


1  **Animals of the Benthic Environment**

2  **Chapter summary in haiku form**


Stuck to the bottom  
Barnacles, anemones  
Waiting for a meal


3  **Distribution of benthic organisms**

- More benthos beneath areas of high primary productivity
- Mainly on continental shelves
- Affected by surface ocean currents


4  **Benthic organisms on rocky shores**

- Epifauna
  - Attached to substrate (e.g., marine algae)
  - Move over seafloor (e.g., crabs, snails)
- Moderate diversity of species
  - Greatest animal diversity at tropical latitudes
  - Greatest algae diversity at mid-latitudes

5  **Intertidal zonation (rocky shore)**

6  **Intertidal zonation (rocky shore)**

Spray zone (supratidal)

7  **Intertidal zonation (rocky shore)**

- High tide zone
  - Avoid drying out so animals have shells
  - Marine algae—rock weeds with thick cell walls
- Middle tide zone
  - More types of marine algae
  - Soft-bodied animals
- Low tide zone
  - Abundant algae
  - Many animals hidden by sea weed and sea grass
  - Crabs abundant in all intertidal zones

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**Benthic organisms on sediment-covered shores**










- Similar intertidal zones
- Less species diversity
- Greater number of organisms
- Mostly infauna
  - Burrow into sediment
- Microbial communities

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**Benthic organisms on sediment-covered shores**

- Coarse boulder beaches
- Sand beaches
- Salt marshes
- Mud flats
- Energy level along shore depends on
  - Wave strength

- Longshore current strength
  - Fine-grained, flat-lying tidal flat more stable than high energy sandy beach
- 17  **Intertidal zonation (sandy shore)**
- 18  **Sandy beaches**
  - Animals burrow
  - Bivalve mollusks
  - Annelid worms
  - Crustaceans
  - Echinoderms
  - Meiofauna
- 19  **Mud flats**
  - Eelgrass and turtle grass common
  - Bivalves and other mollusks
  - Fiddler crabs
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- 23  **Shallow ocean floor**
  - Continental shelf
  - Mainly sediment covered
  - Kelp forest associated with rocky seafloor
    - Also lobsters
    - Oysters
- 24  **Coral reefs**
  - Most coral polyps live in large colonies
  - Hard calcium carbonate structures
  - Coral reefs limited to
    - Warm (but not hot) seawater
    - Sunlight (for symbiotic algae)
    - Strong waves or currents
    - Clear seawater
    - Normal salinity
    - Hard substrate
- 25  **Reef-building corals**
- 26  **Symbiosis of coral and algae**
  - Coral reefs made of algae, mollusks, foraminifers as well as corals
  - Hermatypic coral mutualistic relationship with algae
    - Algae provide food
    - Corals provide nutrients
- 27  **Coral reef zonation**
  - Different types of corals at different depths
- 28  **Importance of coral reefs**
  - Largest structures created by living organisms
    - Great Barrier Reef, Australia, more than 2000 km (1250 m) long
  - Great diversity of species
  - Important tourist locales
  - Fisheries
  - Reefs protect shorelines
- 29  **Humans and coral reefs**
  - Activities such as fishing, tourist collecting, sediment influx due to shore development harm coral reefs

- Sewage discharge and agricultural fertilizers increase nutrients in reef waters
  - Hermatypic corals thrive at low nutrient levels
  - Phytoplankton overwhelm at high nutrient levels
  - Bioerosion of coral reef by algae-eating organisms
- 30  **Crown-of-thorns starfish**
- 31  **Benthic organisms on the deep seafloor**
  - Little known habitat
  - Bathyal, abyssal, hadal zones
  - Little to no sunlight
  - About the same temperature
  - About the same salinity
  - Oxygen content relatively high
  - Pressure can be enormous
  - Bottom currents usually slow
- 32  **Food sources in deep seafloor**
  - Most food from surface waters
  - Low supply
- 33  **Deep-sea hydrothermal vent biocommunities**
  - First discovered 1977
  - Chemosynthesis
  - Archaea use sea floor chemicals to make organic matter
  - Tube worms
  - Giant clams and mussels
  - Crabs
  - Microbial mats
- 34  **Global hydrothermal vent fields**
- 35  **Deep-sea hydrothermal vent biocommunities**
  - Vents active for years or decades
  - Animals species similar at widely separated vents
  - Larvae drift from site to site
  - “Dead whale hypothesis”
    - Large carcasses may be stepping stone for larvae
- 36  **Deep-sea hydrothermal vent biocommunities**
  - Life may have originated at hydrothermal vents
  - Chemosynthesis also occurs at low temperature seeps
    - Hypersaline seeps
    - Hydrocarbon seeps
    - Subduction zone seeps
- 37  **Beneath the sea floor**
  - Deep biosphere
  - Microbes live in pore fluids
  - Might represent much of Earth’s total biomass
- 38  **End of CHAPTER 15**  
**Animals of the Benthic Environment**