Coral Reefs
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Importance of Coral Reefs
Coral reefs fringe 1/6th or 17% of world’s coastlines.

Home to 25% of named marine species.

Fragile Ecosystems
High biodiversity
What is necessary:
> Clear, clean water – sediment free
> Shallow depths/bright light
> Calcium Carbonate – CaCO$_3$
  Warm water temperatures allow for better absorption of CaCO$_3$.

Anatomy and classification
- Corals are cnidarians – related to jellyfish.
- Form polyps that are colonial
- Polyps sit in coralite cups
- Individuals in a colony are interconnected by cenosarc tissue that grows over the coralites

Courtesy of George Schmahl, Flower Garden Banks National Marine Sanctuary, National Oceanic & Atmospheric Administration
Coral Reefs – formation & distribution
- Different forms: encrusting, massive, branching, foliaceous
- Can be polymorphic and exhibit different forms in response to different growing conditions. Reef-forming corals:
  - Found in tropics and subtropics
  - More abundant along eastern margins of continents
  - Salinity must be average (about 35 ppt).

Why do animals need bright light?

Coral Ecology
- Live symbiotically with dinoflagellates (photosynthetic protista)
- *Zooxanthellae* live within reef-building coral tissues.
- *Zooxanthellae* - Up to 1 million cells/cm² of coral tissue!

- Polyps get:
  - 40% of nutrients from photosynthesis.
  - 60% from filter feeding.

Coral Reefs - Types
- Coral reef formation:
  - Shelf reefs
  - Along continental margins
  - Oceanic reefs
- Fringing reefs – grow outward from coastline
- Barrier reefs
- Atolls

http://factural.com/index.php/2018/03/14/the-coral-reefs/
Places to dive & Explore
Note the Coral Sea

Concerns
The quest to preserve coral reefs in times of a changing climate & a changing world.
- Over 50% of corals have perished in the last century.
- Current threats include climate change, ocean acidification, overfishing, pollution.
- Some corals can adapt to increased water temperatures if given time to acclimate.
- More than 50% of Great Barrier Reef crashed in winter 2016-17 alone.

Disturbance - Anthropogenic
- Coastal development
- Agricultural runoff
- Deforestation
  - Introduce sediments, pollutants, and excess nutrients into the water
- Overfishing
- Climate change – Ocean Acidification

Disturbance – Naturally occurring
- Hurricanes & Storms
- Waves
- Predation
- Disease e.g. black band
- Invasive species
Reason for Hope
Restoration & Preserves

Prince Albert, Honduras

- Coral Bleaching
  - https://www.hhmi.org/biointeractive/coral-bleaching
- Scientists at Work
- Annotated paper – for deeper science
  - http://www.scienceintheclassroom.org/research-papers/take-heat