

Sampah laut dalam Ekonomi Biru Sirkuler

1a. Pengenalan pada Sampah Laut dan Ekonomi Sirkuler

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MITRA PROYEK

Malaysia



Indonesia



Greece



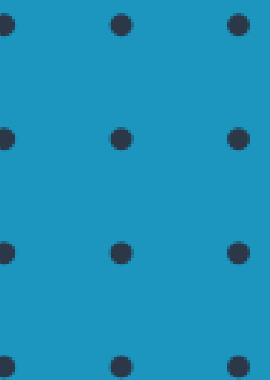
Cyprus



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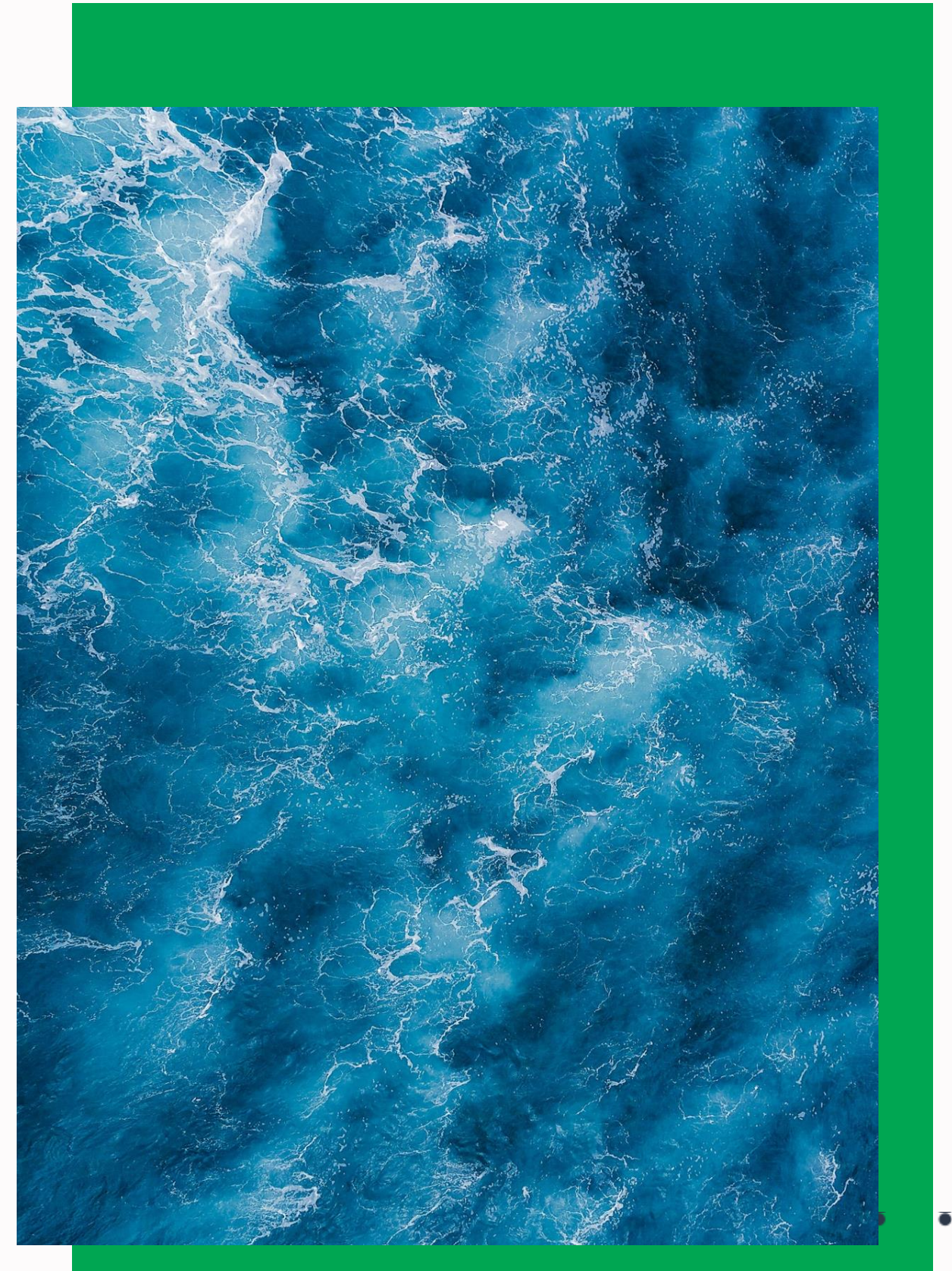
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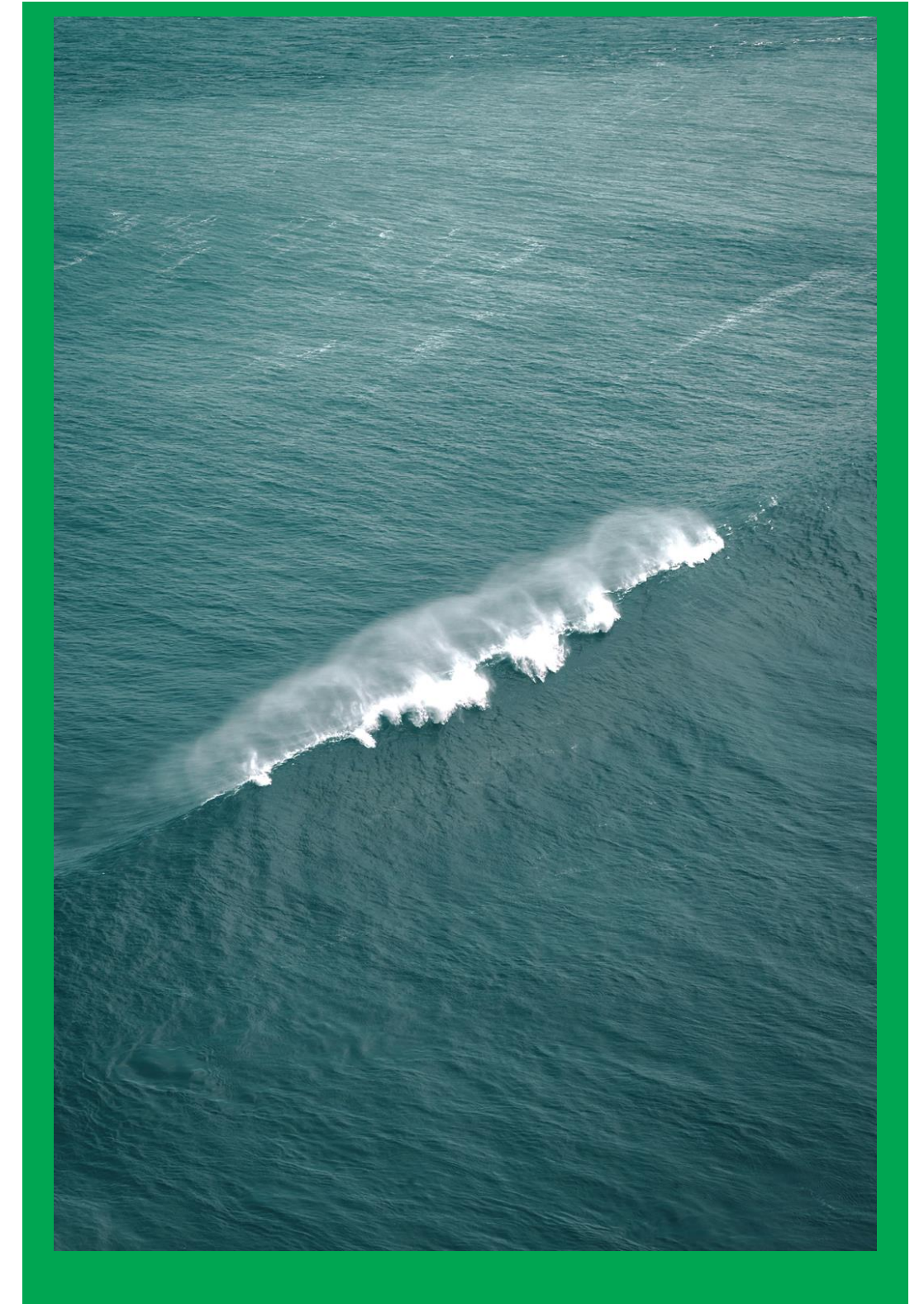
Pendahuluan

