Threats to the Coastal Marine Ecosystems in Vietnam

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Introduction

- Vietnamese sea is over 1 million km2 in area, and its coast stretches along 3200 km with 114 river mouths, 48 bays, 12 lagoons, over 3000 islands.
- Coastal marine area is very diversity in geology and landforms; climate and hydrology are different in other parcels. Vietnam Sea is divided into 4 natural regions: The Gulf of Tonkin, Central area, South East area, and The Gulf of Thailand.
- The coastal marine ecosystems are high in high productivity and biodiversity. Recently, they have been degraded obviuosly by human activities and climate change.

1. Distribution of coastal marine ecosystems

Island ecosystem

- Vietnam has over 3,000 small and big islands.
- More than 1300 island species with many specious and endemic species on the islands.
- Many sub-ecosystems and their fauna and flora around islands
- A lot of islands is a core of National parks or biosphere reserved areas

1. Distribution of coastal marine ecosystems

Coral reefs

Abundant in Vietnam, concentrated in the Centre. Coral reefs are from few tens meters to 200m in width, from low tidal sub zone to 40-50m in depth; high coverage, from several to over 90%.

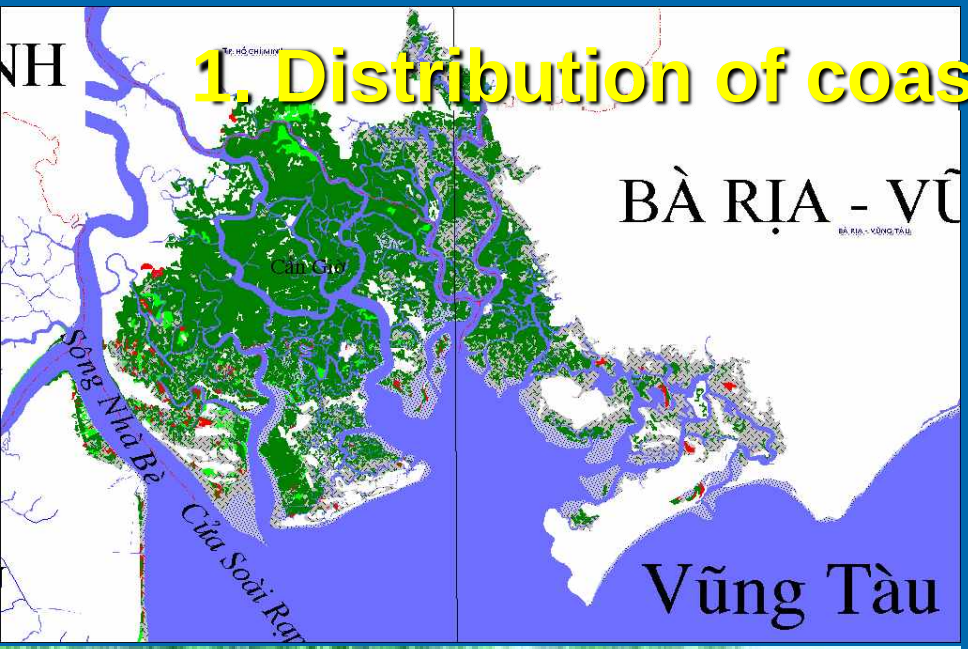
Biodiversity very high, 298 hard coral species, 125 soft coral species and 73 keratin coral species have recorded. Habitats of precious species as oyster, snail, holothurians

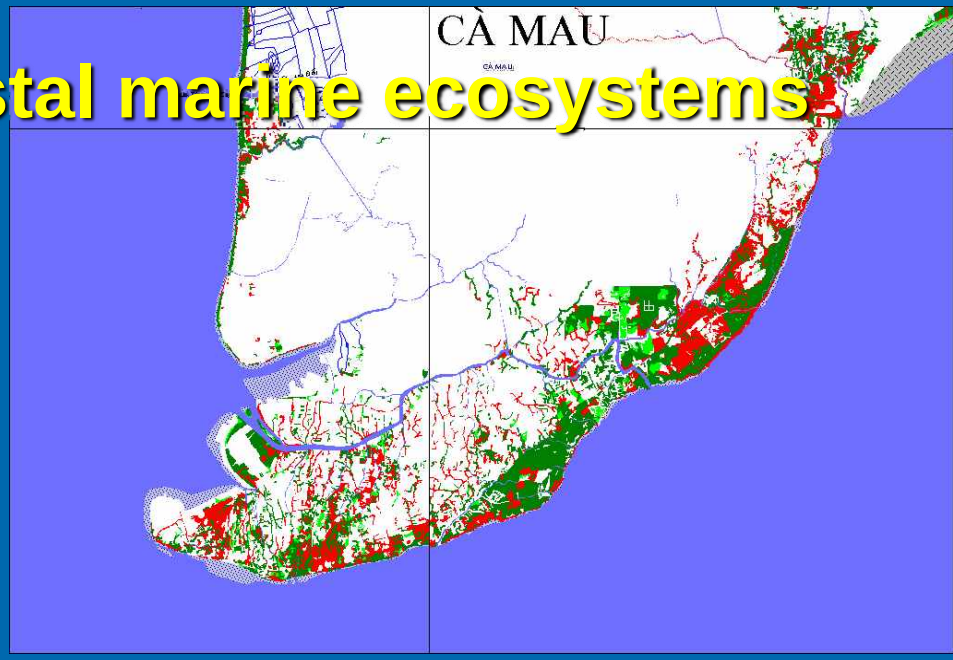
1. Distribution of coastal marine ecosystems

Mangrove ecosystem

- About 94 mangrove species in Vietnam. Very abundant in estuaries.
- Biodiversity, biological productivity and fishery products are very high.
- Great significance on coastal ecology and environment, prevention of natural hazards.

