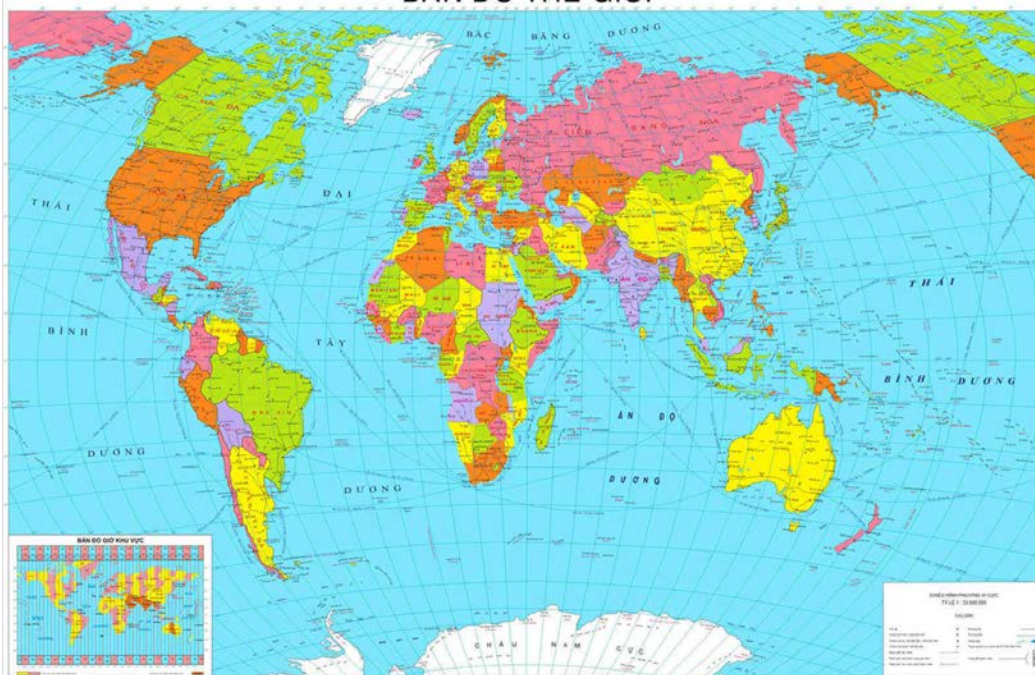


Vietnam Coastal Erosion
- Cause and Challenges -

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Introduction



Area	331,690 km ²
Population	95.9 million (2018)
Population Density	226 persons/km ²
Percent Urban	20.8%
Percent Rural	79.2%

Introduction

- Vietnam is a coastal state with more than 3,000 islands
- Coastline is of more than 3,260 km in length including 28 coastal province and cities
- Vietnamese sea area covers more than 1 million km² (three times larger than its land area)

Socio - Economics

- Over 50% of Vietnam's major cities are coastal cities and 31% national population settling down.
 - GDP of marine and coastal economy accounts for 48% GDP in 2010 (*NWMST, 2011*).
- ➡ Sea and coastal play an important role in Vietnam's economy

