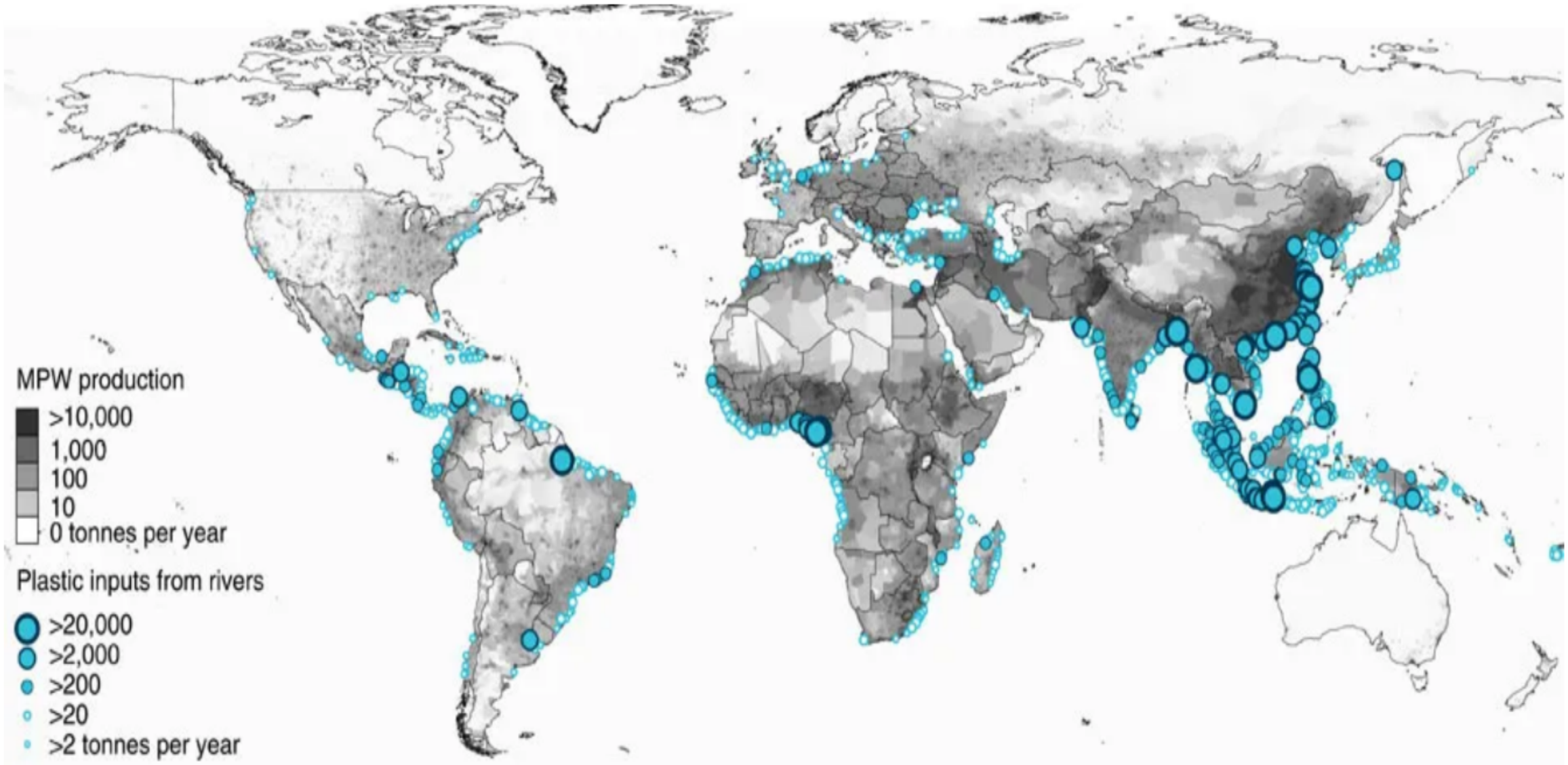
FUTURE OF OUR OCEANS

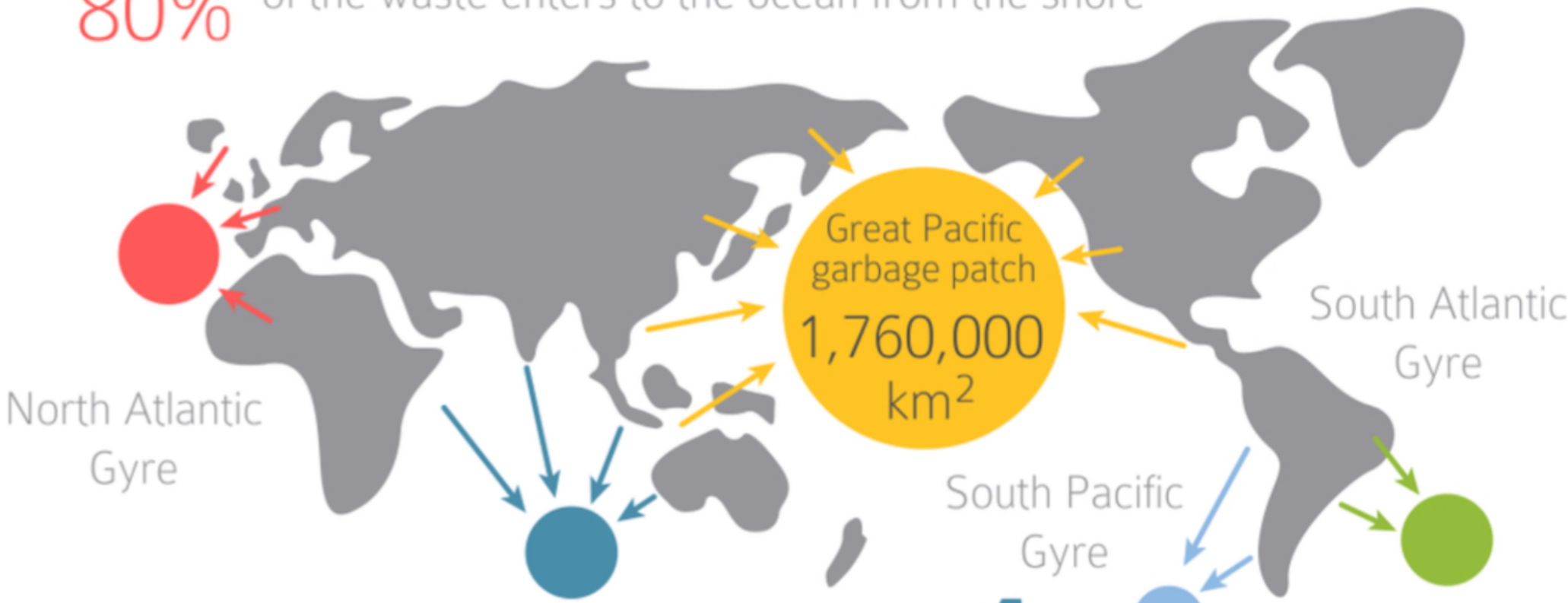
Health & Marine Pollution and Plastics

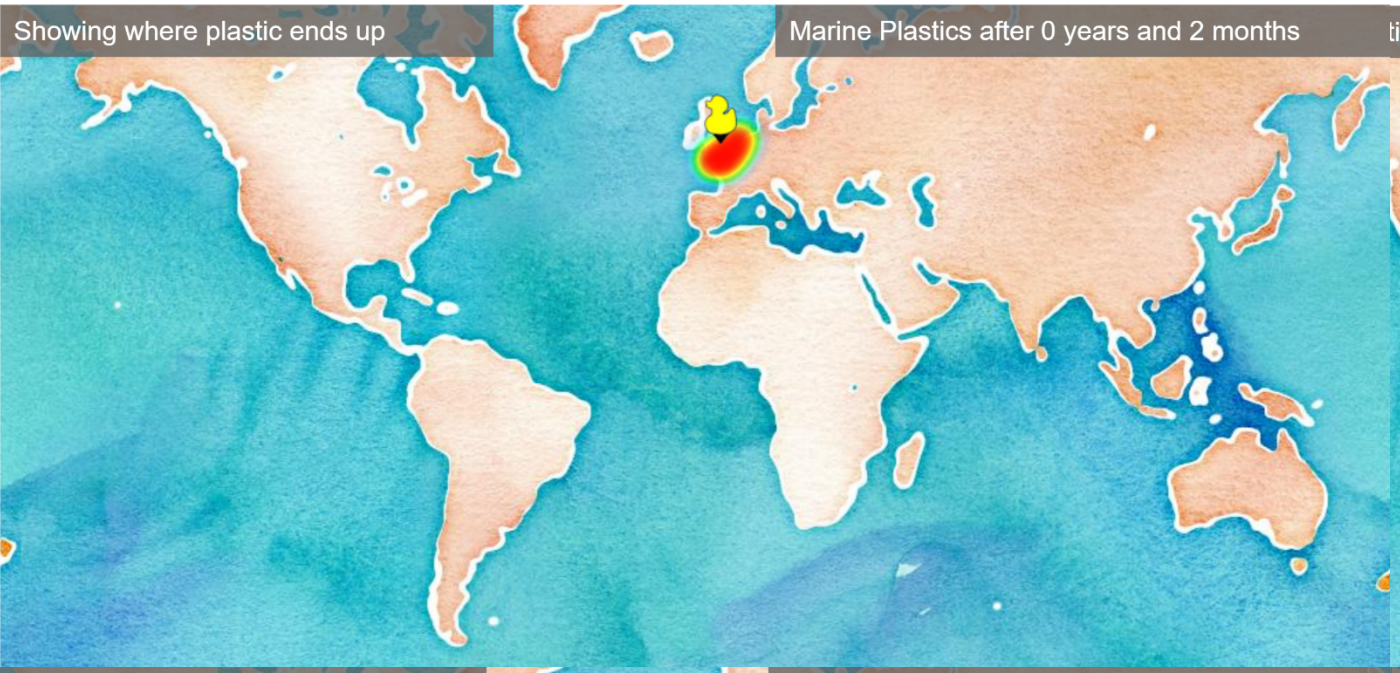
Jacquie McGlade
