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# BET4733 Introduction to Coastal Infrastructure

## Introduction to Coastal Engineering

by

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# Chapter Description

- **Expected Outcomes**

Analyze the principles of wave mechanics, tides, littoral processes and coastal sediment transport in methods of shore protection and coastal infrastructures.

- **References**

- 1) Kamphuis, J. William, Introduction to Coastal Engineering and Management, Advanced Series on Ocean Engineering-Volume 30, World Scientific, 2010.
- 2) Reeve D., Chadwick A. and Fleming C. Coastal Engineering-Processes, Theory and Design Practice, CRC Press, 2015.
- 3) Kim Y.C., Design of Coastal Structures and Sea Defences, World Scientific, 2015.
- 4) US Army Corps of Engineers. Coastal Engineering Manual, Washington, 1998-now.



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# CONTENTS

- Introduction
- Definitions of the Coastal Area
- Coastal Features
- The Coastal Environment
- Dynamic Equilibrium



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# INTRODUCTION

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Coastal  
Engineering

Specialized field.

Complex.

Very site specific – solutions at one location cannot be applied to another location.

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# INTRODUCTION

## Areas

- Port and harbour development
- Land reclamation
- Shoreline management
- Sand mining and dredging
- Coastal protection works (revetment, breakwater, groynes, beach nourishment, etc)
- Marine structures (jetty, navigation channels, etc)
- Maritime infrastructures (bridges, submerged tunnels, etc)



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# INTRODUCTION

## Coastal Engineering Problems

Shoreline Stabilisation

Backshore Protection

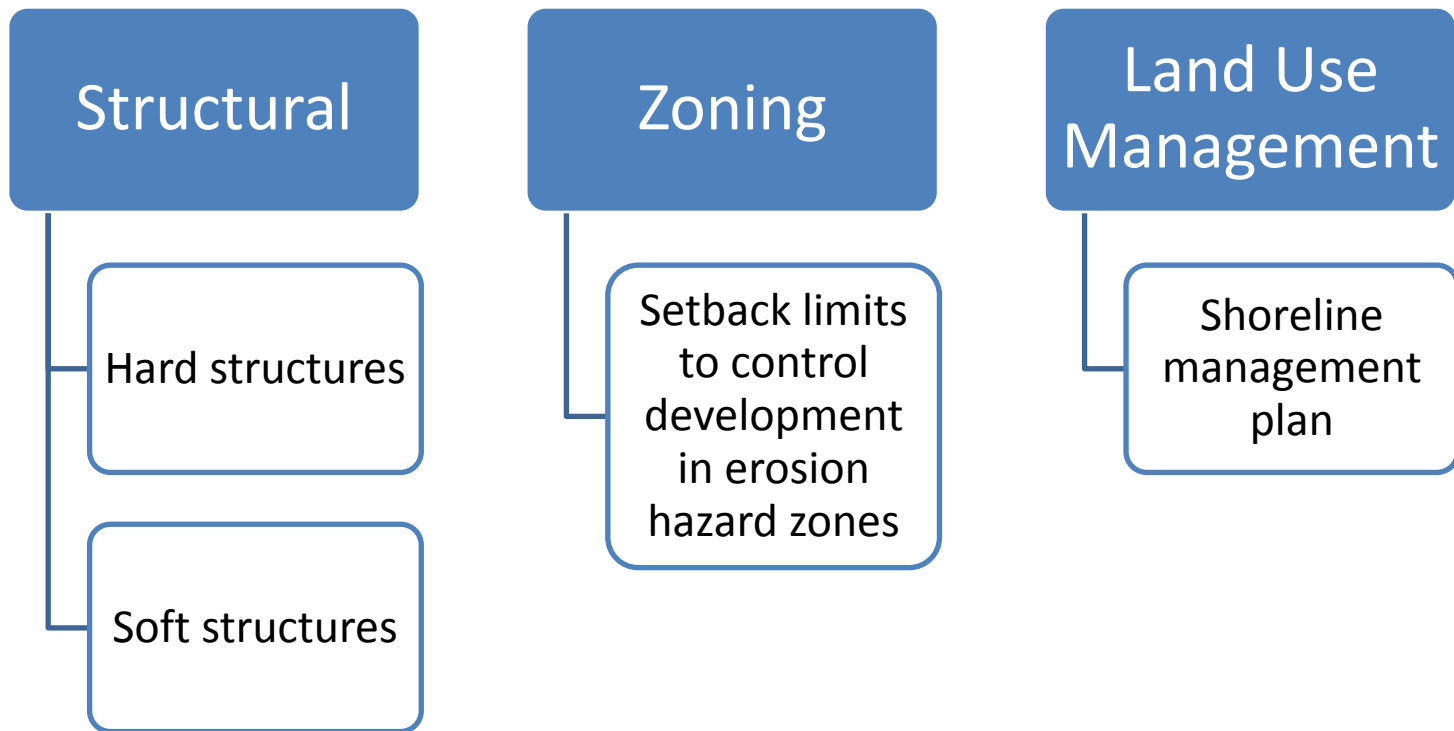
Inlet Stabilisation

Harbour Protection



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# INTRODUCTION: TYPICAL COASTAL ENGINEERING SOLUTIONS



# DEFINITIONS OF THE COASTAL AREA

- Shore – narrow strip of land in immediate contact with the sea including the zone between high and low water lines.
- Coast – a strip of land of indefinite width (maybe several km) that extends from the beach/shore inland to the first major change in terrain features.
- Shoreline – intersection of a specified plane of water (e.g high water) with the beach or shore.
- Coastline – The boundary between the coast and the shore.



