

**Vietnam Administration of Sea and Islands
Center for Oceanography
University of Transport and Communications**

***Current Status of Vietnam Coastal Erosion
and Major Measures for Mitigation***

Case Study: Thanh Hoa Province

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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 sovereignty sea area covers more than 1 million km²

Climate

- Climate is mainly dominated by tropical monsoons (Northeast and Southeast)
- An average of 10 typhoons and tropical depression hit Vietnam's land annually
- Tidal regime is complex with maximum amplitude of 4m in North coastal area
- Vietnam is considered as one of countries most affected by sea level rise due to climate change and loss 1.5% GDP by hazard each year

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 plays an important role in Vietnam's economy

Present status of Vietnam coastal erosion

Present status of erosion along North Vietnam coastline

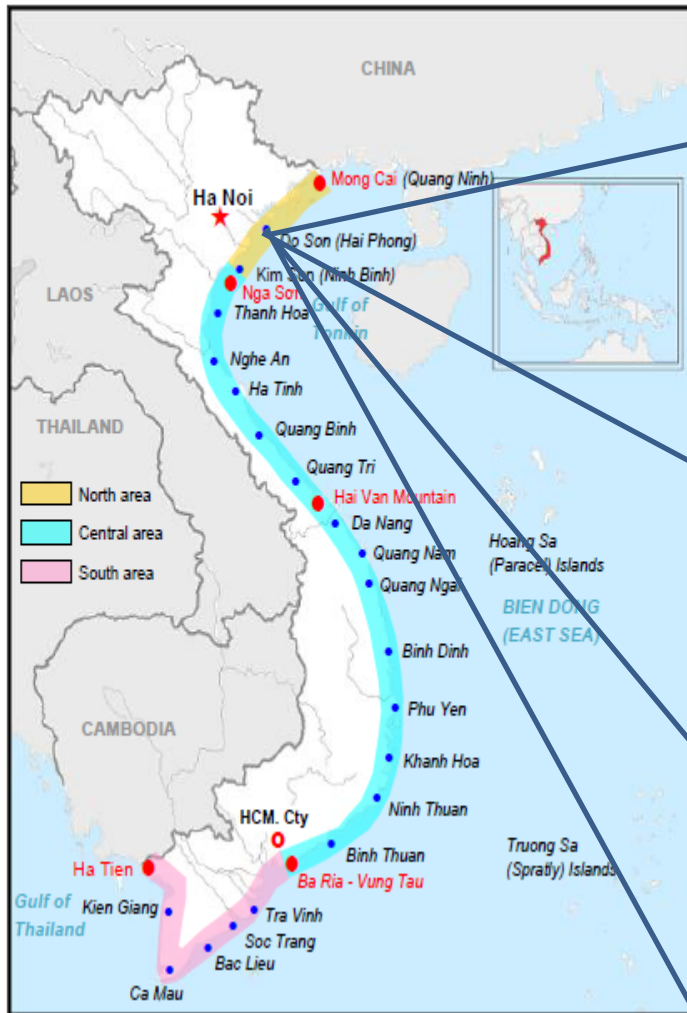


Fig 1. Vietnam Coastline and marine region map

- 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 relative 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



