Erasmus+ CBHE ***Marine Coastal and Delta Sustainability for Southeast Asia***

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LECTURE

CONTROL OF MARINE POLLUTION

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Lecture 1

MARINE ENVIRONMENTAL ISSUES

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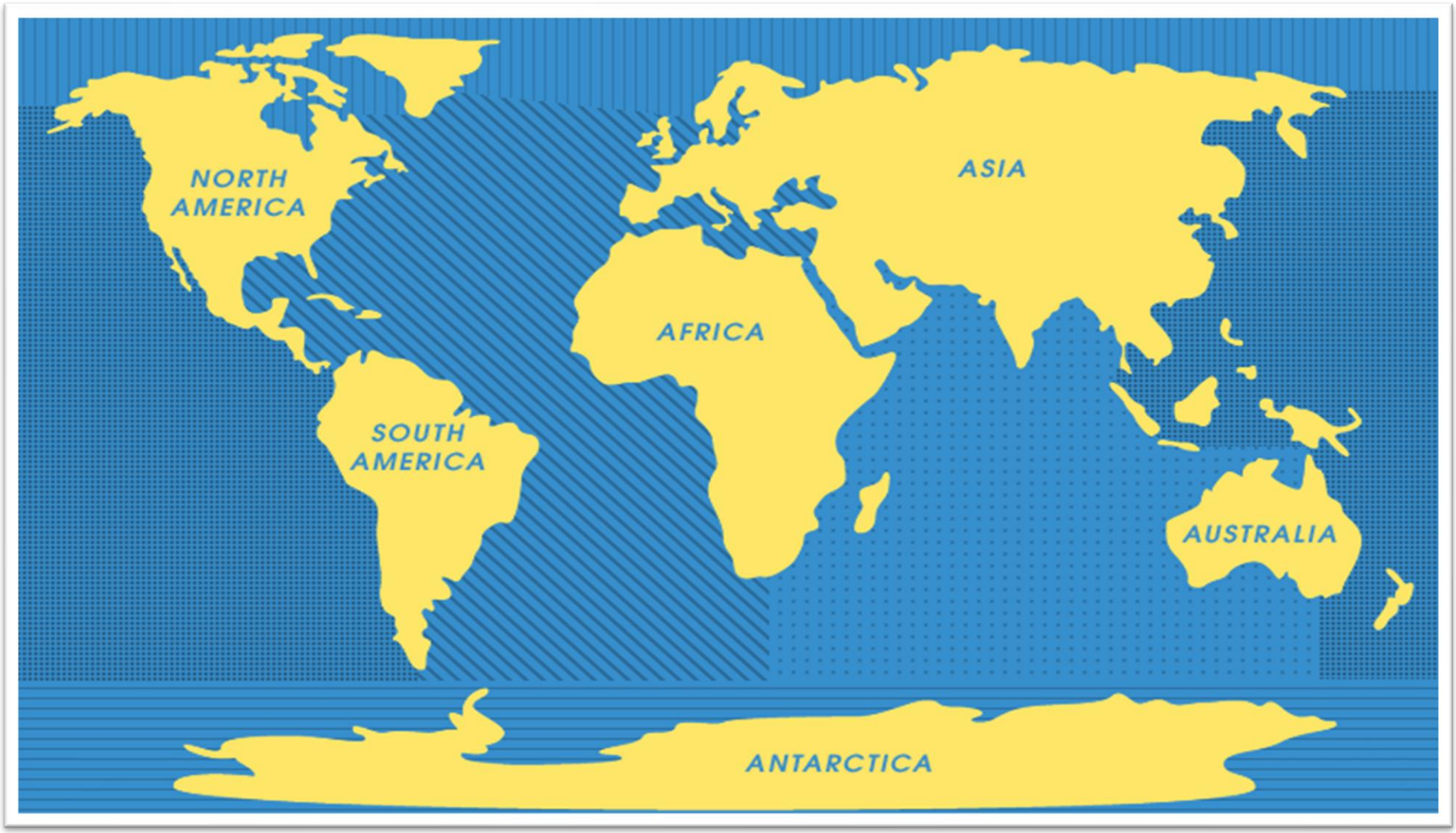
Video 1