1. Distribution of coastal marine ecosystems





Mangroves in Biosphere Reserved Area in Can Gio

Mangroves in Biosphere Reserved Area in Ca Mau

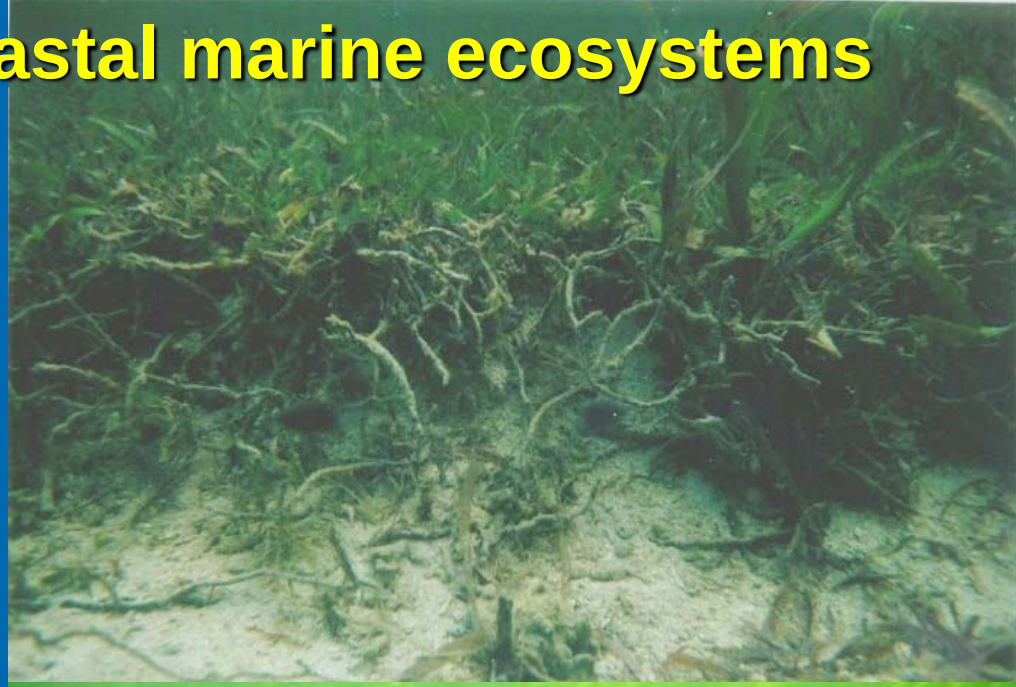
1. Distribution of coastal marine ecosystems

Sea grass beds

-About 14 sea grass species. Concentrated in the Centre and the big islands as Con Dao, Phu Quoc
- Strongly developed in tidal flats and to 5m in sub-tidal zone.
Habitats and foods for many animal species and included Dugong, a rare marine mammal.

