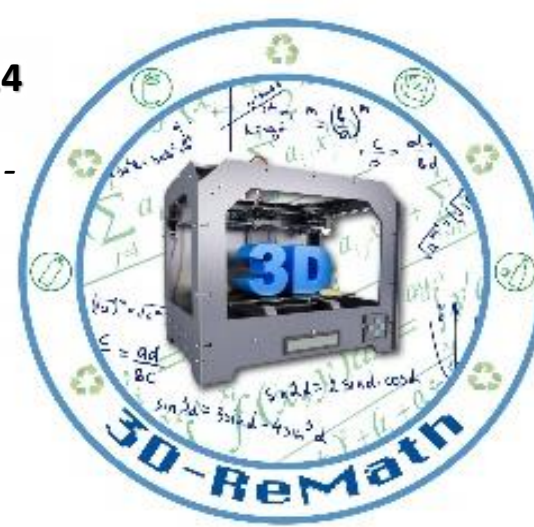




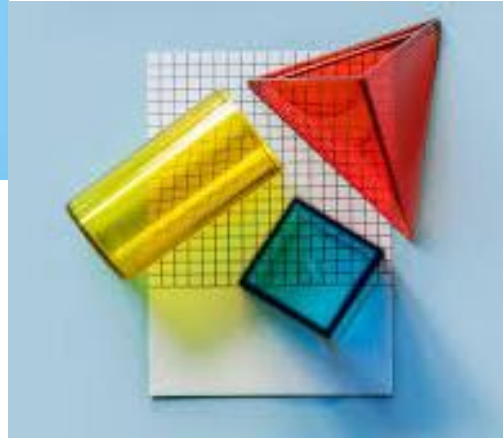
Project code:  
2019-1-EL01-KA201-062914

Erasmus+ Call: 2019 - KA2 -



Erasmus+

This project is funded by the European Union.