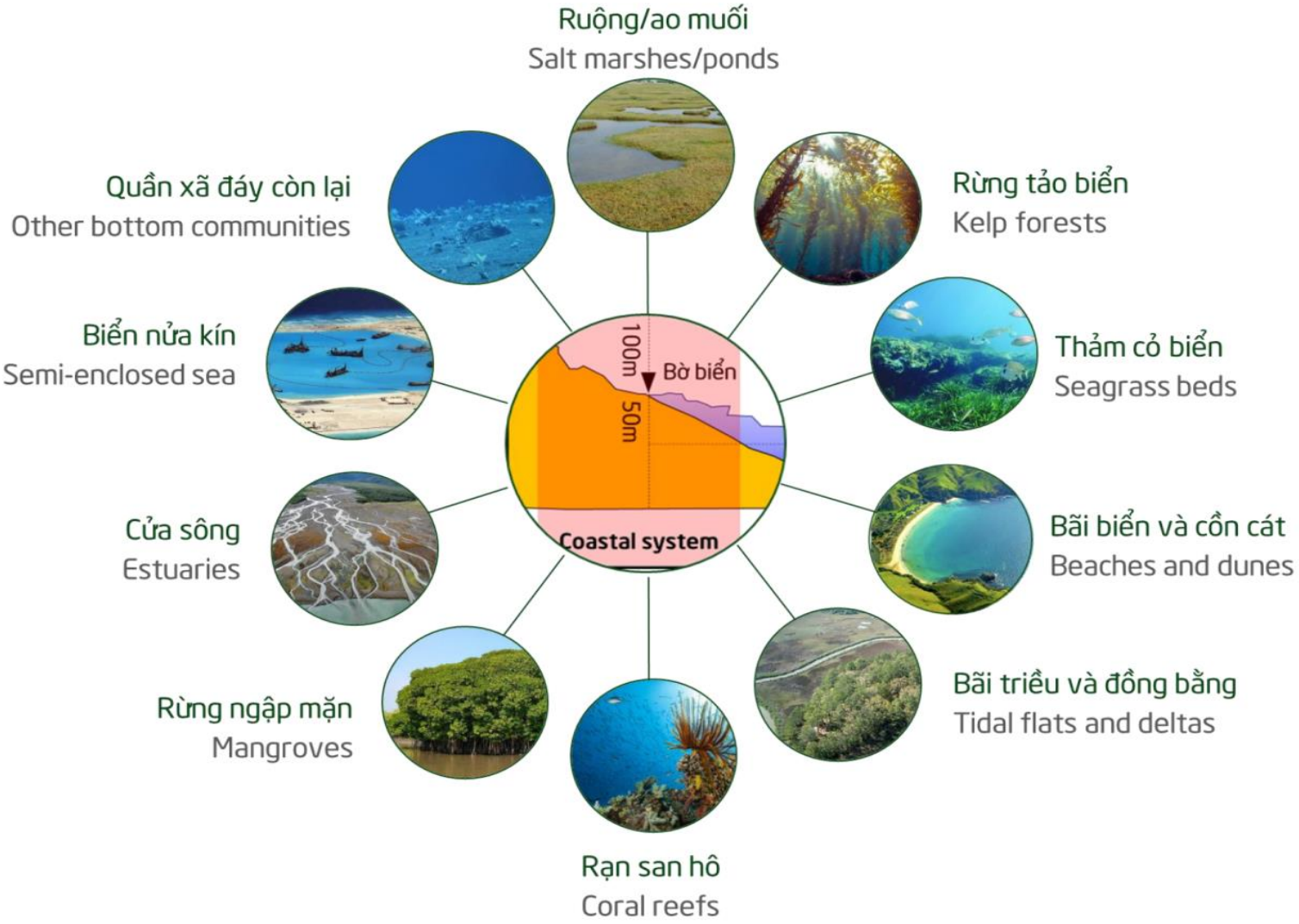


Nguồn: Marine pollution, 1st theme of the 2017 #OurOcean conference

NATURAL CONDITIONS AND MARINE ENVIRONMENT

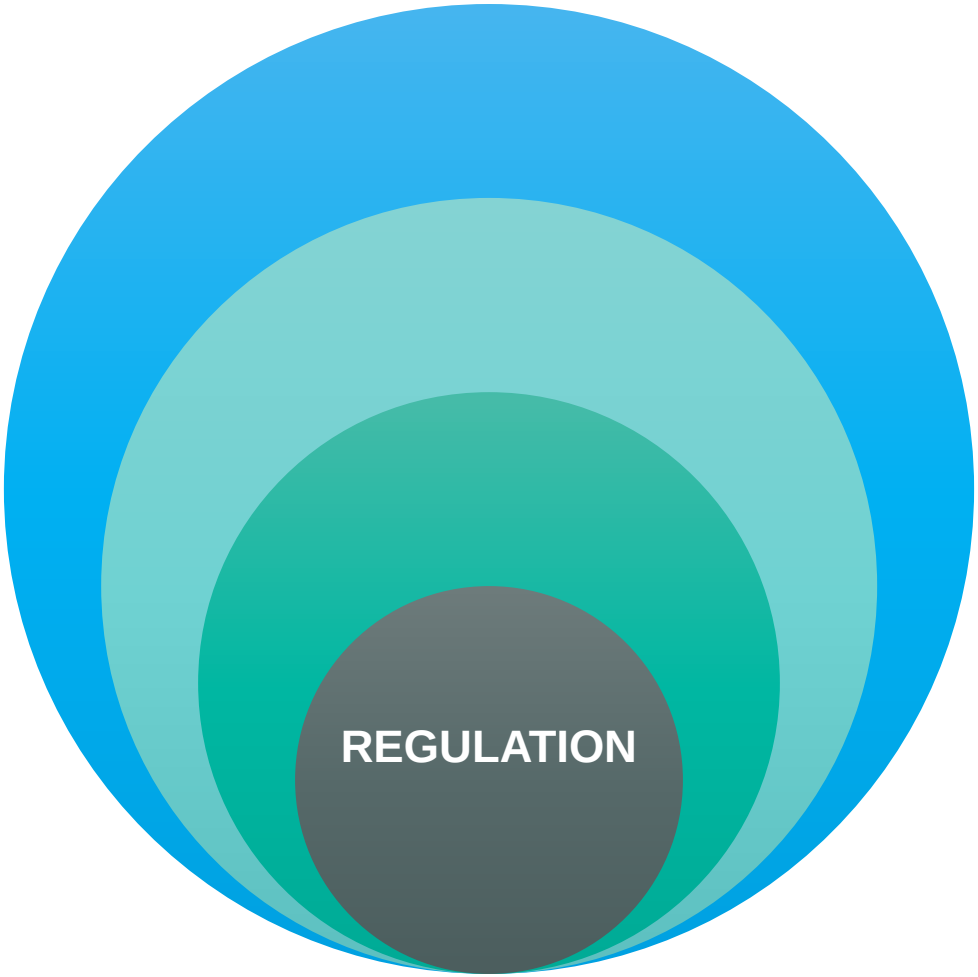
- The ocean covers about 71% of the Earth's surface.
- They play an important role in the chemical and biological balance of life on Earth.
- They are critical to our food, trade and transportation security.
- Ensuring the comforts for people (travel, sports, rest)

COASTAL ECOSYSTEMS



(Soure: UNEP, 2006)

FUNCTION OF COASTAL ECOSYSTEMS



Source: De Groot, Wilson và Boumans (2002)