Dugong in Con Dao Island

Photo: VS Tuan



Zostera japonica in Quang Nam Photo: NV Quan

1. Distribution of coastal marine ecosystems

Coastal wetland ecosystems

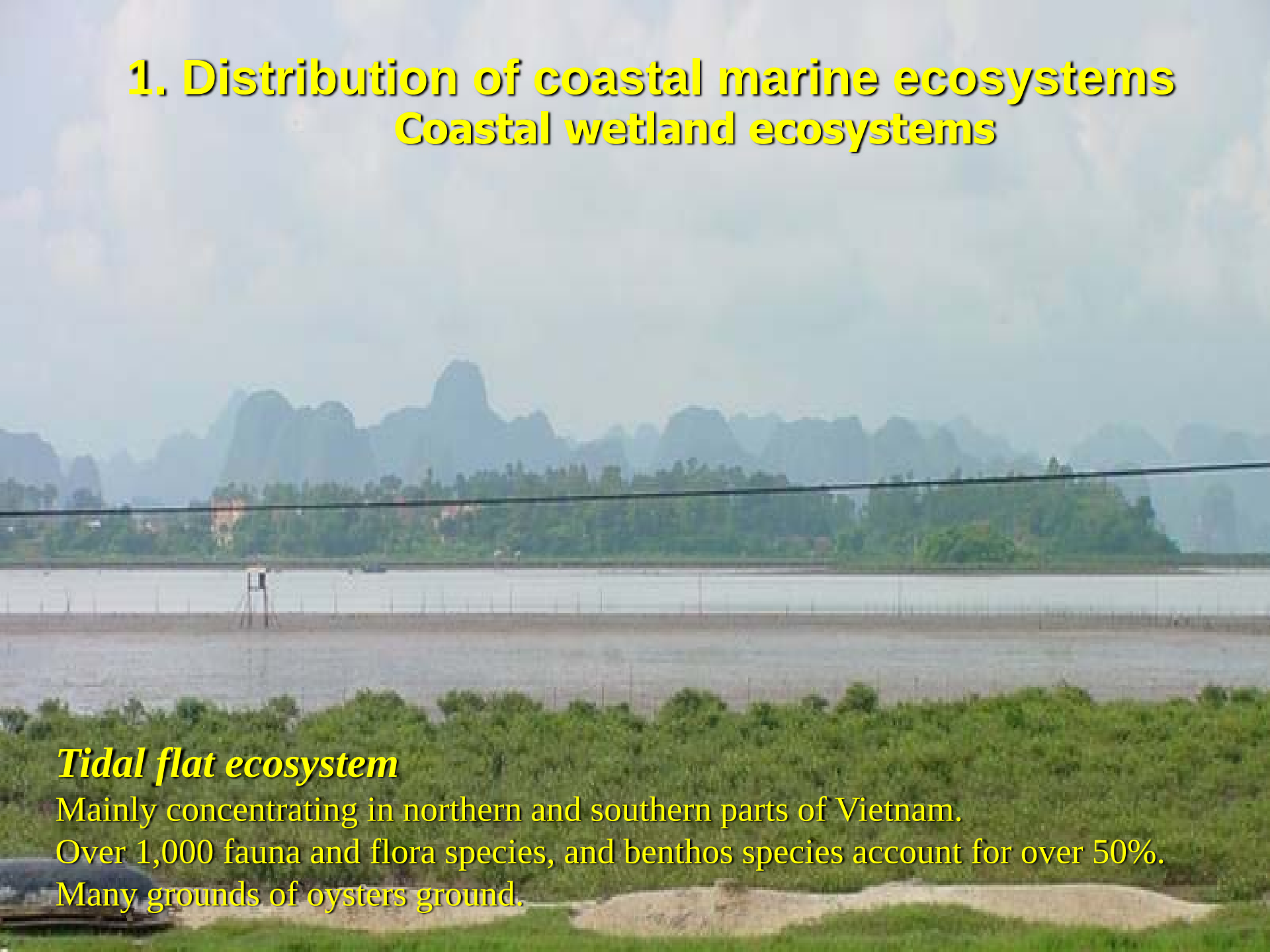
***Platalea minor* in Xuan Thuy RAMSA SITE**
Photo: Cuong CT

Including estuary ecosystem, tidal marsh, mangrove forest, muddy tidal flat, beach, coastal lagoon, inland pond, coral reef, small Wild Island, coastal soft seabed. About 10,960 km2.
Very high in biodiversity and fishery production.
Many unique species listed in the Red Data Book of Vietnam

Tidal Marshes

1. Distribution of coastal marine ecosystems

Coastal wetland ecosystems



Tidal flat ecosystem

Mainly concentrating in northern and southern parts of Vietnam.

Over 1,000 fauna and flora species, and benthos species account for over 50%.

Many grounds of oysters ground.

1. Distribution of coastal marine ecosystems

Coastal sand dune ecosystem

- Along coastal zone from Thanh Hoa to Binh Thuan, about 600,000 ha.
- Poor in spicies number, but special in biotops and habitat.
- Easy vulnerably with coastal hazards
- Are being affected with sand and heavy mineral exploitation.

Beach ecosystem: abundant along coast

Chelonia mydas Photo: N. Pilcher

1. Distribution of coastal marine ecosystems

Estuarine ecosystem

- Total 114 river mouths along the coast. Two largest are Mekong and Red River estuaries. Bio-communities are diverse and abundant: freshwater, brackish water and seawater. Mangroves are very dense.
- Communities: The brackish water ecosystems are more diverse, especially in estuarine and mangrove area.

