HCMC UNIVERSITY OF NATURAL RESOURCES AND ENVIRONMENT
FACULTY OF MARINE RESOURCE MANAGEMENT

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MARINE RESOURCES AND ENVIRONMENT MANAGEMENT

Topic 3 - THE EFFECTS OF NATURAL RESOURCES EXPLOITATION ON THE MARINE ENVIRONMENT

3.1. Marine pollution

MATERIALS

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CONTENTS

1. Causes of marine and ocean pollution

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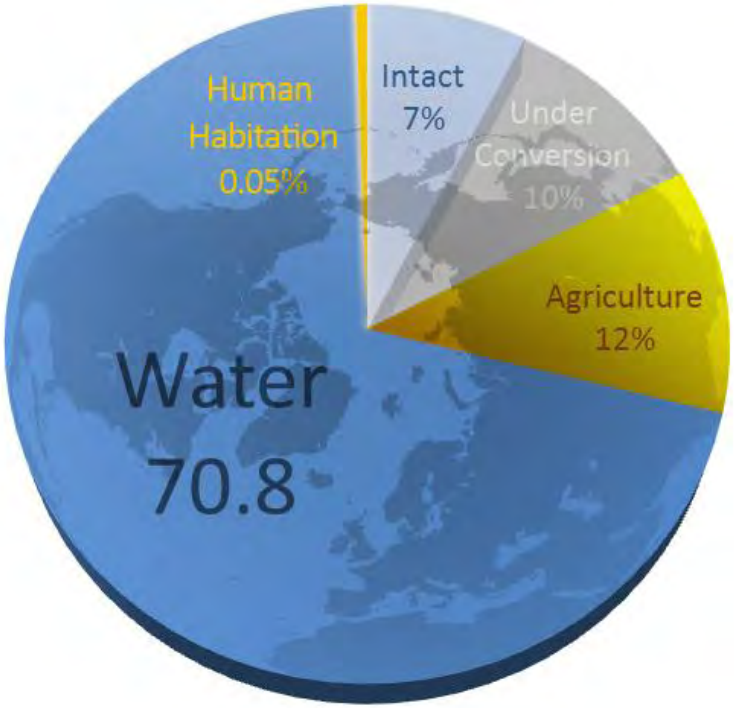
- About **71%** of the Earth's area – **326.000.000 km²** is ocean. The total length of the Earth's coastline is up to **504.000 km, 12 times** longer than the equator



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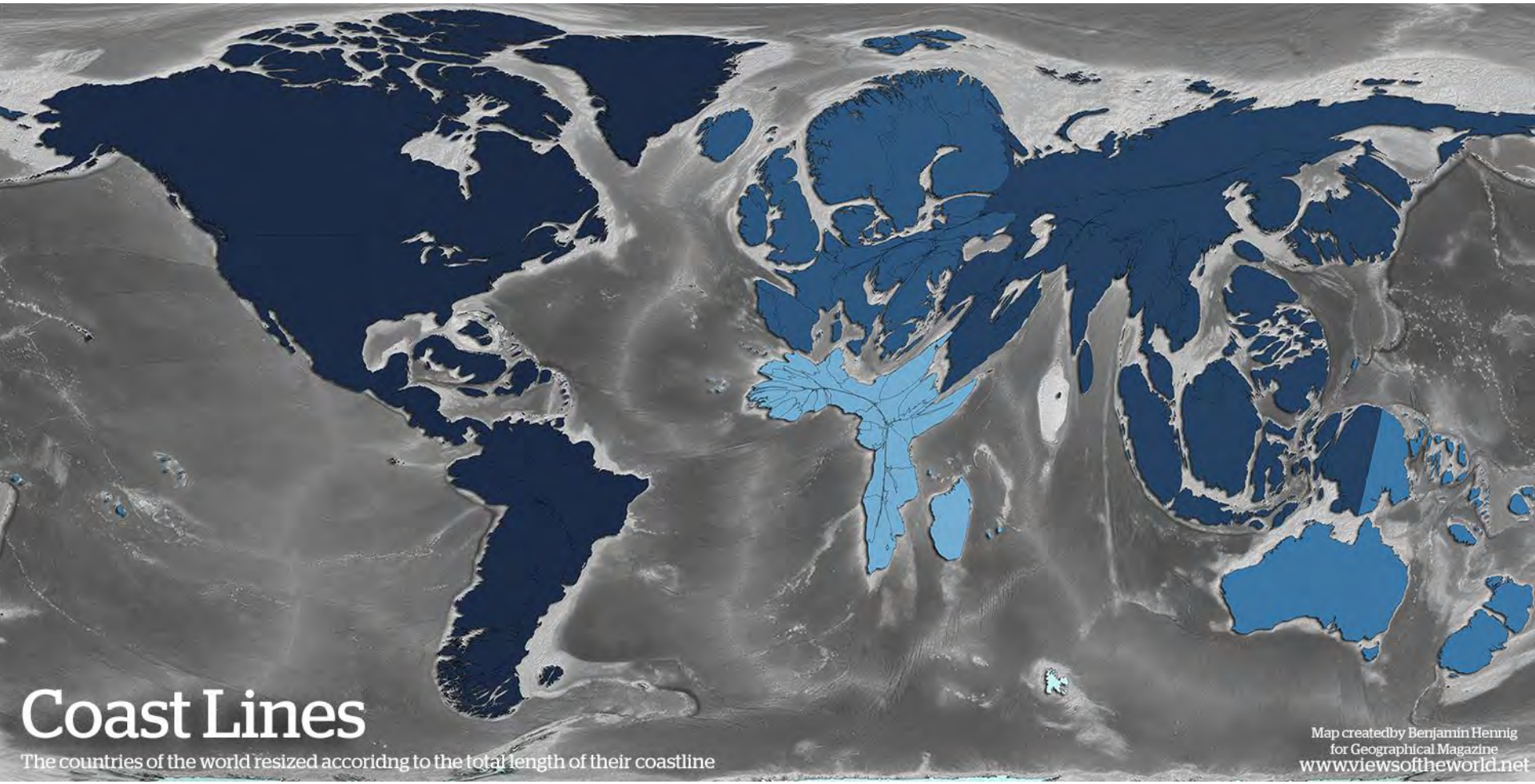