FUNCTION OF THE COASTAL ECOSYSTEM

Function	Service
Regulating function	**Maintain essential ecological processes and life support systems**
1. Air conditioning	1.1. Prevent UVB radiation by O_3 1.2. Stabilize air quality 1.3. Influence on microclimate 1.4. Maintain atmospheric chemical balance
2. Climate control	2.1 Maintain favorable climatic conditions (such as temperature, precipitation, gas cycle) for living, health and production
3. Prevent turbulence	3.1. Prevent storms, waves (eg coral reefs, mangroves, casuarina forests, ...) 3.2 Flood prevention (e.g. wetlands, mangroves)
4. Water regulation	4.1. Regulating the hydrological regime through currents and tides 4.2. Environment for transport
5. Water supply	5.1. Supply water to the users
6. Sediment stabilization (water retention)	6.1. Water purification (increasing water clarity) 6.2. Prevent erosion
7. Erosion, accretion (soil formation)	7.1. Increasing coastal accretion
8. Nutrition Cycle/Regulation	8.1. Maintain nutrients and health for ecosystems
9. Waste treatment	9.1. Pollution control 9.2. Detoxify
10. Biological control	10.1. Control insects and diseases 10.2. Biodiversity control

(Source: De Groot, Wilson and Boumans, 2002)

FUNCTION OF THE COASTAL ECOSYSTEM

Habitat function	Provide habitat (suitable living space) for wildlife
11. Residual function (Refugium)	11.1. Maintain biodiversity and genetic resources (foundation for other functions)
12. Incubator function (Nursery)	12.1. Nurture and create habitat for native and cultivated species. 12.2. Maintain commercial efficiency for cultivated species

(Source: De Groot, Wilson and Boumans, 2002)

FUNCTION OF THE COASTAL ECOSYSTEM

Production function	Provide all kinds of natural resources
13. Food	13.1. Caught seafood 13.2. Seafood Aquaculture
14. Raw materials	14.1. Raw materials for construction and civil production 14.2. Renewable energy sources (eg tidal, wave, wind, geothermal, solar, bioenergy) 14.3. Fertilizers and other organic substances
15. Gene source	15.1. Applications in medical and other fields
16. Medicinal herbs	16.1. Medicines and pharmaceuticals 16.2. Chemistry 16.3. Experimental creature
17. Jewelry	17.1. Resources for religion, spirituality, fashion, handicrafts, decor and souvenirs

(Source: De Groot, Wilson and Boumans, 2002)

FUNCTION OF THE COASTAL ECOSYSTEM

Information function	Provide opportunities to develop awareness
18. Cosmetology	18.1. Enjoy the scenery (e.g. seascape, seashore, cliffs, etc.)
19. Entertainment	19.1. Eco-tourism, outdoor activities (boating, kayaking, fishing, wildlife watching, beach sports, recreation, ...)
20. Culture and art	20.1. Use coastal elements as symbols or artistic inspiration
21. Spiritual history	21.1. Use of coastal elements for spiritual or historical purposes (eg Heritage value)
22. Science of Education	22.1. Using natural ingredients of the coastal zone for teaching purposes 22.2. Using natural components of the coastal zone for scientific research purposes

(Source: De Groot, Wilson and Boumans, 2002)

FUNCTION OF COASTAL ECOSYSTEMS

marine and coastal ecosystems in Vietnam

8 million poor people depend on ecosystems and 20 million people are indirectly affected by these services

Marine and coastal ecosystems in Vietnam provide many economic benefits (food, income, employment) and many community values (visits, entertainment, culture) for human life, through through important services and functions such as regulation, provision of food, culture and support

	mangrove forest	tidal flats, bays and coastal lagoons	seagrass	Coral reef
Diverse marine ecosystems	**155.000**ha	**800.000**ha	**~16.000** ha	**~1.300**km²
value of products and services of some marine ecosystems	provide seafood production	provide seafood production	provide seafood production	provide seafood production
	450 kg /km²	**> 2.000** USD /ha	**> 1.250** USD /ha	**10.000** USD /km²

Nguồn: TTXVN

http:// infographics.vn

THE BASIC CONCEPTS

The marine environment - including the oceans and all seas and adjacent coastal areas - forms an integrated whole that is an essential component of the global life-support system and a positive asset that presents opportunities for sustainable development. – (Agenda 21)



THE BASIC CONCEPTS

Ti* **on of the marine*** and island environment is the possibility of po ge to people, property, resources, living conditions and socio-ec caused by pollution of the marine and island environment.

O* ***emicals*** at marine means the discharge of oil, toxic chemicals fr age, transportation or from works, equipment and oil fields to the se l incidents, natural disasters, accidents or human-caused.

THE BASIC CONCEPTS

M… **esis of natural resources, marine and island environment** is a systematic m… natural resources, marine and island environment, factors affecting natural re… island environment in order to provide information and assess the current state of … evelopments, marine and island environment and forecasts and warnings of ac… sources, marine and island environments.

D… is the intentional sinking or disposal into the sea of materials and su… unk in the sea in accordance with this Law.

BASIC CONCEPTS

Marine pollution is…

is n by man, directly or indirectly, of substances or energy into the marine environment, inc h results or is likely to result in such deleterious effects as harm to living resources an to human health, hindrance to marine activities, including fishing and other legitimate us ent of quality for use of sea water and reduction of amenities; (Joint Group of Experts on of Marine Pollution – GESAMP, 1981)

is t nsforming and disturbing the chemical components of seawater caused by activities at (oil spreads into seawater when oil tankers are wrecked or cargo ships, passenger shi s ...), oil extraction (oil leakage from drilling rigs, oil pipelines, refineries, etc.), or due to sing from the mainland (toxic radioactive wastes dumped into the sea by inc sing ships ...) affect the lives of marine species and adversely affect the growth, Th ed Nations Convention on the Law of the Sea 1982, Article 1, Clause 4)

