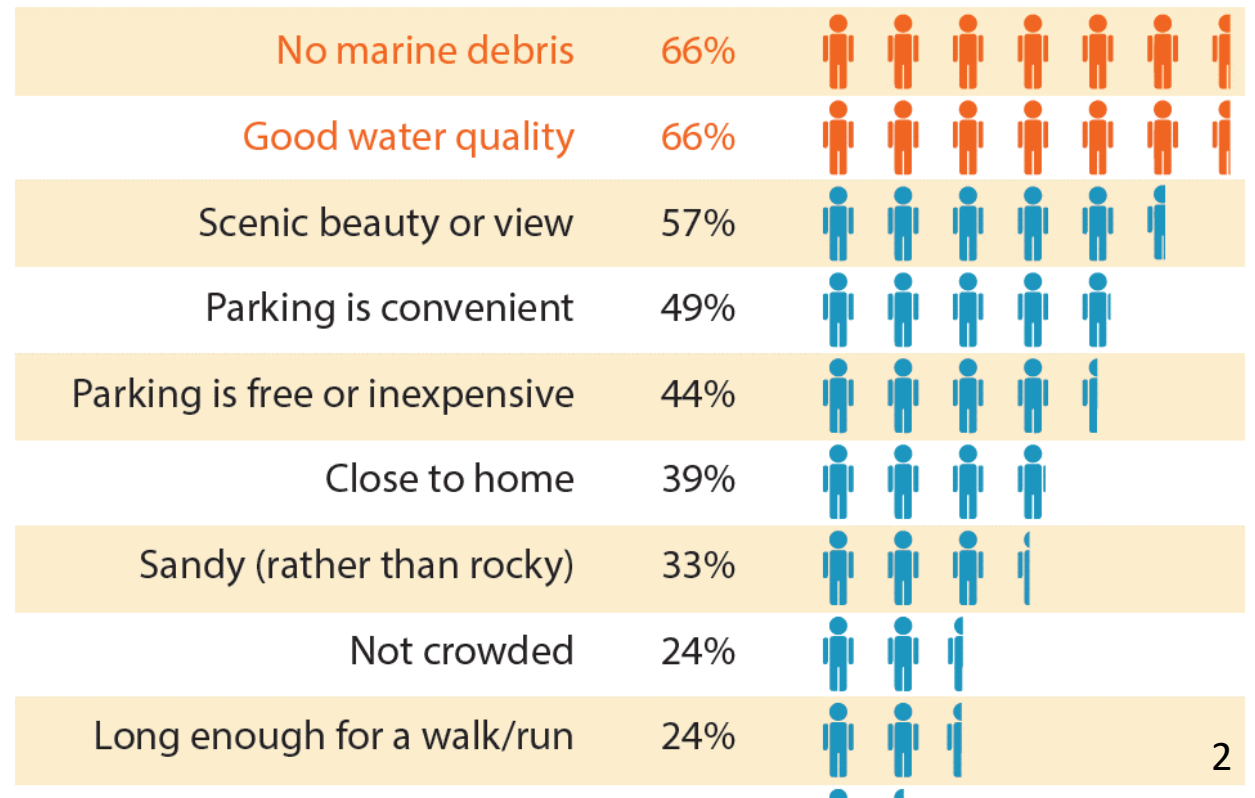
When choosing a beach:

- Cleanliness is the most important factor for foreign tourists.¹
- ~50% of the local people would travel seven times further to visit a clean beach.¹

Beach litter creates a feeling of:

- unhealthy conditions;
- is perceived as a risks to health and safety.

Percentage of people that ranked the following beach characteristics as very important



Beach plastic litter has a negative effect on a huge amount of ecosystems.

¹Ballance, A. et al., 2000

²Figure adopted by: www.marinedebris.noaa.gov

2. Impacts of plastic litter - Socioeconomic

Public safety

In an evaluation of beaches in Australia and New Zealand:

- 21% of the respondents had received injuries due to beach litter
- Primary injuries were wounds (65%)¹
- Injuries doubled from 2007 to 2016 ²



Average cleaning costs per kilometre of beach per year are:

- around € 7,000
- and can increase to €82,000.00 at regularly cleaned beaches, in tourist areas.³

