UNIVERSITY OF HULL

About plastics and how they get into our environment

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What are plastics?

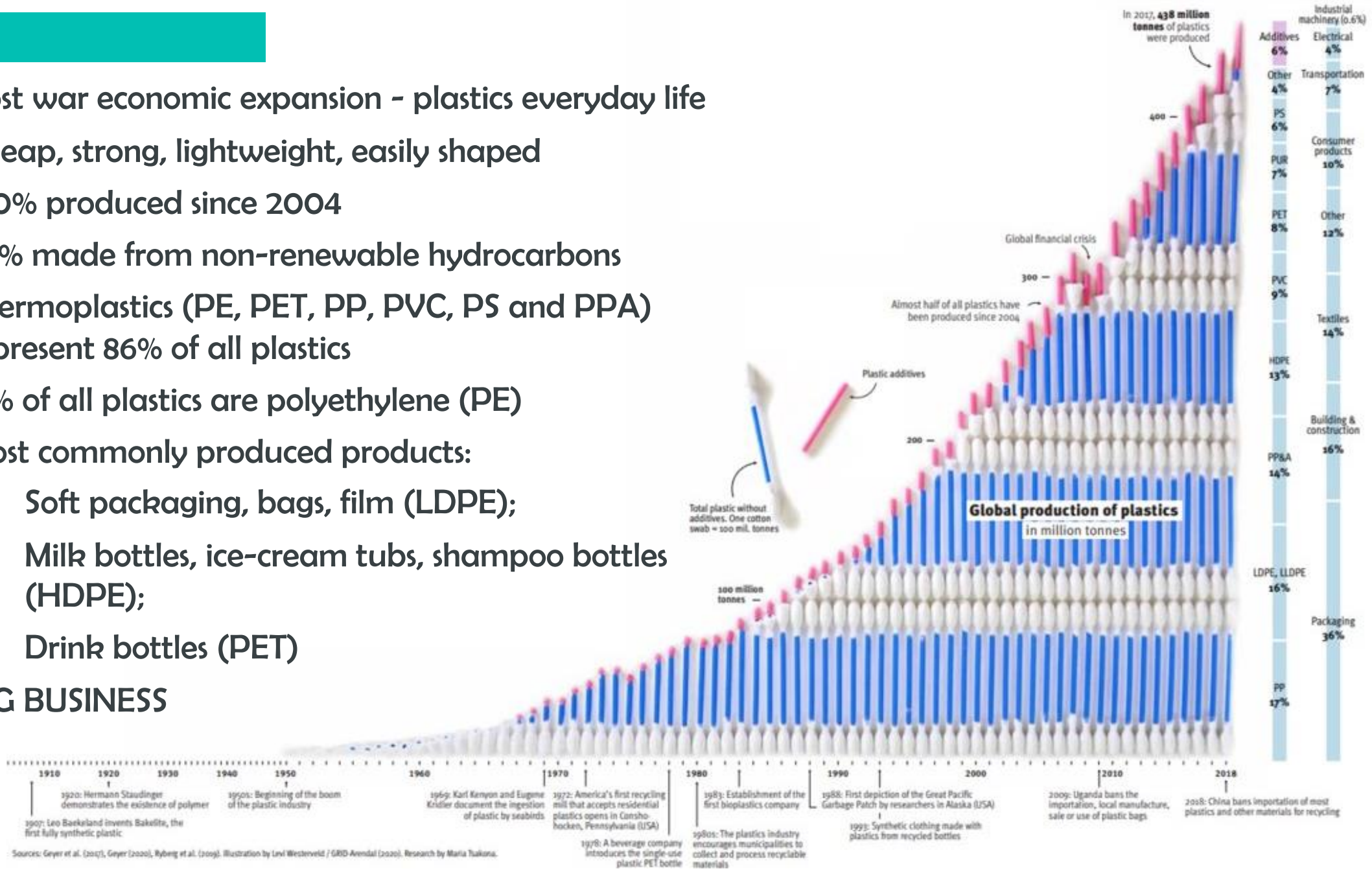
- Synthetic or semi-synthetic polymers
- Short for thermoplastic = mouldable using heat
- Organic compounds
  - just like wood, paper or wool
- Made from natural materials
  - mainly crude oil or natural gas (99%), but also coal, salt (all non-renewable resources) and cellulose, sugars and vegetable oils (renewable resource)