1. Distribution of coastal marine ecosystems

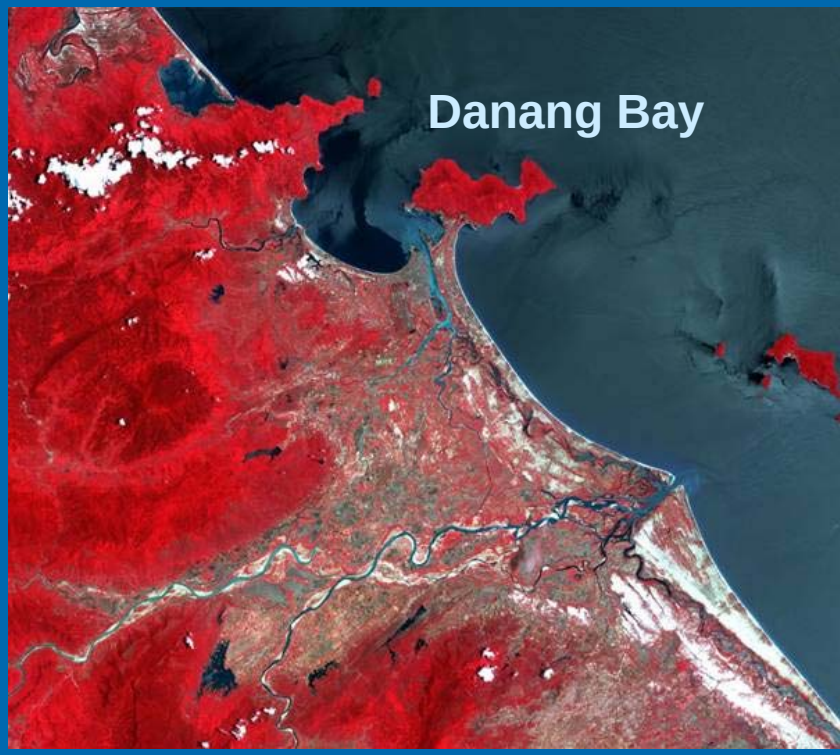
Lagoon ecosystem

- Total 12 lagoons in coastal central Vietnam: Over 1,000 fauna and flora species; nutrient storages, a breeding and spawning grounds, and seasonal migration paths of marine fishes.
- The biggest is Tam Giang - Cau Hai lagoon: 21,600 ha and 921 species, particularly 7 species of sea grass, 230 species of fishes. The fishery production of 4,000 - 5,000 tons/year.
- Coastal hazards: flood and inundation, inlet displacement.

1. Distribution of coastal marine ecosystems

Ecosystems in Bay – embayment

- Total 48 bays and embayments.
- Consist of some secondary ecosystems such as mangroves, sea grass beds, coral reefs, beaches etc.
- Many bays are the traditional fishing grounds. Some bays are Heritage, Biosphere Reserve, and National Park etc.



1. Distribution of coastal marine ecosystems

Hard bottom ecosystem

- It consists of organism community living on bed rocks in the bottom, including coral reef
- Total area of about 51,040 km2. The Centre is abundant in hard bottom ecosystem.
- Habitats of some 22 species of lobster, and roughly 340 species of reef fishes

1. Distribution of coastal marine ecosystems

Soft bottom ecosystem and surrounding water bodies

- Some 50 % of marine organism lives in this area reaching 20m deep.
- Main grounds of fishes, shrimps and squids concentrated in this area.

Four fishing ground located along the coastal zone and one offshore.

Dolphins in Spratly Sea

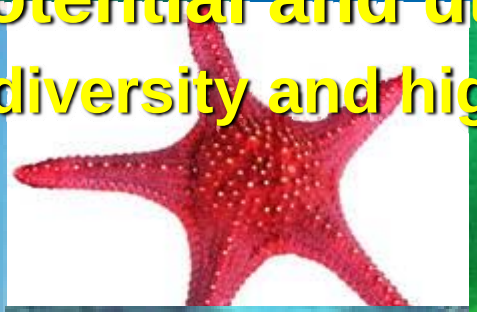
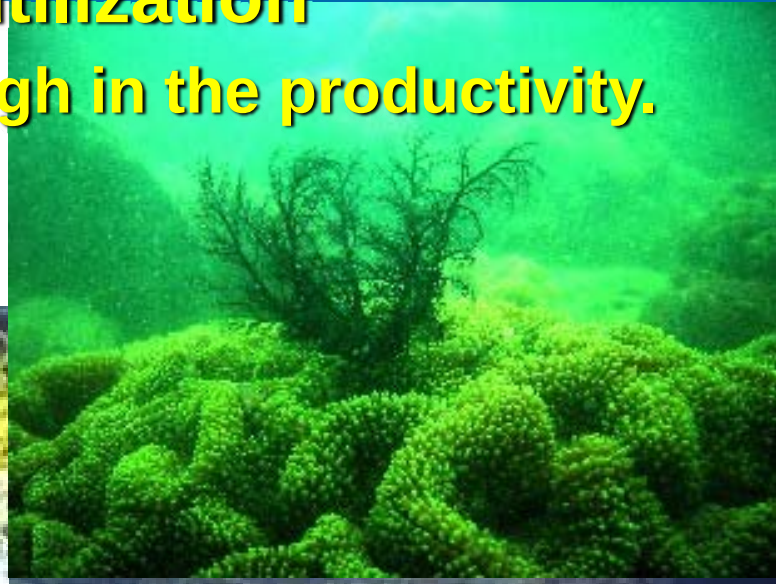
Photo: ND Ngai