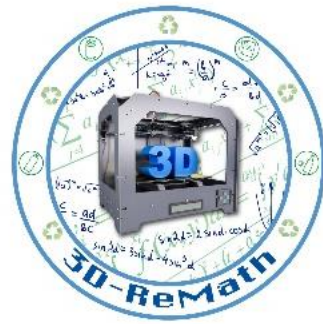


2nd  
Primary School  
of Chios



3D printing technology aims students understanding maths and recycling procedure

Intellectual Output 4 (IO4) - Curricula for Microplastics



# Curricula 2: Microplastics in the environment & marine litter



**Waste Management  
Laboratory**

**DEPARTMENT OF ENVIRONMENT  
UNIVERSITY OF THE AEGEAN**



Erasmus+

*This project is funded by the European Union.*



# Presentation Structure

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**What is the problem?**



**What are the microplastics?**



**How microplastics are generated**



**Microplastics in the marine environment**



**Which are the types of microplastics?**



**Impacts of microplastics**

Marine environment  
Food & Health  
Climate change  
Tourism



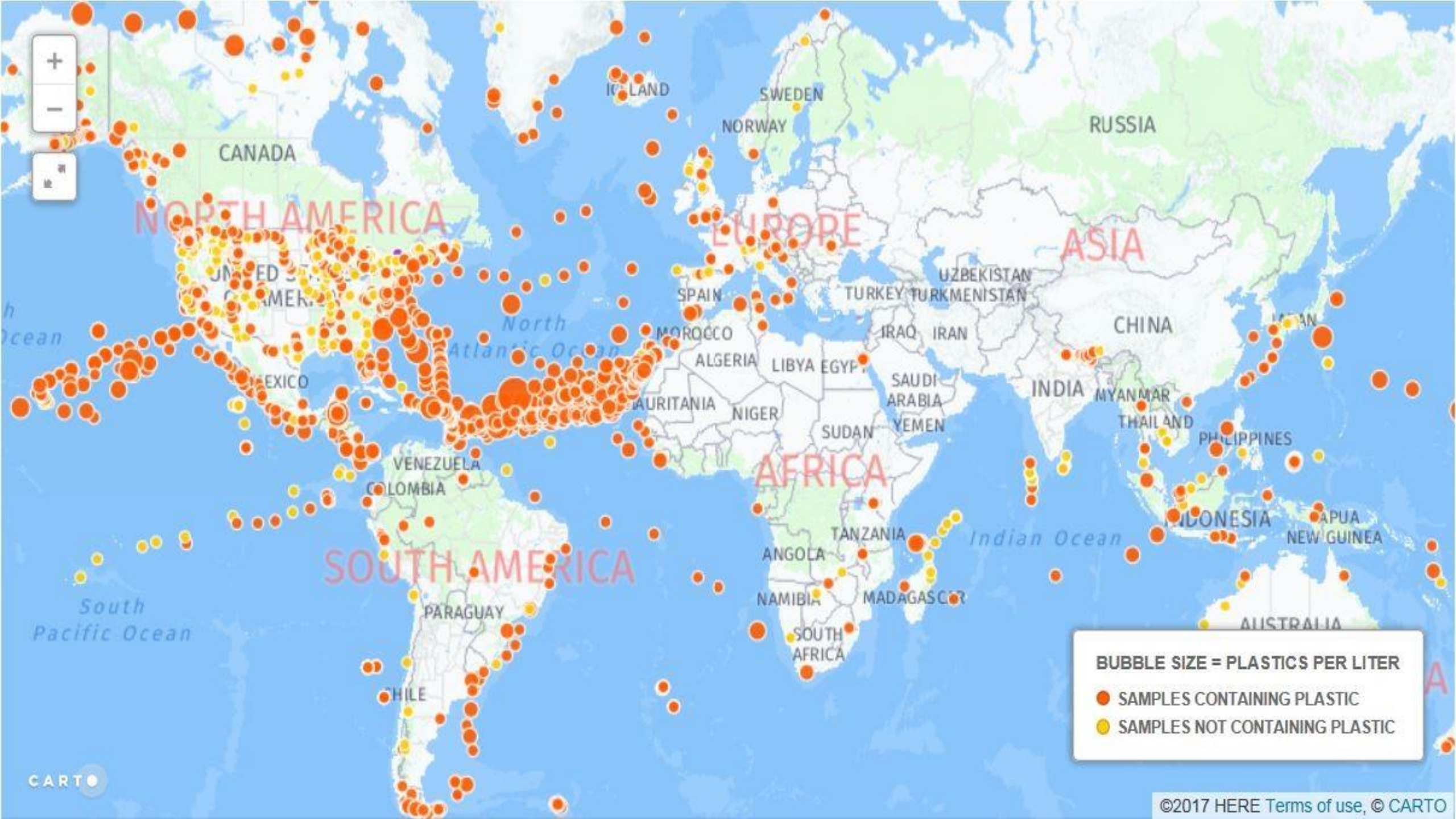
**Facts about microplastics**



**What can be done?**

# What is the problem?





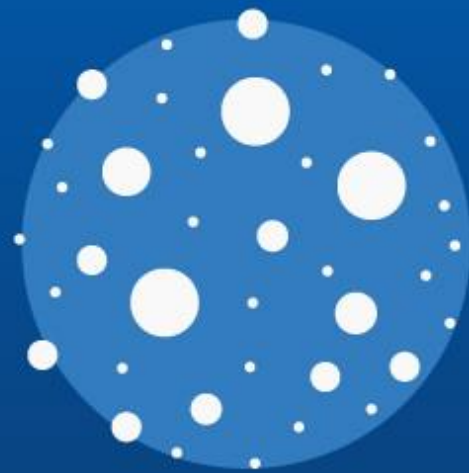
## What are the microplastics?

**The term microplastics** generally refers to plastic particles between 0.33 mm and 5 mm in size. Microplastics can originate from a variety of sources including, microbeads from personal care products; fibers from synthetic clothing; pre-production pellets and powders; and fragments degraded from larger plastic products.

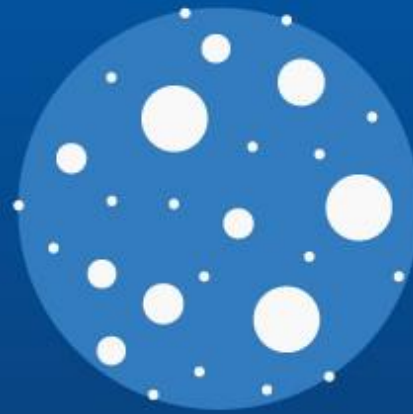


# Where Do the Oceans' Microplastics Come From?

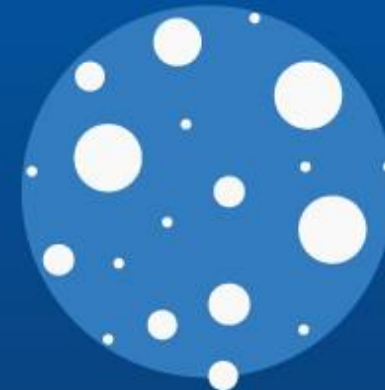
Distribution of sources of microplastics in the world's oceans



Synthetic textiles  
35.0%



Car tires  
28.0%



City dust  
24.0%



Road markings  
7.0%



Marine coatings  
3.7%



Personal care products  
2.0%



Plastic pellets  
0.3%

<https://europeansting.com/2019/12/14/the-ocean-is-teeming-with-microplastic-a-million-times-more-than-we-thought-suggests-new-research/>