Frank Jackson Professor of the Environment
April 2020

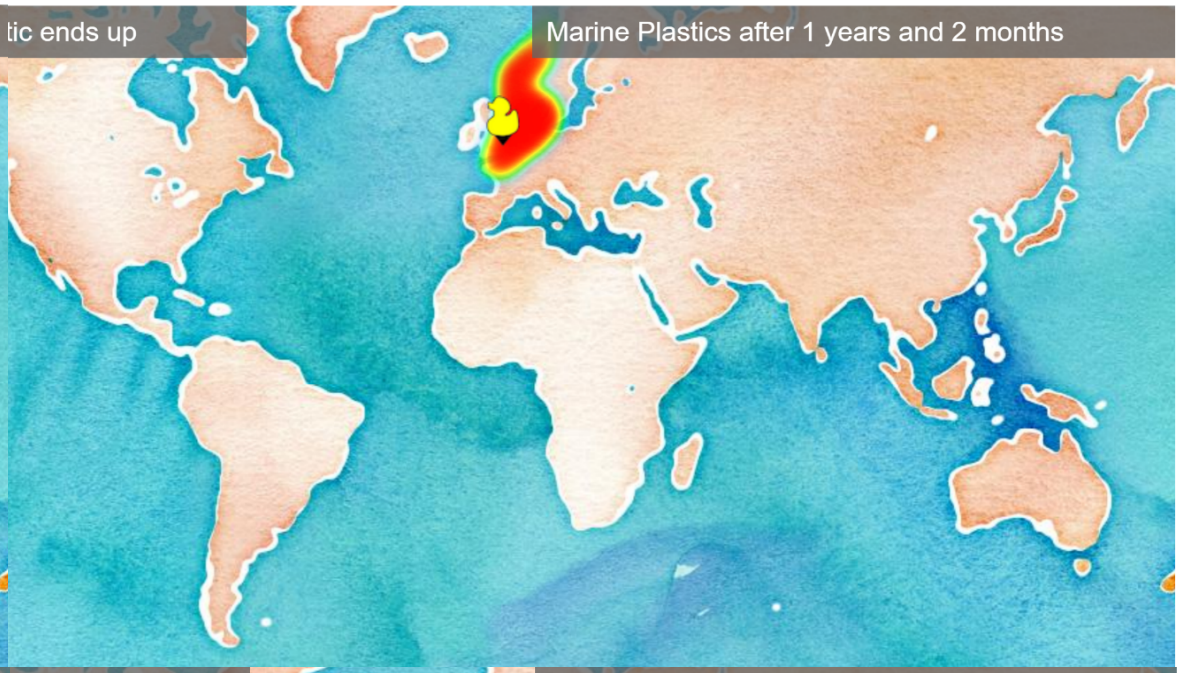

MPW production
>10,000
1,000
100
10
0 tonnes per year
Plastic inputs from rivers
>20,000
>2,000
>200
>20
>2 tonnes per year