Present status of Vietnam coastal erosion

Present status of erosion along North Vietnam coastline

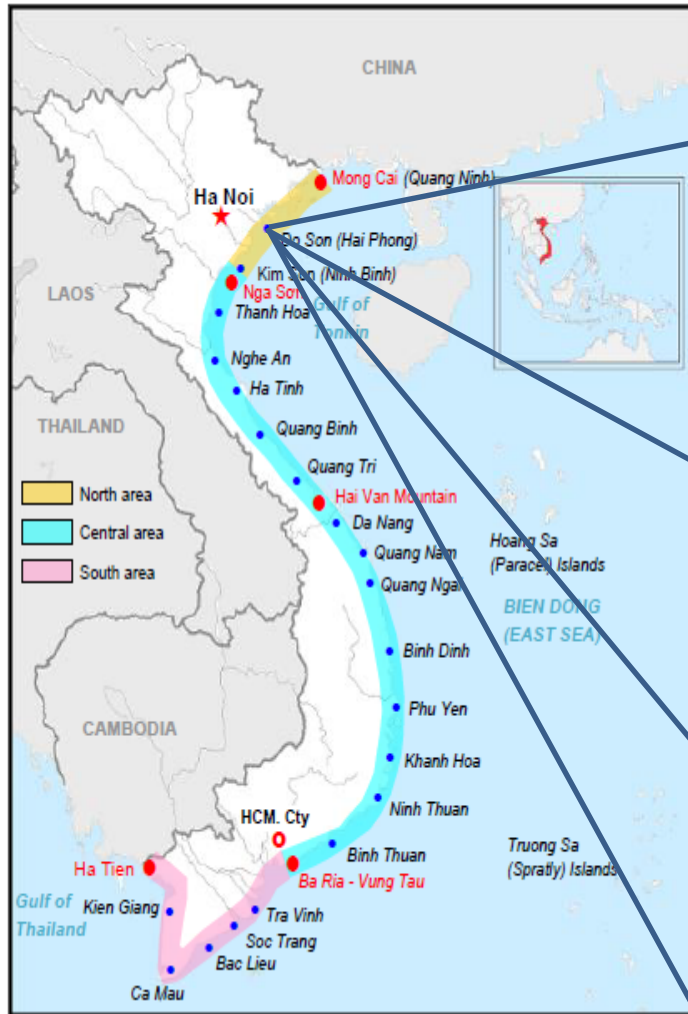


Fig 1. Vietnam Coastline and marine region map

- Cliffs, low rock coasts and low foreshore with limestone, gravel, sand, lay and mud.
- Accretion: 50-60m in river mouths (Cu et al., 2000) beside strong erosion far from river mouths
- In Quang Ninh province Coastline region is relatively stable but erosion takes place at short coastal sections
- Red - Thai Binh river delta coast has been rather complicated with alternate accretion and erosion
- Erosion occurred seriously continuously at Nam Dinh and Cat Hai (Hai Phong)

Coastal erosion areas in North Vietnam coastal provinces

Province	Eroded area (ha)
Quang Ninh	675.4
Hai Phong	129.6
Thai Binh	132.9
Nam Dinh	464.8
Ninh Binh	-

Source: The Final report of project KC.09.05 (2005)

Coastal erosion in Nam Dinh province



TC21 field trip to Hai Hau District, Nam Dinh Province



Present status of erosion along Central Vietnam coastline

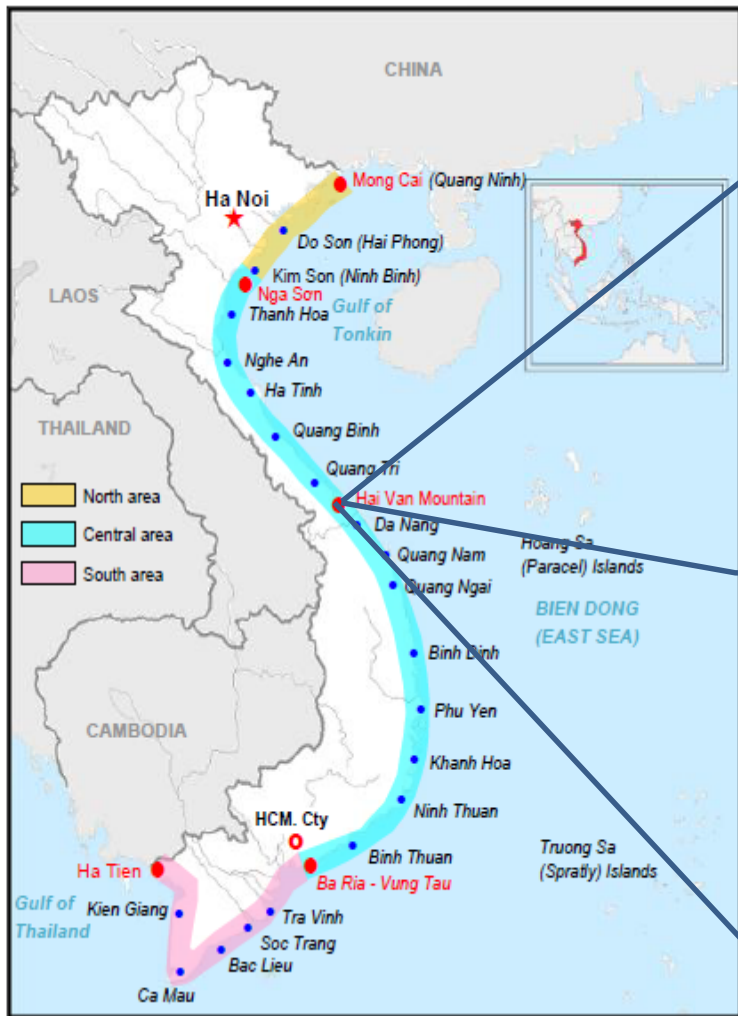


Fig 1. Vietnam Coastline and marine region map

- Coastal sand-banks and bay beach, mountain form coastal cliffs and rock shores
- Erosion predominates with a high concentration of sand and low fraction of mud and clay