1. Causes of marine and ocean pollution

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1. Causes of marine and ocean pollution

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- Pollution is the introduction by man, directly or indirectly, of substances or energy into the marine environment (including estuaries) **resulting in deleterious effects that include** hazards to human health, harm to living resources and to marine ecosystems, damage to amenities or interference with other legitimate uses of the sea.

- Chemical
- Thermal
- Biological

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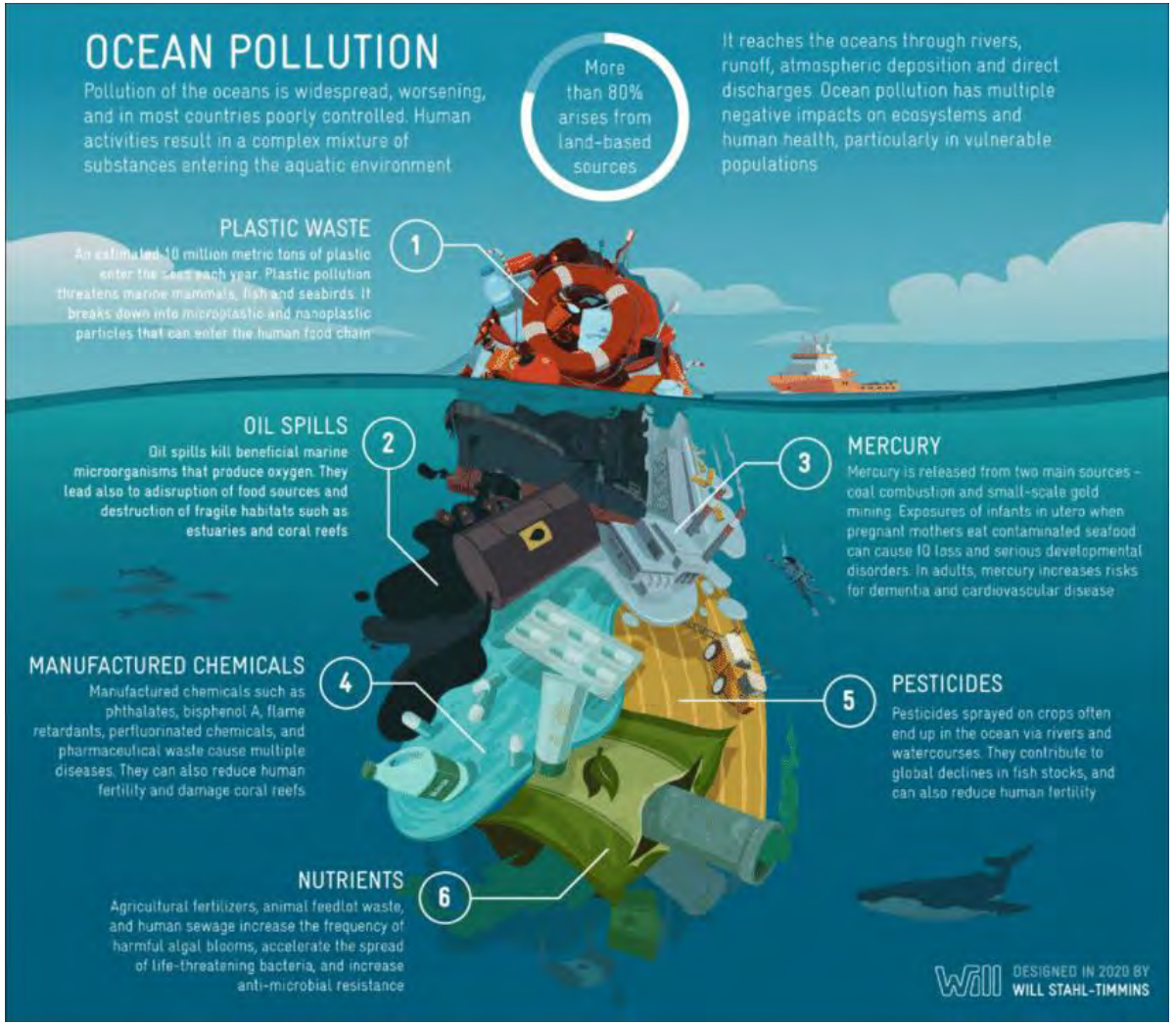
1. Causes of marine and ocean pollution

WHAT IS THE MARINE POLLUTION ?

Marine pollution is a phenomenon in which the concentration of pollutants in seawater or the concentration of pollutants accumulated in marine sediments in coastal areas increases.



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WHAT IS THE MARINE POLLUTION ?

Or degradation of marine ecosystems, reduction of marine species stocks, occurrence of phenomena such as red tides, accumulation of pollutants in food taken from the sea are also manifestations of marine pollution. .