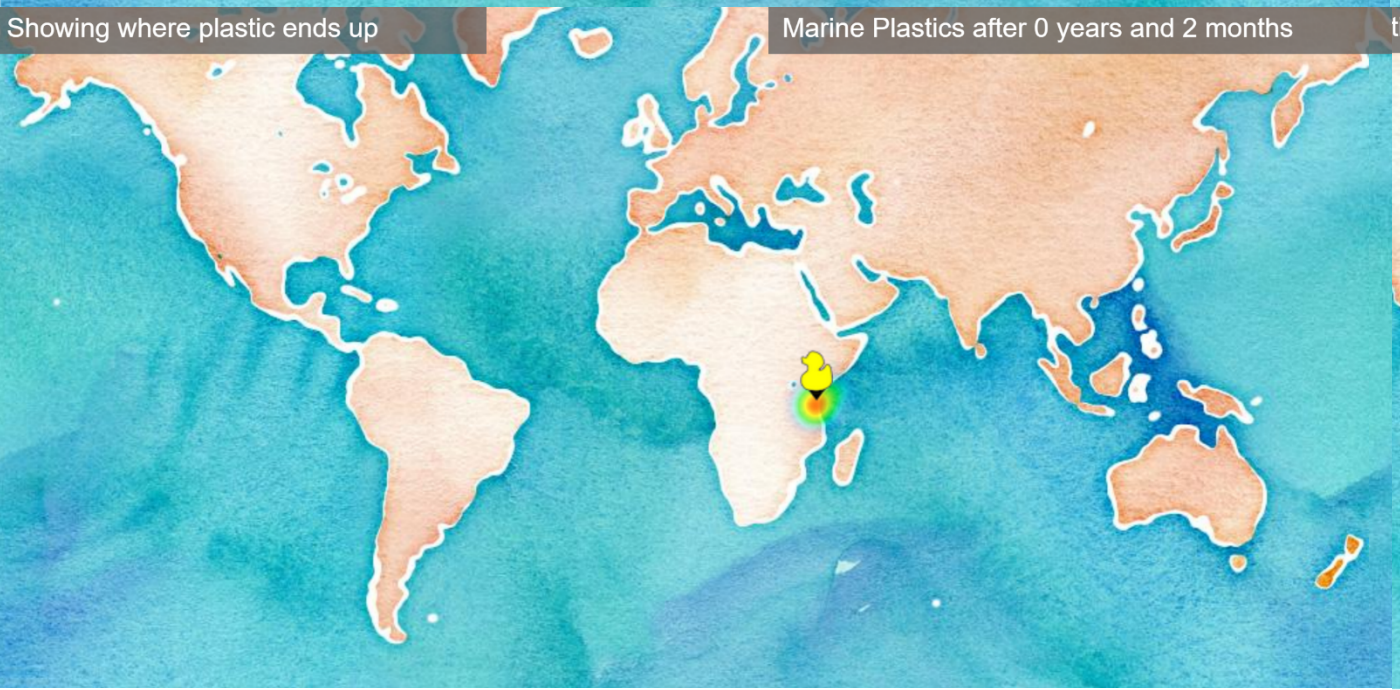
GARBAGE PATCHES MAP

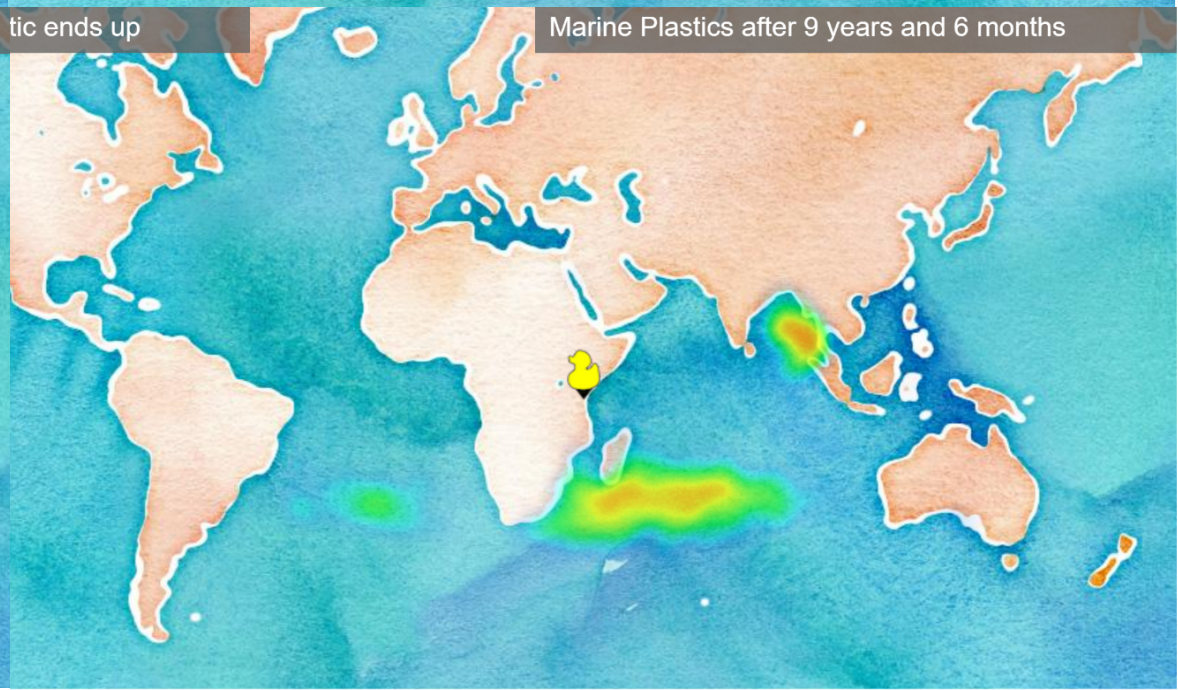
80% of the waste enters to the ocean from the shore

