

# MARINE POLLUTION: PLASTIC IN THE OCEANS

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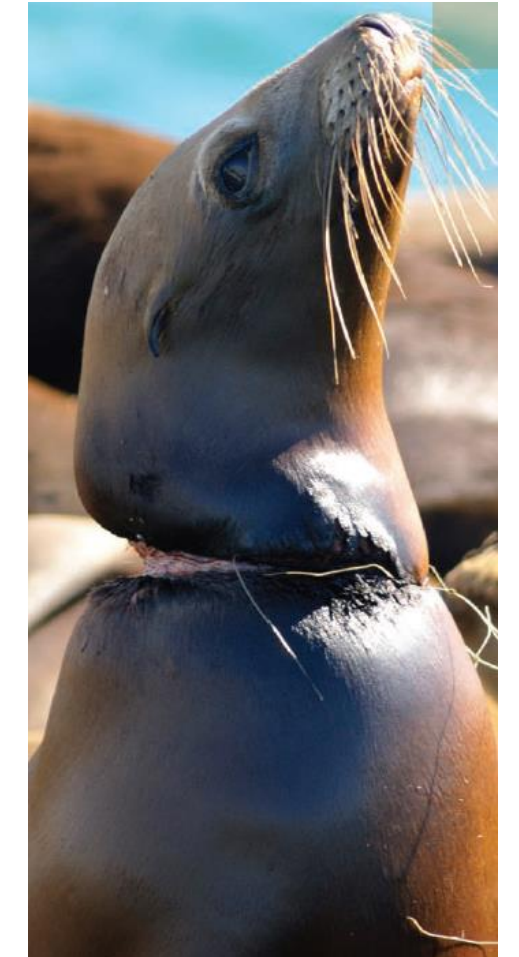
# PLASTIC IN THE OCEANS

Floating plastics: single use plastics, such as bottles, packaging material, and fishing nets, ...

Threats:

- sea birds, fish, marine mammals, sea turtles : ingested, seen as food
- fish, marine mammals, sea turtles : entangled in plastics

Action: prevent, recycle, reuse (circular economy), substitute by biodegradable packaging; restore by ocean clean up





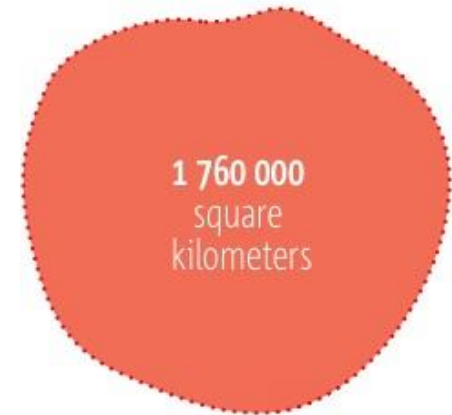
# PLASTIC IN THE OCEANS

## The Great Pacific Garbage Patch

Is an area of marine debris, laying approximately 135° to 155° West and 35° to 42° North. Although it shifts every year and exact position is hard to tell. It lies within North Pacific Gyre and does not go anywhere, as it is confined by its currents.

### The area

The Patch is around 2200 kilometers long and 800 kilometers wide



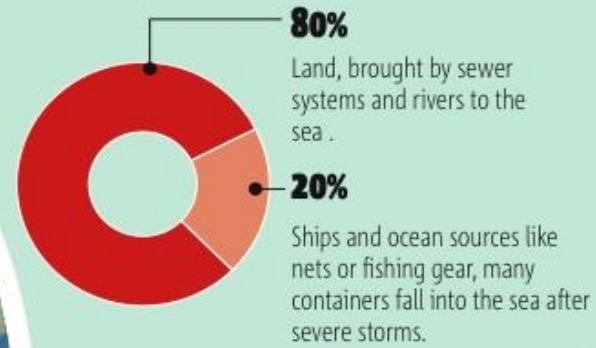
Almost 3 times more than Spain and Portugal combined