1. Causes of marine and ocean pollution

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Due to natural factors

Harmful marine organisms and harmful marine microalgae increased in number. They participate in red tides, which reduce the number of beneficial marine life.

1. Causes of marine and ocean pollution

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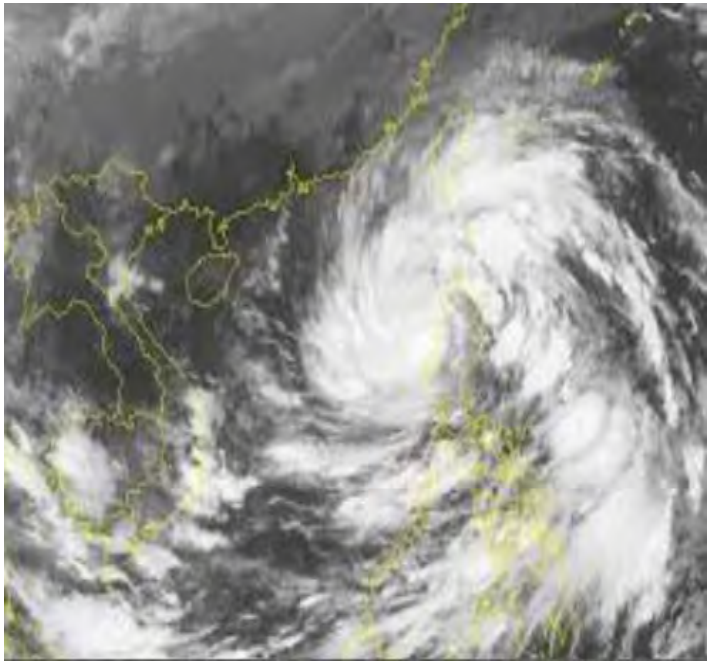
Due to natural factors

Geological activities such as volcanoes, hurricanes, etc. kill marine life, and their carcasses are not handled, causing pollution in coastal waters.



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Due to natural factors

The faulting of the earth's crust that leaks oil deposits on the ocean floor has contributed to marine pollution.

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Due to anthrop -ogenic factors

- *From the mainland:* pollution from development activities on land, especially in river basins such as urbanization, development of industrial zones, agriculture, brackish water aquaculture and exploitation, residential area, mining,...

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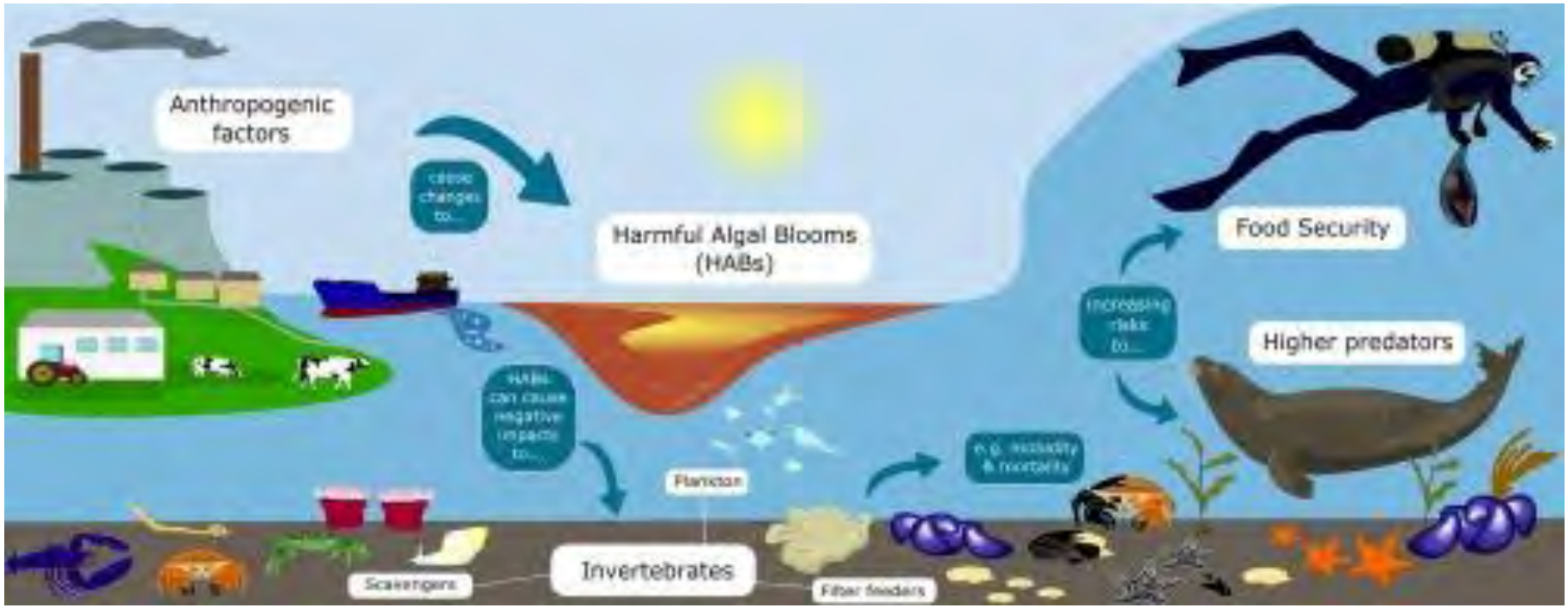

