



Project funded by
EUROPEAN UNION

MARLITER



Microplastics



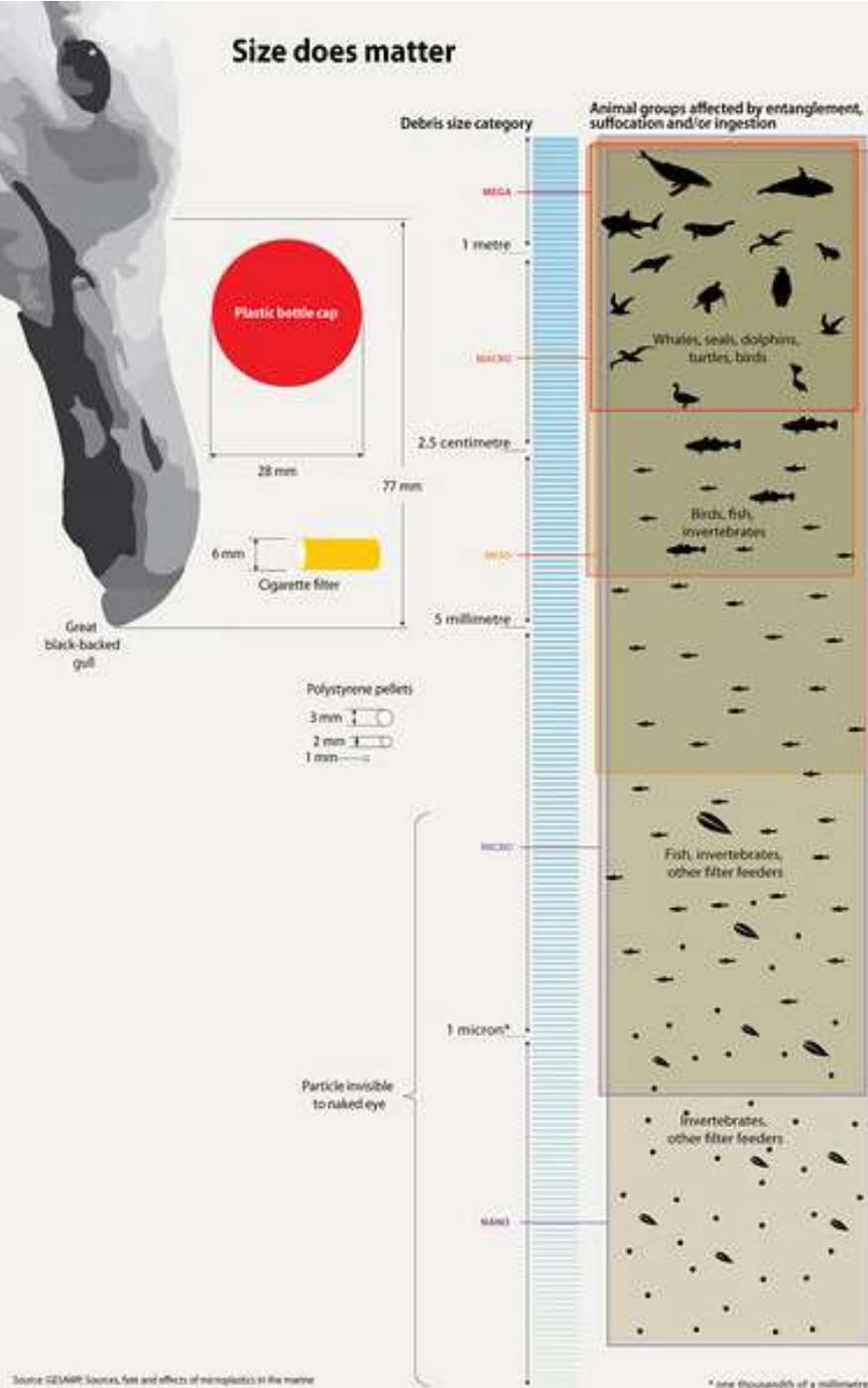
Project funded by
EUROPEAN UNION



What are microplastics?