Data sources: https://theconversation.com/the-world-of-plastics-in-numbers-100291 and https://www.plasticseurope.org/en/about-plastics/what-are-plastics

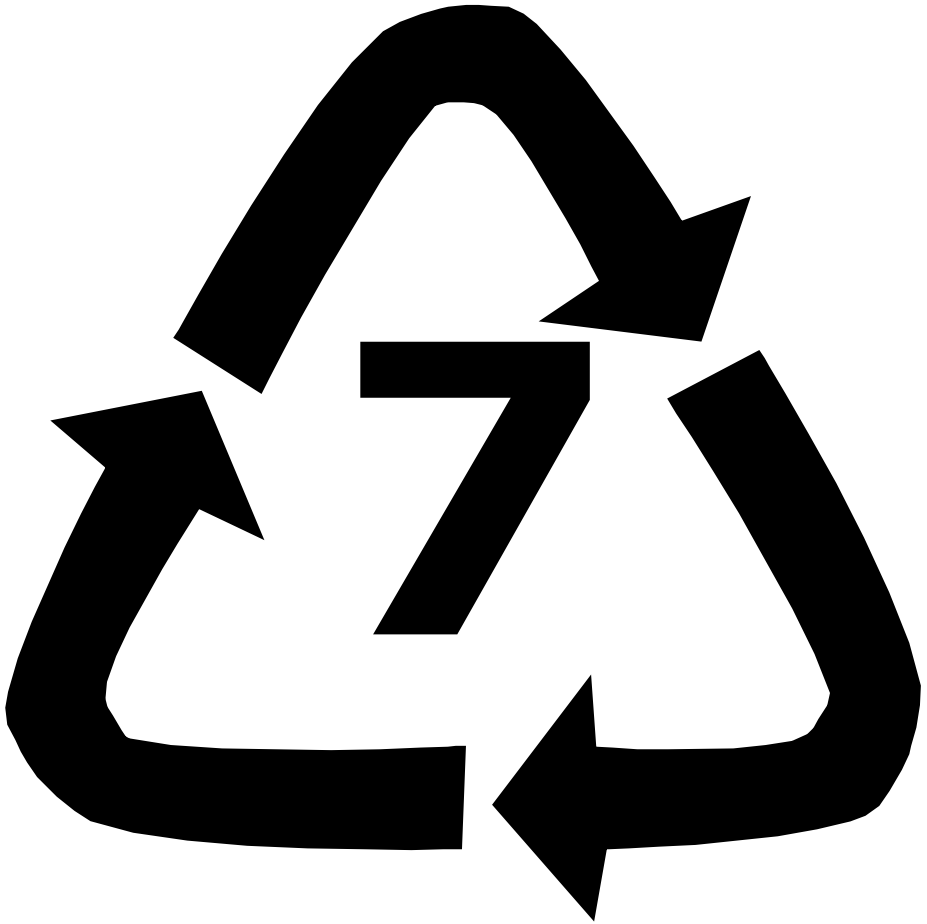
Plastics Production

From: United Nations Environment Programme (2021). *Drowning in Plastics – Marine Litter and Plastic Waste Vital Graphics.* https://tinyurl.com/DrowninginPlastics

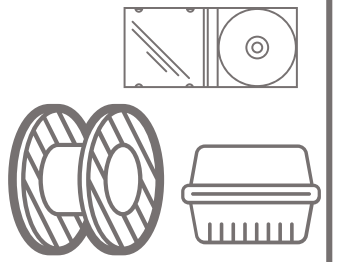
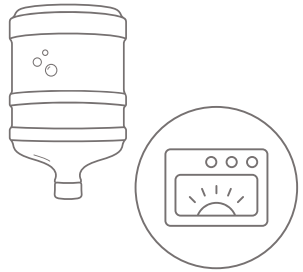
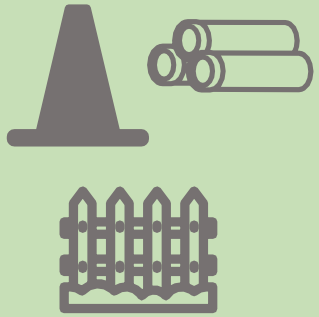
- Post war economic expansion - plastics everyday life
- Cheap, strong, lightweight, easily shaped
- >50% produced since 2004
- 99% made from non-renewable hydrocarbons
- Thermoplastics (PE, PET, PP, PVC, PS and PPA) represent 86% of all plastics
- 31% of all plastics are polyethylene (PE)
- Most commonly produced products:
  - Soft packaging, bags, film (LDPE);
  - Milk bottles, ice-cream tubs, shampoo bottles (HDPE);
  - Drink bottles (PET)
- BIG BUSINESS



What does this symbol mean?

