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

# MARINE RESOURCES AND ENVIRONMENT MANAGEMENT

Topic 1 - Integration for management of natural  
resources and environment of the islands

*Lecturer: MSc. Dang Thi Thanh Le  
MSc. Tran Thi Kim  
MSc. Phung Thi My Diem*



# CONTENT

A green lightbulb icon with rays emanating from it, positioned above the word "marine" in the first content box.

**1- Concepts of sea, marine and coastal zone**

A red five-pointed star icon positioned above the word "environment" in the second content box.

**2- Marine environment**

**3- Marine environmental issues**



# **I. CONCEPTS OF SEA, MARINE & COASTAL ZONE**

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## **1. Basic concepts**

- Ocean and sea
- Bay - Awkward - Shallow - Lagoon
- Coastal Strip - Coastal Zone
- Other concepts

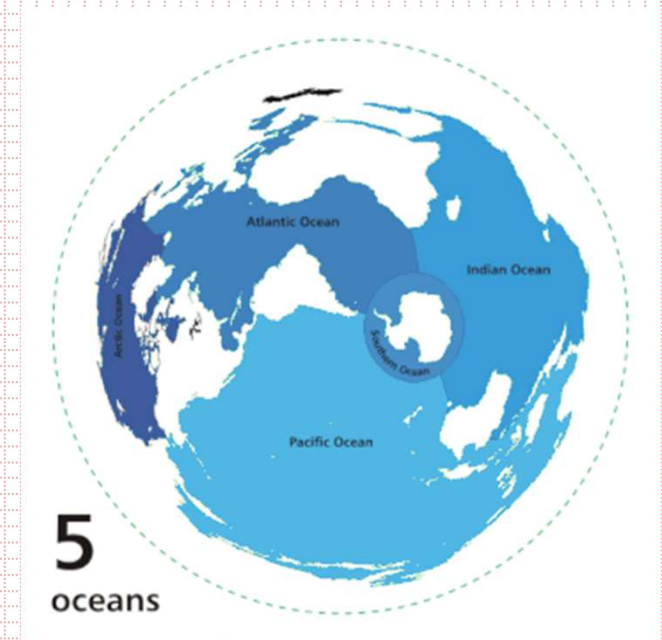
## **2. Concept of marine space**

- Inland Sea, territorial waters, adjacent territorial waters, exclusive economic, more continents.

## **3. Coastal and Marine Environment Concepts**



**Ocean**: is a large area of salt water that forms the basic composition of the hydrosphere. About 71% of the Earth's surface (about 361 million square kilometers) is covered by oceans, a mass of water that is constantly customary divided into several key oceans and several small seas. More than half of this area has a depth of over 3,000 meters (9,800 ft).





Sea: The sea is generally a vast saltwater sea connected to the oceans, or large reservoirs of salt water that do not have a natural way to the ocean like the Caspian Sea, the Dead Sea.

Each sea has a dominant hydrological, to some extent different from the hydrological mode of the approaching ocean part. The sea can be divided into three main categories: t-tallying sea, natural sea, and artificial sea.

The sea can be divided into three main categories: t-tallying sea, natural sea, artificial sea.

Teodosic seas are the middle sea of the continent that is often ingrained inland, connected to the ocean by narrow straits, not allowing water exchange with the ocean to be easy.





# 1. Basic concepts

The natural sea is the continental sea separated from the ocean by a chain of islands, sometimes by peninsulas.

Some continental seas: Sea of Japan, Bering Sea, South China Sea of Vietnam





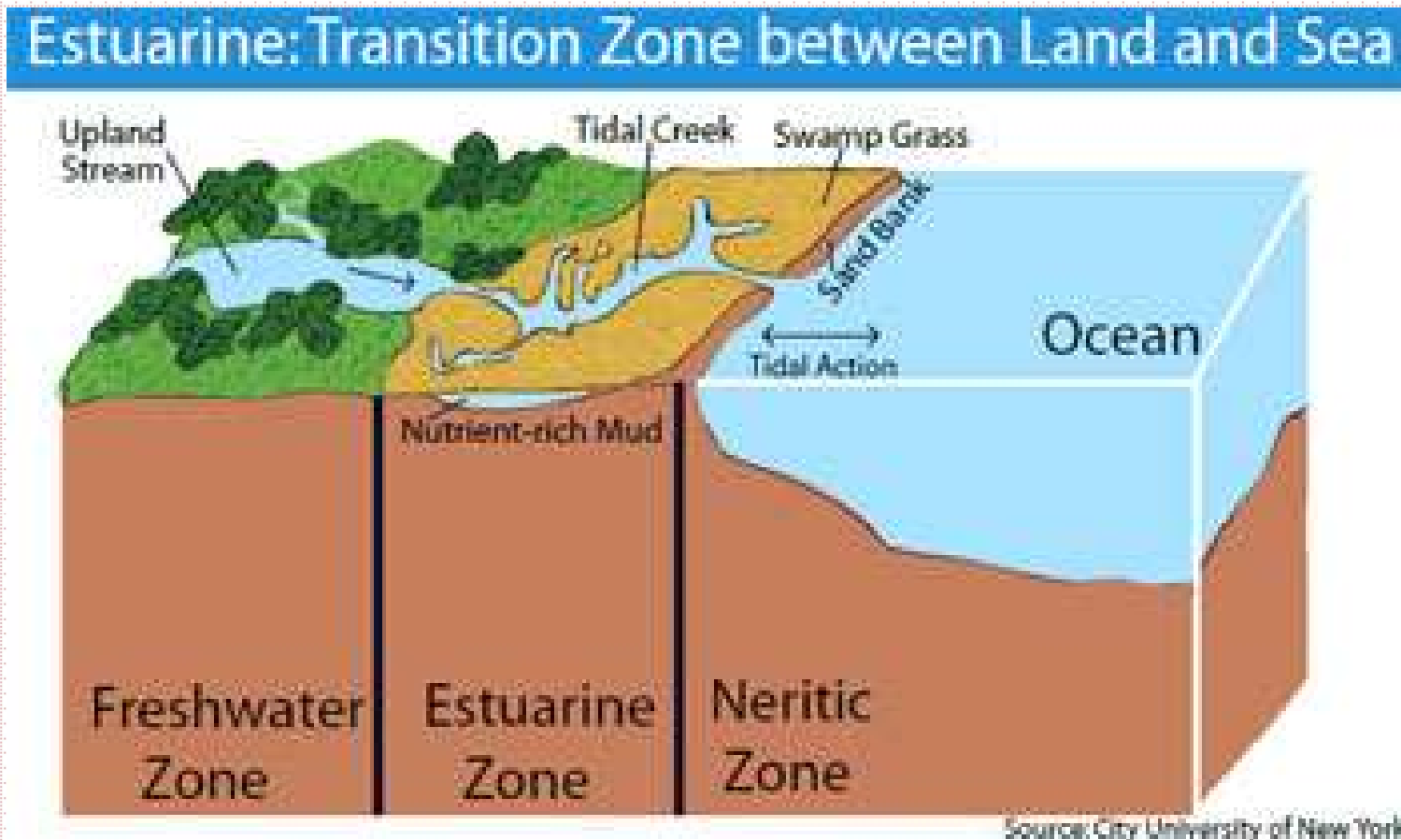
# 1. Basic concepts

An Artificial sea is the sea between islands or seas surrounded by thick or sparse islands. There are about 50 seas in the world, some of which are Xelep, Banga, Xulu and Java sea.



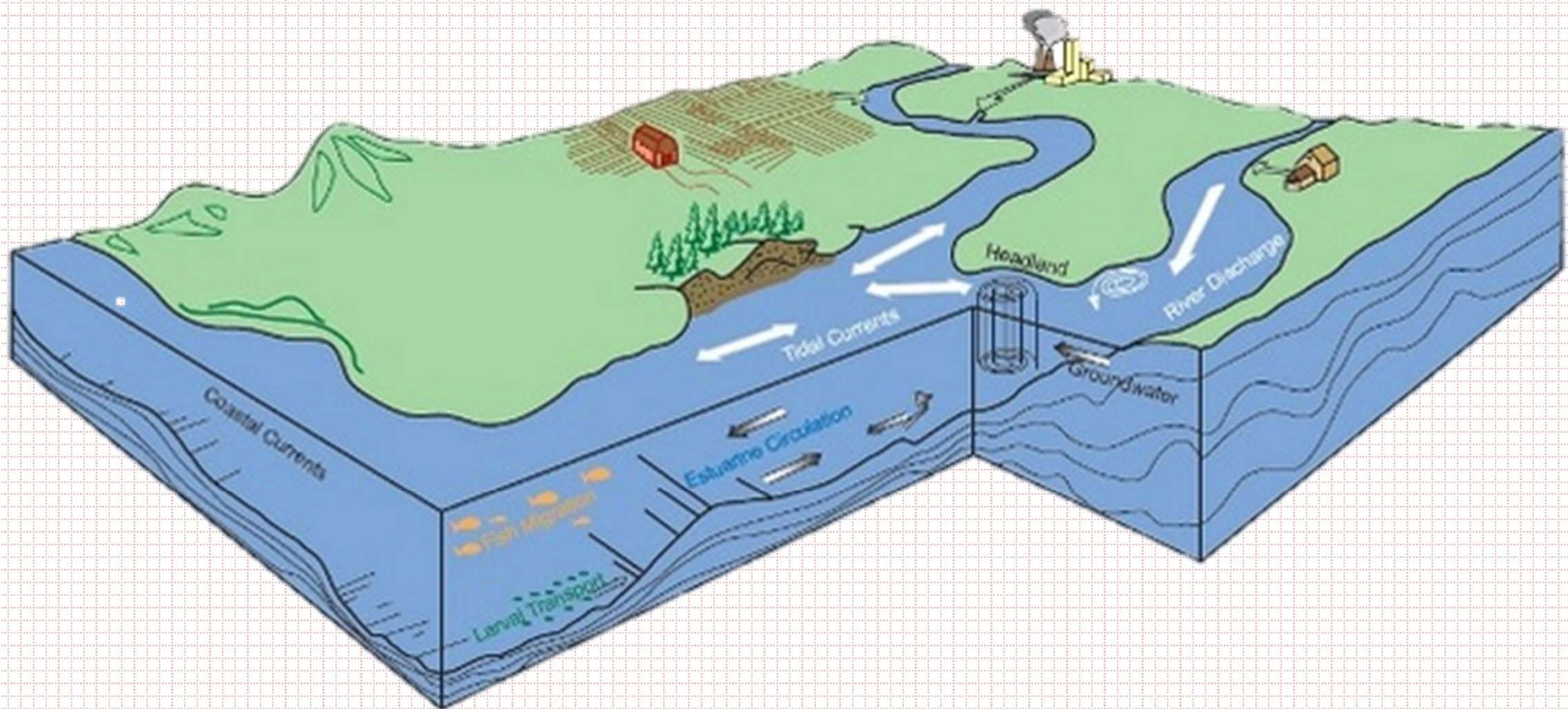


**Estuary area:** An estuary is an area where a freshwater river or stream meets the ocean. In estuaries, the salty ocean mixes with a freshwater river, resulting in brackish water



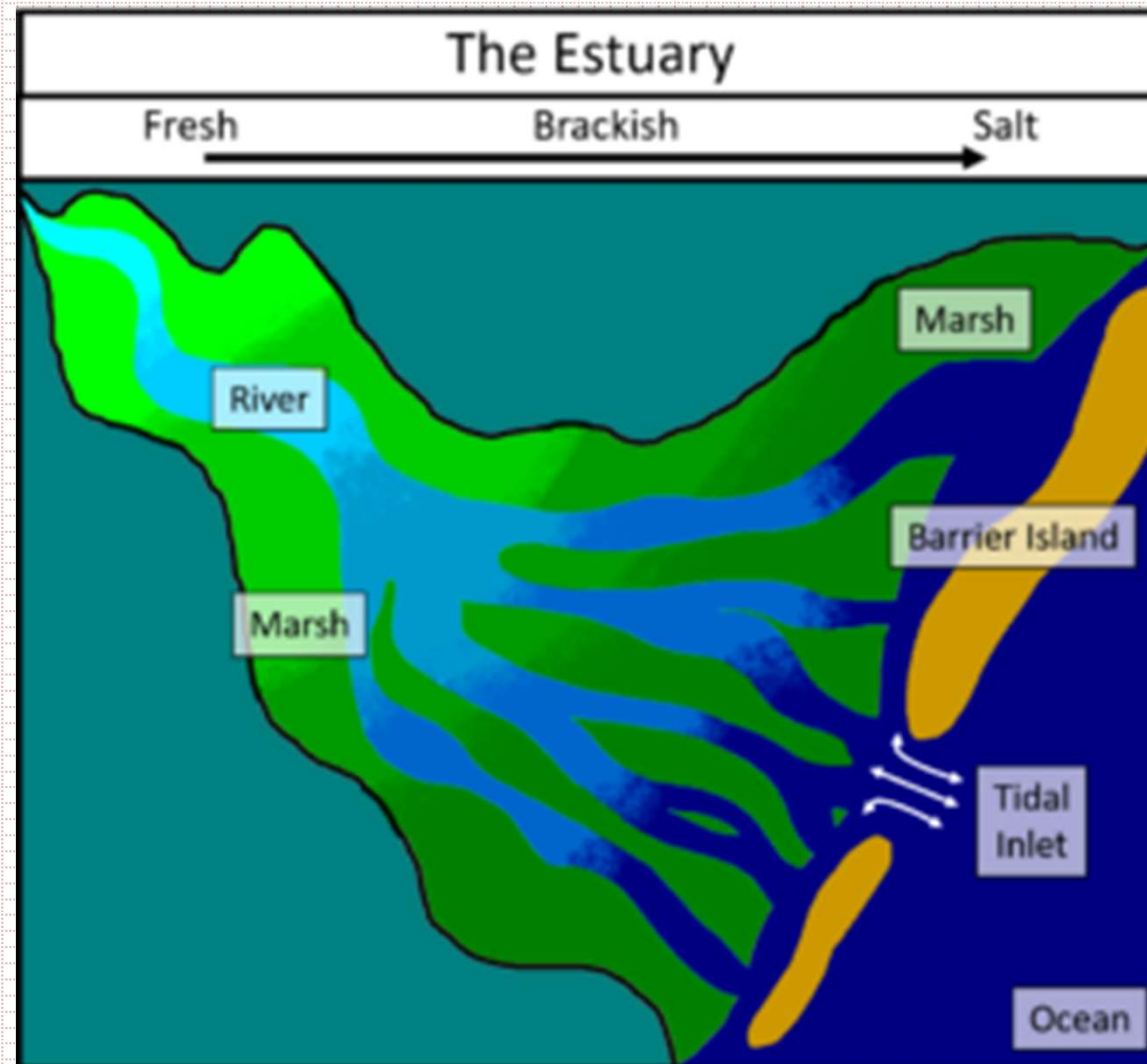


## Estuary area:



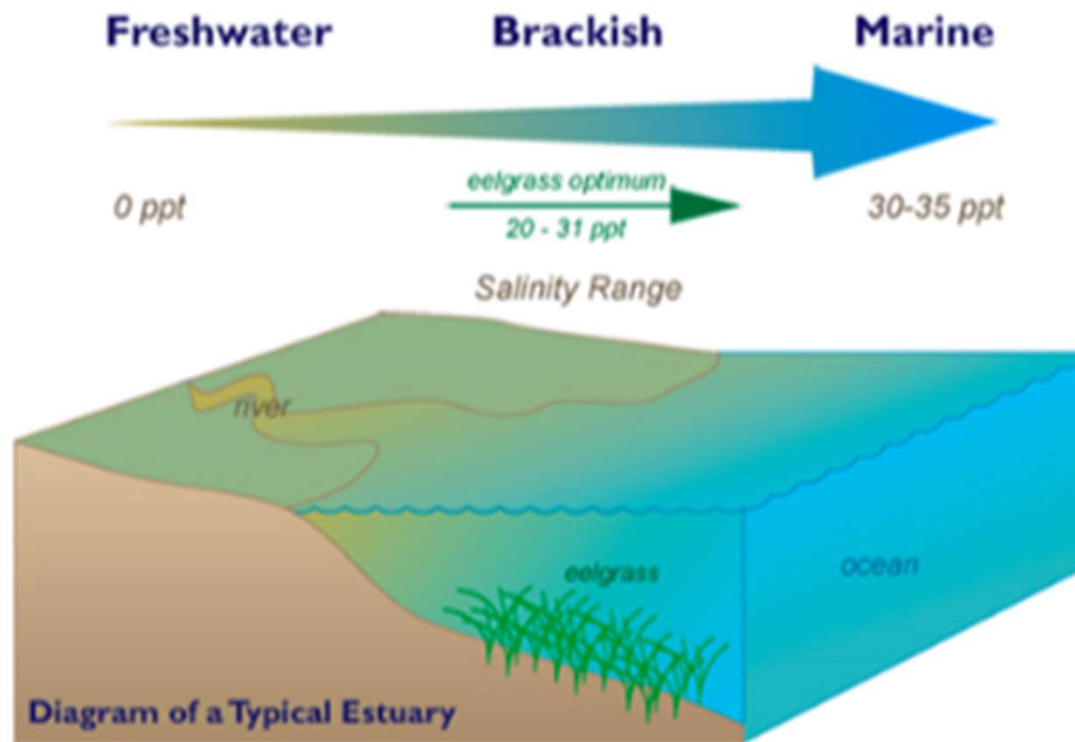


**Brackish water:** Water has a higher salinity than fresh water but is not as salty as seawater.





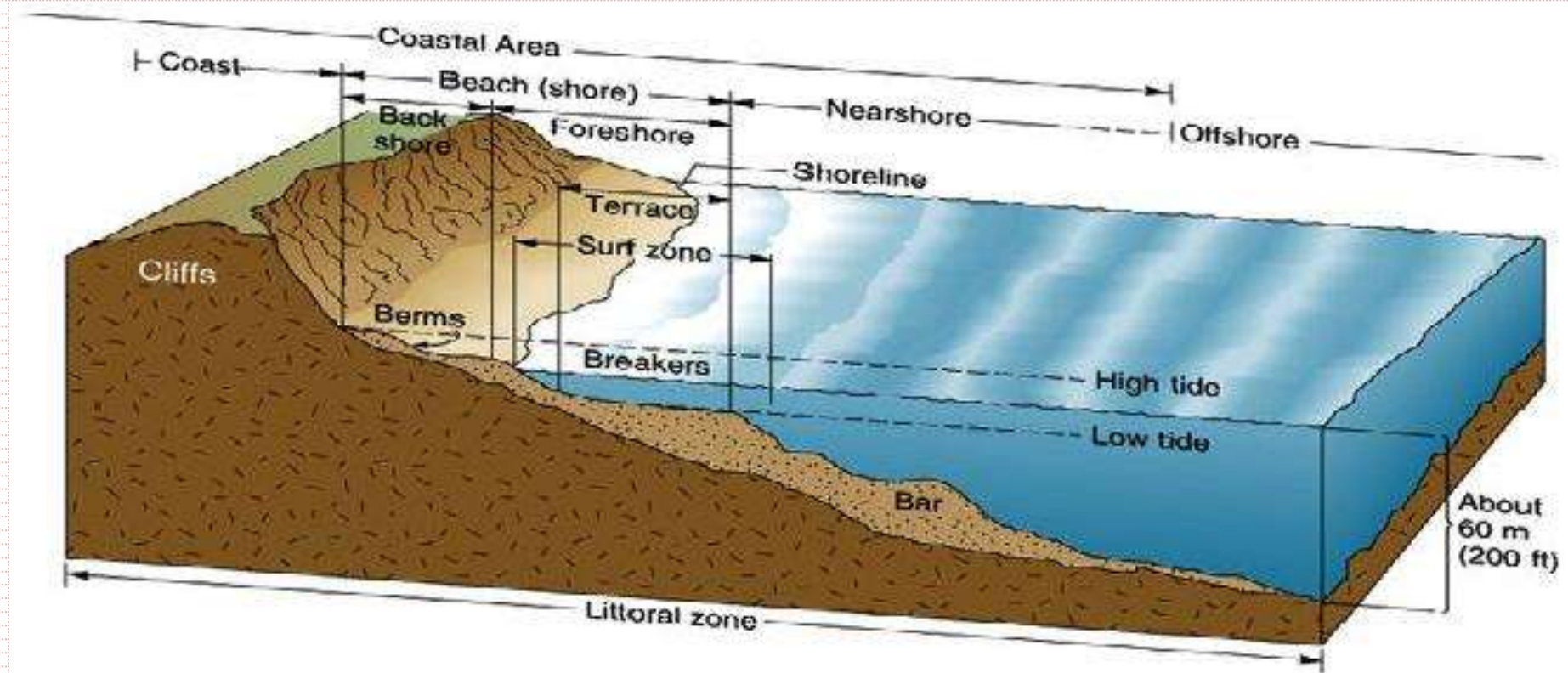
**Brackish water:** Water has a higher salinity than fresh water but is not as salty as seawater.



	ppt
FRESHWATER	< 0.5
BRACKISH / ESTUARY	0.5 - 17
BLACK SEA	16
OCEAN RANGE	32 - 37
OCEAN AVERAGE	35

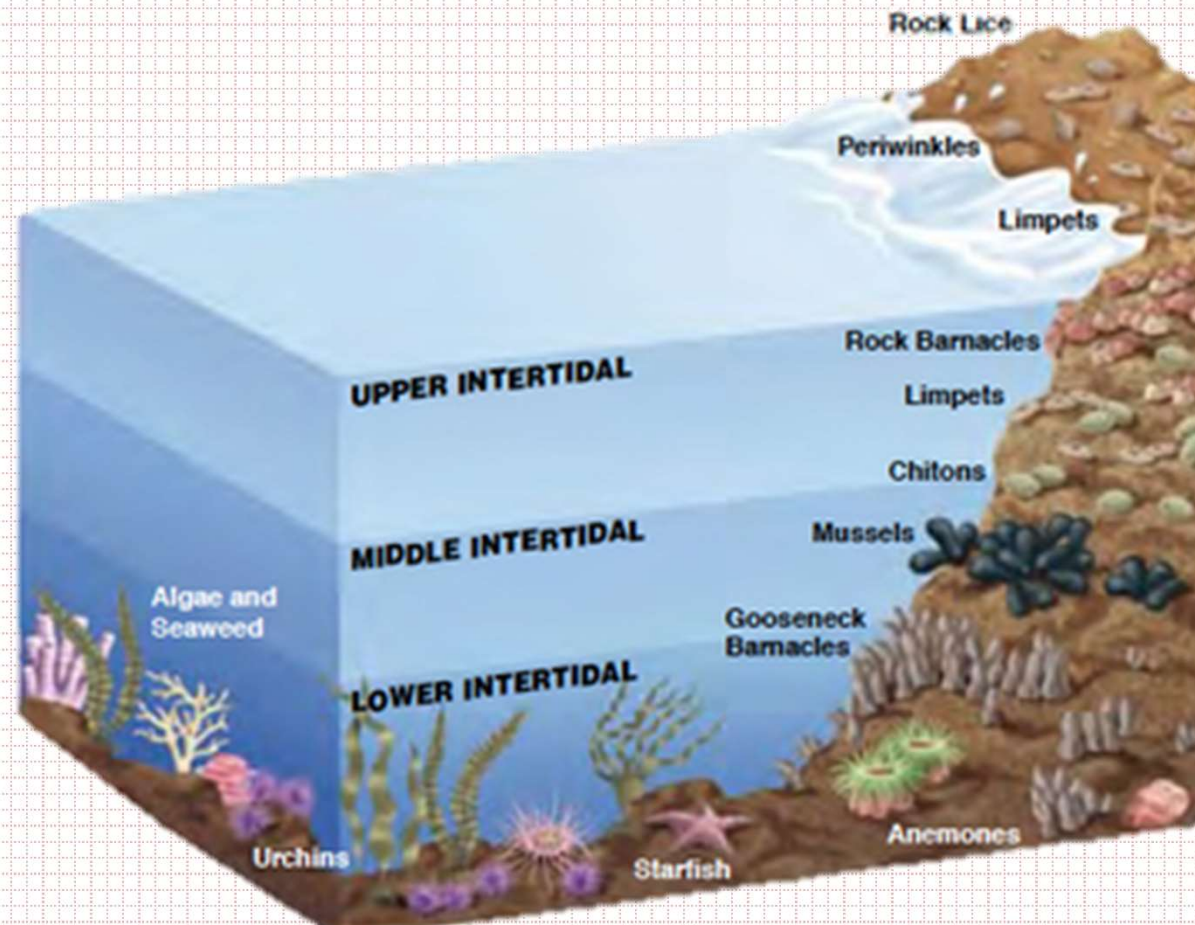


*Intertidal zone*: the area where tidal water can rise and fall, from the highest and lowest tide levels



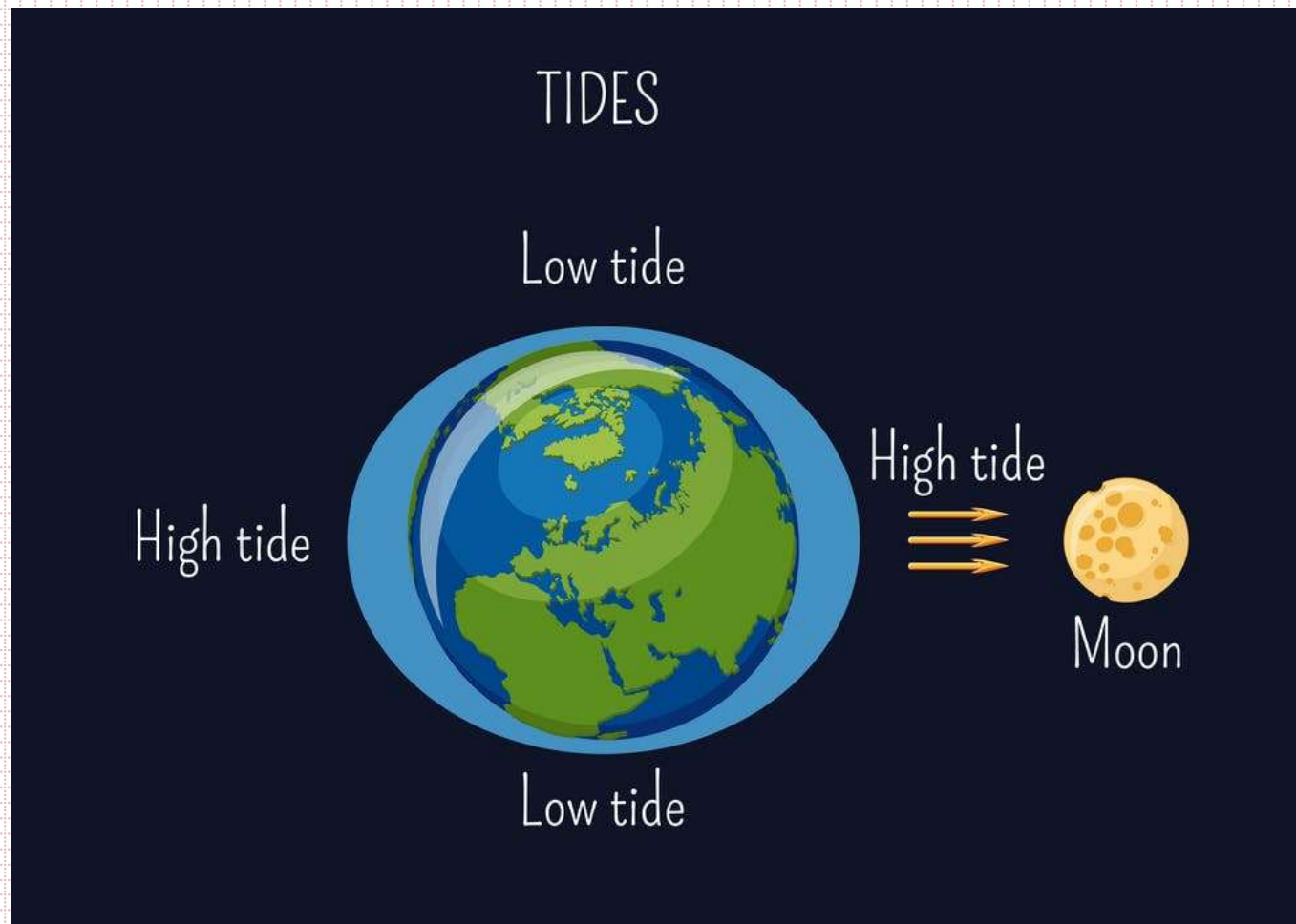


**Intertidal zone:** the area where tidal water can rise and fall, from the highest and lowest tide levels



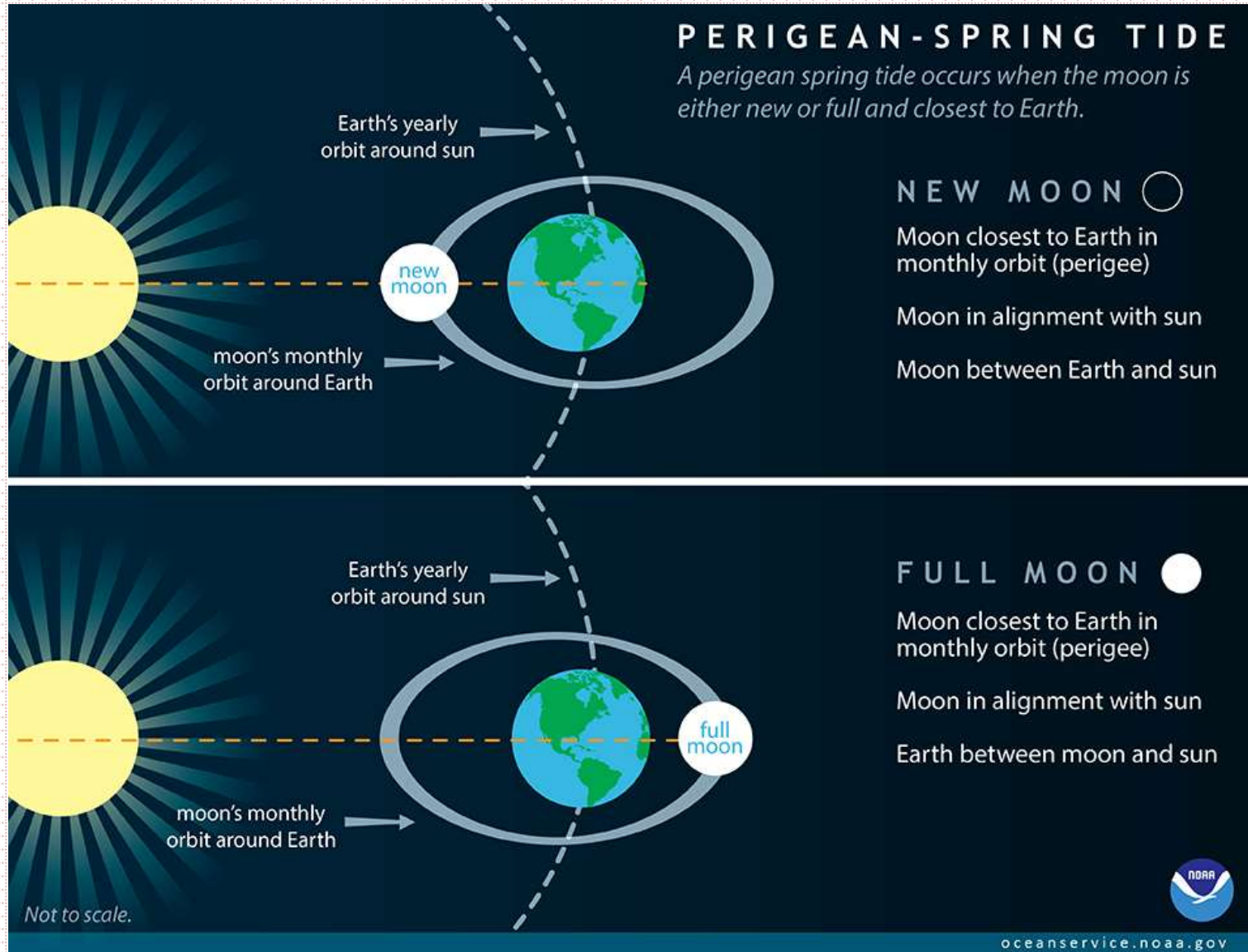


**Tides:** the surface of the ocean rises and falls cyclically, associated with the gravitational forces of the moon and sun to different parts of the earth





## Tides





***Bay:*** is a deeply concave sea, quite large. The boundaries of the bays are largely determined by convention, either taken by protruding muzzles at the bay gates or taken in a deep line.

Depending on the origin, the composition of the coast, and the form and size of the bay, it is possible to divide those waters into the form of gulf, clumsy (flying), liman, lagoon and fiord.





**The bays:** are not large in size, protected against waves by muzzles protruding into the sea. (Nha Trang Bay, Ha Long Bay)



**Shallow puddles:** are shallow bays deep indented inland, with land dunes or dune compartments at clumsy gates. Shallow puddles are the valley of the 50-ing or downstream area that is flooded with seawater.