¹Campbell ML, et al., 2016

²Campbell ML, et al., 2019

³Mouat, J. et al. 2010

3. Plastic litter on the coast

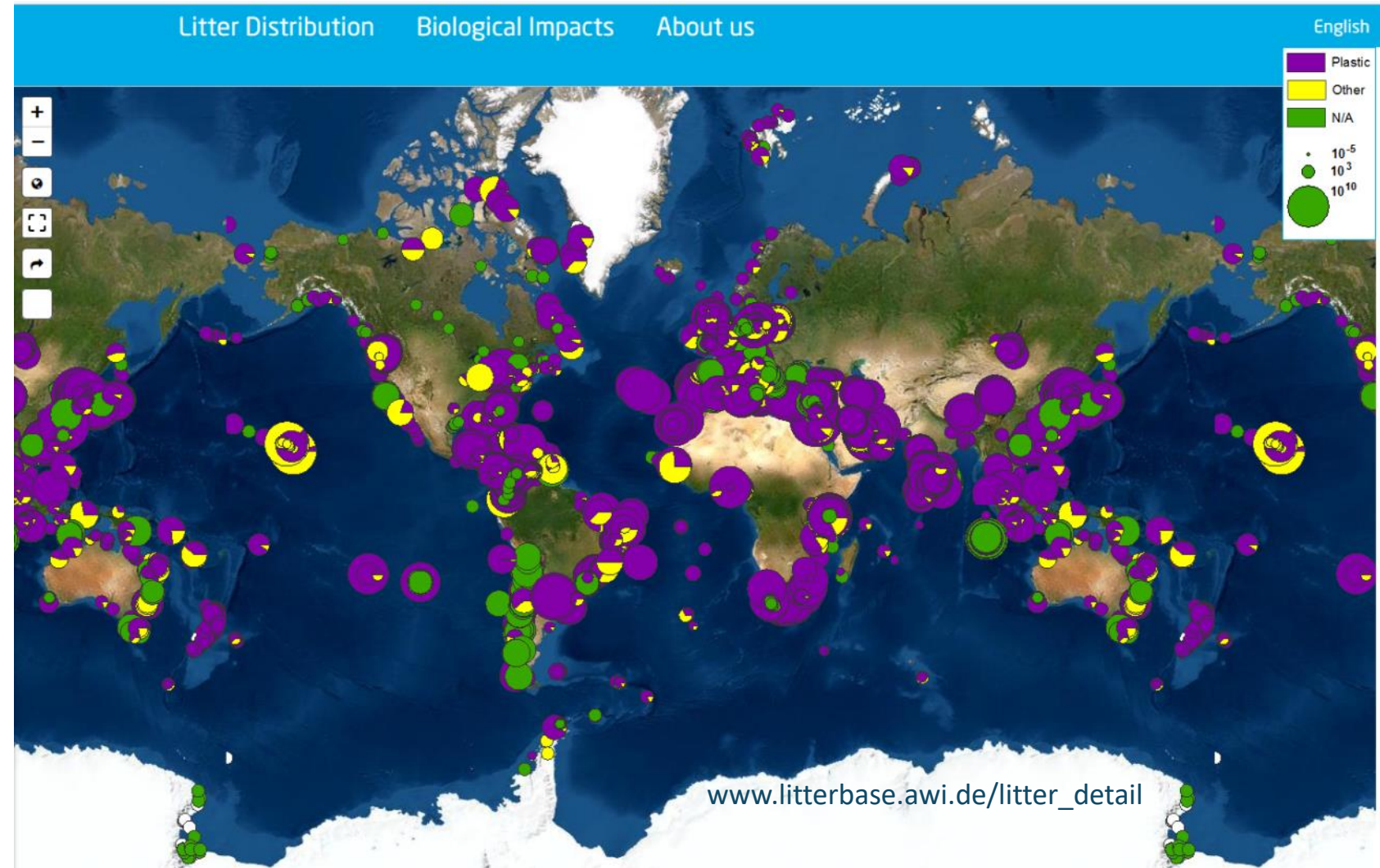


Plastic-litter is used worldwide to quantify and monitor marine litter pollution, as it is possible to generate data in a cost-effective way.

3. Plastic litter on the coast



Beach studies from
1960 to 2020



From a few initial studies conducted in the 1960s, research on beaches has extensively grown.

The vast majority of litter found is plastic regardless of time or location surveyed.

4. EU - Marine Strategy Framework Directive (MSFD)

Objective: the Good Environmental Status

Descriptor (10) Properties and quantities of marine litter

- The **composition, amount and spatial distribution of litter on the coastline**, [...], are at levels that do not cause harm to the coastal and marine environment.
 - For D10C1: litter shall be **monitored on the coastline ...**
 - Information on the **source and pathway** of the litter shall be collected...
 - Member States shall establish **threshold values...**¹

¹European Commission (2017)



5. Macro-litter pollution

Naked eye surveys with focus on macro-litter (> 25 mm) is the most common monitoring approach.



OSPAR (2010)

- Largely used in Europe (EU);
- Harmonized monitoring approach;
- 100m or 1km long stretch of the coast is investigated; 4 times per year;
- Litter between the waterline and the back of the beach is picked up and analysed.

5. Macro-litter pollution



JRC TECHNICAL REPORTS

A Joint List of Litter Categories for Marine Macrolitter Monitoring

Manual for the application of the classification system

Fleet, D., Vlachogianni, T., Hanke, G.
MSFD Technical Group on Marine Litter

2021



Categories

- Clothes/textile
- Food waste (organic)
- Glass/ceramics
- Paper/cardboard
- Rubber
- Processed/worked wood
- Metal
- Chemicals
- **Artificial polymers/plastics**