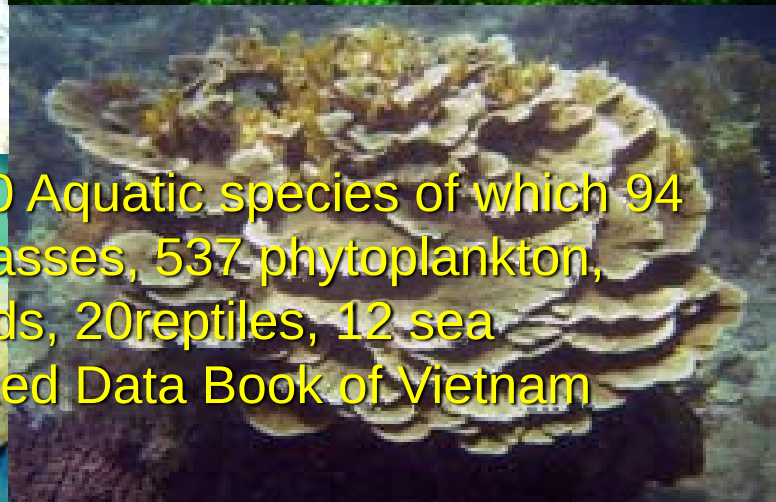
2. **Potential and utilization**

- High in biodiversity and high in the productivity.
- Establish the natural conservation areas
- Having relation closed to the coastal marine fishery
- Area of coastal aquaculture over 600,000 ha, of which shrimp over 200,000ha.
- Harmonization for coastal marine environment.
- Service for many other economic – social benefits

2. Potential and utilization

High in biodiversity and high in the productivity.



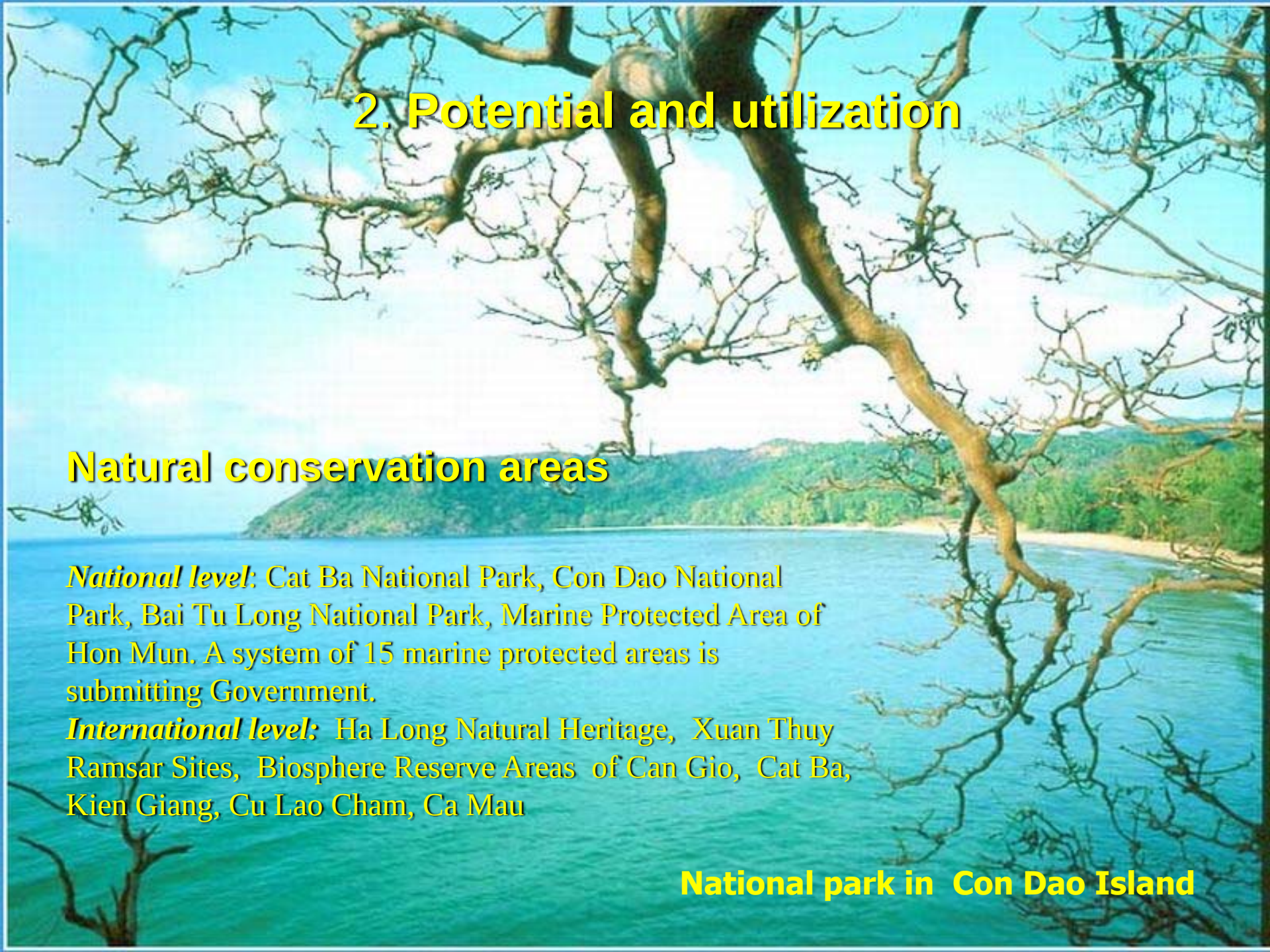
More than 1300 island species, about 11,000 Aquatic species of which 94 mangrove species, 653 seaweed, 14 sea grasses, 537 phytoplankton, some 6000 benthos, 2038 fishes, 43 sea birds, 20reptiles, 12 sea mammals.83 species are officially listed in Red Data Book of Vietnam

2. Potential and utilization

Natural conservation areas

National level: Cat Ba National Park, Con Dao National Park, Bai Tu Long National Park, Marine Protected Area of Hon Mun. A system of 15 marine protected areas is submitting Government.