**Lagoon:** stretching along the coast, is a shallow "bay" containing salt water or brackish water, connected to the sea by not large straits or completely separated from the sea by land. It can also be seawater storage located in the heart of atolls.





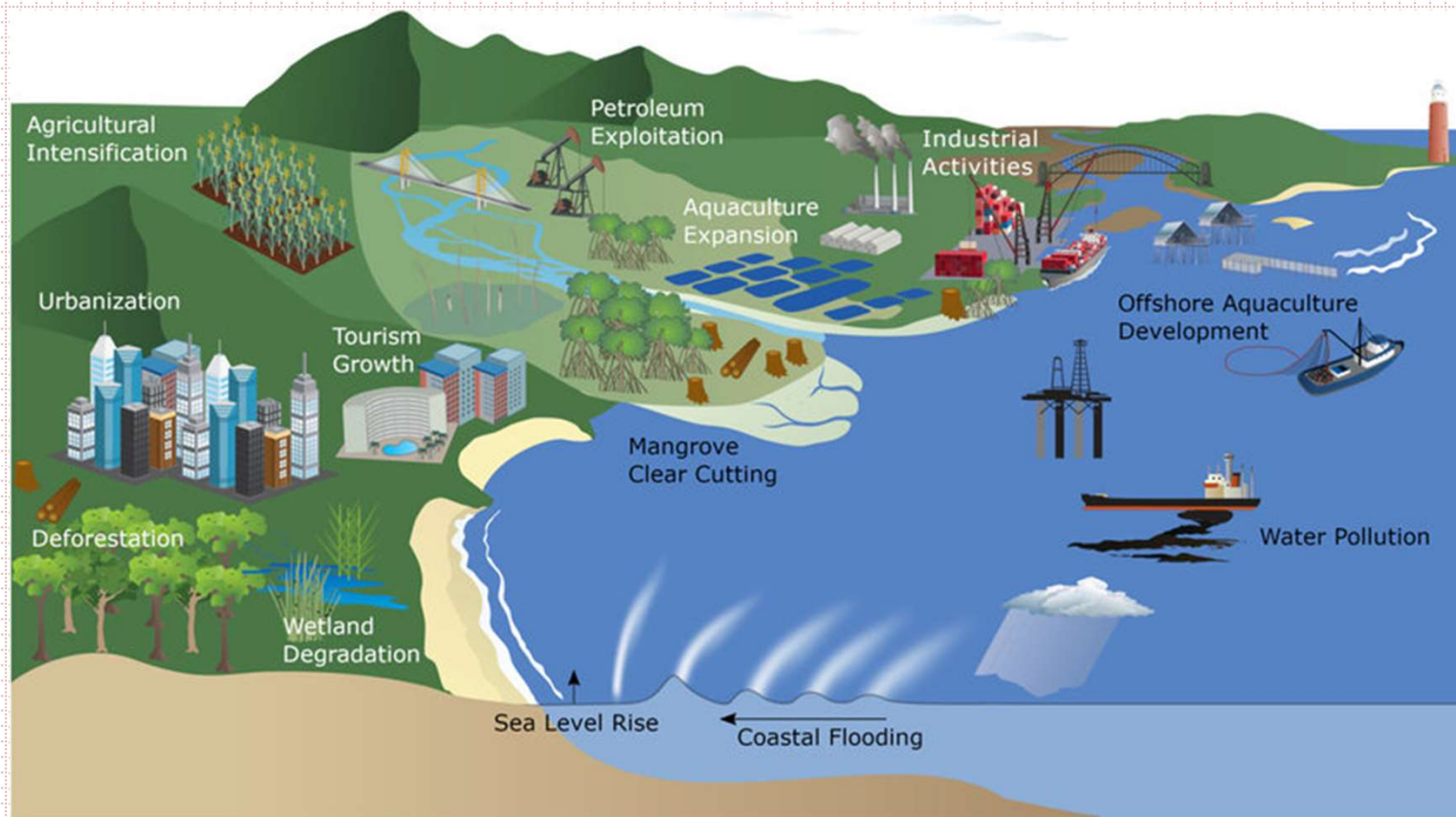
*The coastline* is a tangerine between the sea surface at medium tide level and the surface of the continental flank.

*Coastal land* is a coastal continental strip, regardless of plains or mountains, from the shoreline back into the continental side to where the sea's influence ends, corresponding to the continental boundary of the coastal zone.

*The coastal waters* are coastal waters, from the offshore line to the place where the direct influence of continental processes, corresponding to the maritime boundary of the coastal zone, is terminated.



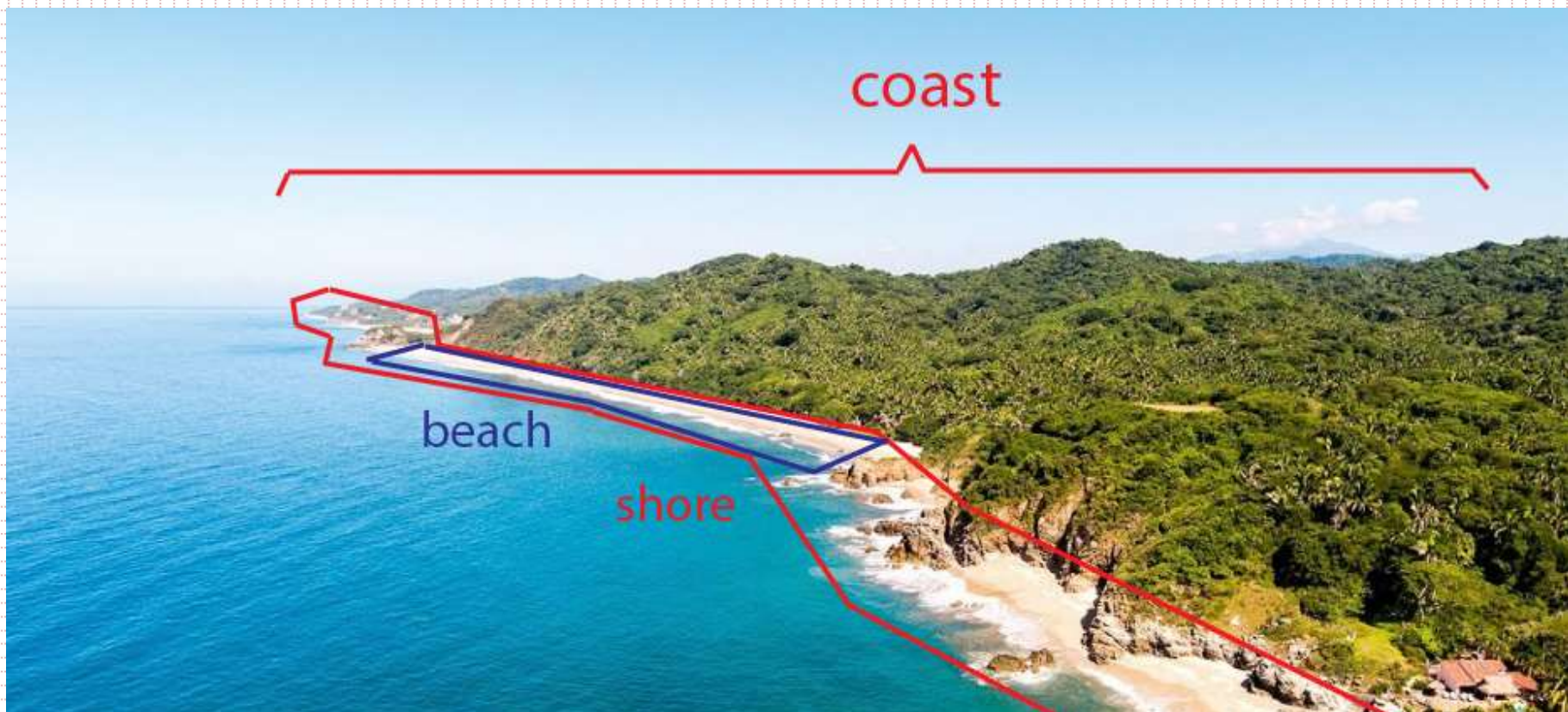
The coastal area is a meeting place between land and sea, always subject to the interaction of continental (river) and sea processes (waves, currents and tides), dynamic processes (upwelling, hypocritical decline), and directly from human activities.





What is the "coastal zone"?

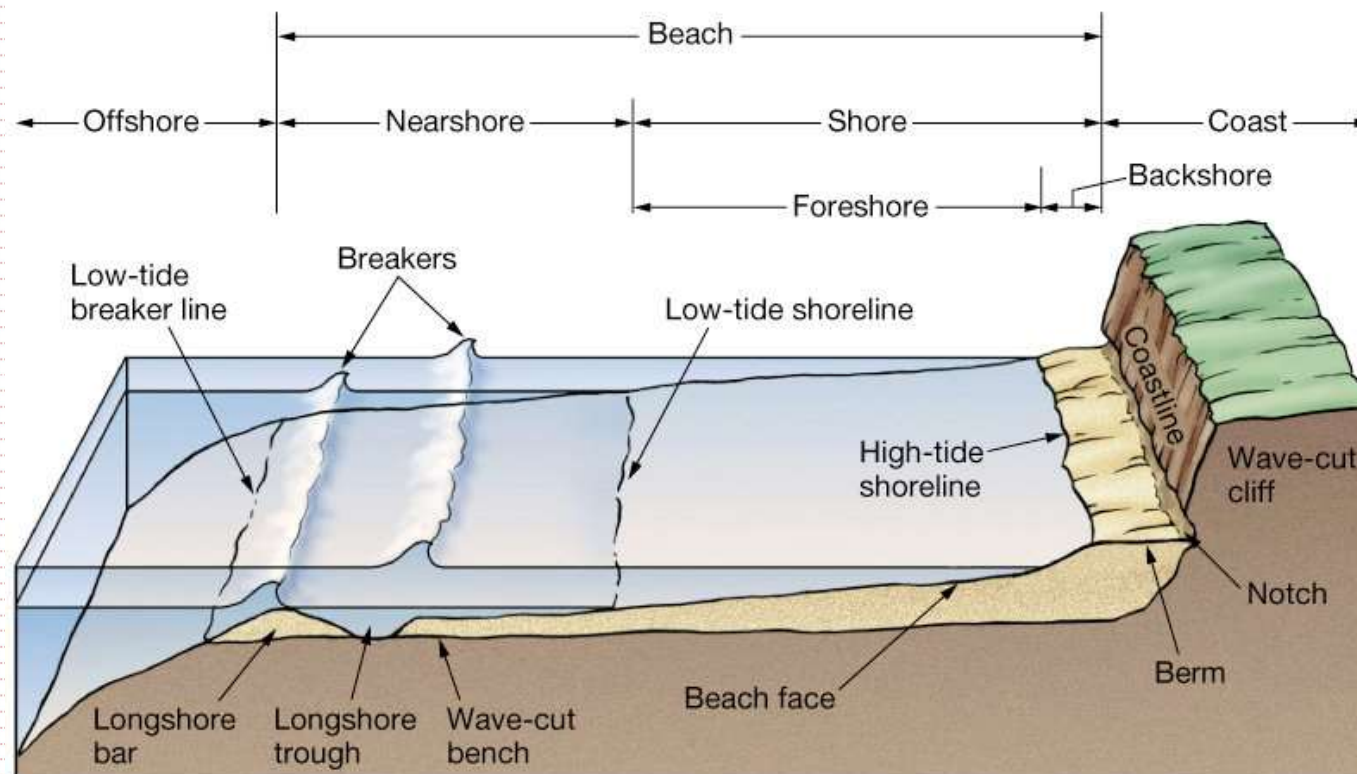
**Coast (or coastal, coastal):** defined as where land and sea are contiguous. The exact boundary is called the coastline, however, this factor is difficult to determine due to the influence of the tide.





## What is the "coastal zone"?

**Coastal zone:** is essentially a planetary-scale natural system, complex and on a par with the surrounding seas and continents. It is characterized by arising, development, evolution and decay, as well as having a distinct resource value that is different from that of the neighbouring continent and sea.





## 2. The formation and development of a country's sea and island spaces

- From 1958 to 1984, coastal states had territorial waters and adjoined waters no more than 12 nautical miles wide, with continental shelves stretching from the sea to no more than 220 meters (according to the 1958 United Nations Conventions on the Law of the Sea).
- Neighbouring countries are either adjacent or opposite each other, based on the law itself, which regulates the scope or boundaries of national waters resulting in overlap and disputes.
- The International law of the sea at that time stipulated that overlapping zones must jointly resolve maritime border lines (including maritime borders in territorial waters, maritime boundaries in contiguity zones and continental shelves) in overlapping areas.
- The principle of border planning at that time was through negotiation on the basis and method of applying the principle of the median line.



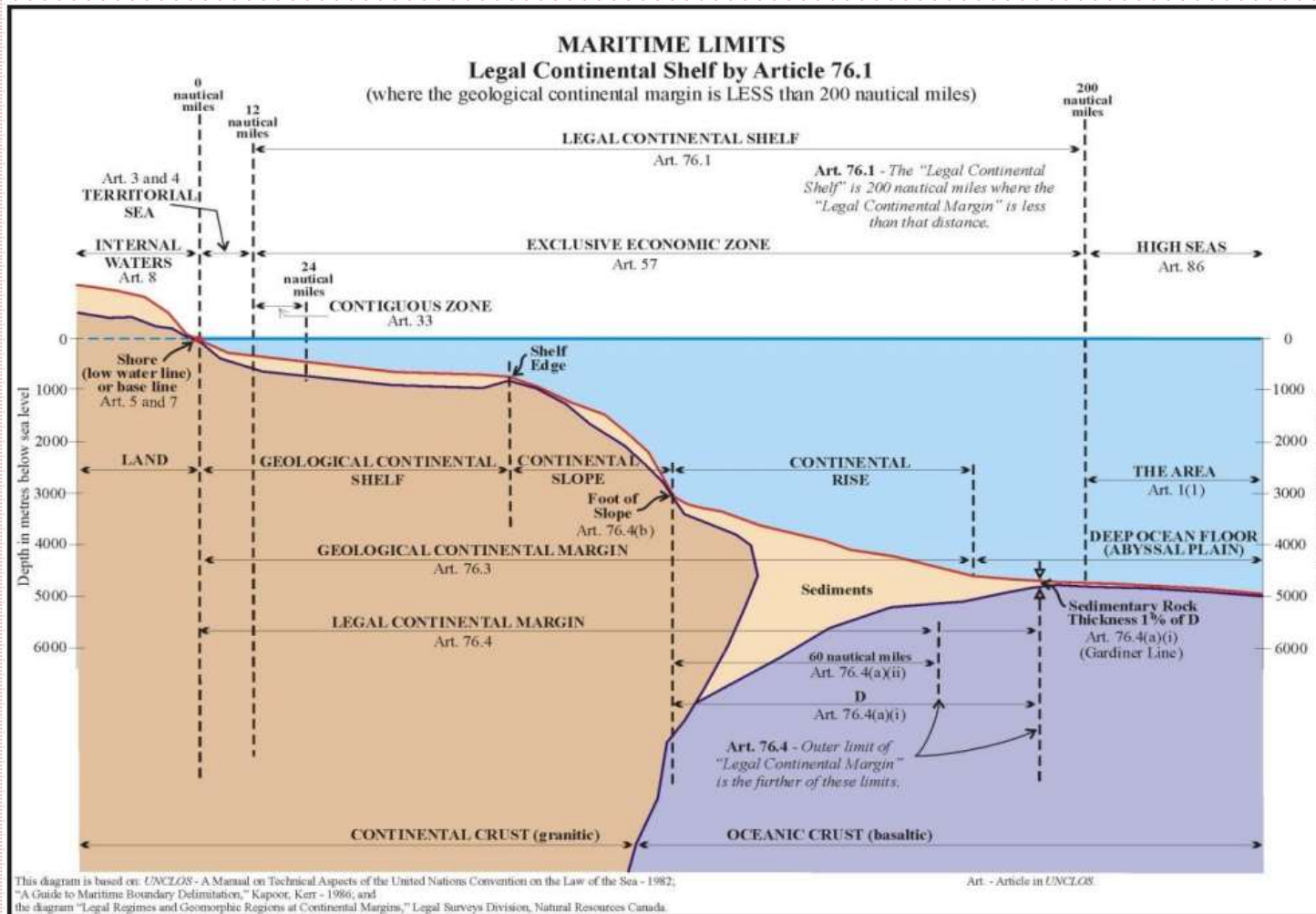
## 2. The formation and development of a country's sea and island spaces

In 1982 Convention (United Nations Convention on the Law of the Sea), a coastal country has five (05) seas:

- Inland Water,
- Territorial Waters,
- The area adjacent to the territorial sea,
- Exclusive Economic Zone,
- Extra continental region



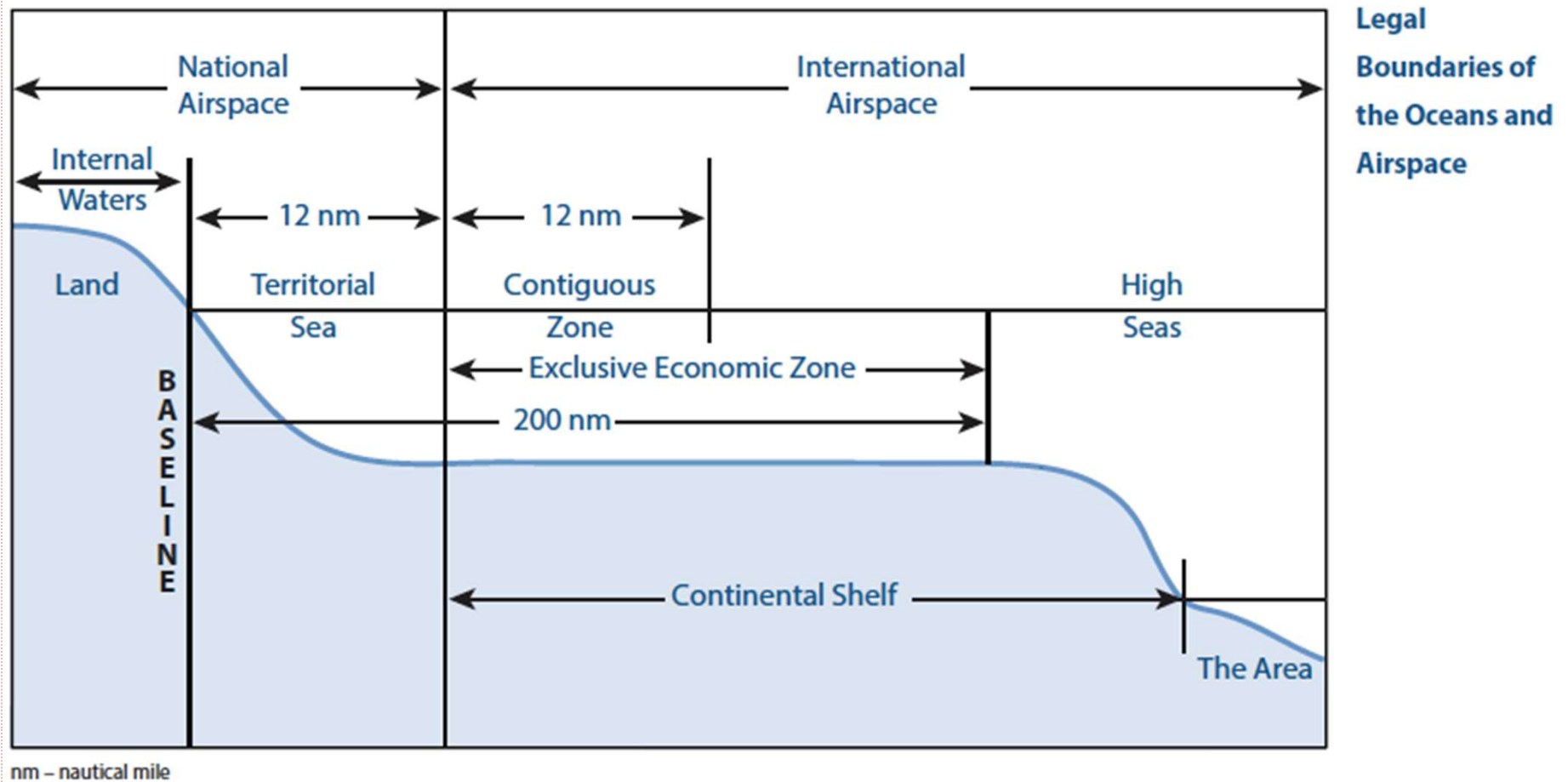
## 2. The formation and development of a country's sea and island spaces



*Diagrammatic division of the Maritime Zones according to the United Nations Convention on the Law of the Sea 1982*



## 2. The formation and development of a country's sea and island spaces





## 2. The formation and development of a country's sea and island spaces

### 1.2.2. Vietnam's main waters

**Internal water:** are the waters located inside the baseline of the Socialist Republic of Vietnam, internal water is considered as land-based territory, placed under the full and absolute sovereignty of the State of Vietnam.

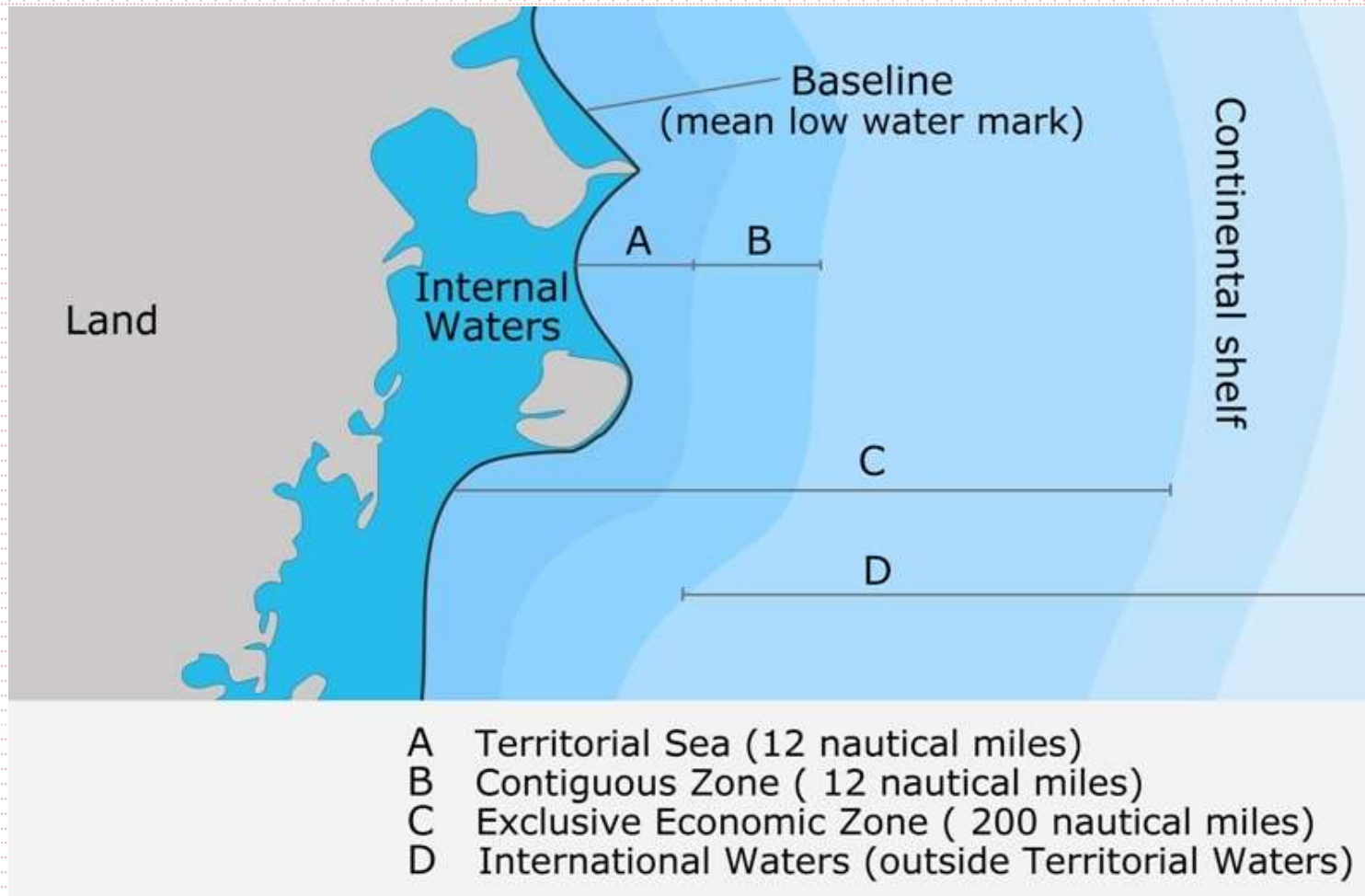


## 2. The formation and development of a country's sea and island spaces

- **Baseline** is the inner and outer boundary of the territorial sea and the outer part of the inland sea, defined by the coastal state or archipelago state by the 1982 United Nations Convention on the Law of the Sea to act as a basis for determining the scope of the waters under national sovereignty and jurisdiction. It is a road used as a base for calculating the width of territorial waters and other seas.
- **There are two types of baselines:**
  - *Normal baseline*: Is the road that uses the lowest tide water on the coast or island.
  - *A straight baseline* is the line connecting the most protruding points or islands of the continental coast or island. Straight baselines apply when the coastal national coastline is divided or has a chain of islands attached and runs along the coast.



## 2. The formation and development of a country's sea and island spaces

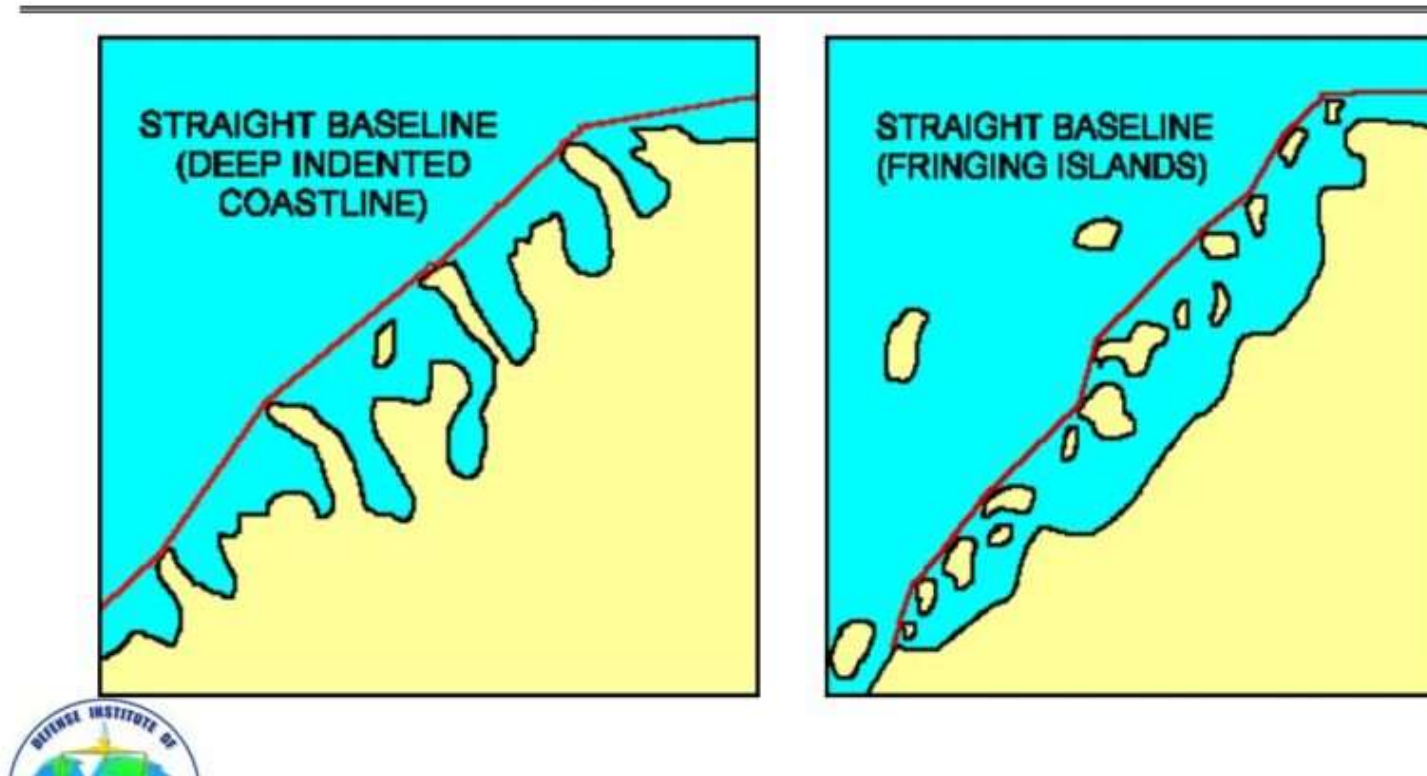


*Normal baseline*



## 2. The formation and development of a country's sea and island spaces

### Straight Baselines



*Straight baselines*



## 2. The formation and development of a country's sea and island spaces





## 2. The formation and development of a country's sea and island spaces

*Territorial Waters:* Vietnam's territorial waters are 12 nautical miles wide, outside the baseline.

The outer boundary of the territorial sea is the border of the coastal state.

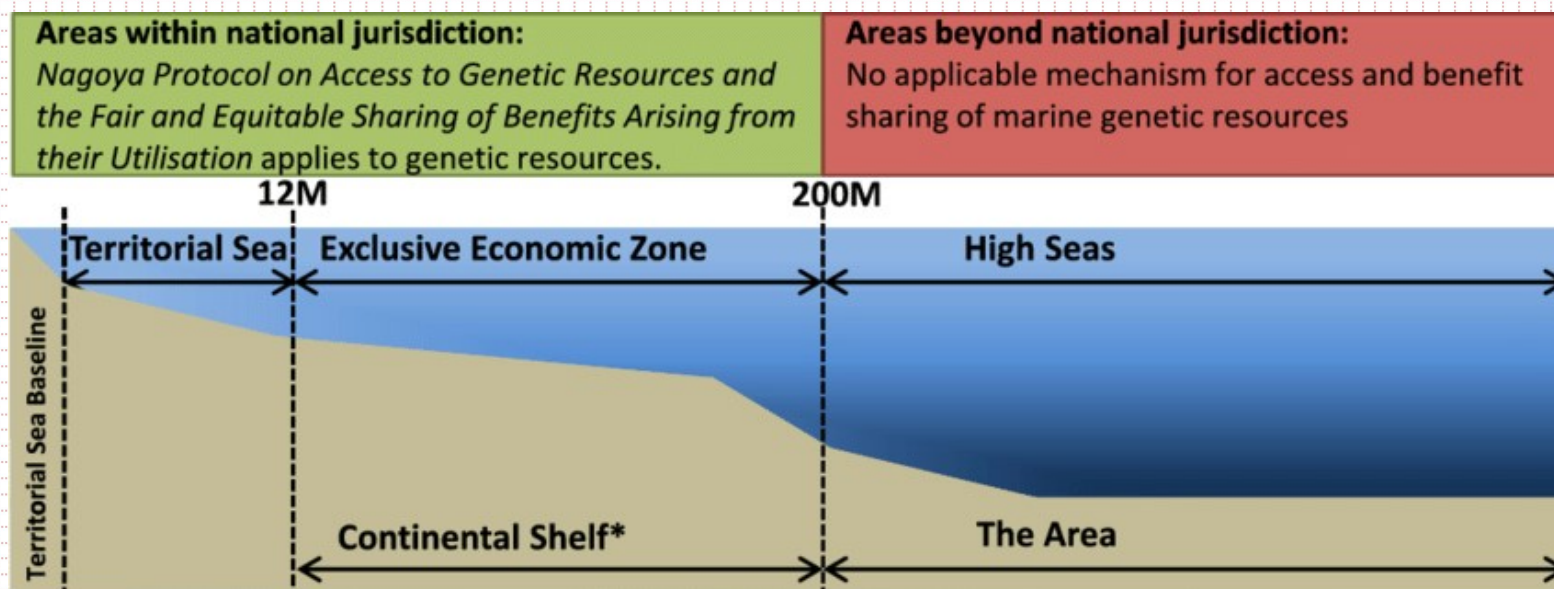
According to the 1982, United Nations Convention on the Law of the Sea, sovereignty over territorial waters is not as absolute as inland waters, ships of other countries are "passing through without harm" in territorial waters.

Coastal States have the right to designate routes and regulate the division of traffic flows for foreign vessels passing through territorial waters to ensure their sovereignty, national security and interests.



## 2. The formation and development of a country's sea and island spaces

- Contiguous zone of territorial sea is a contiguous sea outside the territorial sea with a width of 12 nautical miles, suitable for the territorial sea into an area of 24 nautical miles from the baseline used to calculate the width of the territorial sea.
- Coastal States are permitted to exercise the necessary control in the contiguity of their territorial waters in order to protect their customs and tax interests, ensuring respect for regulations on health, migration, immigration on their territory or in their territorial waters.