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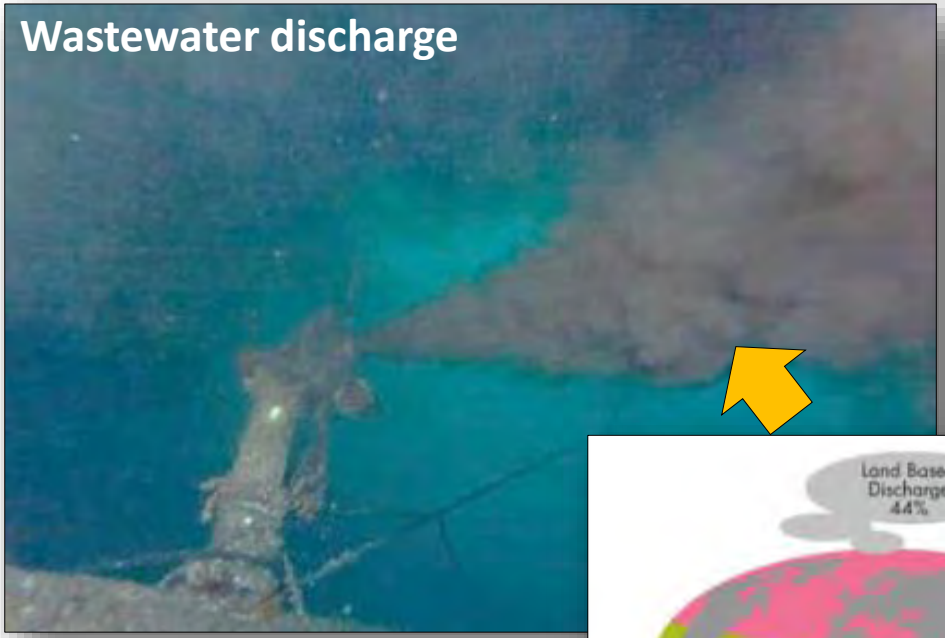
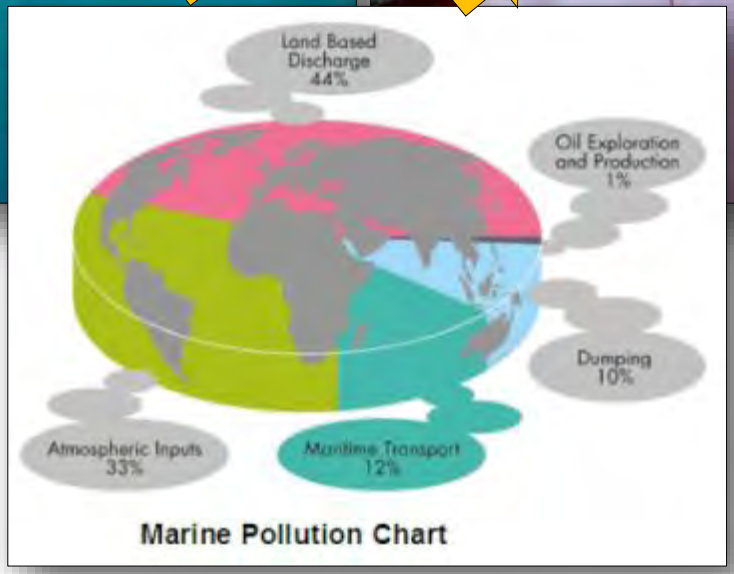
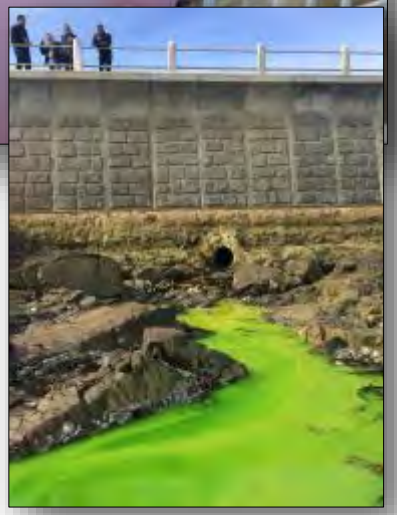
LAND BASED DISCHARGES

- About 80-100% of pollution in coastal and marine environment from land-based







1. Causes of marine and ocean pollution

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Due to anthrop -ogenic factors

- *From the sea:* pollution from marine activities such as navigation, aquaculture and fishing, port development and seabed dredging, marine tourism, marine mineral exploration and exploitation...
- *In the case of pollution arising from a single source*, such as a sewer pipe or a factory sewage manhole, it is relatively simple to identify and manage, because the regulator can find the source and control over the spatial scale of the effect.

1. Causes of marine and ocean pollution

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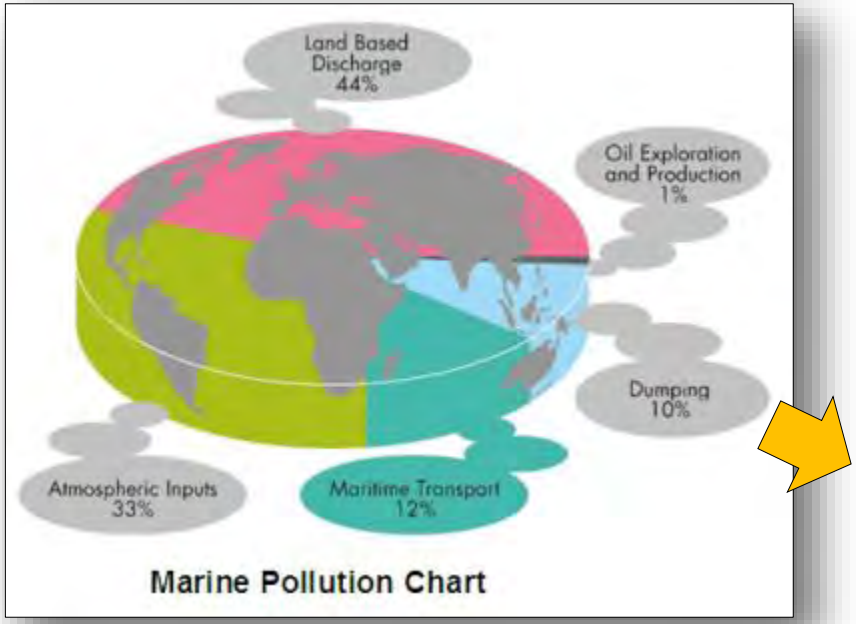