- **Microplastics** are plastic items with a diameter of **less than 5 mm**.
- Microplastic pollution occurs everywhere in the marine environment.
- The chemical reactions in which microparticles take part and how these particles affect organisms is still under study.
- Research about the effects of nanoparticles, smaller than $1 \mu\text{m}$, is also ongoing.
- Microplastics and nanoplastics may have potential impacts on ecosystems.

Size does matter



Microparticles: less than 5 mm

- large: 1 - 5 mm
- small: less than 1 mm

Nanomaterial: particle aggregate or agglomerate with size range 1 - 100 nm (1 nm = 10^{-9} m or one millionth of a millimetre)

Ingested by invertebrates and filter feeders

How microplastics are generated

Sources of microplastic particles

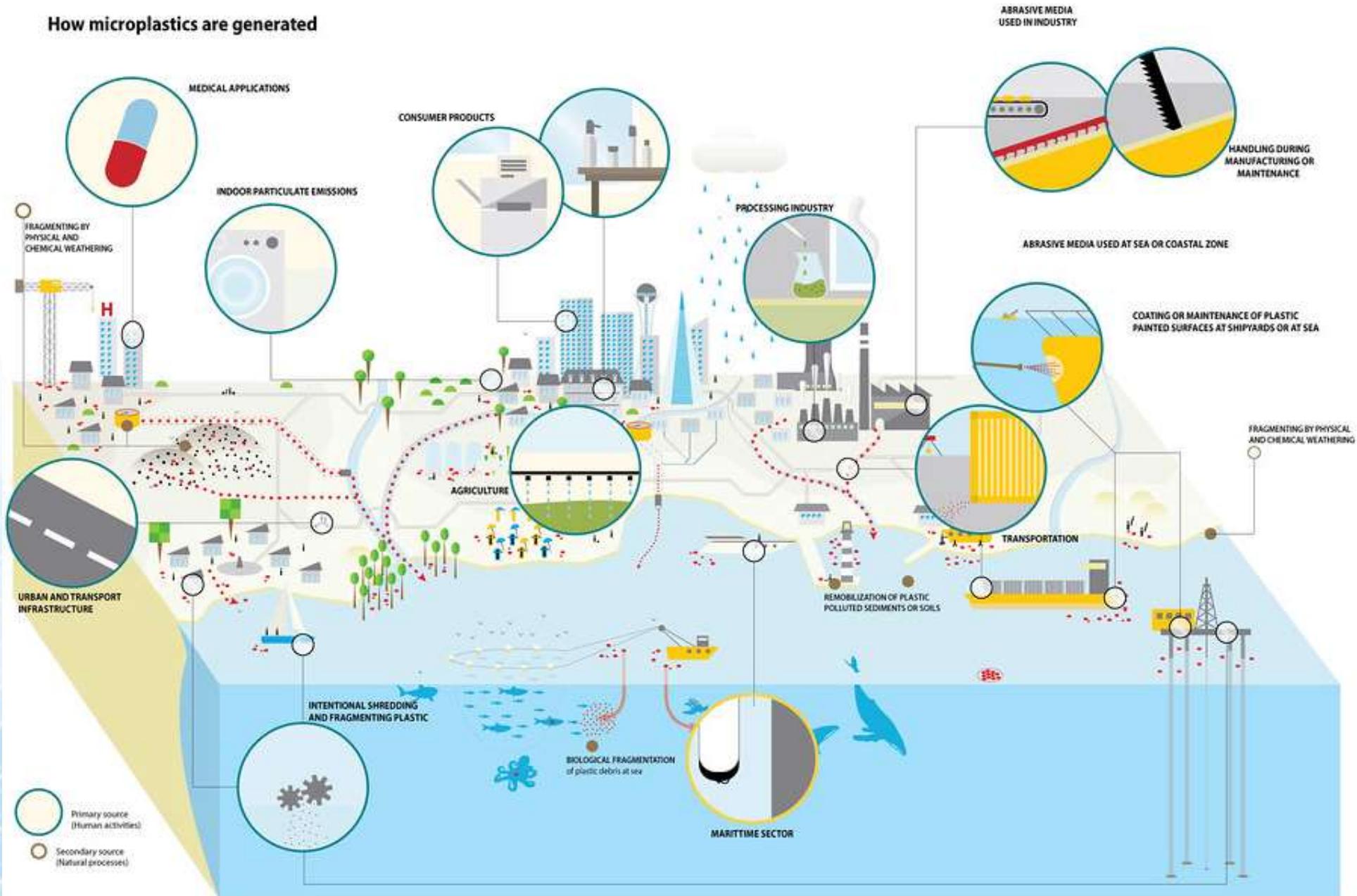
Primary: made on purpose

- cosmetic products
- abrasive media for cleaning applications

Secondary: variety of sources

- accidental release of primary plastics
- industrial waste and by-products
- wear and tear of plastic products during normal use (textiles, paints, car tyres, etc.)
- particles and fibres