Present status of erosion along Central Vietnam coastline

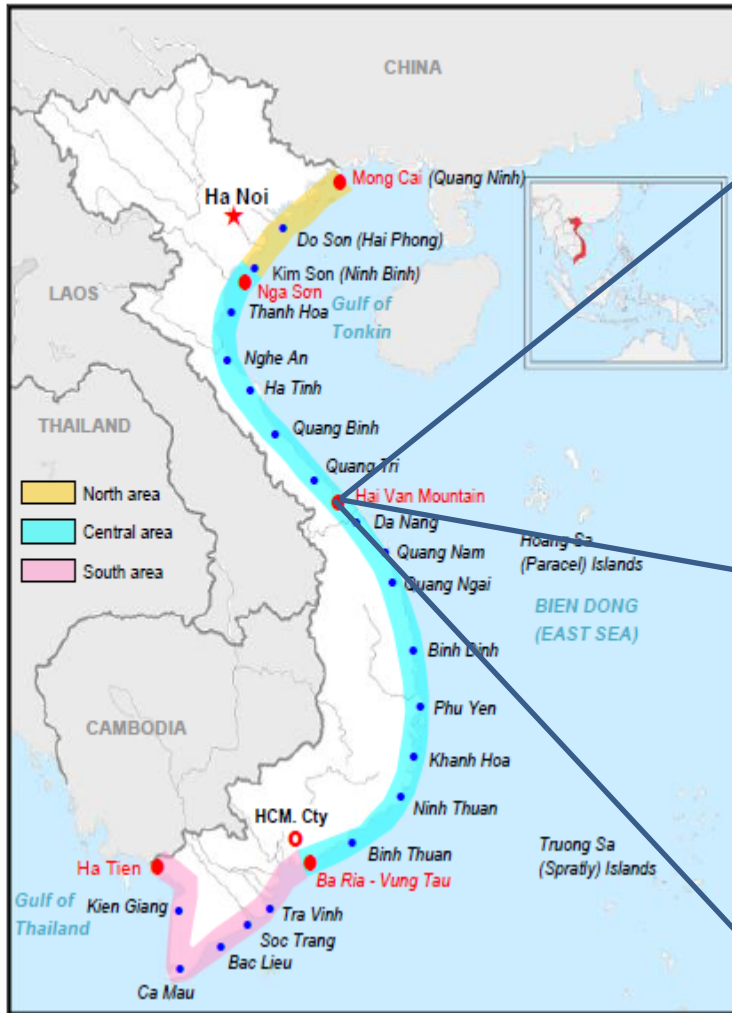


Fig 1. Vietnam Coastline and marine region map

- 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 50% of the eroded sectors are of more than 1 km in length

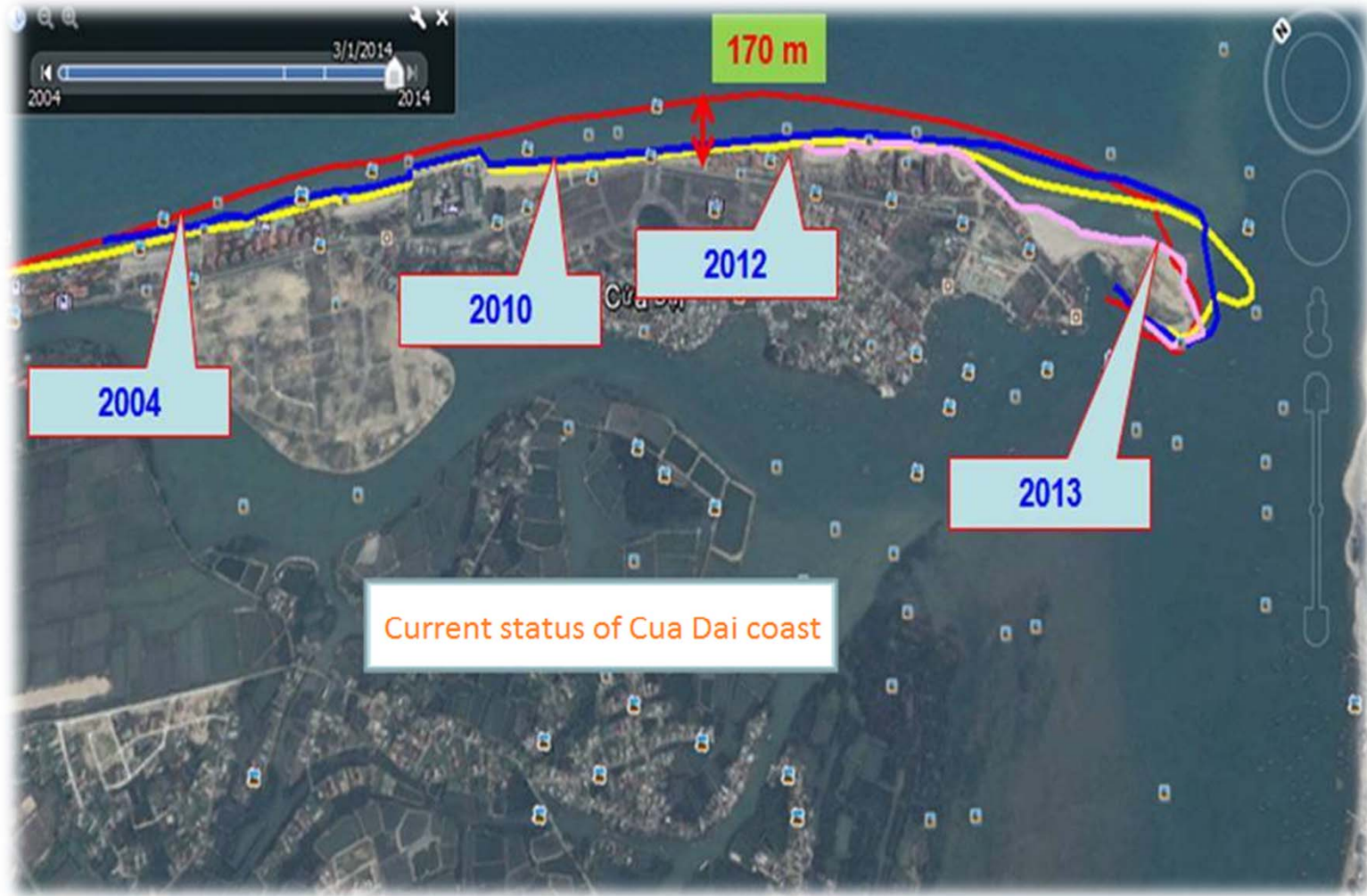
- 10.6% of the coast has eroded 200 m or more inland.