Litter items

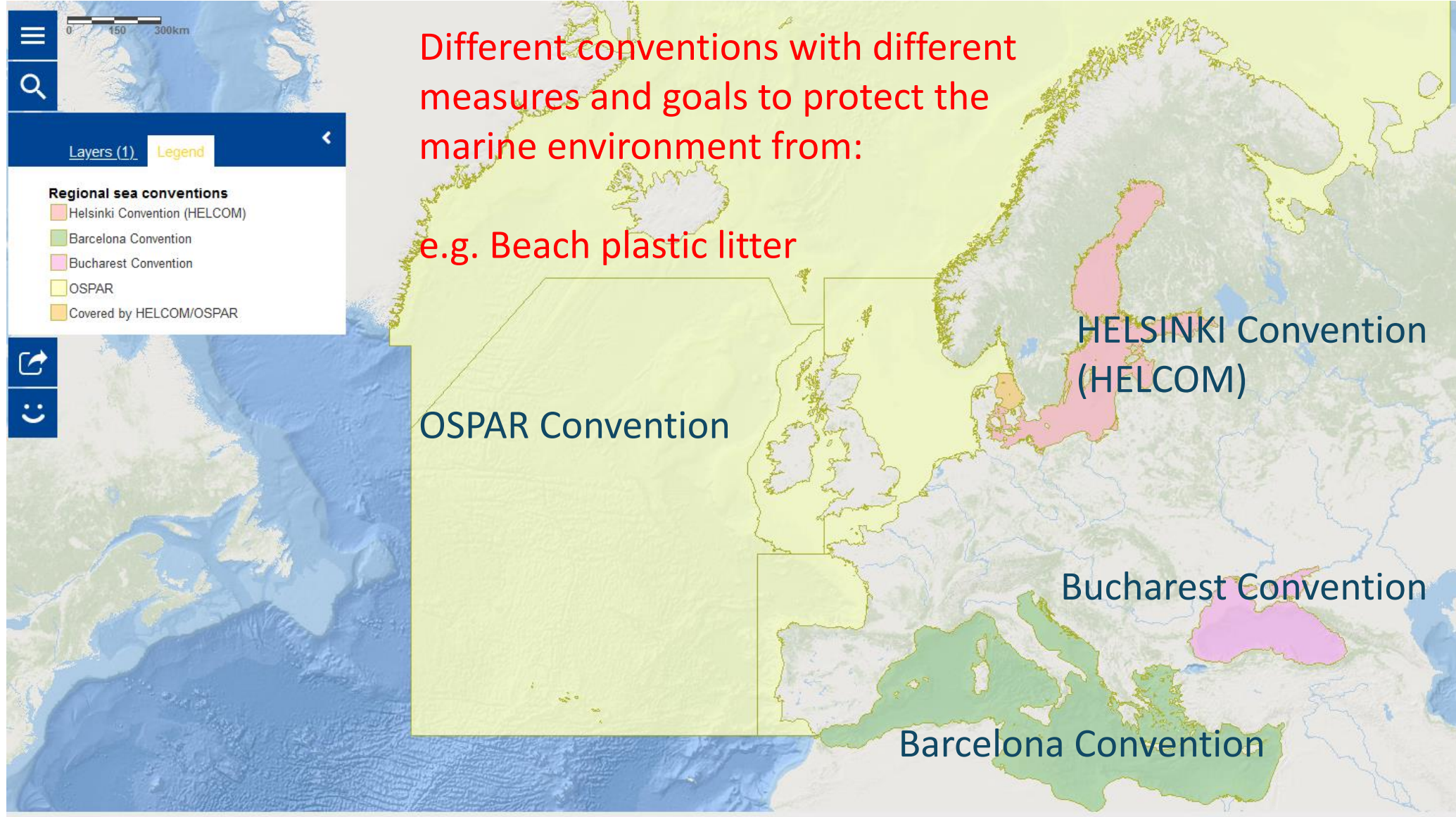
Plastic drink bottles > 0.5 l



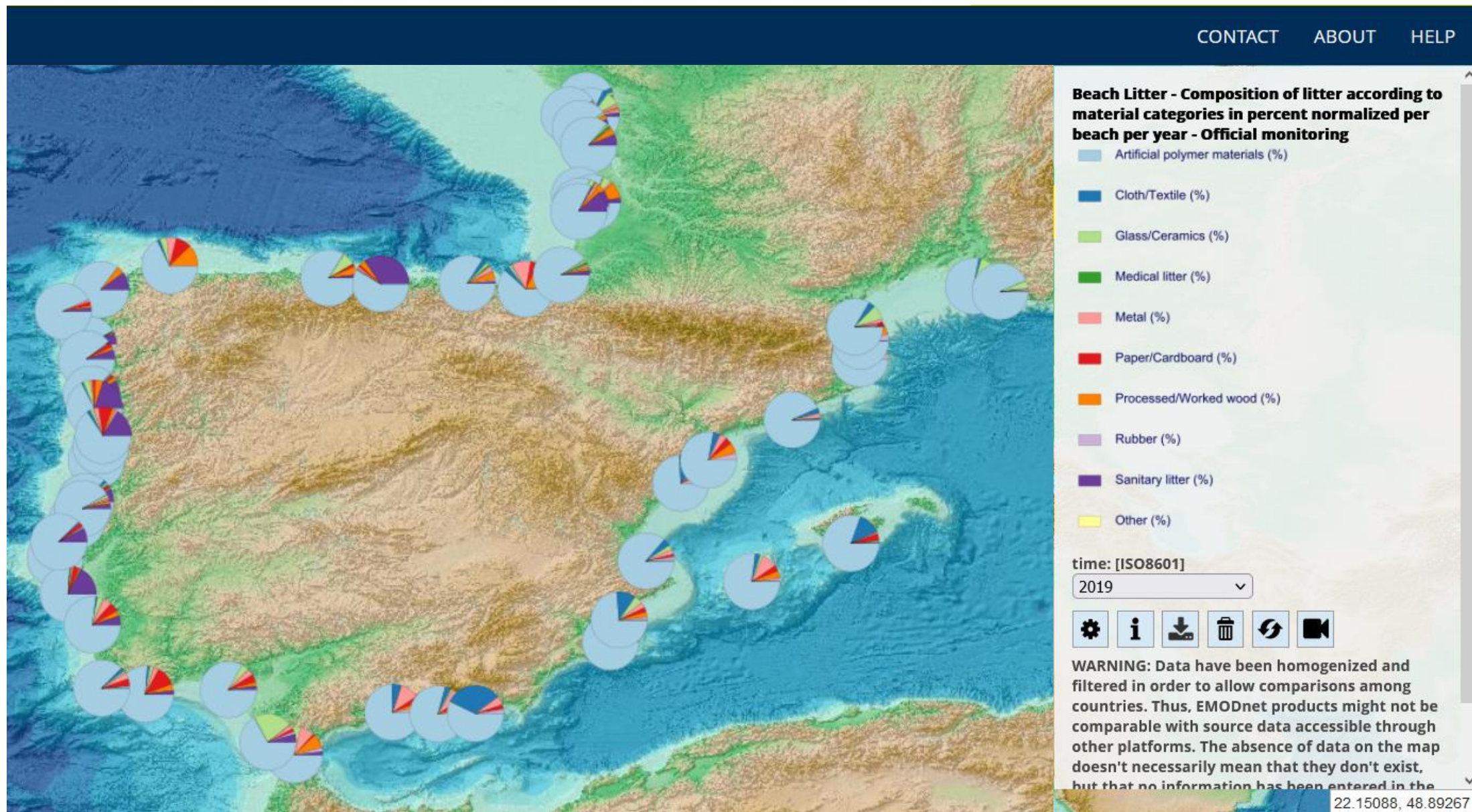
Plastic bags



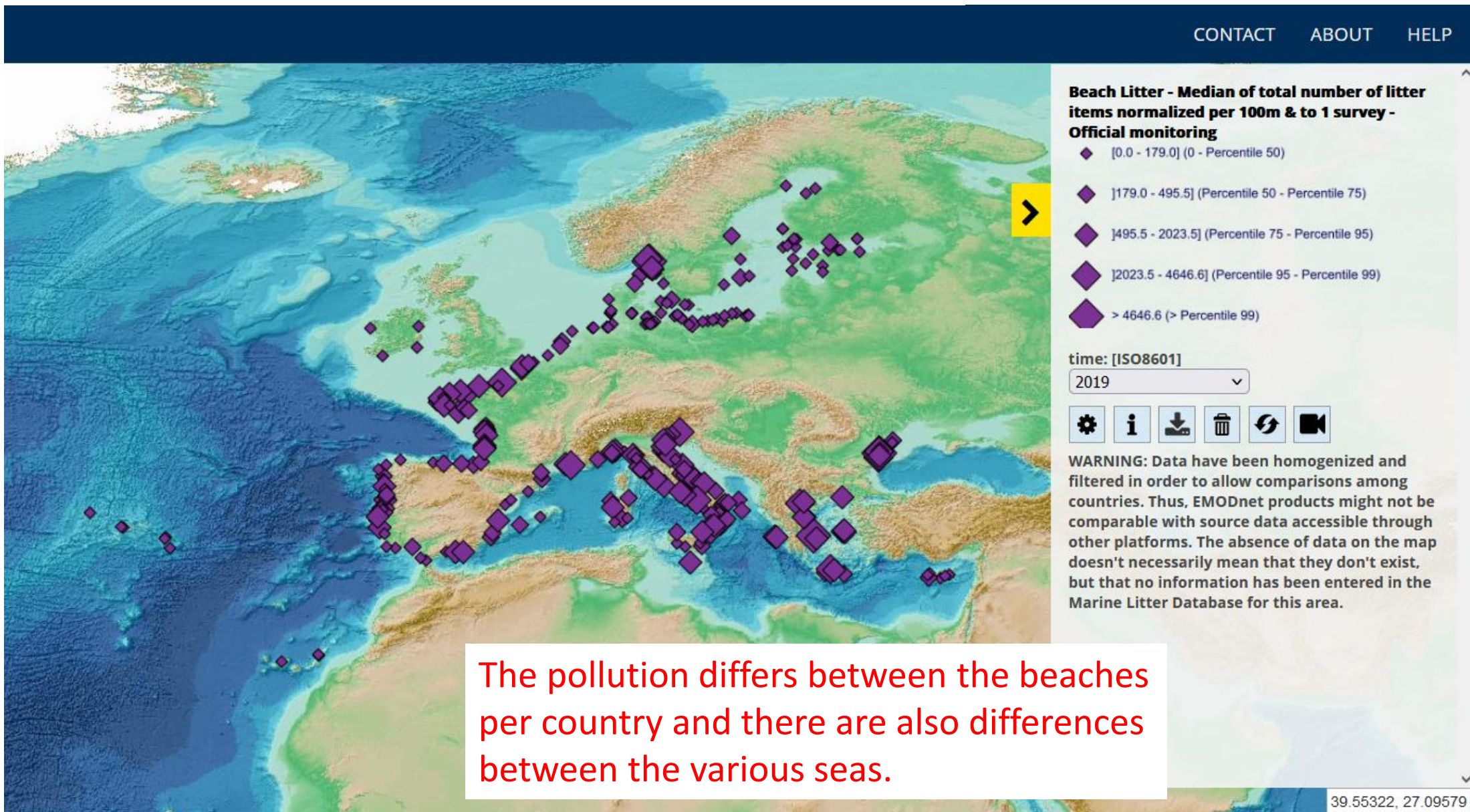
5. Macro-litter pollution



5. Macro-litter pollution



5. Macro-litter pollution



The pollution differs between the beaches per country and there are also differences between the various seas.

