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

3.2. Impacts by mining resources using the resource

MATERIALS

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2. Quản lý biển, Lê Đức Tố, 2004

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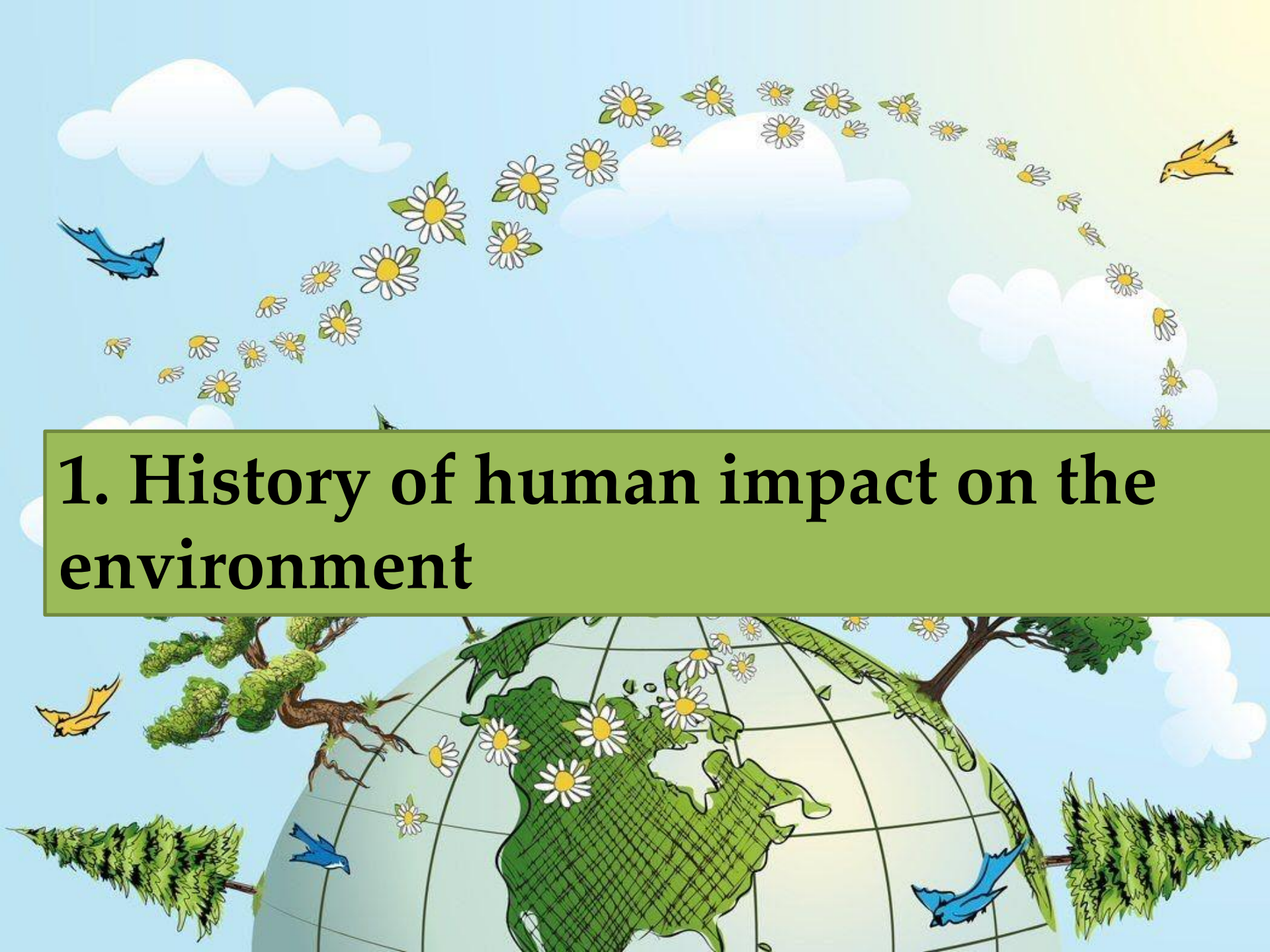
The impact of exploitation and use of marine resources