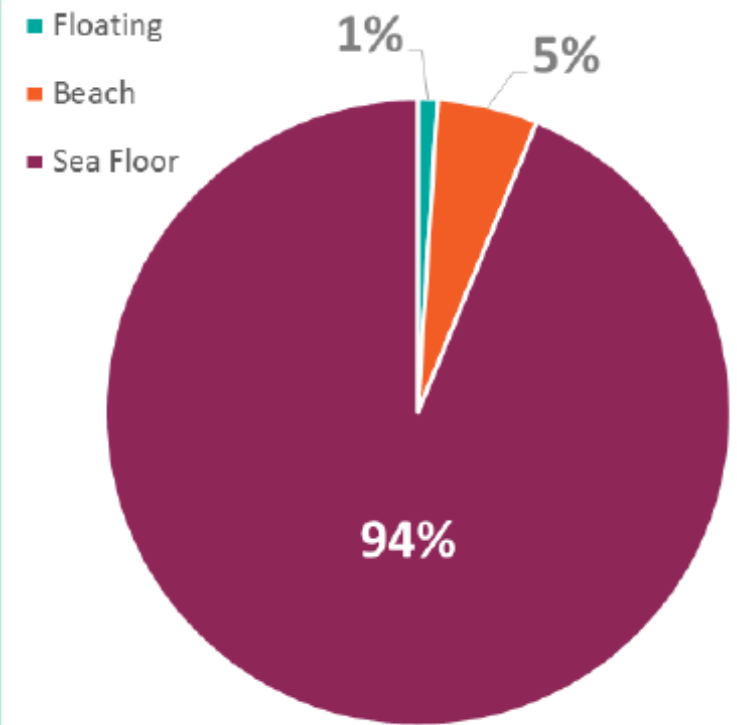
### How does it form?

Currents in the Pacific Ocean create a circular effect that pulls debris from North America, Asia and the Hawaiian Islands. Then it pushes it into a floating pile of 100 million tons of trash.