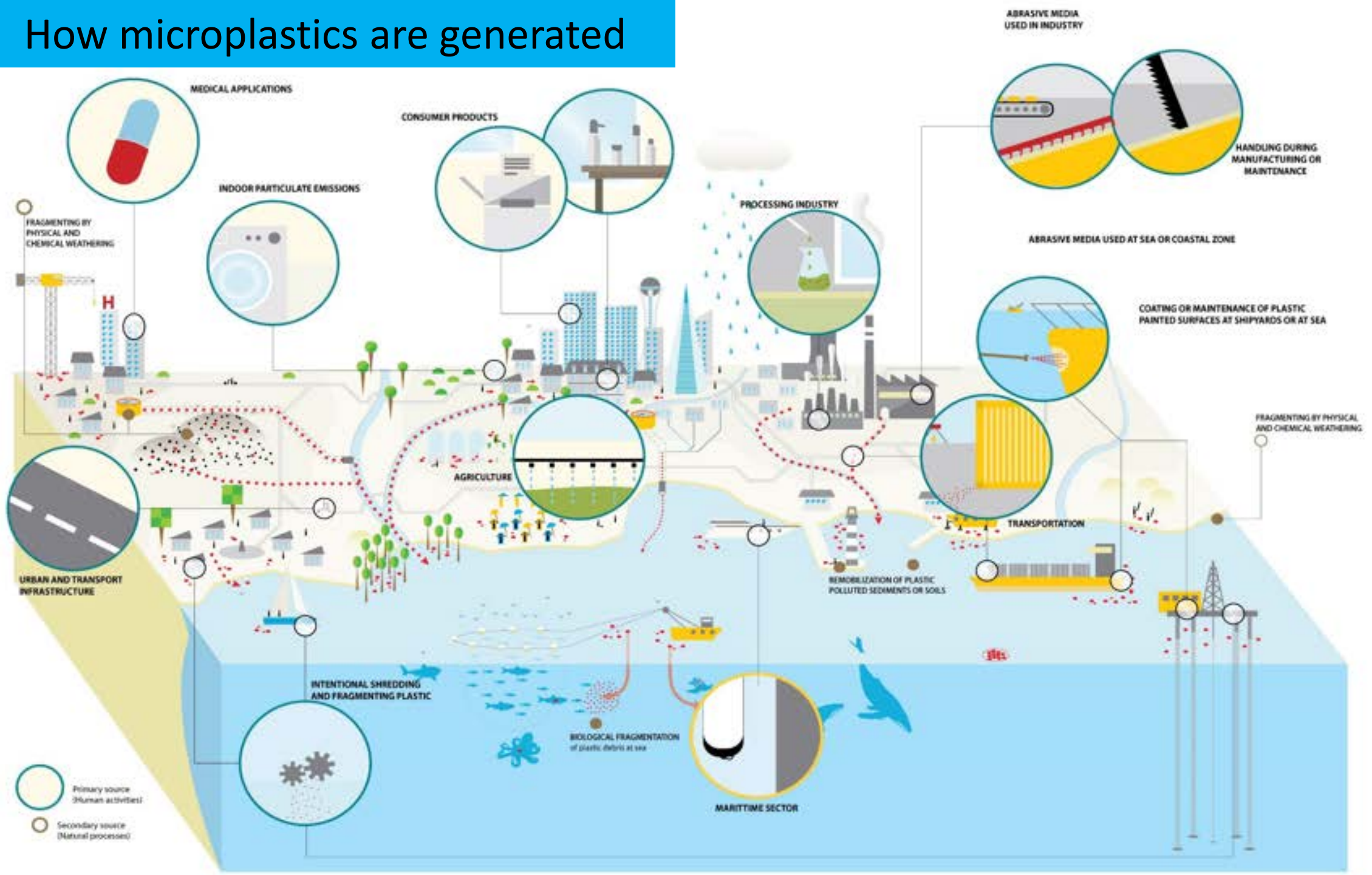


@StatistaCharts

Source: International Union for Conservation of Nature

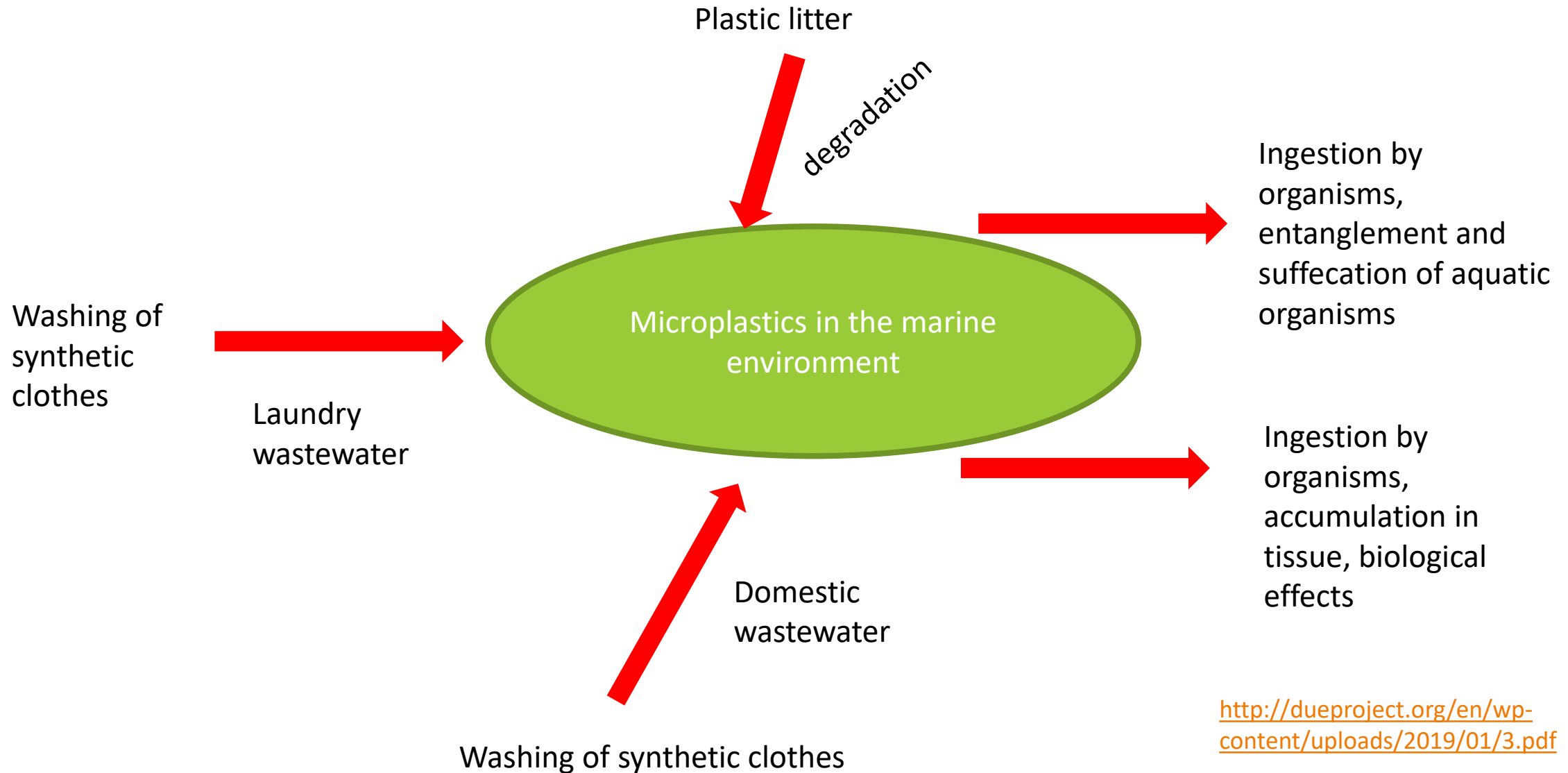
statista

# How microplastics are generated





# Microplastics in the marine environment



# Which are the types of microplastics?

**Primary microplastics** are manufactured as microbeads, capsules, fibers or pellets. Examples include microbeads used in cosmetics and personal care products, industrial scrubbers used for abrasive blast cleaning, microfibers used in textiles, and virgin resin pellets used in plastic manufacturing processes.

