COASTAL DISASTERS
AND MITIGATION MEASURES IN VIETNAM

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### Socialist Republic of Vietnam

<table>
<thead>
<tr>
<th>Metric</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Area</td>
<td>331,690 km²</td>
</tr>
<tr>
<td>Population</td>
<td>90.5 million (2014)</td>
</tr>
<tr>
<td>Population Density</td>
<td>226 persons/km²</td>
</tr>
<tr>
<td>Percent Urban</td>
<td>20.8%</td>
</tr>
<tr>
<td>Percent Rural</td>
<td>79.2%</td>
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</table>
Viet Nam has monsoon tropical climate with hot and humid weather and high rainfall. However, the rainfall is distributed unevenly by time, and location (even in the same region).
1. INTRODUCTION

349 storms in East Sea of Vietnam
Typhoon distribution along Vietnam coastline
Based on the tidal range (Davies, 1964)

1. Mesotidal coasts, tidal range = 2‐4 m
2. Microtidal coasts, tidal range = 0‐2 m

1. INTRODUCTION
1. INTRODUCTION

DISASTERS TYPES IN VIETNAM

- **The Red River delta and the Northern midland area**: Flood, storm, cyclone
- **The Northern Coastal area**: Sea level rise, storm, flood, cyclone
- **Central coastal region**: Storm, flood, sea water rising, flash flood, salt invasion
- **The South coastal region**: Storm, salt invasion, forest fire
- **The Mekong river delta**: Flood, drought, whirlwind, storm
1. INTRODUCTION

COASTAL DISASTERS IN VIETNAM

- Flood
- Flash flood
- Storm and typhoon
- Storm surges

Not on the map:
- Drought
- Salt invasion
- Forest fire
- River bank and shoreline erosion
2. COASTAL DISASTERS

Factors leading to coastal vulnerability

- Climate Change
  - sea-level rise, sea-temperature rise, increase in cyclone intensity
  - loss of coral reefs, vegetation, dunes, storm ridge
  - blockage of sand movement
  - acceleration of coastal erosion

- Rapid economic development
  - developments in coastal areas
  - port construction, reclamation, resort development
  - construction of coastal structures, resorts/hotels
  - channel dredging
  - increase in wave height

- Lack of regulations
  - illegal mining, tree trimming, damping, and construction
  - demand rise of construction material
  - sand extraction from seabed or coast

- Rapid population growth
  - development of watershed
  - increase in electricity and water demand
  - construction of dam
  - construction of river dike
  - decrease of sand supply
  - population increase in coastal areas

Increase in the vulnerability of coastal areas
2. COASTAL DISASTERS

Coastal issues in Vietnam

Coastal Environment
- Coastal Erosion
- Pollution

Coastal Disaster
- Typhoon and Storm Surge
- Tsunami, High Wave, Sea Level Rise

Having better management plans and reducing the risks

People’s awareness

Sustainable development for coastal areas
2. COASTAL DISASTERS

Coastal issues in Vietnam

a. High erosion,
   Erosion rate > 30 m/year.

b. Average erosion,
   Erosion rate 10 ÷ 30 m/year

c. Low Erosion,
   Erosion rate < 5 m/year

Along 3260km of coastline, there are 397 erosion segments with a total length of 920,21 km.
2. COASTAL DISASTERS

EROSION HOT-SPOTS IN COASTAL

1. Cát Hải (Hải Phòng)
2. Hải Hậu (Nam Định)
3. Hậu Lộc (Thanh Hóa)
4. Hải Dương (Thừa Thiên Huế)
5. Cửa Đại (Quảng Nam)
6. Sa Huỳnh (Quảng Ngãi)
7. Xuân Hải (Phú Yên)
8. Phước Thịnh (Bình Thuận)
9. Cần Giờ (Hồ Chí Minh)
10. Gò Công (Tién Giang)
11. Mũi Cà Mau (Cà Mau)
2. COASTAL DISASTERS

HAI HAU AND GIAO THUY COATS, NAM DINH
2. COASTAL DISASTERS

BEACH EROSION IN HOI AN, QUANG NAM
2. COASTAL DISASTERS

COASTAL EROSION IN TUY HOA, PHU YEN (18/11/2015)
2. COASTAL DISASTERS

COASTAL EROSION IN NHA TRANG BEACH
2. COASTAL DISASTERS

CA MAU COASTAL EROSION
3. MITIGATION MEASURES

SIMPLE MEASURES IN CUA DAI, HOI AN, QUANG NAM
3. MITIGATION MEASURES

- HARD STRUCTURERS IN CUA DAI, HOI AN

- SOFT STRUCTURERS IN CUA DAI, HOI AN
3. MITIGATION MEASURES

T-SHARP GROINES IN HAI HAU

DETACK BREAKWATER AND REVETMENT IN NGHIA HUNG
3. MITIGATION MEASURES

MANGROVE FOREST

MANGROVE AND HARD STRUCTURES
4. MITIGATION MEASURES

RECENT RESEARCH ON MITIGATION MEASURES

Pile supported inclined plate breakwater

Semi-circle breakwater
Wave and semi-circle breakwater physical model test
1. Vietnamese coasts are vulnerable to coastal hazards and climate change.

2. Coastal disasters and climate change in Vietnam are more and more complicated and unpredictable.

3. It is necessary to promote community awareness and education on disaster mitigation and reduction.

4. Strengthening disaster warning and forecasting capacity.

5. Research and innovation of new structural countermeasures.

6. Need to have more collaboration in a wide range and many levels, domestic and international.

4. CONCLUSIONS
Thank you
Trân trọng cảm ơn!

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