### Where does it all come from?

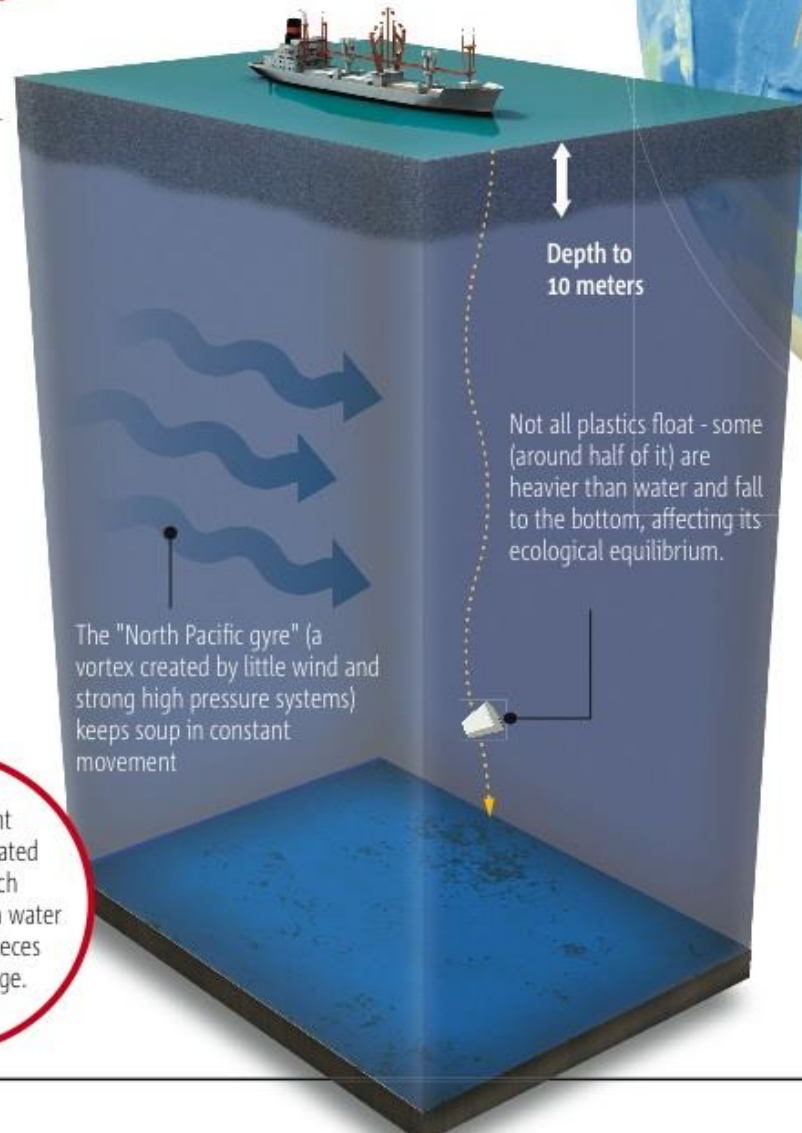


### Interesting facts



### Plastic Soup

Consists of both larger and disintegrated plastic objects and particles, both on the surface, in the water column below it and on the bottom.



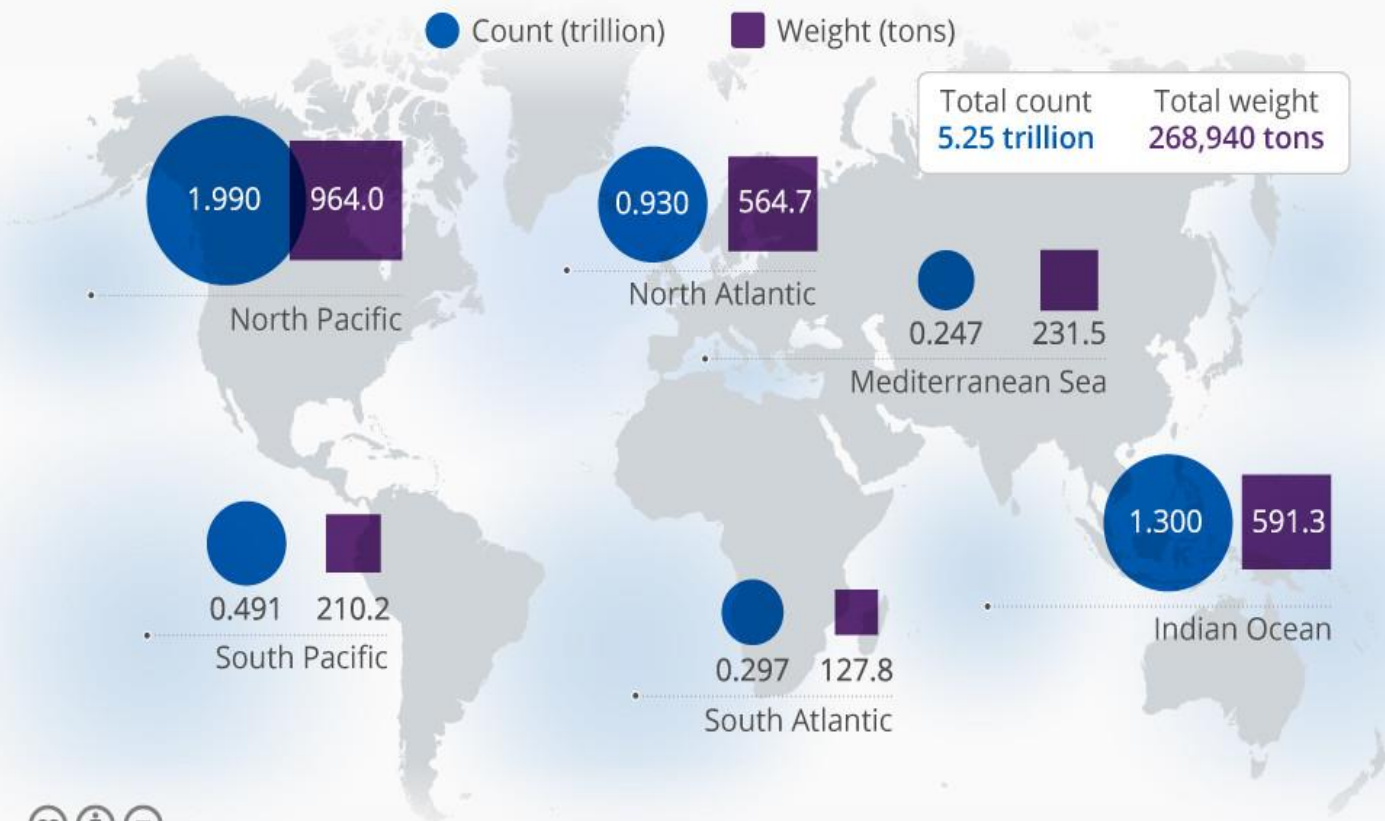
UN Environment Programme estimated recently that each square mile of ocean water contains 46,000 pieces of floating garbage.