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# COASTAL FEATURES

- Bay
- Lagoon
- Inlet
- Sand spit
- Barrier island
- Tombolo
- Pocket beach



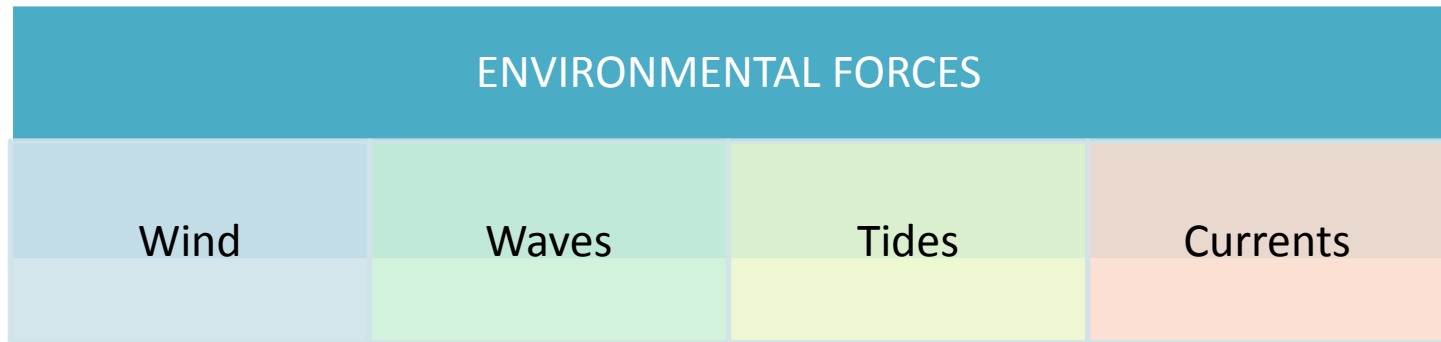
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# COASTAL FEATURES



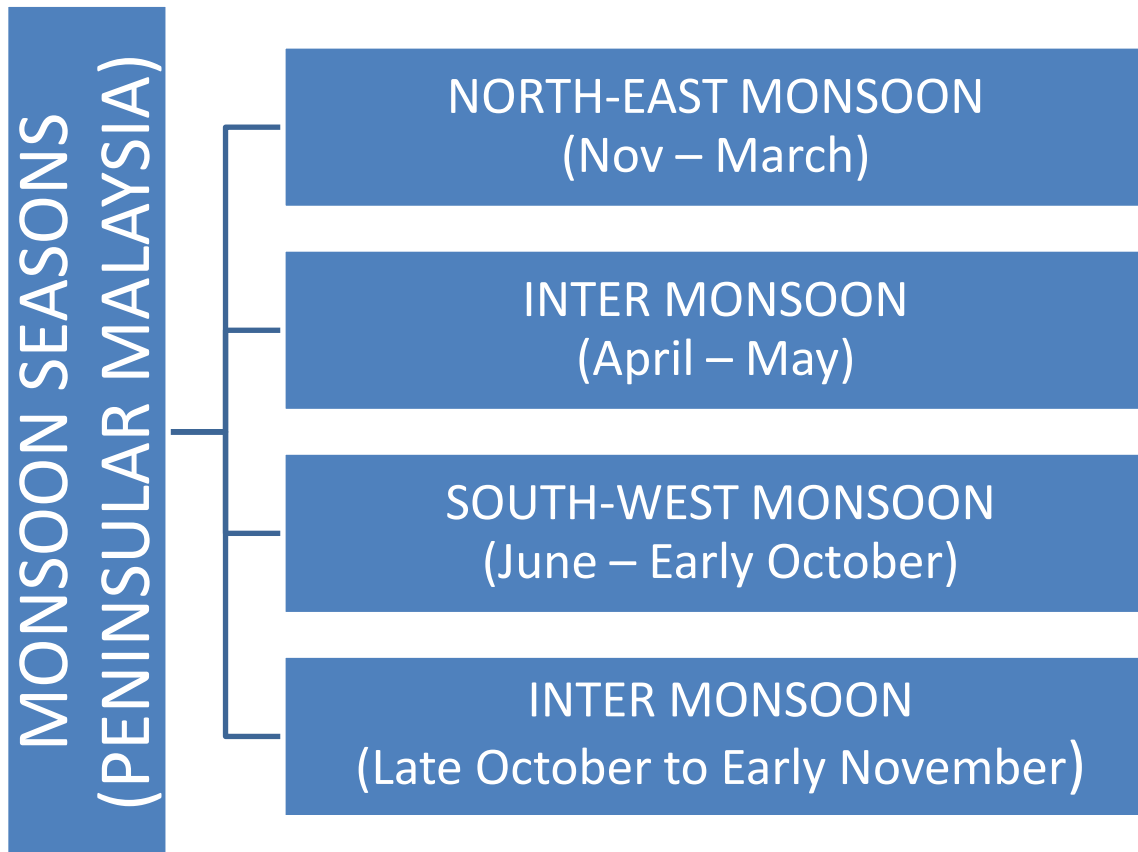
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# THE COASTAL ENVIRONMENT



