

# OCEANOGRAPHY

## 10. Beaches, Shoreline Processes and the Coastal Ocean (part 4)

notes from the textbook, integrated with original contributions

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## 10.5 – How Does Hard Stabilization Affect Coastlines?

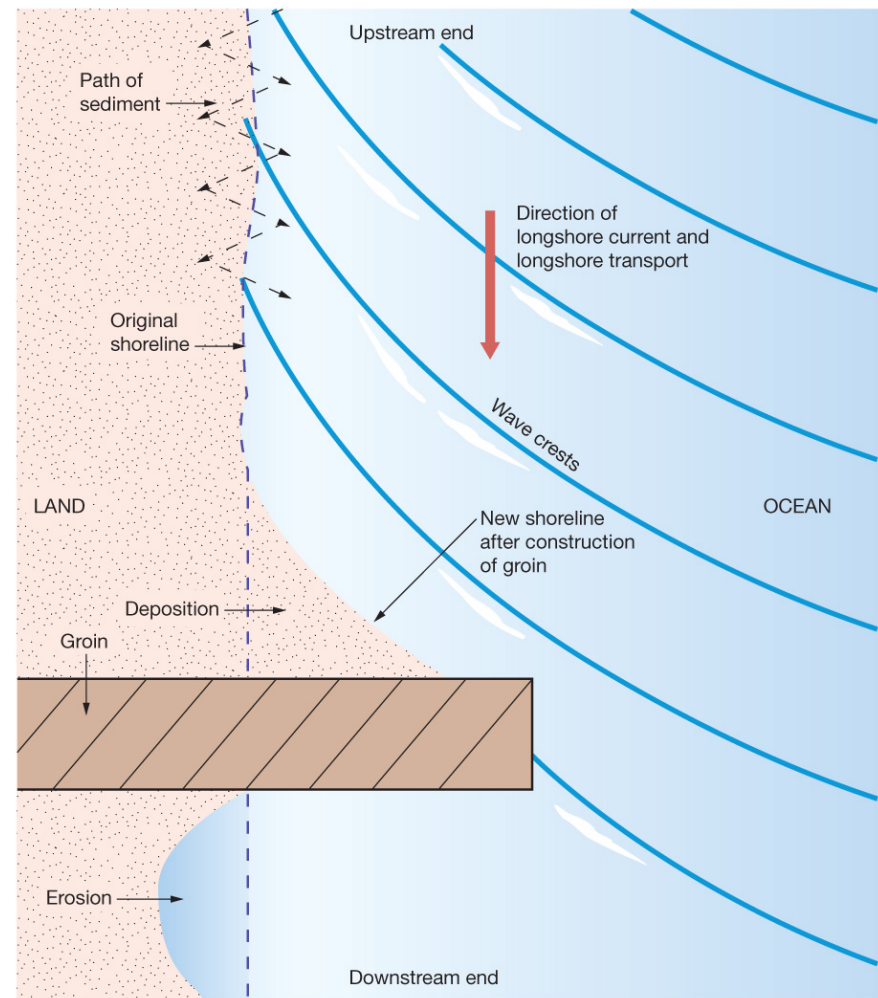
- Structures that are built to protect a coast from erosion, or to prevent the movement of sand along it are known as **hard stabilization**
- Also called **armoring of the shore**
- Often results in unwanted outcomes
  - Some structures may increase wave erosion

# Hard Stabilization

- Four major types of stabilization structures:
  1. Groins and groin fields
  2. Jetties
  3. Breakwaters
  4. Seawalls