### Problems created by plastic:

- It fouls beaches worldwide and scares tourists away.
- Plastic entangles marine animals and drowns them, strangles them and makes them immovable.
- Plastic litter washed ashore destroys habitats of coastal species.
- Plastic litter gets inside ships propellers and keels, making ship maintenance more expensive.
- Plastic does not biodegrade, plastic things make an ideal vessel and enable invasive species to move to further regions.

## The World's Oceans Are Infested With Plastic

Number and weight of plastic pieces afloat at sea





# PLASTIC IN THE OCEANS

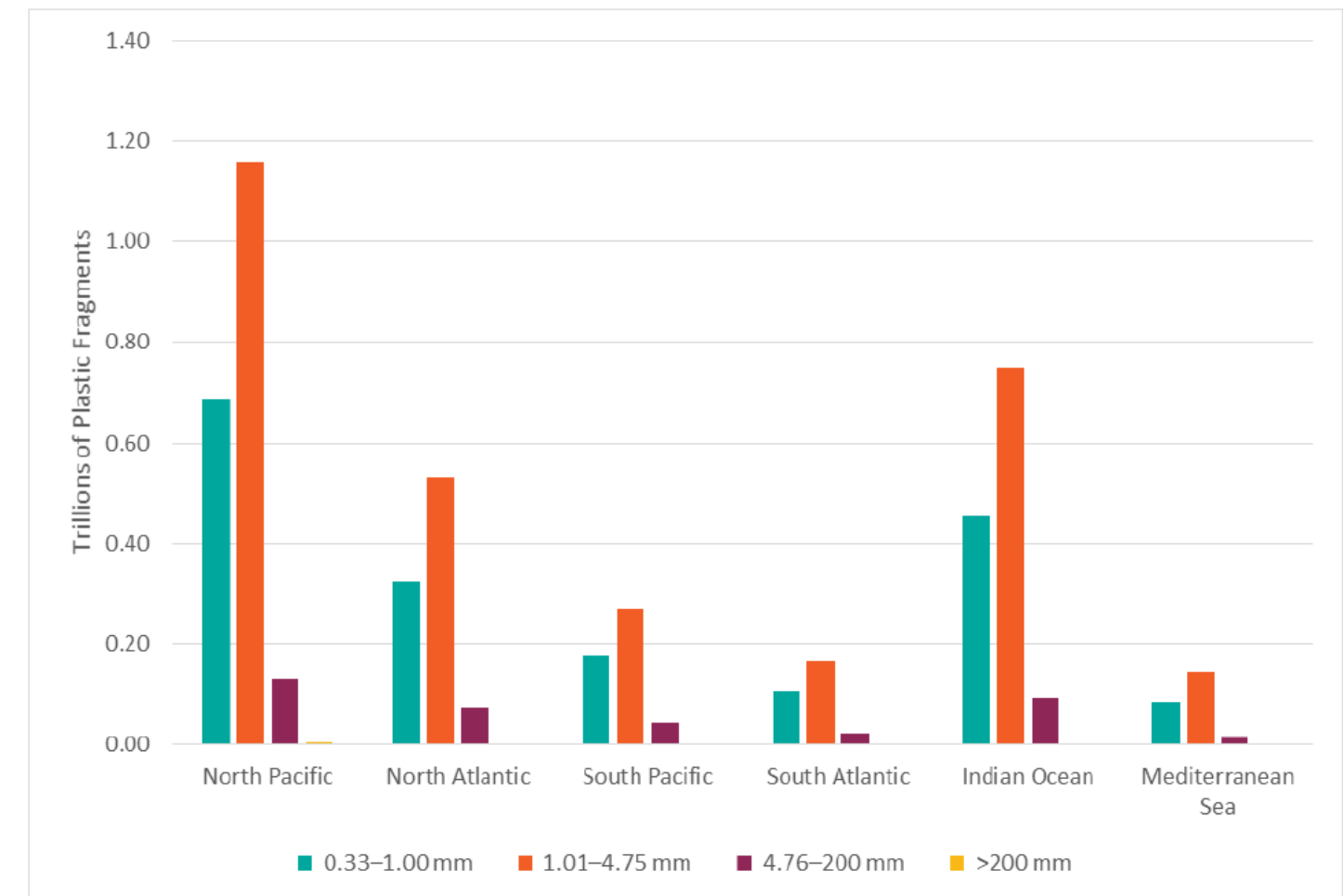


Microplastics (< 5 mm): waste water treatment plants, traffic, industry, households (cosmetics, synthetic textile fibers, ...), ...

Threats:

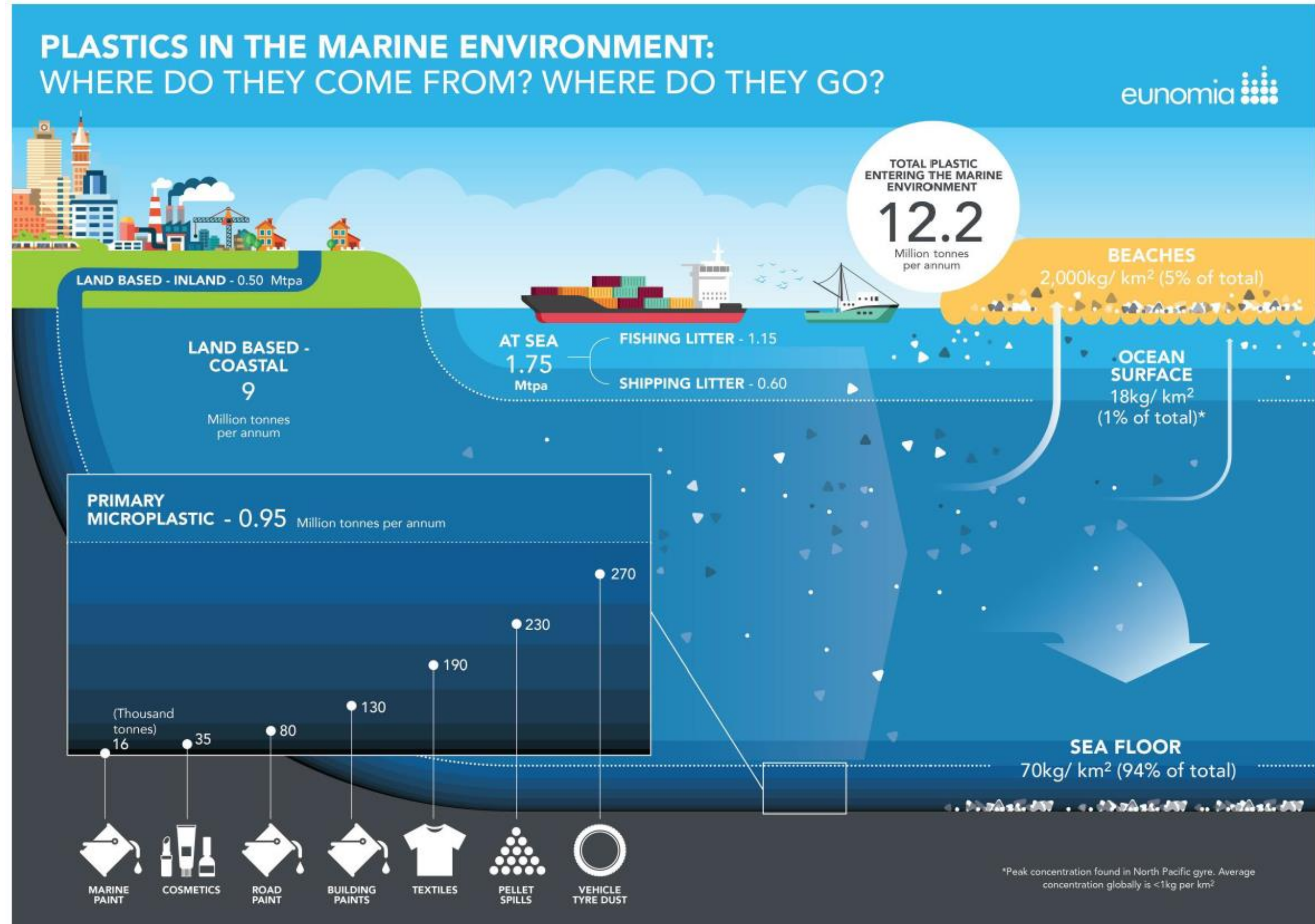
- accumulating in marine ecosystems, zooplankton, fish and marine mammals (whales, seals, ) --> food chain: fish consumption by humans