## Primary Microplastics – the main sources



Source: Primary microplastics in the oceans (IUCN, 2017)

## Which are the types of microplastics?

**Secondary microplastics** are formed when larger pieces of plastic breaking down into smaller pieces. This occurs when plastic debris is exposed to sunlight and the plastic begins to weather and fragment



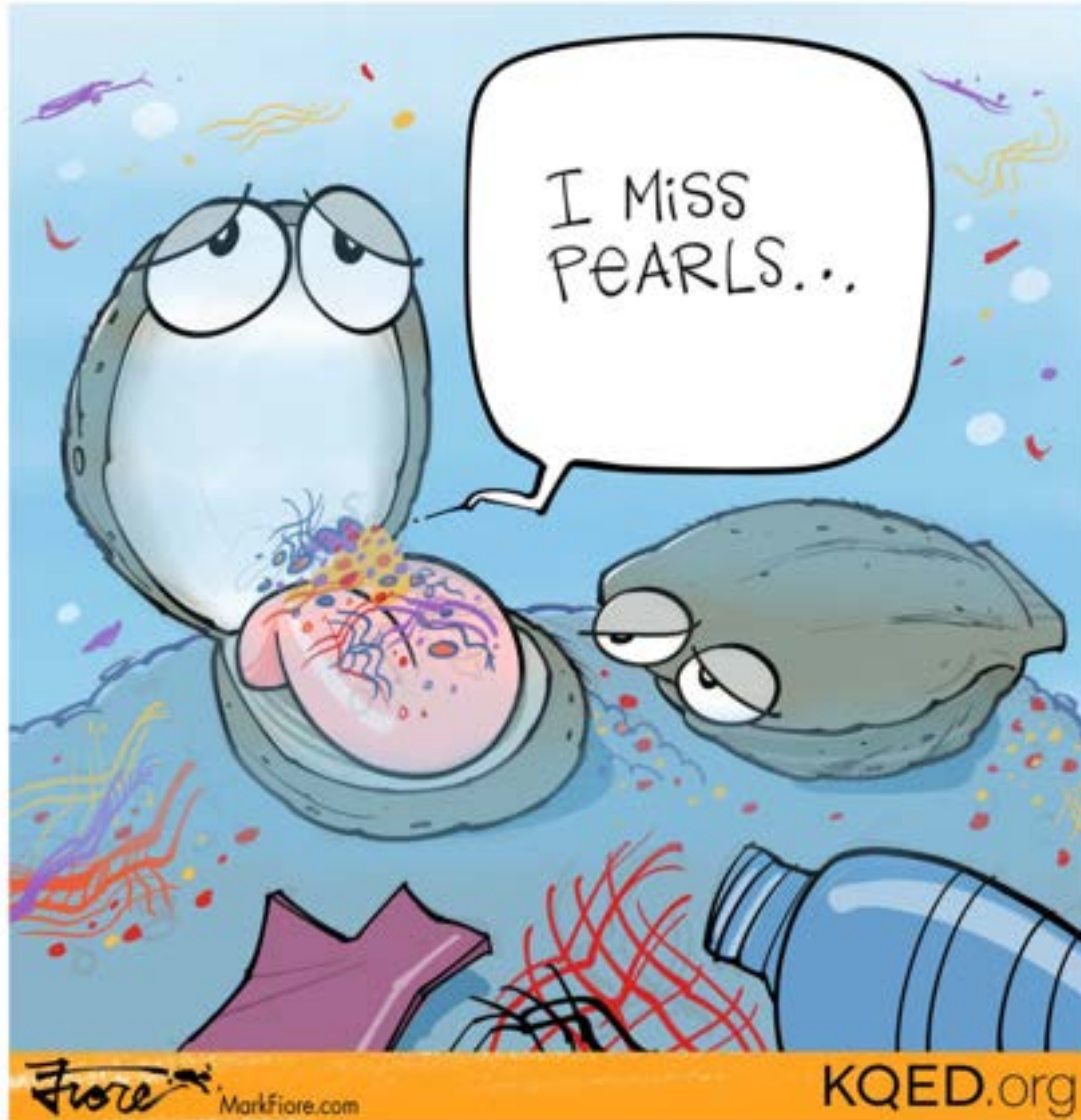


**Why we must care about microplastics?**

A microscopic view of biological cells, likely from a tissue sample, stained with a combination of red and blue dyes. The red-stained cells are numerous and appear as irregular, somewhat polygonal shapes with varying degrees of opacity. The blue-stained cells are smaller and more numerous, appearing as small, dark blue dots or clusters. The overall background is a light, pale blue color.