SOURCES OF MARINE ENVIRONMENTAL POLLUTION

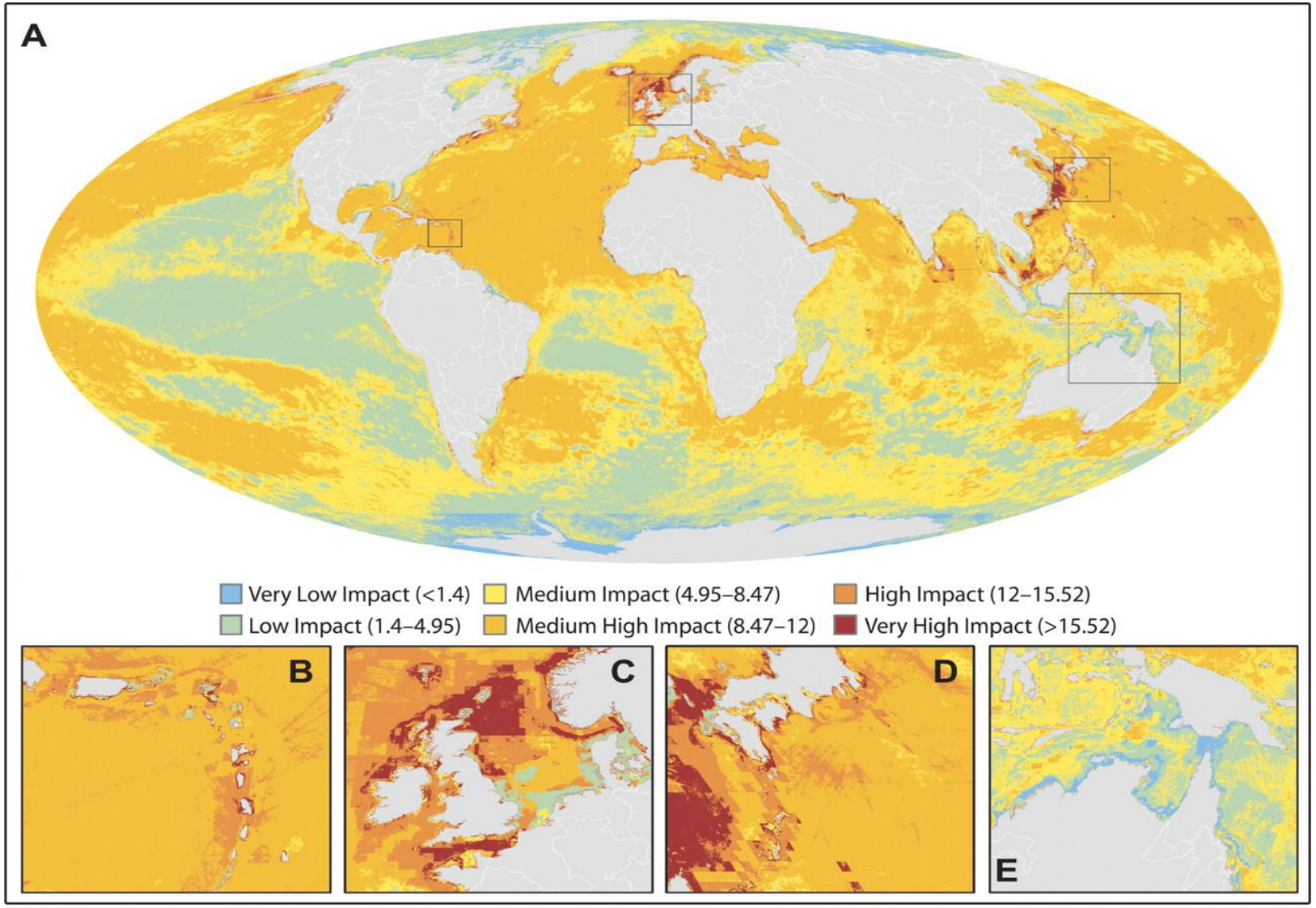
According to the 1982 United Nations Convention on the Law of the Sea, marine environmental pollution consists of the following six main sources:

- Land-based
- Activities related to the seabed
- Sinking hazardous waste and other substances
- Ship
- Atmosphere