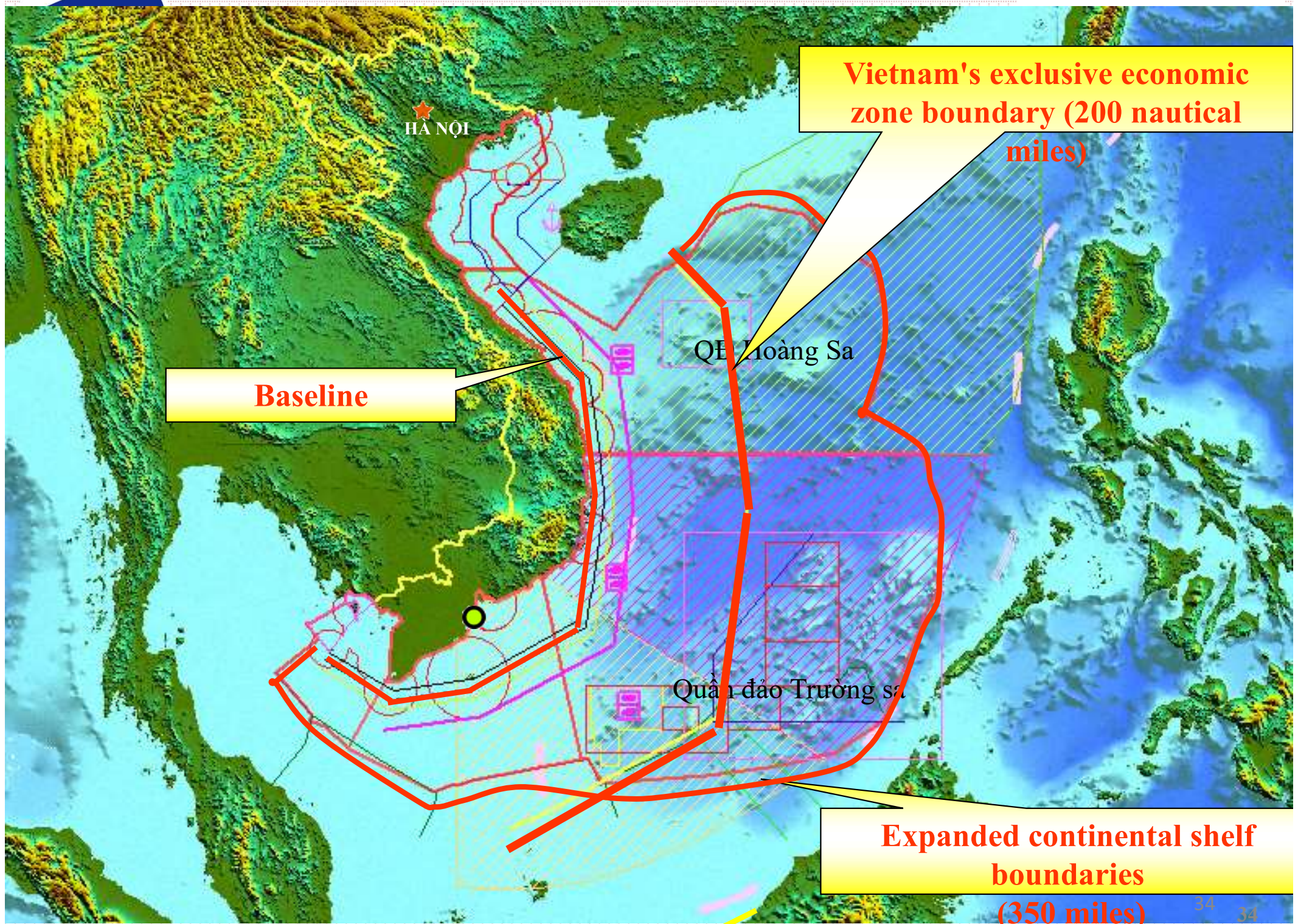




## 2. The formation and development of a country's sea and island spaces

- **Exclusive economic zone:** contiguous territorial waters and in accordance with territorial waters into 200 nautical miles wide from the baseline used to calculate the width of the territorial sea.
- **Coastal States** The Coastal States have full sovereignty over the exploration, exploitation, protection and management of all-natural, biological and non-biological resources in the waters, at the seabed and in the under-seabed of their exclusive economic zones;
- Having separate rights and competencies for other activities for the exploration and exploitation of the exclusive economic zone for economic purposes;
- Having separate competencies on scientific research, environmental protection and anti-pollution in exclusive economic zones; have the right to install artificial works and equipment. Other countries have freedom of flight, freedom of navigation, laying of underground cables and pipes.





**Vietnam's exclusive economic  
zone boundary (200 nautical  
miles)**

**Baseline**

QE Hoàng Sa

Quần đảo Trường sa

**Expanded continental shelf  
boundaries  
(350 miles)**



## What is management?



Broad  
definition

: Is a continuous, repetitive process, adaptation and community participation and consists of a series of related tasks. All of these tasks must be done to achieve a series of desired **Goals and Objectives**

**What is  
management?**

Simple

Is "organizing and controlling activities according to certain requirements".

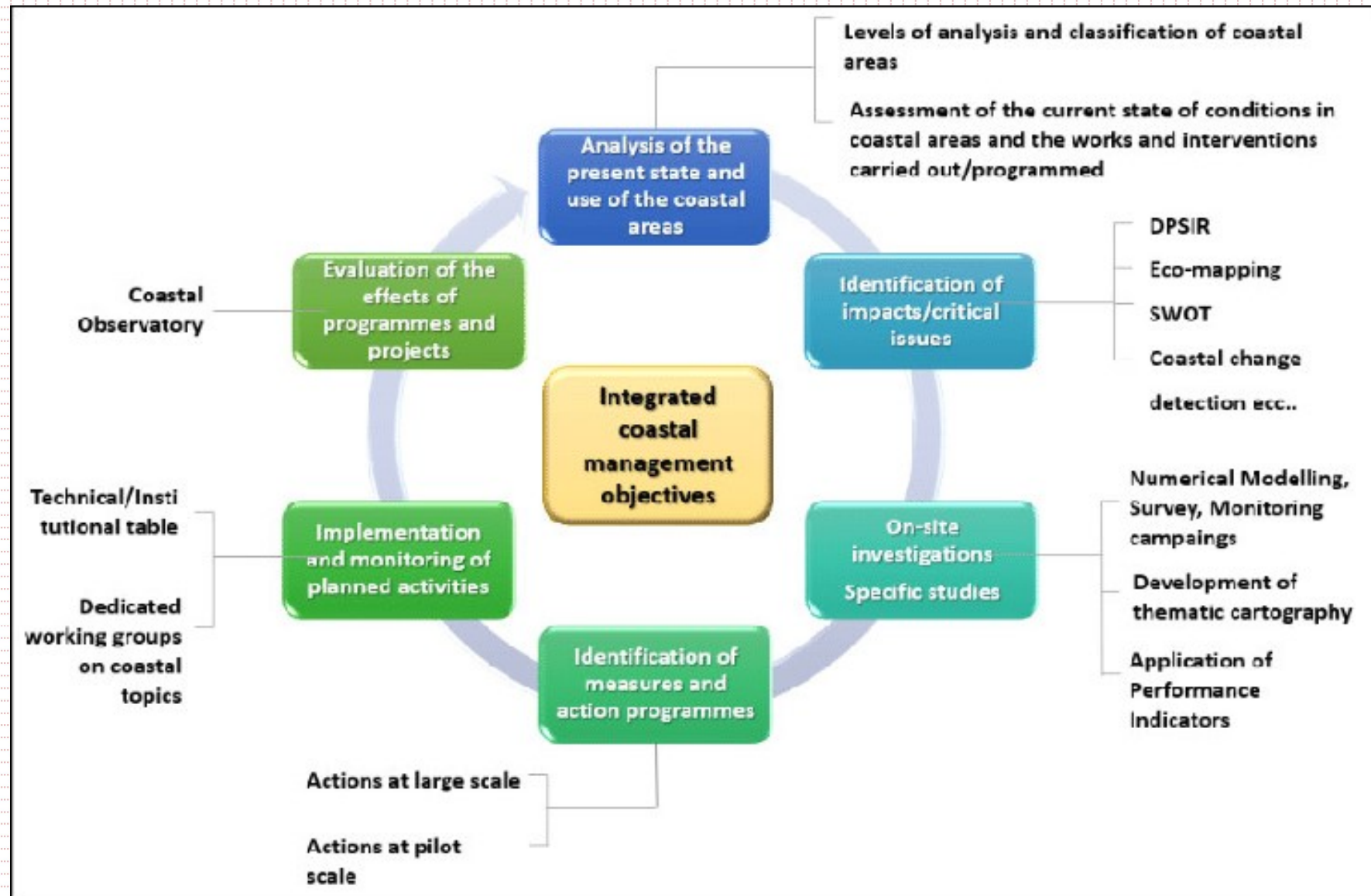
Specific  
definition

Is the characteristic for the process of **controlling and guiding** all parts of an organization, through the establishment and change of resources (human resources, finance, supplies, intellectuals and other values )





## What is management?

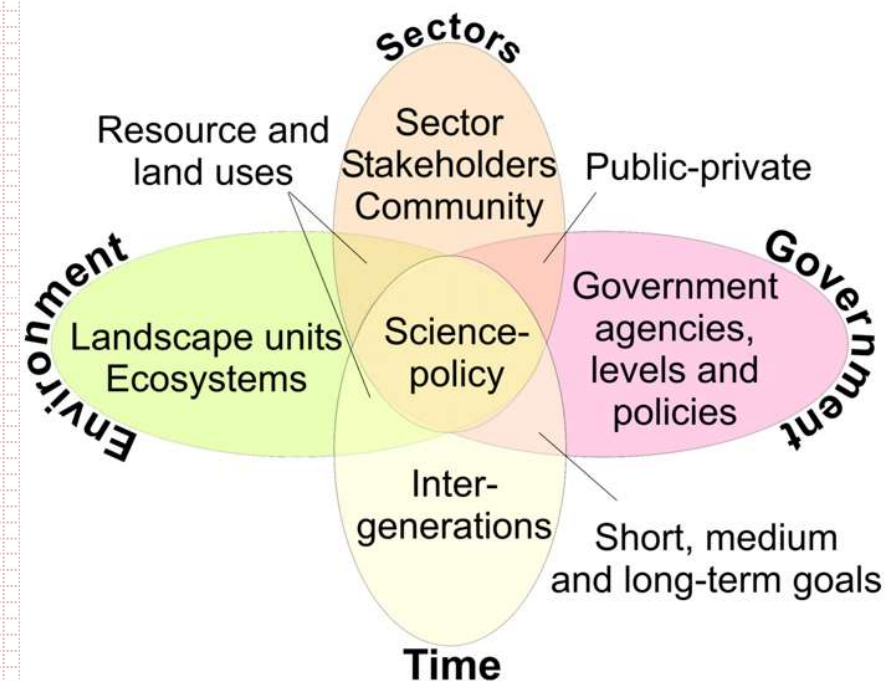
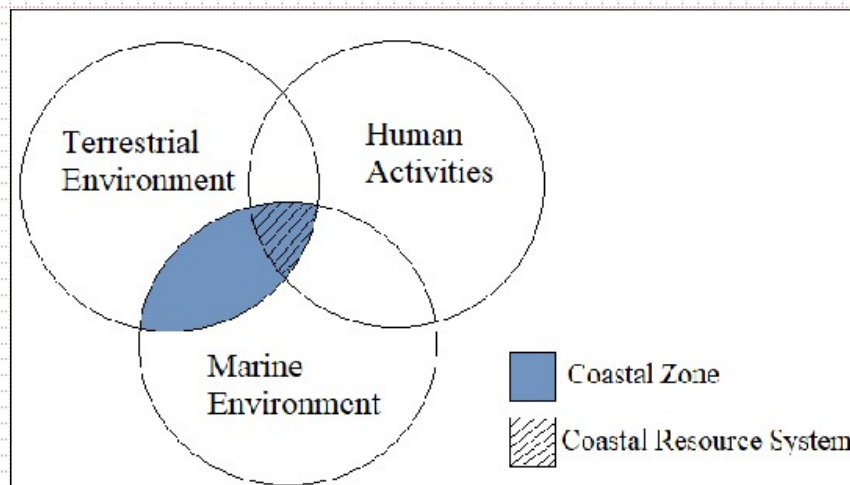




## Integrated Coastal Zone Management

Integrated Coastal management involves complex issues, desirable (and often conflicting) outputs to coastal resources, the different production possibilities spatially and temporally within each region, close or fragmented linkages with areas upstream and beyond, multiple sectors, and agencies with different responsibilities for management aspects (Bowler, Ehler and Basta, 1994).

*M.E. Portman et al. / Science of the Total Environment*

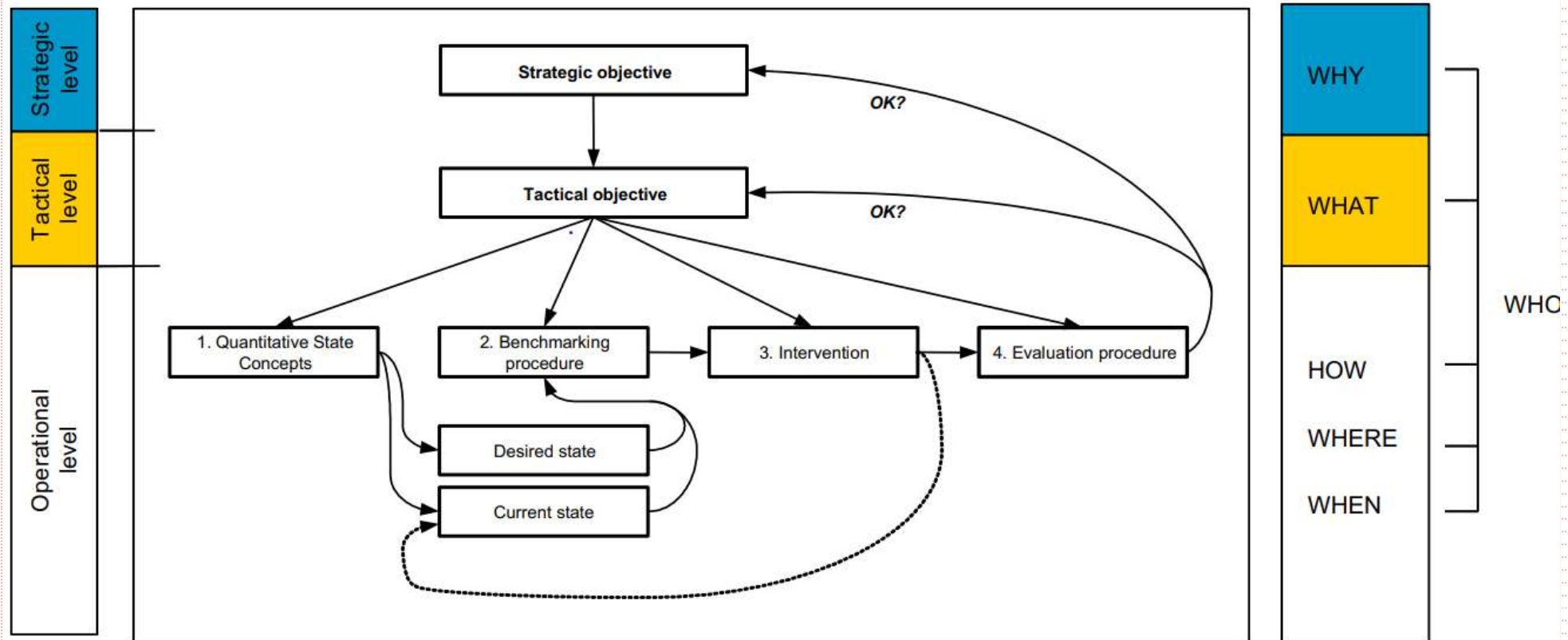




## Principles of Integrated Coastal Zone Management

- 1) Think ahead e by thinking beyond traditional planning time frames, to plan for long-term issues such as climate change.
- 2) Try to see the bigger picture e by taking both the land and marine dimensions of the coastal zone into consideration in planning and management.
- 3) Be flexible and adaptable e by taking a 'learning by doing' approach to management.
- 4) Work with nature rather than against it e by recognising the limitations of the coastal systems for assimilating pollution and the negative impacts of development and human activity.
- 5) Use a combination of tools - by using techniques such as awareness raising, technology, legal and policy instruments to achieve management objectives.





Generic Frame of Reference for coastal management



The actual management process regarding interventions can be formulated through four steps, namely:

1. Quantitative state concept: a means of quantifying the problem in hand. Coastal state indicators (CSIs) (i.e. specific parameters that play a role in decision-making) are relevant at this stage of the process.
2. Benchmarking process: a means of assessing whether or not action is required. CSIs are compared to a threshold value at this stage.
3. Intervention procedure: A detailed definition of what action is required if the benchmark values are exceeded.
4. Evaluation procedure: Impact assessment of the action taken. If the action was not successful it may be necessary to revise the strategic/operational objectives



## II. MARINE ENVIRONMENT

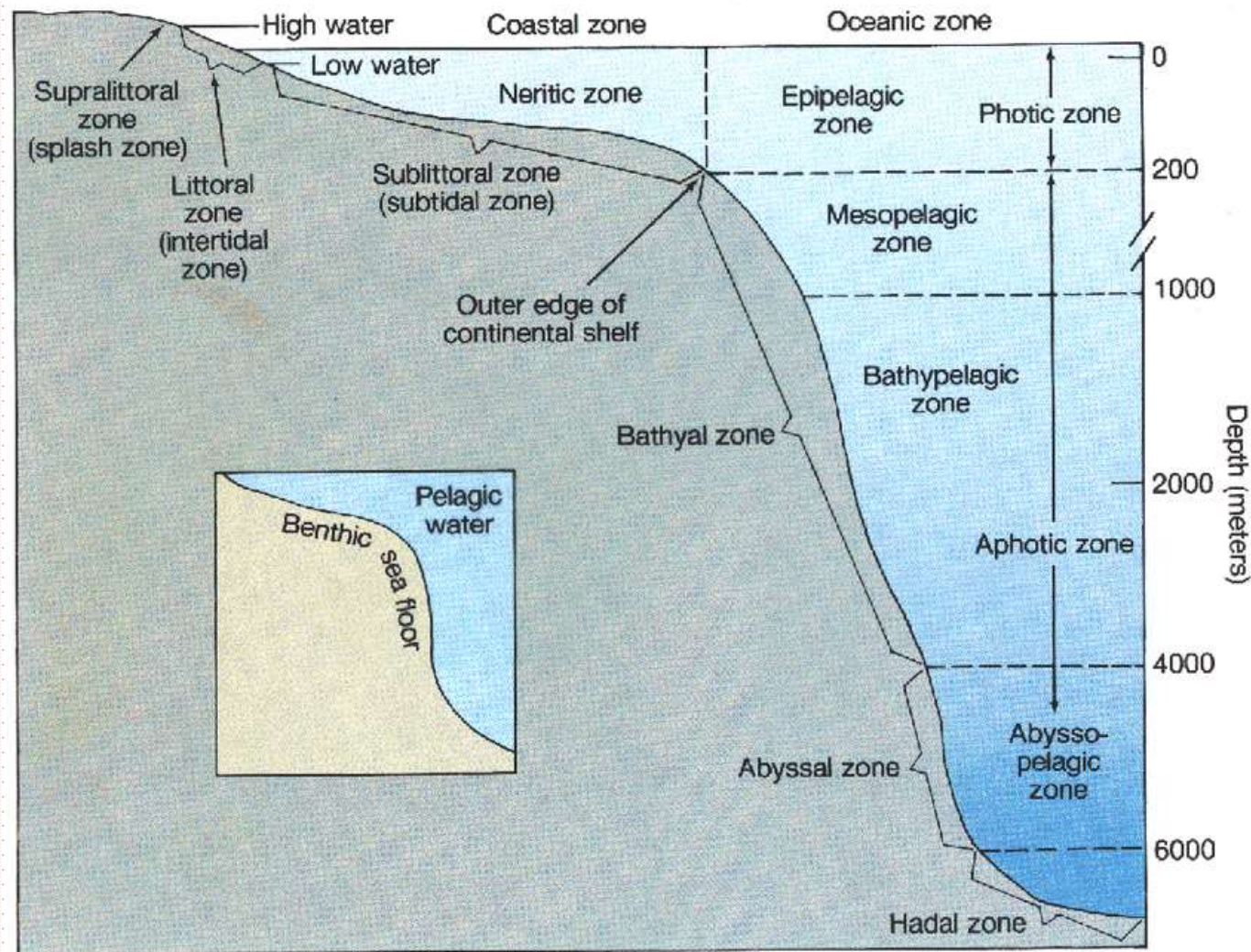


Marine environment: a region consisting of oceans, seas and coastal regions that form a whole, a fundamental part of the global life maintenance system and a useful asset that creates opportunities for sustainable development.

## Characteristics of the marine environment

- (i) is a space, a part of the earth consisting of seawater, seabed and sub-seabed of oceans, seas and coastal regions forming a unified, interactive relationship;*
- (ii) the important function and value of the marine environment are to maintain global life as well as a valuable resource to ensure sustainable development. However, this concept does not specify the components of the sea including the entire living organism, the species of animals, plants and ecosystems, landscapes and non-biological resources found in these waters.*





Marine Environment Zones from Duxsbury and Duxbury, 1994.



- Marine living resources are of vital importance for mankind because they constitute an important source of protein and so their conservation is to be considered a common interest of the international community. Marine living resources are also important for the international trade and industry of many countries. Hence, conservation is not only a pure scientific or biological concept but involves also economic, political and social elements.
- Despite its vital importance and the danger that marine pollution represents, the need to regulate it has attracted little attention until recently as the law of the sea focused on the use of the oceans not on the protection of them.



- It is only since World War II that international regulation of marine pollution has begun to develop and moved slowly until 1950s.
- In 1958, Geneva Convention of the High Seas covered a few sources of marine pollution, as discharge of oil from ship and the resulting from exploitation and exploration of seabed and its subsoil.
- in 1967, the incident of Torrey Canyon raised public and international the attention for vessel source pollution and in 1969 the first international Convention of Civil Liability for Oil Pollution Damage was adopted.
- in 1970s and 1980s were concluded some treaties about regulation of marine pollution as Marpol 1973, modified by 1978 Protocol, providing the key instruments for regulating pollution from ships till the 1982's LOSC.



The UN Convention on the Law of the Sea (LOSC) established a general framework for marine environment protection stating that “States have the obligation to protect and preserve the marine environment” as in the oceans as in the High Seas. The framework covers all sources of marine pollution and obliges States to take all measures that are necessary to prevent, reduce and control pollution and constitutes a uniformity of rules.

LOSC defines “marine pollution” as “the introduction by man, directly or indirectly, of substances or energy into the marine environment, including estuaries, which results or is likely to result in such deleterious effects for living resources and marine life, hazards for human health, hindrance to marine activities”.



Protection of the marine environment is the prevention of the negative impact of human and natural activities on the marine environment, polluting and degrading the marine environment and coastal marine areas.

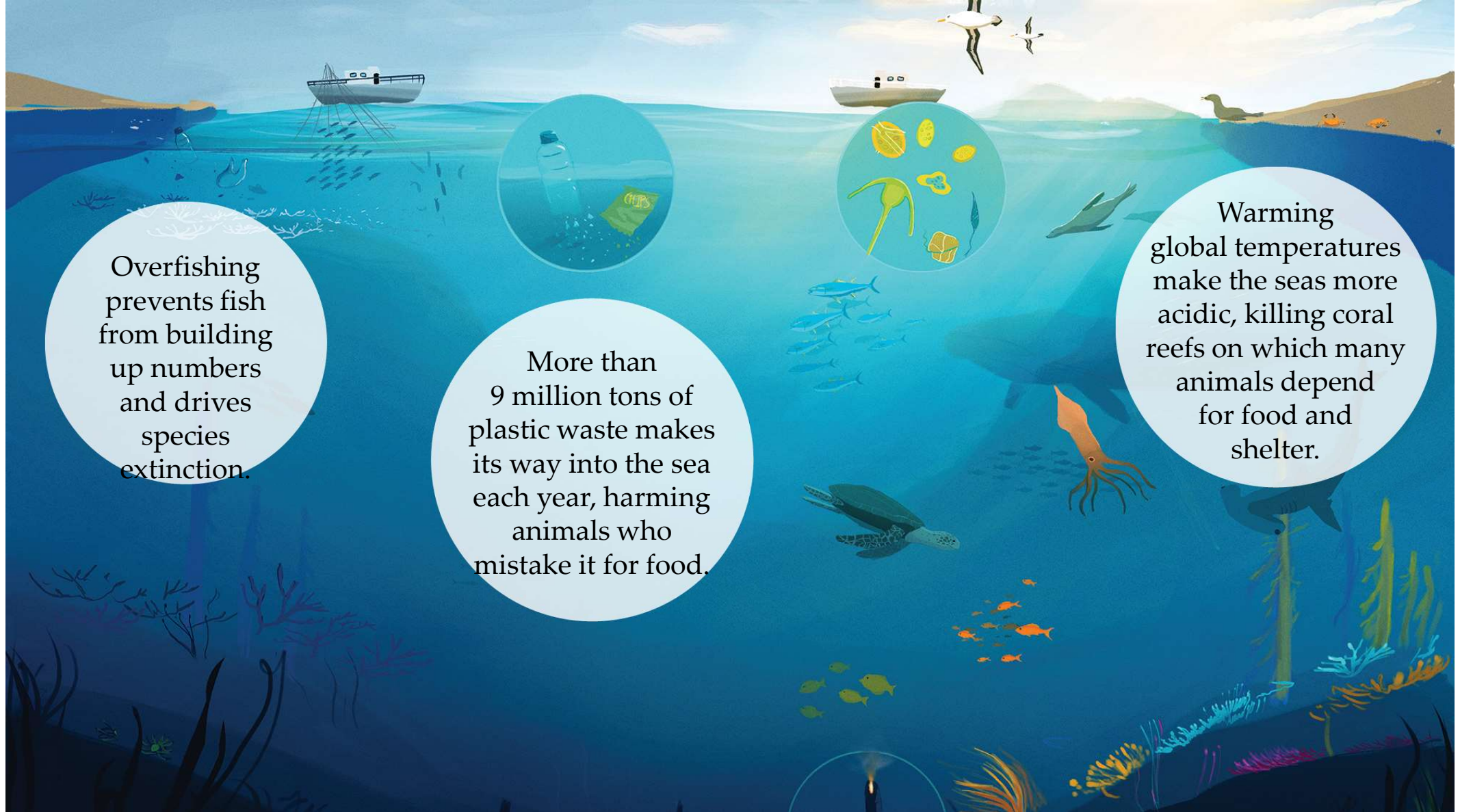
*The definition indicates:*

- *Firstly, the nature of environmental protection is to prevent negative effects on the marine environment, specifically polluting activities and degradation of the marine environment;*
- *Second, polluting activity is caused by humans or natural causes. However, the author does not mention the mechanism which includes ways and measures to prevent negative effects on the marine environment.*



- Two major pollution types:
  - **Point sources:** From an identifiable “point” such as a factory
  - **Nonpoint sources:** Not from a single “point”; Carried to water by runoff from various sources
- Sources of marine pollution:
  - Runoff, sewage treatment plants, factories, oil spills, accidents, ocean dumping, offshore drilling, airborne emissions
  - Example: Deepwater Horizon Drilling Rig Explosion (2010)
  - Can you think of others?
- Some effects of pollution:
  - Seafood and water contamination, loss of marine organisms, beach closures, economic losses, eutrophication





Overfishing prevents fish from building up numbers and drives species extinction.

More than 9 million tons of plastic waste makes its way into the sea each year, harming animals who mistake it for food.

Warming global temperatures make the seas more acidic, killing coral reefs on which many animals depend for food and shelter.

# What's the problem?

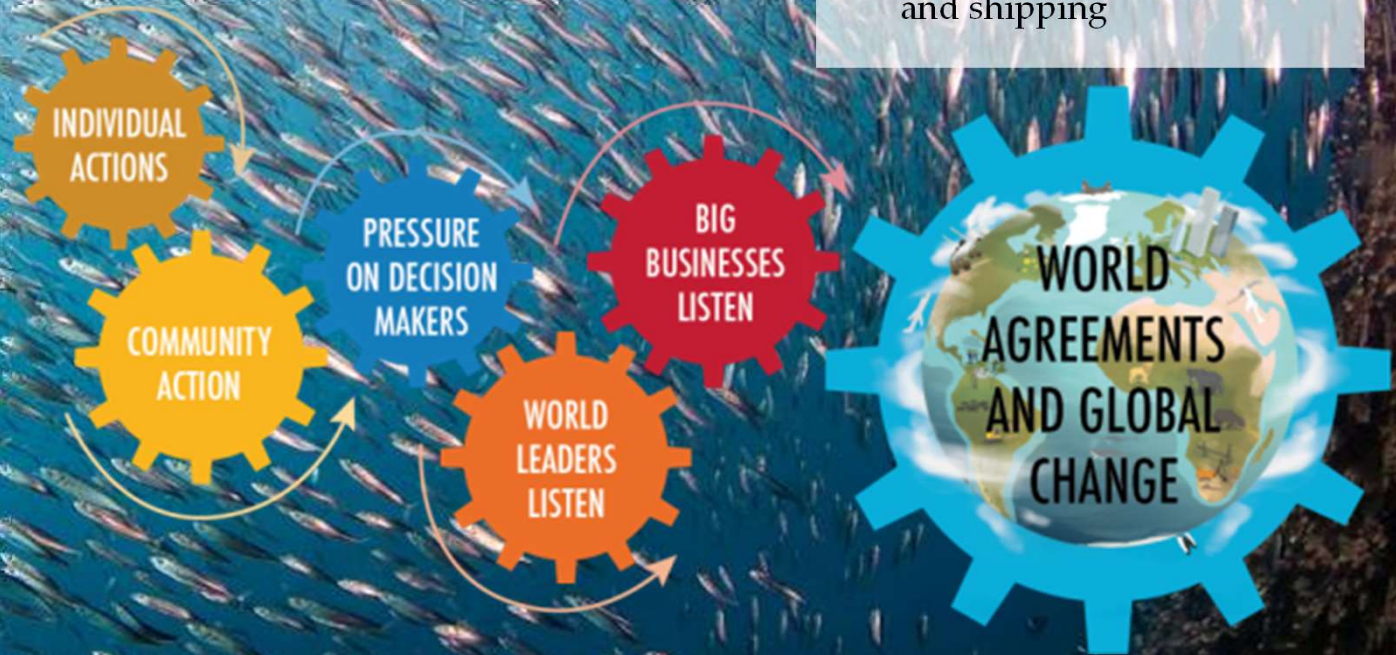


### Global change

- Create Marine Protected Areas in costal waters
- Need for an international treaty to protect high seas from overfishing, mining and shipping

### Individual actions

- Buy sustainable fish and seafood
- Reduce plastic use, reuse and recycle
- Reduce use of fossil fuels that contribute to global warming
- Hold businesses to account
- Ask politicians to protect oceans



# What can we do?



- Marine pollution: Quality of sea water, sea litter
- Degradation of marine biodiversity, typically coral ecosystems





- Marine life requires habitat for survival and growth
- Habitat loss may impact species dependent upon these areas
- Sources of habitat destruction include natural and human factors
- Examples
  - Coastal development that results in wetlands loss
  - Hurricanes may damage barrier islands and seagrass beds
  - Dams may block salmon from reaching freshwater habitats

Photo: NOAA



Mangroves, vital nursery habitat for many tropical species, used to cover around 60-75% of the earth's tropical coastline. By 2010, about 50% of mangroves had been destroyed.



Destruction and extinction of some species, seafood near the shore





- Waste, polluted wastewater lose beauty, causing the revenue of the tourism industry to be severely damaged





- Damage machinery, resource extraction equipment and waterway transportation.
- Impacting and holding back the development of the marine economy,... Due to the loss of chi
- Environmental troubleshooting fees



*Marine life in Central Vietnam dies from Formosa pollution*



# REVIEW QUESTIONS



**Which side of the South China Sea is our coast located:**

**1**

- A. Eastern.**
- B. West.**
- C. Southern.**
- D. Northern.**

**RUNG CHUÔNG VÀNG**





2

**Which of the following countries  
is not located on the East Coast:**

- A. Mianma.**
- B. Campuchia.**
- C. Brunay.**
- D. Thái Lan.**

RUNG CHUÔNG VÀNG





**How many millions of square kilometers of our waters:**

- A. 0.5 million square kilometers.**
- B. 1 million square kilometers.**
- C. 3 million square kilometers.**
- D. 3.5 million square kilometers.**

**3**

**RUNG CHUÔNG VÀNG**





**How many kilometers of  
coastline does our country have:**

**4**

- A. 1260 km.
- B. 2260 km.
- C. 3260 km.
- D. 4260 km.