Action: prohibit (substitute), prevent, ...



Adapted from Eriksen et al. (Five Gyres)

# PLASTIC IN THE OCEANS





# PLASTIC IN THE OCEANS

Sources: 80% land-based; 20% activities at sea

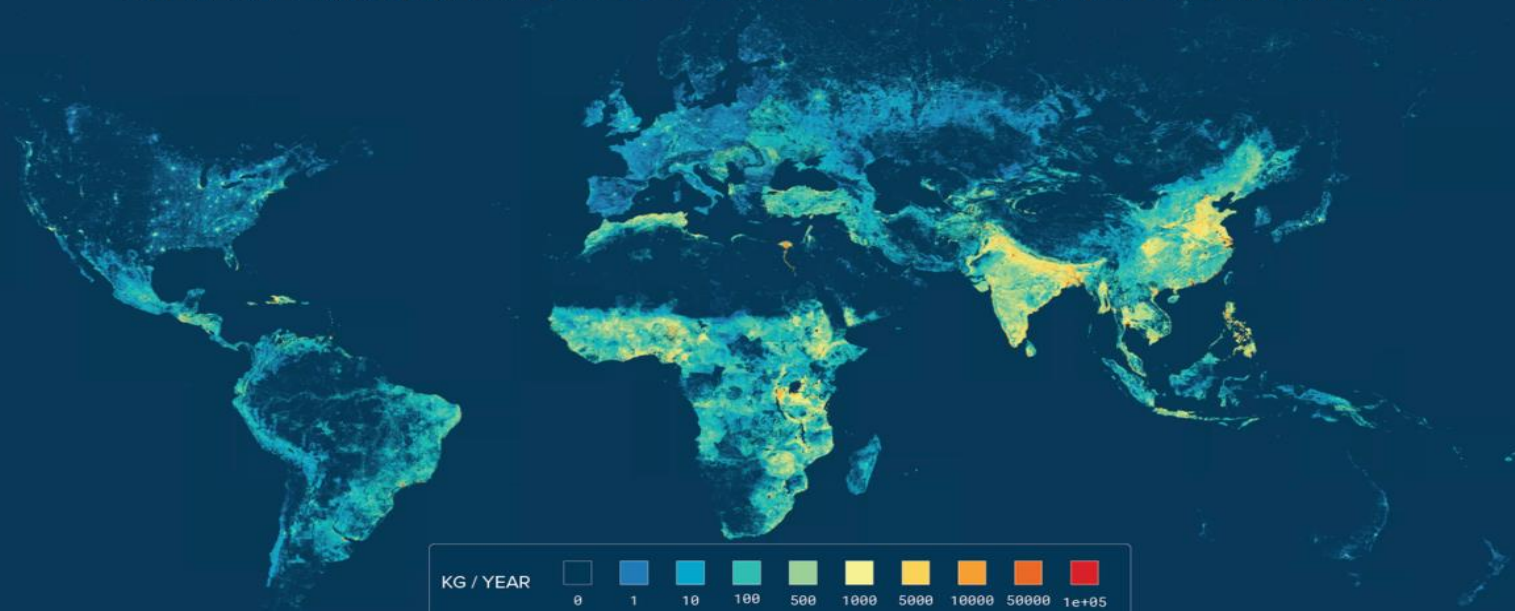
- Tourism: beaches
- Rivers: sewage related or direct outlets
- Fishing: nets and garbage lost accidental or deliberate disposal (= dumping)
- Vessels: garbage, sewage, ... due to operational or illegal discharges

## THE TOP-10 RIVERS FOR LAND-BASED CONTRIBUTION TO MARINE LITTER



Source of the data: Christian Schmidt, Tobias Krauth, Stephan Wagner. Export of Plastic Debris by Rivers into the Sea. Environmental Science & Technology, 2017; DOI: 10.1021/acs.est.7b02368. Source of the map: European Commission.