THE BASIC CONCEPTS

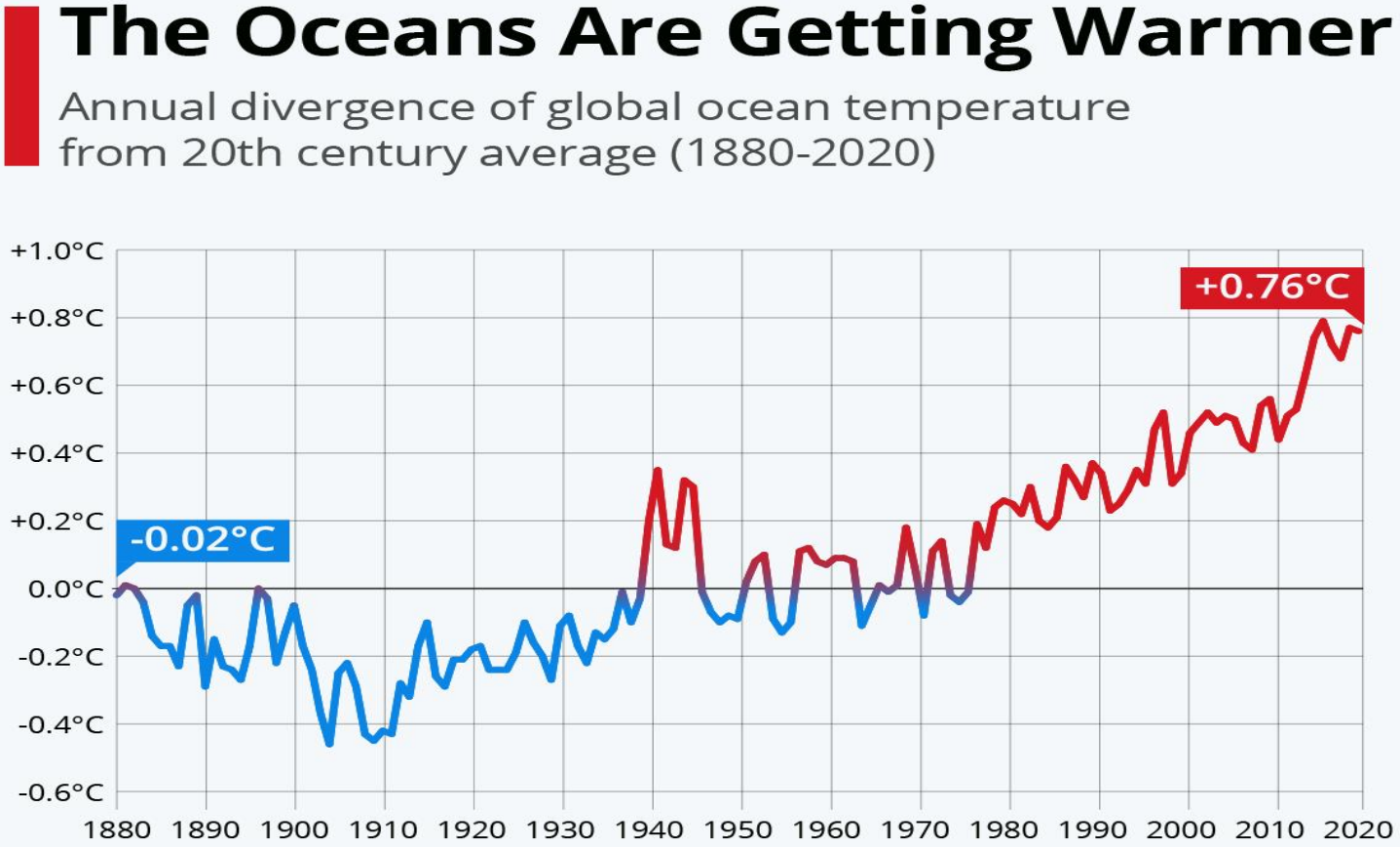
Marine pollution control – involving methods to prevent and minimize the negative impact of human and natural activities on the marine environment, pollution and degradation of the marine environment.

HUMAN IMPACT ON THE MARINE ENVIRONMENT



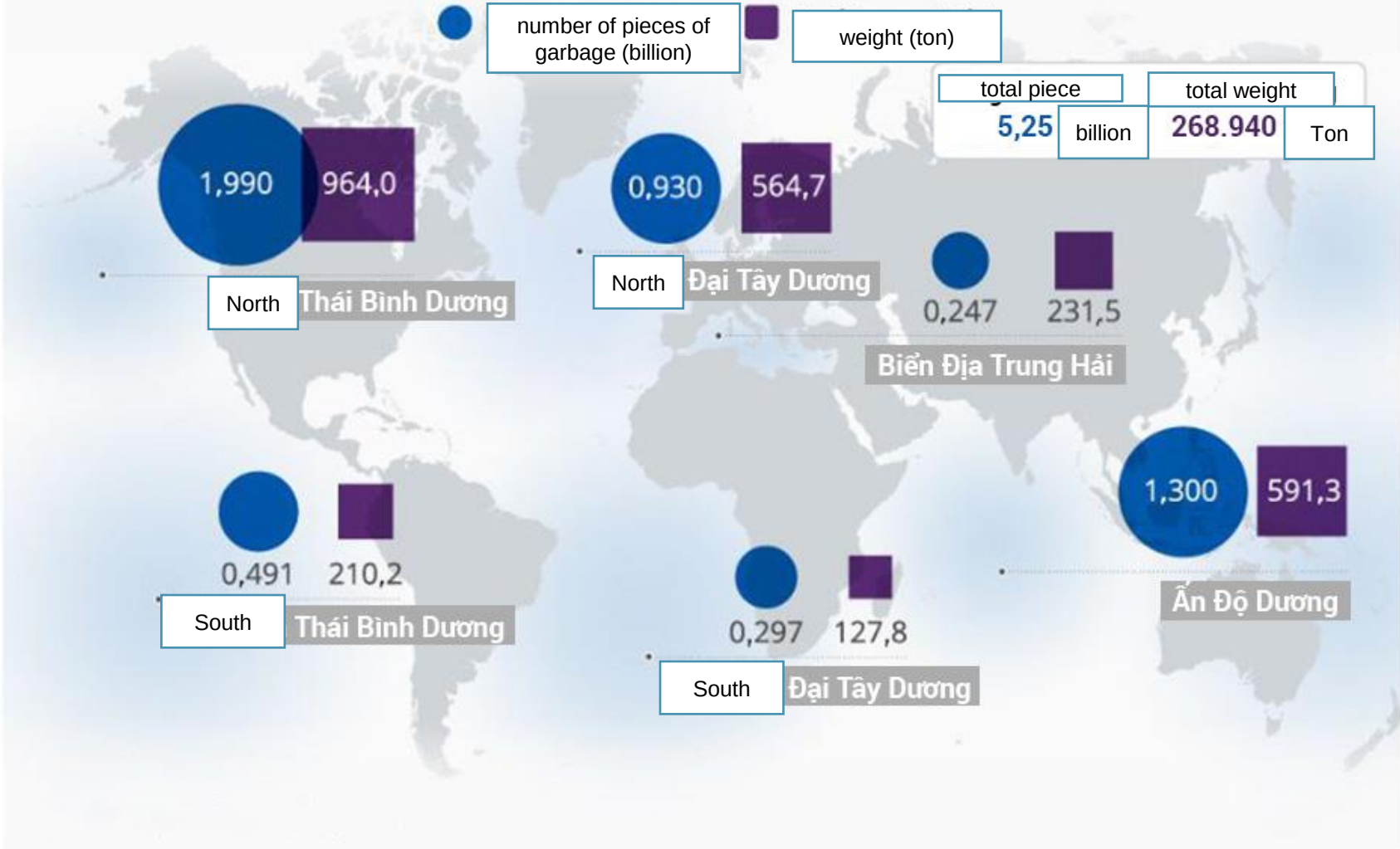
Source: National Center for Ecological Analysis and Synthesis, 2015)