Tujuan:

- Memahami sumber dan dampak dari sampah laut bagi industri ekonomi biru.

Hasil Pembelajaran:

- Gambaran umum mengenai sampah laut, sumbernya, distribusi, dan dampaknya terhadap ekosistem laut.
- Pengenalan mengenai konsep ekonomi sirkuler dan relevansinya dalam menangani polusi plastik di laut.



Sampah Laut

- = sampah laut
- Setiap bahan padat buatan manusia atau hasil proses industri, yang dibuang, ditinggalkan, atau tidak dikelola dengan baik di lingkungan laut atau pesisir.



Plastics are the most common form of marine debris. They can come from a variety of land- and ocean-based **SOURCES**, **ENTER THE WATER** in many ways, and **IMPACT** the ocean and Great Lakes. Once in the water, plastic debris never fully biodegrades.

COMMONLY FOUND PLASTICS



Cigarettes Butts



Food Wrappers



Beverage Bottles



Straws



Cups & Plates



Bottle Caps



Single Use Bags

HOW TO HELP?



Reduce



Reuse



Recycle



DISPOSE OF
WASTE PROPERLY
no matter where you are.



GET INVOLVED
and participate in local
cleanups in your area.



REMEMBER
that our land and sea are
connected.

PLASTICS IN THE OCEAN

MICROPLASTICS

Microplastics are small plastics less than 5mm. They can come from large plastics breaking down, or can be produced as small plastics such as microbeads, which can be found in products such as toothpaste and face wash.

BOATS/NETS

Fishing gear can become marine debris when it is lost or abandoned.

INGESTION

Animals can easily mistake plastic debris for food.

RAIN & WINDS

Rain and wind can sweep debris into nearby waterbodies.

LITTERING

Intentional littering or improper disposal of trash can cause marine debris.

STREAMS & STORM DRAINS

Streams and storm drains can carry debris directly into the ocean or Great Lakes.

ENTANGLEMENT

Marine life can get caught and killed in derelict fishing nets and other plastic debris.



<https://marinedebris.noaa.gov/>



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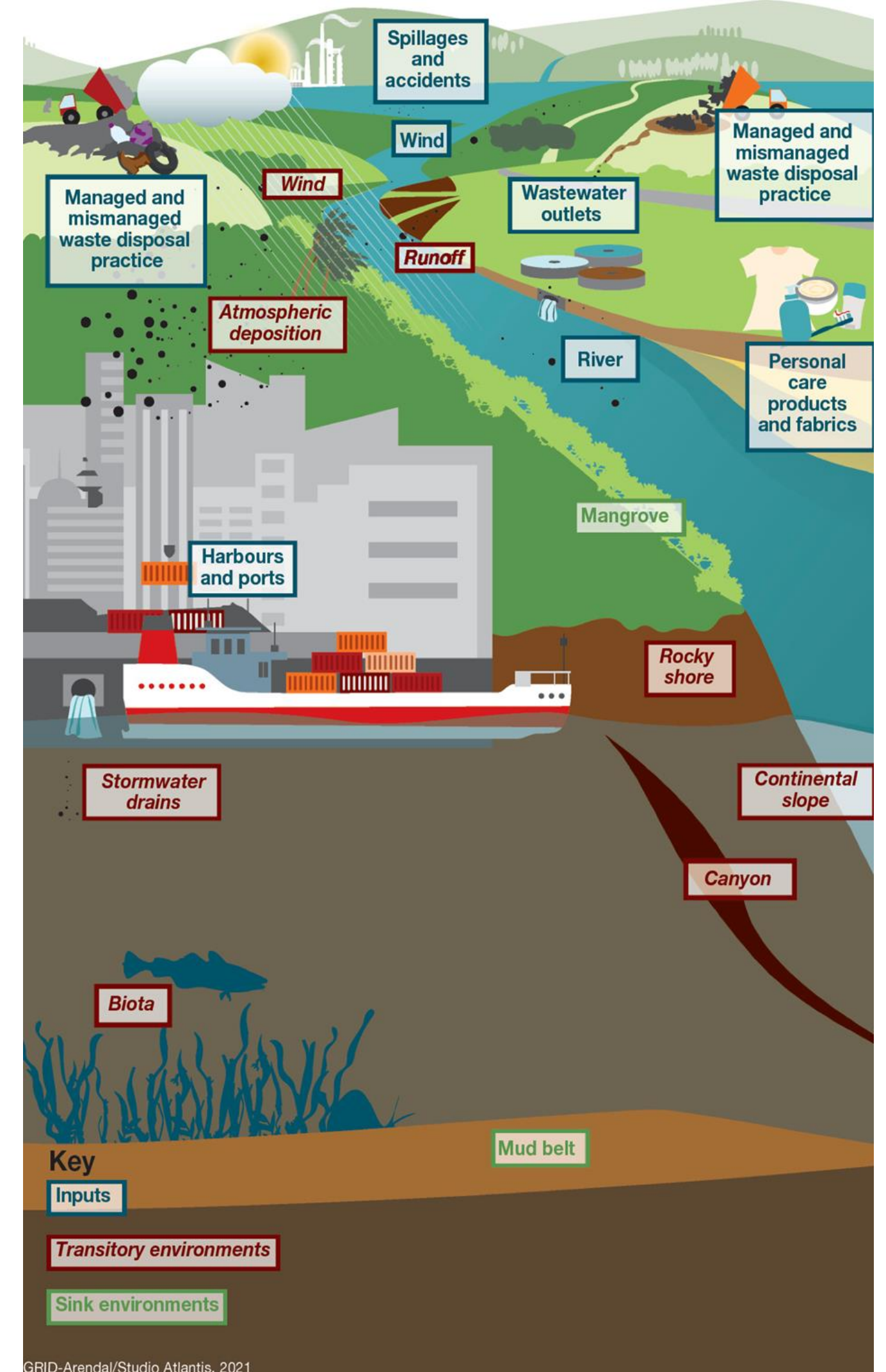
Plastics are the most common form of marine debris. They can come from a variety of land and ocean-based sources, enter the water in many ways, and impact the ocean and Great Lakes. Once in the water, plastic debris never fully biodegrades (Credit: NOAA).