5. Macro-litter pollution

The good environmental status threshold value is 20 macro litter items / 100 m (Median).



Only in 3 of 31 European subregion the threshold value of 20 macro litter pieces / 100 m is reached.

JRC (2020)

Country-subregion Period 2015-2016	Median litter pieces / 100m
Germany - North Sea	79
Denmark - North Sea	221
France - North Sea	671
Germany - Baltic Sea	26
Estonia - Baltic Sea	43
Finland - Baltic Sea	49
Spain - Med. Sea	120
France - Med. Sea	294
Italy - Western Med. Sea	623

EU Median pollution

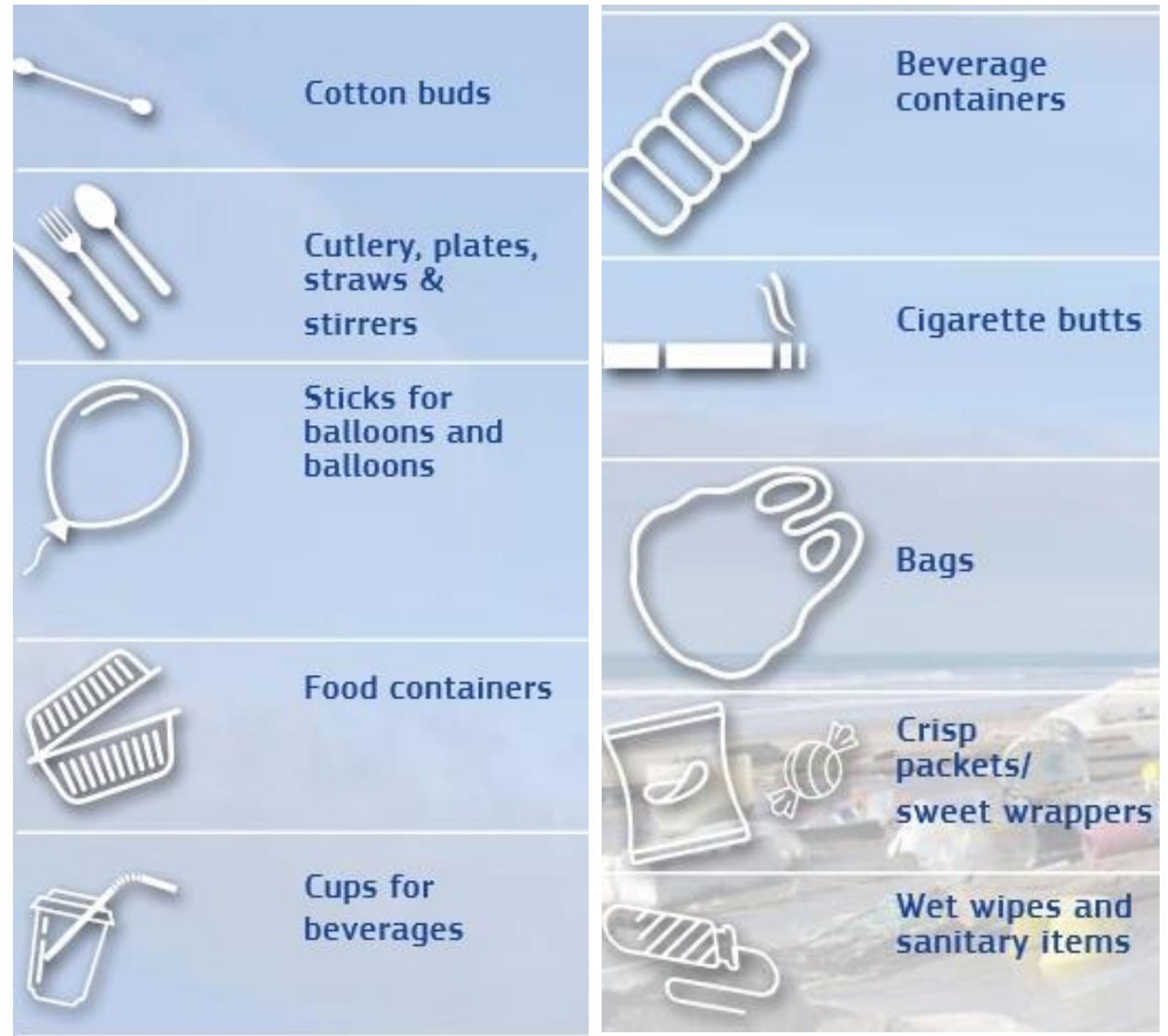
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5. Macro-litter pollution