1

History of human impact on the environment

2

Impacts on non-organisms/ organisms



1. History of human impact on the environment

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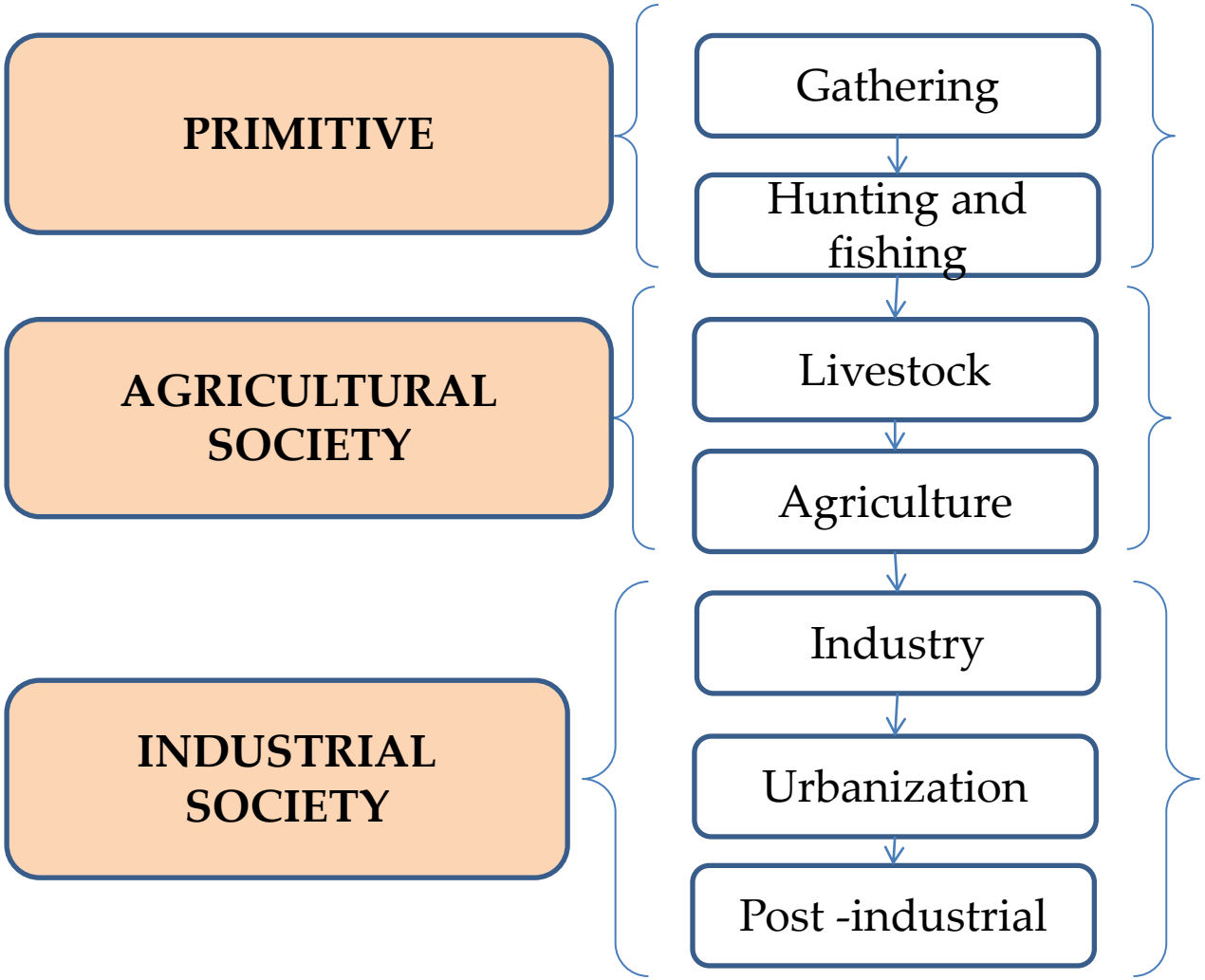