International level: Ha Long Natural Heritage, Xuan Thuy Ramsar Sites, Biosphere Reserve Areas of Can Gio, Cat Ba, Kien Giang, Cu Lao Cham, Ca Mau



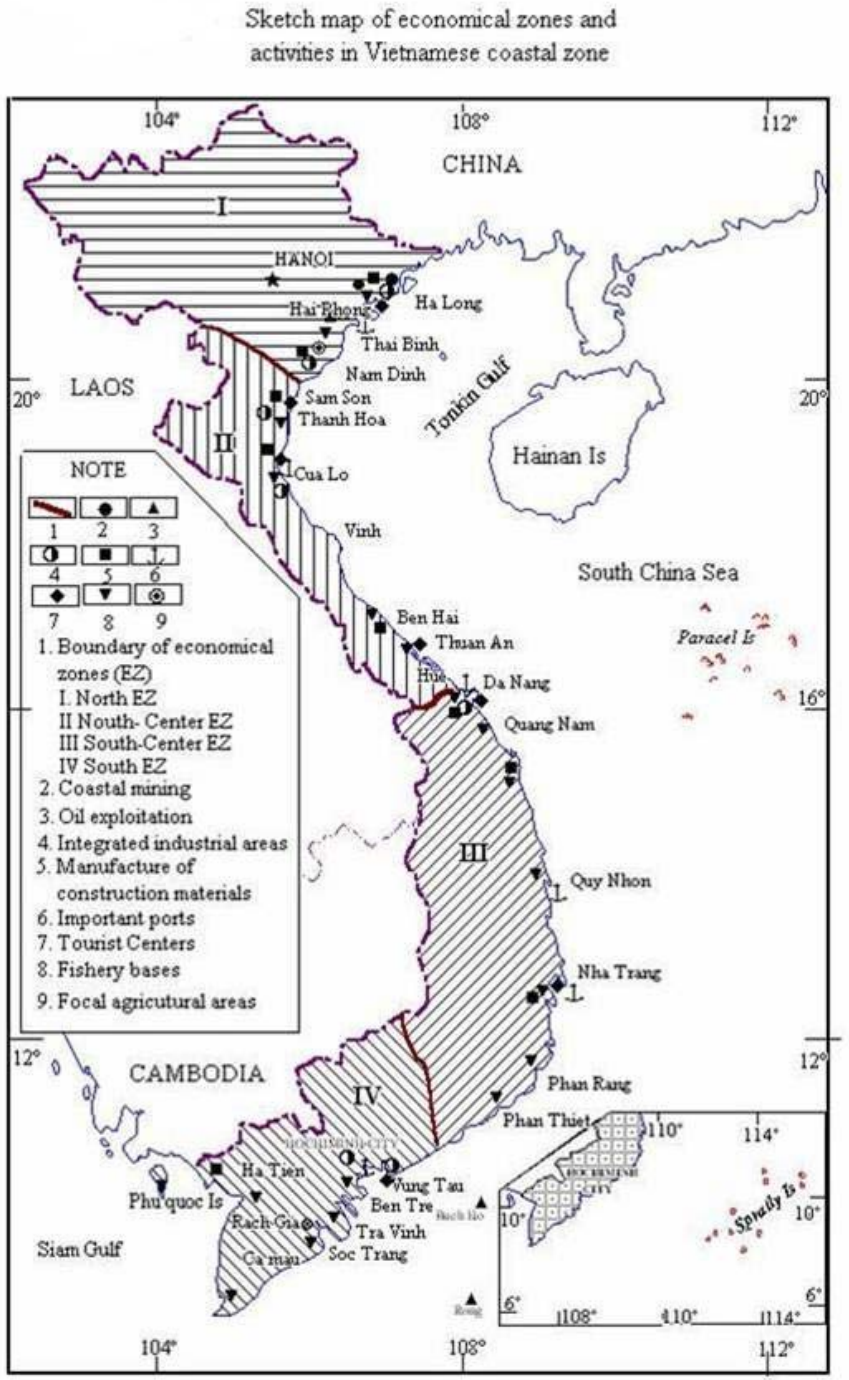
National park in Con Dao Island

2. **Potential of biodiversity and conservation**

- Having relation closed to the coastal fishery, including catching and aquaculture. Valuable fishery production reserve of Vietnam marine area in roughly 3,500,000 tons. The annual allowable catching capacity is more than 1 million tons. The catching products in Vietnam costal sea was 1,434,800 ton in 2002.
- Area of coastal aquaculture over 600,000 ha, of which shrimp over 200,000ha.
- Harmonization for coastal marine environment, contribution to natural disasters: coastal erosion, strong wave and storm surges, tsunamies etc
- Used as the inhabited areas, agriculture lands, location for waterway, harbor and fishery infrastructure, and sites for tourism and outdoor recreation. They have also the values for

3. Threats from human activities

- The activities in watershed include upstream deforestation and the construction of dams, and dumping the pollutants from activities of agriculture, industry, and domestic.
- The activities in coastal marine area include mining, tourism, navigation, and fishery leading to the losses of habitats, pollution, over catching and over aquaculture, fishery activities by dangerous methods as dynamite, electric powers and toxic chemicals.