THE EFFECT OF CLIMATE CHANGE



MARINE POLLUTION

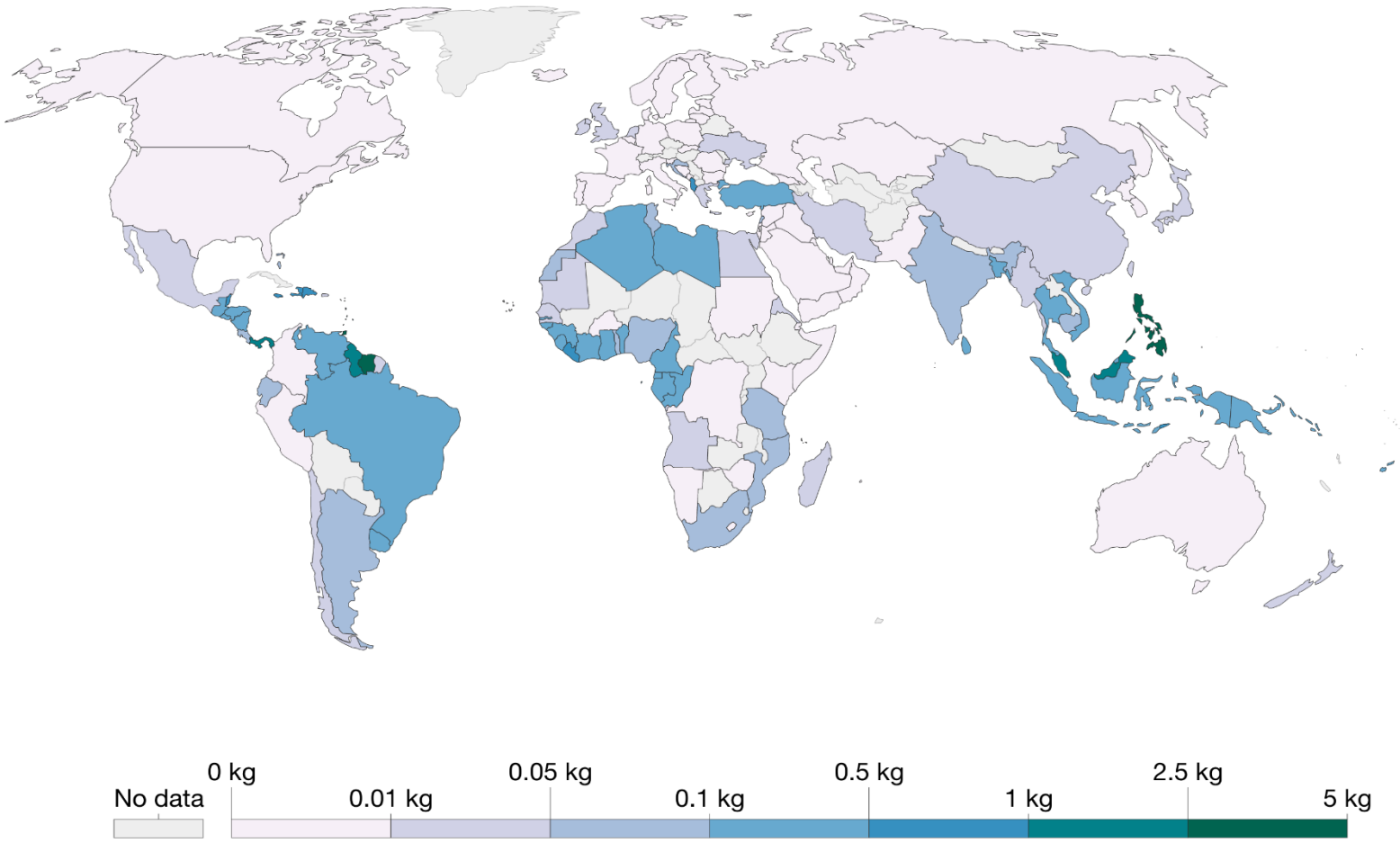
The world's oceans are overflowing with plastic waste (according to the number of pieces and the total weight of floating garbage on the sea surface)