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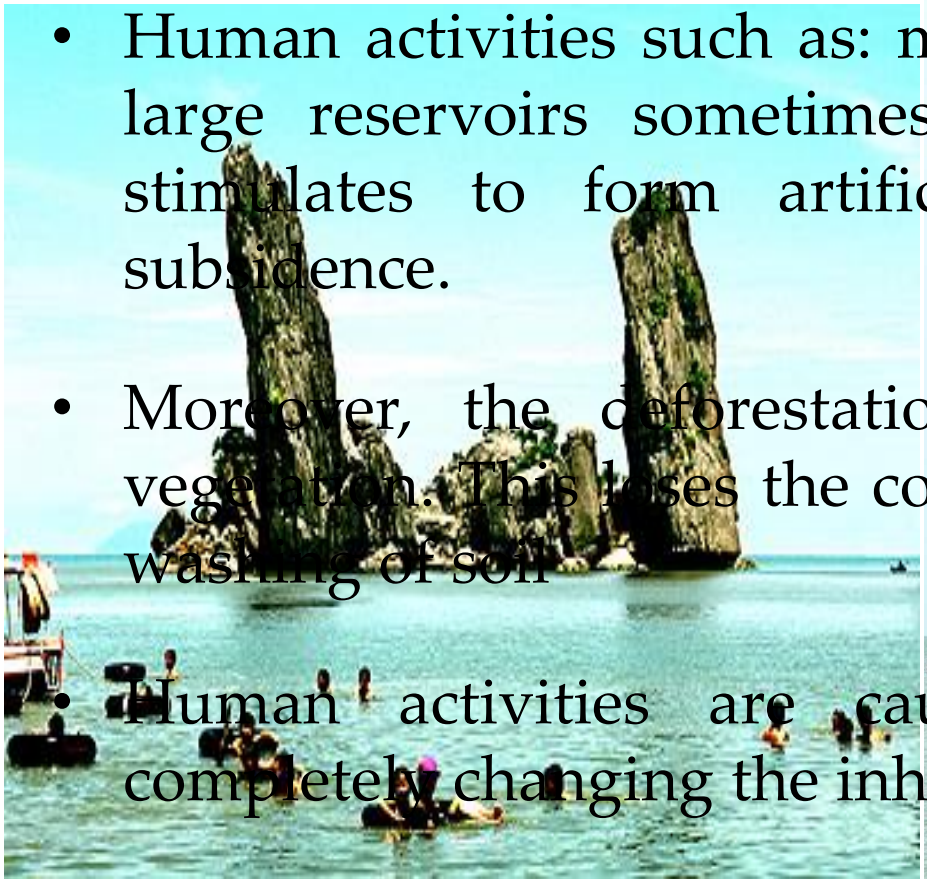
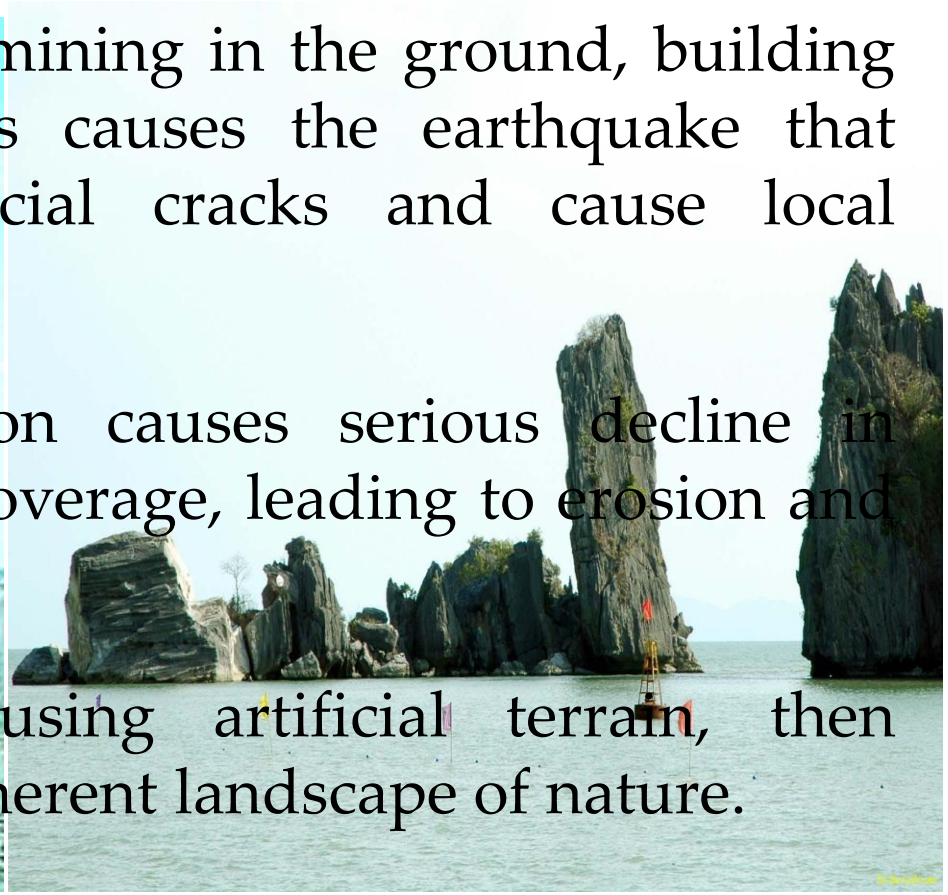
❖ Changing landscape terrain

- Human activities such as: mining in the ground, building large reservoirs sometimes causes the earthquake that stimulates to form artificial cracks and cause local subsidence.
- Moreover, the deforestation causes serious decline in vegetation. This loses the coverage, leading to erosion and washing of soil
- Human activities are causing artificial terrain, then completely changing the inherent landscape of nature.





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❖ Impact on biosphere and ecosystem

People 'activities impact on natural ecosystems by changing or renovating into new ecosystems according to their wishes such as:

- *Transforming forest land into agricultural land, losing many types of rare animals and plants, increasing soil erosion;*
- *Change the ability to harmonize water and climate change (climate change). Improving the lagoon into arable land: Losing the wetlands is important to the habitat of many creatures and humans.*
- *Transforming forest land, agricultural land into industrial parks, urban areas, roads, creating an area of regional ecological imbalance and local pollution.*
- *Causing environmental pollution in various types of socio -economic activities.*

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Habitat Destruction

Threatens Biodiversity

We destroy habitat to make room for **crops, livestock,** and the growing **human population.**

Habitat destruction is the main cause of biodiversity loss.

Deforestation has destroyed 99% of the original temperate forests.

Agriculture has replaced nearly all grasslands in North America.

The world's 48,000 dams disrupt both aquatic and land ecosystems.