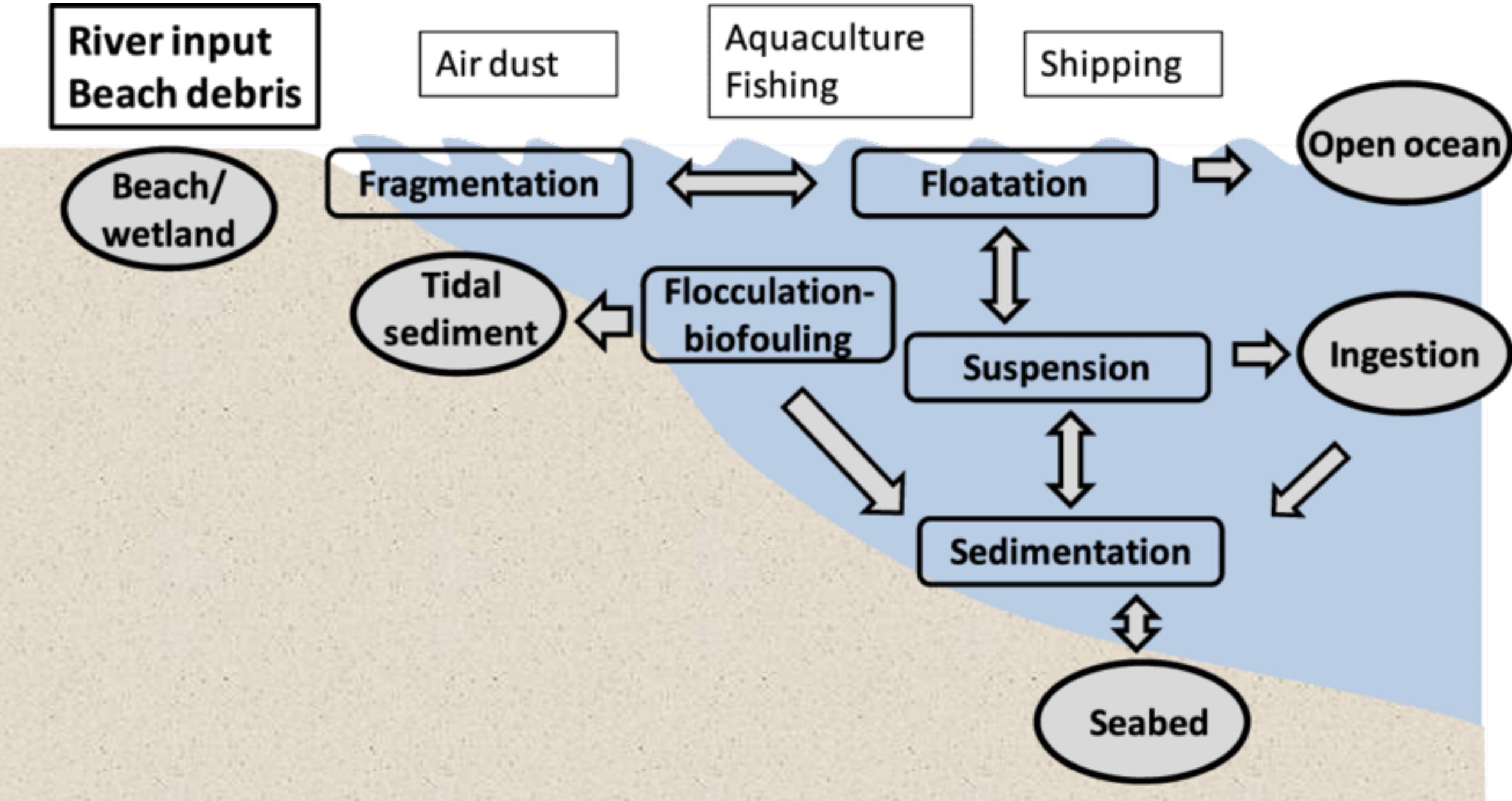



Showing where plastic ends up
Marine Plastics after 0 years and 2 months

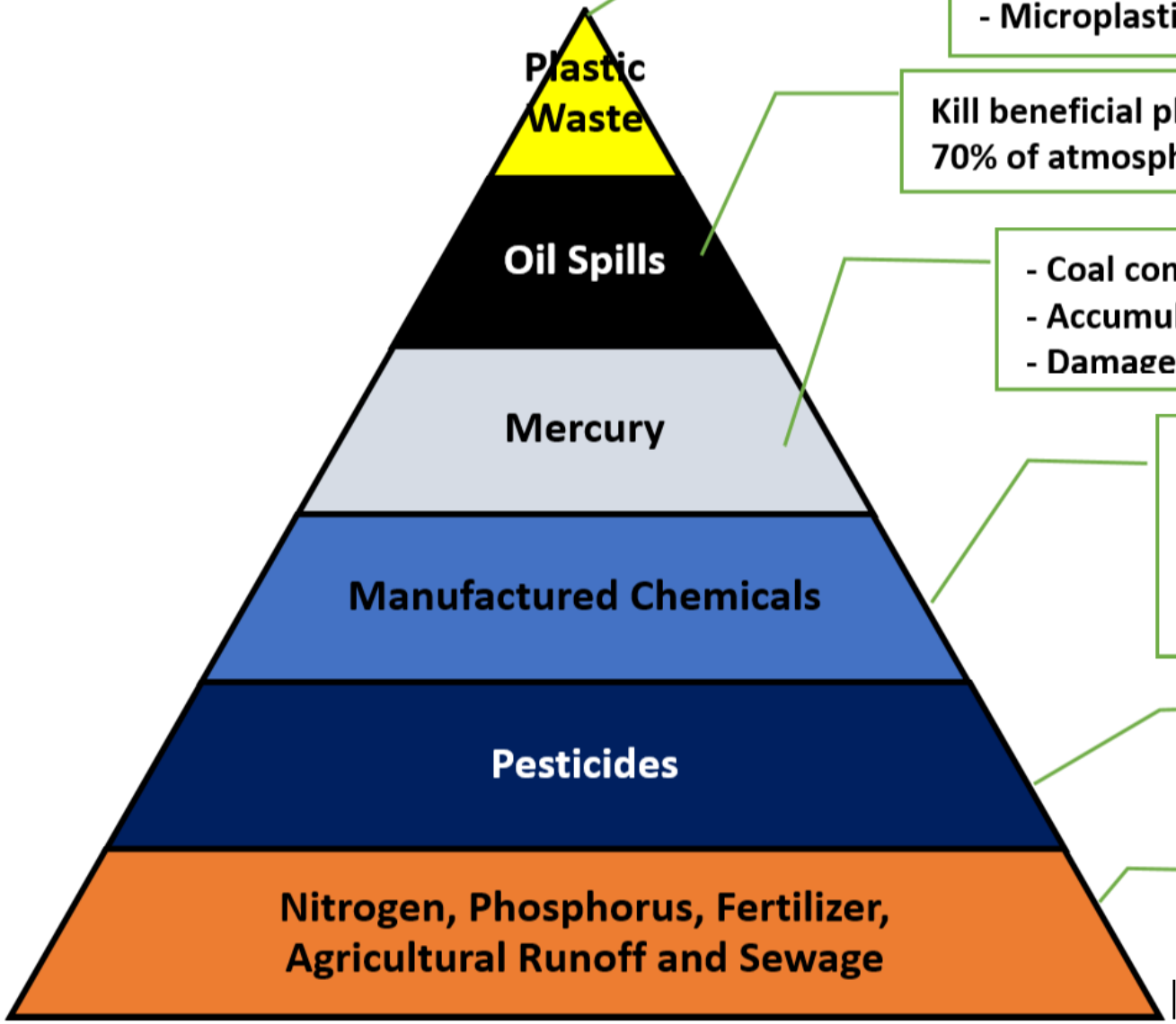

tic ends up
Marine Plastics after 1 years and 2 months


Showing where plastic ends up
Marine Plastics after 0 years and 2 months


tic ends up
Marine Plastics after 9 years and 6 months


River input
Beach debris
Air dust
Aquaculture
Fishing
Shipping
Open ocean
Beach/
wetland
Fragmentation
Floatation
Tidal
sediment
Flocculation-
biofouling
Suspension
Ingestion
Sedimentation
Seabed

The Ocean Pollution Pyramid



- Comprises 80% of all marine litter
- 10 Million tons discharged per year
- Kills fish, birds, whales and dolphins
- Microplastic particles enter the human food chain

Kill beneficial plankton that produce 50-70% of atmospheric oxygen

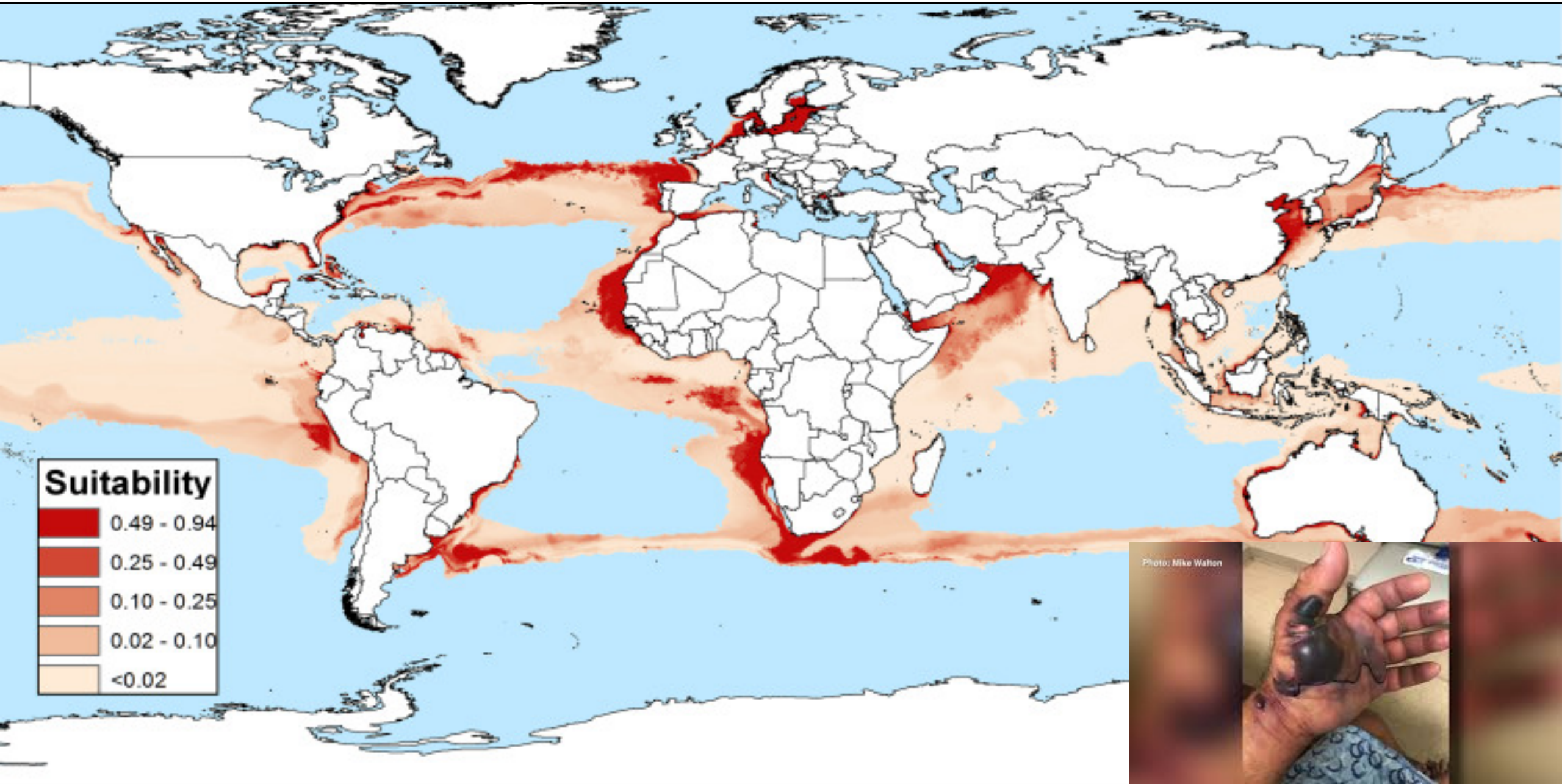
- Coal combustion and gold mining are major sources
- Accumulates in predator fish and marine mammals
- Damages children's brains and reduces IQ