- More than 40% of the eroded sectors are of more than 1 km in length

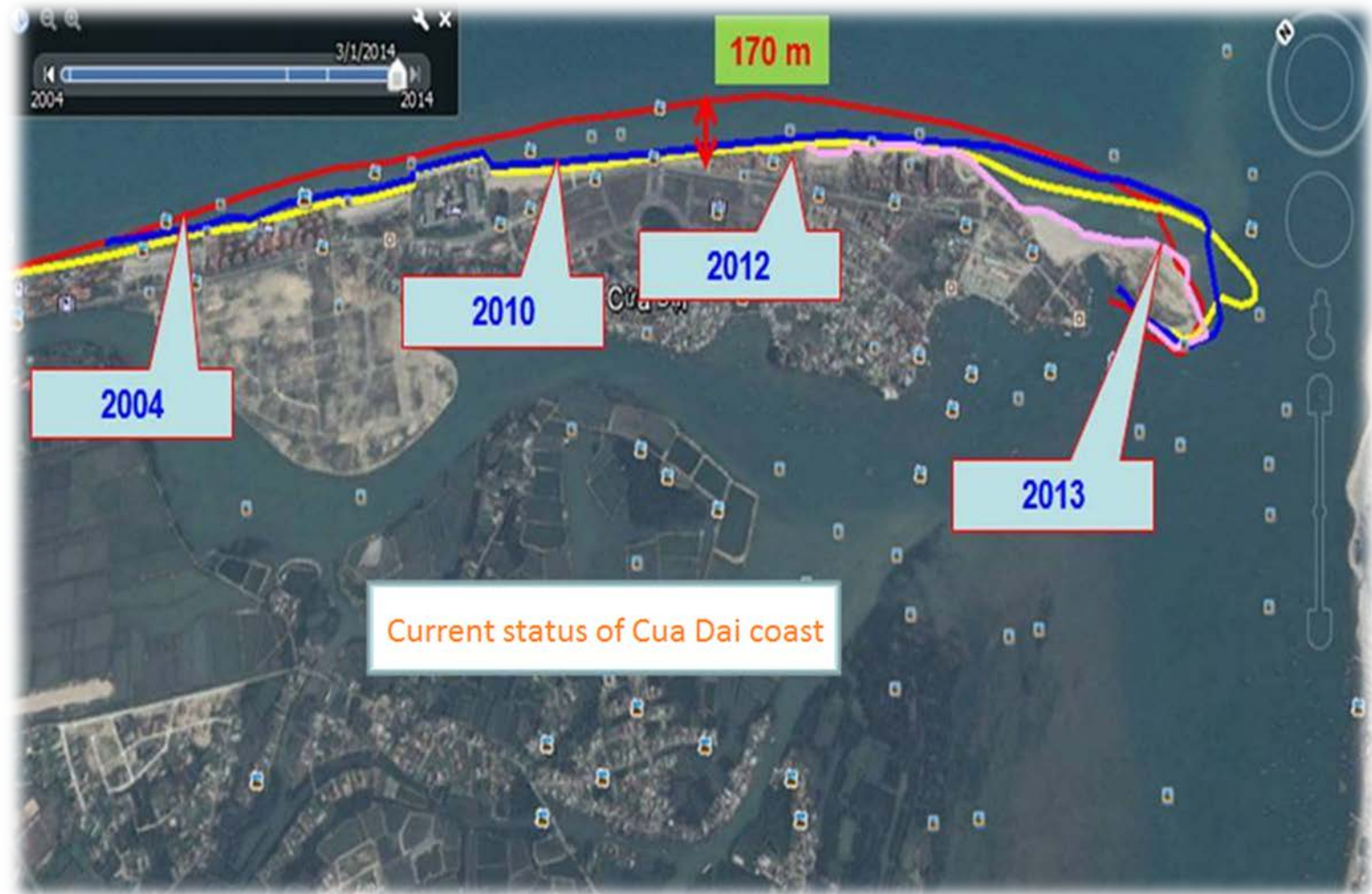
- 10.6% of the coast has eroded 200 m or more inland.