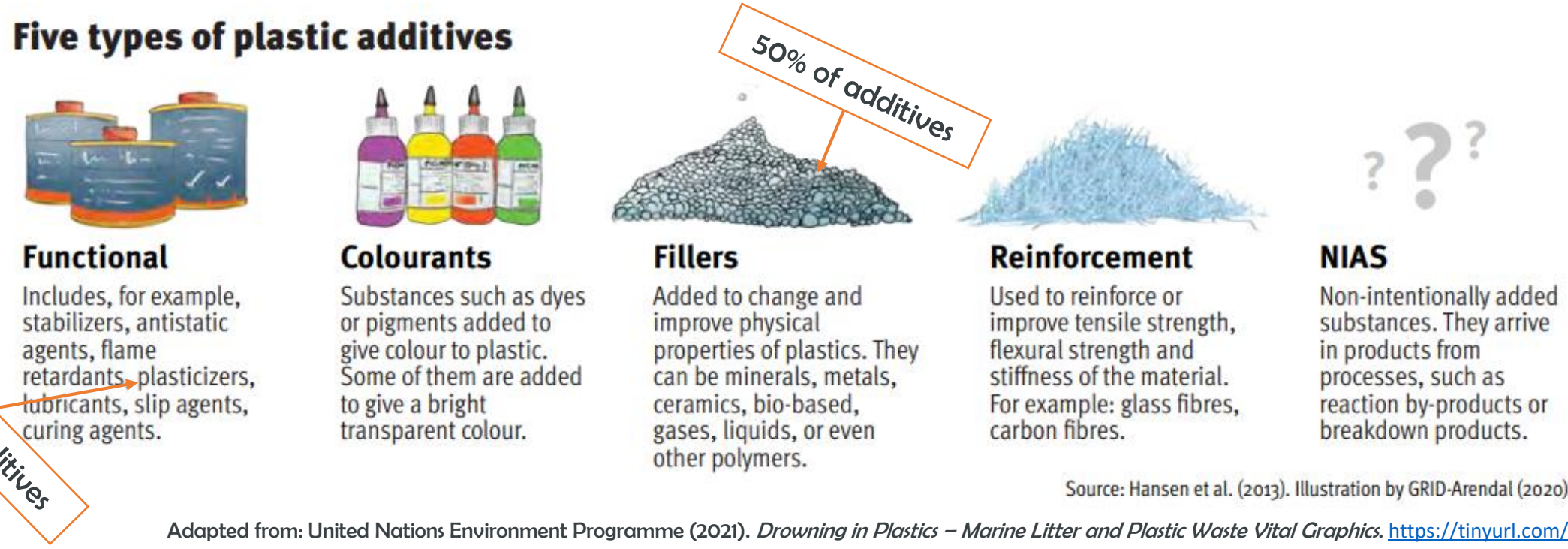


Plastic resin codes

1 PETE	2 HDPE	3 PVC	4 LDPE	5 PP	6 PS	7 OTHER
						
Kerbside	Some kerbside	Difficult to recycle	Some in shops	Some kerbside	Difficult to recycle	Difficult to recycle
						