**Impacts of**  
**microplastics**

# Marine Environment

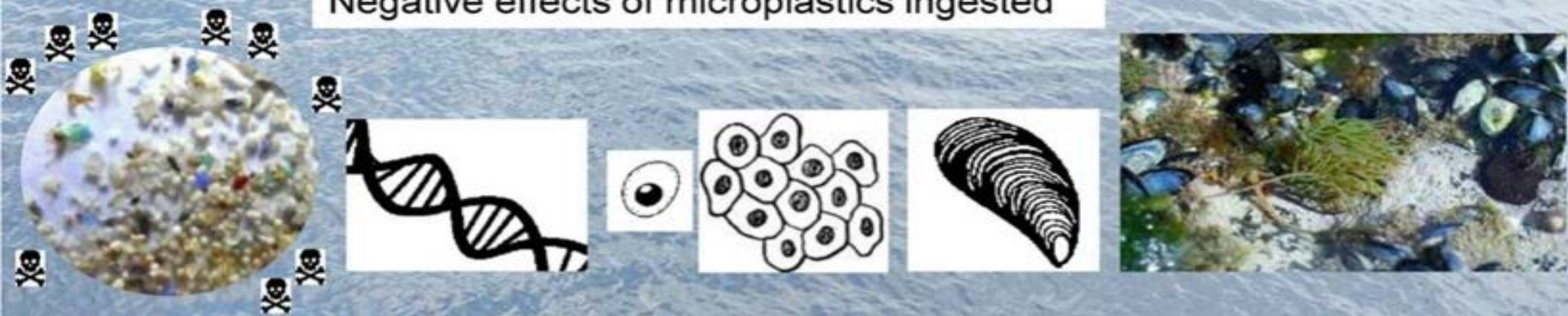


## Marine Biota Affected

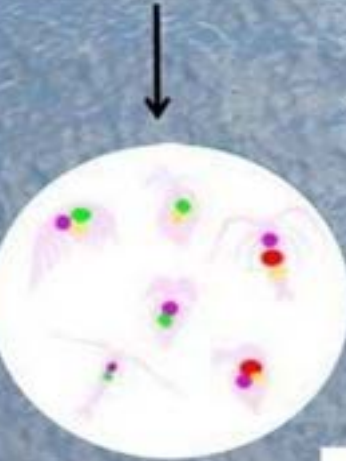
- ❖ Corals
- ❖ Phytoplanktons
- ❖ Zooplanktons
- ❖ Benthic organisms
- ❖ Fish
- ❖ Sea birds
- ❖ Large marine animals which includes whales, dolphins, seals and polar bears

<https://journals.openedition.org/factsreports/5257>

# Negative effects of microplastics ingested



Microplastics → Sub-cellular → Cellular → Individual → Ecosystem



- Reduced enzymatic activity and gene expression
- Oxidative damages

- Oxidative stress
- Apoptosis
- Inflammation

- Reduced fecundity and fertility
- Altered energetic metabolism
- Cancer

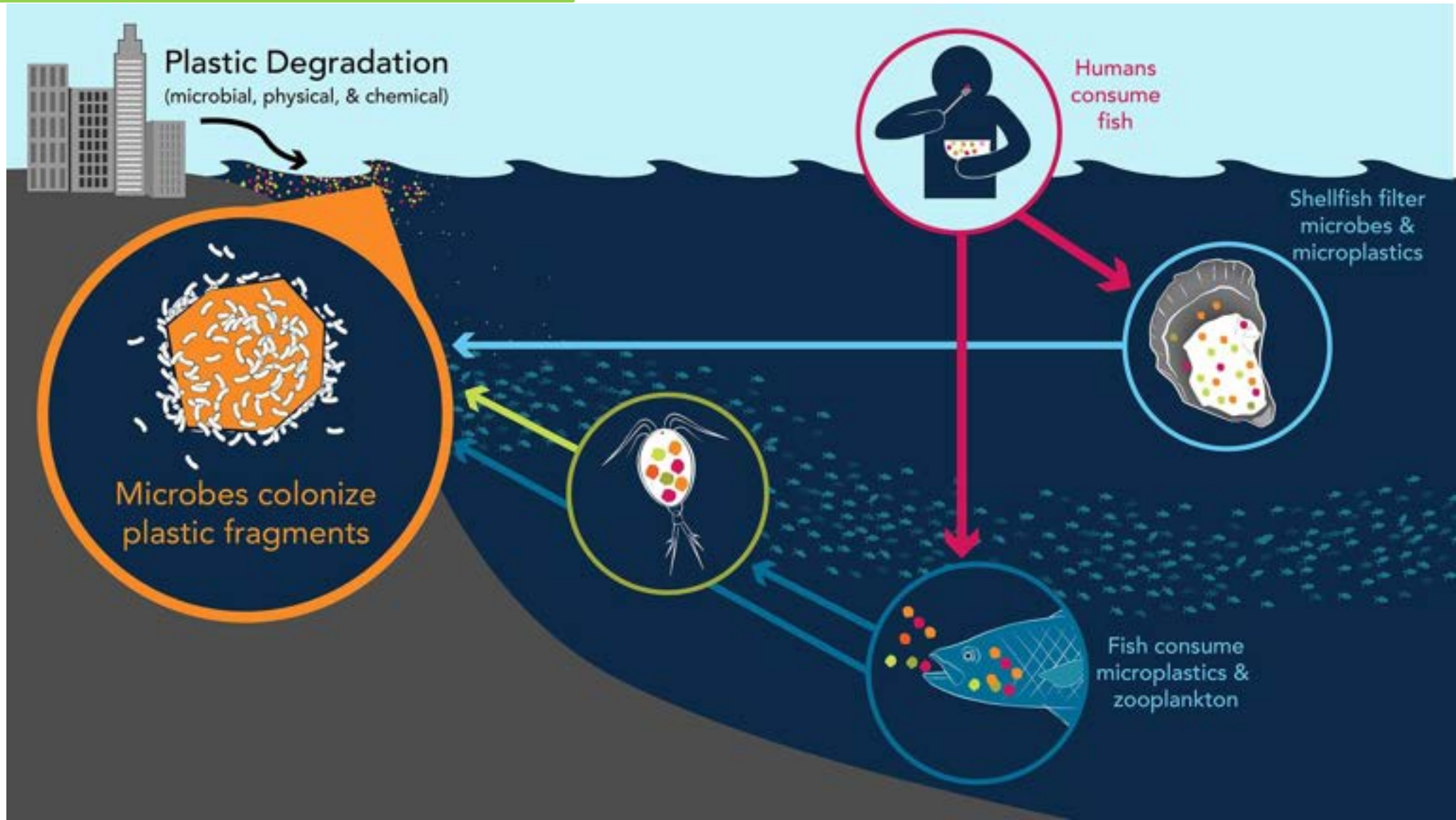
- Altered behaviours
- Altered habitats and population structure



