Coral Reef Zonation and Succession

Disclaimer

The terms used to identify different reef zones are not based upon a uniform agreement among reef scientists. There are variations among different literature sources regarding the naming of reef zones.

Environmental Factors Shaping Coral Reefs (Geomorphology) and Contributing to Reef Zonation

- Water Motion
- Depth (light & water motion)
- Sedimentation
- Proximity to Land
- Relative Sea Level Change
  - Eustatic Sea Level Change
  - Isostatic Sea Level Change
Reef Flat of a Barrier Reef

Coral Island (Cay or Motu)

Reef Front

Open Ocean

Lagoon

Buttress Zone of the Upper Reef Slope

Spurs or Buttresses

Grooves

Reef Front

Upper Reef Slope of a High Energy Environment

Upper Reef Slope

Upper Reef Slope of a Lower Energy Environment

Leeward Reefs

Versus

Windward Reefs
Ecological Succession

The progressive change in the species composition of an ecosystem.

Ecological Succession

New Bare Substrate

Colonizing Stage

Successionist Stage

Climax Stage

Ecological Succession

Ecological Succession

Ecological Succession

Ecological Succession

Ecological Succession

Ecological Succession

Abandoned farmland

0–1 years

Crapgrass colonizes first

1–3 years

Tall grass/herbaceous plants establish

3–10 years

Pines invade
Ecological Succession

- 10–30 years
- Pine forest is established

Ecological Succession

- 30–70 years
- Hardwoods invade

Ecological Succession on a Coral Reef

- 70+ years
- Hardwood climax forest is formed
- Succession complete

Ecological Succession on a Coral Reef

- Colonizing Stage
- Succession Stage
- Climate Stage
- New Reef Substrate
- Old Reef Substrate

Ecological Succession on a Coral Reef
Ecological Succession on a Coral Reef

3 month old lava flow

10 year old lava flow

15 year old lava flow

20 year old lava flow

40 year old lava flow

100 year old lava flow
Successional Models and their Impacts

• No Disturbance (Competitive Exclusion Model)

• Occasional Strong Disturbance (Intermediate Disturbance Model)

• Constant Strong Disturbance (Colonial Model)