How microplastics are generated





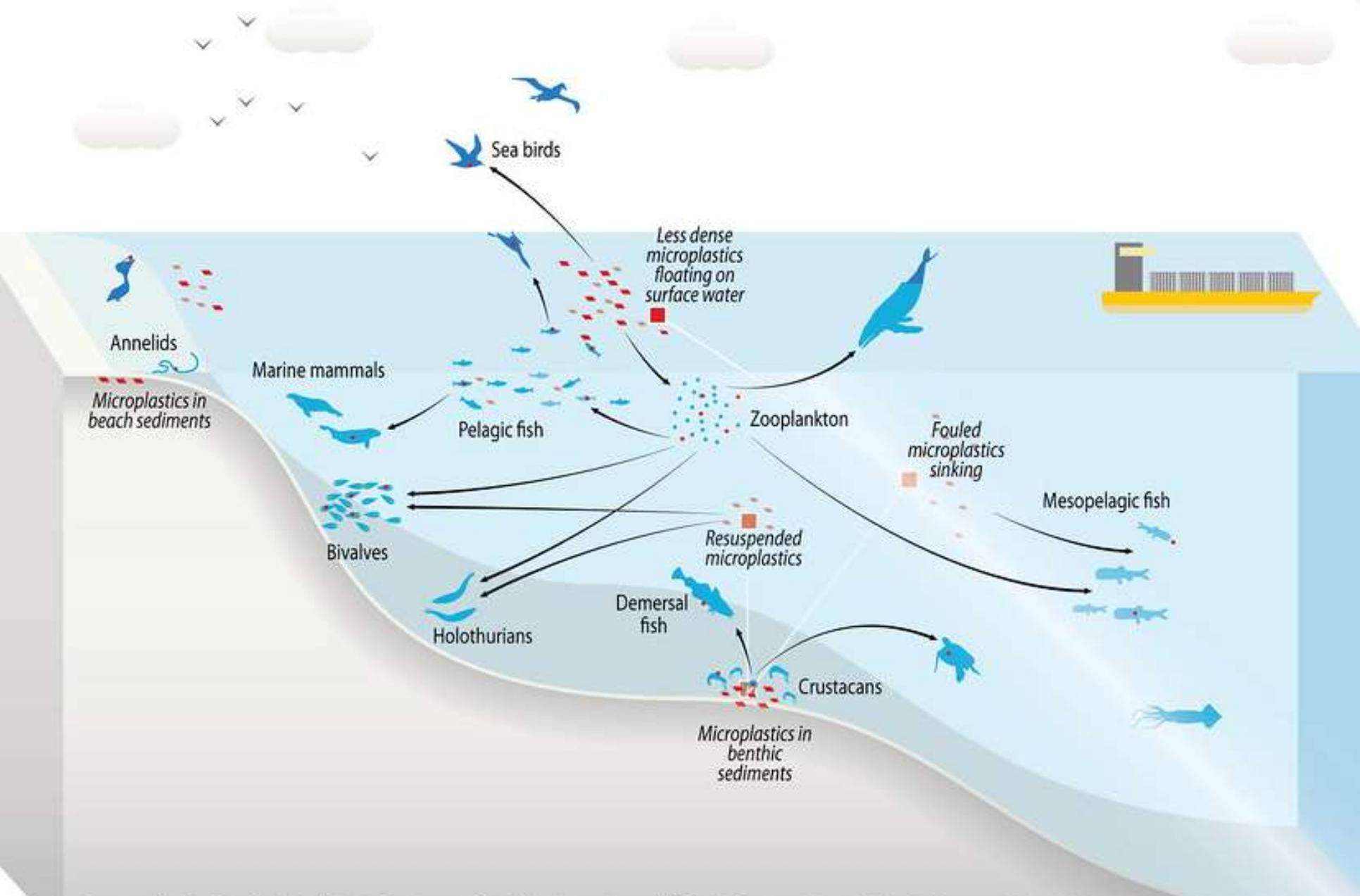
Project funded by
EUROPEAN UNION



How plastics enter the food web

- Swallowed by fish, mammals, birds, other sea animals
- Microplastics are similar in size to sediment and suspended particulate matter
- Filter feeding or sediment ingesting organisms ingest small plastic particles
- Some particles may not be excreted and remain in the digestive system of individual animals
- When an animal with microplastics in its body is eaten by a predator the microparticles travel up the food web