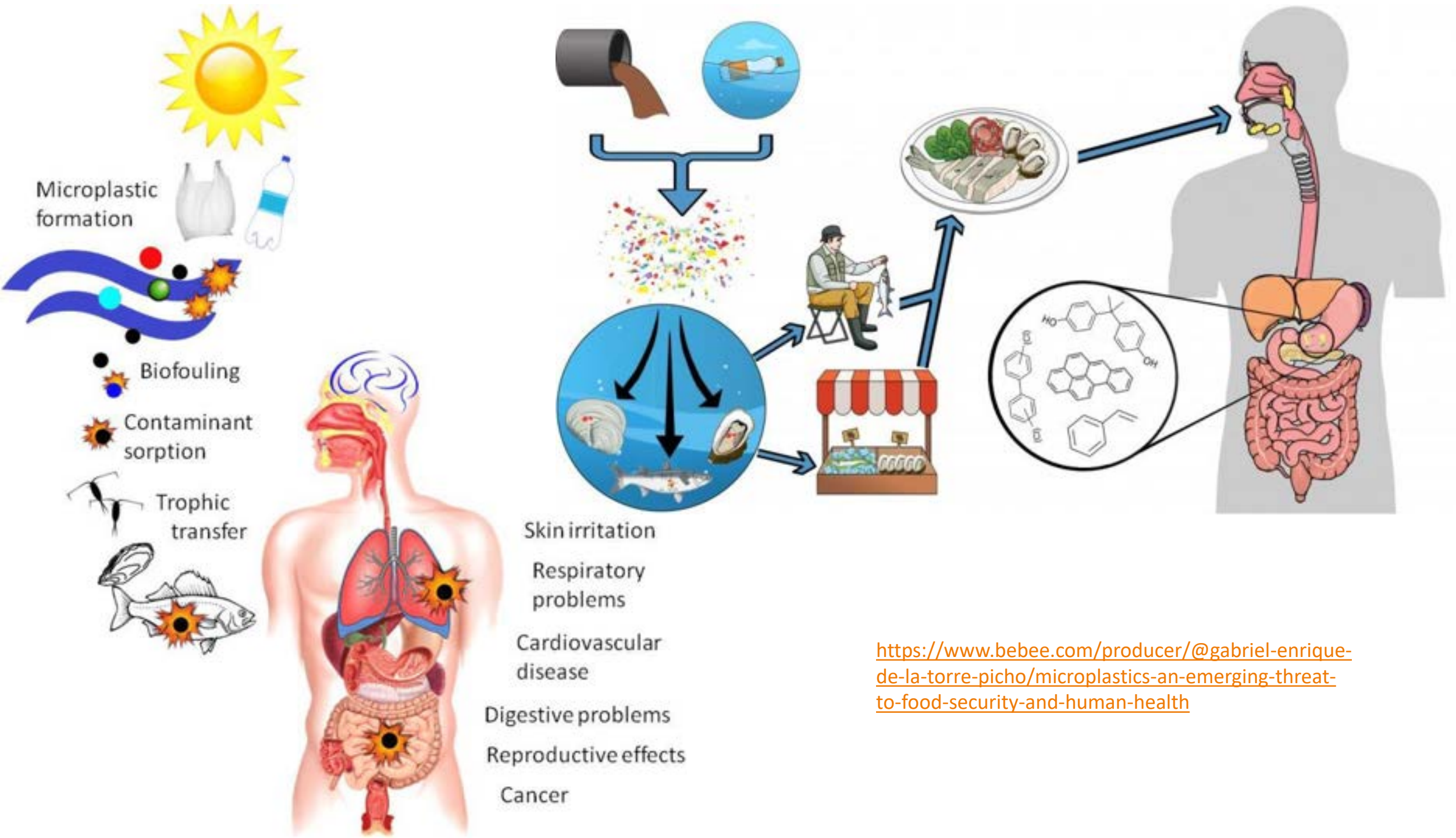
<https://www.sciencedirect.com/science/article/pii/S1382668918303934>

Microplastics in benthic and pelagic habitats could influence to biogeochemical cycles and lead to contamination of marine biotic and abiotic products with potential risks for humans health.

# Food & Health







<https://www.bebee.com/producer/@gabriel-enrique-de-la-torre-picho/microplastics-an-emerging-threat-to-food-security-and-human-health>

# Tourism

Plastic waste degrades the aesthetic value of touristic destinations, leading to decreased tourism-related incomes and major economic costs related to the cleaning and maintenance of the sites.

<https://geographical.co.uk/nature/oceans/item/2769-tourism-causes-ocean-plastic-rise>