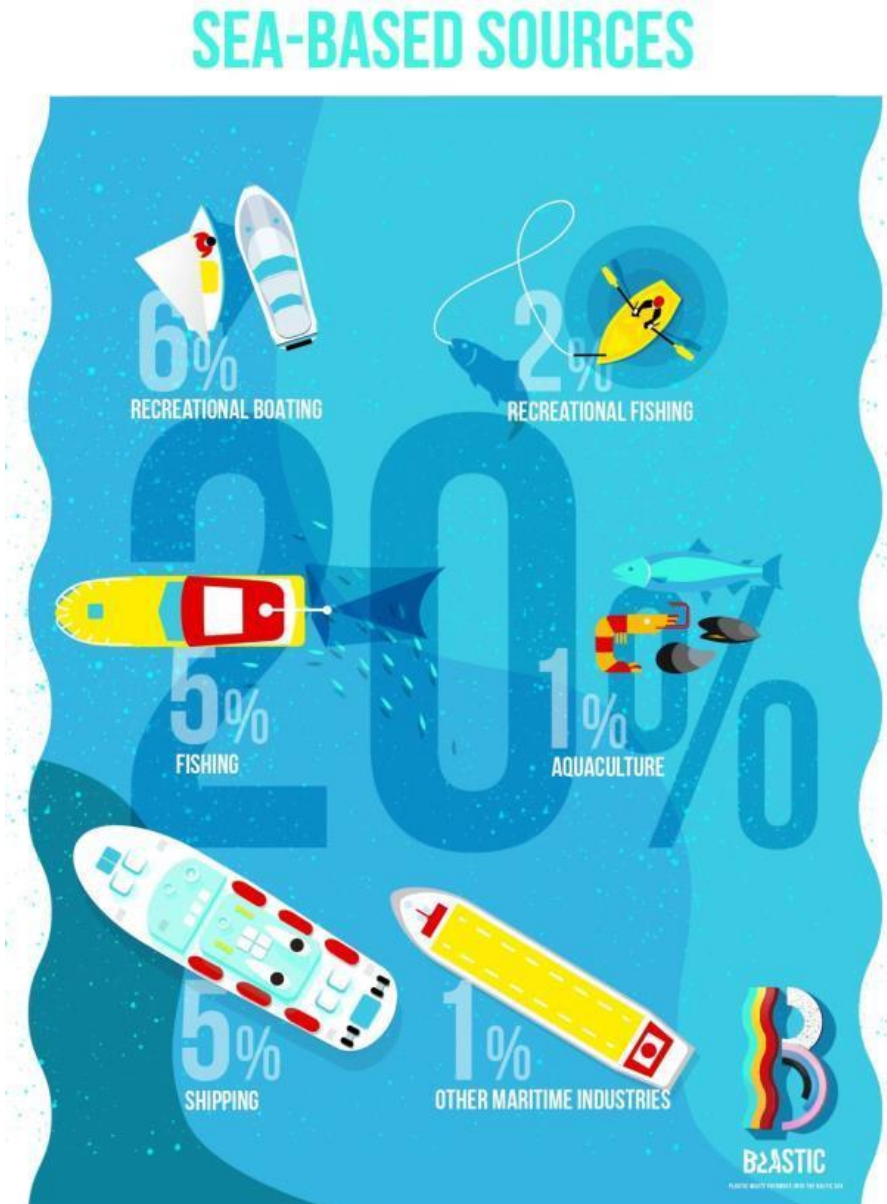
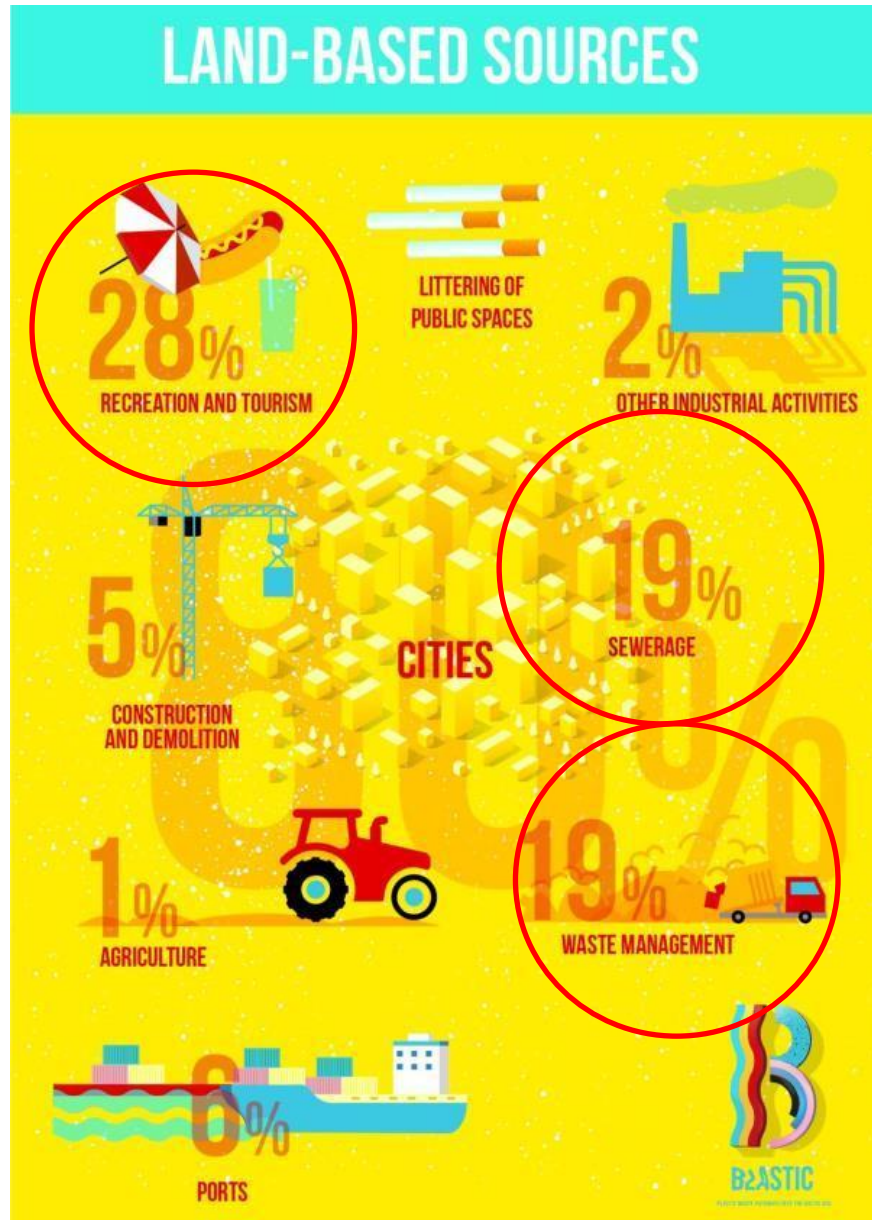
The 10 most found Single Use Plastic items on European beaches account for 43% of total marine litter.