Sumber Sampah Laut

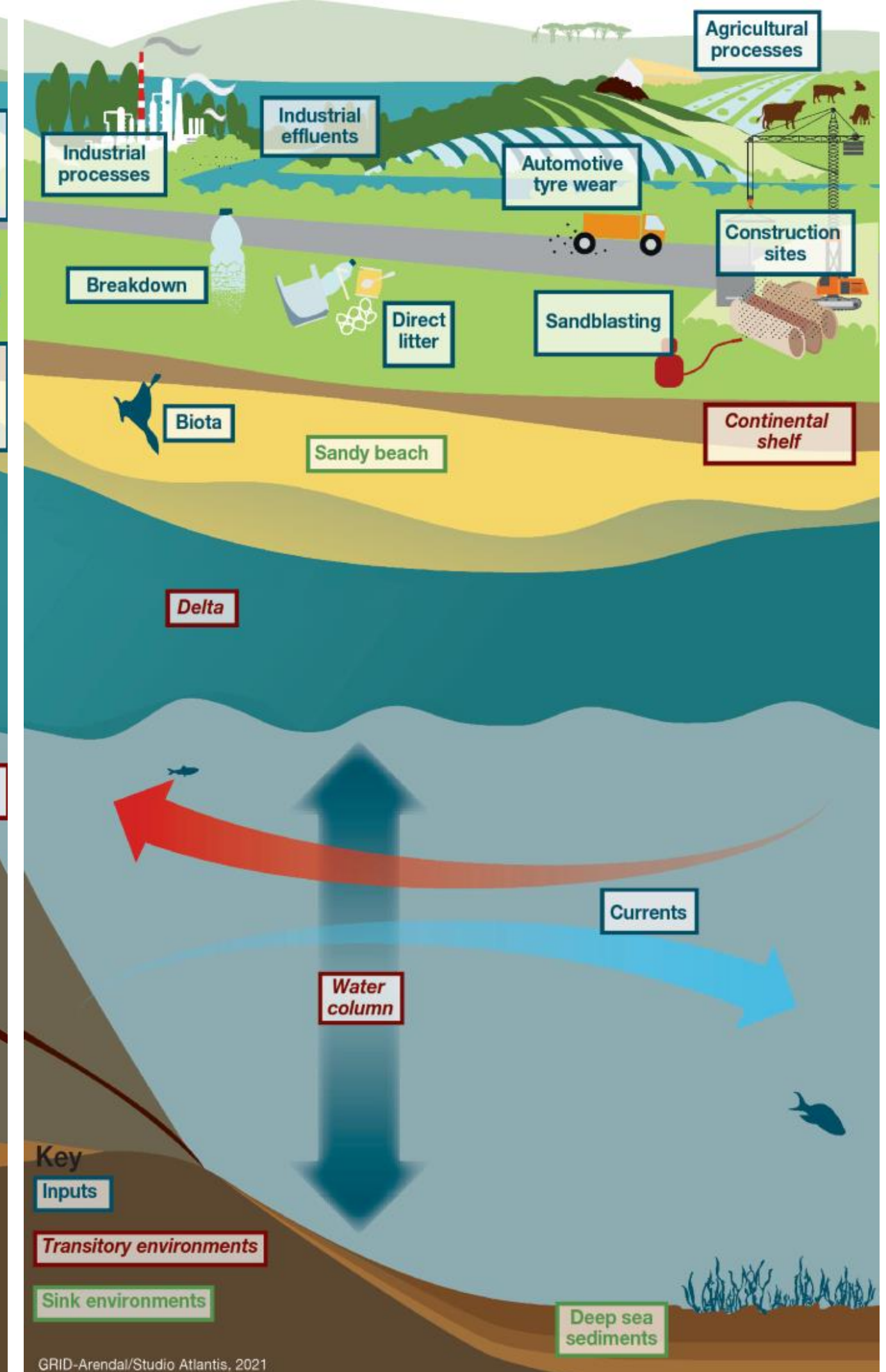
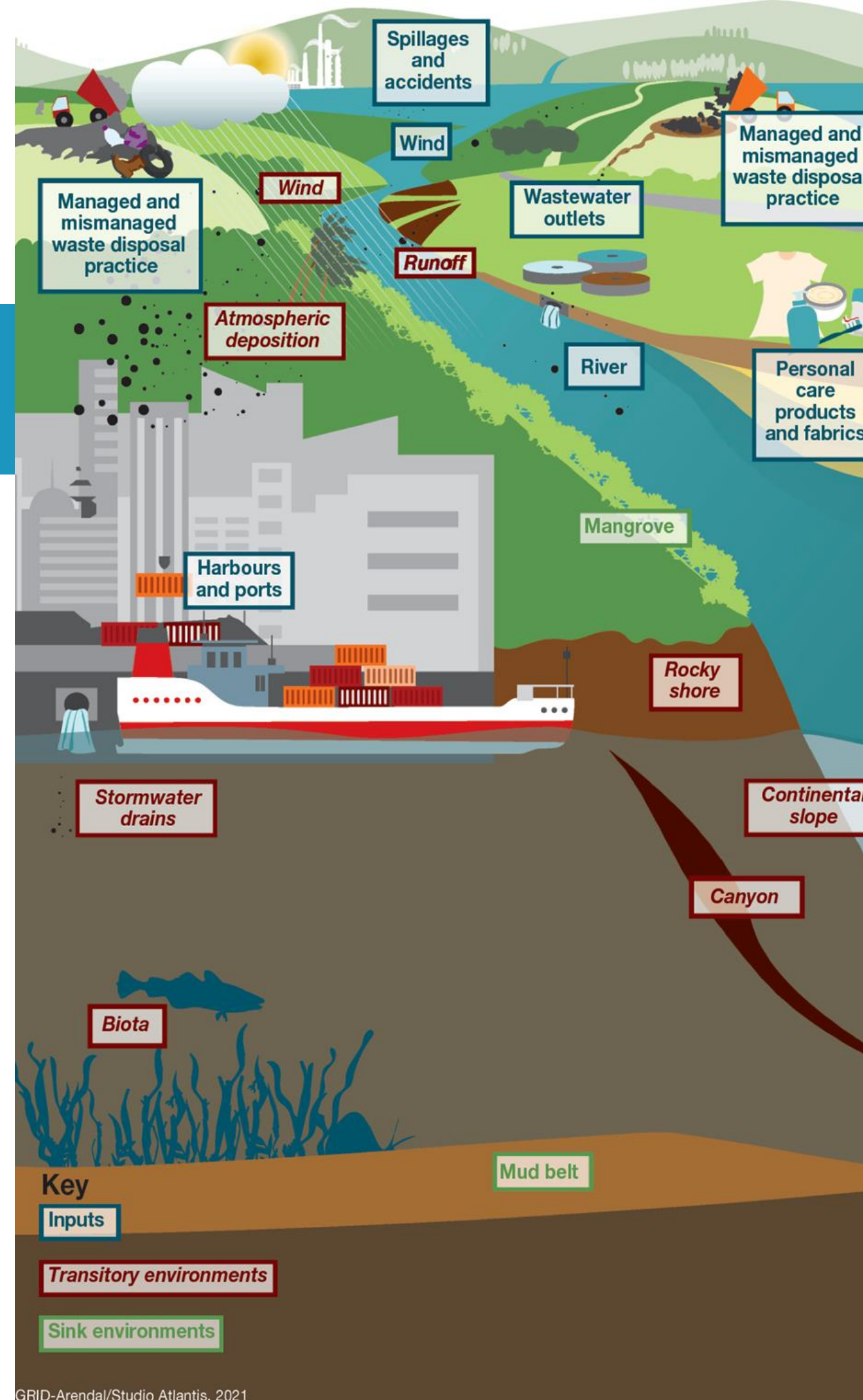
A. Sumber yang berasal dari daratan:

- Pembuangan sampah sembarangan
- Aliran permukaan dari sungai
- Pembuangan limbah dan air limbah
- Aliran limbah pertanian
- Pariwisata dan rekreasi pesisir

= manajemen limbah yang tidak memadai



Sampah laut telah menjadi perhatian global selama beberapa dekade terakhir. Memahami sumber dan jalur distribusi sampah laut sangat penting untuk pengembangan intervensi dan strategi yang terarah serta efektif. Gambar ini menunjukkan sumber, jalur, dan tempat penampungan (*sinks*) dari sampah laut, mulai dari benda berukuran makro hingga mikro, berdasarkan studi kasus di benua Afrika.

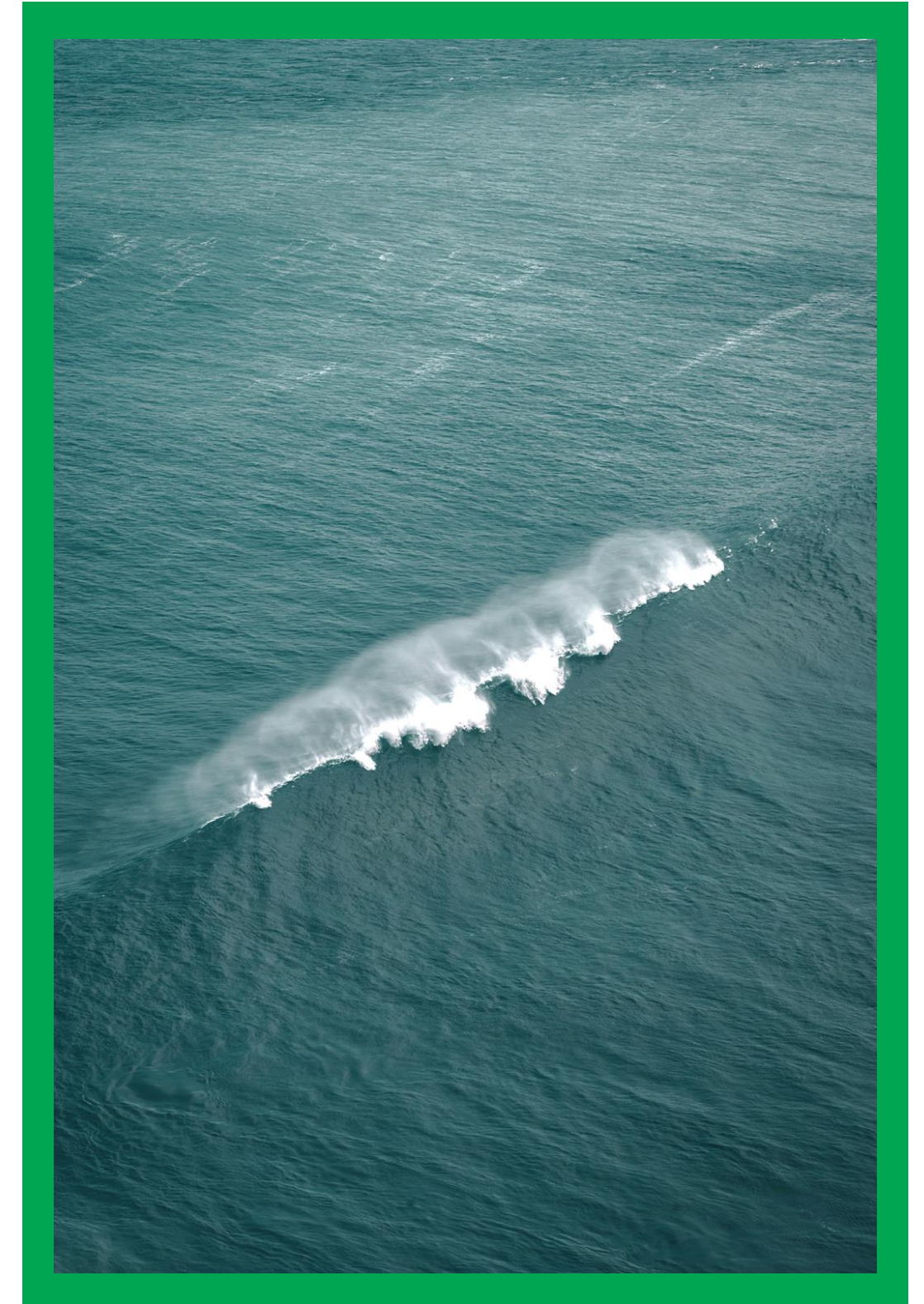


Sumber Sampah Laut

B. Sumber Berbasis Laut:

- Industri perikanan
- Sisa muatan kapal
- Kegiatan budidaya laut (akuakultur)
- Sisa dari platform lepas pantai
- Pembuangan tidak sengaja

= manajemen limbah yang tidak memadai



The pathway by which plastic enters the world's oceans

Estimates of global plastics entering the oceans from land-based sources in 2010 based on the pathway from primary production through to marine plastic inputs.