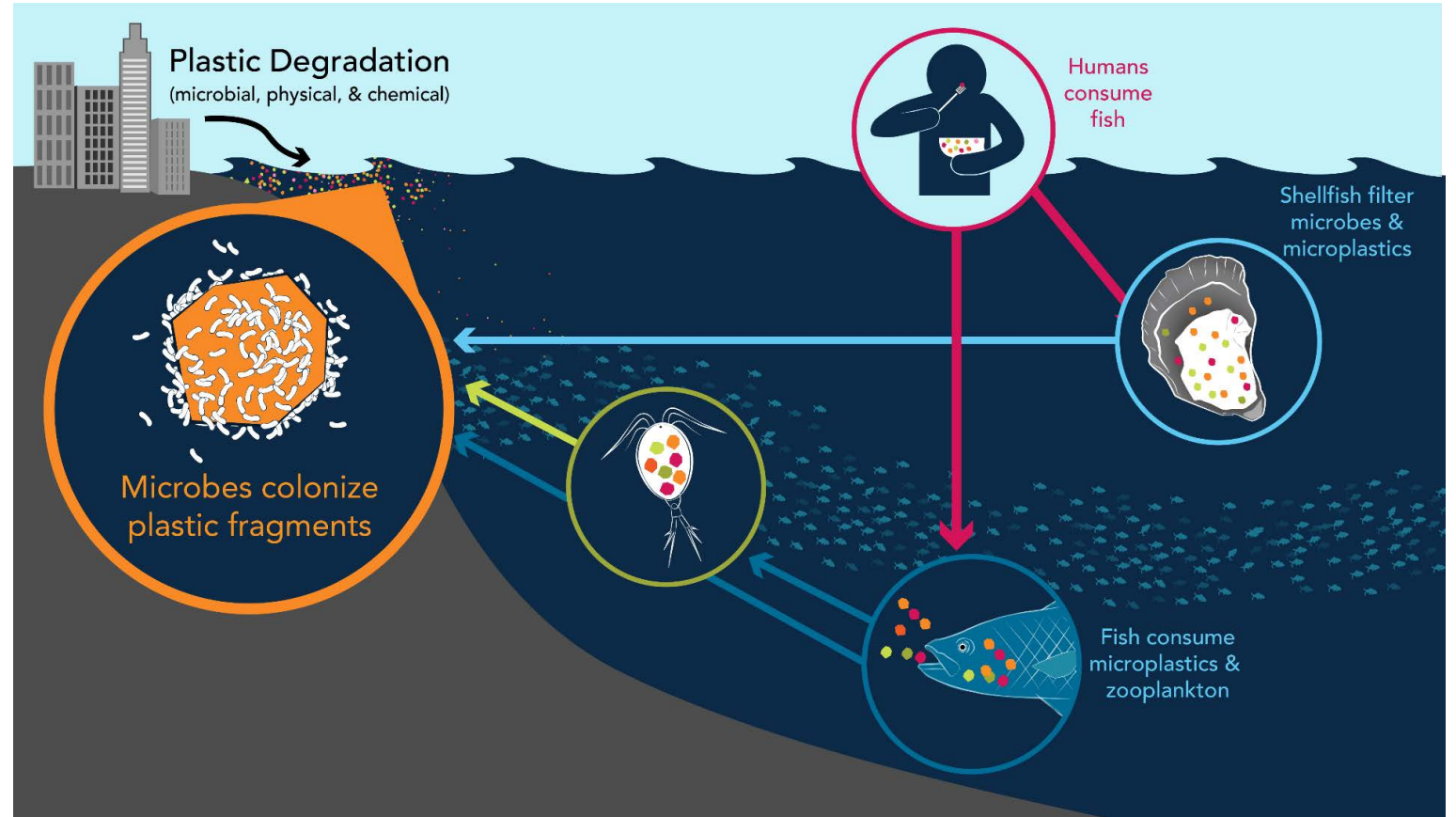
## Facts About Microplastics

Each year, 8 million tons of plastics enter our oceans; that is equivalent to dumping a truckload of plastics into the ocean every minute.



# Facts About Microplastics

Microplastics and the chemicals absorbed on their surface can contaminate the food chain, including seafood consumed by people



## Facts About Microplastics

In 2015, the Federal Microbead-Free Waters Act has been embedded in the legislation. Law requires that companies should stop using tiny beads of plastic in personal care products, where they were used as abrasives, by July 2017. Microbeads are commonly used in facial cleansers, toothpaste, and cosmetics.



<http://www.ecopartnersinc.com/2016/03/15/five-fast-facts-on-microplastics/>

# Facts About Microplastics

A fleece jacket sheds about 2,000 pieces of plastic per washing. Wastewater treatment plants do not have the ability to screen those tiny pieces, meaning they end up in both the discharged water and the sludge.



# 5 surprising things you are doing at home that contribute to the massive microplastic pollution!



# 1. Using garment and bed linen which are increasingly made of plastic

<https://www.renovation.sg/5-surprising-things-you-are-doing-at-home-that-contribute-to-the-massive-microplastic-pollution/>