PCBs, DDT, bisphenol A, phthalates, PFAS flame-retardants and pharma wastes. Cause multiple diseases. Reduce human fertility, Damage coral reefs

Kill fish. Reduce human fertility

Increase frequency of harmful algal blooms (red, green and brown tides) and accelerate spread of life-threatening bacteria

AREAS SUITABLE FOR *VIBRIO CHOLERA*



The Lifecycle of Plastics

Plastic bag
20 years

Coffee cup
30 years

Plastic straw
200 years

6-pack plastic rings
400 years

Plastic water bottle
450 years

Coffee pod
500 years

Plastic cup
450 years

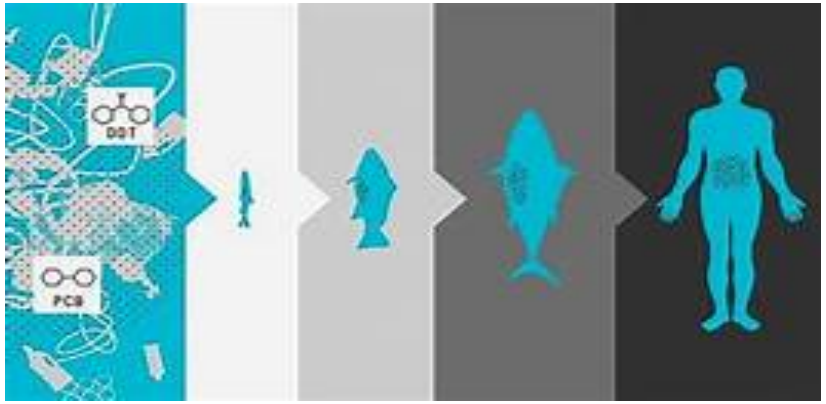
Disposable diaper
500 years

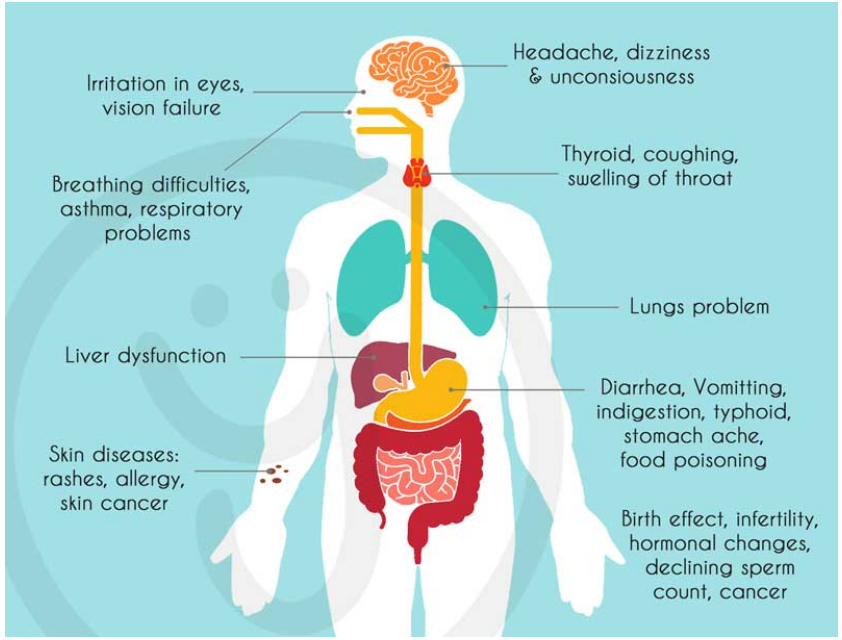
Plastic toothbrush
500 years

HUMAN HEALTH IMPACTS

Plastics and their associated chemical pollution have **multiple effects on human health** ranging from the neurotoxicity of polychlorinated biphenyls (PCBs) to the **poorly defined risks of complex mixtures** of microplastic particles, agricultural and pharmaceutical wastes, endocrine disruptors, brominated flame retardants and perfluorinated substances.

Many of the plastics discharged into the oceans today **have never been tested for safety or toxicity**, and thus their potential effects on ecosystems and on human health are not known.