MARINE POLLUTION

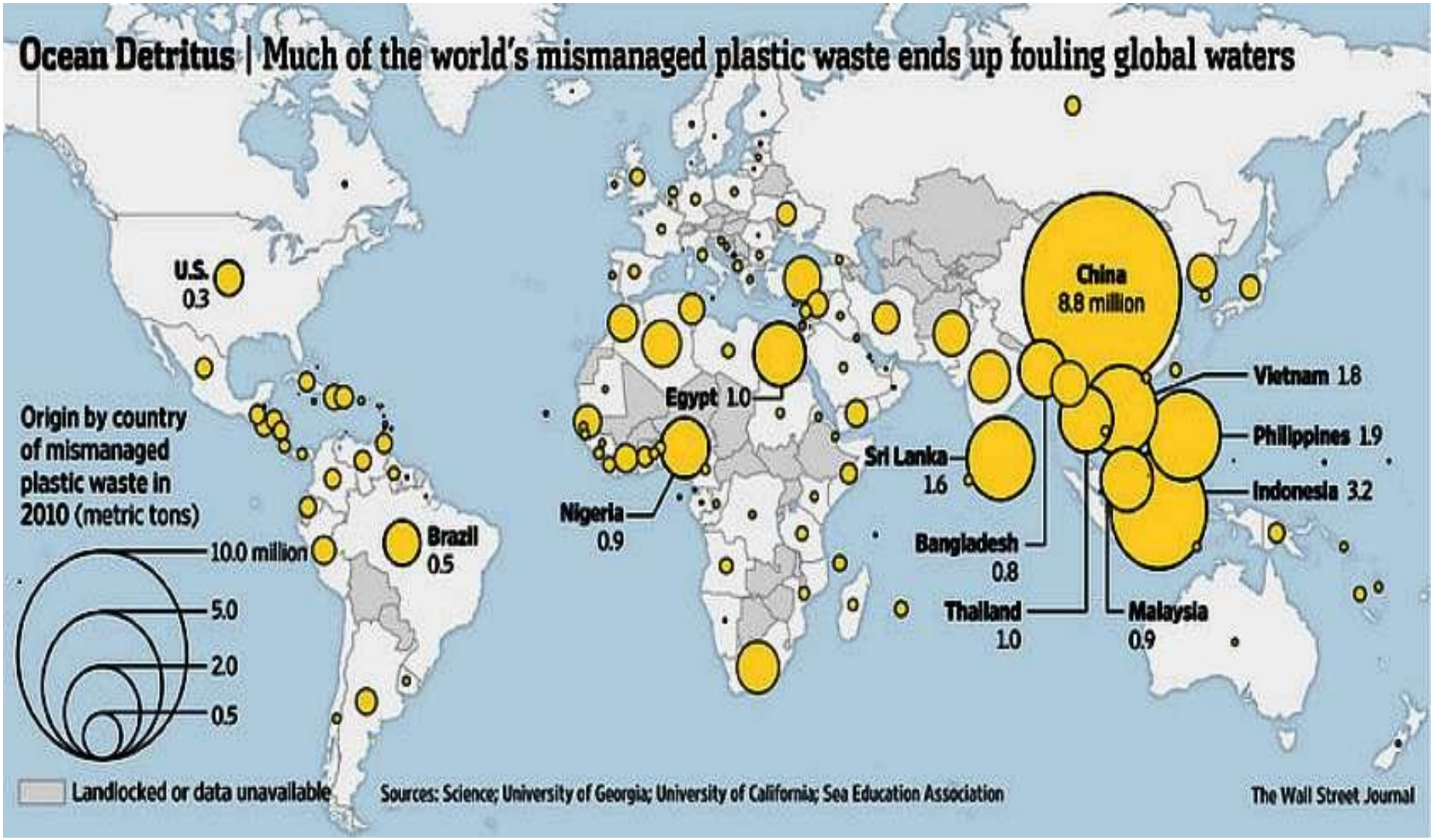
Plastic waste emitted to the ocean per capita, 2019

Our World in Data



Source: Meijer et al. (2021). More than 1000 rivers account for 80% of global riverine plastic emissions into the ocean. Science Advances.