Global primary plastic production:
270 million tonnes per year

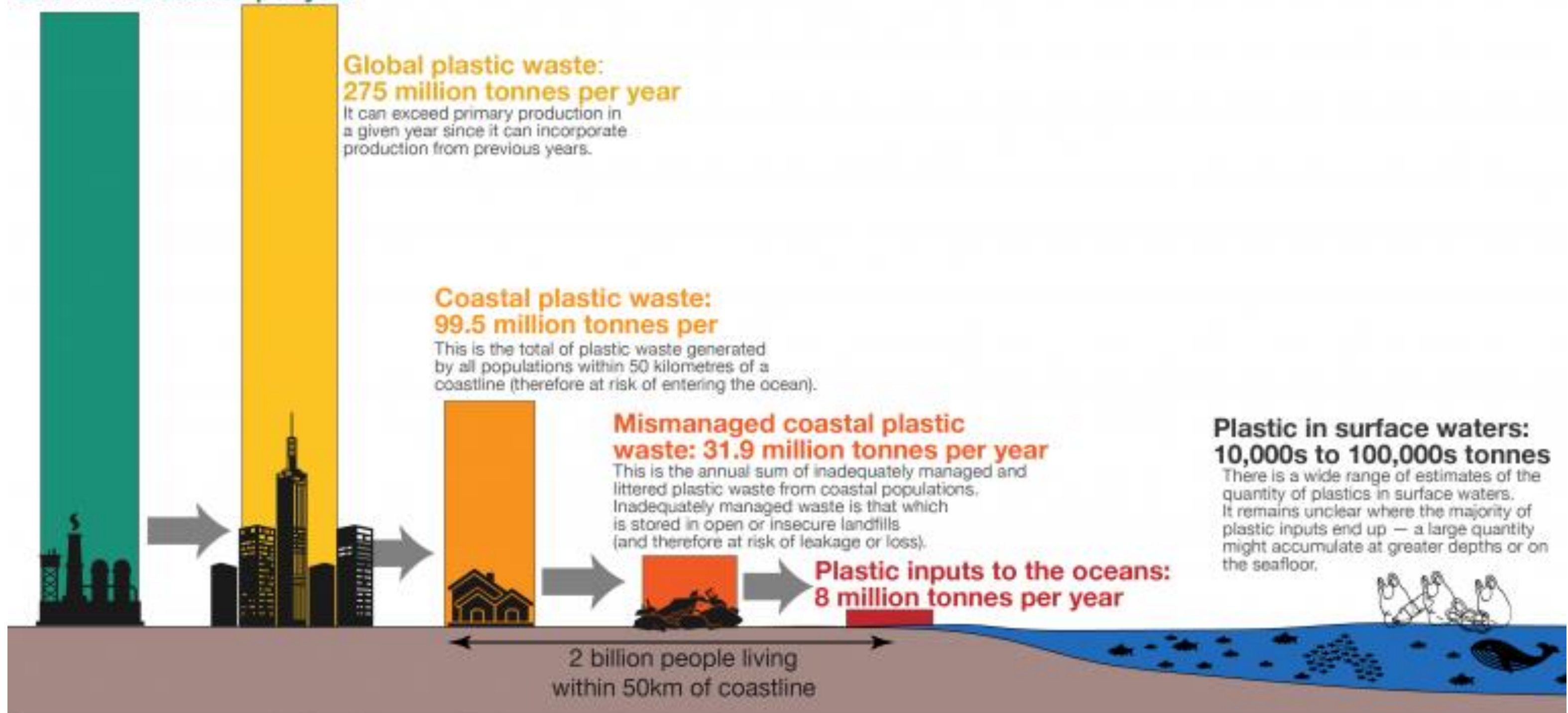
Global plastic waste:
275 million tonnes per year
It can exceed primary production in a given year since it can incorporate production from previous years.

Coastal plastic waste:
99.5 million tonnes per year
This is the total of plastic waste generated by all populations within 50 kilometres of a coastline (therefore at risk of entering the ocean).

Mismanaged coastal plastic waste:
31.9 million tonnes per year
This is the annual sum of inadequately managed and littered plastic waste from coastal populations. Inadequately managed waste is that which is stored in open or insecure landfills (and therefore at risk of leakage or loss).

Plastic inputs to the oceans:
8 million tonnes per year

Plastic in surface waters:
10,000s to 100,000s tonnes
There is a wide range of estimates of the quantity of plastics in surface waters. It remains unclear where the majority of plastic inputs end up — a large quantity might accumulate at greater depths or on the seafloor.



Source: based on Jambeck et al. (2015) and Eriksen et al. (2014). Icon graphics from Noun Project.

Data is based on global estimates from Jambeck et al. (2015) based on plastic waste generation rates, coastal population sizes, and waste management practices by country.