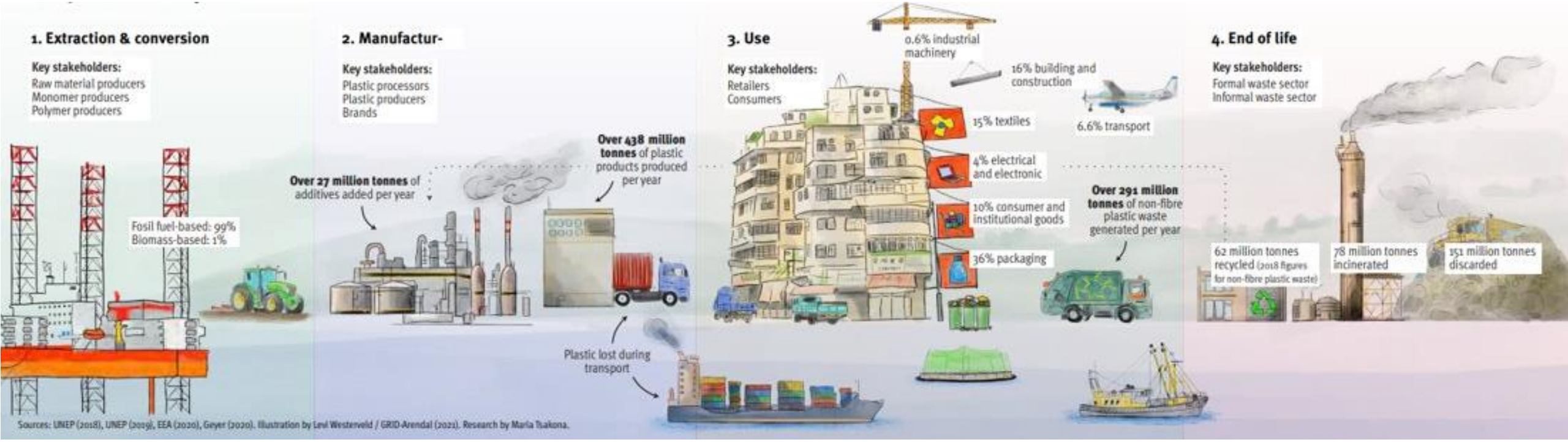
Plastic additives

- Every plastic item contains additives – but no transparency or reporting system
- Weakly bound additives leach out; degrade, spread far, persist and bioaccumulate in organisms
- Human health and environmental hazards
- Difficult for recycling chain - problems for recycled food packaging or toy products



Adapted from: United Nations Environment Programme (2021). *Drowning in Plastics – Marine Litter and Plastic Waste Vital Graphics*. https://tinyurl.com/DrowninginPlastics

Plastics Life Cycle



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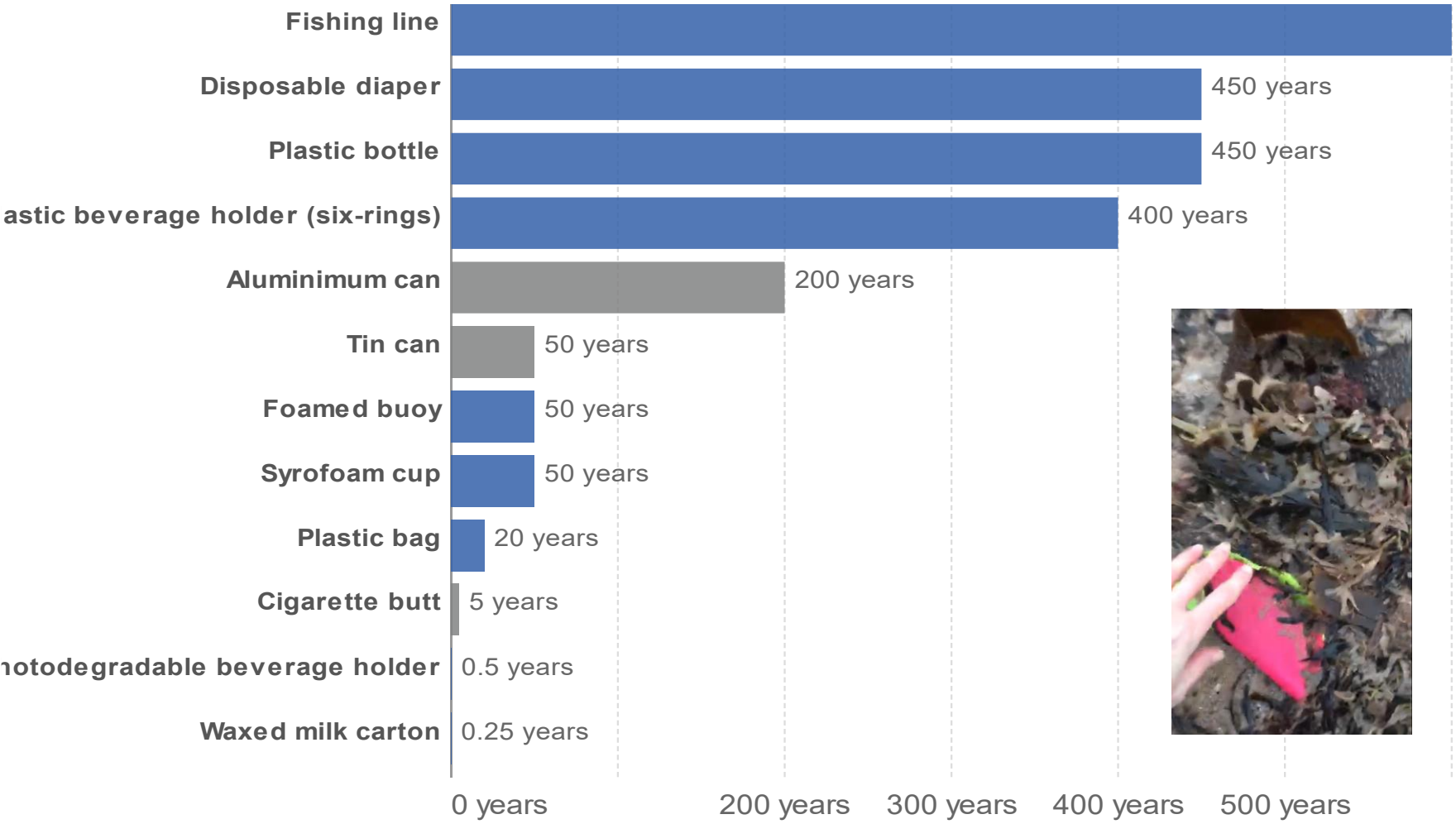
Decomposition rates of marine debris items