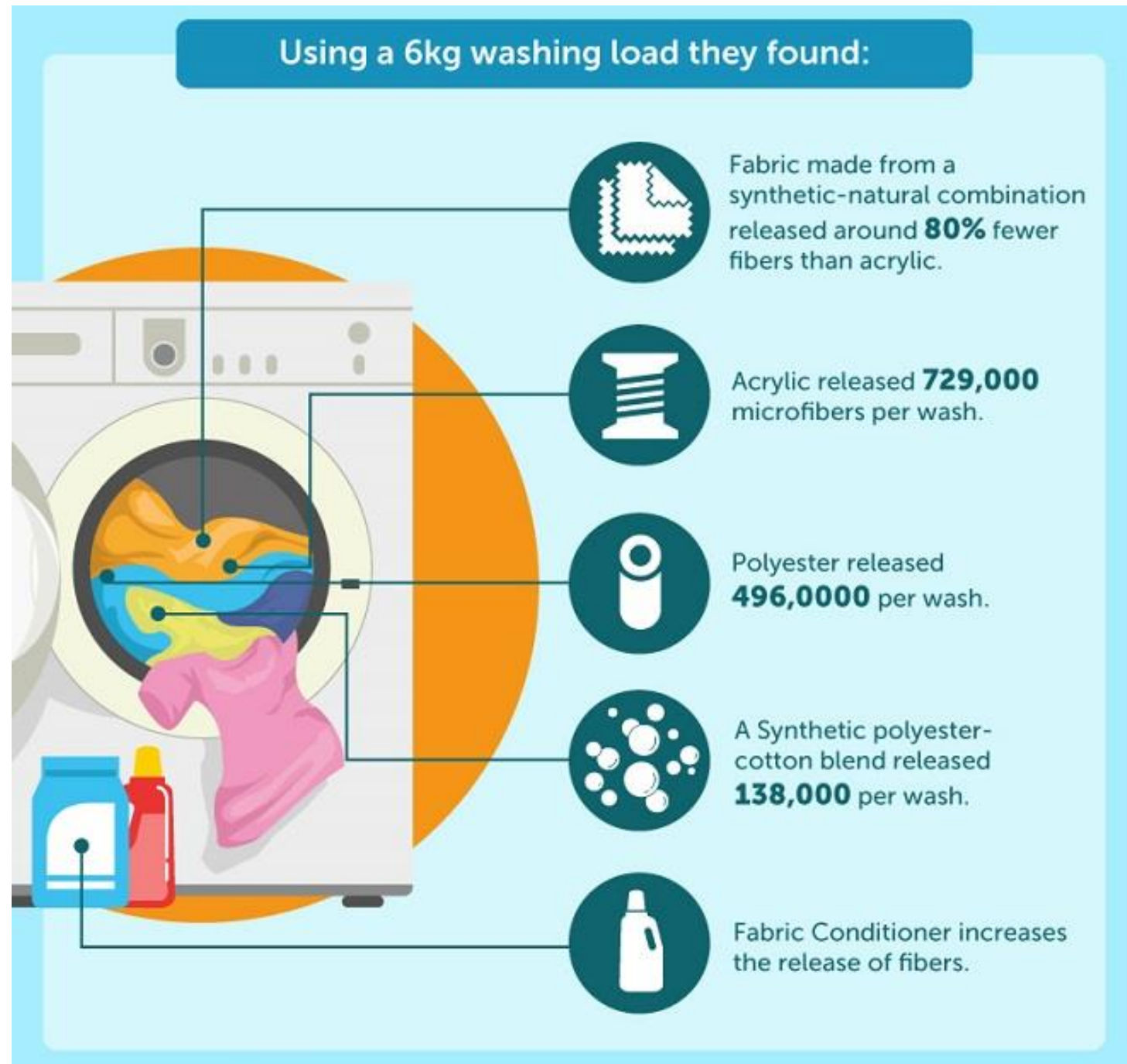


*Always check the label to ensure that your purchases are made up of 100% natural organic material. Furthermore, avoid over-washing the items and opt for sun dry instead of tumble dry.*



## 2. Using laundry, dishwasher pods and tablets which contain tons of microplastics

<https://www.renonation.sg/5-surprising-things-you-are-doing-at-home-that-contribute-to-the-massive-microplastic-pollution/>



*Switch to plastic free detergents, dishwasher and soap nuts, which are made from plant-derived ingredients which are earth-friendly alternatives.*



# 3. Using wet wipes for almost everything

<https://www.renovation.sg/5-surprising-things-you-are-doing-at-home-that-contribute-to-the-massive-microplastic-pollution/>

## Please **do not** Flush

Even though a product is small enough to be flushed, does not mean it should be. Flushing items that are not meant to be flushed, including those labeled “flushable” can lead to problems in the sewer pipes, at the wastewater treatment plant, and for the environment.



SANITARY WIPES



FEMININE HYGIENE PRODUCTS



MEDICATIONS & SUPPLEMENTS



TRASH



METALS & PLASTICS



FATS, OILS & GREASE



CHEMICALS

*Switch to the more eco-friendly traditional all-cotton flannel. Always dispose the wet wipes properly and never flush them down the toilet bowl!*



## 4. Using tea bags

<https://www.renovation.sg/5-surprising-things-you-are-doing-at-home-that-contribute-to-the-massive-microplastic-pollution/>

### DO YOUR TEABAGS CONTAIN PLASTIC?



YES

#### PRESSED TEABAGS

(CRIMPED EDGES):

20-30% plastic (polypropylene) woven through the paper and melted to seal the teabag shut.



YES

#### SILKEN TEABAGS:

Made from plastic, not silk. Either fossil-fuel based plastic (nylon or PET) or plant-based plastic (PLA, often called cornstarch).



PROBABLY

#### STRING-AND-TAG TEABAGS:

Closed by folding, secured by stitching / stapling rather than heat. Many brands use paper with plastic (polypropylene) fibres to add strength.

*Avoid purchasing tea in the form of tea bags! Always choose to purchase the loose-leaf tea, which is cheaper and more flavorful as they are not grounded to dust!*



# 5. Using Personal Care and Cosmetic Products (PCCPs) with microbeads

<https://www.renovation.sg/5-surprising-things-you-are-doing-at-home-that-contribute-to-the-massive-microplastic-pollution/>





*Find out whether the PCCPs contain microbeads by doing a quick online check at [Beat the Microbead](#) before making the purchase*





**What can be done?**

# Government & Businesses

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Many governments are about to publish legislation to ban the use of microplastics in personal care products in the very near future



Outdoor clothing manufacturers have been proactive, and are actually funding research into the rates of shedding of their clothing and evaluating new manufacturing methods that can reduce these losses.

# Individuals



Avoid

Avoid purchasing products with excess packaging, choose glass or metal drink containers over plastic



Avoid

Avoid disposable plastic bags and bring reusable bags with you; choose wool over synthetic garments



Sign up

Sign up to participate in a shoreline cleanup near you

# Citizen participation

- ✓ Enable
- ✓ Engage
- ✓ Encourage
- ✓ Exemplify



# The More We Get Together



# References

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- <https://journals.openedition.org/factsreports/5257>



Thank you for your time!