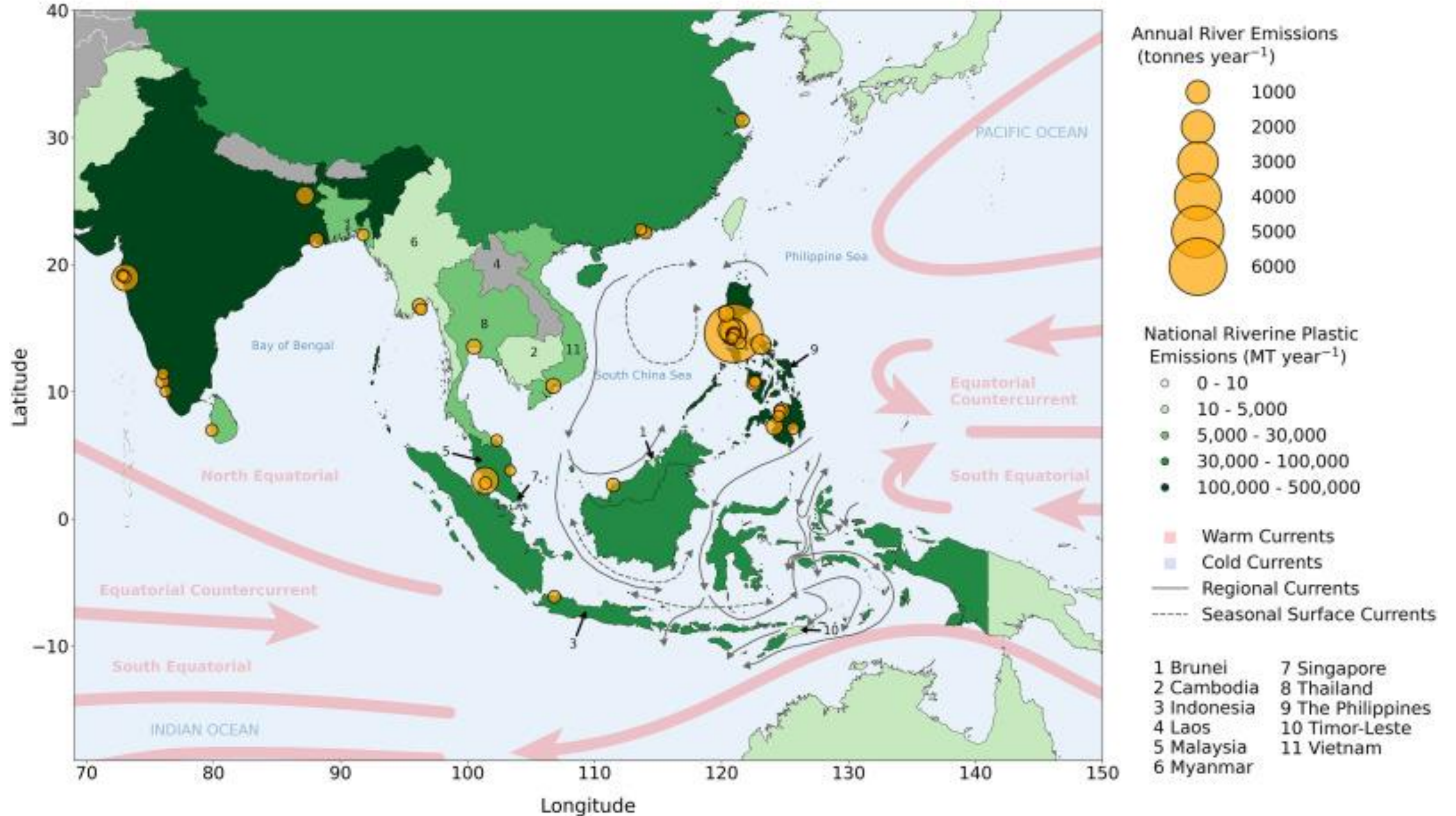
This is a visualization from OurWorldinData.org, where you will find data and research on how the world is changing.

Licensed under CC-BY-SA by the authors.



Contoh polusi plastik di Asia Tenggara:

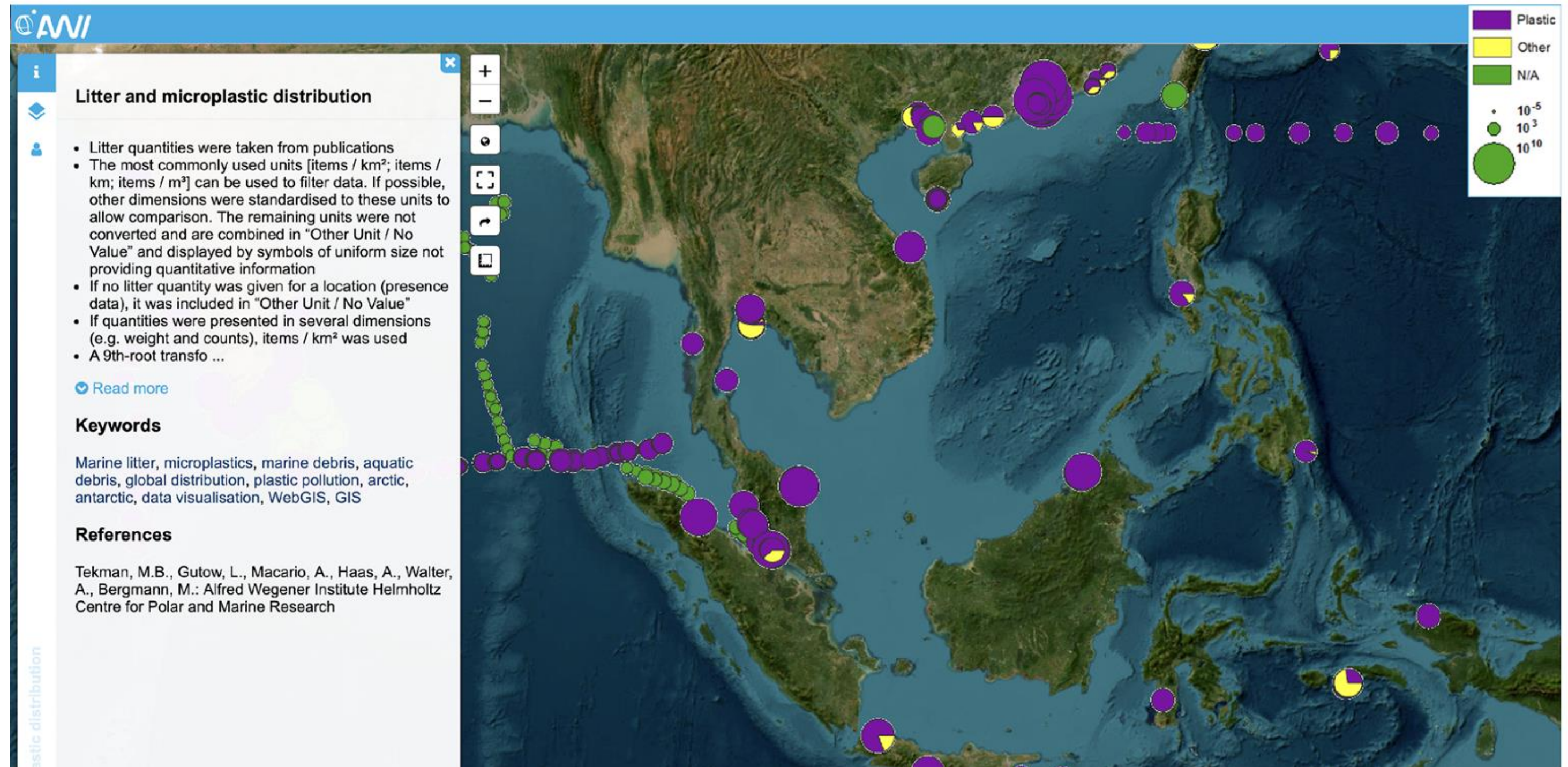
- a) Setelah hujan di bawah jembatan Sungai Ciluar, Bogor, Indonesia (sumber gambar: Muhammad Reza Cordova);
- b) Di hutan mangrove di Carmen, Cebu, Filipina (sumber gambar: Tim SEAMaP, Universitas San Carlos);
- c) Di Suaka Margasatwa Pulau Rambut, Teluk Jakarta, Indonesia (sumber gambar: Muhammad Reza Cordova);
- d) Di pantai Tanah Merah, Singapura (sumber gambar: Tai Chong Toh);
- e) Di terumbu karang di Paiton, Jawa Timur, Indonesia saat kegiatan pembersihan pesisir (sumber gambar: Ruly Istaful Khasana); dan
- f) Botol plastik di dasar laut Pulau Lazarus, Singapura (sumber gambar: Our Singapore Reef).