Fishing gear represents an additional 27% of all marine litter.

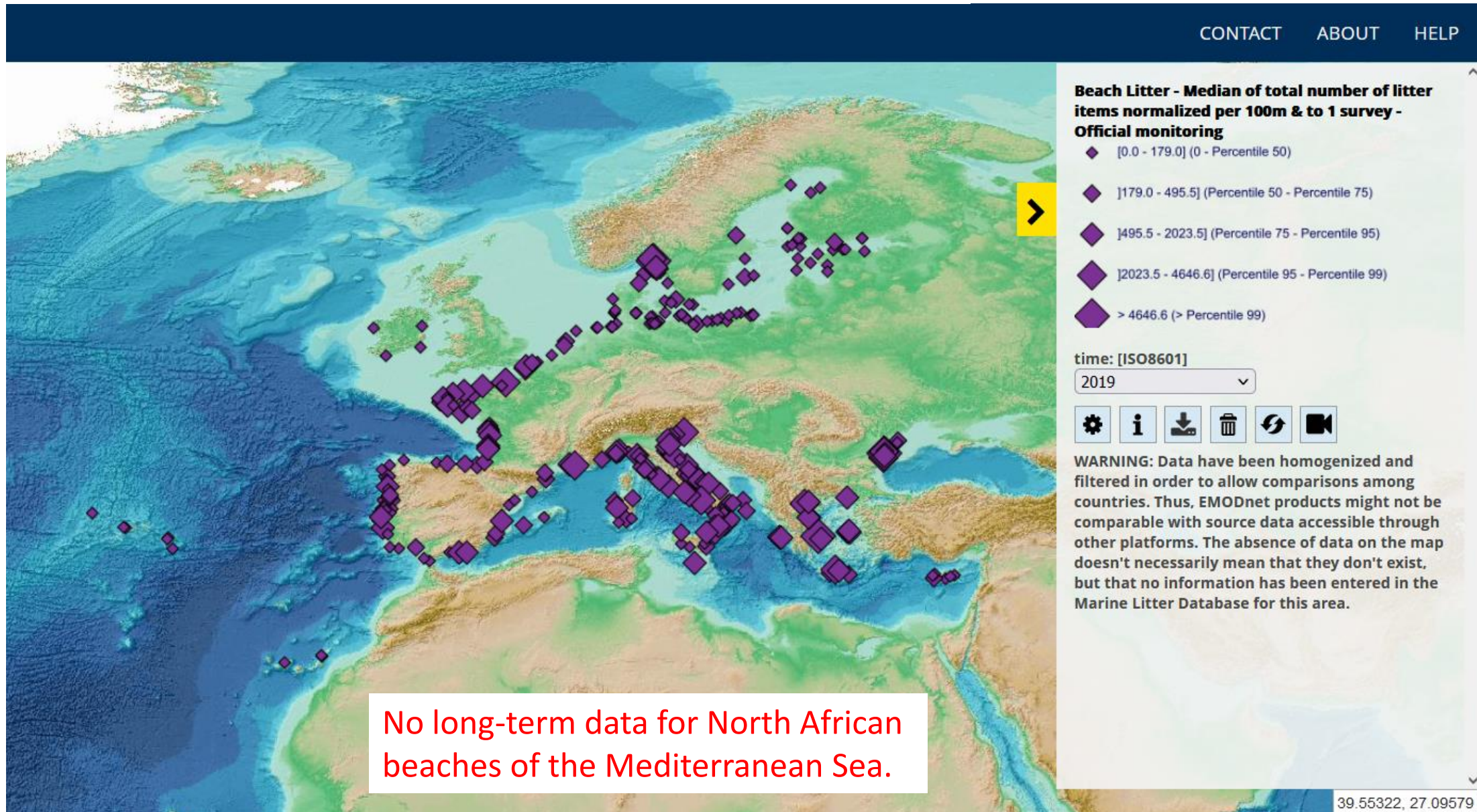
It is important to take action against the (single use) plastics pollution.



6. Sources and pathways



7. North African beaches



No long-term data for North African beaches of the Mediterranean Sea.

7. North African beaches



First study results	Median litter pieces / 100m
Tunisia	1100
Tunisia	1900
Tunisia	3500

Much higher numbers of litter pieces at North African beaches of the Mediterranean Sea.

Single use plastic from the tourism sector is a large problem.