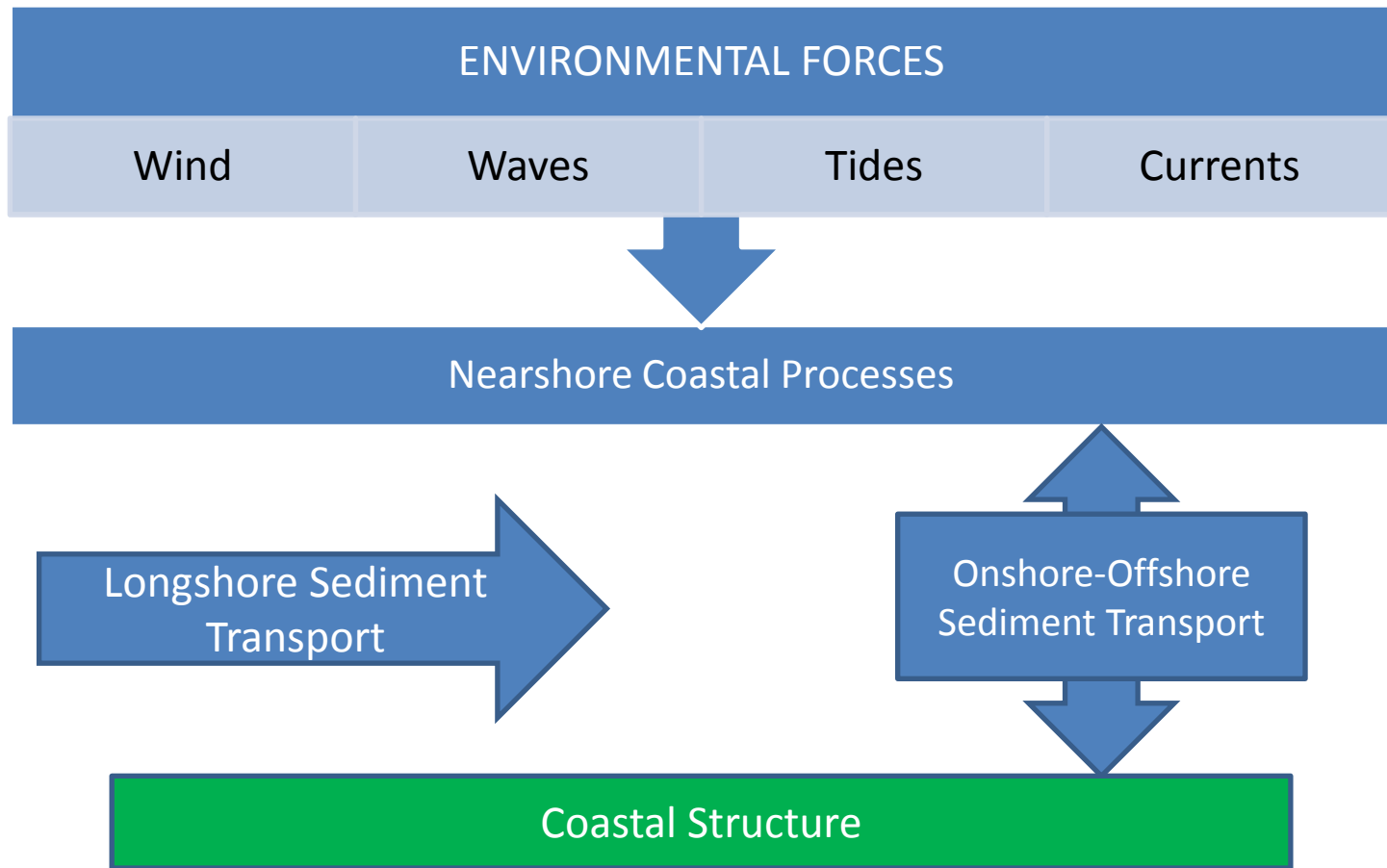
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# THE COASTAL ENVIRONMENT



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# THE COASTAL ENVIRONMENT



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# DYNAMIC EQUILIBRIUM

- Factors affecting dynamic equilibrium of beaches:
  1. **sand supply**
  2. **waves energy**
  3. **sea-level change**
  4. **shoreline location**



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