The number of eroded sectors (according to length)

Province	Erosion sectors (m)				
	<200	200-1000	1000-2000	2000-6000	>6000
Thanh Hoa	0	7	3	3	0
Nghe An	13	6	4	6	1
Ha Tinh	1	2	2	4	2
Quang Binh	12	4	2	6	1
Quang Tri	11	8	6	3	1
Quang Nam	2	6	6	3	1
Thua Thien Hue	8	13	6	5	1
Da Nang	5	4	3	2	0
Quang Ngai	14	9	8	7	2
Khanh Hoa	7	8	3	2	0
Phu Yen	3	4	6	2	1
Ninh Thuan	3	3	4	1	0
Binh Thuan	9	7	4	3	1
Total	87	81	57	47	12

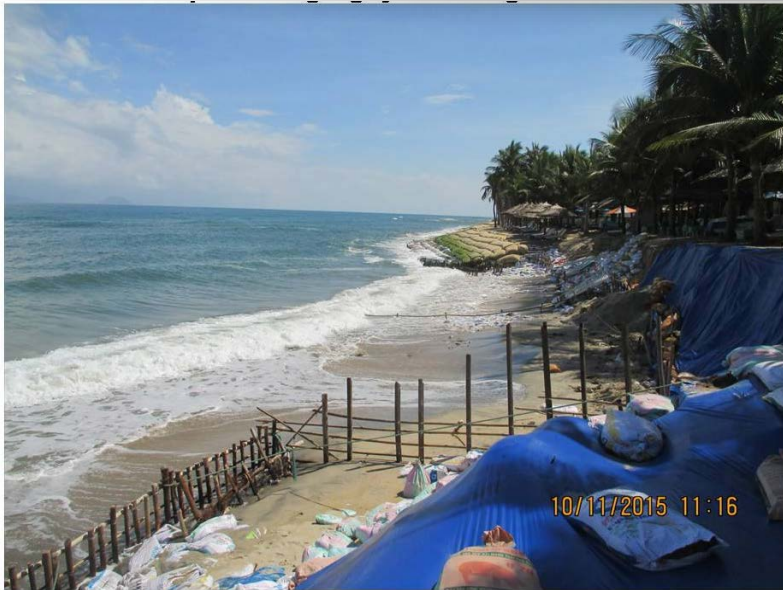
Source: The final report of project KC.09.05 (2005)

Example of Erosion: Evolution of Cua Dai Coast

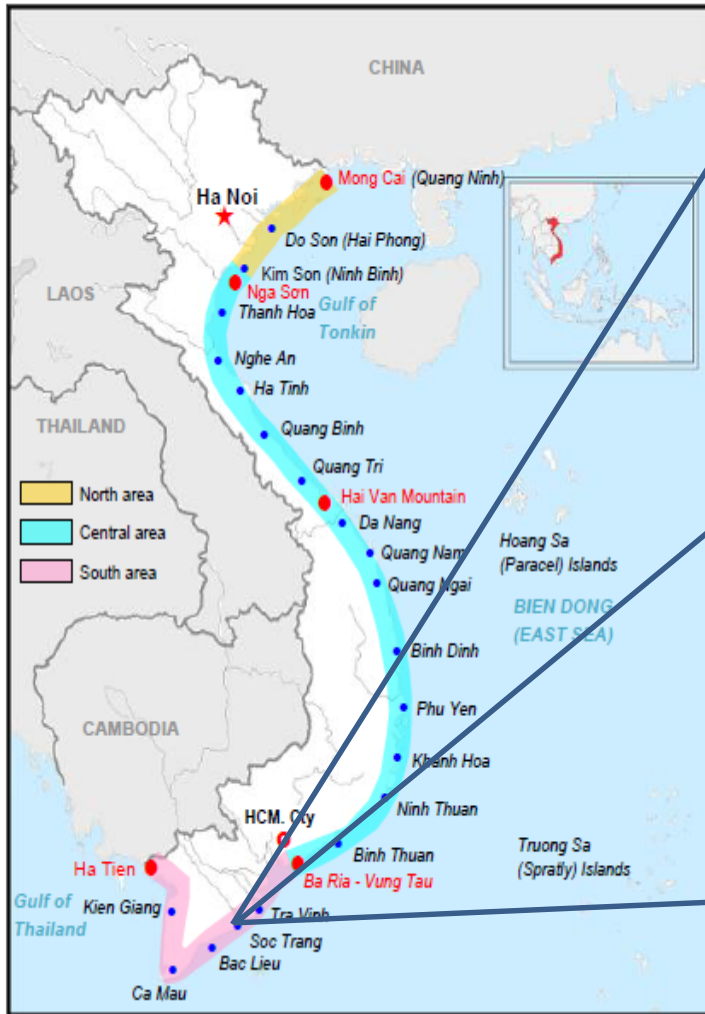


Source: Google Earth

Erosion in Cua Dai river mouth



Present status of erosion along South Vietnam coastline



➤ Mud and clay. Mangroves develop in low-lying stretch. Cliff are formed close to the shore causing the absence of beaches