7. North African beaches



In some tourist areas, more than 75 % of the annual waste is generated in summer.¹

Tourists generate up to twice as much solid waste per person and day (2.6 kg) than locals (0.6-1.0 kg).²

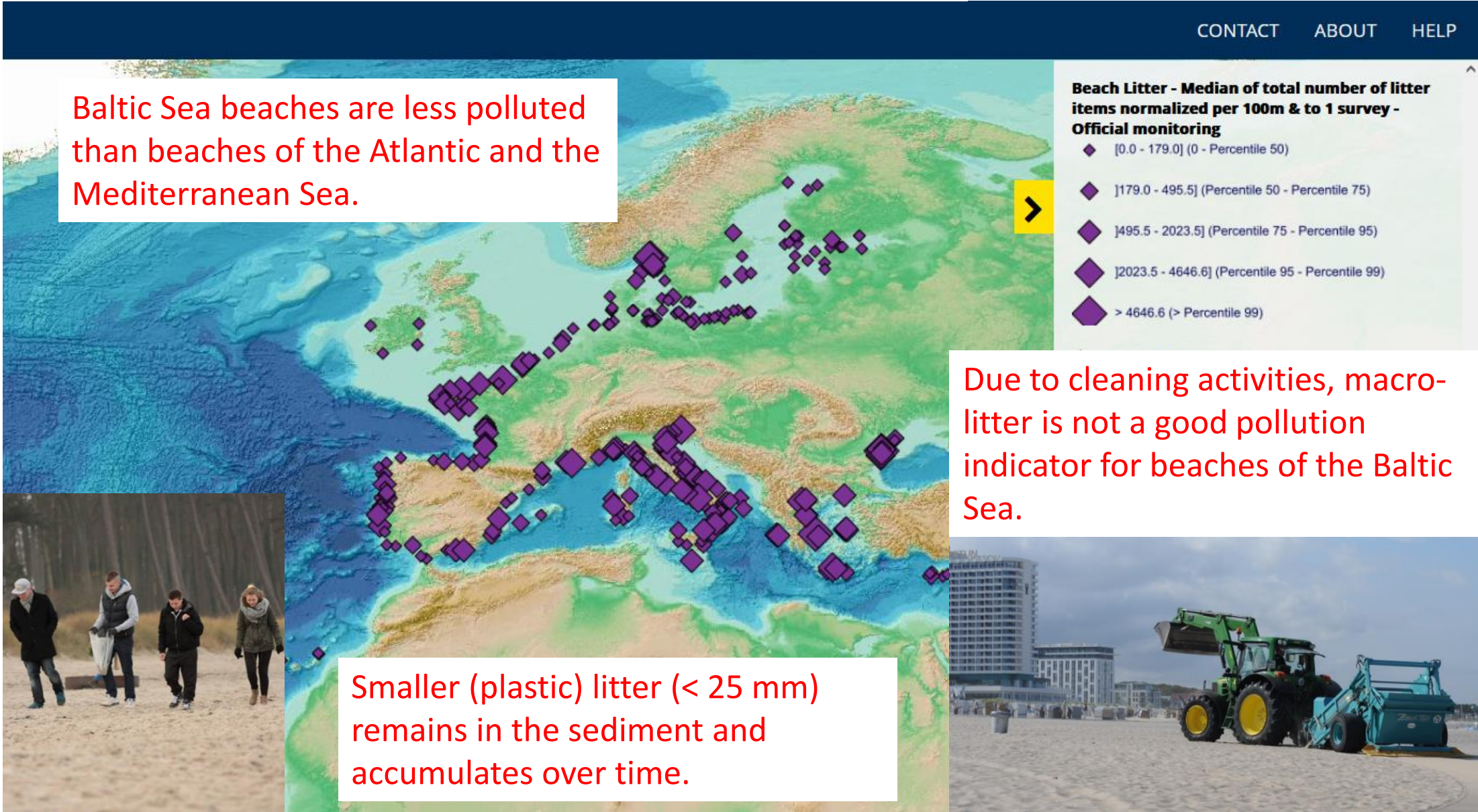
Economic losses can arise when beaches are persistently polluted and international tourists could stay away as a result.

Mitigation measures are needed to decrease the plastic litter pollution from the tourism sector.

¹Ryan PG (2015)

²Chaabane, W (2020)

8. Baltic beaches



8. Baltic beaches

Sand rake monitoring

An alternative method for beaches where macro-litter is no suitable indicator.

It can be used (by volunteers) at all sandy beaches (urban, managed, touristic and river mouth) of the Baltic Sea.

Data can serve as a basis for:

- Pollution baselines (for large micro-, and meso-litter).
- The definition of the Good Environmental Status for Baltic beaches.



9. Conclusions

- The amount of plastic in the marine environment has certainly increased over the last decades and beaches are important sinks for plastic litter.
- Beaches all around the world are highly polluted with plastic litter (in various sizes); which leads to negative ecological and socioeconomic impacts.
- Only in 3 of 31 European subregion (EU) the Good environmental status of 20 macro litter pieces / 100 m is reached (in 2019).
- For North African beaches of the Mediterranean Sea long-term data is needed to qualify and quantify the pollution status.
- Understanding the amount, sources, and pathways of plastic on beaches is central for the implementation of successful mitigation measures.
 - Therefore, harmonized long-term monitoring approaches are needed.
- Macro-litter is not a good pollution indicator for highly used, urban and managed beaches of the Baltic Sea.
- Meso-litter monitoring methods can help to provide a full picture of the pollution of Baltic beaches over time and allow for trend analysis and the effectiveness of marine litter mitigation measures.



Thank you for your attention!



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