DUMPING

- All ports must be dredged for safe vessel navigation and development.
- Contaminants transferred to disposal site in dredged material.

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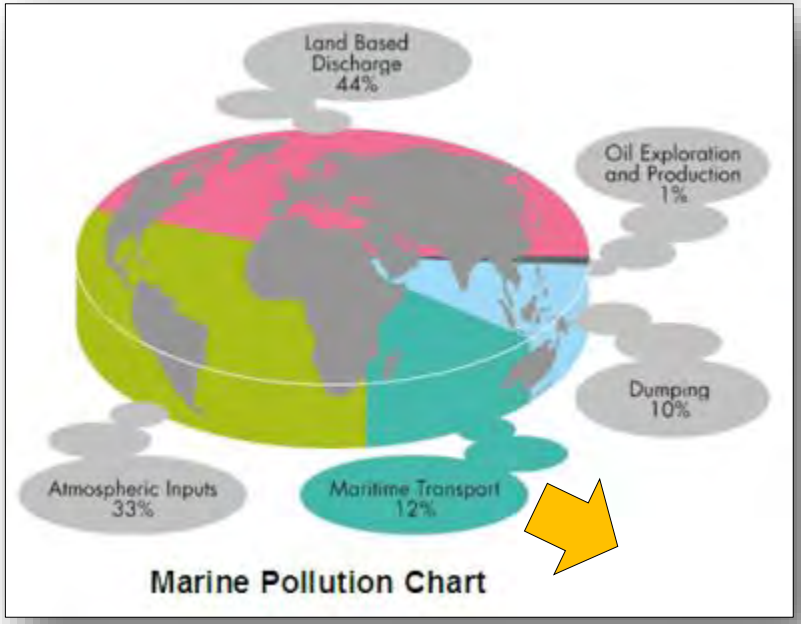

Maritime Transport

- Anti-fouling coatings – estimated 42 tons of (antifouling chemicals) copper and 850 kg of Irgarol leached into Dutch coastal waters in 2007 as a result of vessel traffic.
- Large number of vessels call at/pass SA annually.

1. Causes of marine and ocean pollution

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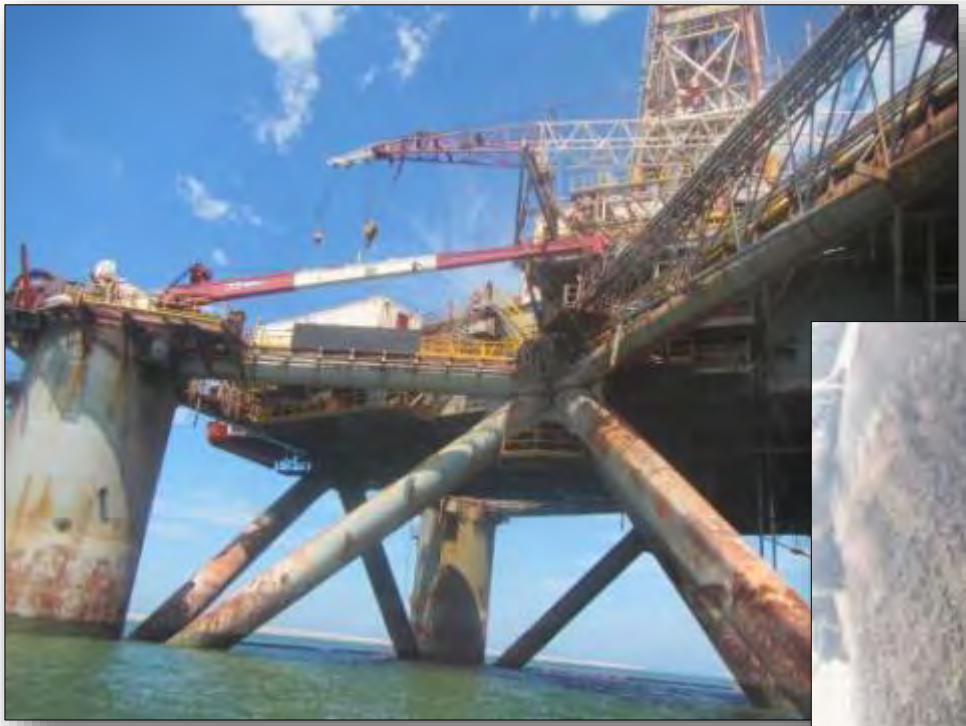
Marine Transport and Manufacturing

- Strong drive for vessel and oil rig construction and repair, and hull cleaning operations in South Africa ports.