3. Threats from human activities

Damming

- The dam system built at the upper stream caused changes in the sediments water, nutrients discharges to the sea.
- Al biggest dams of Vietnam in Red River. In Mekong river, China is ongoing rapidly develop the dam system.. In 2010, there will be 8 dams with the total capacity of water volume reach more than 40km3 in Mekong catchment
- The biodiversity and fishery resources tend to be reduced significantly. For example, the Vietnam's fishing stock in Gulf of Tonkin reduces about 24,6%.

3. Threats from human activities
Mining and shipping

- Coastal mining as oil, coal, construction materials, mineral make changes in the coastal habitats, discharge of solid and liquid wastes and increase the coastal erosion. The crude oil production increases rapidly, reaches over 10 mill. tons/year.
- There are many big ports locating along the coastline but low in the frequency usage. Activities come from port and shipping cause negative affects to the ecosystems, especially oil spills.

3. Threats from human activities

Pollution

- as Fe, Cu, Zn, Cd, As, Pb is not common, but tends to occur more frequently and is higher in water, sediments and The pollution of heavy metals such living organisms.
- Cyanide was polluted very seriously from 1998 – 2000, and significantly decreased recently. In 2007
- The contamination of organic compounds is not very common, however, relatively high in some areas.

3. Threats from human activities

Oil spills

- Extremly be serious in the near shore area. concentration normally reaches over the permission level at the offshore water, near the oil drilling plant and international maritime route.
  Oil spills are one of the major causes of pollution. The statistical data showed that 40 oil spill cases were reported in the coastal marine area. In 1994 at the Saigon petrolium port, 1865 tons of oil were spilled.
- From February to May, 2007 a huge amount of unknown- origin oil occurred in 20 provinces and cities along coastal area of Vietnam, heavily impacted on the coastal marine ecosystens economy.

Dolphin died by oil spills in Con Dao

3. Threats from human activities loss of habitats

- **Damaged seriously by reclamation for aquaculture, agriculture, and wood cutting.**
- **About 400,000 ha in 1943 and over 200,000ha at present.**
- **Over 150,000ha mangroves in South Vietnam destroyed by warring herbicides.**

Photo: N.Goro,1976

Mangroves turned into shrimp pond

Mangroves were damaged for land reclamation.

3. Threats from human activities
Over catching

Valuable fishery production reserve of Vietnam marine area in roughly 3,500,000 tons. The annual allowable catching capacity is more than 1 million tons. The catching products in Vietnam costal sea was 1,434,800 ton from 2002. Of with more than 80% production got from nearshore waters

Fishing by dynamite in Con Dao Island

Photo: NV Quan

Fishing weir in Mekong estuary

Catching in Tam Giang lagoon

Fishing by elictric power in Nam Dinh area

3. Threats from human activities

Over aquaculture and exploitation

- Area of coastal aquaculture is over 600,000 ha, of which shrimp over 200,000ha.
- Marine animals exploited as souvenirs for tourists.

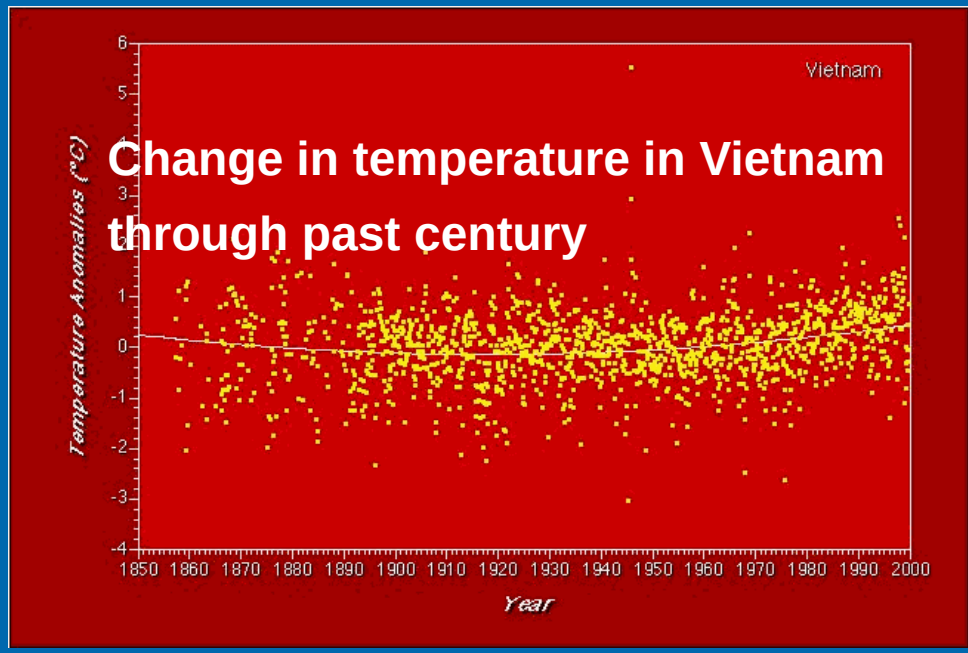
Ponds of aquaculture

Cages of aquaculture

Fishing fan

4. Threats from climate change

- *Climate change and sea level rise* have been causing flood, salinization, erosion, siltation and degradation of ecosystems.
- Strengthening coastal marine disasters such as flood, erosion, sedimentation and saltwater intrusion.
- Loss of habitats and breeding grounds.
- Disturbance of coastal marine ecology
- El-Nino makes increasing the salinization, poor nutrient, and mortality of many organisms, especially corals. During El-Nino, the increasing temperature causes bleaching corals