How plastics enter the food web





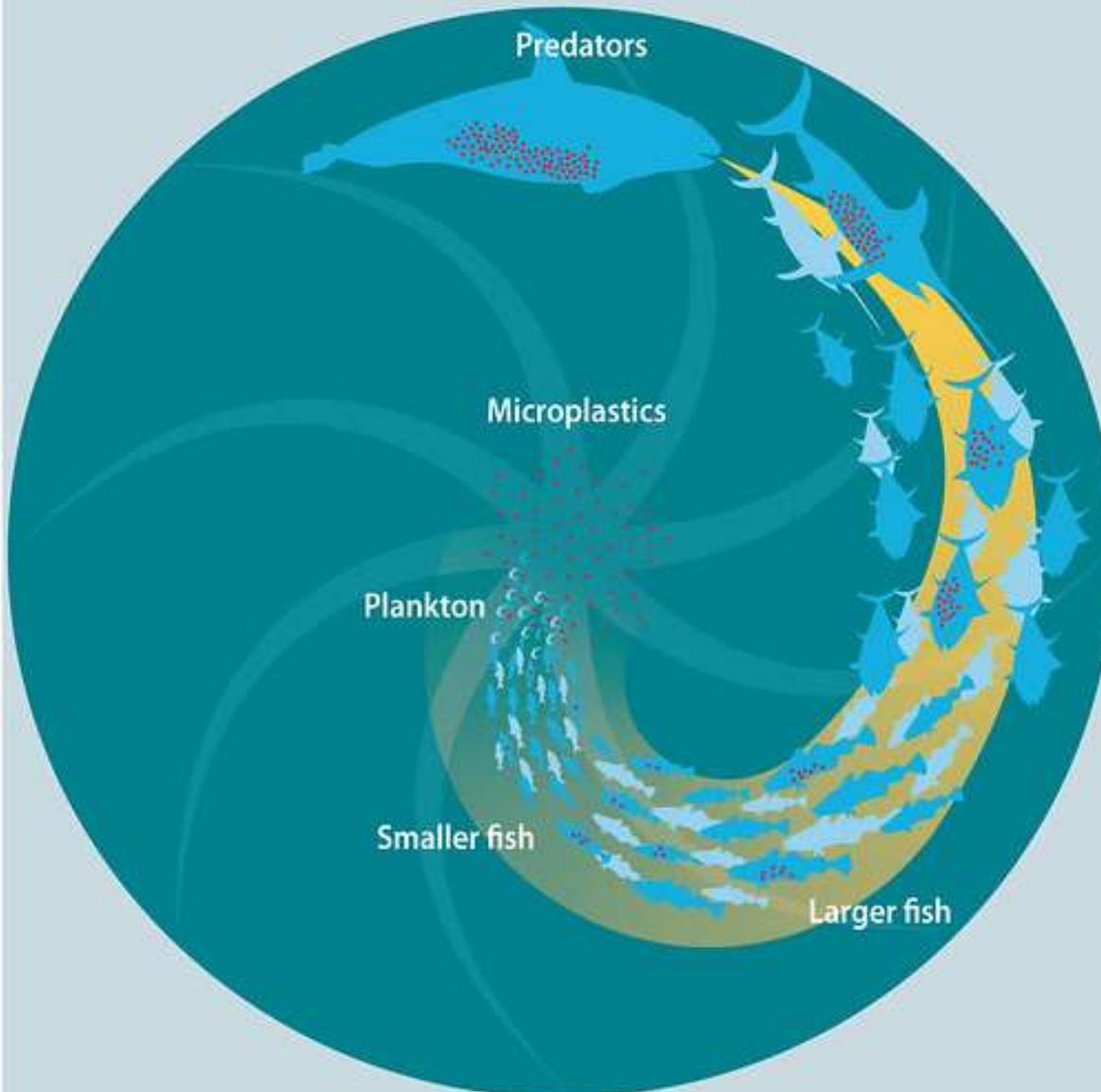
Project funded by
EUROPEAN UNION



Plastic bioaccumulation in the food web

- Zooplankton and other invertebrates ingest plastic particles and fibres
- Zooplankton usually excrete the particles within hours but microplastics may remain in the organism for up to seven days in laboratory conditions
- Ingestion of polystyrene particles by zooplankton significantly decreases their nutritional intake, since plastic provides zero energy, and may affect how these organisms deal with food shortages