1. Causes of marine and ocean pollution

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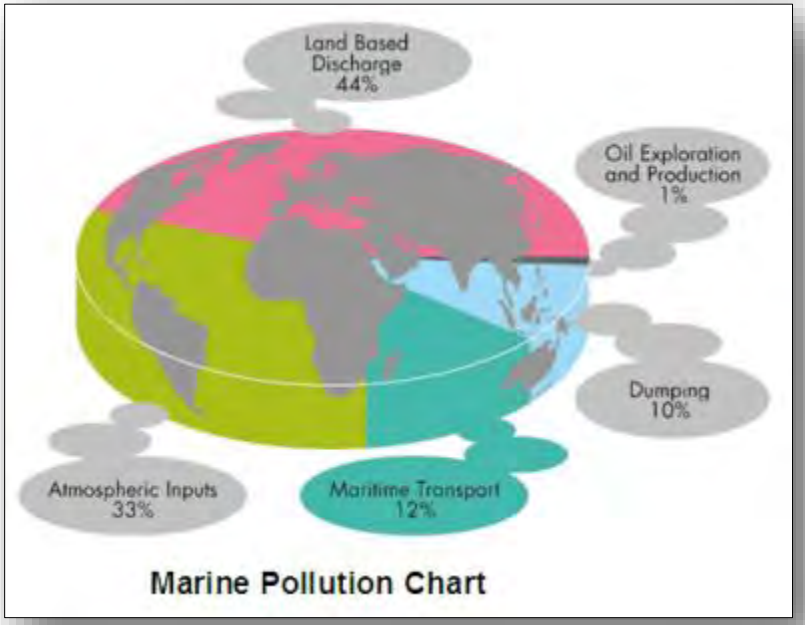
Atmospheric Pollution

- Atmospheric pollution – particulates deposited in sea.



1. Causes of marine and ocean pollution

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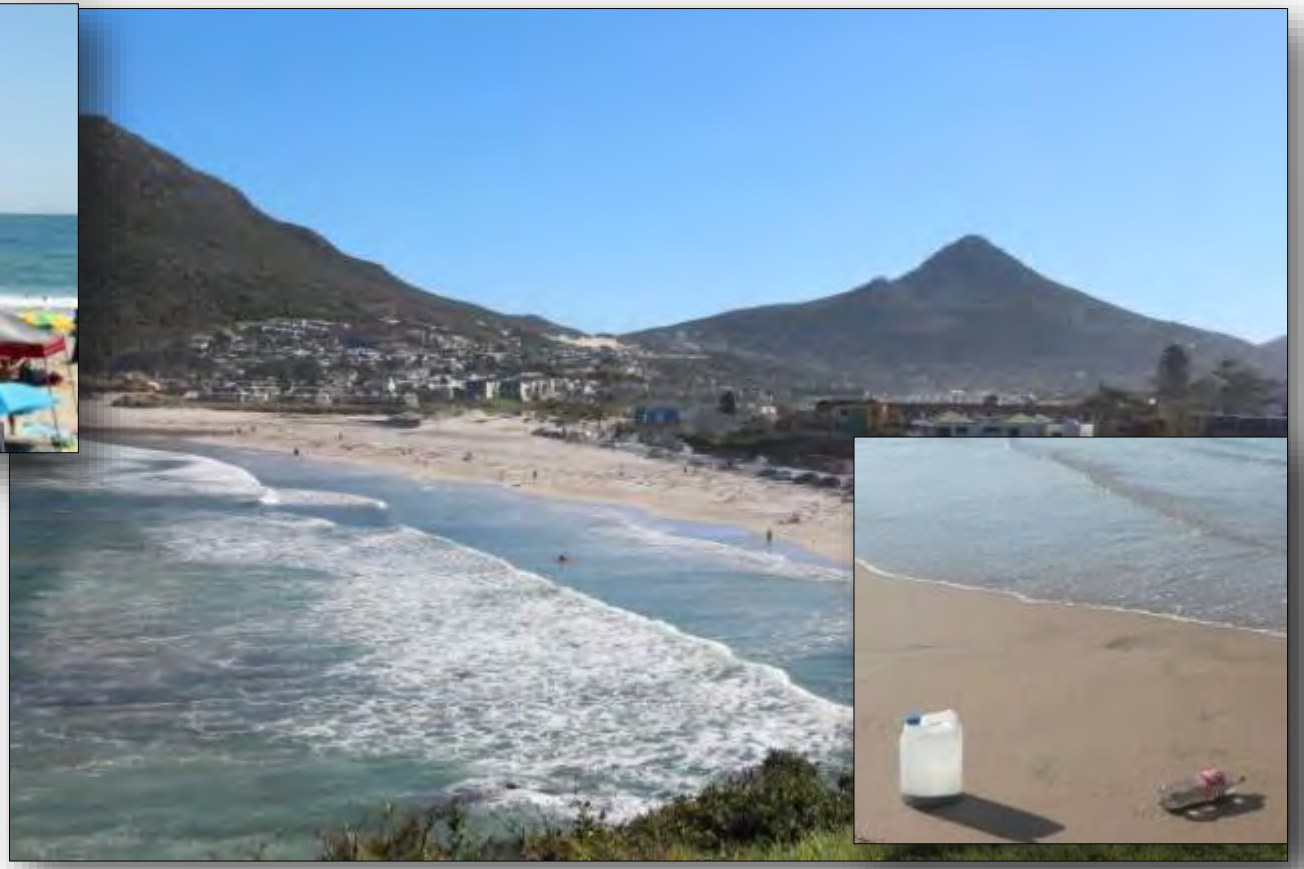
Coastal and Marine Tourism

- Bacterial and virus pollution affects tourism and cultural practices.
- Main sources are contaminated river and stormwater entering sea.
- Estimated Blue Flag value to Margate was R17-25 million in 2008.



