

# ECOLOGICAL SUCCESSION

## Changes Over Time

Lesson Adapted from National Geographic Education



# Do Ecosystems Change Over Time?

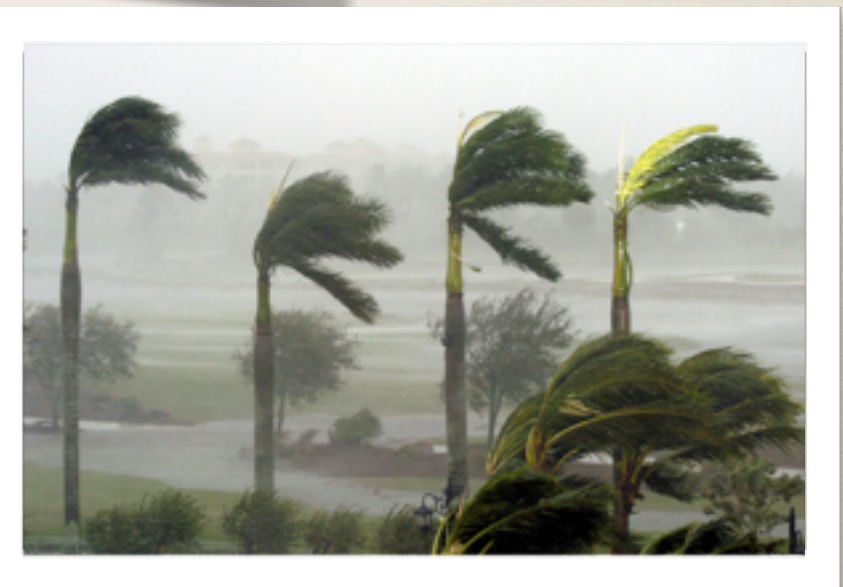
## Brainstorm:

- \* What could cause those changes?



# Examples of Change

- \* Volcanic Eruptions
- \* Wildfires
- \* Nuclear Contamination
- \* Hurricanes





# Anthropologic Vs. Natural Causes

Anthropologic (Human)	Natural



# SUCCESSION

Glimpses of a Pristine Ocean



# Shifting Baselines

This video uses human interaction with coral reefs to show the change of the ecosystem over time.

What are some disturbances that occur in marine ecosystems?



# Shifting Baselines

- Hurricanes
- Ocean Warming
- Dead Zones
- Overfishing
- Habitat Destruction
- Pollution





# Shifting Baselines

What is a baseline?

- It is a point of reference to measure change over time.

A shifting baseline is a baseline that changes until we accept that the state is “normal” and so we lower our standards.



# SHIFTING BASELINES AND SUCCESSION WORKSHEET

- Belize Coral Reef -



Name \_\_\_\_\_ Date \_\_\_\_\_

## Shifting Baselines and Succession

Before watching the videos, work with your group to provide at least one example of each item in column 1. After watching the videos, work with your group to identify examples and explanations of the terms provided in the videos.

Term	Group Example(s)	Video Example Location	Video Explanation
Natural disturbance			
Anthropogenic disturbance			
Shifting baseline			



## Shifting Baselines and Succession

Term	Group Example(s)	Video Example Location	Video Explanation
Ecological succession			
Pristine ecosystem			
Disturbed ecosystem			
Sustainability			



# Question:

Do you think that coral reefs can recover from natural disturbances at the same time that anthropologic disturbances are increasing?

Why or why not?



# PODCAST

- Paradise Redefined: Line Islands -



# Questions:

How did the scientists describe the initial stages of coral reef succession?

What stages do you think might follow?



Name \_\_\_\_\_ Date \_\_\_\_\_

## Shifting Baselines and Succession Answer Key

Before watching the videos, work with your group to provide at least one example of each item in column 1. After watching the videos, work with your group to identify examples and explanations of the terms provided in the videos.

Term	Group Example(s)	Video Example Location	Video Explanation
Natural disturbance		Belize	Belize: Hurricane Mitch struck in 1998, and it was an El Niño year. The combined effects of the hurricane and coral bleaching (due to increased water temperatures) destroyed more than 48% of the live coral cover.
Anthropogenic disturbance		Line Islands	The five islands studied showed degrees of damage in direct proportion to anthropogenic disturbance. Palmyra is recovering from the impacts of WWII soldiers stationed there.
Shifting baseline		Belize; Line Islands	<p>Belize: After disturbance, the baseline shifts, and although the reef seems to be stable, continued and increased natural and anthropogenic disturbances could lead to a tipping point where the reef cannot fully recover.</p> <p>Line Islands: Most coral reefs studied by modern science were already degraded and heavily impacted by humans so we don't have a proper baseline; this has lowered our expectations for what we want for the future of our reefs; the baseline needs to be set back in time.</p>



## Shifting Baselines and Succession Answer Key

Term	Group Example(s)	Video Example Location	Video Explanation
Ecological succession		Belize; Line Islands	Belize: Reefs seems to be able to recover from natural disturbances, but with increasing anthropogenic disturbances, natural succession processes may be threatened. Line Islands: Scientists found rock substrate with little algae and several coral recruits. Thus, reefs can recover from former disturbance. This has important implications for reefs throughout the world, and there is hope in local protection.
Pristine ecosystem		Line Islands (Kingman Reef, Palmyra Atoll)	Kingman Reef and Palmyra Atoll (with the least human disturbance) had an inverted trophic pyramid with more predators than prey, increased biomass, intact coral communities with juvenile corals settling and corals regrowing.
Disturbed ecosystem		Belize; Line Islands	Belize: Recent natural disturbances and prevalent anthropogenic disturbances. Line Islands: The five islands studied showed degrees of damage in direct proportion to anthropogenic disturbance. Palmyra is recovering from the impacts of WWII soldiers stationed there.
Sustainability		Belize; Line Islands	Belize: The reef is essential to local residents as a food source and a wave buffer; the reef shows sustainability because it continues to support life and thrive, but the future is uncertain. Line Islands: Reefs can recover from former disturbance. If the ecosystem is intact (with all its species), the ecosystem is able to recover from disturbances such as overfishing and global warming.



# Key Terms

Anthropologic  
Shifting Baseline  
Disturbance  
Succession  
Sustainability