Peta Asia Tenggara yang menunjukkan arus laut utama di wilayah tersebut serta emisi plastik berdasarkan negara dan sungai. Peta *choropleth* menggambarkan total plastik yang dibuang ke laut (juta ton/tahun), sementara diagram sebar (berwarna oranye) menunjukkan distribusi geospasial dari emisi plastik masing-masing sungai (ton/tahun). Arus laut permukaan global yang hangat ditunjukkan dengan panah merah tebal. Arus permukaan regional dari *Indonesia Through Flow* yang memengaruhi penyebaran sampah plastik laut ditunjukkan dengan panah abu-abu tipis. Data emisi plastik bersumber dari Meijer dkk. (2021) dan Omeyer dkk. (2022).

Distribusi Sampah Laut

Distribution of litter types in different realms (1,426 publications)



Video:

<https://www.dw.com/en/online-maps-fight-environmental-destruction/video-51081278>



This diagram illustrates the lifecycle of marine plastic pollution, showing the path from discard to various impacts on marine life and ecosystems.

Plastics or fishing gears are discarded, abandoned or lost at sea.

Wind is shown as a factor influencing the movement of plastics on the surface.

Plastic Pathways:

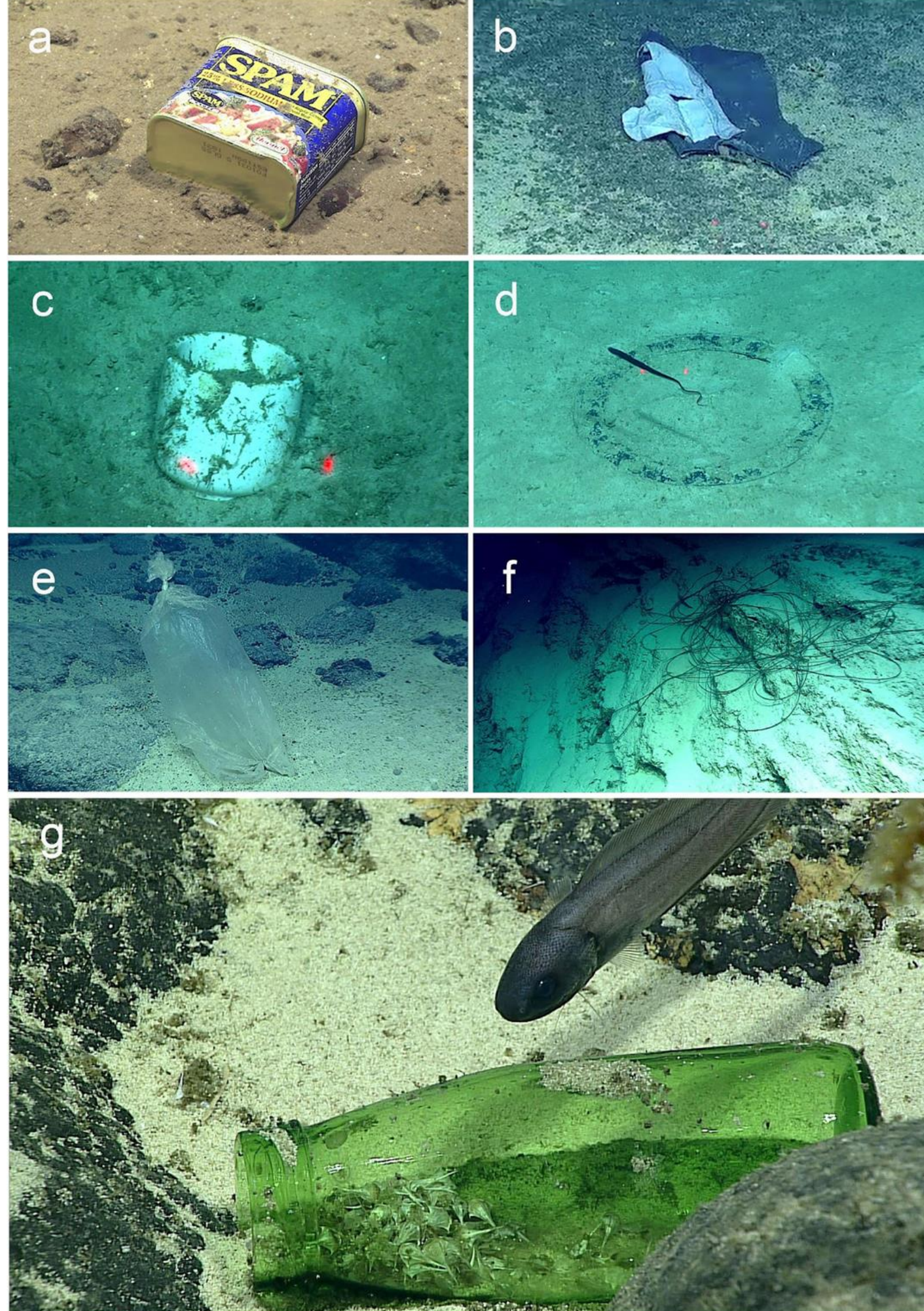
- Upwelling process:** Plastics can be brought back to the surface by ocean currents.
- Downwelling process:** Plastics sink into the water column.
- Sinking:** Plastics eventually reach the seabed.

Impacts on Marine Life and Ecosystems:

- Surface:** Plastics can be ingested by **Pelagic fish** or **Marine mammals** (e.g., dolphins).
- Water Column:** Plastics can be ingested by **Mesopelagic fish**.
- Seabed:**
 - Ghost gear entanglement:** Abandoned fishing nets can entangle **Holothurians** (sea cucumbers) and **Crustaceans**.
 - Entangled by plants** or **Stuck in rocky area or buried in the sediment**.
 - Microplastics in sediments:** Plastics break down into **Microplastics**, which can be ingested by **Annelids** (worms).
 - Resuspended microplastics:** Microplastics can be stirred up by currents, becoming available for ingestion by **Pelagic fish**.
 - Biofouling:** Plastics can be colonized by organisms, leading to **Biofouling** and **Breaking down** into smaller particles.

Other Impacts:

- Ghost nets on the reef, smothering coral and killing fish:** Abandoned nets can damage coral reefs and kill fish.