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❖ Impact on biosphere and ecosystem

Human impact on natural ecological balance shows:

- *Excessive hunting, excessive fishing causes decline in species, even disappears a number of things and increases ecological imbalance.*
- *Hunting rare animals such as tigers, rhinos, elephants, etc. can lead to extinction of many rare animals.*
- *Destruction of natural forests get firewood. This loses the residence of animals and plants.*
- *The immigration of foreign animals and plants has the ability to fertility quickly and disputes in many indigenous species.*
- *Discharged into the natural lifetime systems of artificial synthetic compounds that organisms are unable to decompose such as: HDP, grease, pesticides, toxic metals. nylon, ...*

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- **Impact on biosphere and ecosystem**

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❖ Impact on the atmosphere

- *Pollution caused by volcanic activity: volcanic activity emits a huge amount of pollutants such as dust, SO_x, NO_x, which has severe and long-lasting effects on the environment.*
- *Pollution from forest fires: produces smoke, dust, SO_x, NO_x, CO, THC.*
- *Pollution from sandstorms: Sandstorms often occur in areas without vegetation cover. It not only causes dust pollution but also reduces visibility.*

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❖ Impact on the atmosphere

- Pollution from the ocean: Due to the process of evaporating sea water, a quantity of salt (mainly NaCl) is carried inland by the wind. Air with high salt concentration will be harmful to metal materials.
- Pollution due to decomposition of organic substances in nature: Due to the fermentation of organic matter in landfills, marshes will produce gases such as methane (CH_4), foul-smelling compounds such as nitrogen (ammonia - NH_3), sulfur compounds (hydrosulfide - H_2S) and even microorganisms.

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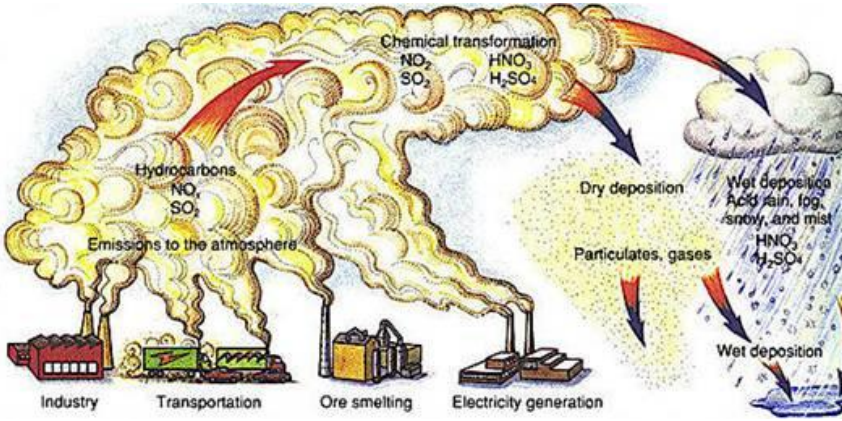
❖ Impact on the atmosphere



- *Pollution caused by human activities includes: industrial and handicraf production: e.g. chemical factories paper production, metallurgy, therma power plants (use of coal fuel, oil...).*
- *Agricultural activities: using fertilizers, spraying pesticides and herbicides.*
- *Commercial services: trading market. Activities: cooking to serve this daily life of people (family, office, etc.). Entertainment and recreation: tourist area, football field. The above sources can be considered as fixed sources.*

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❖ Impact on the atmosphere

Typical global air pollution phenomena:

1. Acid Rain
2. Ozone layer depletion
3. Greenhouse effect
4. Heat island phenomenon
5. Global climate change

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❖ Impact on the hydrosphere

- Humans are always under the influence and often affect the hydrosphere. People use fresh water in daily life.
- *Continental fresh water:* Continent (including surface water and groundwater) accounts for about 2.5% of the volume of the hydrosphere, but plays a very important role in the life of many organisms.
- This is the Earth's main source of fresh water, plays a role in regulating the climate of the continent, creating clean energy reserves for humans.
- Fresh water on the continent includes streams, groundwater and lake water, water vapor in the atmosphere. Because fresh water has such a great role, an increasing population will lead to the risk of depleting this valuable resource.