Average estimated decomposition times of typical marine debris items. Plastic items are shown in blue.

Our World in Data



Source: U.S. National Park Service; Mote Marine Lab; National Oceanic and Atmospheric Administration Marine Debris Program

The good, the bad and the ugly…

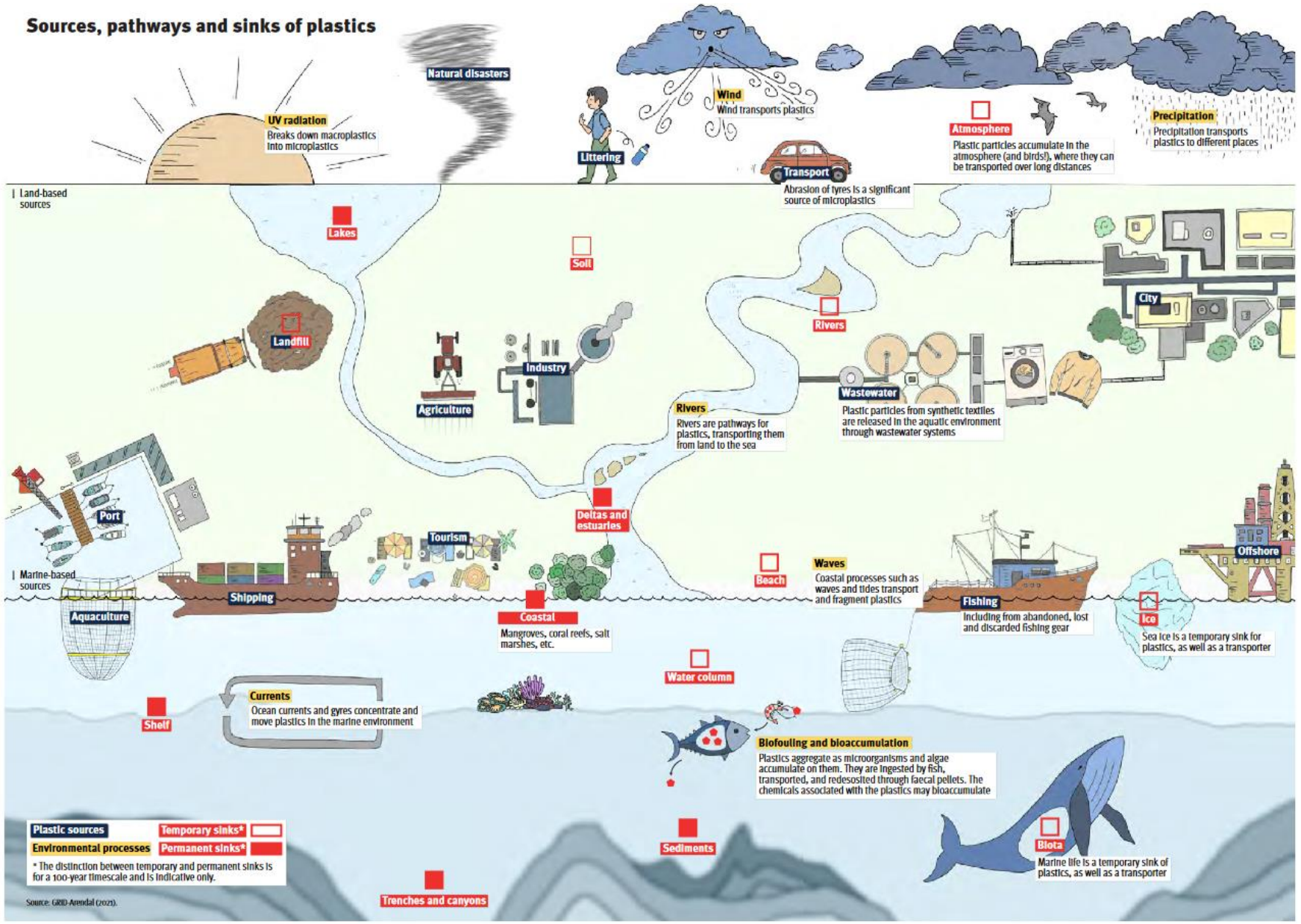
- Recyclable
- Low emissions

- Additives
- Polymers degrade

- Leaching
- Cheap to make virgin
- Production increasing
- Many superfluous single use items
- Persistent waste – taking many 100s of years to breakdown

Environmental pollution

How do they get into our environment?