## WHERE MISMANAGED PLASTIC WASTE IS GENERATED



# PLASTIC IN THE OCEANS: SHIPPING

MARPOL 73/78, Annex V (garbage): discharges of all plastics from fisheries, merchant ships and offshore platforms is **prohibited** world wide since 1989 (153; 98% world tonnage), however linked to the availability of adequate port **reception facilities** (1990 IMO port waste reception guidelines). No prohibition to discharge grey water (shower, kitchen, laundry) as sewage (Annex IV) into the sea.

Annex V Amendments:

1995 – garbage management plan & garbage record book for every ship of 400 GT & every ship certified to carry 15 persons, but limited to international voyages.

2011 - revised Annex V adds fishing gear, ships of 100 GT need a garbage management plan, ships of 400 GT need a garbage record book, duty to **report** accidental loss of fishing gear to flag state and to the coastal state where the loss occurred. Vessels below 400 GT are not required to record discharge operations in the garbage record book.

2012 – Guidelines: avoid supplies that are packed in plastic and plastic covering for cargo protection, unless reusable or recyclable; report to the IMO measures taken to address the loss or discharge of fishing gear + where gear was lost (information) in order to reduce loss and facilitate recovery.

# PLASTIC IN THE OCEANS: SHIPPING

Universal problems:

- flag state implementation and enforcement (compliance) in case of commercial vessels and long distance fisheries: port state control
- capacity, organisation and financing of port state reception facilities

**PSC EU:** to reduce substandard vessels in EU waters by harmonized inspection and detention procedures in all EU ports – Paris MoU PSC (1982) - followed in 8 other regions in the World

*Directive 95/21/EC*, amended by *Directive 98/25/EC* obliges member states to enforce MARPOL 73/78 and accept its amendments; ***Recasted by Directive 2009/16/EC on PSC: all costs of inspecting, which warrant detention of ships, are to be borne by the owner or the operator*** + Amended by *Directive 2013/38/EU* new detention and banning procedures.



# PLASTIC IN THE OCEANS: SHIPPING

## **Reception facilities EU:**

*Directive 2000/59/EC on Port Reception Facilities for Ship-generated Waste (as amended)*

Waste generated during the service of a ship and falling under the scope of inter alia MARPOL 73/78, Annex V (garbage) and Annex IV (sewage)

All ships, including fishing vessels and recreational craft, irrespective of their flag (exception warships, naval auxiliary or other ships owned or operated by a State).

All ports of the MS normally visited by above mentioned ships.

**Obligation** to dispose waste ashore in EU ports - if **storage capacity** on ship is insufficient, the ship will not be allowed to proceed to the next port of call. Checked by PSC inspectors.

Every ship shall contribute in the costs for waste reception, processing and final disposal by means of **harbor dues or waste fees**.

# PLASTIC IN THE OCEANS: DUMPING

- 1972 London Convention (87) & 1996 London Protocol (50)

## **Disposal of plastics into the sea is prohibited.**

The 1996 London Protocol: dumping prohibition, with exceptions for dredged material, sewage sludge and vessels under certain conditions (based on guidelines).

Dredged material and sewage sludge (such as microplastics passing through the filtration process of waste water treatment) are a waste stream contributing to marine litter. Dumping of sewage sludge and vessels is prohibited in the Baltic Sea and in North East Atlantic Ocean, including the North Sea (OSPAR), in other regions some countries stopped unilaterally sewage sludge dumping (Israel).

The dumping of fibre glass vessels/fibre reinforced plastic vessels, lost and abandoned fishing gear (ghost nets, estimated as more than 100,000 tons/year + ropes), polystyrene and Styrofoam buoys used in aquaculture still contribute to plastic pollution.



# PLASTIC IN THE OCEANS: FISHERIES

Losses in the fisheries sector: fishing gear, such as nets, ropes, floats, fishing lines; ancillary items, such as gloves, fish boxes, strapping bands.