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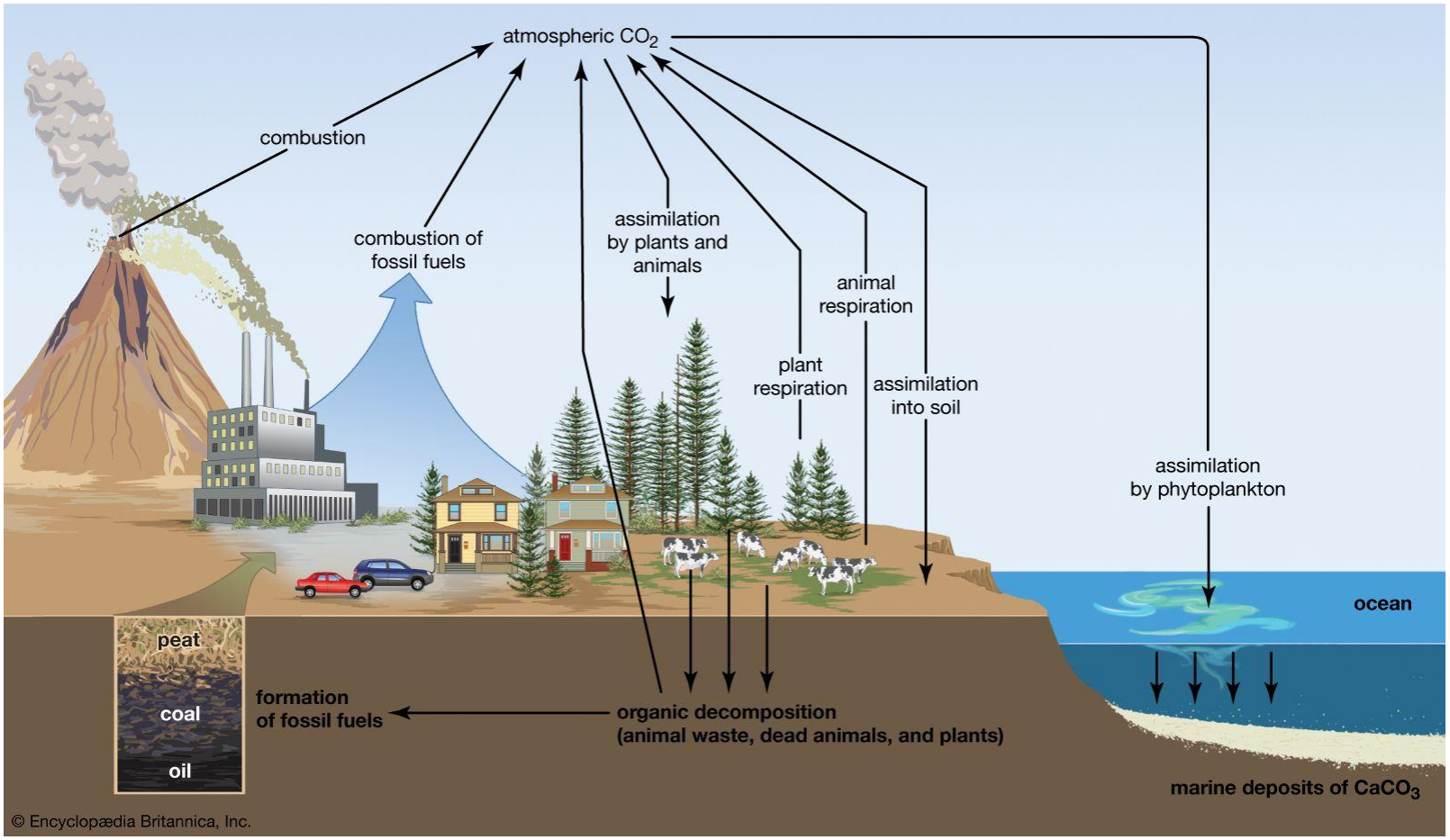
Impact on the hydrosphere



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❖ Impact on the hydrosphere

In recent years, increasing Earth's temperature has accelerated the melting of ice at the poles, causing sea levels to rise. The melting of polar ice can cause sea level to rise from 65 to 100 cm and lead to the following phenomena:

- Flooding of lowlands and low islands.
- Currently, these are regions with dense populations and human food stores.
- The coastline deepens into the mainland, increasing coastal erosion.
- Water: saline intrusion into river basins, coastal freshwater aquifers.
- Sea flow regime, tidal regime and influence of sea and ocean on climate and weather will change.

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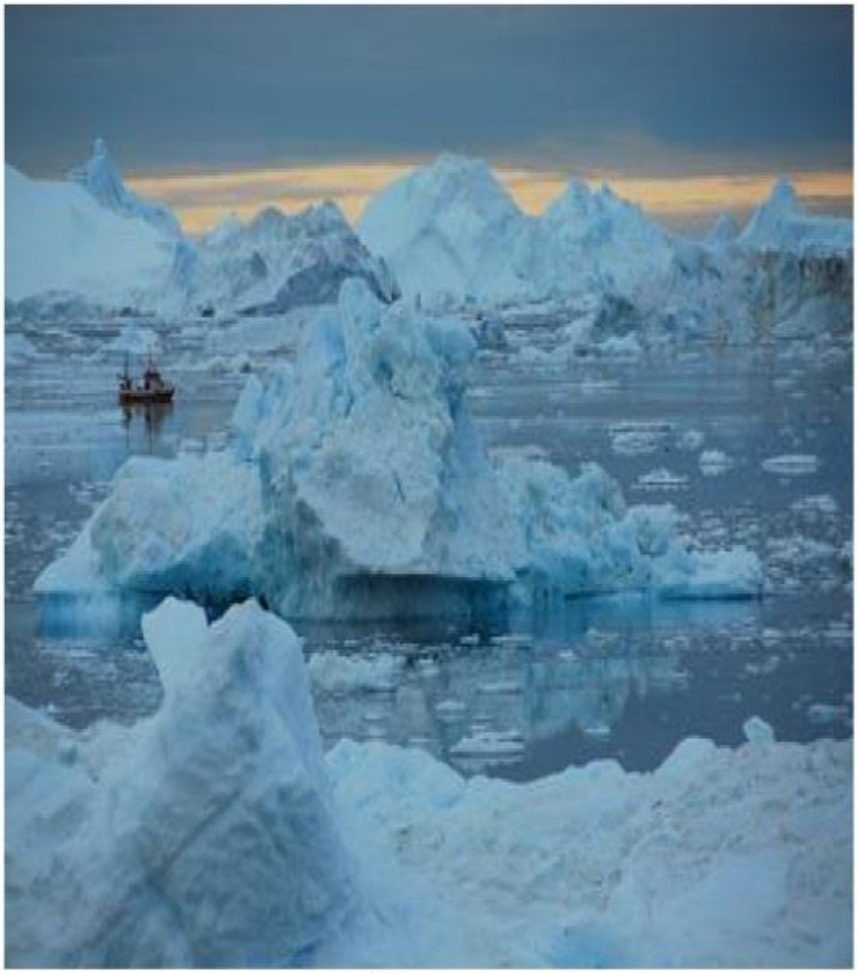
❖ Impact on the hydrosphere