**RUNG CHUÔNG VÀNG**







**The sea is seen as a part.  
land-based territory and having a  
regime The legality of the land is called:**

- A. Inland Water.**
- B. Territorial waters.**
- C. The area adjacent to the  
territorial sea.**
- D. Continental shelf.**





**On his continental shelf,  
Coastal water has the privilege of:**

- A. Installation of underground cables and pipes.**
- B. Exploration and exploitation of natural resources.**
- C. Maritime.**
- D. It's all right.**







## **Inland water is:**

- A. The waters are adjacent to the territorial sea.**
- B. The water is 12 nautical miles from the coast.**
- C. The water is located inside the baseline and adjacent to the coast.**
- D. The waters range from the coast to the coastal islands.**



# THE END



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

# Topic 2 - MARINE RESOURCES

## 2.1. Benefit of Biological resources

*Lecturer: MSc. Dang Thi Thanh Le*  
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*MSc. Phung Thi My Diem*



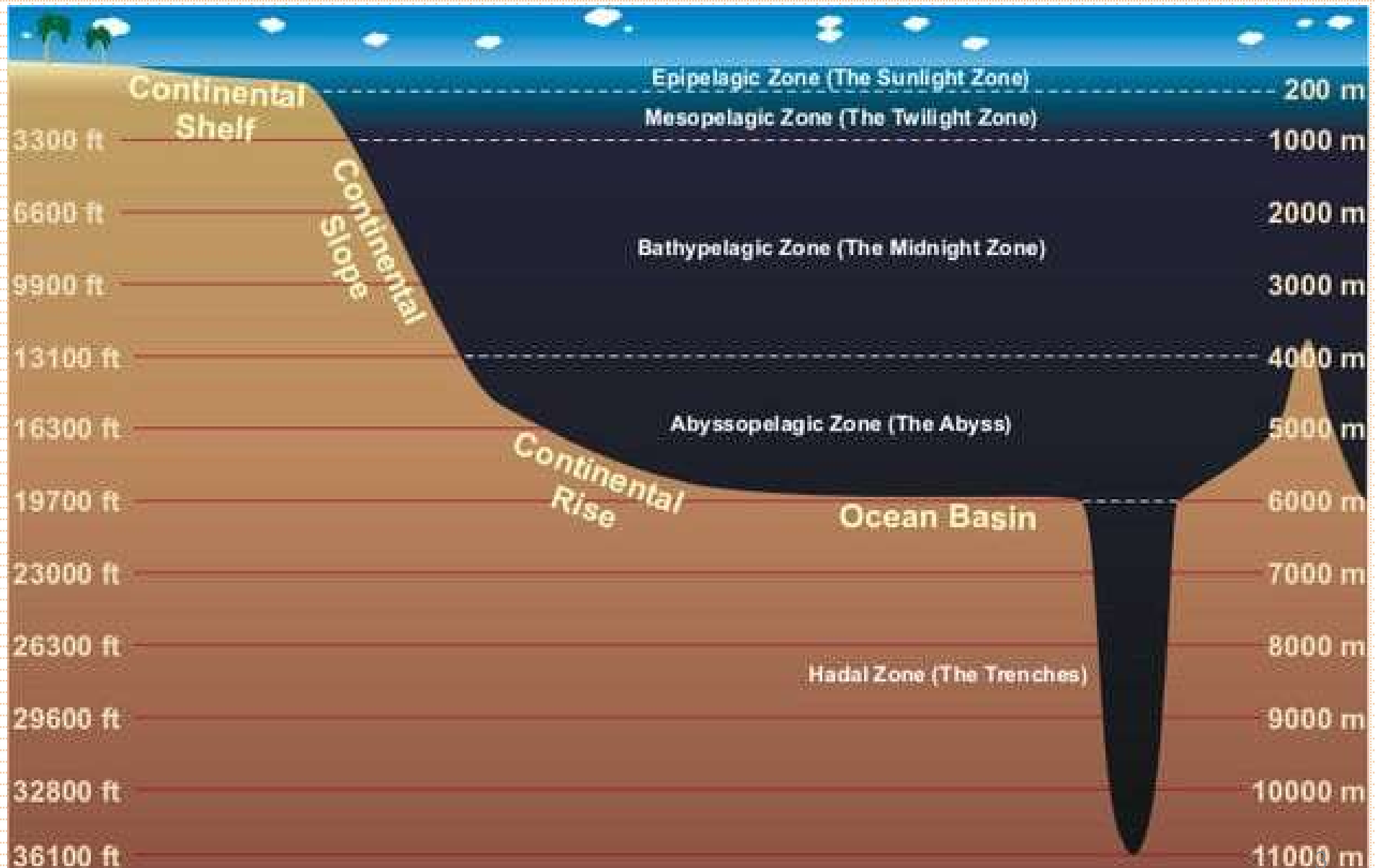
# CONTENT

1. Determinate the division of the sea

2. Biological resource



# 1) How to determinate the section of the sea





## SUNLIT ZONE

0-200 m (0-650 ft)

MANA  
• Up to  
• Lives  
• Found  
Caribbean

GREY  
• Up to  
• Can  
• Main  
Atlantic

200

1000

## TWILIGHT ZONE

200-1000 m (650-3300 ft)

4000

## MIDNIGHT ZONE

1000m (3300 ft) going down to about 6000 m (20000 ft)

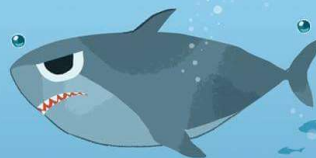
VIPER  
• Up to  
• Usually  
(5000  
surface  
• Found  
oceans

6000

10000



VÙNG BIỂN KHƠI MẶT  
(EPIPELAGIC ZONE):



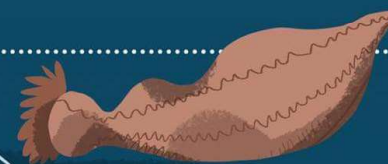
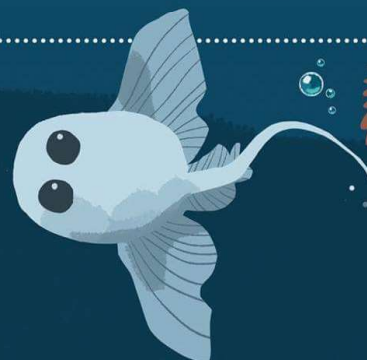
VÙNG BIỂN KHƠI TRUNG  
(MESOPELAGIC ZONE)



VÙNG BIỂN KHƠI SÂU  
(BATHYPELAGIC)



VÙNG BIỂN KHƠI SÂU  
THẳM (ABYSSALPELAGIC)



VÙNG ĐÁY VỰC KHƠI TẦM TỐI  
(HADALPELAGIC)

**CORAL**  
• Up to 25 cm (10 in) long  
• Most live in depths of up to 70 m (230 ft)  
Found in oceans worldwide

ng  
and to depths  
000 ft)

**PACIFIC  
JUS**  
m (16 ft) long  
depths of up to  
5600 ft)  
North Pacific Ocean

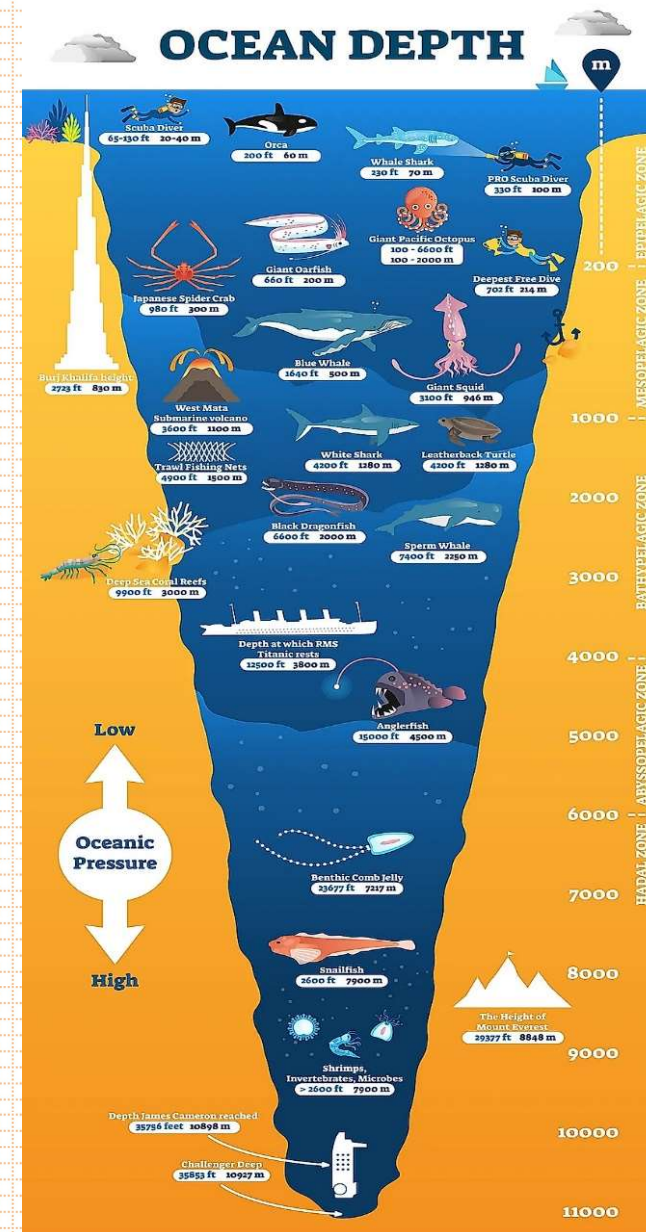
**HATCHETFISH**  
• Up to 12 cm (4.7 in) long  
• Lives in depths of up to 1500 m (4900 ft)  
• Found in warmer waters of Atlantic, Pacific and Indian Oceans

**GIANT TUBE WORMS**  
• Up to 2.5 m (7 ft) long  
• Usually about 1500 m (5000 ft) below surface  
Found near hydrothermal vents on Pacific floor



# 1) How to determinate the section of the sea

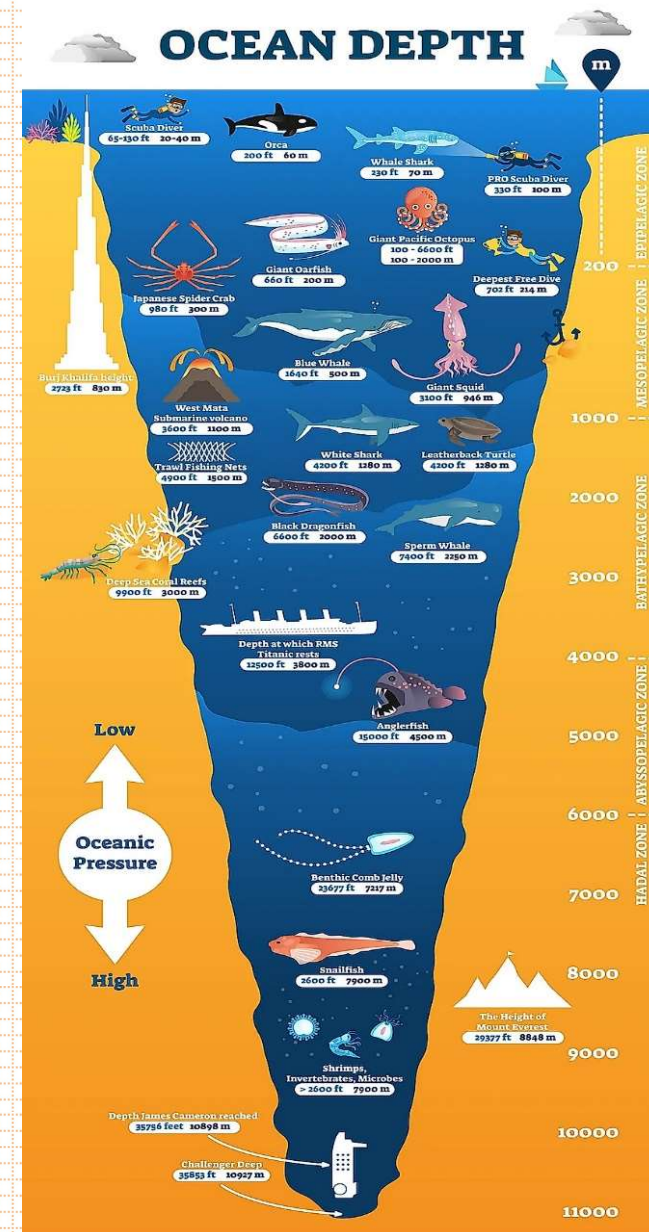
**Mesopelagic zone:** extends from 200 to 1,000 meters (660-3,300 feet) below the surface of the ocean. This area is known as the twilight zone, as it sits between the epipelagic zone, which receives the most light, and the bathypelagic zone, which receives no light. The water temperature here is colder than the surface layer. The species that live here are usually crustaceans and many muscles such as shrimp, crab, etc.





# 1) How to determinate the section of the sea

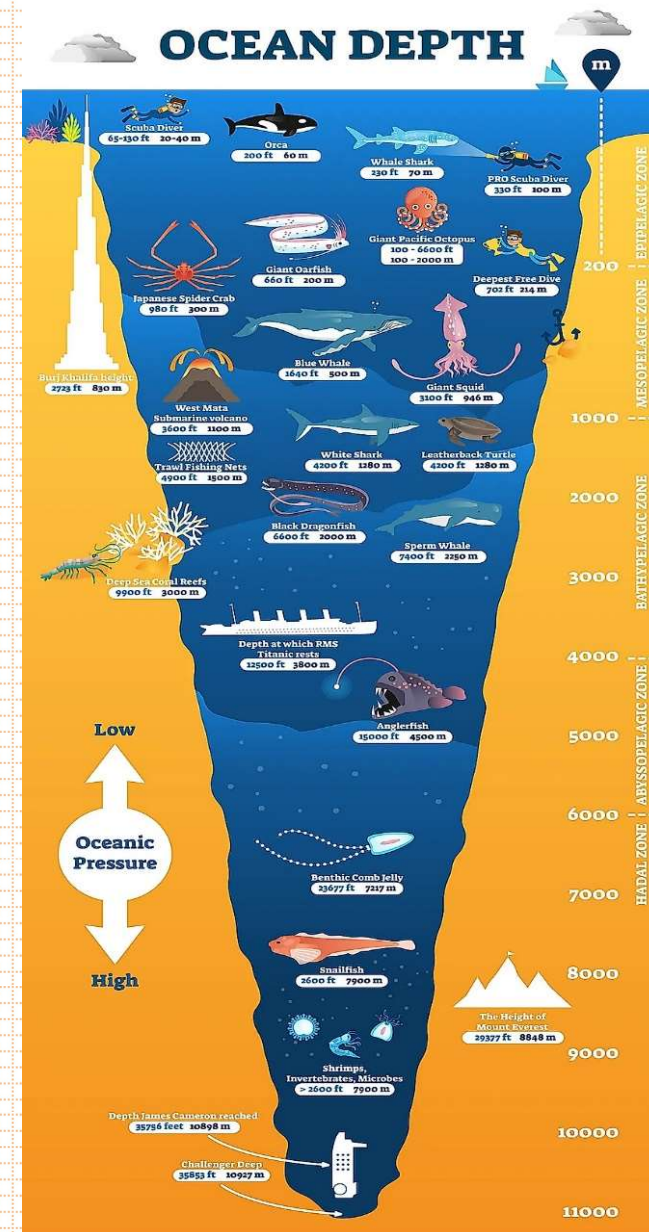
**Bathypelagic zone:** A layer of the oceanic zone lying below the mesopelagic zone and above the abyssopelagic zone, at depths generally between about 1,000 and 4,000 m (3,280-13,120 ft). The bathypelagic zone receives no sunlight and water pressure is considerable. marine ecologic realm extending down from the edge of the continental shelf to the depth at which the water temperature is 4° C (39° F).





# 1) How to determinate the section of the sea

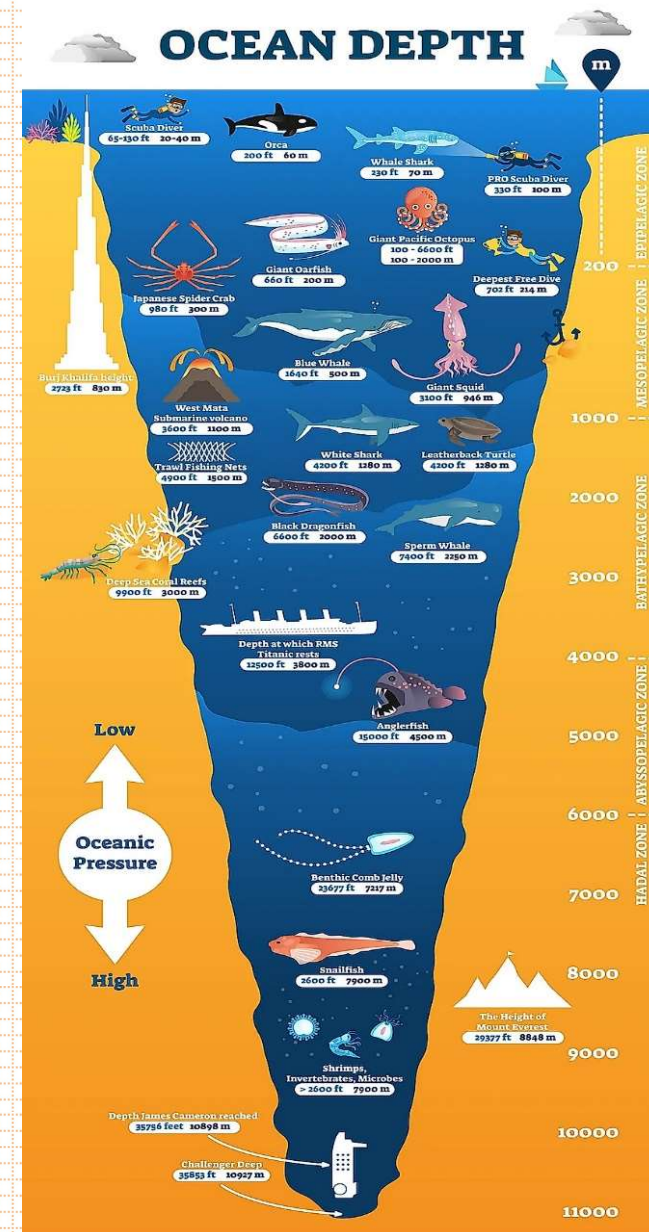
**Bathypelagic zone:** It is always dark, the water temperature is cold and only a few animals live. Most of the animals here have low metabolic rates due to the nutrient-deficient waters, fragile skin, little muscle, and slippery bodies. Some typical species include: squid, starfish, octopus, viperfish, etc. Due to lack of light, the animals living here have small or no eyes, and cannot see their prey, so they have adapted by developing wide mouths and elongated teeth, such as the gulper eel. The fish here move slowly and have strong gills to get oxygen from the water





# 1) How to determinate the section of the sea

**Abyssalpelagic zone:** (or abyssal zone) extends from 13,100 feet (4,000 meters) to 19,700 feet (6,000 meters). It is the pitch-black bottom layer of the ocean. The name (abyss) comes from a Greek word meaning "no bottom" because they thought the ocean was bottomless. The temperature in this sea is below 2 degrees Celsius, and salty water, high water pressure. But there is still life here, for example, and sea worms, sea urchins. Quite a few species have bioluminescence.

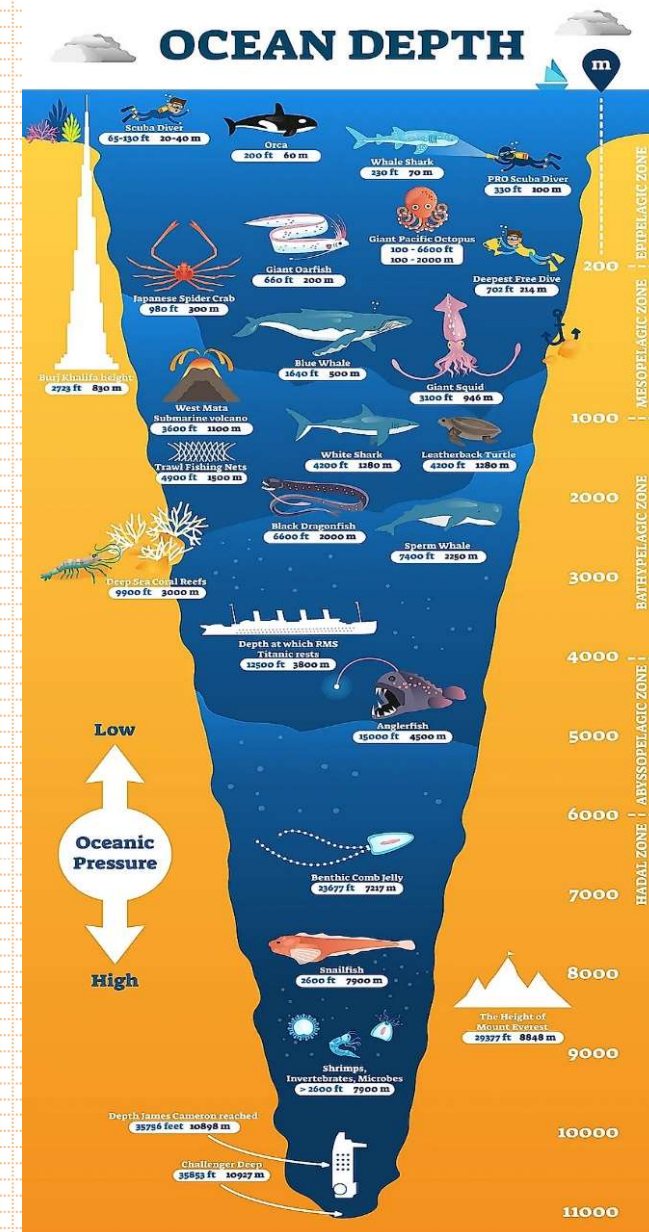




# 1) How to determinate the section of the sea

***Abyssalpelagic zone:*** the abyssal zone, due to its depth, is an extremely demanding environment for living beings: it is an aphotic region, i.e. it lacks light; the temperature ranges between 0 °C and 3 °C.

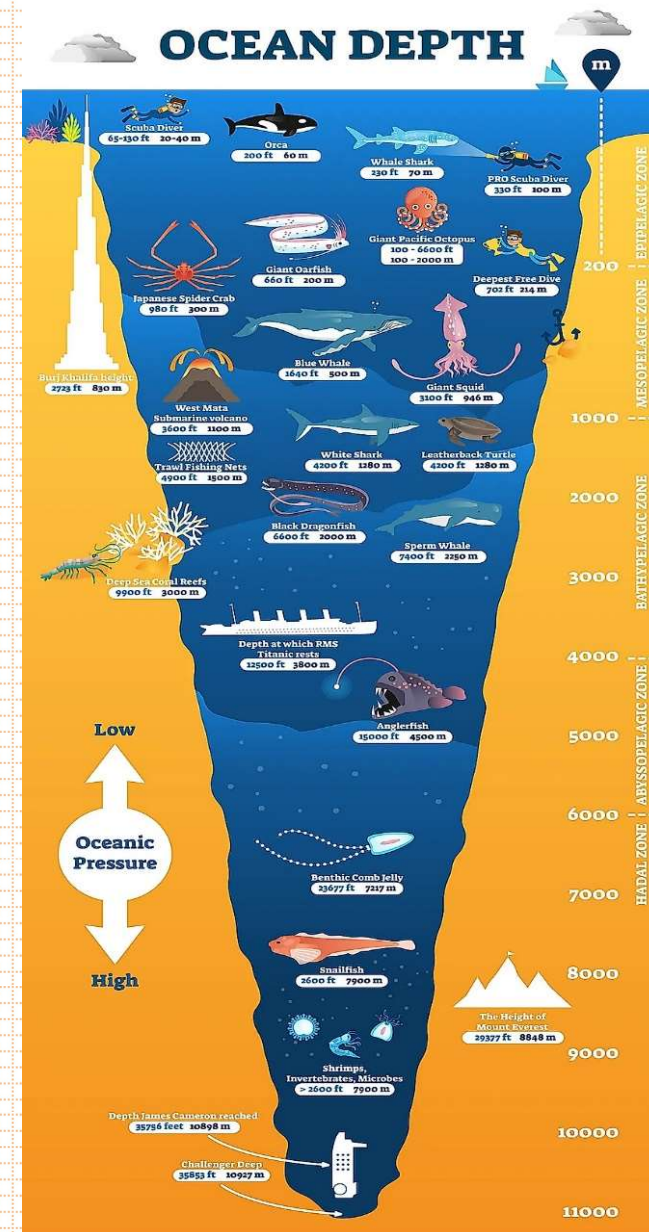
***Hadalpelagic zone:*** the depth from 6000-10000m, is the deepest, darkest and coldest place of the ocean. Only very few creatures exist here, such as sea cucumbers, sea spiders, sponges, etc.





# 1) How to determinate the section of the sea

*Abyssalpelagic zone:* there is a shortage of nutrients, which makes it difficult for the species that inhabit it to feed and grow; and the hydrostatic pressure increases with depth, for example, in the Challenger Deep, the deepest point of the ocean at almost 11,000 metres, the pressure is a thousand times higher than at [sea level](#).. But there is still life here, for example, and sea worms, sea urchins. Quite a few species have bioluminescence.

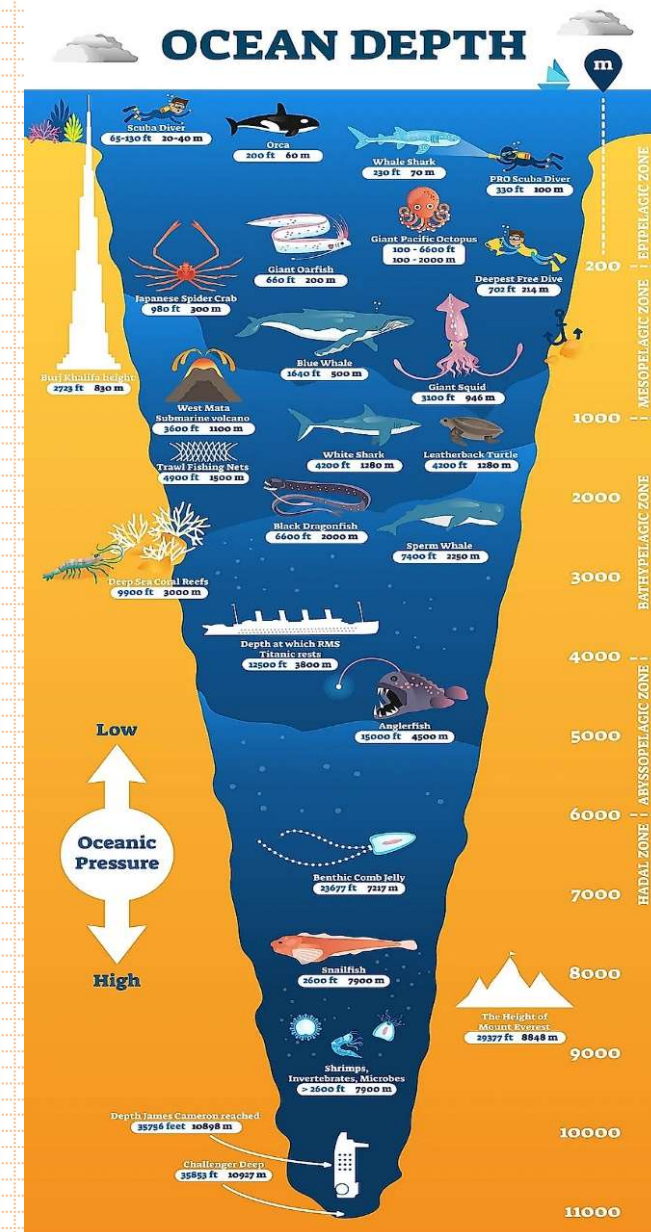




# 1) How to determinate the section of the sea

***Hadalpelagic zone:*** also known as the hadopelagic zone, is the deepest region of the ocean, lying within oceanic trenches. The hadal zone is found from a depth of around 6,000 to 11,000 metres (20,000 to 36,000 ft), and exists in long narrow topographic V-shaped depressions.

It is the deepest, darkest and coldest place of the ocean. Only very few creatures exist here, such as sea cucumbers, sea spiders, sponges, etc.





## 2) BIOLOGICAL RESOURCES

### ❖ The East Sea

#### Plants

More than 400 species of hard corals.

653 species of seaweed.

537 species of phytoplankton.

94 species of mangrove plants.

15 species of seagrass.



## 2) BIOLOGICAL RESOURCES

### Plants and elementary organisms

**Plants that stick to the bottom:** are species of algae, algae bottom-dwelling in the high-tide and sub-tidal zones with a small depth

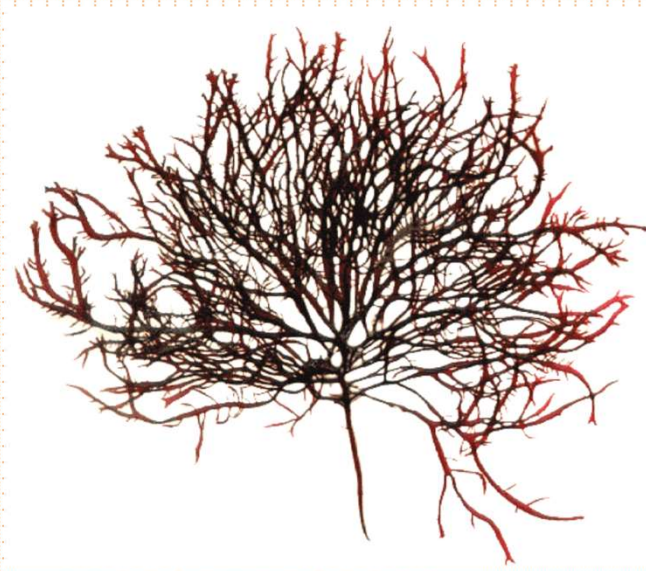


Dream group



seaweed group the sentence

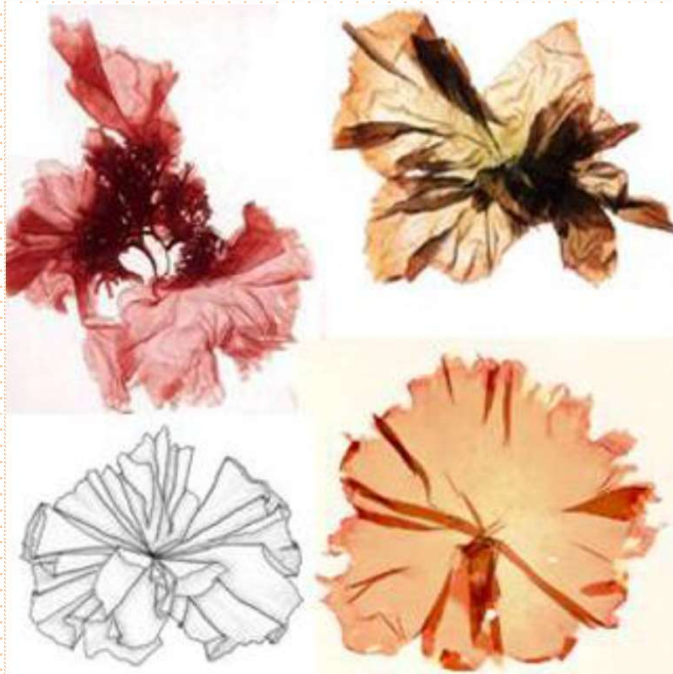




Frozen seaweed group



Unicorn seaweed group



Porphyra (Porphyra)



Seaweed (Gelidiaceae)



## 2) BIOLOGICAL RESOURCES

**Group of floating plants:** As species of algae: green algae, Blue-green algae, thyroid algae, siliceous algae live floating in the surface water.

- BILLION Give the sea a magical blue color - the color of sea water.
- OLD It plays the most important role in the food chain in seas and oceans

Play an important role in sea water

Photosynthesis of phytoplankton to form plant organic matter depends on **4 basic elements** : solar radiation energy in the visible light spectrum, sources of carbon dioxide (CO<sub>2</sub>), and mineral salts in water and the characterization of plant communities.