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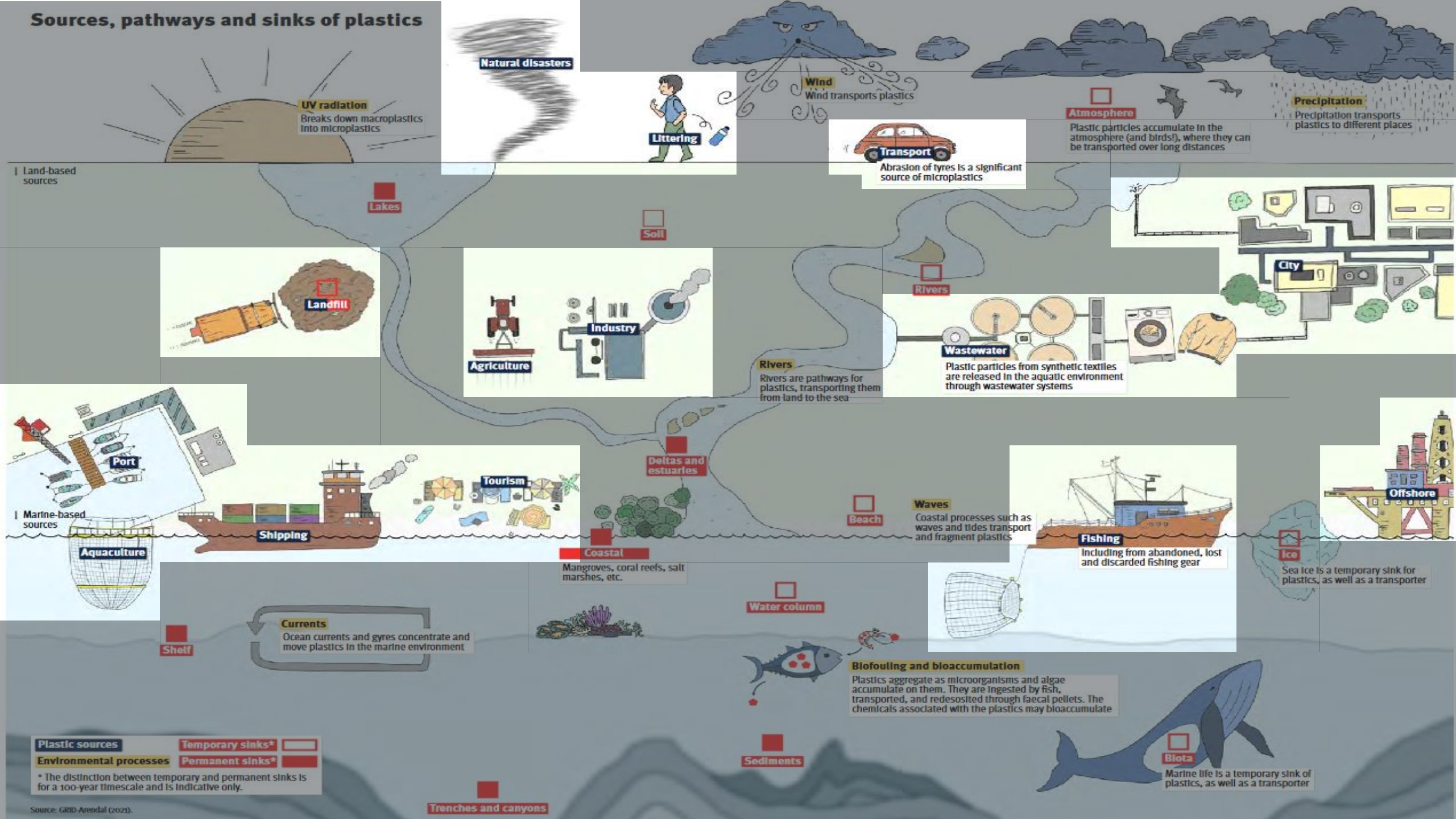