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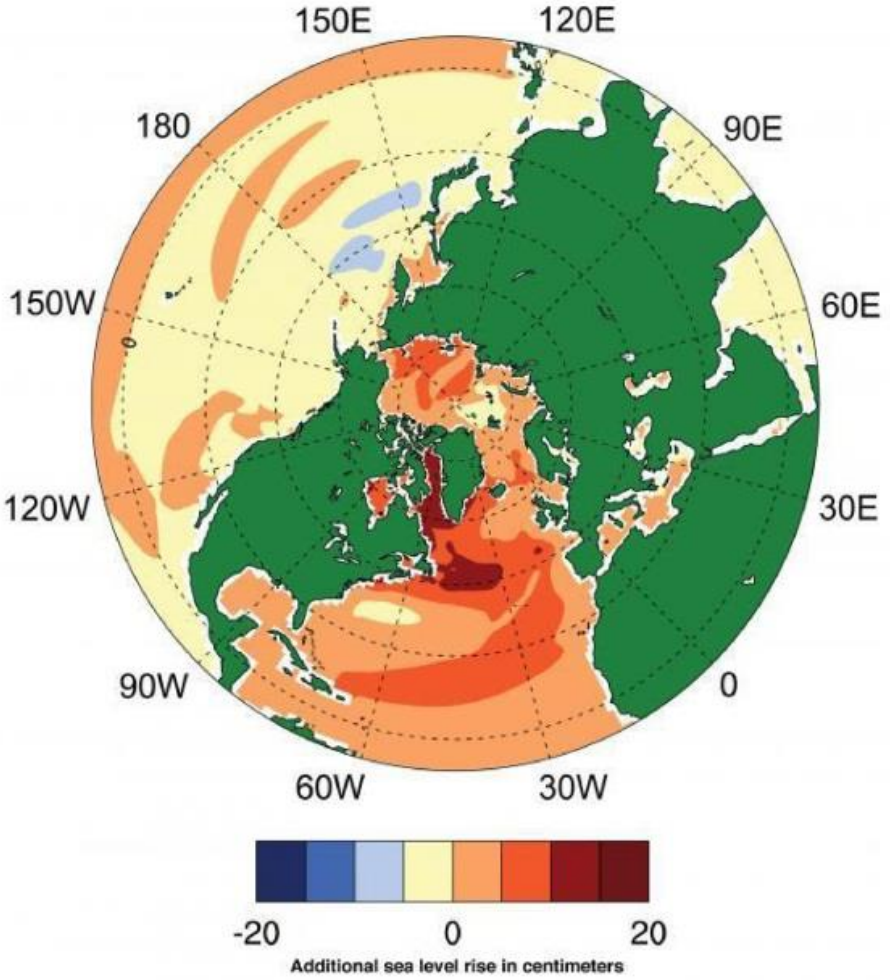

(b)

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What do you observe from these paintings?

2. Impacts on non-organisms/ organisms

Impacts on non-organisms/ organisms

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Reduced marine biodiversity - loss of natural resources

- The toxins in the waste cause many harms to the marine ecosystem: destroying organisms, reducing fertility, causing genetic mutations, etc.
- Mining of tin from golden sands on the coast of Thailand has polluted the sea, temporarily disrupting benthic communities and damaging the environment in the long run by disrupting the chemical properties of the sediments.

Impacts on non-organisms/ organisms

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Reduced marine biodiversity - loss of natural resources

- Plastic waste and inert materials interfere with the activities of marine mammals, seabird colonies and fish.
- Oil pollution is one of the major causes of damage to marine life

Impacts on non-organisms/ organisms

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Reduced marine biodiversity - loss of natural resources

- If the oil content in the water is about 20-30 mg/L, the reflex activities of the fish are disturbed and if the concentration is higher, it can cause fish death.
- Oil repels sea fish groups that have disappeared from the island of HoKaiDo (Japan).
- Minamata disease in Japan in the 50s and 60s of the twentieth century was the result of dumping of chemical plants into the sea that contaminated fish with methylmercury.

Impacts on non-organisms/ organisms

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Reduced marine biodiversity - loss of natural resources

- In shallow or semi-enclosed marine areas, an excess of nutrients such as nitrogen and phosphorus stimulates the growth of phytoplankton and other plants.