Bleaching corals in Bach Long Vi Island from 1997 - 1998

4. Threats from climate change

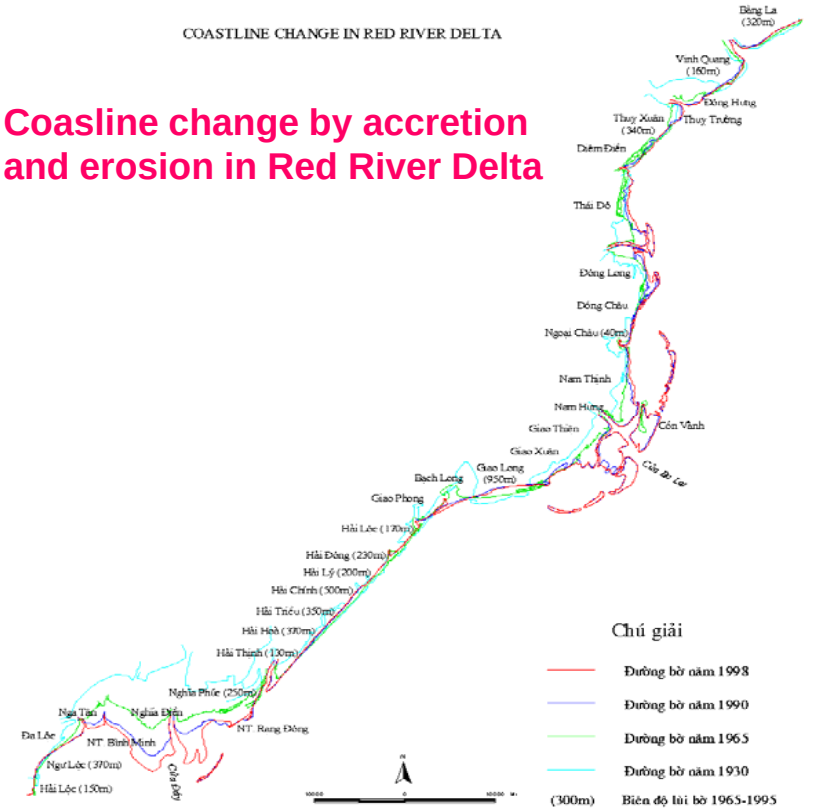
Coastal erosion and sedimentation

Coastal erosion (Loss of habitats) has been in both scale and dangerous level. The total of 397 coastal sites with length of 920 km have been eroded at mean rate 5-10 m/year, some time 30-50 m/year.

In both Red River and Mekong deltas, they are well known by the accretion and erosion occuring at the 1/4 of the coastline in each delta.

Moving sand filling up mangroves

Coasline change by accretion and erosion in Red River Delta



4. Threats from climate change

- **Unusual typhoons in combination with heavy rain** make great pressure to the coastal environment. In the past ten years, typhoons have decreased in the North, but increaese in the Central and the South. The big typhoons called Linda in the South in 1997 was considered as rare henomenon of the 20th centrury.

  - La Nina causes heavy rain, increases the turbidity, reduces the salinity of the coastal waters and making coastal floods. Increases of coastal floods are also results of damage of upstream forest, heavy rain, sea level rises, enclose of river mouth and lagoon inlets by siltation. Coastal flood is an cause of freshening ecosystems.

Historical coastal Flood in 1999 in Hue City
Dark red color indicates the heavy flood area

5.protection orientation for the coastal marine ecosystems

- Protecting and restoring the habitats like sea grass beds, mangroves, coral reefs, beaches, and marshes etc.
- Establishing strongly systems of natural conservation areas. Protection of rare, endangerous, precious and endemic species.
- Preventing and mitigating pollution, natural disasters.
- Controlling overexploitation and dangerous exploitation.
- Changing fishery structure for coastal inhabitants with the orientation of strengthening offshore catching.
- Supporting the poor fishmen and strengthening education, information
- Strengthening effectiveness of laws and regulations.
- Promoting international collaboration.

Conclusion

The coastal marine ecosystems in Vietnam are:

- Very diversity and typical for the tropical zone.
- Very high in biological production and biodiversity, but highly vulnerable, too.
- Take a very important function in coastal ecology and environment.
- Plays an important role for the coastal economic - social development.
- Have been degraded seriously by human and climate change impact.
- By these reasons, it needs to take a resolution series of management and protection of them.

Caretta caretta
Photo: N Pilcher
thank you very much