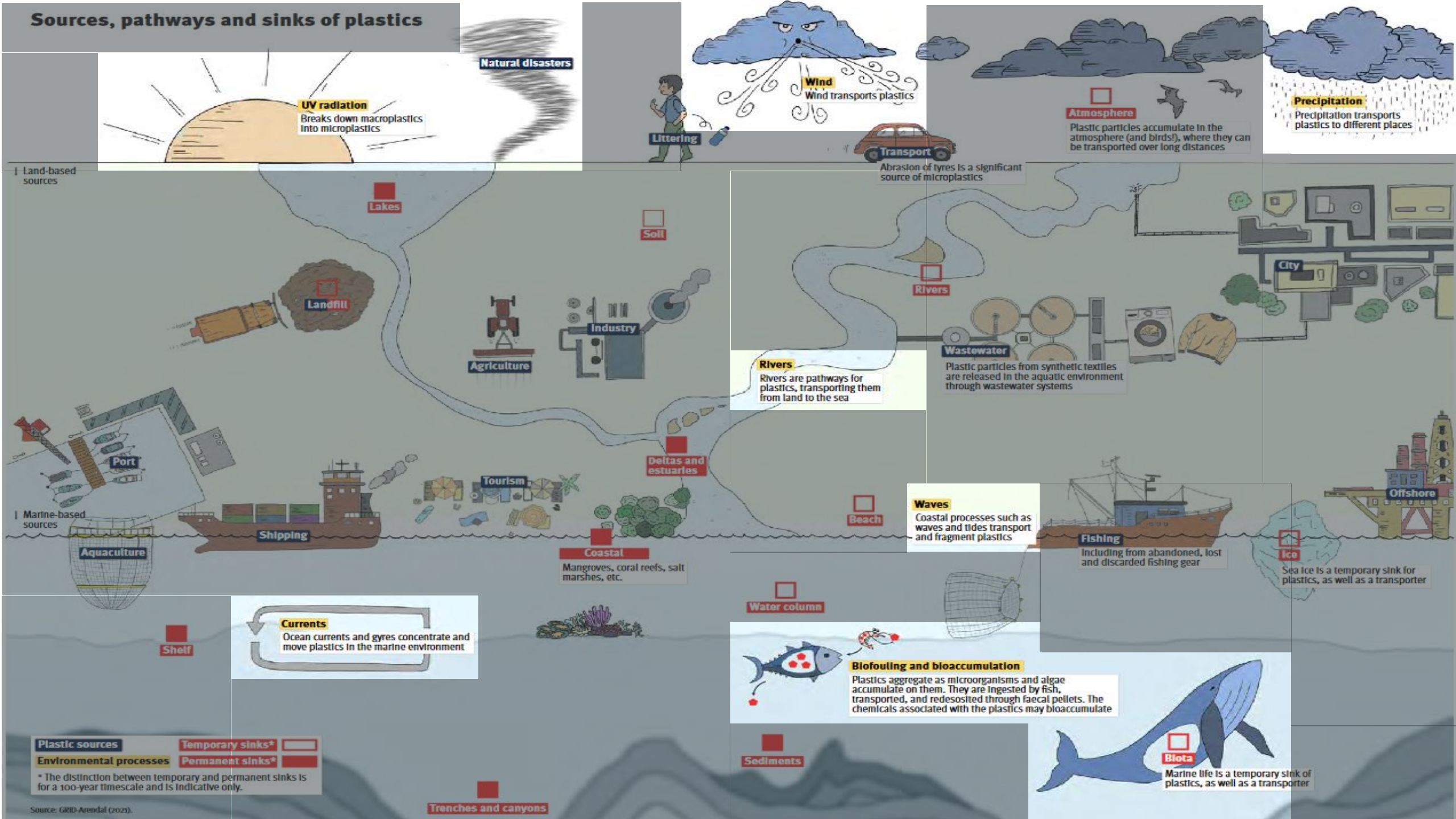
Sources, pathways and sinks of plastics



Source: GRID-Arendal (2021).