- Microplastics affect also reproduction
- Zooplankton is at the base of the food web, so higher levels of consumers accumulate larger amounts of plastics

Plastic bioaccumulation in the food web



Microplastics are ingested by zooplankton.

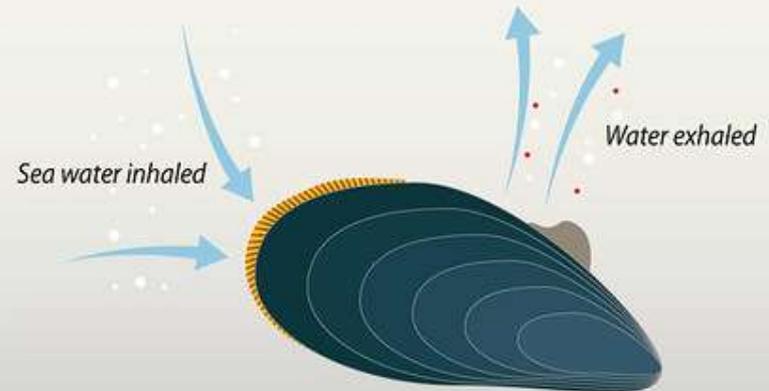
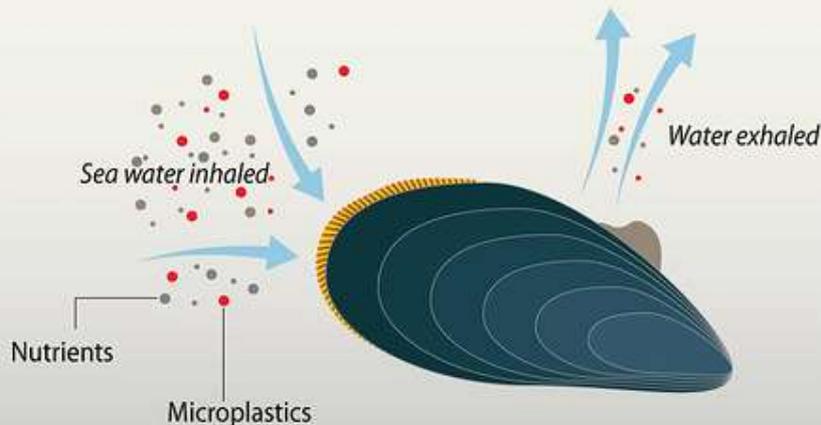
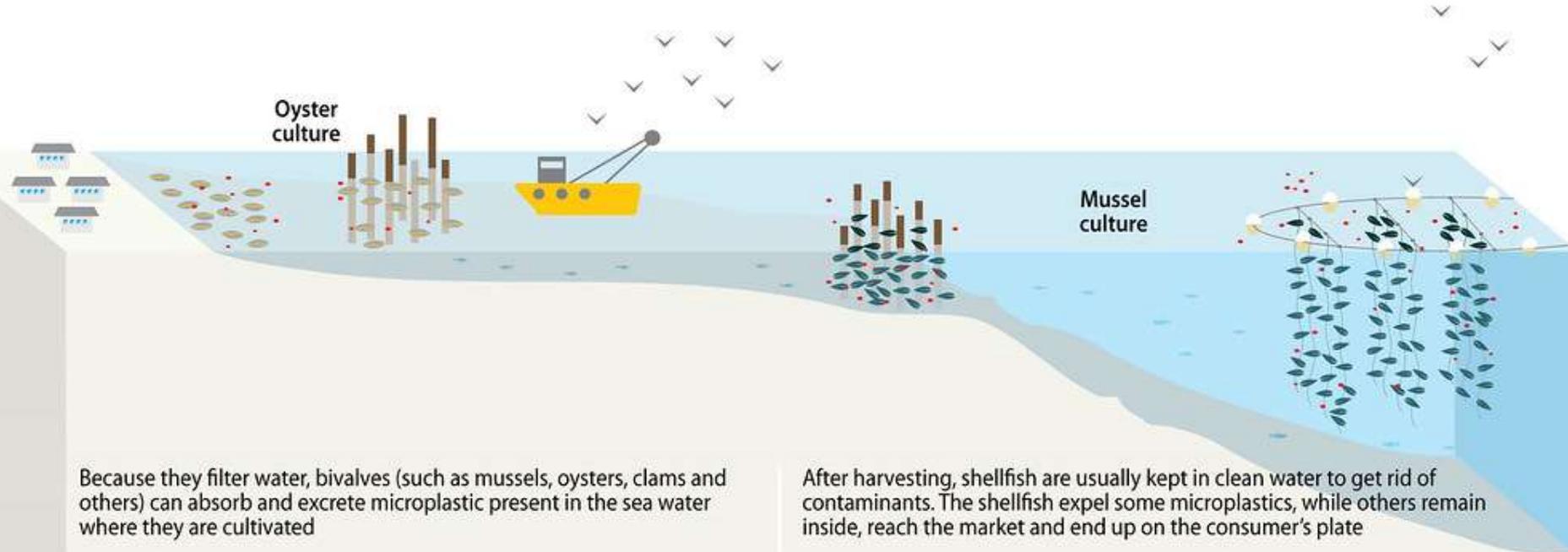
Zooplankton is the main food for smaller fish, eaten themselves by larger fish and marine mammals.