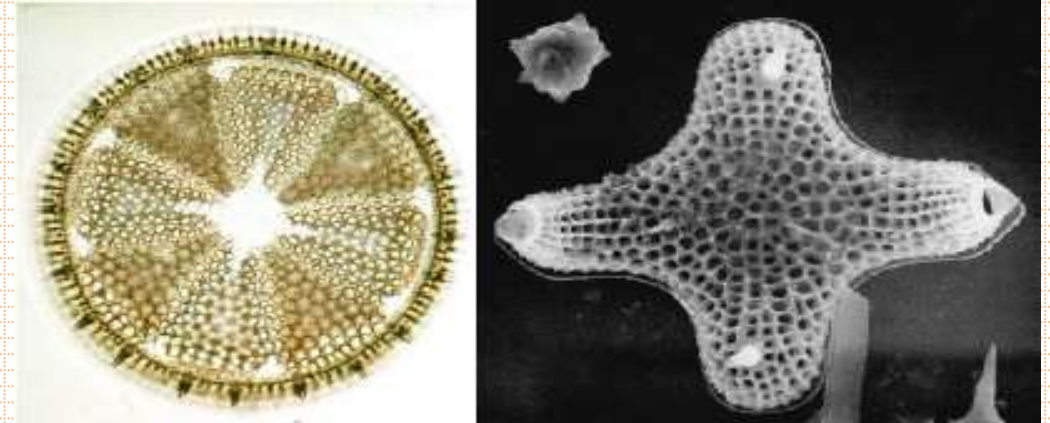
Green algae



Blue-green algae



Types of Algae Armor



Silica Algae  
(Bacillariophyta)



## 2) BIOLOGICAL RESOURCES

Outside out there higher plant form, salt-loving, like to record with the scene "half water, half land" of the tidal zone (as in Vietnam) such as tiger, parrot, trout, mangrove, fish sauce, cork... creating a unique landscape. :





## 2) BIOLOGICAL RESOURCES

### ❖ *The East Sea*

So far, in this sea, about 12,000 species of creatures have been discovered.

#### **Animal**

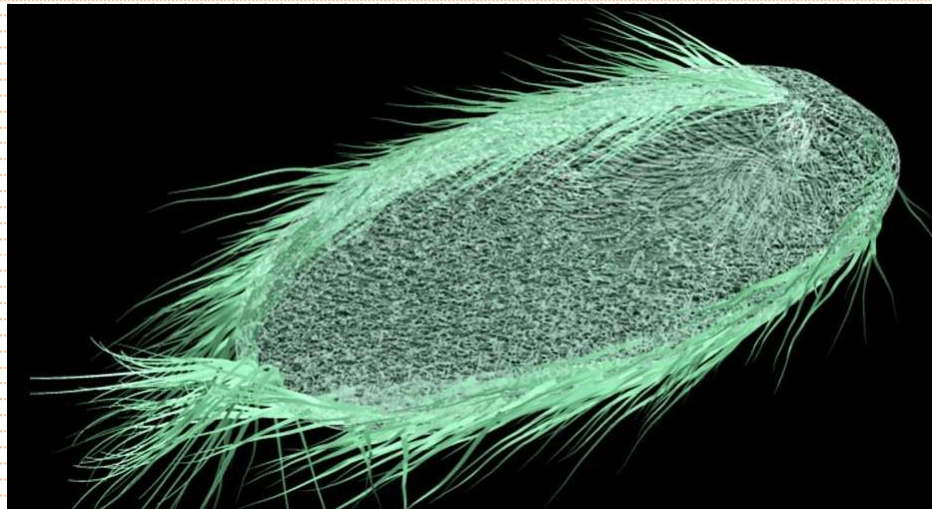
- 6,400 species of benthic animals.
- 15 species of sea snakes.
- 21 reptile species.
- 657 species of zooplankton.
- 12 species of marine mammals.
- 2,038 fish species.
- 5 species of sea turtles.
- 225 species of marine shrimp.



## 2) BIOLOGICAL RESOURCES

### Floating animals and the first source of animal food

**Floating animals (*Zooplankton*):** is a group of invertebrates, eating floating plants, living in aquifers, but most abundant in surface water and shallow waters of the continental shelf.



Protoplasm (*Protozoa*)



Crustacean (*Crustaceae*)



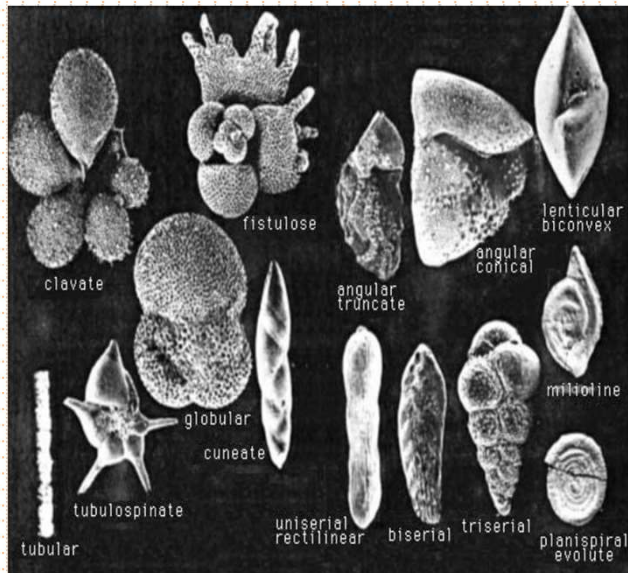


Cavity intestine (*Coelenterata*)

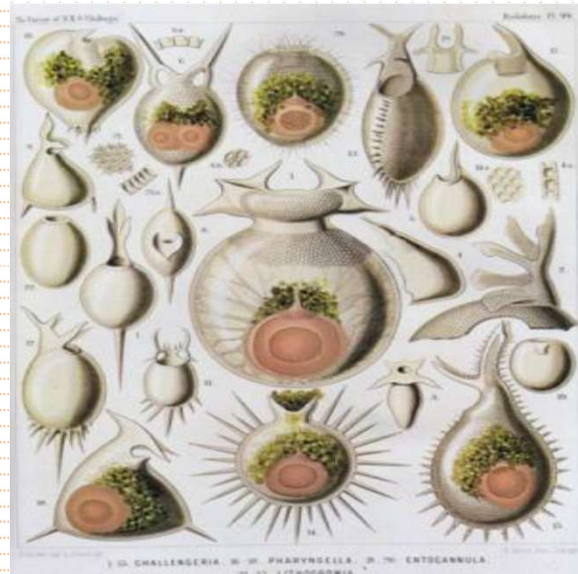


Soft body (*Mollusca*)

There are also Roundworms (*trochelminthes*), Worms bite (*Annelida*), Joint foot (*Arthropodata*) and a multitude of benthic larvae, including fish



Double hole (*foraminifera*) Radioactive bacteria (*Radiolaria*)



Holotricha



## 2) BIOLOGICAL RESOURCES

Sword leg



Jellyfish



Starfish  
larvae





## 2) BIOLOGICAL RESOURCES



- Rich marine life, rich in species composition. Many species have high economic value, and some are rare.
- In addition to fish, shrimp, crab, squid ... the sea has many other specialities such as tortoiseshell, snail, sea cucumber, abalone, blood cockle...
- There are many species of seabirds; NTB has many swiftlets - bird's nest (swallow's nest) is a high value export item.



## 2) BIOLOGICAL RESOURCES

### Benthic animals and benthic resources

- Bottom-dwelling invertebrates : forming a bottom food source, at the same time many species of them are important exploitation objects by humans such as shellfish, oysters, sea cucumbers, pearl mussels, abalone, shrimp, crabs, etc..



Hole body ( *Porifera* )



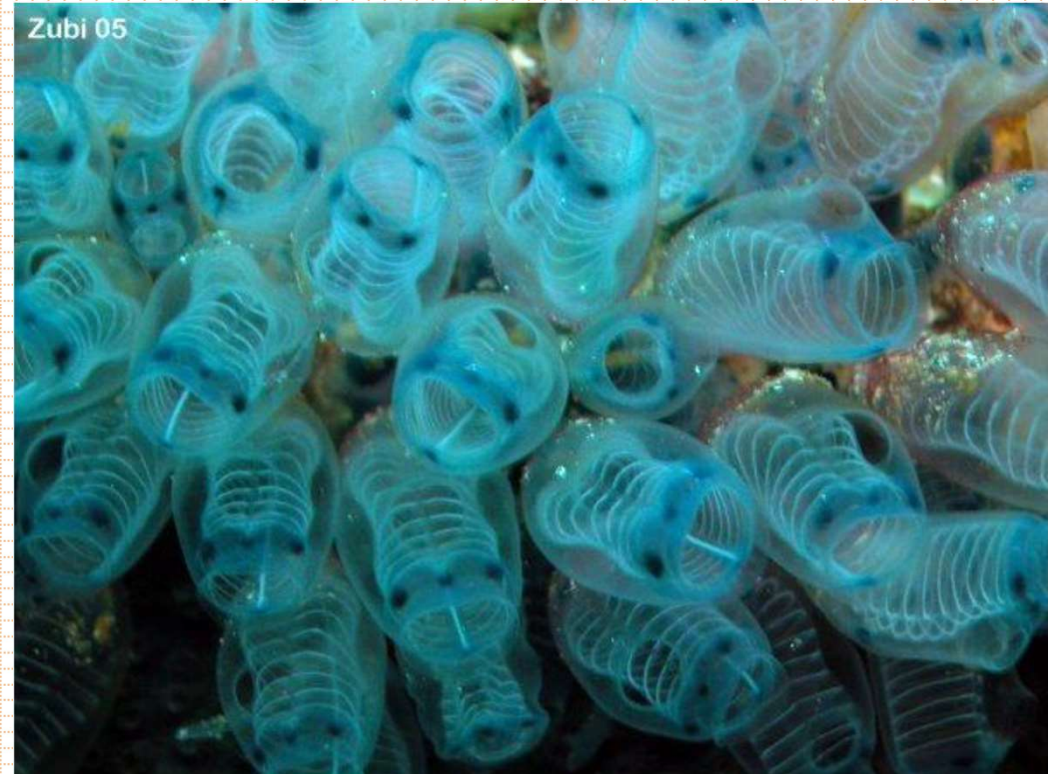
Cavity intestine ( *Coelenterata* )



## 2) BIOLOGICAL RESOURCES



Bivalve molluscs ( *Bivalvia* )



Shellfish ( *Tunicata* )

The development of the number and biomass of benthic animals, in addition to the dependence on food and environmental factors, is also determined by the species structure of the communities.

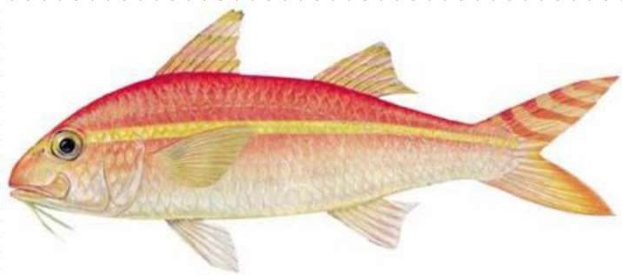


## 2) BIOLOGICAL RESOURCES

**Fish and fish resources: This is the most exploited resource in the East Sea**

- The most important secondary biological productivity created in the sea is fish.

### Group of bottom fish:



Alum fish 1  
stripe



Red  
snapper



Stretch  
fish

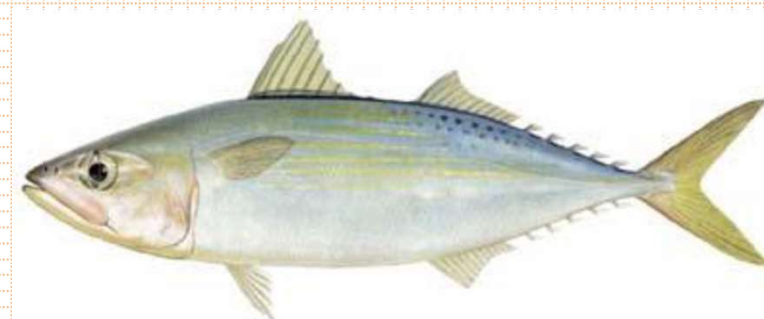


## 2) BIOLOGICAL RESOURCES

### Group of floating fish:



Anchovy



Fish silver  
cheeks

Potential fish stocks focus on groups of fish living in the surface and near bottom layers. In general, fish caught in the East Sea belong to two main groups of fish: continental shelf fish and oceanic fish.



## 2) BIOLOGICAL RESOURCES

Some types of  
seafood in Vietnam

- Lobster
- Rock oysters
- Crab
- Clams
- Abalone
- Squid
- Sacrifice





## 2) BIOLOGICAL RESOURCES

Dried seafood products:

- Dried shrimp.
- Dried octopus.
- Dried fish.
- .....





## 2) BIOLOGICAL RESOURCES

### Other biological resources

REMOVE The sea also has other potential biological resources, creating important values in exploitation such as: **turtle** , **sea snake** , **bird**







Đ . .

1



RUNG CHUÔNG VÀNG

**Our country's sea has about  
how many seaweed species:**

**A. 550 species.**

**B. 653 species.**

**C. 680 species.**

**D. 700 species.**







D . .

1



**Of the following types of seaweed,  
Which seaweed is the most important:**

- A. Seaweed and paper seaweed.**
- B. Rock seaweed and shaved seaweed.**
- C. Seaweed and seaweed dream.**
- D. Frozen seaweed and unicorn seaweed.**

TRUNG CHUÔNG VÀNG







Đ . .

1



RUNG CHUÔNG VÀNG

**Number of fish in our waters up to:**

- A. More than 100 species.**
- B. More than 200 species.**
- C. More than 1500 species.**
- D. More than 2000 species.**





# THE END



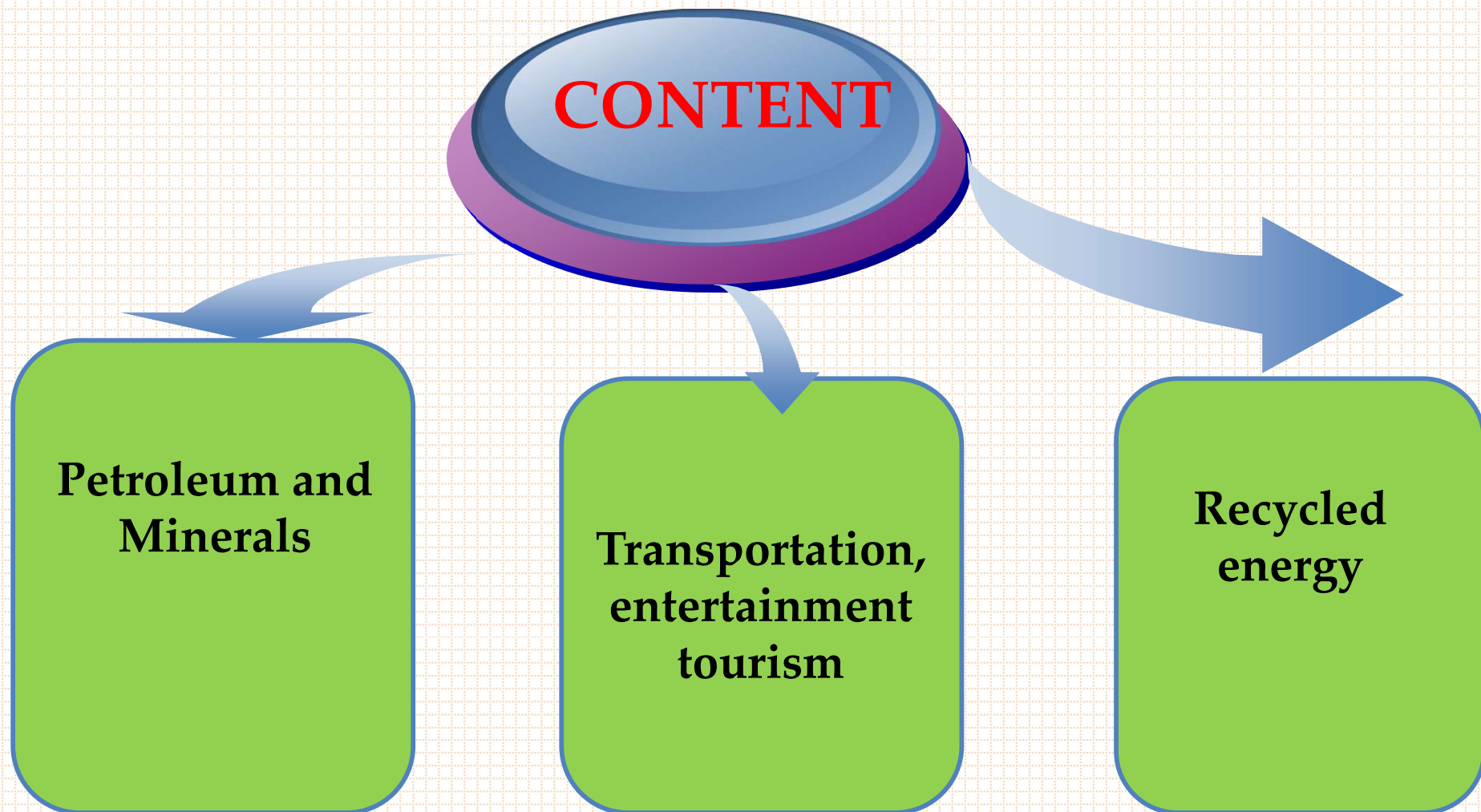
HCMC UNIVERSITY OF NATURAL RESOURCES AND ENVIRONMENT  
FACULTY OF MARINE RESOURCE MANAGEMENT

# Topic 2 - MARINE RESOURCES

## 2.1. Benefit of Non-living resources

*Lecturer: MSc. Dang Thi Thanh Le*  
*MSc. Tran Thi Kim*  
*MSc. Phung Thi My Diem*







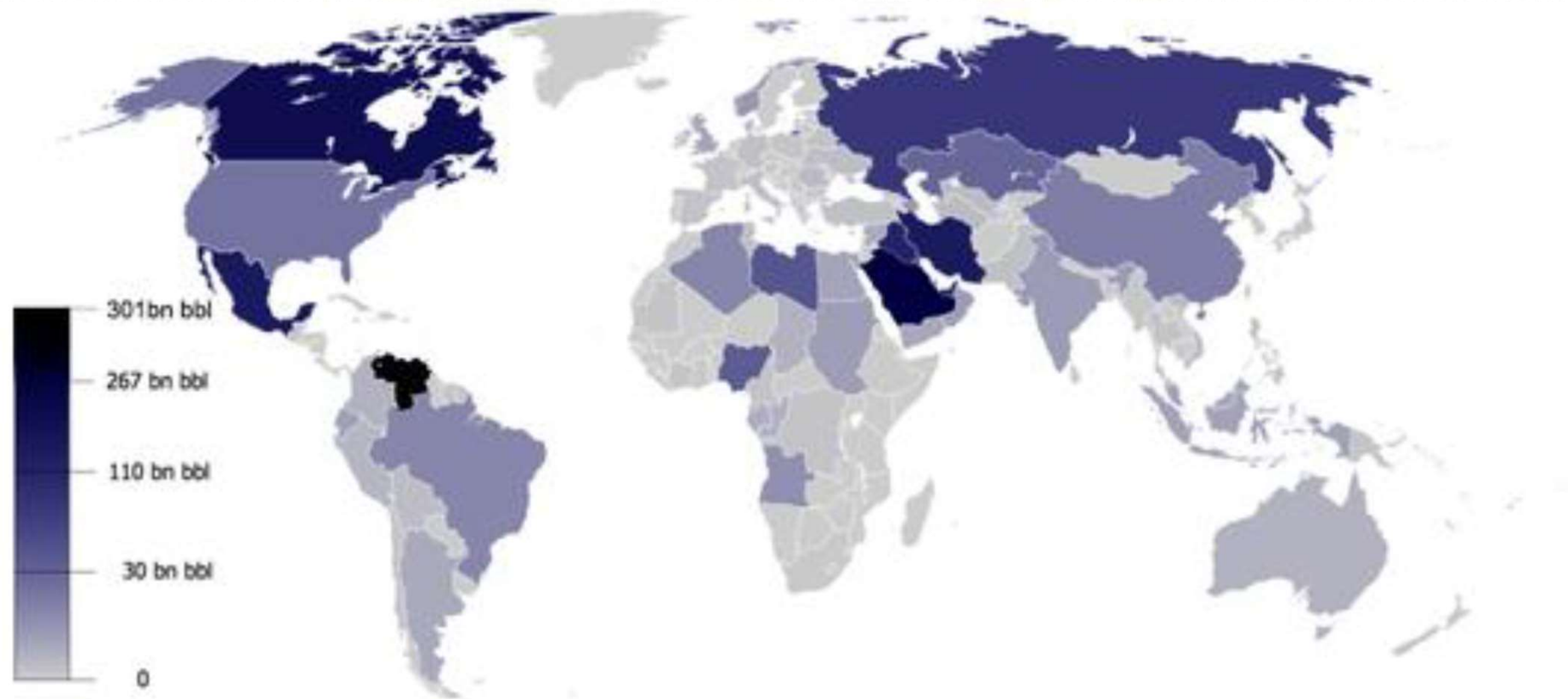
# 1) Oil and gas

- Gas and oil form in the sea over a period of millions of years, as the remains of animals and plants sink to the ocean floor. Combined with particles flushed from the land, they are buried and compressed into layers of sediment several kilometres thick on the ocean floor.
- Petroleum is widely distributed on continents and ocean floors.  
According to the 1985 exploration data, the world's oil reserves were 95.8 billion cubic tons.
- The sources of oil and gas are not endless. At the current rate of production, the world's oil reserves are only enough for another few decades.



# 1) Oil and gas

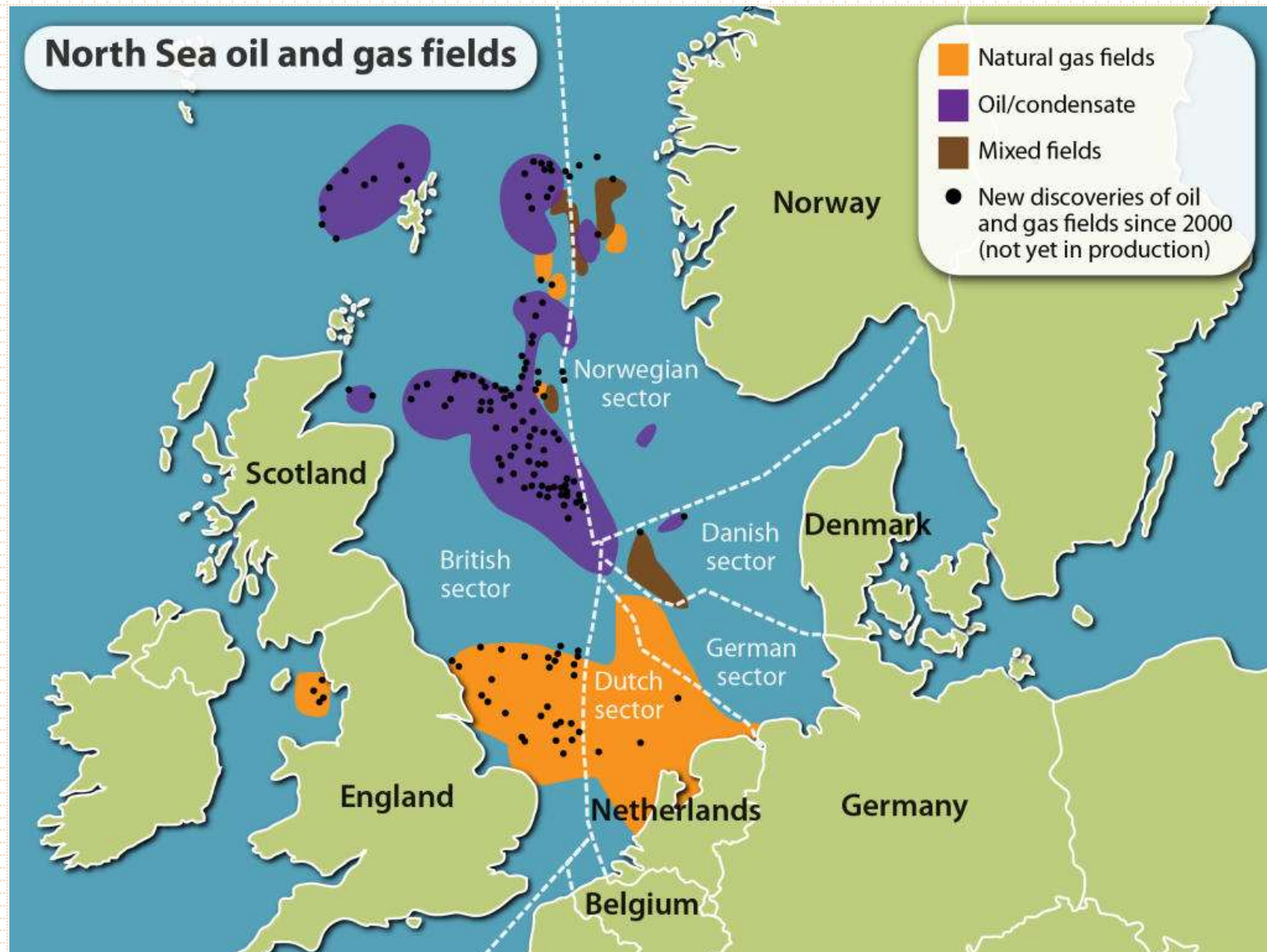
## Oil reserves



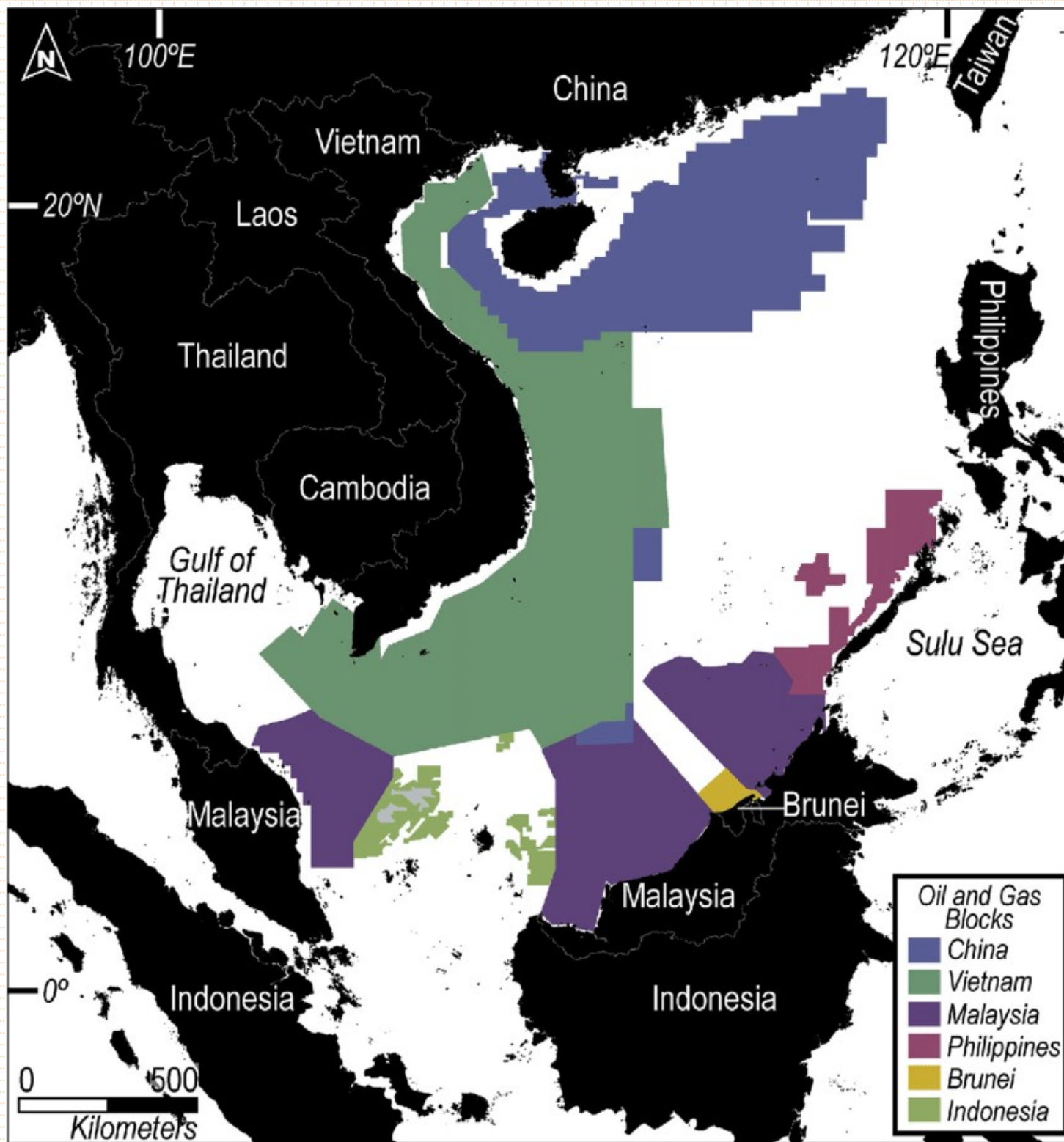
Map of world oil reserves in 2013



# 1) Oil and gas









## Mineral resources, oil and gas:



- Along the coast of Vietnam, many areas have favourable conditions for salt production.
- Our waters have many placer deposits: titanium oxide, and white sand.
- The continental shelf of our country has an accumulation of oil and gas, with many fields continuing to be discovered, explored and exploited



## Vietnam's oil and gas production



- With estimated crude oil reserves of 4.4 billion barrels, Vietnam ranks 2 in East Asia in terms of oil reserves..
- Vietnam's crude oil production is about 340,000 barrels per day



## 2) Chemicals and minerals

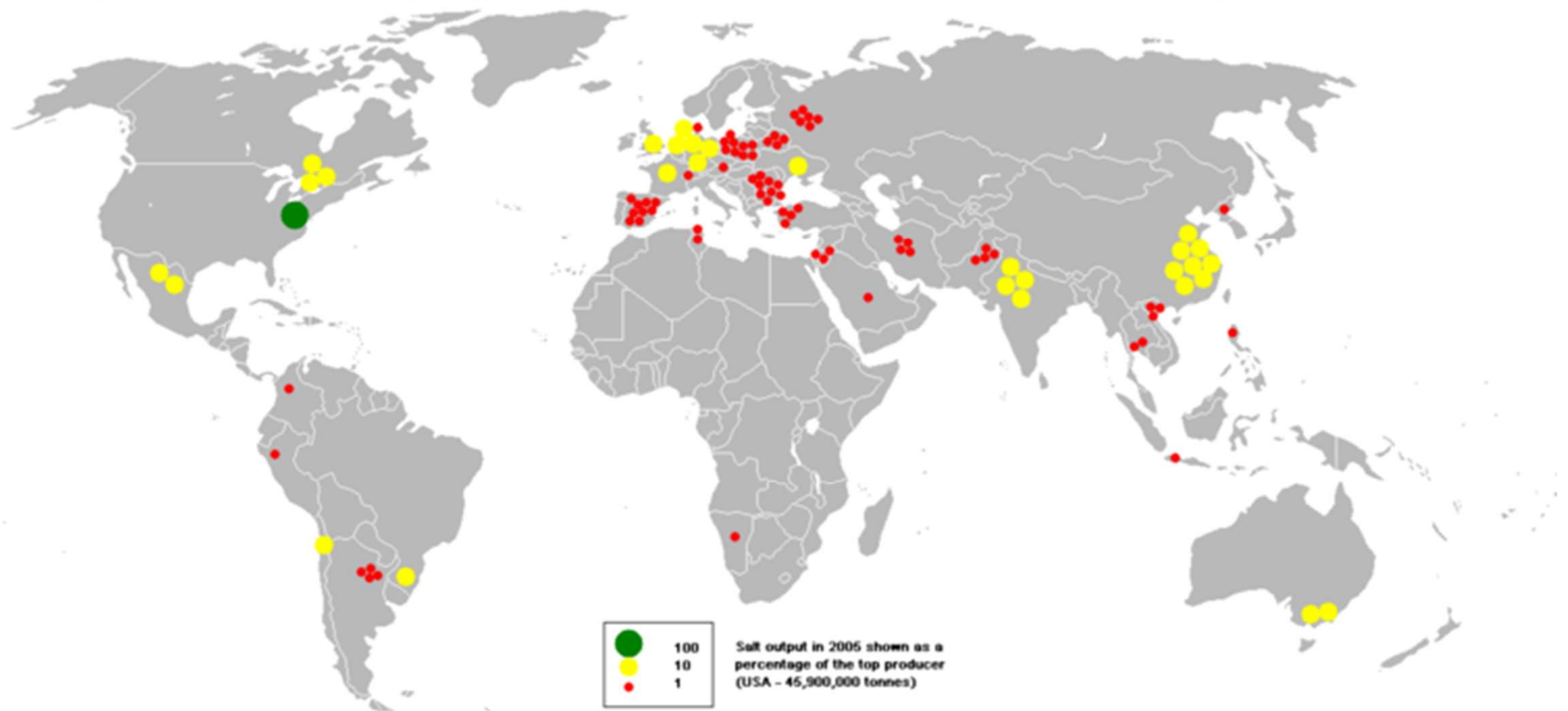
- Many chemicals are mined both on land and at sea such as table salt, sulfur, manganese, gold, etc.