Sources, pathways and sinks of plastics



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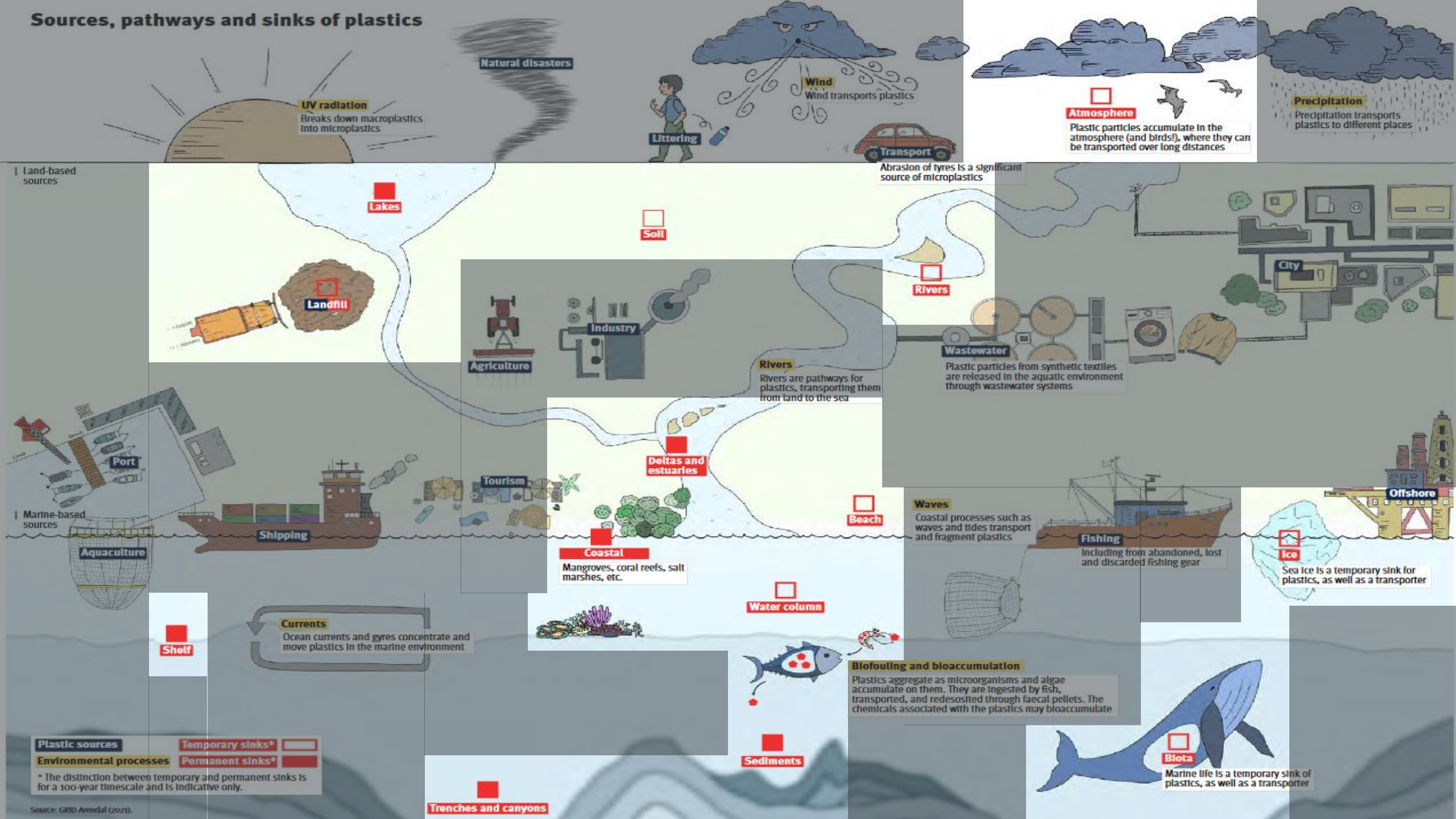

Source: GRID-Arendal (2021).

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Thank you for listening