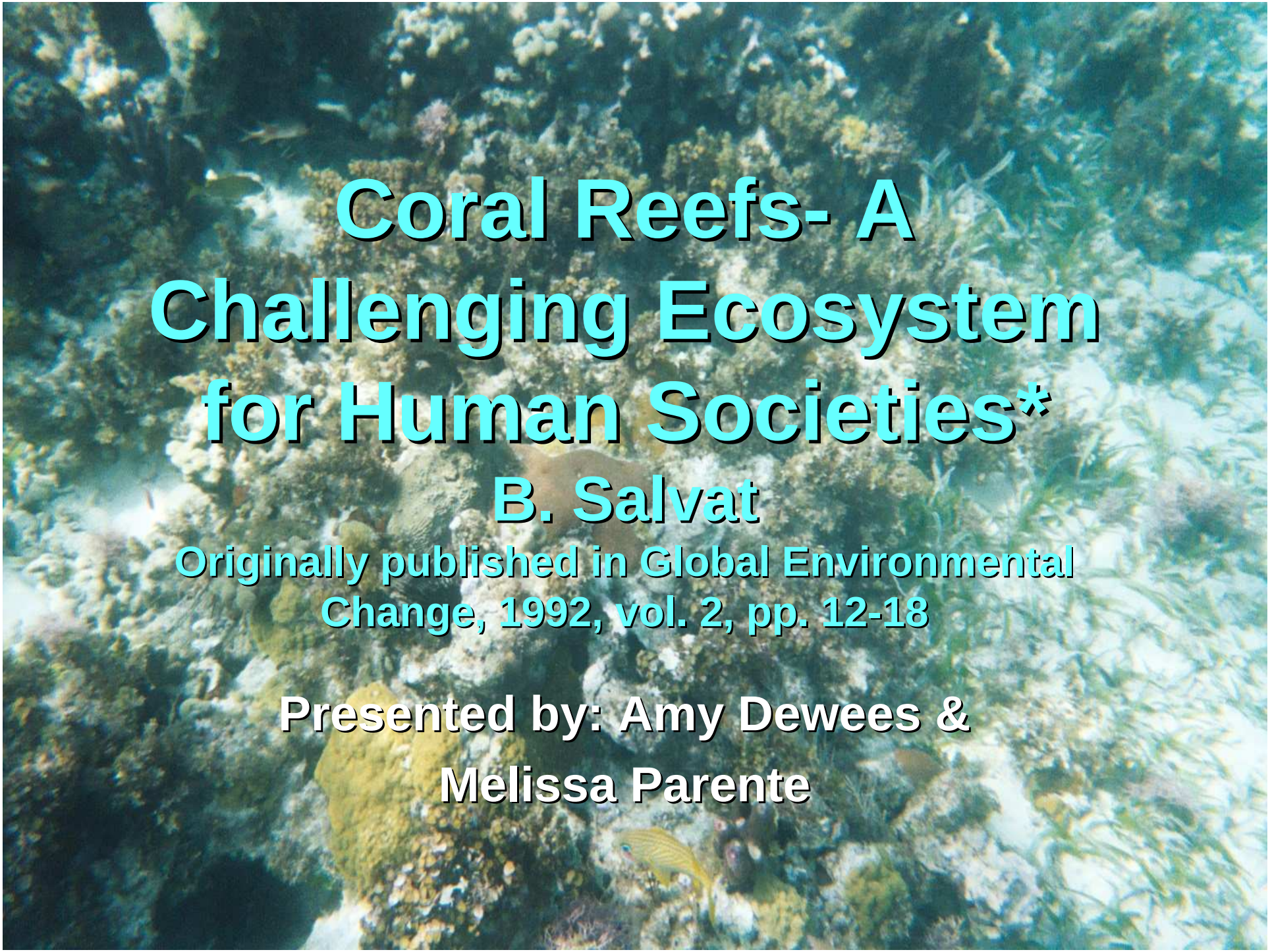

Coral Reefs- A Challenging Ecosystem for Human Societies*

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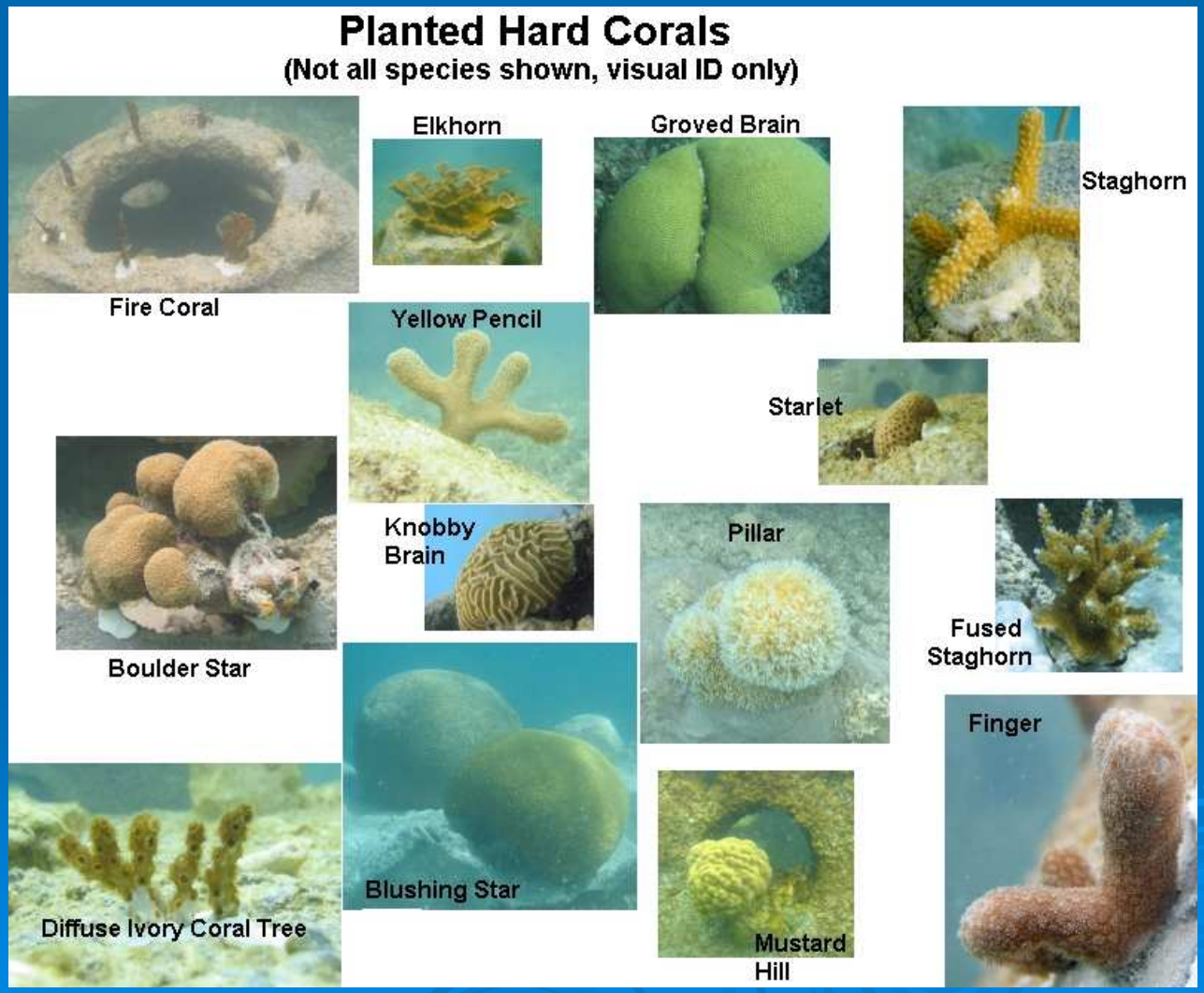
Presented by: Amy Dewees &
Melissa Parente

What is coral?

- Coral skeletons make up the structure of the reef and are covered by a layer of living coral polyps.
- The skeletons are made of calcium carbonate and act as a carbon sink.

•http://sps.k12.ar.us/massengale/sponges__cnidarian_notes_b1.htm

Examples



- http://www.reefball.com/map/antiguascience/corals.jpg

About the polyps…

- The coral polyps participate in a symbiotic relationship with zooxanthellae (unicellular algae).
- Through the process of photosynthesis, algae provides food for the polyps during the day and at night the polyps feed on particles and plankton in the water.
- This relationship allows the coral to thrive in nutrient-poor waters.
- http://www.reef.edu.au/asp_pages/secc.asp?formno=6

Where they are found:

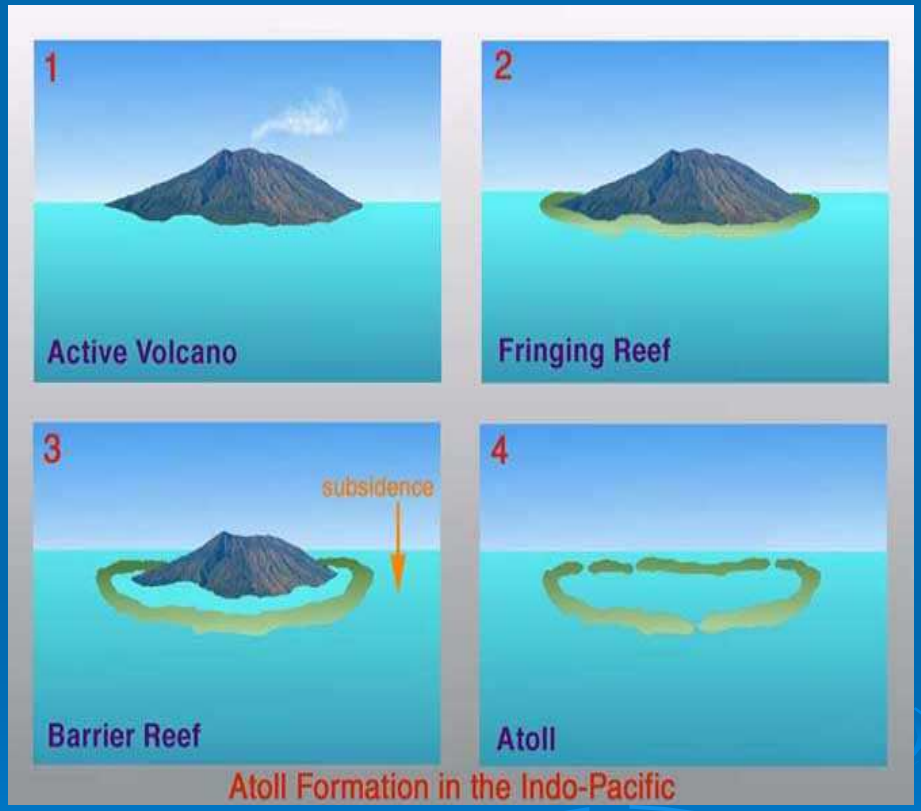
- Along coasts of the Pacific, Indian, and Atlantic Oceans, covering 600,000 km^2, usually between 25º north and south of the equator.
- In warm water from the surface down to 100 m.

http://www.coris.noaa.gov/about/what_are/

- Over 100 countries are bordered by coral reefs, including Australia, Japan, France, the United States, and Southeast Asia.
- Many reefs are located near developing and least developed countries.

Types of Reefs

- Large reefs occupy continental shelves or shallow seas (ex. Great Barrier Reef).
- Protective fringes around volcanic islands or low atolls.



•https:/.../research/ izg/coralreefformation.htm

Human Use of Coral Reefs

- Tens of millions of people in locations such as, the Philippines and Indonesia, live along coasts with coral reefs and use them as a resource for subsistence or sale in local markets.
- Over time there has been a influx of people without a culture that promotes responsible use of the marine ecosystems.
- Increased numbers of people also cause increased exploitation of the ecosystem for food.

Effects of Natural Events

- Disease
- Predators (Crown-of-Thorns Starfish)

http://www.aims.gov.au/pages/reflib/cot-starfish/pages/cot-q20.html

- Sea-atmosphere processes (El Nino)
- Hurricanes

http://sealevel.jpl.nasa.gov/science/hurricane.html

Human Induced Degradation

- More than 20 categories of stress-causing damage have been identified. These include:
  - Runoff from land clearance
  - Chemical pollution*
  - Eutrophication
  - Coral and sand mining
  - Overfishing*
  - Coastal construction*
  - Oil pollution*

Anthropogenic or Natural Disturbances?

- Coral reef ecosystems are now known to be extremely variable in their inhabitance (ex. species of algae, coral, fish, echinoderms, & molluscs).
- Lack of historical information about these ecosystems makes it extremely difficult to distinguish between natural variability and anthropogenic impacts (2 examples).

Example 1: Crown-of-Thorns Starfish

- From the late 1950's through the 1960's, the population of Crown-of-Thorns Starfish drastically increased, causing the destruction of 14% of the Great Barrier Reef and 90% of fringing reefs of Guam.

- It was speculated that the cause of the outbreak was human induced, but since then there has been evidence of past outbreaks.

http://www.uwcsea.edu.sg/bio/biology/ibhfcphoto.htm

Example 2: Bleaching …

- is due to disruption of the symbiotic relationship between the coral and algae.
- often leads to the death of the coral.
- is caused by warmer ocean temperatures, heavy sediments and pollution.
- could be related to global environmental change.

http://www.flmnh.ufl.edu/fish/SouthFlorida/coral/Naturalimpacts.html

Global Change

- Increases in atmospheric temperatures
- Increases in ocean temperatures
- Increase in ocean level

Image from: http://newsfromrussia.com/science/2005/11/28/68684.html

Global Change

- Possible Benefits
  - Coral may have a larger habitat than currently exists.
  - More carbon may be fixed by the coral, lowering atmospheric levels of greenhouse gases, combating global warming.
- Possible Detriments
  - Coral will die due to temperature changes.
  - Greater destruction due to storms and hurricanes due to El Nino.
  - Increased rainfall may lead to heavier sedimentation and consequent destruction of some coral reefs.

What does it all mean?

- It has not been determined whether or not the loss of reefs is due to human and/or natural factors.

- Now is the time to monitor and manage coral reefs and tropical coastal ecosystems in light of possible greenhouse effects.