- Diamond, quartz, sand, clay, kaolin, limestone... and many other compounds of many important industries.. found in the sea.



# *Salt industry*



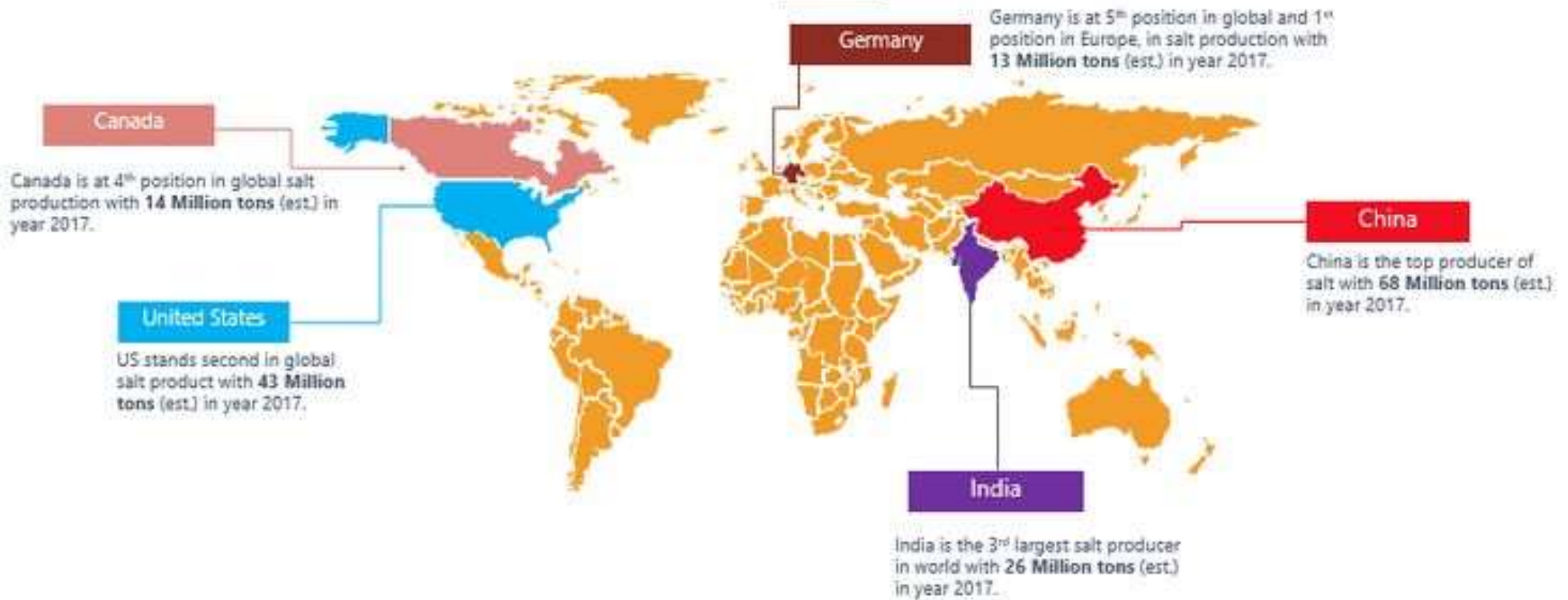


# *Salt industry*



## Global Salt Production

### Top 5 Countries





# *Vietnam salt industry*

Vietnam is considered as a country with great potential for the development of salt production, with a coastline of 3,260 km (excluding islands) extending from Ca Mau cape to Mong Cai headland, with a tropical climate. Hot sea water, with high salinity (from 3.2 to 3.5%). The total salt reserve of our country is about 120-130 billion tons of salt.





## 2) *Potential for development of maritime traffic*

- About 80% of the world's merchandise are transported by sea.
- Most of the valuable resources are concentrated in 3 regions: North America, Western Europe and Japan - Korea through sea transportation. This is explained by the development of 48 countries in the 3 regions mentioned above. develop strongly in the marine economy. Marine economy includes 6 industries: shipbuilding, seaports, oil and gas, tourism, seafood and sea reclamation.

**Marine transportation is very precious and important.**



## 2) *Potential for development of maritime traffic*





## 2) *Potential for development of maritime traffic*

**Figure 1. A Snapshot of Global Vessel Traffic Based AIS Data**

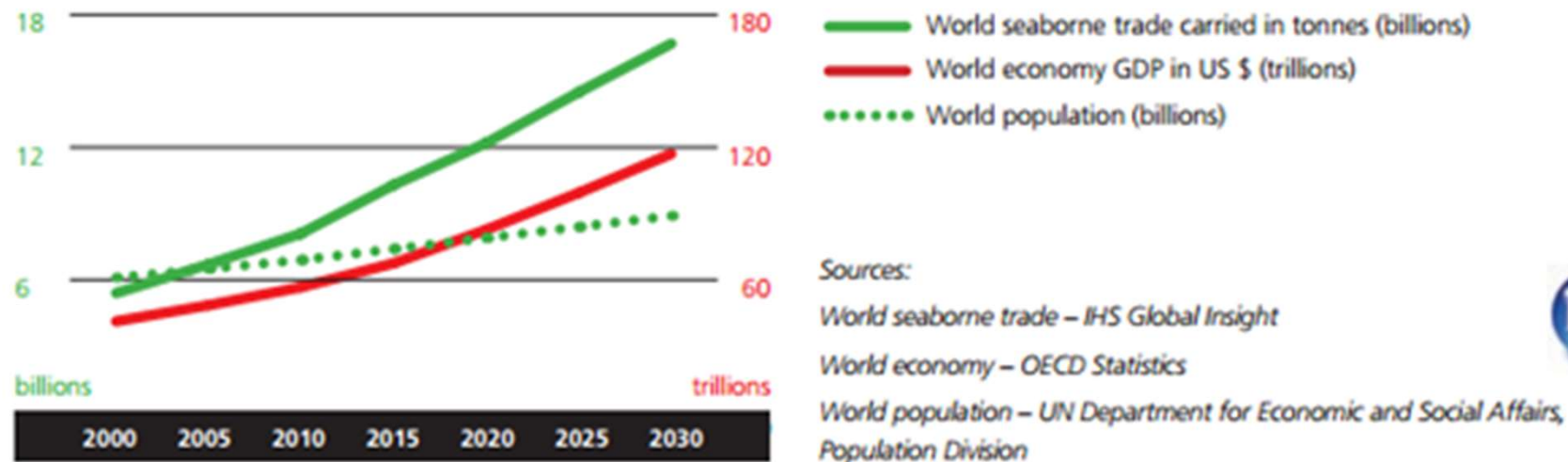


Source: MarineTraffic.

Note: Different types of vessels are shown in different colors.



## PREDICTED INCREASES IN WORLD SEABORNE TRADE, GDP AND POPULATION



Source: ics-shipping

- About 11 billion tons of merchandises are transported by ocean liner every year. This number shows about 1.5 tons/person based on the current global population.
- As of 2019, the total annual value of world shipping trade has reached more than 14 trillion US dollars



## Vietnam's seas and coasts have conditions for marine transportation development:

Regarding conditions for development of sea transport:

Located near international maritime routes in the East Sea .

Along the coast, there are many closed bays that are favorable for the construction of deep-water ports. Many estuaries are also favorable for port construction.

Cam Ranh Bay



Van Phong Bay



Da Nang Bay



## In Vietnam



- The volume of goods through Vietnam's seaport system in 2019 increased by 14%; container volume increased by 6%; Passengers through the port increased by 22%. Vietnam's fleet ranks 4th in the ASEAN region and 29th in the world... These are impressive figures of the maritime industry after the period 2014-2015 "negative growth".

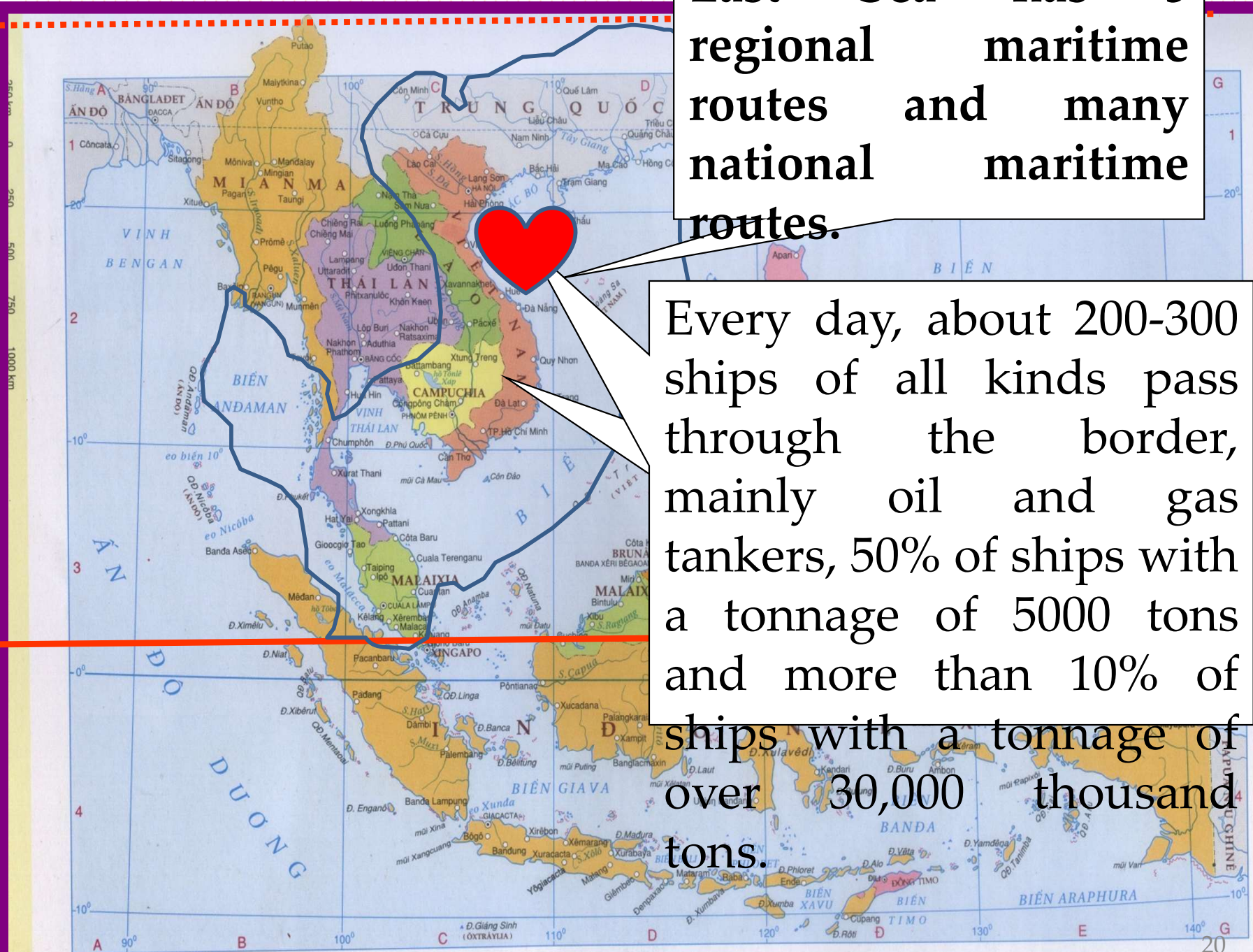






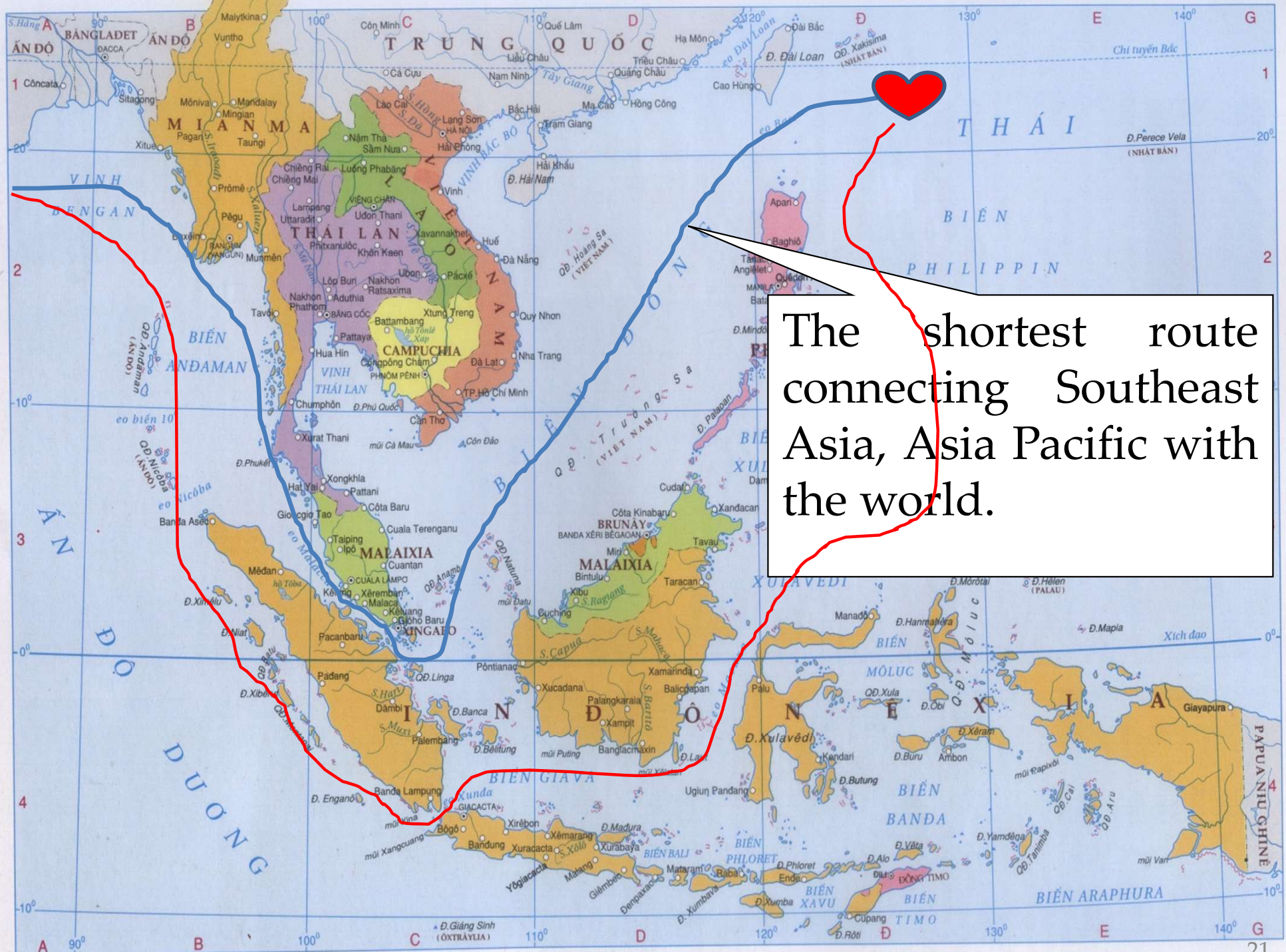
East Sea has 5 regional routes and many national maritime routes.

Every day, about 200-300 ships of all kinds pass through the border, mainly oil and gas tankers, 50% of ships with a tonnage of 5000 tons and more than 10% of ships with a tonnage of over 30,000 tons.





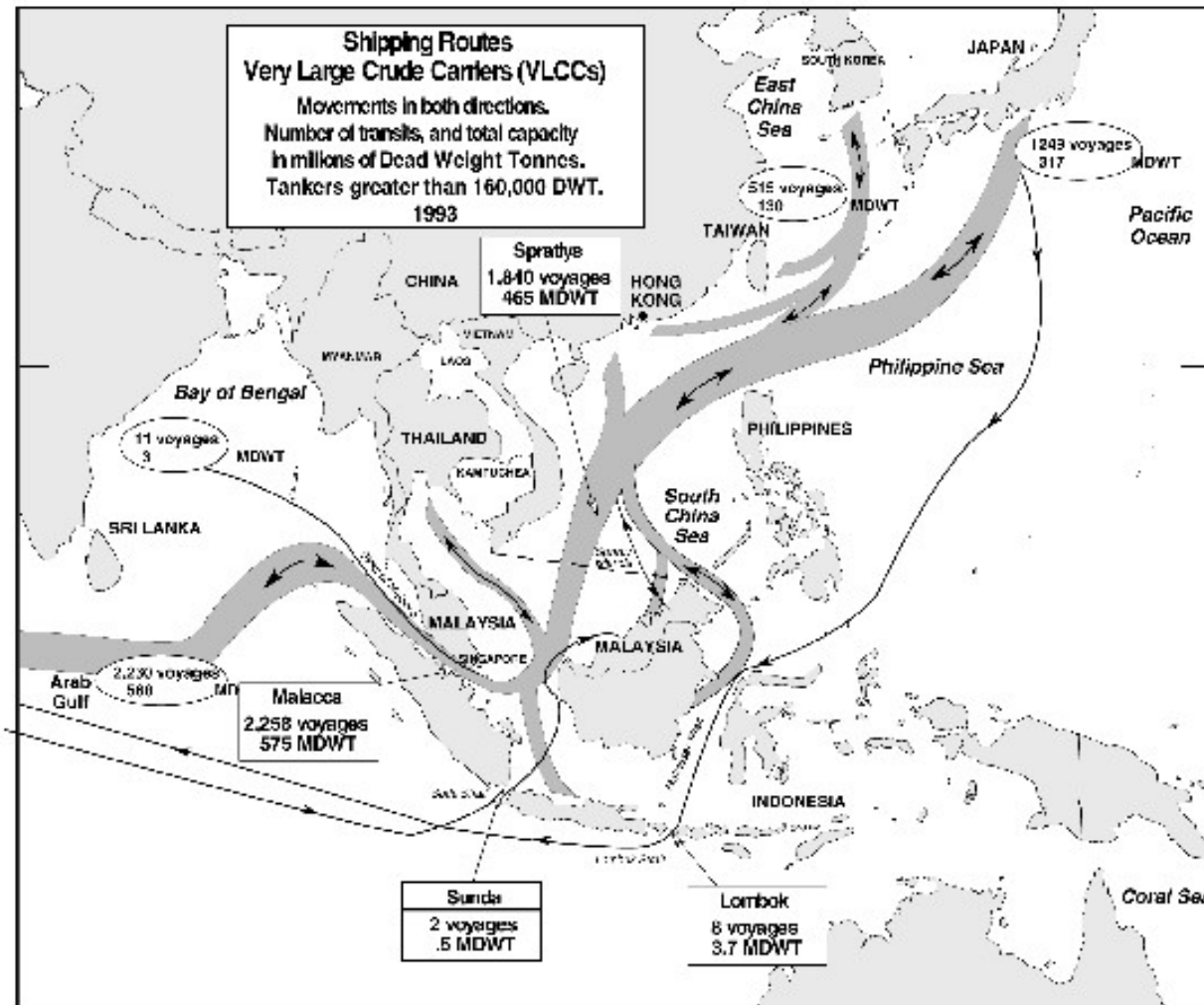
250 km  
0  
250  
500  
750  
1000 km



The shortest route connecting Southeast Asia, Asia Pacific with the world.



# Why is the East Sea important to the world?



- More than 50% of the world's waterways and crude oil are transported through the East Sea.
- The amount of crude oil transported through the South China Sea is 3 times higher than through the Suez Canal, 5 times more than through the Panama Canal.
- More than 80% of crude oil from Japan, South Korea and Taiwan is transported through the South China Sea.



# NON- BIOLOGICAL RESOURCES

## 2) Potential for tourism and entertainment development

- Tourism is a necessity of life and it has become an industry, contributing its strengths to the national income.
- One of the consequences caused by tourism without planning and guidance is environmental pollution in coastal areas .
- WOMEN the risk of losing rare species of animals and plants or being threatened with destruction due to overexploitation.



Our country has a coastline ~ 3,260 km with many beautiful beaches with an average slope of 2 - 30, high clarity (especially beaches in the Central region): Tra Co, Cat Ba, Cua Lo, Nha Trang, Vung Tau...In addition, the Central Coast has long and beautiful sandy beaches that attract tourists.



**Nha  
Trang  
Bay**





Nam Chu Islands



Phu Quy Island

Coastal island : Vietnam has over 2273 large and small islands with a total area of over 1700 square kilometers, of which:

- Over 100 km<sup>2</sup>: Phu Quoc, Cai Bau, Cat Ba
- From 50 to 100 km<sup>2</sup>: Tra Ban, Con Lon
- Under 50 km<sup>2</sup>: Phu Quy, Quan Lan, Co To, Cu Lao Cham, Ly Son...Island

Distribution: The province with the most islands is: Quang Ninh (75%), Hai Phong (8.8%), Kien Giang (5.7%)...





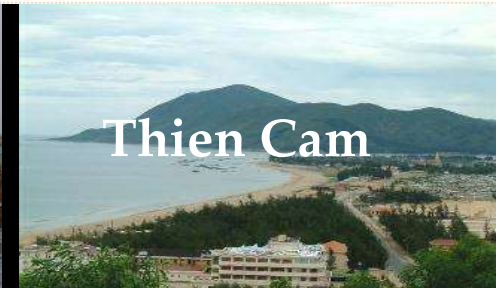
Ancient Tea



Hai Thinh



Door of  
Assembly



Thien Cam



Update  
rate



Door Tung



Thuan An



Lang Co



Sa Huynh



Vung Tau



Nha Trang



Van Phong Bay



Da Dia Rapids



Non Nuoc



Jumping  
Rock



Ning Chu



### 3) *Clean energy sources on the sea*

#### Ocean Energy

Wave energy

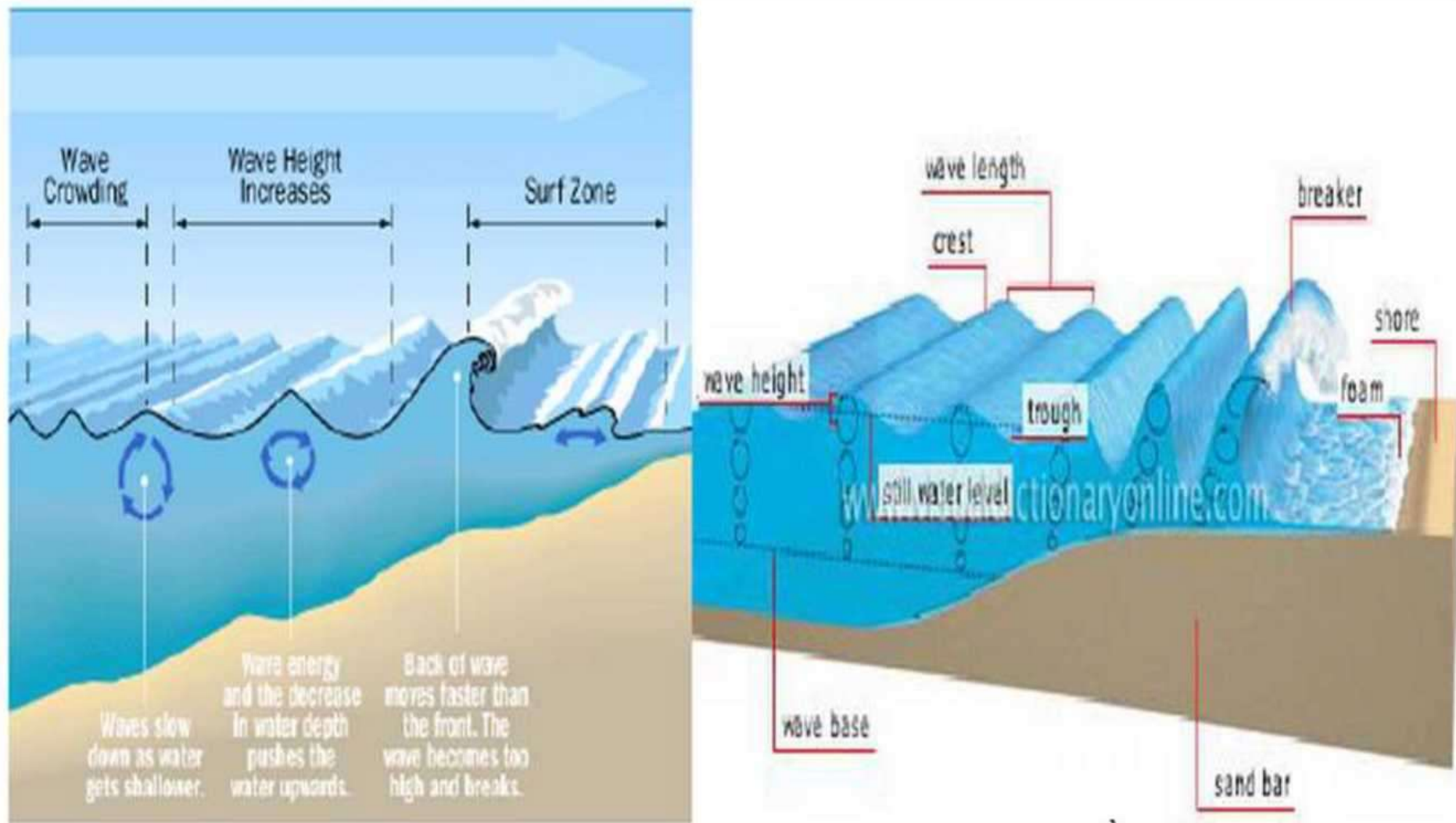
Tidal energy

Energy of the flow

Ocean Thermal Energy

Energy solar wind





The estimated total theoretical wave energy potential in 2010 is 32,000 TWh/year (nearly double the total global power supply in 2008 (16,800 TWh/year)).

In the East Sea, there is an irregular semi-diurnal tide regime, large tidal amplitude and potential for exploiting this energy source



# Tidal energy

40

## Tidal power systems :

The system works based on the tidal turbine method.

- ❖ Each structure consists of 4 turbines attached to a tubular buoy. Water is filled into the buoy so that it sinks, leaving only the top of the float to rise, pulling the turbines into position.

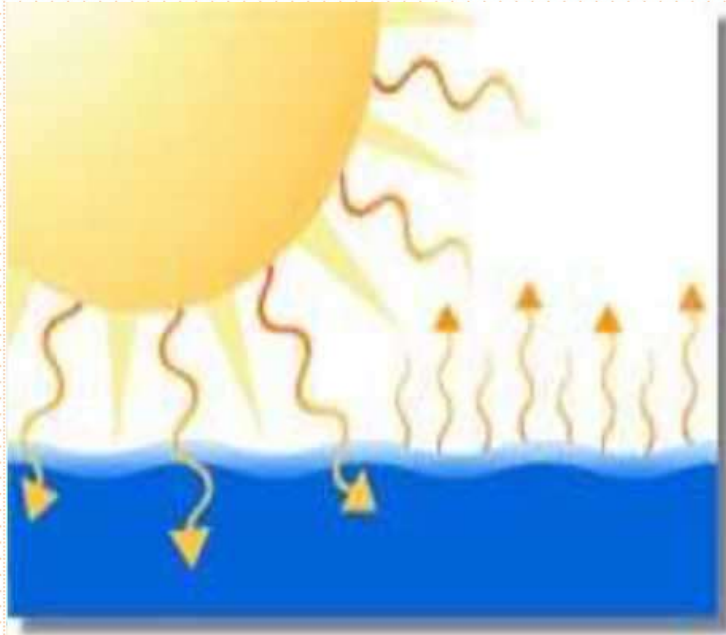
- ❖ A long arm connects the buoy to a heavy base that rests on the seabed. The arm is designed to be moved up and down, left and right, allowing the turbines to drift to the position of the strongest tidal currents.



*System Tidal Stream*



# Ocean Thermal Energy



About 15% the total amount of solar energy reaching the Earth's surface is reabsorbed by the oceans as heat energy, central mainly in upper class. The biggest difference can be 20 - 25 degrees C



*Engine unit 100 kW live  
Hawaii- America*



# Wind enery



Trach Dong, Bac Lieu province





## Review questions



Along the coast of our country  
How many beaches are there?  
eligible

To exploit for tourism activities:

A. 100.

B. 120.

C. 125.

D. 130.





## Review questions



**Our country begins  
In what year do you exploit oil?**

- A. 1980.**
- B. 1985.**
- C. 1986.**
- D. 1990.**





## Review questions

Which of the following is not the meaning of development our country's sea transportation:



- A. Bring economic benefits to the country.
- B. Contributing to strengthening security and defense.
- C. Take advantage of geographical position and natural conditions.
- D. Contribute to the implementation of exchanges between localities.





## Review questions



**The most important cause, make our country conditions for the development of salt industry are:**

- A. Long coastline.**
- B. Large market.**
- C. The salinity of sea water is high.**
- D. People have experience in salt production.**





## Review questions



According to ability exhausted, oil and gas, What kind of resource is it classified as?

- A. Recovery is possible.
- B. Unrecoverable.
- C. Endless resources.
- D. Resources do not run out.