MARINE POLLUTION

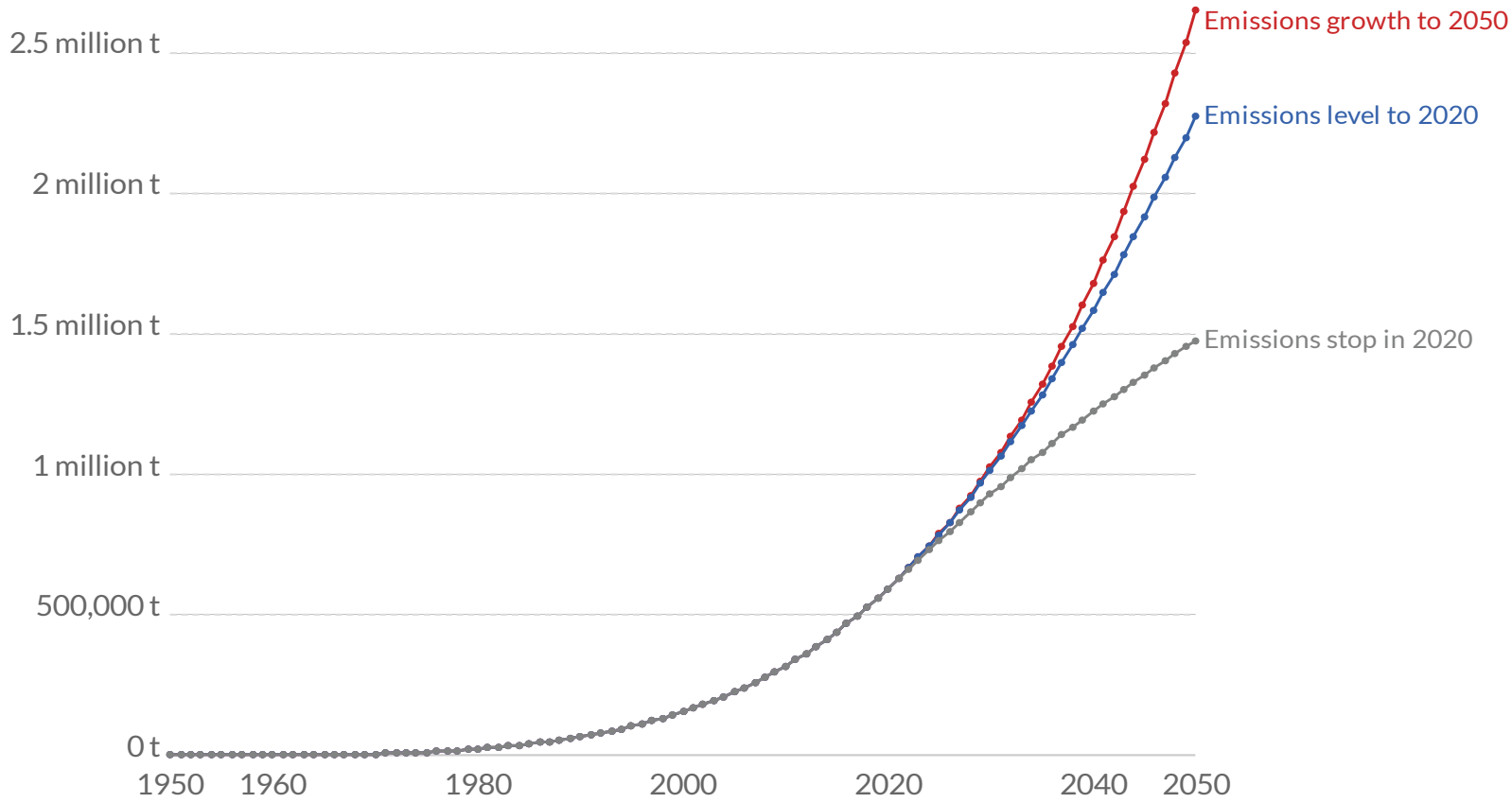


MARINE POLLUTION

Microplastics in the surface ocean

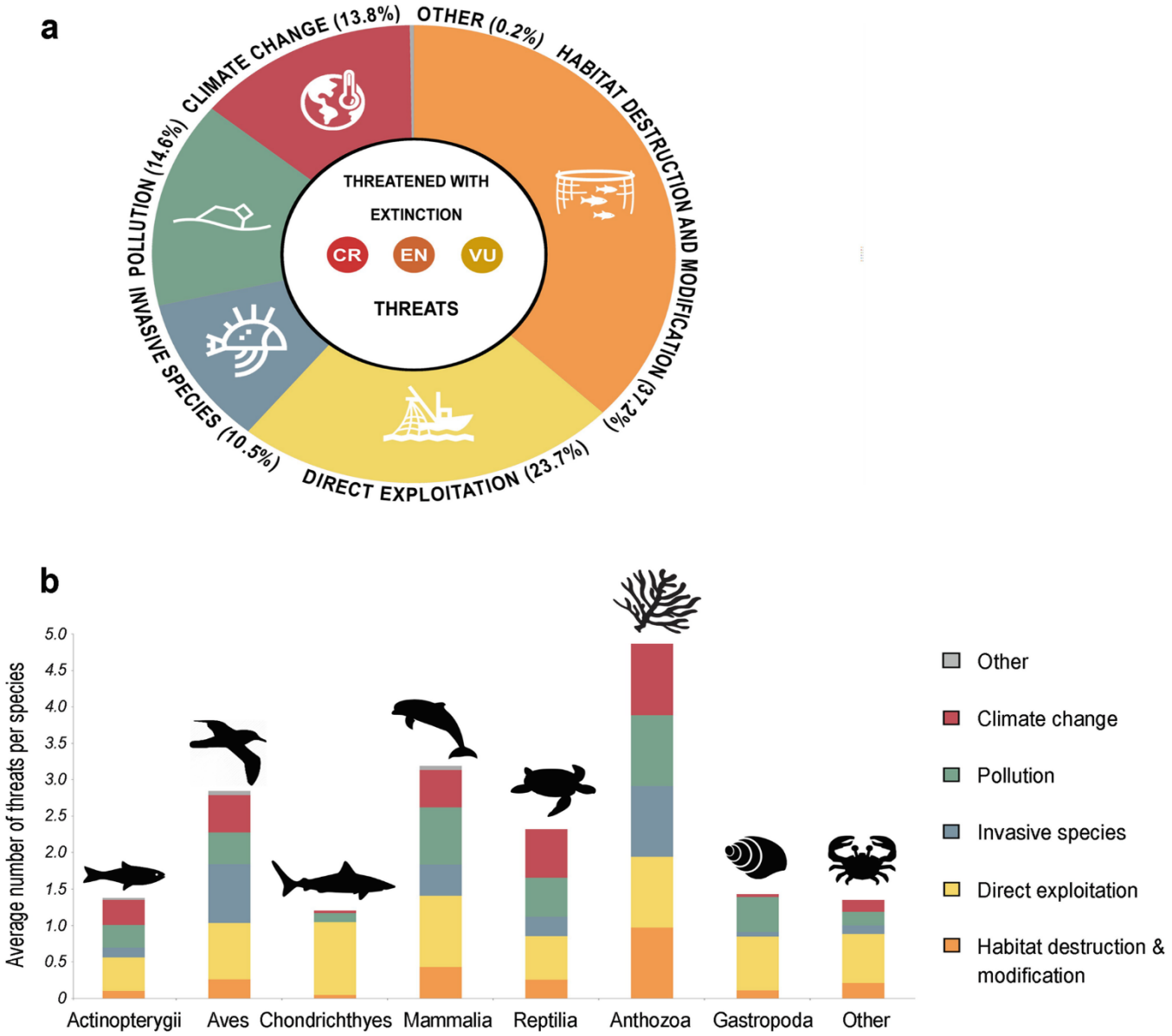
Our World in Data

Microplastics are buoyant plastic materials smaller than 0.5 centimeters in diameter. Future global accumulation in the surface ocean is shown under three plastic emissions scenarios: (1) emissions to the oceans stop in 2020; (2) they stagnate at 2020 emission rates; or (3) continue to grow until 2050 in line with historical plastic production rates.



Source: Lebreton et al. (2019). A global mass budget for positively buoyant macroplastic debris in the ocean.

BIODIVERSITY DECLINE



(Source: Luypaert T., Hagan J.G., McCarthy M.L., Poti M. (2020) Status of Marine Biodiversity in the Anthropocene. In: Jungblut S., Liebich V., Bode-Dalby M. (eds) YOUMARES 9 - The Oceans: Our Research, Our Future. Springer, Cham.

ASSIGNMENT

[1] Describe of the importance of the marine environment?

[2] How many coastal ecosystems are there?

[3] Presentation of the function of coastal ecosystem?

[4] Presenting the state of the marine environment?

[5] Why do we need to control marine pollution?