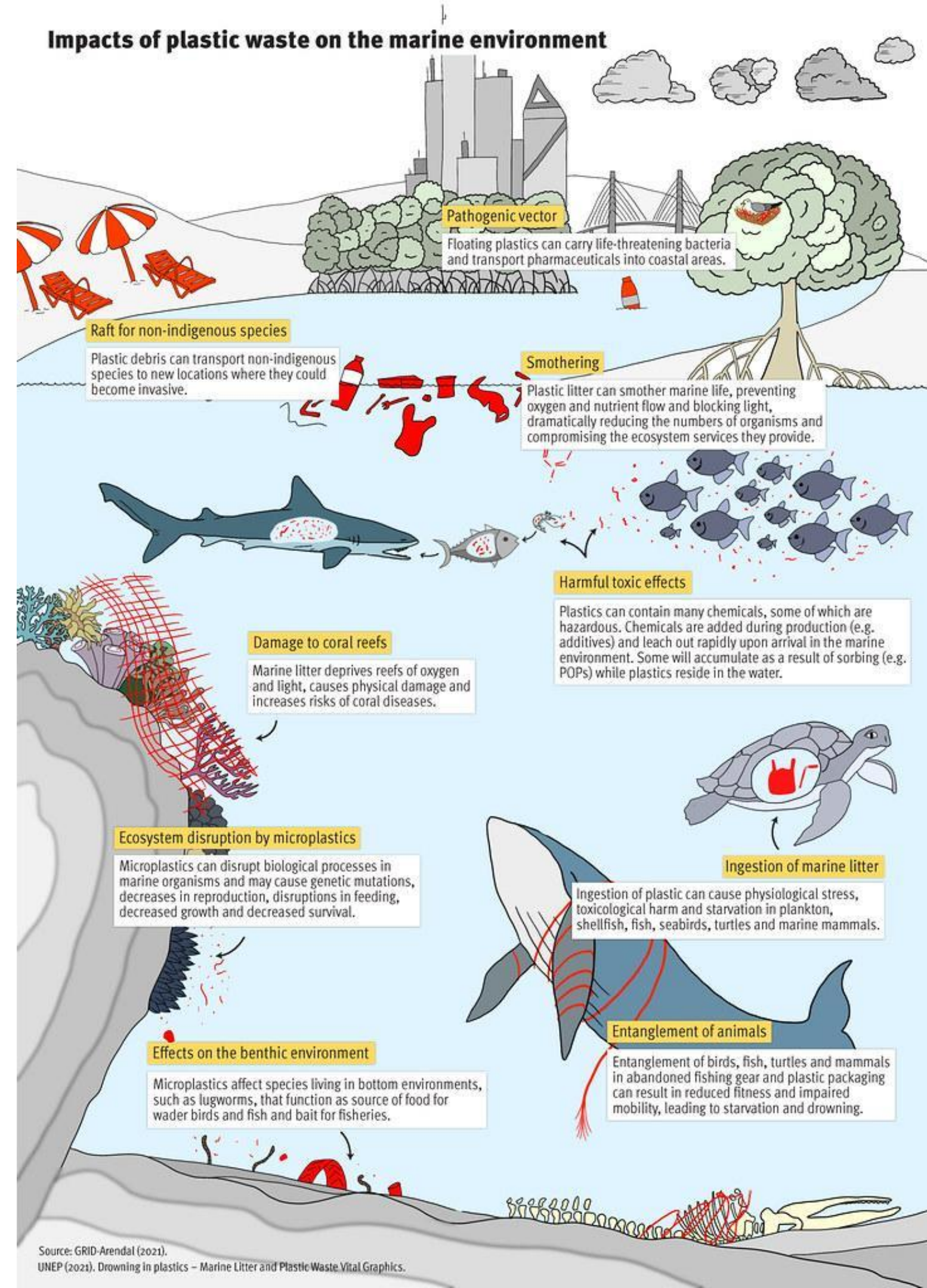
Jenis-jenis sampah laut dalam yang diamati:

- a) Sampah logam – kaleng makanan pada kedalaman 4.947 m di Sirena Canyon, lepas Kepulauan Mariana.
- b) Sampah kain – sepotong kanvas pada kedalaman 3.780 m di Enigma Seamount, lepas Kepulauan Mariana.
- c) Sampah lainnya – cangkir keramik pada kedalaman 838 m di CAIMAN/I-203, lepas Kepulauan Hawaii.
- d) Sampah karet – gasket pada kedalaman 839 m di CAIMAN/I-203, lepas Kepulauan Hawaii.
- e) Sampah plastik – kantong plastik pada kedalaman 3.767 m di Enigma Seamount, lepas Kepulauan Mariana.
- f) Sampah perikanan – tali pancing pada kedalaman 453 m di South Palmyra Slope, PRIMNM Kingman Reef dan Palmyra Atoll.
- g) Sampah kaca – botol kaca pada kedalaman 1.152 m di Titov 2, PRIMNM Howland dan Baker Unit.

Amon et al. (2020)

Dampak dari Sampah Laut

- A. Kehidupan Laut** (misalnya: tertelan oleh biota laut, terjerat, dan degradasi habitat)
- B. Ekonomi** (misalnya: perikanan, akuakultur, pelayaran, dan pariwisata)
- C. Kesehatan Manusia** (misalnya: masuk ke rantai makanan melalui konsumsi makanan laut)
- D. Lainnya** (misalnya: mengganggu layanan ekosistem dan menghambat pencapaian tujuan pembangunan berkelanjutan)



Video:

<https://www.youtube.com/watch?v=Lh6loYOoeNk&t=6s>



Refleksi



- Memahami sumber dan dampak dari sampah laut



Evaluasi

1. Apa sumber utama sampah laut secara global?

- A. Pengeboran minyak lepas pantai
- B. Kecelakaan kapal
- C. Aktivitas berbasis daratan
- D. Penambangan laut dalam

2. Manakah dari pernyataan berikut yang paling tepat menggambarkan bagaimana sampah laut tersebar di lautan?

- A. Merata di seluruh wilayah laut
- B. Terkonsentrasi hanya di wilayah pesisir
- C. Dipengaruhi oleh arus laut dan pola angin
- D. Ditemukan hanya di dekat muara sungai

3. Apa salah satu dampak ekologis utama dari sampah plastik laut terhadap organisme laut?

- A. Meningkatkan keanekaragaman hayati
- B. Mendorong pertumbuhan terumbu karang
- C. Terjerat dan tertelan yang menyebabkan cedera atau kematian
- D. Menyediakan nutrisi bagi rantai makanan



Evaluasi

1. Manakah dari berikut ini yang **BUKAN** merupakan jenis sampah laut yang umum?
 - A. Botol plastik
 - B. Alat tangkap ikan
 - C. Kaleng aluminium
 - D. Batu lava
2. Bagaimana polusi mikroplastik memengaruhi rantai makanan laut?
 - A. Mendorong pertumbuhan ikan
 - B. Meningkatkan kadar oksigen dalam air
 - C. Tertelan oleh organisme laut dan berpotensi terakumulasi dalam rantai makanan
 - D. Larut secara aman di air laut



Bacaan Lanjutan

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Terima Kasih

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