**Fishing gear** = largest in terms of impact and volume of sea-based sources: 46% of Great Pacific Garbage Patch mass; 1/3 of marine litter in European seas (11.000 tons/year), often linked to IUU fishing.

2018 FAO Technical Consultation on Voluntary Guidelines on the Marking of Fishing Gear to be approved by the FAO Committee, to identify the owner of fishing gear and to deter discarding of fishing gear.

**What is needed:** mandatory marking of all fishing gear needs a mandatory IMO Ship Identification Number for all inboard fishing vessels, regardless length and where they fish.

## PLASTIC IN THE OCEANS: LAND-BASED

- SDG 14 (2015): by **2025**, prevent and significantly reduce marine pollution of all kinds, in particular from land-based activities, including marine debris and nutrient pollution.
- No universal convention dealing with land-based marine pollution, but regional sea conventions and highly fragmented.
- More than 143 countries participate in 13 regional seas conventions/programs (AP) of which 6 under the auspices of UNEP: Black Sea (1992), Wider Caribbean (1983), East Asian Seas (AP), South Asian Seas (AP), Eastern Africa (1985), Persian Gulf (1978), Mediterranean Sea (1976/1995), North East Pacific (2002), North-West Pacific (AP), South-East Pacific (1981), South Pacific (1976/1986), Red Sea & Gulf of Aden (1982) and Western and Central Africa (1984).
- Other: Antarctica (1982-1992), Arctic (1996 Arctic Council) and in Europe: North East Atlantic (1972-1992), Baltic Sea (1972-1992) & Caspian Sea (2003).



# PLASTIC IN THE OCEANS: LAND-BASED - EU

## Packaging:

Directive 94/62/EC on packaging and packaging waste, amended by Directive 2015/720/EU (plastic bag directive) and Directive 2018/852/EU (plastic packaging directive)

Directive 2015/720/EU. Aim: to reduce the consumption of lightweight plastic carrier bags. MS shall take measures to reduce the consumption of plastic bags (national reduction targets, marketing instructions if proportionate and non-discriminatory) to achieve the following results:

- Annual consumption does not exceed 90 plastic bags/person by 31.12.2019 and 40 bags/person by 31.12.2025; and/or
- Plastic carrier bags will not be provided free of charge at the point of sale of goods by 31.12.2018

However, very lightweight plastic bags (thickness of 15 microns) may be excluded.

# PLASTIC IN THE OCEANS: LAND-BASED - EU

## Packaging:

### Plastic packaging directive (2018/852/EU)

1. prevent the production of packaging waste, and
  2. promote the reuse, recycling and other forms of recovering of packaging waste, instead of its final disposal (= contributing to the transition towards a circular economy).
- By 31 December 2025, a minimum of 65% of all packaging waste will be recycled and at least 50% by weight of plastic must be recycled.
  - By 31 December 2030, a minimum of 70% of all packaging waste will be recycled and at least 55% by weight of plastic must be recycled.
  - Target deadlines may be postponed by 5 years under certain conditions (derogation of 15% for a single target if this recycling rate is not reduced below 60% + Commission is notified 24 months before the deadline)



# PLASTIC IN THE OCEANS: LAND-BASED - EU

- Proposed directive on **single-use plastics** (political agreement Council and Parliament on 19.12.2018). If alternatives (substitution) are easily available and affordable, single-use plastics will be banned from the market. This will be the case for plastic cotton buds, cutlery (forks, knives, ...), plates, straws, drink stirrers, stick for balloons, oxo-degradable plastic products and polystyrene food and beverage containers. For other products the use will be limited through national reductions in consumption; through design and labelling; waste management (collection)/clean-up obligations for producers (tobacco).
- After formal approval, MS will have 2 years for transposing the directive



## PLASTIC IN THE OCEANS: CLEAN UP

- Beach cleaning
- Fishing for litter
- Ocean cleaning

<https://www.theoceancleanup.com/> for the Great Pacific

Garbage Patch (Boyat Slat)

<https://4ocean.com/> (Caribbean, Florida, Bali)

Preventive measures: to little, to slow and hopefully not to late