THE BLUE FLAG

eco-label for beaches and marinas

2. Current status of marine and ocean pollution

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- According to a report by the United Nations Environment Program (UNEP), about 8-13 million tons of plastic waste is dumped into the sea every year, with an estimated damage to the ecosystem of up to 13 billion USD, of which 80% of the plastic trash comes from the mainland

- In 2010, 275 million tons of plastic waste was generated in 192 coastal countries with between 4.8 and 12.7 million tons discharged into the ocean. It is estimated that between 2010 and 2025, humans will discharge an additional 155 million tons of waste into the sea, which will make the ocean into a giant dumping ground of the world.

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2. Current status of marine and ocean pollution

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According to statistics from the US Marine Environmental Protection Committee, the components of 8 million tons of plastic waste discharged into the sea include:

- 94% of plastic waste is concentrated on the ocean floor with a density of 70 kg/km^2
- 1% of plastic waste floating on the sea surface with a density of 0.74 kg/km^2
- 5% of plastic waste near the coast with a density of 2.000 kg/km^2

→ *This shows that the amount of plastic waste in the sea that we observe is only a very small number compared to the actual amount.*

2. Current status of marine and ocean pollution

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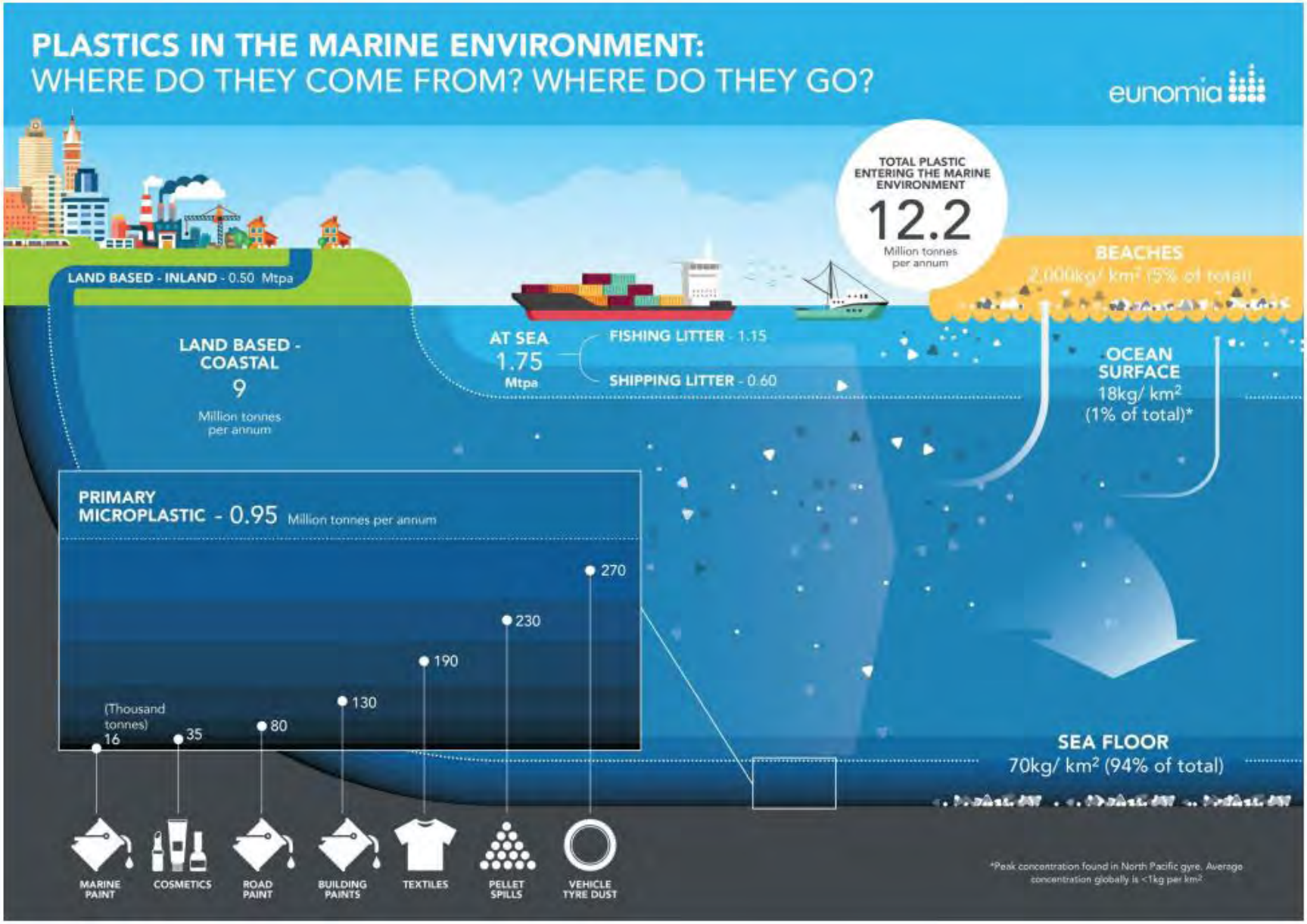

2. Current status of marine and ocean pollution

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- Although more than 60 countries around the world have national action plans to prevent marine pollution in mainland, the results have not yet compensated for the damage caused by population growth, rapid digitalisation, urbanization and industrialization in coastal regions.
- According to UNEP executive director - Achim Steiner, about 80% of marine pollutants originate from land, and this trend could increase significantly by 2050 if the population living in coastal areas doubles.
- The United Nations (UN) has launched a call for countries to act quickly to reduce marine pollution caused in mainland-waste, through close cooperation between governments and local authorities; between private organizations and non-governmental organizations, considering the prevention of marine pollution as a top responsibility.