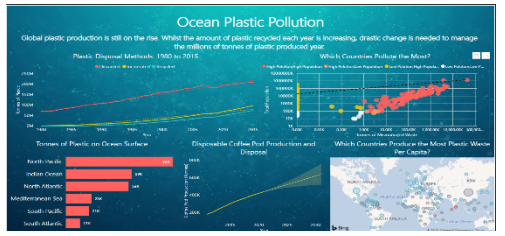


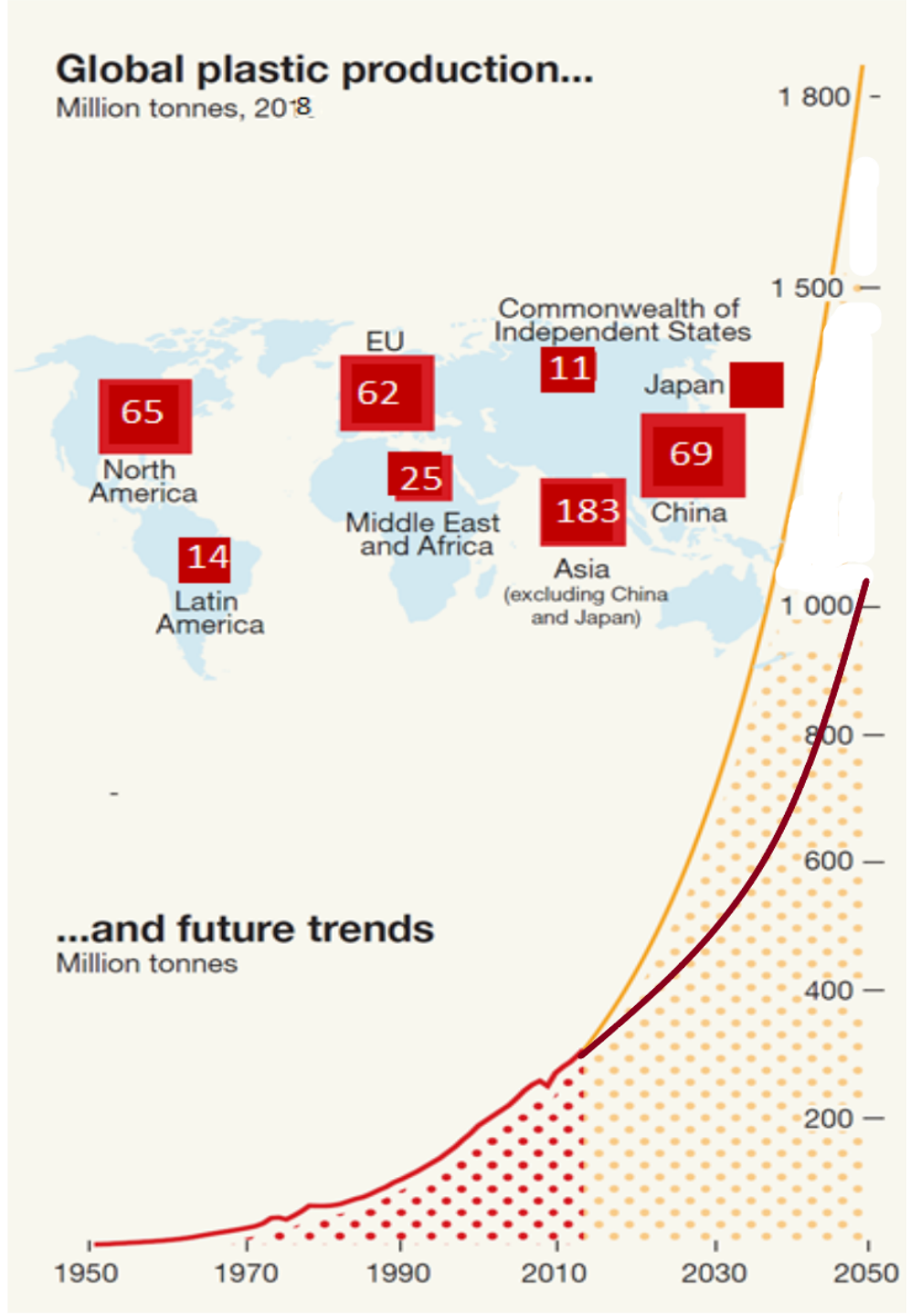
ECONOMIC COSTS OF MARINE PLASTICS

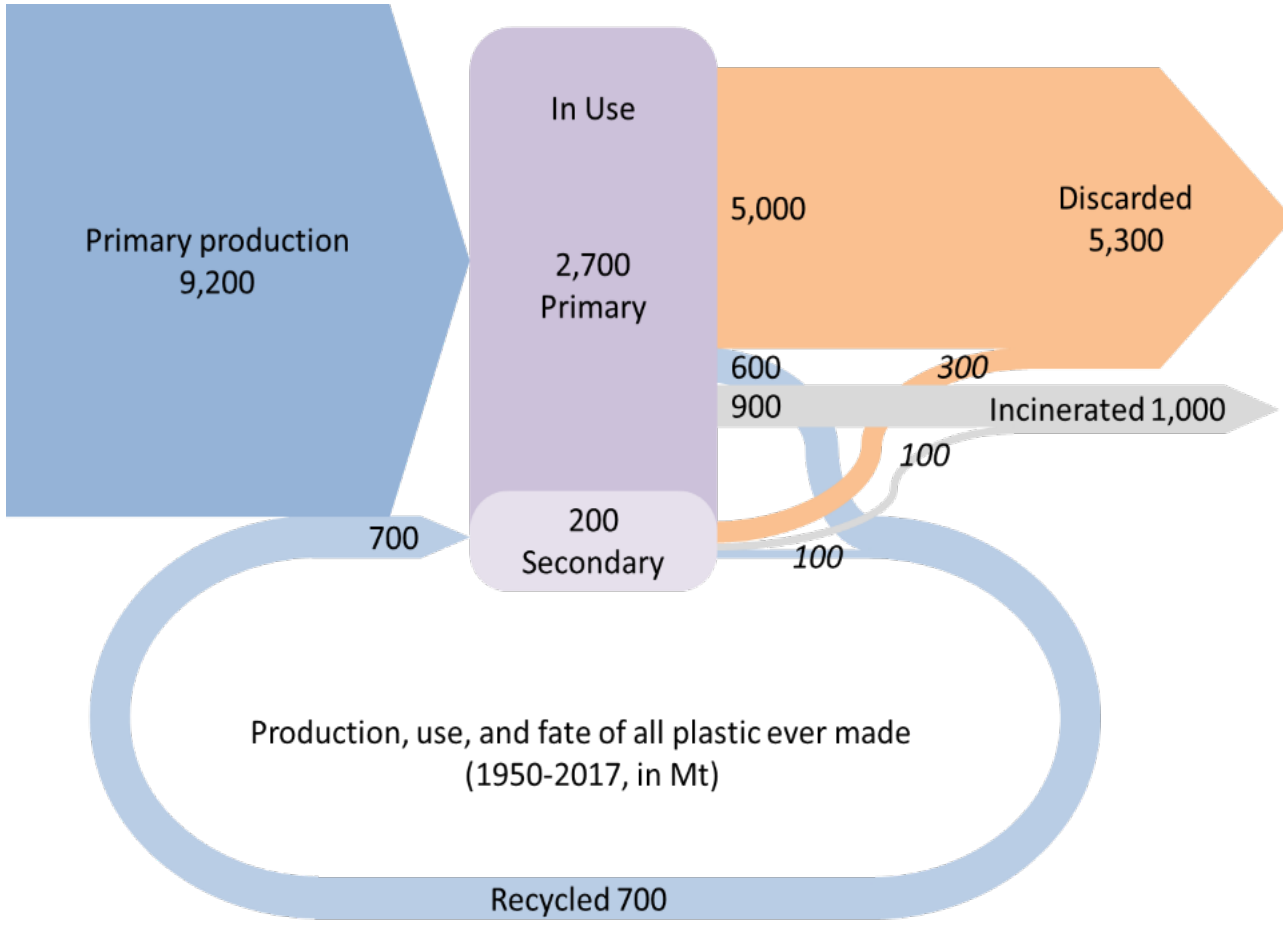
The economic, social and environmental costs of the **150 million MT** of plastics in the ocean are estimated at

$ 49.7 trillion (ie $3300/MT)

These costs include damage to infrastructure, maritime operations, contamination of seafood, costs of clean-ups and loss of ecosystem services but **NOT HUMAN HEALTH**