Impacts on non-organisms/ organisms

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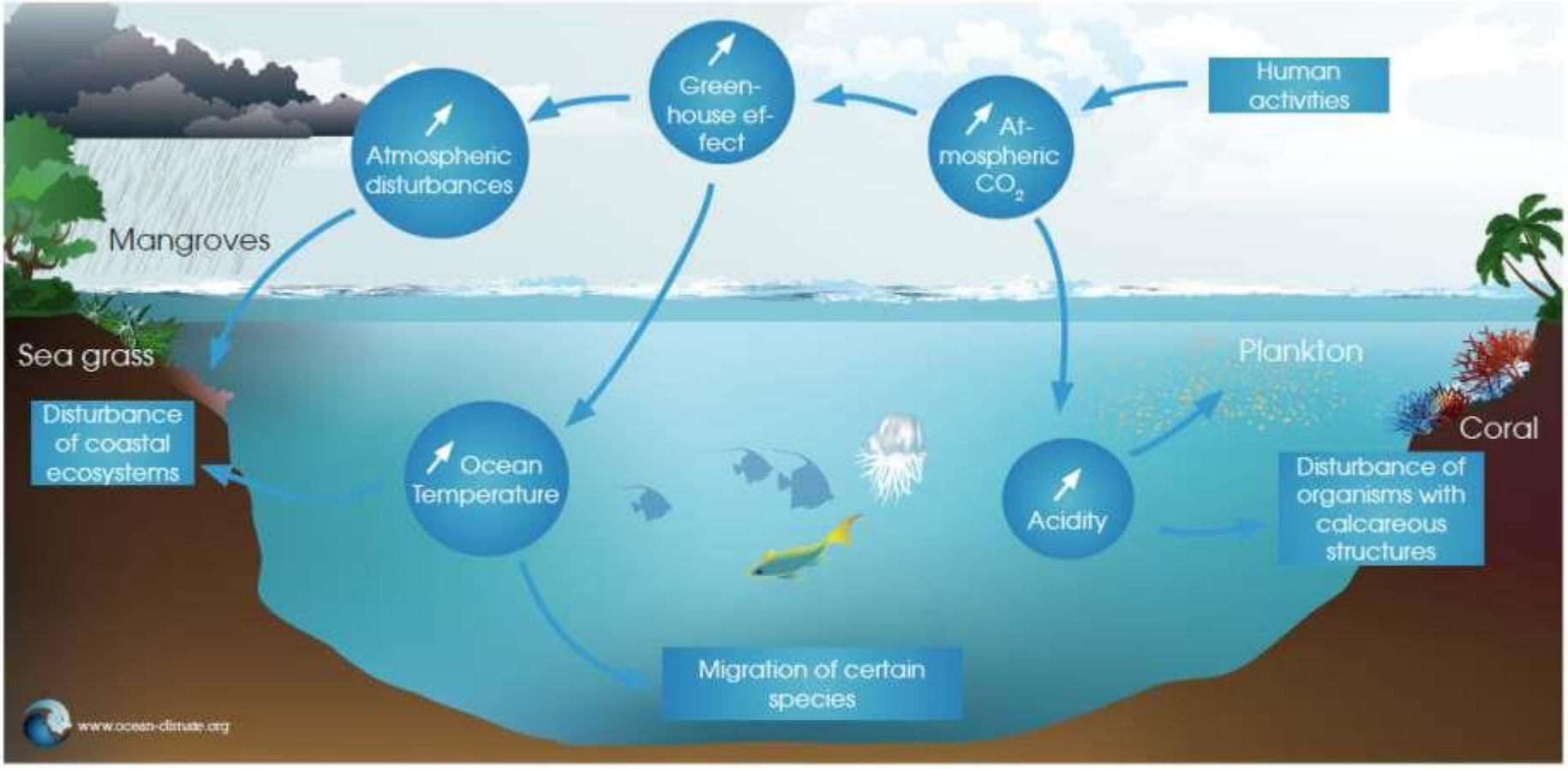
Reduced marine biodiversity - loss of natural resources



Impacts on non-organisms/ organisms

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Damage to the fishing industry

- Due to increased coastal pollution by civil wastewater, the frequency of closure of fishing grounds also increases, resulting in loss of income and disintegration of fishing communities.
- Oil pollution at sea can directly damage fishing boats, fishing nets, aquaculture equipment as well as indirectly reduce fishing and farming productivity.

Impacts on non-organisms/ organisms

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Damage to the fishing industry

- The natural process does not decompose many plastics, pesticides and other synthetic organic chemicals in the ocean floor -> Non-living organisms.
- Algae bloom is a phenomenon that has a harmful impact on fish and shrimp stocks, thereby affecting living and trading activities.

Impacts on non-organisms/ organisms

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Damage to the fishing industry

In 1988, about 27% of the sea in the 48 states of the United States could not be fished because of pollution and ecological degradation.

Pollution in Fomosa in Vietnam 2016

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Damage to the fishing industry

According to statistics, more than 17,600 fishing boats and nearly 41,000 people have been directly affected.