# Groins and Groin Fields

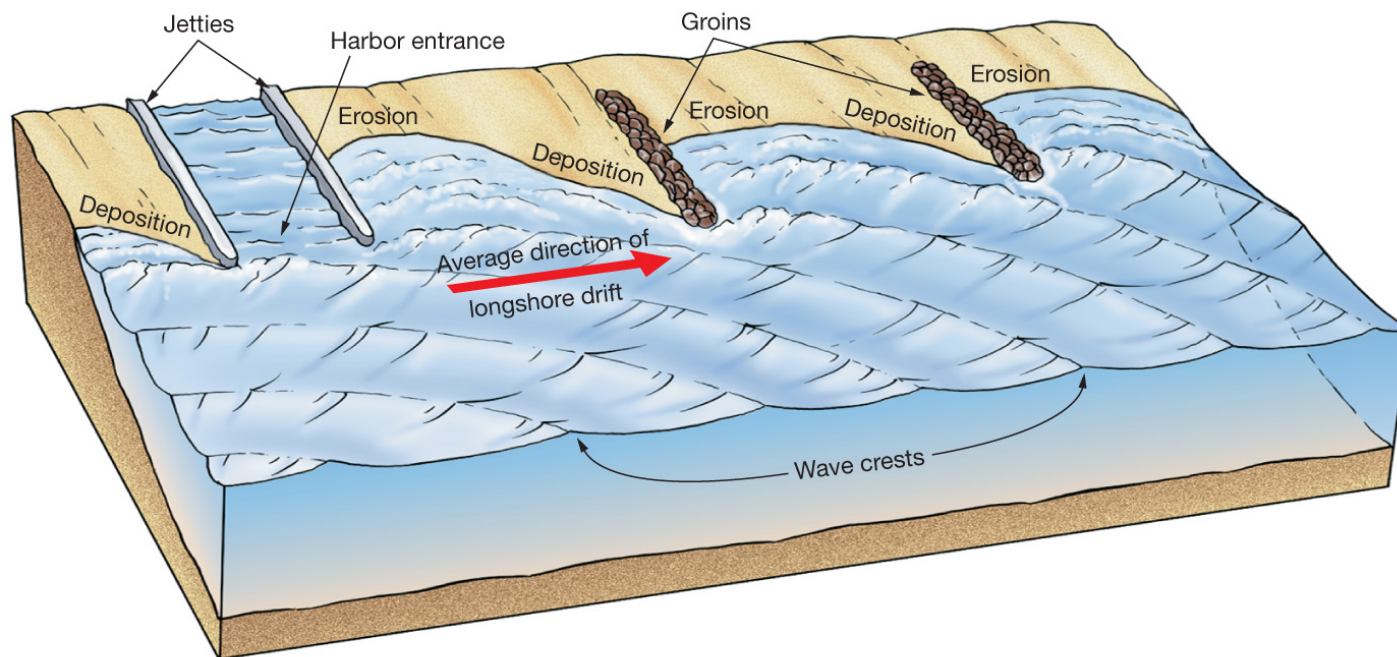
- Built perpendicular to the beach
  - Often made of **rip rap**, or large blocky material
- Traps sand **upcoast**, which can cause erosion downstream of the longshore current
- May necessitate a **groyne field**, or a series of groins built along a beach



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# Jetties

- Built perpendicular to shore
- Built in pairs
- Built to protect harbor entrances

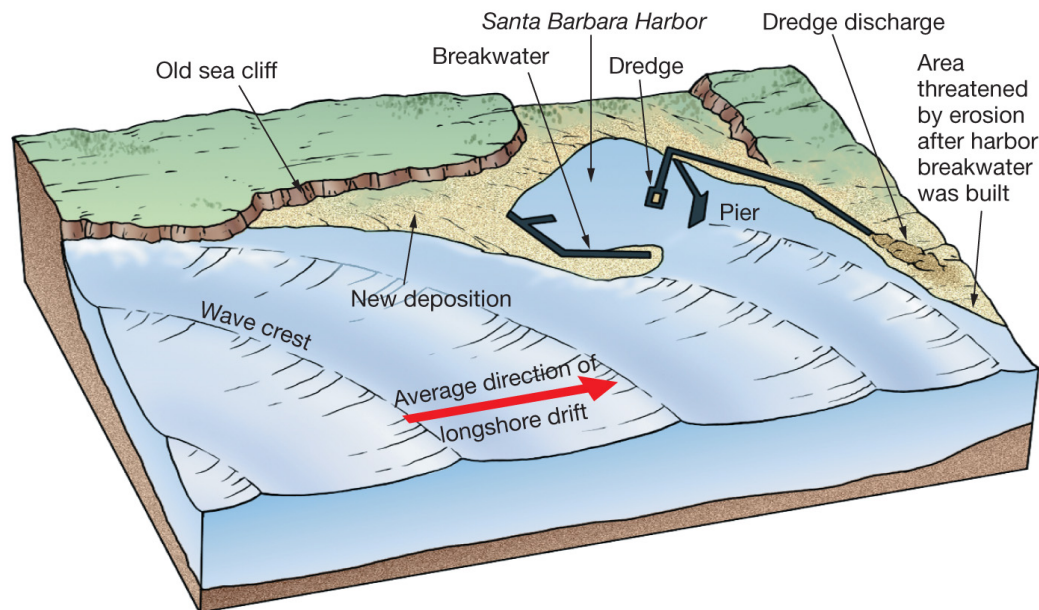


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# Breakwaters

- Built parallel to a shoreline
- Designed to protect harbors from waves
- Can cause excessive erosion, requiring dredging to keep area stable