# THE END





# MARINE RESOURCES AND ENVIRONMENT MANAGEMENT

## Topic 2 - MARINE RESOURCES 2.3 Coastal ecosystems

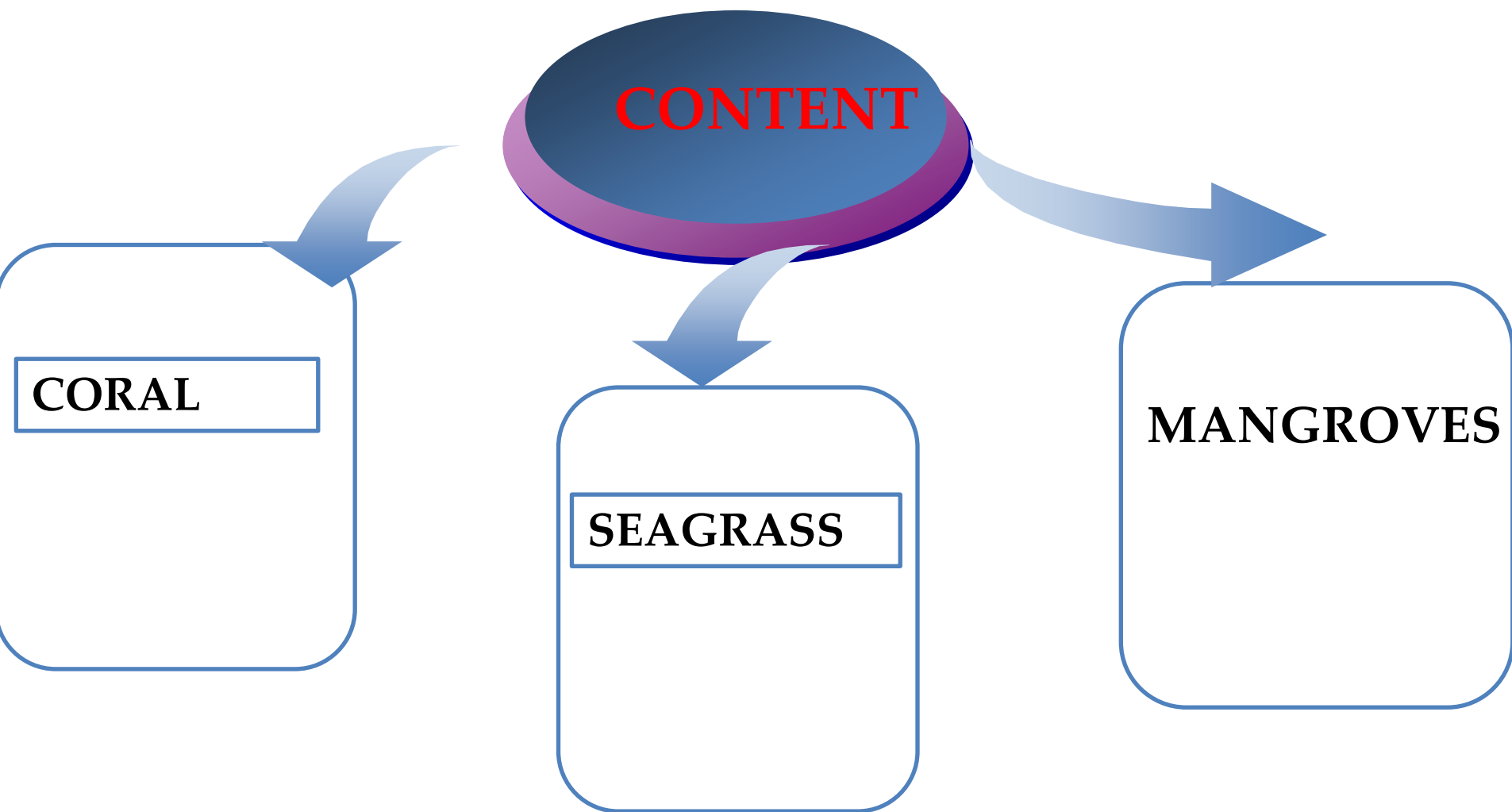




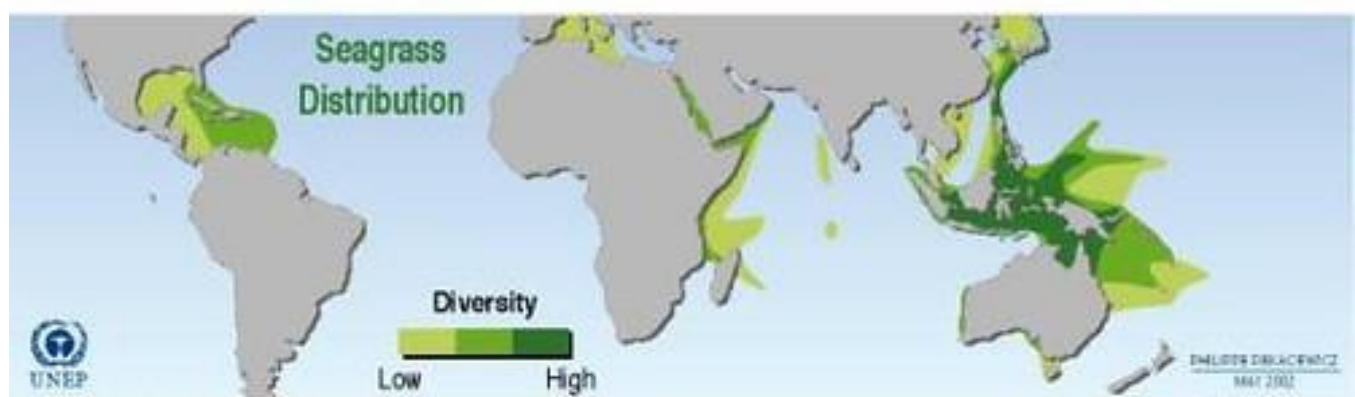
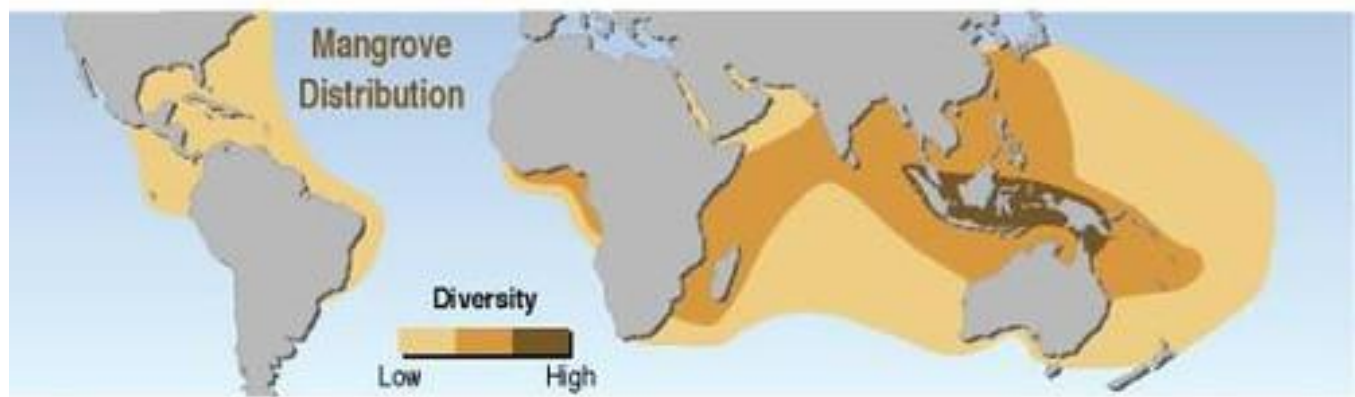
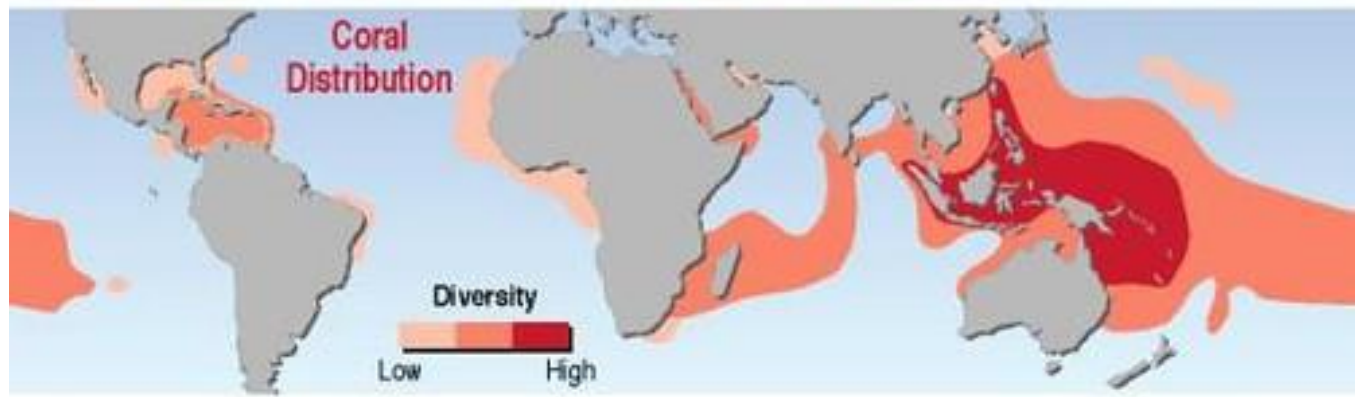
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# 1) Coral Ecosystem

## Taxonomy Coral



Co-funded by the  
Erasmus+ Programme  
of the European Union

Class Coral (Anthozoa) is a class of invertebrates aquatic including sea anemones, rock corals and soft corals, belonging to the phylum Anthozoa

- There are 3 main groups: hard corals, soft corals and horn corals





# Structures of coral reefs

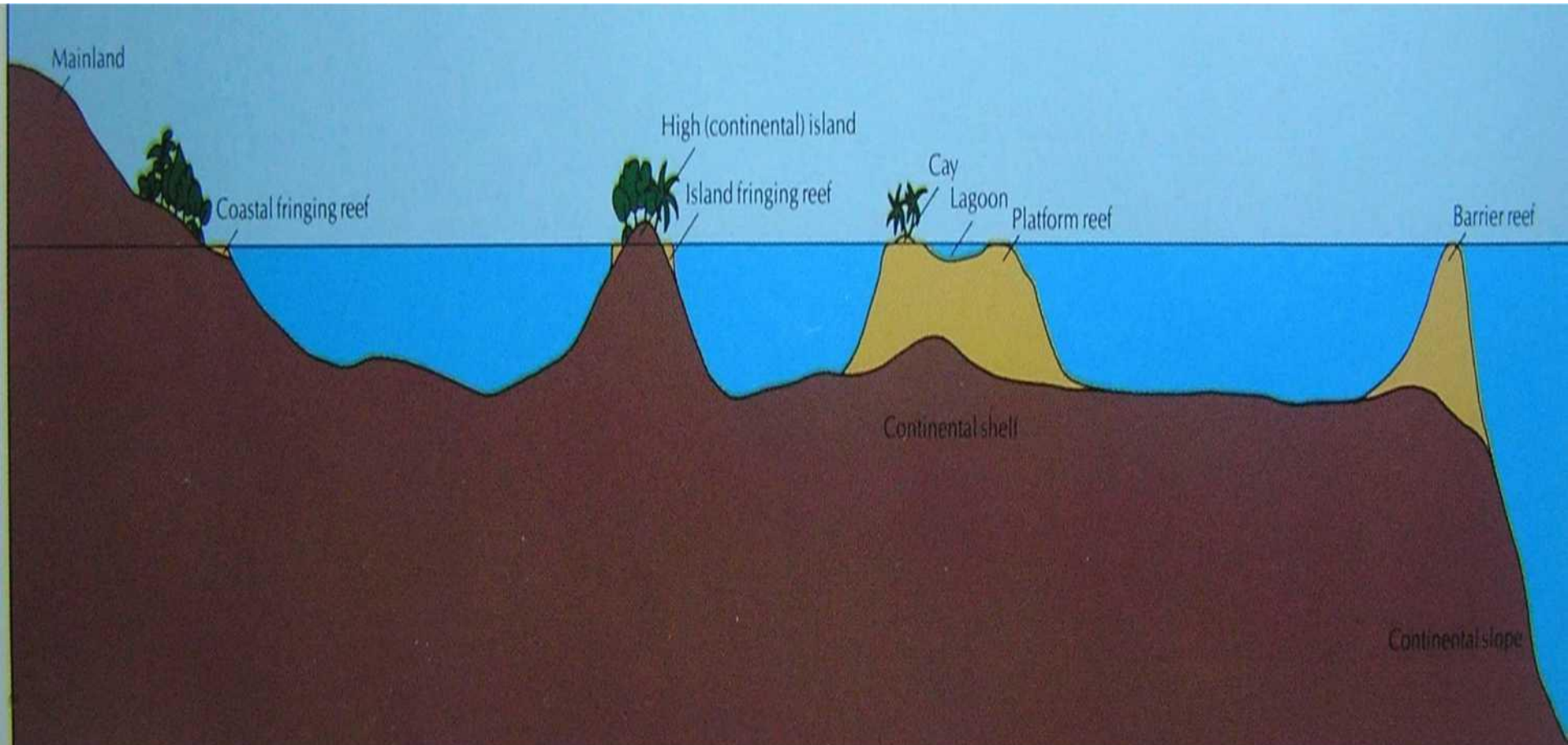
1. Atoll reef
2. Fringing reef.
3. Platform reef
4. Barrier reef

*According to Veron, 2000*



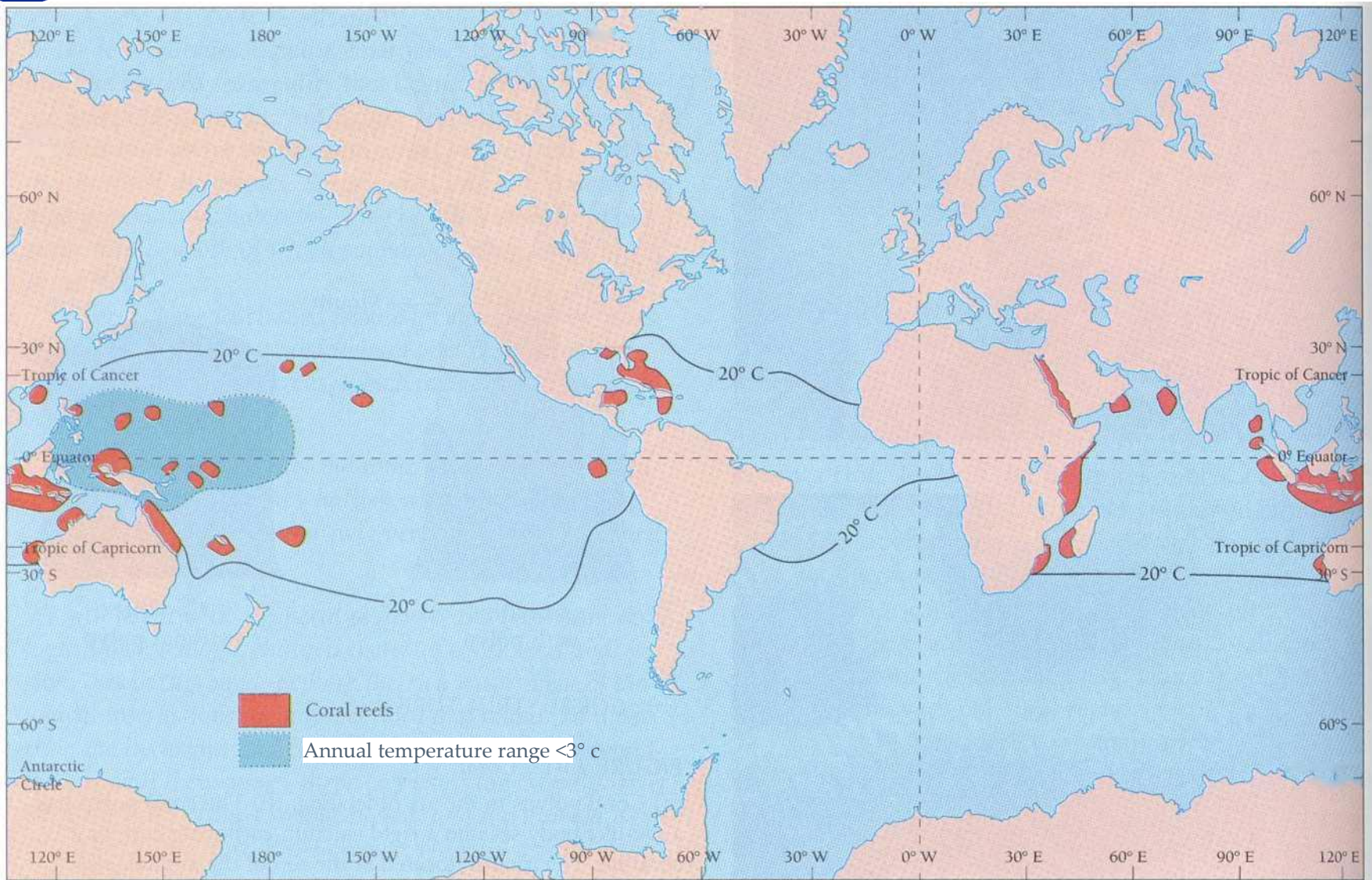


# RESISTANCE STRUCTURE RESISTANCES



*According to Veron, 2000*





- World:  $6 \times 10^5$  kilometer<sup>2</sup>

winter male ASIAN: 100,000 km<sup>2</sup>







- High diversity
- Fisheries: direct and indirect(10%): 10.5 -31 tons/km<sup>2</sup>
- High biological productivity
- Tourism: high diversity
- Coastal protection
- Gene reserves
- Supply of pharmaceutical productsrare
- Other: research, education,...



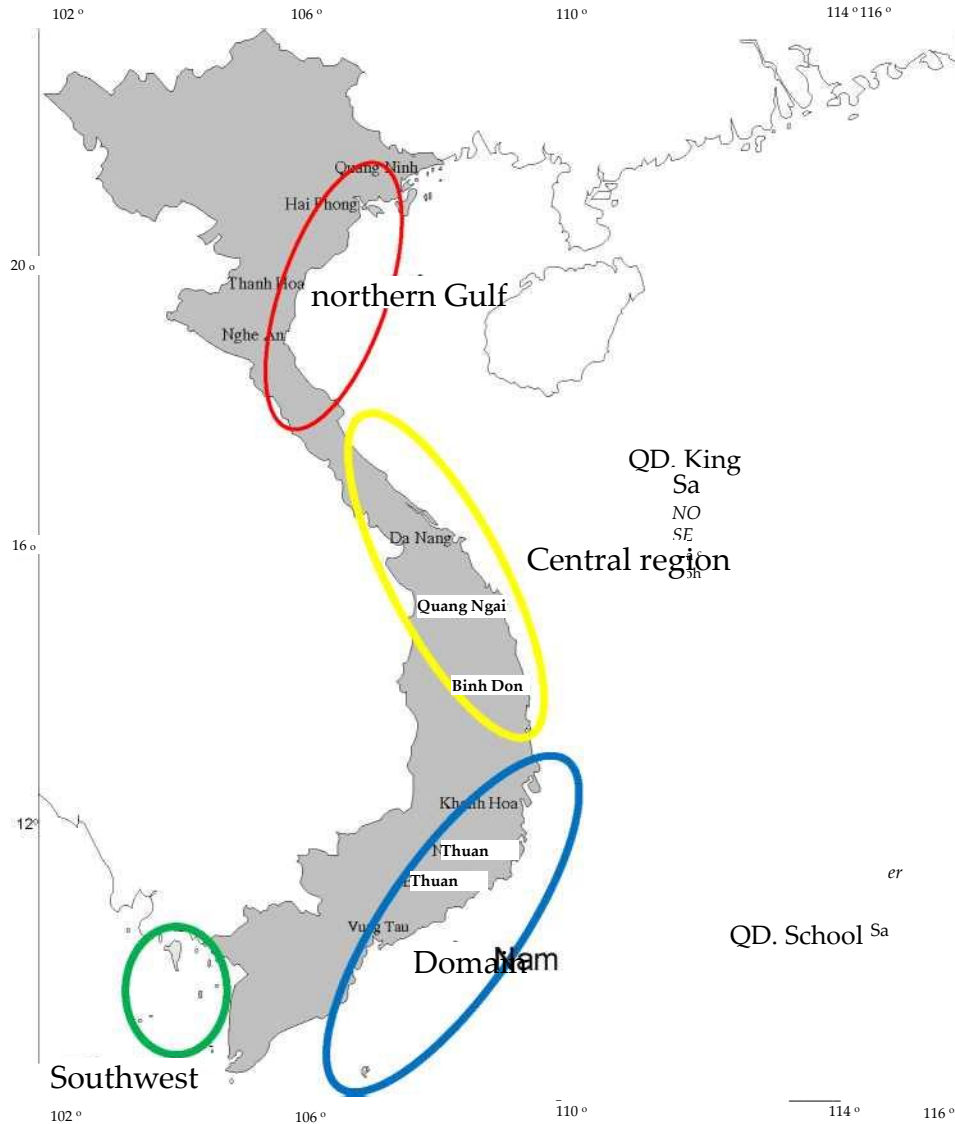


# Annual income from 1 square kilometer of coral reef

Forms of coral reef exploitation	Annual production capacity	Annual Income (USD)
Fisheries for domestic consumption	10 -30 tons	15,000 -45,000
Export fisheries (live fish)	0.5 -1 tons	5,000 - 10,000
Tourism	600 - 2,000 people	4,500 - 25,000
Coastal protection		5,000 - 25,000
Entertainment and variety born learn	600 - 2,000 people	2,400 -8,000
<b>Total</b>		<b>31,900 - 113,000</b>



# Zoning of the coral system creating Vietnam's sea reefs



Isopangeneric contours of hemnatypic corals in South China Sea ( .....: after Veron, 1993; -----: Changing proposal)

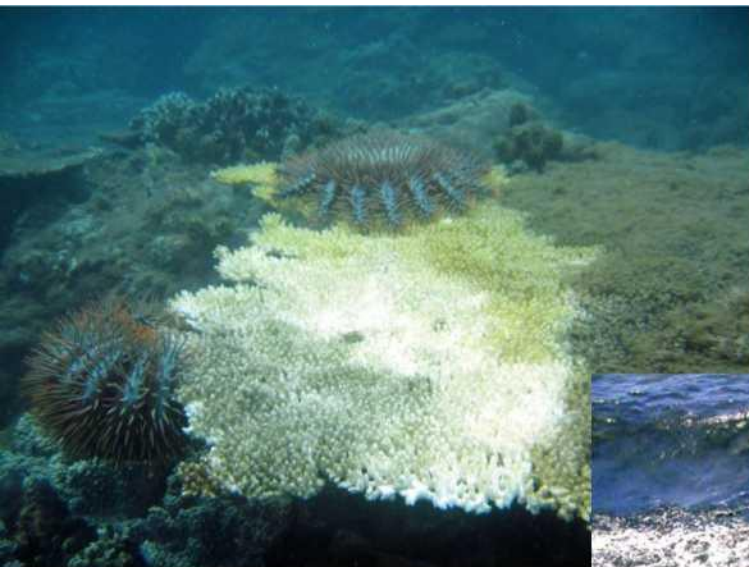


# Threats to Vietnam's marine coral reefs

- Overexploitation
- Destructive mining









# Tourist activities

...

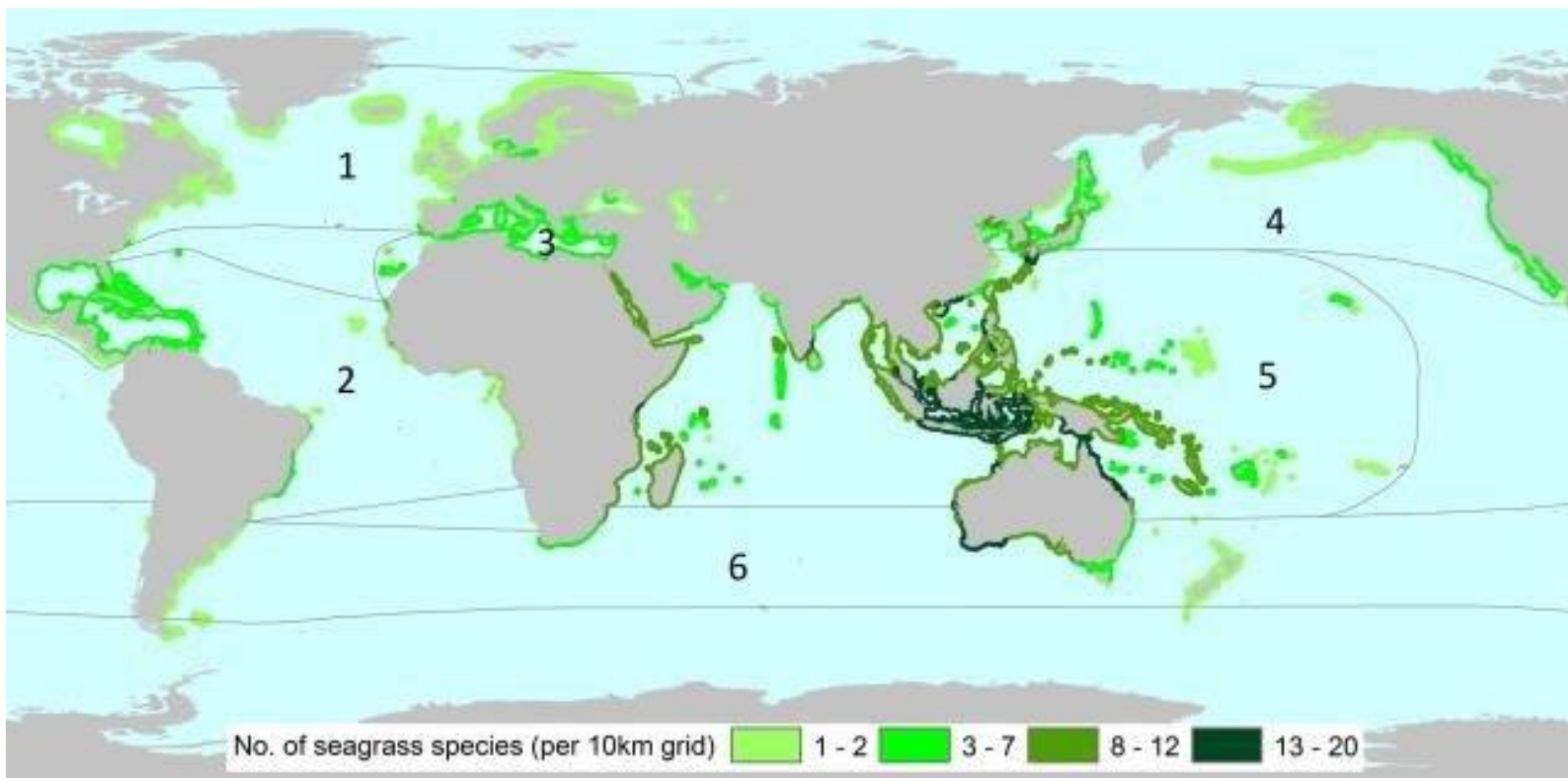




- Seagrasses are **underwater plants that evolved from land plants**. They are like terrestrial plants in that they have leaves, flowers, seeds, roots, and connective tissues, and they make their food through photosynthesis.
- There are about 60 species of fully marine seagrasses which belong to four families, all in the order Alismatales. Seagrasses evolved from terrestrial plants which recolonised the ocean 70 to 100 million years ago
- Unlike terrestrial plants, however, they do not have strong stems to hold themselves up—instead they're supported by the buoyancy of the water that surrounds them. Seagrasses are a very important food source and habitat for wildlife, supporting a diverse community of organisms including fish, octopuses, sea turtles, shrimp, blue crabs, oysters, sponges, sea urchins, anemones, clams, and squid. Seagrasses have been called “the lungs of the sea” because they release oxygen into the water through the process of photosynthesis.



## 2) Seagrass





### Seaweed

Seaweed with Seaweed?

- They are all lower plants



Multicellular



Unicellular



## Rhodophyta

- Rhodophytas have an additional pigment phicoerithrin that gives most of these algae their red color.
- In the tropics, they have the highest percentage of species groups.
- Diversity in morphology and size: single-celled or forming large flakes of several kg





## Phaeophyta

- Pigments: chlorophyll, carotene, xanthophin...
- - Different shapes.
- - Cell membranes are low in cellulose, but high in alginic acid, up to 39%.





## - Chlorophyta

- Chlorophyta have additional pigments chlorophyll a, b, carotene, xanthophin.
- The reserve substance is usually starch.
- Size: Unicellular or multicellular

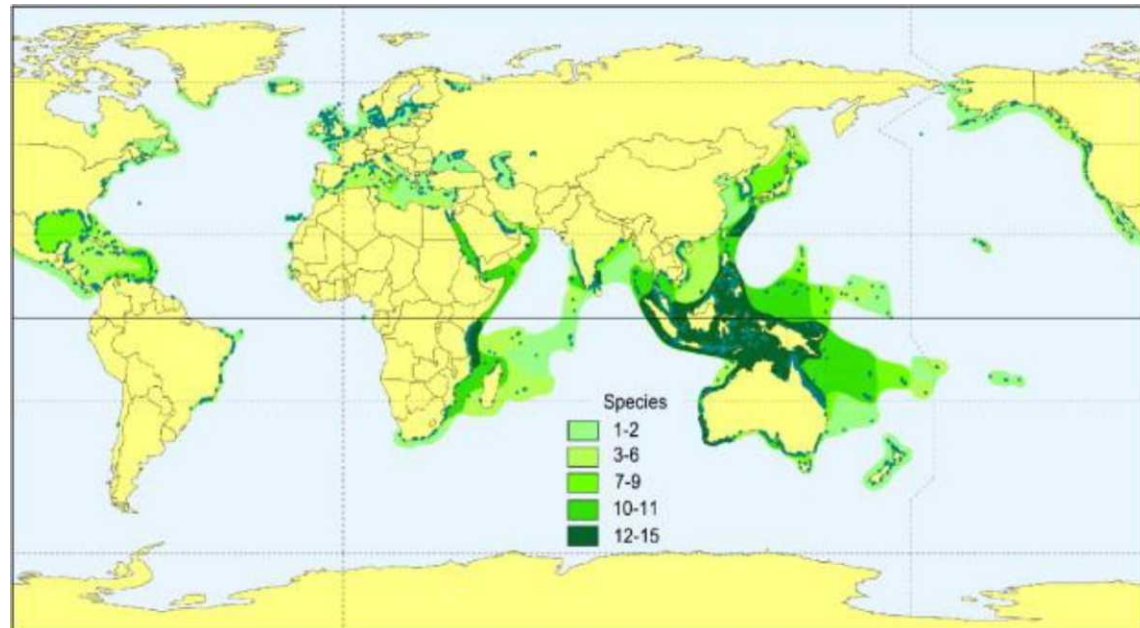
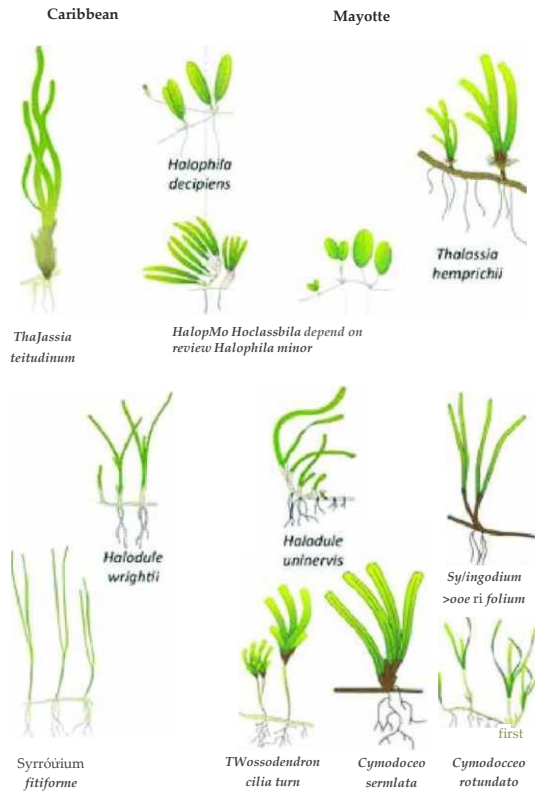




# Seagrasses

## Species distribution in the world

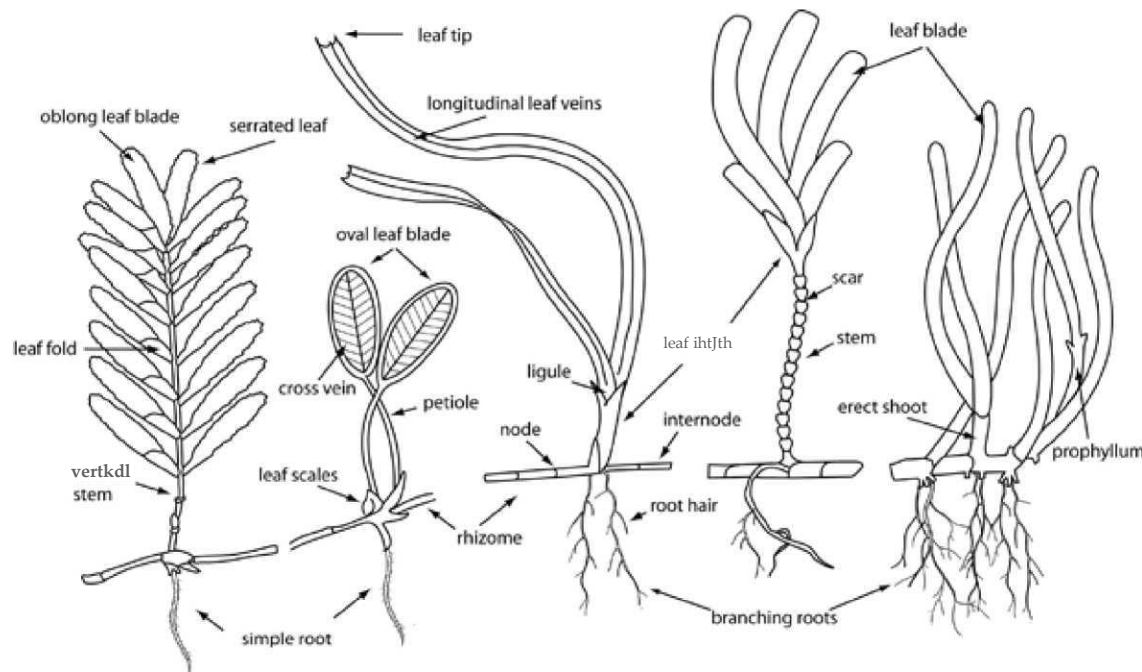
Cymodoceace family Hydrocharitaceae family



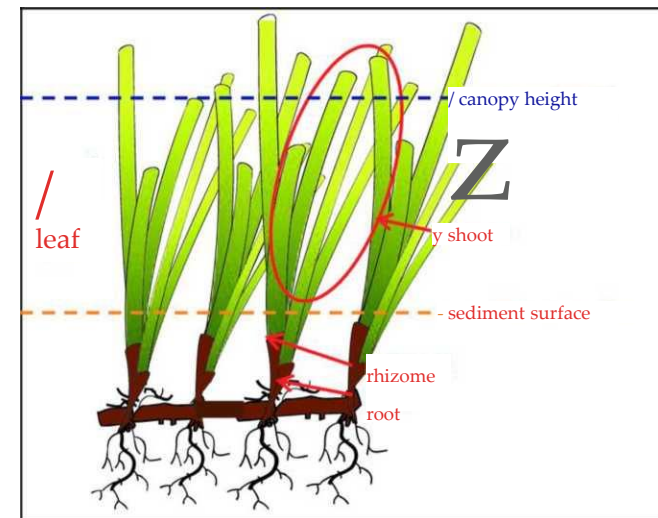
Short et al. 2017



# Seagrasses



## Seagrass shape





## Seagrasses: Taxonomy and Species Diversity

Branch: Tracheophyta Class: Monocots The set: Alismales Surname: 4 Surname

Posidoniaceae	Zosteraceae	Hydrocharitaceae	Cymodoceaceae
Genus: Posidonia	Genus Heterozostera*	Genus Halophila*	Genus Amphibolis
7 species	2 species	20 species (Vietnam: 5)	2 species
	Genus Nanozostera*	Genus Thalassia	Cymodocea
	7 species	2 species (Vietnam: 1)	4 species (Vietnam: 2)
	Genus Zostera	Genus Enhalus	Genus Halodule
	6 species (Vietnam: 1)	first species (Vietnam: 1)	8 species (Vietnam: 2)
	Phyllospadix		Genus Syringodium: 2 species; first
	5 species		Genus Thalassodendron: 3 species; first
7	20	23	19



### 3) Mangroves

- Mangroves - Mangroves - Mangrove ecosystems
- Mangroves: are shrubs, tall trees living in areas affected by tides, lagoons.
- Mangrove forest: A collection of many mangrove tree populations
- Mangrove ecosystem: Including flora and fauna associated with mangroves





### 3) Mangroves

- Mangroves are a tropical species of trees or shrubs that have adapted to live in coastal regions. They grow on loose wet soil that is periodically flooded by salty seawater during high tides.
- There are about 54 species of mangroves in the world, and we have four of those types in the Caribbean: Red, Black, White, and Buttonwood mangroves. The bark of mangroves is used as a source of dyes, and as durable and water resistant wood. Black and Buttonwood mangroves are used in charcoal production.
- Mangrove fruits can be eaten, and the leaves can be consumed as tea and medicine.