Over 176,000 dependents are affected. Due to the inability to fish within the range from shore to 20 nautical miles, up to 90% of ships with low power engines and nearly 4,000 ships without engines had to stay ashore. The loss of coastal fishing output is about 1,600 tons/month

Impacts on non-organisms/ organisms

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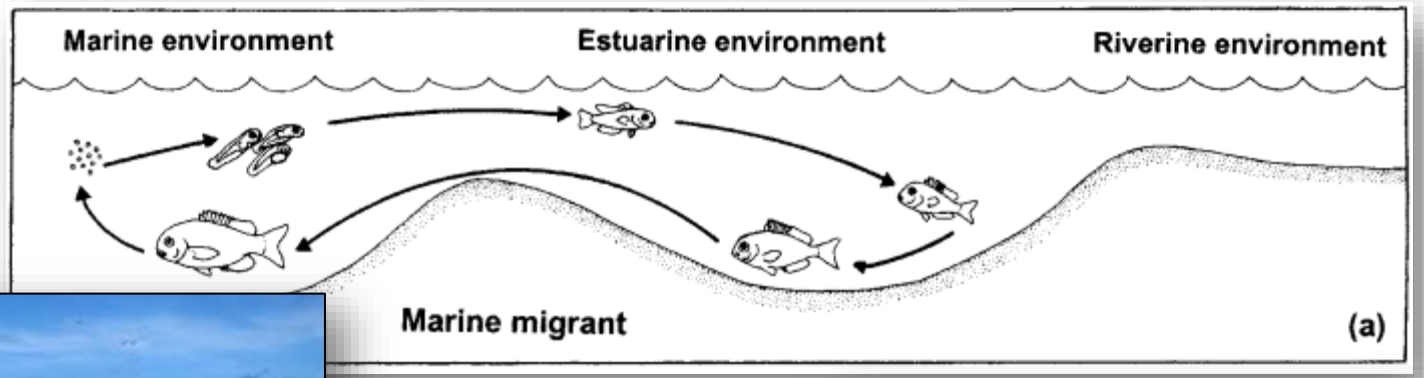
- Estuaries and sea are connected – affect each other.
- Estuaries are important nursery areas for fish, including those targeted by subsistence, recreational and commercial fisheries.



Impacts on non-organisms/ organisms

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Impact on the tourism industry

- Due to some polluted seas or incidents, tourists have decreased significantly, affecting the income of the tourism industry.
- Garbage, plastic and other types of garbage ... lose the aesthetic value, beauty of coastal areas such as beaches, underwater landscapes.

Impacts on non-organisms/ organisms

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Impact on the tourism industry

- Pathogens from wastewater pose a danger to beaches.
- Oil slicks on beaches damage beaches, salt production areas, industrial production, and cause discomfort to sea users.

Fomosa pollution has severely affected beach tourism in Central Vietnam in 2016

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Impact on the tourism industry

- *Large hotels in Cua Lo town such as Green Hotel, Pacific Ocean Hotel, Saigon Kim Lien, Muong Thanh Cua Lo..., the number of tourists coming to stay during the 2016 tourist peak season decreased sharply from 40 -60% of the plan.*
- *Located close to Cua Lo beach, but Saigon Kim Lien hotel only reaches about 40% of room capacity in peak months, revenue decreased sharply compared to the previous year.*

Impacts on non-organisms/ organisms

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Increased costs for pollution control, incident prevention and remediation of marine pollution

The Exxon Valdez oil spill in Alaska in 1989, spilled 40,000 tons of raw oil into the sea. To clean up the oil, authorities had to mobilize **10,000 workers**, **1,000 boats** and about **100 helicopters** at a cost of up to **$1.1 billion**. Exxon has spent **$1.3 billion** to cover the costs of cleaning, compensation, management and environmental protection.

Impacts on non-organisms/ organisms

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Increased costs for pollution control, incident prevention and remediation of marine pollution

The Gulf of Mexico oil spill lasted for **87 days** with an estimated oil spill of **4.9 million barrels**, causing severe pollution in wetlands and the East Coast of the United States in a range stretching up to **1700 km**, and killed more than **6000 birds**.

After the disaster, BP company had to spend **40.7 billion USD** to overcome the consequences and compensate

Impacts on non-organisms/ organisms

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Increased costs for pollution control, incident prevention and remediation of marine pollution

In July 1996, Chisso Company - The Company discharged methyl mercury into Minamata Bay. The government has dredged and rehabilitated with a total cost for the control of **1,510,000 m²** of the seabed costing **47,900 billion JPY**, of which the relevant agency has to pay **30,500 billion JPY**. Chisso Co. has paid **90,800 billion JPY** to compensate patients suffering from Minamata disease.

Impacts on non-organisms/ organisms

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Harm to human health

- Marine pollution harms the ecological environment, reduces marine biodiversity and ultimately affects human health.
- Currently, compensation for damage to human health and the environment is still being carried out.
- Hazardous or toxic substances in the marine environment cause harm to human health through **oral, skin** and **inhalation, excretion**.

Impacts on non-organisms/ organisms

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Harm to human health

- Wastewater from sewers, agricultural fertilizers and cleaning agents, wastewater from the food processing industry, etc. contains potentially microbial contamination important to biological resources used for food.

Impacts on non-organisms/ organisms

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Impacts on Human Health

- Insidious ecological and human health risks.