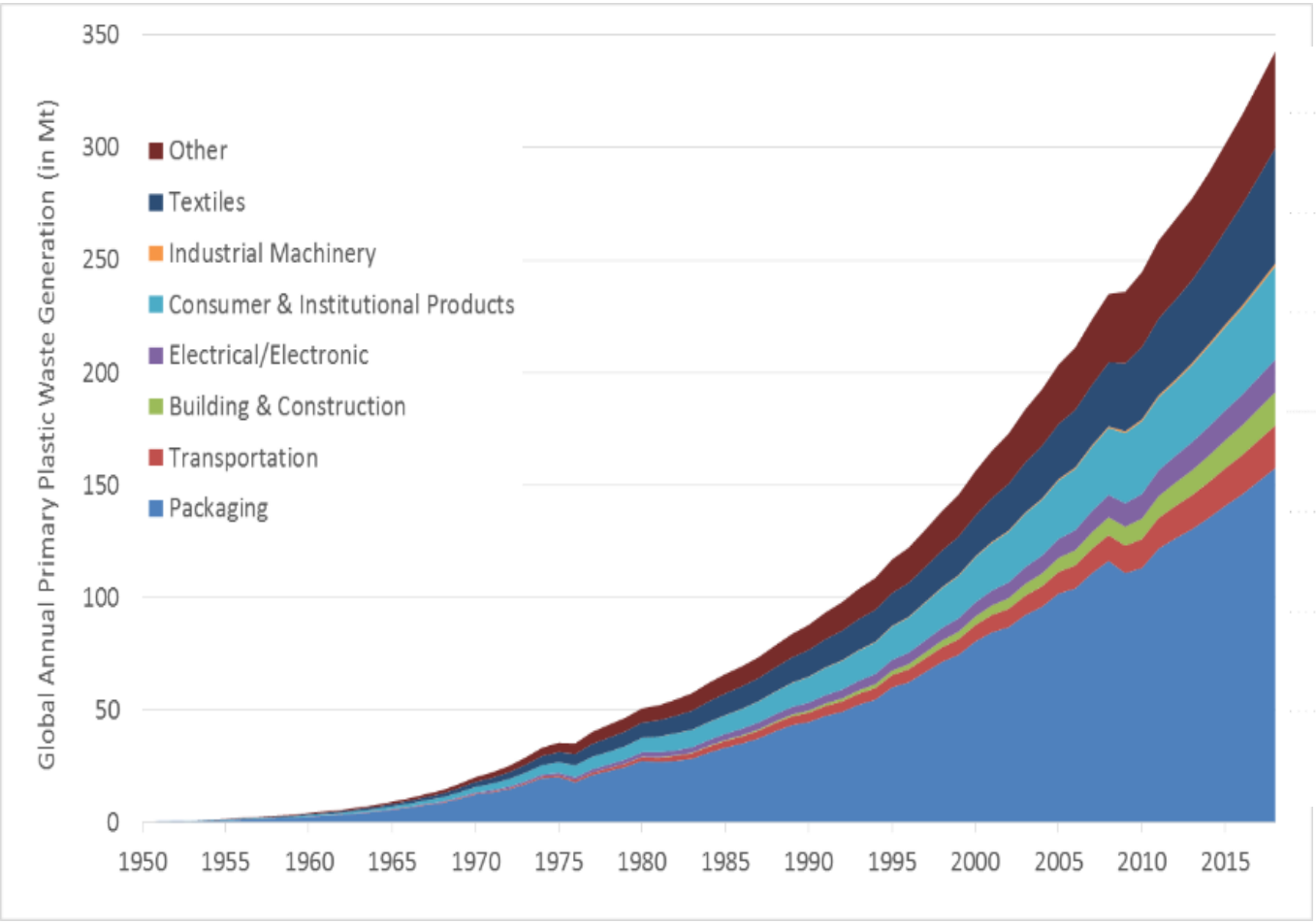


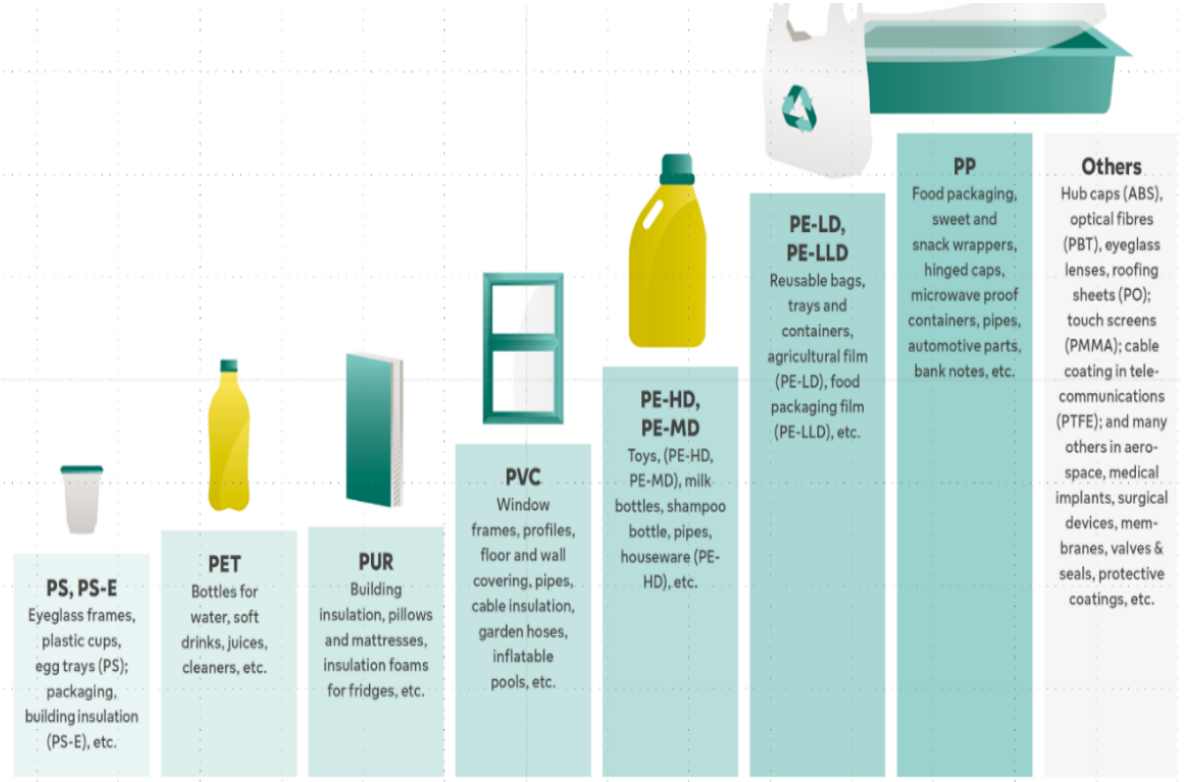


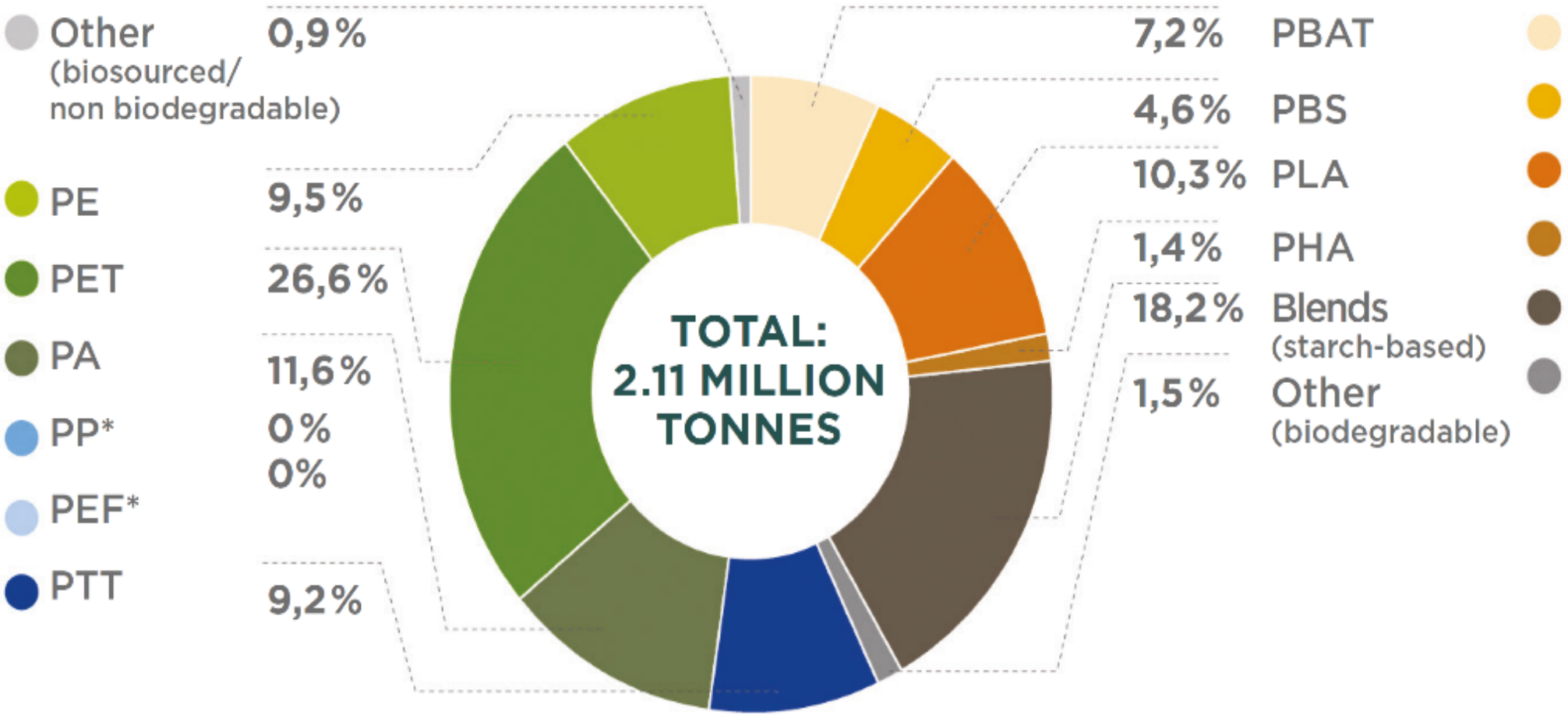


The cumulative volume of plastics, including resins, fibers, and additives, produced between 1955 to 2017 is estimated to be **9.2 billion MT rising to 1.1 billion Mt in 2050**.

SOURCES OF WASTE PLASTICS







Biosourced/non biodegradable
56,8%

Biodegradable
43,2%

Beat plastic pollution
with ISO standards

ISO 22526
Carbon and environmental footprint

ISO 15270