# 3) Mangroves

Tree



(a)

Flower



(b)

Fruit



(c)



(d)



(e)



(f)



(g)



(h)



(i)



(j)



(k)

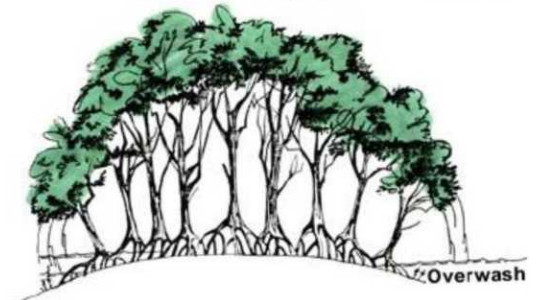
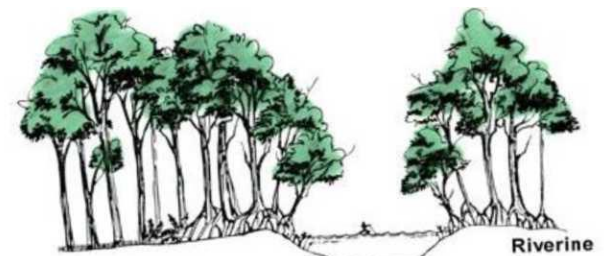
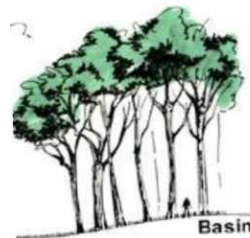
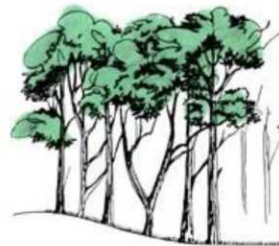
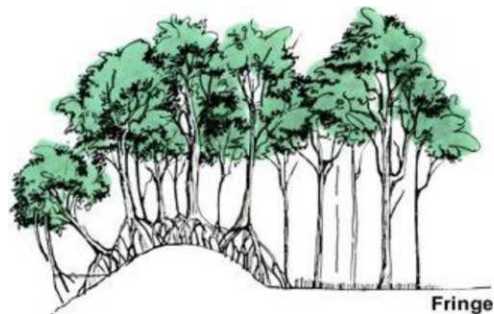


(l)



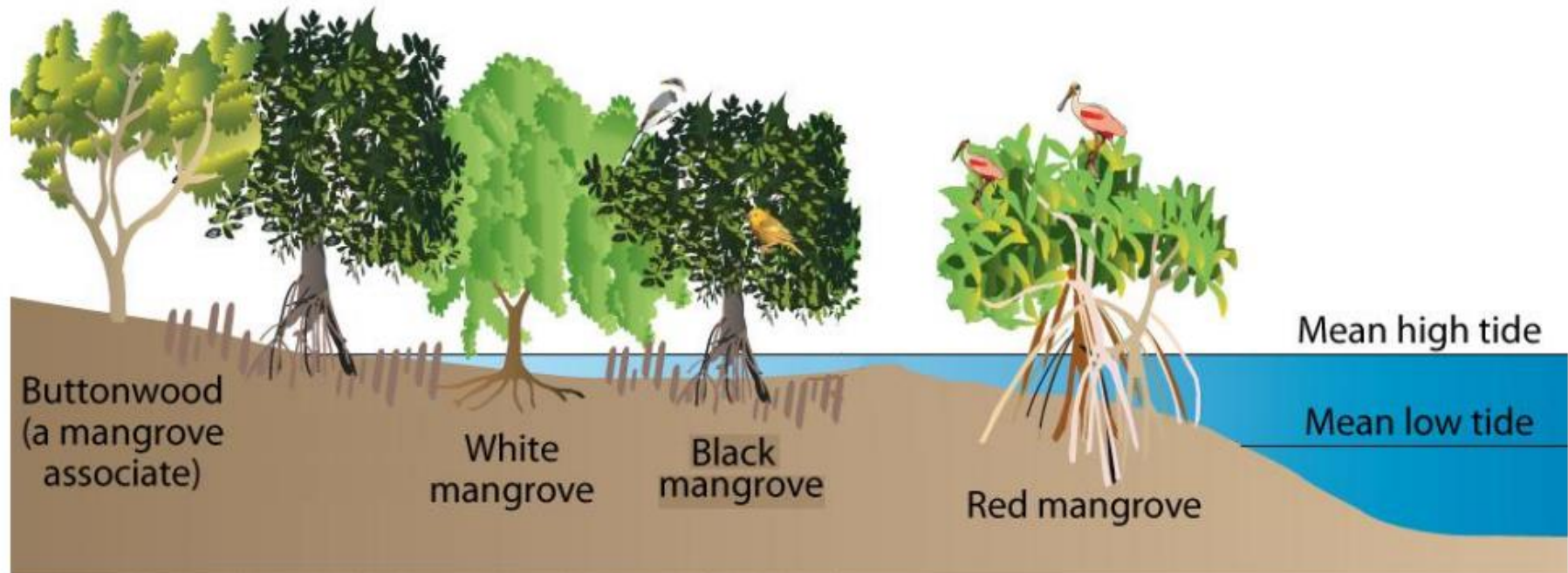
# Basic information

## Types of mangroves





“Mangrove zonation” describes the order in which the four different types of mangroves are found on land. The red mangrove is closest to the water, while the buttonwood mangrove is found the farthest from the water (deeper inland). Their positions depend on land elevation, water and soil salt levels, and tidal changes.

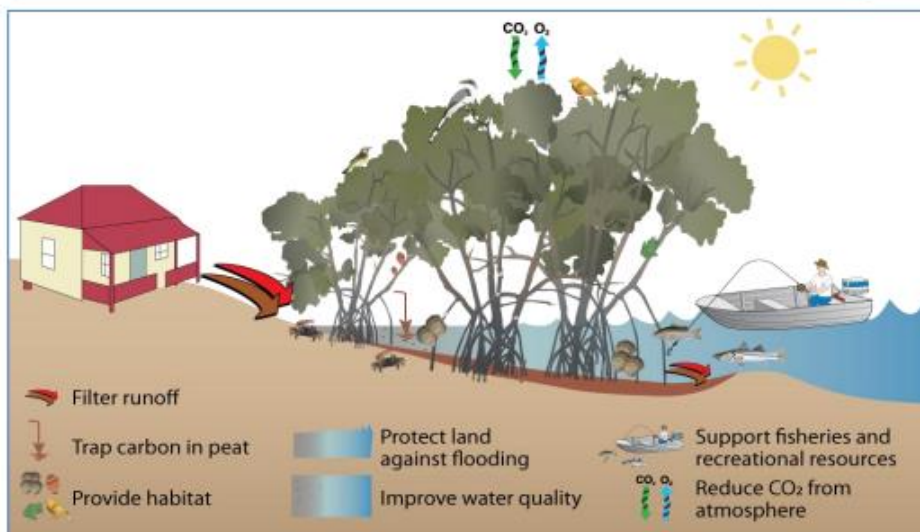
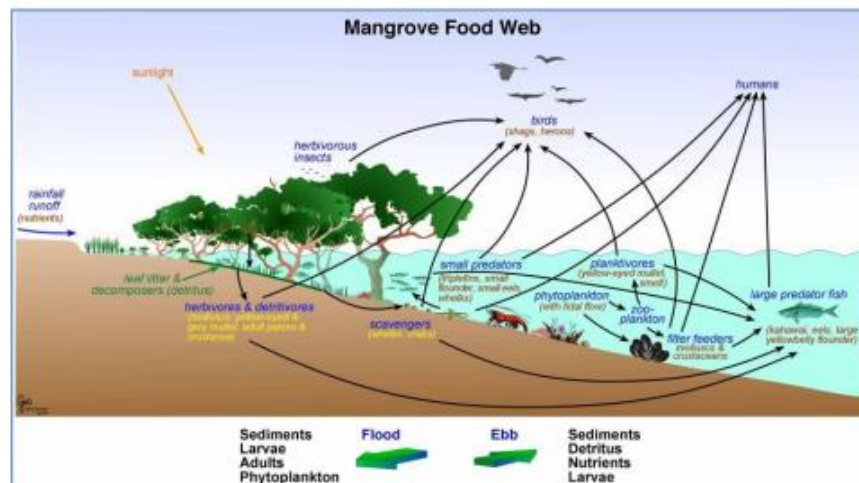


Conceptual diagram illustrating the dominant mangrove species of south Florida.

Diagram courtesy of the Integration and Application Network ([ian.umces.edu](http://ian.umces.edu)), University of Maryland Center for Environmental Science. Source: Kruczynski, W.L., and P.J. Fletcher (eds.). 2012. Tropical Connections: South Florida's marine environment. IAN Press, University of Maryland Center for Environmental Science, Cambridge, Maryland. 492 pp.



## Importance of Mangroves

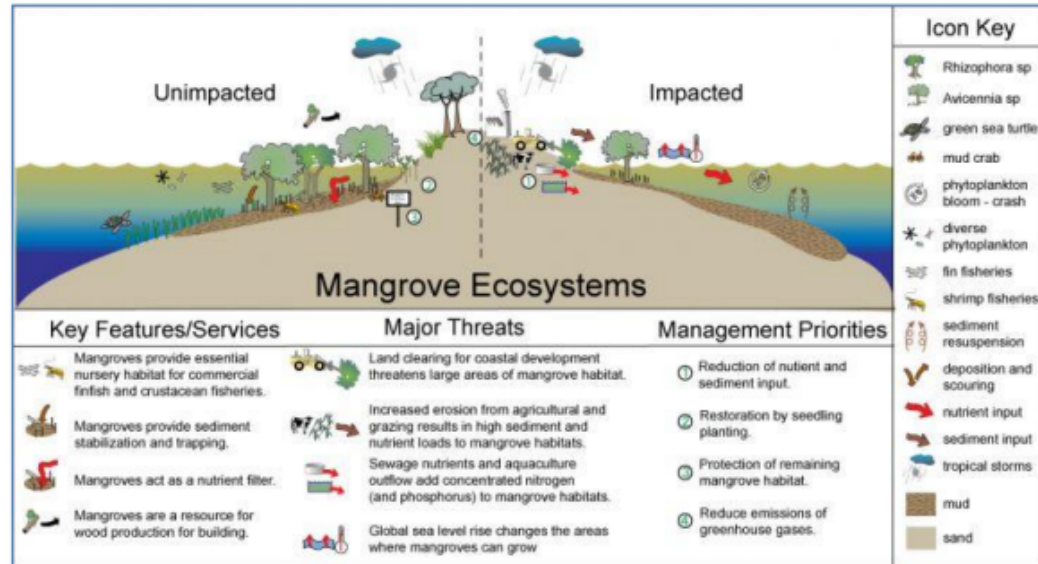


Conceptual diagram illustrating the important ecological functions that mangroves provide to the marine environment.  
Diagram courtesy of the Integration and Application Network (ian.umces.edu), University of Maryland Center for Environmental Science. Source: Kruczynski, W.L., and P.J. Fletcher (eds.), 2012. Tropical Connections: South Florida's marine environment. IAN Press, University of Maryland Center for Environmental Science, Cambridge, Maryland. 492 pp.

- **Provide a physical habitat and nursery grounds for marine organisms**
  - These organisms have important recreational and commercial value
  - Mangroves are nurseries for shrimp, crabs, and fish
  - The roots protect organisms from predators
- **Serve as buffers for storms (and hurricanes)**
  - Mangroves reduce the damaging effects of storm winds and waves.
- **Protect shorelines from erosion**
  - Mangrove roots hold sediments and loose soil together. They stabilize the land
- **Provide roosting and nesting sites for many birds**
- **Improve water clarity and quality**
  - The tangled root systems filter runoff that may include pollutants. They trap sediments and debris from the land
- **Provide food for many marine organisms**
  - Fish like the snook, gray snapper, and the tarpon find food here
- **Trap and cycle organic materials, chemicals, and nutrients that sustain ecosystems**
- **Support endangered species**
  - The hawksbill and green sea turtle, for example
- **Used as a renewable resource**
  - As mentioned in the introduction



## Damage to the Mangroves



### • Climate change

- Mangroves require a stable sea level to survive
- Climate change causes sea levels to rise

### • Floods and Hurricanes

- Strong waves and currents prevents seedlings from taking root in the sediment and washes nutrients away

### • Wildlife, pests, and weeds

- Wildlife damage seedlings, leaves, flowers, roots, and propagules
- Pests eat mangrove foliage and damage the wood
- Weeds restrict the growth of mangroves

### • Tourism

- Visitors bring garbage, sewage, noise, fumes, lights, and other disturbances that put a stress on mangrove ecosystems

### • Coastal development

- Building of ports, docks, hotels, marinas, and human settlements pollute the water and mangrove forests
- People involved in the construction bring traffic, garbage, and noise which put a stress on mangroves and their habitats
- Deforestation increases erosion and the amount of sediments in the water, which affects mangroves' filtering ability

### • Agriculture

- Mangrove forests are being cleared to make way for rice paddies, rubber trees, palm oil plantations
- Fertilizers, pesticides, waste, and other agricultural products block pneumatophores, choking the mangroves
- Natural flow of water to mangroves is disrupted by paving roads over waterways or diverting waterways for irrigation

### • Lumber industries

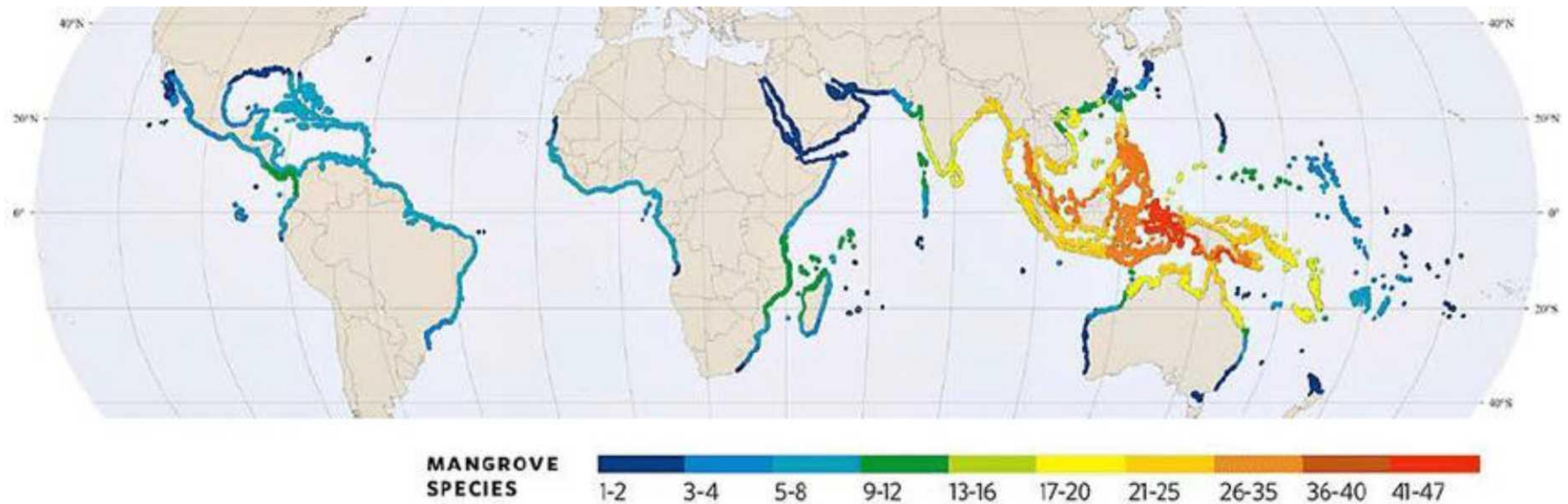
- Mangrove wood is harvested for building material, fencing, fuel, firewood, construction wood, and charcoal production
- The problem is that the harvesting of wood is no longer sustainable

### • Shrimp farming

- Mangrove forests are being replaced by artificial shrimp farming ponds
- Farmers divert water to their ponds, which reduces the amount of freshwater supplied to mangroves and makes it difficult for mangrove seeds to be dispersed



## Distribution of mangroves in the world





## Area mangrove forest In the world

- Current area now: 145,494 km<sup>2</sup> in 108 countrys
- - Failure reduce : 9,736 km<sup>2</sup> from year 1996

Global mangrove losses and gains, 1996-2016, including annualised percentage change					
Variable	1996	2007	2010	2016	1996-2016
Extent (kilometer <sup>2</sup> )	142.795	138,901	137,629	136.714	-
Losses (krr <sup>2</sup> >	-	5,969	3,498	3.057	8,437
Gains (kilometer <sup>3</sup> )	-	2.074	2,227	2.142	2.356
% Change	-	-2.73	-0.92	-0.66	4.26
Annual % Change	-	-0.25	-0.31	-0.11	-0.21



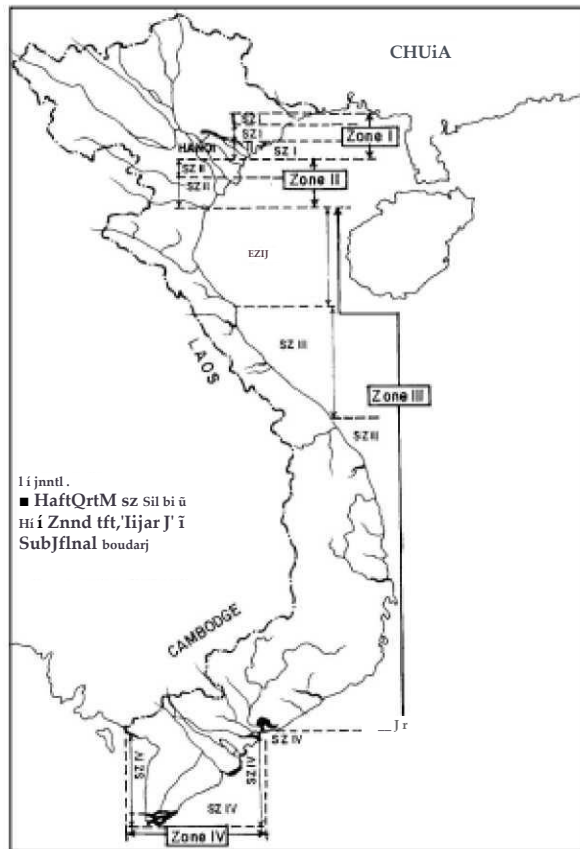
# Area of mangroves in the world

## Areas of decline, recovery

**By region: global mangrove net losses and gains, 1996-2016,  
Including annualized percentage change**

Region	1996 Area km <sup>2</sup>	2016 Area km <sup>2</sup>	Loss km <sup>2</sup>	Gain km <sup>2</sup>	% Change	Annual % Change
Australia & New Zealand	10,332	10,037	370	74	-2.86	-0.14
East & Southern Africa	7,630	7,329	424	122	-3.95	-0.2
East Asia	159	159	12	13	0.55	0.03
North & Central America & the Caribbean	22,702	21,072	2,196	566	-7.18	-0.36
Pacific Islands	6,410	6,327	146	63	-1.29	-0.06
South America	19,632	19,063	1,106	537	-2.9	-0.14
South Asia	8,701	8,492	435	226	-2.4	-0.12
South East Asia	46,789	44,060	3,308	579	-5.83	-0.29
The Middle East	334	319	19	4	-4.54	-0.23
West & Central Africa	20,107	19,857	422	171	-1.24	-0.06
<b>Total km<sup>2</sup></b>	<b>142.795</b>	<b>136.714</b>	<b>8,437</b>	<b>2,356</b>	<b>-4.26</b>	<b>-0.21</b>



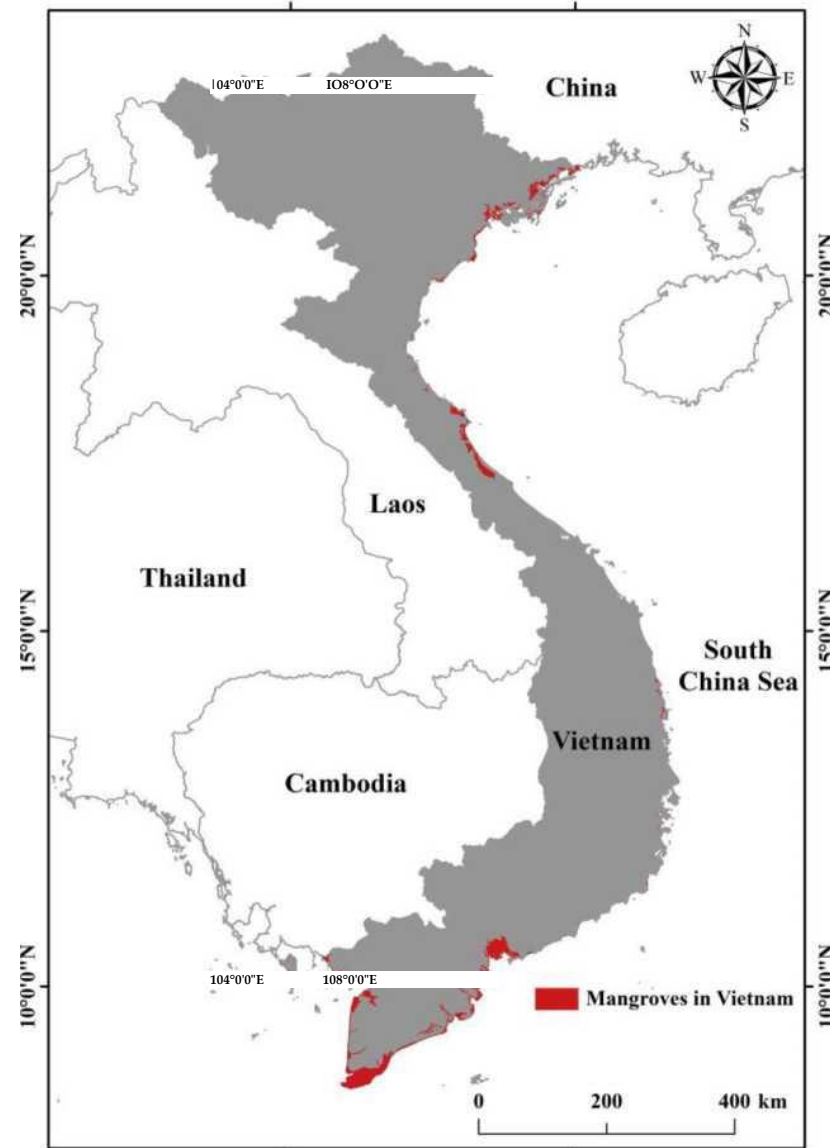


Divided into 4 regions:

- I. Mui Ngoc-Do Son
- II. II. Along the coast of the Northern Delta, from Do Son cape to Lach Truong estuary
- III. III. Central Coast from Lach Truong estuary to Vung Tau cape
- IV. IV. South Coast, from Vung Tau cape to Ha Tien



# Distribution of Mangrove Forest in Viet Nam







# Ho Chi Minh City University of Natural Resources and Environment



Co-funded by the  
Erasmus+ Programme  
of the European Union

## MARINE RESOURCES AND ENVIRONMENT MANAGEMENT

Topic 2 - MARINE RESOURCES  
2.4 Assessment method of resource benefit





# MATERIALS

1. Quản lý tài nguyên và môi trường biển, Nguyễn Kỳ Phùng, 2016
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**CONTENT**



**Overview of  
sea and  
island  
management**



**Steps to  
analyze  
resources**



# Overview of sea and island management

- ❑ Objects in the management of sea and islands
- ❑ Contents, principles, mechanisms and tools of state management of seas and islands



# 1. Objects in the management of sea and islands

## ❖ The concept of "position":

- In the broadest sense, "*position is the comparative correlation of location (foothold) in social nice in nature of a person, a community, an administrative unit, a country, an alliance, or of a space (territory) of different sizes*"
- "**Position is advantage** compare in terms of **geography, ability to exploit NS immaterial and material values of a certain territory**" [NC ", 2005];





# 1. Objects in the management of sea and islands

❖ For the management of seas and islands:

- **Space - position** within the framework of "comparative correlation in terms of geographical (natural) position of a certain space (territory) that can be exploited for environmental, economic, political, including the challenges faced by that territory.
- **Positional resources of the sea:** The main subjects are marine space and coastal zones, the water surface and seabed, channels, bays, wharfs, coastal lands, peninsulas and seas. islands, sandy beaches, rocky shelves, cliffs, caves.
- One Bay water deep, private poor talent original transmission system, but due to stay one taste wisdom geography physical Mandarin important Yes price treat history use Fort one port water deep Carry again NS profit useful terrible economic big.



- ❖ For the management of seas and islands:
  - Marine position resources are not only of natural origin, but also related to historical, archaeological, cultural, community structures, etc.
  - Marine position resources are also related to both biotic and abiotic factors, renewable and non-renewable, forming the shape and position in space of the subject.
  - Positional resources in current Vietnamese management documents often refer to the values brought by a space related to its geographical position in relation to political-economic centers and focal points. regions, with key economic zones, economic belts, corridors, etc.



- ❖ **Resources** are all forms of matter, knowledge used to create material wealth, or create new use values of people.

Resources are objects of human production. As human society develops, the number of types of resources and the amount of each type of resource exploited by humans is increasing.

- ❖ **Natural resources** are material possessions available in nature that humans can exploit, process, use, and serve human life (forests, rare animals and plants, mineral deposits, water, oil, gas...). Natural resources are an essential part of the environment and closely related to the environment..



## *1.2 Natural resources of Vietnam's sea and islands*

Types of resources of the sea and islands:

Position Resources

Biological resources Non-living resources

Energy resources

Transportation resources

Travel resources

### ❖ **Contents of general management of marine and island resources**

1. Formulating and promulgating legal documents on general management of marine and island resources.
2. Making planning on the use of sea and island resources.
3. To uniformly manage activities of basic investigation, exploitation and use of sea and island resources.
4. International cooperation in the field of general management of marine and island resources.



### **Specific management mechanism:**

- The mechanism for formulating, promulgating and organizing the implementation of master plans and plans on the use of seas and islands.
- The mechanism for appraisal, allocation or lease of sea and island areas to organizations and individuals for exploitation and use.
- The mechanism for coordination in inspection, supervision and handling of violations of the law on sea use.
- Dispute settlement mechanism in management, exploitation and use of seas and islands.
- The mechanism for organizing and managing basic investigation activities, keeping and sharing information and documents on sea and islands.
- Coordination mechanism in international cooperation, training and marine scientific research.



## **2: Resource benefit assessment**

**2.1. Single-sector management**

**2.2. Multi-disciplinary, multi-purpose management**

**2.3. Steps to analyze resources**



## 2.1. Single-sector management

Concept is management at all levels such as a central, provincial, and district. However, there is a lack of coordination in both vertical structures (central to grassroots) and horizontal structures (between sectors in the same area).

Effective coastal zone management must be based on sound science, taking into account the limitations of coastal resource systems in a context that is balanced and consistent with the development needs of different sectors. Sustainable coastal management can be understood in different ways:

Maintain environmental quality and preserve the function of coastal resource systems.

Realize the economy effectively, ensuring long-term benefits. Ensuring the rights of generations to enjoy coastal resources. Ensure adaptability to the natural and social environment.



## 2.2. Multidisciplinary management, goals

Purpose

Accept multidisciplinary development.

Minimizing antagonisms of interests, harms and irreversible losses in choosing development for the future.

Preserve ecosystem function.

Optimize the multi-target utilization of coastal resource systems



## Approach

- Integrated management approaches to adjust the traditional options in planning and management of coastal areas. In other words, it combines and integrates management plans with development plans in the following three combinations:
- System integration: this form involves the integration of coastal resource systems with biological resource systems and socio-economic systems.
- Coordination of tasks: related to the coastal management plan, based on which, management plans are proposed to address specific issues, by the purposes and objectives of the development plan.
- Policy coordination: related to government, local and sectoral policies on development.



## 2.3. Steps to analyze resources

### B1. Choose boundaries

It is necessary to choose the appropriate boundaries for the research of coastal functions and approach to assessment of their resources before conducting detailed research surveys.

The selection of suitable boundaries for coastal research and then planning and managing them requires the synthesis of 3 factors:

- *Basic environmental processes;*
- *Administrative units;*
- *Activities that affect or depend on the resources of the coastal area.*



## 2.3. Steps to analyze resources

### B2. Review benefits

The objective of the resource evaluation is:

- *Assess the current status of goods and services including supply and demand.*
- *Identify basic management parameters affecting existing methods.*
- *Building a comprehensive list of ability to use and identify basic management measures, such as control of the intensity of using resources, the needs of using them sustainably.*
- *Identify risks associated with increased use of resources.*



## 2.3. Steps to analyze resources

### **B3. Evaluate development opportunities**

- *The process of collecting and comparing information and evaluating benefits helps assess potential resources. The development of this potential depends on factors such as skills, investment capital of private or collective needed for effective and sustainable use of these potential opportunities.*
- *Analysis of these factors will determine the enforcement ability of the coastal use and management plan, and determine what the ministries and the community need to do to facilitate sustainable development.*



## 2.3. Steps to analyze resources

### **B3. Evaluate development opportunities**

Issues that need periodic inspection are:

- *Potential and current status of domestic and international markets for products obtained from coastal areas;*
- *Availability of people with technical and managerial expertise;*
- *The required level of collective investment and necessary institutional support, such as extension services, for the sustainable development of existing or new resources;*
- *Measures may be needed to overcome coastal management problems. For example, relocation or discontinuance of activities beyond sustainable use;*
- *Existing local skills and experience can contribute to the management process.*



## 2.3. Steps to analyze resources

### B4. Evaluation of compatibility

- *The reason for conducting a compatibility assessment is to identify compatible resource uses and potentially conflicting practices.*
- *Multi-use management can be either area oriented or resource oriented. In each case, multiple uses involve complementary or competing relationships between current and potential uses.*



Điểm mạnh	Điểm yếu
S	W
Cơ hội	Thách thức
O	T

One of the most commonly used methods in multidisciplinary management of integrated management is the SWOT analysis method

In analyzing the development of an industry or a field, the SWOT analysis method (Strength - Weakness - Opportunity - Threaten) can give an overview of the industry and then find methods to promote the advantages. strengths, minimizing weaknesses, seizing opportunities and eliminating threats



# SWOT ANALYSIS METHODS

To build a SWOT analysis model, it is necessary to carry out 8 steps as follows:

Step 1: List the opportunities.

Step 2: List challenges

Step 3: List the strengths inside

Step 4: List internal weaknesses

Step 5: Combine internal strengths with external opportunities to create SO strategies.



# SWOT ANALYSIS METHODS

To build a SWOT analysis model, it is necessary to carry out 8 steps as follows:

Step 6: Combine internal weaknesses with external opportunities to create WO strategies;

Step 7: Combine strengths with challenges to create an ST strategy;

Step 8: Combine Weaknesses with Challenges to create a WT strategy.



## The tools of the integrated and unified state management of seas and islands include ?

- A. Law of the sea, Law of the environment, Law of environment and marine resources
- B. Legal tools, economic tools, technical tools
- C. Constitution, related laws, directives, decrees, decisions...
- D. Different legal documents are used depending on the province and city.



What group of tools does the information system and database on seas and islands belong to?

- A. Legal tools
- B. Economic tools
- C. Technical tools
- D. All of the above answers are incorrect



## The steps in resource analysis include ?

- A. Boundary definition → Resource assessment → Compatibility assessment → Growth opportunity assessment.
- B. Boundary definition → Compatibility assessment → Growth opportunity assessment → Resource assessment
- C. Boundary definition → Resource assessment → Growth opportunity assessment → Compatibility assessment.
- D. Resource assessment → Boundary definition → Development opportunity assessment → Compatibility assessment.



## What is the reason for conducting a compatibility assessment?

- A. Determining the feasibility of the coastal zone management and use option
- B. Identify compatible resource uses and potential conflicts
- C. Identify what government ministries and communities need to do to facilitate their sustainable development
- D. All 3 answers above are correct



## **The goals of a resource assessment are:**

- A. Identify key management parameters affecting existing usage patterns.
- B. Develop a comprehensive list of possible uses and identify basic management measures, such as controlling the intensity of resource use, the need for sustainable use of them.
- C. Identify the risks associated with increased resource use.
- D. All 3 answers above are correct