➤ Since 1960 erosion has happened quite commonly in South delta provinces
➤ From 1992-2002 there are 10 additional eroded shore sections during Northeast and Southeast monsoon

➤ Coastal erosion threatens the embankment works and residential areas

Fig 1. Vietnam Coastline and marine region map

Accretion-erosion status of South Vietnam coastal estuary (ha)

Province	Accretion	Erosion	Accretion or Erosion (-)
Ho Chi Minh	696.1	975.8	-279.7
Tien Giang	531.7	432.5	99.2
Ben Tre	1865.2	1846.9	18.2
Tra Vinh	914.5	1135.0	-220.5
Soc Trang	1585.4	856.2	729.2
Bac Lieu	918.3	184.4	733.9
Ca Mau	6612.3	5438.8	1173.5
Kien Giang	896.2	46.0	850.3

Source: Project KC.09.05

Erosion broke down embankment in Ganh Hao (Bac Lieu province)



Factors influencing coastal erosion

Factors influencing coastal erosion

□ Physical factors:

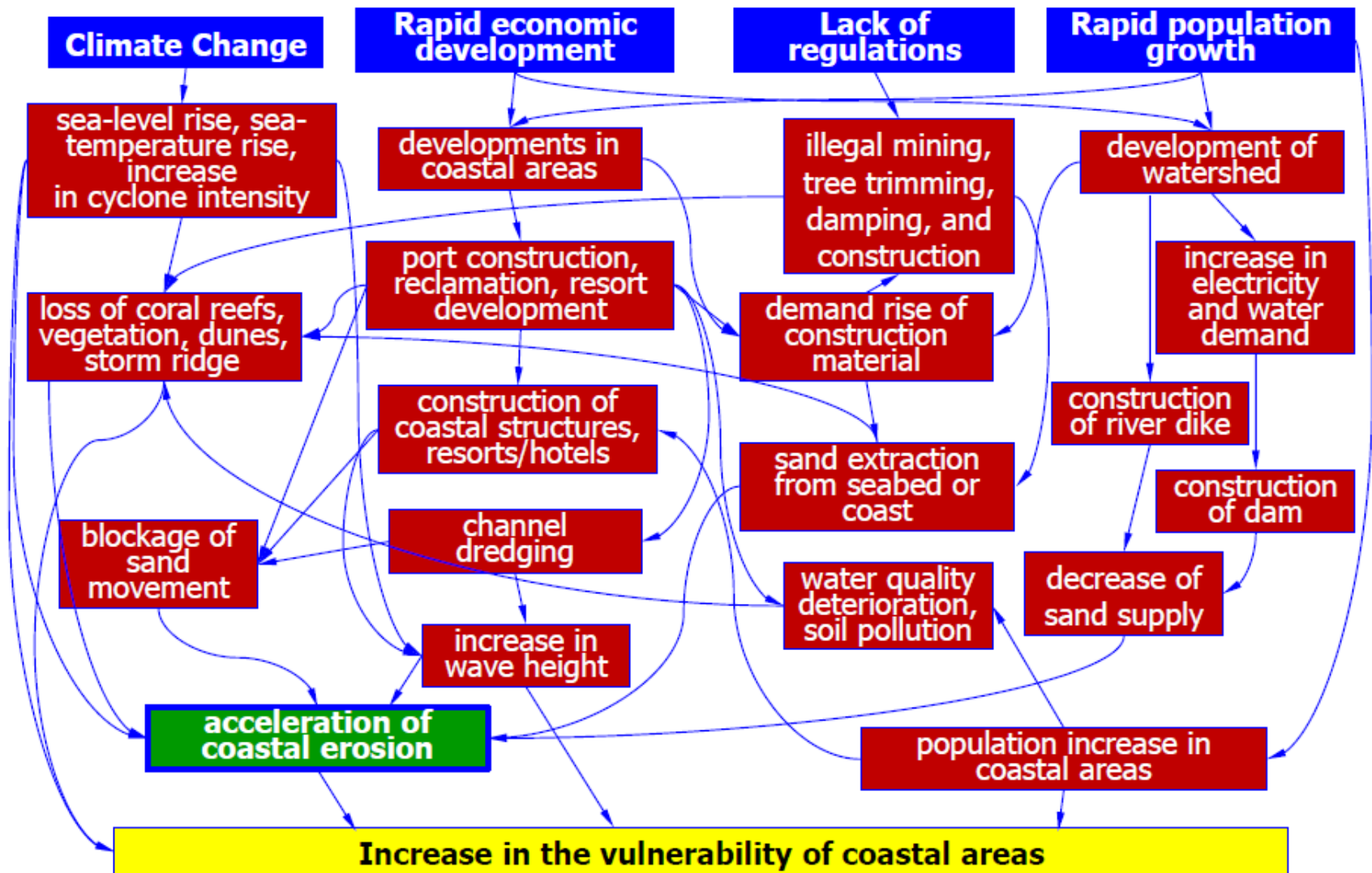
- Geology: coastal sediments are made up of unconsolidated sand and gravel
- Wave and currents: are impacted strongly by two monsoon seasons (NE and SW)
- Tropical cyclones: 60% number of storms that affect Vietnam's marine zone devastating Vietnam
- Storm surge: interact with waves causing coastal erosion