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Consequence

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- Threats to marine ecosystems: Mass death of marine animals, causing serious economic damage as well as ecological environment and biodiversity.

- Reducing marine resources:
+ Seafood reserves
+ Income from the sea tourism industry

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Challenges and Solutions to Ocean Pollution in the World

- Plastic waste
- Chemical and radioactive substances
- Oil spill
- Enrichment
- Natural impact

Current status of marine pollution in Vietnam

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- Currently, our country's marine environment is showing signs of pollution and degradation.
- The environment in coastal waters has been polluted with oil, zinc and domestic waste.
- Suspended solids such as Si,$N0_3$ and NH_4 are at an alarming level.
- The quality of coastal seabed sediments is polluted.

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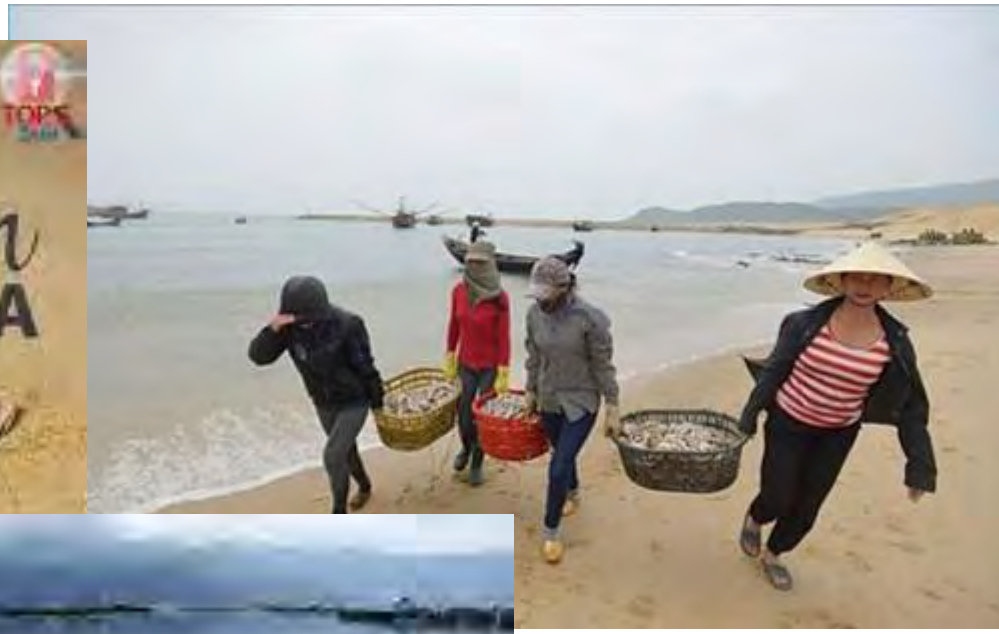
Current status of marine pollution in Vietnam

- Massive fish deaths on the coasts of Central Vietnam - Formosa - April 2016



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Current status of marine pollution in Vietnam

- According to the Ministry of Natural Resources and Environment, about 70% to 80% of marine waste originates inland when factories, factories, industrial parks, and residential areas discharge wastewater and solid waste into rivers, in coastal plains or discharge directly into the sea without treatment.
- Every year, over 100 rivers in our country discharge into the sea 880 km^3 of water and 270-300 million tons of solid sediment, bringing with it many substances that can pollute the sea such as organic substances, nutrients, heavy metals and many other substances from concentrated residential areas, industrial and urban areas, coastal aquaculture areas and agricultural production areas.

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Current status of marine pollution in Vietnam

- Through research and investigation by the Vietnam Institute of Oceanography, the pollution of the sea and island environment is also caused by the inappropriate exploitation and use of sandy coastal areas by localities, leading to lack of fresh water and erosion, coastal erosion and sedimentation with increasing severity.

- The sea and coastal areas have diverse types of resources, containing diverse economic development potential, so there are over 50% of large urban areas, nearly 60% of the country's population, and most of the industrial parks and zones, export processing, aquaculture areas, port activities – maritime and tourism.

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Current status of marine pollution in Vietnam

Pollution of the marine environment also occurs in ports due to the activities of ships entering and leaving the port, dredging channels, and dumping waste. The water turbidity in Hai Phong port area is 418-424mg/l, Danang port with 33-167mg/l. Oil concentration at all ports exceeded the allowable limit of 0.3mg/l (TCVN5943-1995), Hai Phong port with 0.42mg/l, Cai Lan port with 0.6mg/l, Vung Tau port with 0.52mg/l , Vietso Petro port with 7.57mg/l. The oil slick prevent the air from dissolving into the water, so the oxygen content in the water is low, averaging 3.3-10.9mg/l in the drought season and 1.16-6.1mg/l in the flood season, while the oxygen demand is very high, up to 13.6-31mg/l.

Industrial wastewater and domestic wastewater discharged into the sea have not been treated, so the microbiological index is always high. In some ports, it is alarming that the mercury concentration has exceeded the allowable threshold, Vung Tau port exceeds 3.1 times, Nha Trang port exceeds 1.1 times.