Recovery and recycling of plastic waste

ISO/CD 22766
Disintegration of plastic materials in marine habitats

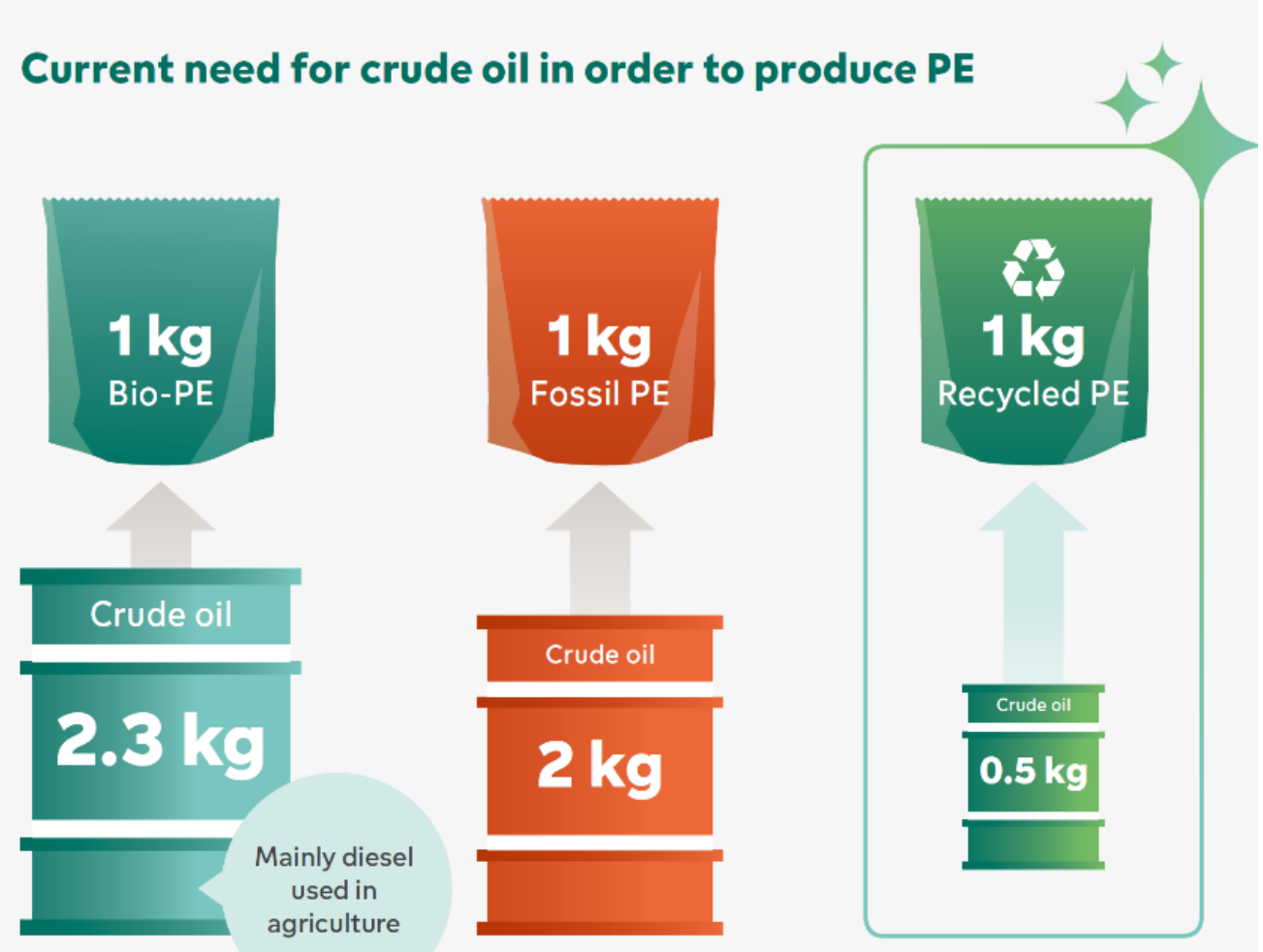
ISO 18830
Biodegradation test

MARKET FAILURES

Lack of connection between production and consumption with **costs of emissions of greenhouse gases**

Market failures leading to

- **distortions to the price** of feedstocks through subsidies,
- lack of **internalizaton** of health, social and environmental costs



FUN ON A PLASTIC FREE OCEAN
Etienne McGlade Ling