Factors influencing coastal erosion

□ Human factors:

- Embankment: causes the loss of coastal sediment and erosion will occur
- Irrigation works at upstream: affected the river flow regime and reduce amount of sediment transported to the sea
- Mining: destroy natural structure of the coast
- Mangrove deforestation: reduce functions in limiting wind storms and wave

Factors influencing coastal erosion



Measures for Mitigation of Erosion

Measures for Mitigation of Erosion

Structure

Aim to protect beach and coastline from the impact of dynamic coastal processes:

- Permanent structures: dam or dykes
- Soft structures: geotube or wave and wind-breaking plants



Non-structure

- Communication education and raising awareness to the population about the hazards of natural disasters and the major reasons of erosion and accretion
- Policies and Various laws such as Law on Environmental Protection, etc.

Relevant Laws and Policies for addressing coastal erosion in Vietnam

- In 1946, Vietnam has established management agencies and legislation on dikes as protection measures such as the Central Committee on Dyke Protection and the Committees on Dyke Protection at various levels
- Since 1990, a number of specialized organizations and legislation to direct and guide the implementation of disaster control measures have been founded.
- New policies on the construction and renovation of coastal dykes and embankments, planting and restoration of mangroves, penalties for violations of dyke and land laws
- But no distinct legislation or institutional office that deals specifically with the management of and countermeasures against coastal erosion

Example of pilot project on erosion mitigation in Vietnam



Location of pilot project

- The locations selected for pilot project was based on the list of national key areas for coastal erosion.
- The selected area should match the goals which aims to solve both the urgent, immediate problems, and the overall, long-term issues, contributing to the development of long-term coastal socio-economic sustainability.



Coast was eroded by Mindule typhoon at Quang Cu commune, Thanh Hoa province (8/2010)



Coast was eroded by Mangkhut typhoon at Quang Cu commune (8/2013)

Main points of pilot project

- Evaluation of coastal erosion resolution: the existing problems, efficiency, challenges, plans and policies, scientific and social issues related to coastal erosion resolution.
- Investigation of the actual erosion causes: assessment of factors contributing to coastal erosion.
- Development of the coastal vulnerability maps: coastal erosion status and risk warning maps; and a coastal erosion database.
- Conferences to disseminate knowledge regarding disaster prevention, coastal ecosystems protection and sustainable development.
- New planting mangroves and casuarina forest as wave and wind barriers.
- Support for repair/construction of damaged dykes by using friendly environmental technology such as sandbags and geotute.
- Proposed resolution strategies for coastal erosion: policy, science and technology and community-based solutions.

Erosion in Hau Loc district (Thanh Hoa province) and embankment reconstruction



Recomendations

- Efficient coastal erosion prevention: coordinated and comprehensive measures, structural and non-structural measures.
- It is necessary to value non-structural measures such as communication, education and raising awareness to the population including understanding of the laws.
- The national and regional development planning should include the issue of coastal erosion and define appropriate responding measures.
- It is also necessary to strengthen of the legal framework, plan coastal protection against over-exploitation of natural resources.
- Policy should plan for permanent relocation from danger zone, temporary relocation in case of warning and urgent relocation in case of emergency.