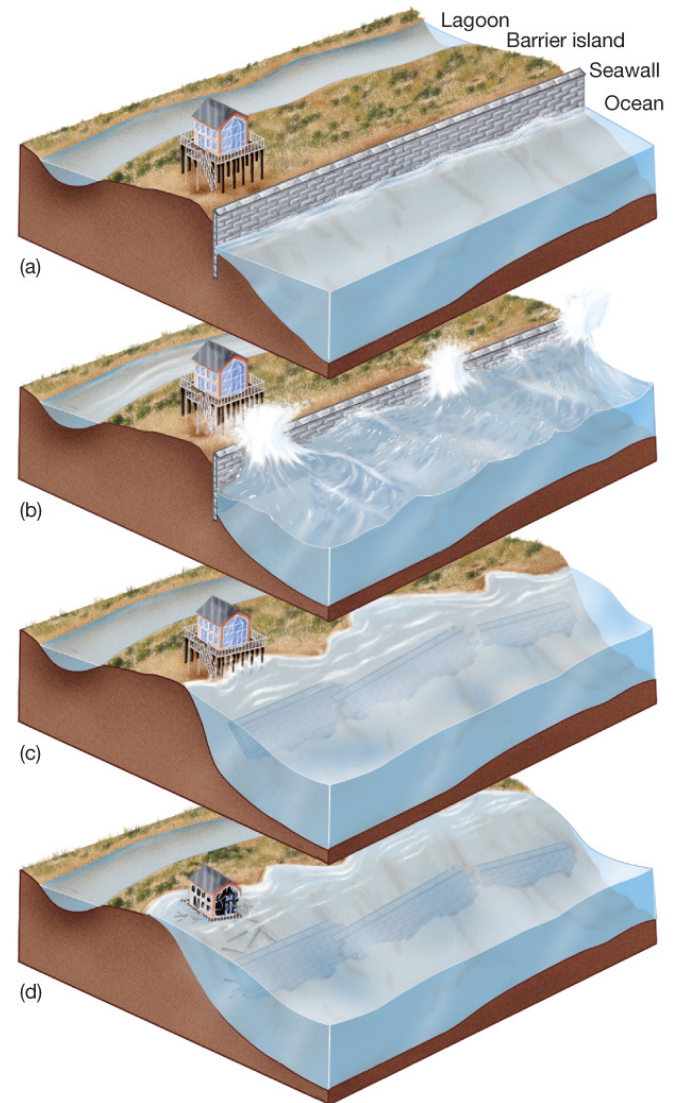


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# Seawalls

- Destructive to environment
- Designed to armor coastline and protect human developments
- One large storm can remove beach
- Wave activity eventually undermines seawall structure; need continual repair or will collapse



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Groins along Pacific Coast Highway, in Pacific Palisades, Los Angeles, California

Notice the accumulation of sand to the northwest of the groins, and its erosion to the southeast, indicating the direction of the longshore current in the Santa Monica Bay beach compartment



## Breakwater and jetties in Marina Del Rey California

Notice also:

- the breakwater close to Venice Beach, is attached to coastline via a tombolo
- the Venice pier, being on pylons, does not affect the longshore current



# Alternatives to Hard Stabilization

- Three major alternatives
  1. Construction restrictions
  2. Beach replenishment
  3. Relocation

# Alternatives to Hard Stabilization

- **Construction restrictions**
  - Simplest alternative
  - Limit building near shorelines
  - Paradoxically, National Flood Insurance Program encouraged construction

# Alternatives to Hard Stabilization

- **Beach replenishment**
  - Sand added to beach/longshore current
  - Expensive; costs between \$5 and \$10 per cubic yard
  - Sand must be dredged from elsewhere.

# Alternatives to hard stabilization

- **Relocation**

- Move structures rather than protect them in areas of erosion



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**Chapter 10**  
**part 2**

**the end**