

Class 38

CORAL REEF COMMUNITIES

Introduction

Corals and symbiosis

Coral Reef architecture

Threats

Coral Reefs:

- Are diverse and productive
- Have thousands of invertebrate and vertebrate species
- Are the “Rainforests” of the marine world

Coral animal -- dominant reef-builder

- Phylum = Cnidaria (like jellyfish and sea anemones)
- Colonies; individual polyps with tentacles -predators and filter feeders.
- Individuals secrete supporting "cup" of CaCO₃ (grow up to 10 cm per year!)
- Variety of growth forms -- massive, columnar, branching, etc.

Environmental requirements of growing coral reefs:

- T: >18°C.....23-25° is best
 ➔ mostly low latitude, < 30° N or S
- S: cannot be low (e.g., not near rivers)
- Depth: Photic zone, cannot grow deeper than 50-150 m
- Clear water (little suspended sediment, phytoplankton)

Coral Nutrition:

- Tentacles capture additional food
- Symbiotic algae provide much food

Symbiotic zooxanthellae in coral tissue

Zooxanthellae are dinoflagellates (photosynthesis)

... give corals color (pink, purple, green)

... may comprise 75% of coral biomass

... corals grow only in photic zone

Symbiosis:

Zooxanthellae get from corals:

- constant, protected environment,
- source of CO₂ and nutrients (P, N)

Zooxanthellae give to corals:

- O₂
- Food (sugars; they are not eaten)

Types of coral reefs:

- Fringing reef -- borders shoreline
- Barrier reef -- further offshore, separated by lagoon
- Atolls -- ring-shaped

Coral reefs in trouble

Causes:

1. Natural predators (e.g., star fish)
2. Human activities (nutrients, fishing, recreation)
3. Coral bleaching: zooxanthellae expelled
 - Color lost
 - Most common in unusually warm waters: $>32^{\circ}\text{C}$
 - 2 degrees above normal maximum causes it
 - Result of global warming?

Coral Reefs and Nutrients

- Nutrients derived from sewage and fertilizer
- Coral ecosystems well suited for low nutrient levels
- Increased nutrient levels allow different species to dominate (e.g., phytoplankton)
- Ecosystem changes, slow-growing corals can't compete