Bigger amounts of plastic particles may be found at the top of the food web.

How microplastics could end up on a consumer's plate

- The risk of exposure of humans to microplastics and chemicals adhering to them is still studied
- The consumption of fish is considered low-risk as the internal organs of fish are usually taken away during fish cleaning
- Sea organisms consumed with their internal organs may have microplastics in them
- The amount of hazardous chemicals attached to plastic particles is at present considered minor in comparison to other exposure pathways, such as consumption of fruits and vegetables treated with herbicides and atmospheric pollution

An example of how microplastics could end up on a consumer's plate





Project funded by
EUROPEAN UNION



Summary

- Microplastics and nanoparticles enter the marine environment and are constantly transported by natural processes
- They may affect the ecosystems
- There is a risk of bioaccumulation of microplastics in the food web
- Seafood is posing a low risk from plastic pollution to humans at present but the issue is under study



Project funded by
EUROPEAN UNION



Credits

All figures in this presentation are produced by [Maphoto/Riccardo Pravettoni, 2016 & 2018](#) and are part of the collection Marine Litter Vital Graphics of GRID-Arendal, available at: <https://www.grida.no/resources/6933>

The images are licenced under CC BY-NC-SA 2.0.



Joint Operational Programme Black Sea Basin 2014-2020
The publication is edited by the Black Sea NGO Network
Varna, November 2020

Joint Operational Programme Black Sea Basin 2014-2020 is co-financed by the European Union through the European Neighbourhood Instrument and by the participating countries: Armenia, Bulgaria, Georgia, Greece, Republic of Moldova, Romania, Turkey and Ukraine

This publication has been produced with the financial assistance of the European Union. The contents of this publication are the sole responsibility of the Black Sea NGO Network and can in no way be taken to reflect the views of the European Union