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

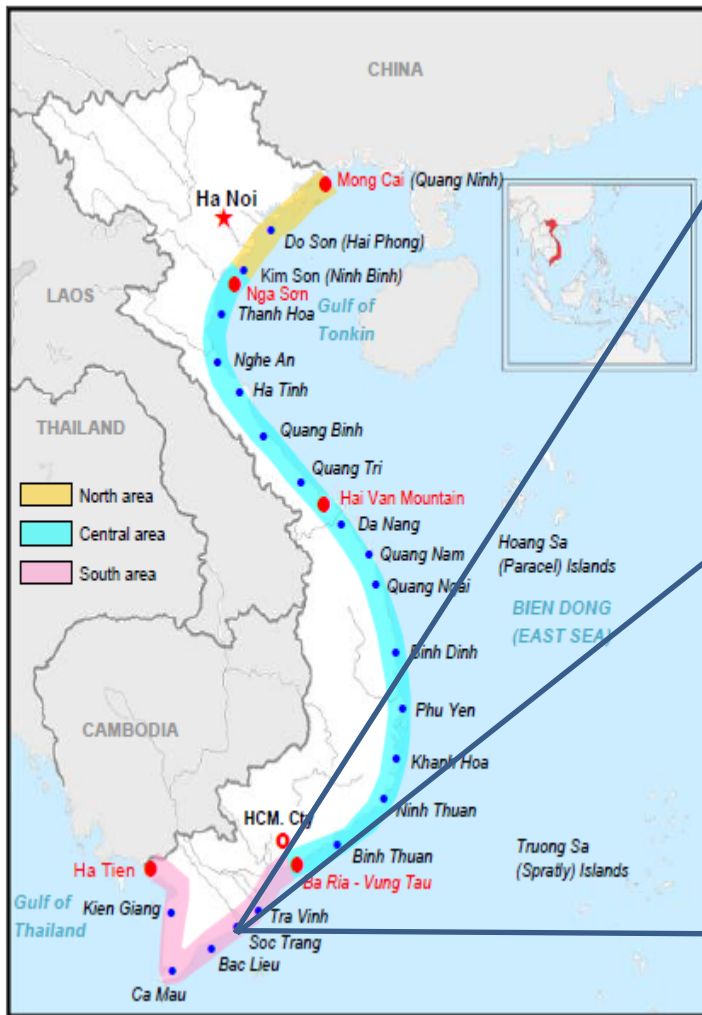


Fig 1. Vietnam Coastline and marine region map

➤ 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

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

□ 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 (continue)

□ 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

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

- Are primarily communication education and raising awareness to the population about the hazards of natural disasters and the major reasons of erosion and accretion
- Importantly this enables the to abide the 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 Dike 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 and remain in force up to the present.
- There are new policies on the construction and renovation of coastal dikes and embankments, planting and restoration of mangroves, penalties for violations of dike 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 intervention on erosion mitigation in Vietnam



Location of example

- The locations selected for intervention pilot project should be on the list of national key areas for coastal erosion.
- The selected area should match the goals of the YEOSU project, 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.
- The estimated budget is US\$ 1,522,860 for two years.



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 this project include

- Evaluation of coastal erosion resolution in Thanh Hoa province : focus on evaluating the existing problems, efficiency, challenges, and plans for policies, scientific and social issues related to coastal erosion resolution.
- Investigation of the actual coastal erosion status and causes in Thanh Hoa province; investigation, calculation and assessment of factors contributing to coastal erosion in Thanh Hoa province.
- Development of the coastal vulnerability maps: coastal erosion status and risk warning maps; and a coastal erosion database of Thanh Hoa province.
- Organization of conferences to disseminate knowledge regarding disaster prevention, coastal ecosystems protection and sustainable development.
- Support for new planting mangroves and casuarina forest as wave and wind barriers, respectively.
- Support for repair/construction of damaged dykes by using environmental friendly technology such as sandbags from Japanese technology (Sea Guardian)
- Proposed resolution strategies for coastal erosion in Thanh Hoa province: these include measures of policy, science and technology and community-based solutions.

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



Conclusion

- Coastal erosion has occurred with increasing frequency and complexity across the entire coastal area of Vietnam with different scopes in each region and location varies depending on geological structure, coastal processes, and human activities.
- Efficient coastal erosion prevention and control requires the implementation of measures in a coordinated and comprehensive manner, from the macro to the micro level, both directly and indirectly, and includes both structural and nonstructural measures to suit each location.
- Vietnam should also quickly establish dikes and embankments protection plans for each specific coastal segment and also invest in research for the application of modern erosion prevention measures
- It is necessary to establish a periodic monitoring system on coastal erosion and accretion so that information can be disseminated promptly to the population through the GIS system, establishing a network between the management agencies with the scientific research institutions and the communities.

A large, powerful blue wave is crashing against a dark, forested cliffside. The water is a vibrant blue, and the cliff is a deep, dark green. The sky is a clear, light blue. The text "THANK YOU FOR WATCHING!" is overlaid in the center of the image in a bold, red, sans-serif font.

THANK YOU FOR
WATCHING!