

Coral reefs: Formation, Classification & Threats

Coral reefs are one of the most diverse ecosystems in the world. The organisms belong to the Phylum Cnidaria. The best known type of corals is the one living in clear, warm tropical waters with plenty of colourful fishes. This is a rocky, shallow water type. The water is clear because of the low concentrations of nutrients. But there are also deep water corals that live in dark cold waters and soft corals that live in shallow, cold waters. They are wave resistant rock structures, created by calcium carbonate - secreting animals and plants.

As the polyps live, reproduce, and die, they leave their skeletons behind. A coral reef is built up by layers of these skeletons covered by living polyps. The polyps reproduce either through fragmentation (when a piece breaks off and new polyps form) or sexual reproduction through spawning.

A reef ecosystem may be made up of many species of corals. Healthy reefs are typically colourful, highly bio-diverse areas made up of a mishmash of corals and the species that inhabit them, such as fish, sea turtles, and invertebrates such as sponges, shrimp, lobsters, crabs, and seahorses. Soft corals, like sea fans, may be found within a coral reef ecosystem, but do not build reefs themselves.

The corals on a reef are further cemented together by organisms like coralline algae, and physical processes like waves washing sand into spaces in the reef.

Conditions for growth:

Reef-building, warm water corals need the following environmental conditions to grow :

- ✓ Clear water: this allows light to reach the photosynthetic zooxanthellae.
- ✓ Light-absorbing adaptations enable some species to live in dim blue light.
- ✓ Ocean temperatures of more than 18°C.
- ✓ Strong wave action which ensures: supply of food and oxygen, the distribution of larvae and prevents sediment to settle on the reefs.
- ✓ Precipitation of calcium necessary for the formation of skeletons. Water temperatures and salinity have to be high and carbon dioxide concentrations have to be low.
- ✓ Hard substrate.

Cold water corals do not need light to function. They obtain their nutrients and energy completely from trapping plankton and organic particles in passing currents. They include stone corals, true soft corals, black corals and lace corals. Most of them do not build reefs, but grow in thick colonies. All cold water corals are extremely fragile and vulnerable to physical disturbance. The polyps cannot escape disturbances and their structures are extremely brittle. They also grow extremely slow, so it takes a long time to rebuild the reef when it is damaged. An additional disadvantage is that can't respond to fast-occurring changes in their environment, because have adapted to stable conditions.

Cold water corals such as Lophelia are true hard corals. They also produce calcium carbonate skeletons. They are mainly found at depths between 200 and 1,000 meters along continental shelves, in fjords and around offshore submarine banks, vents and seamounts. The suitable temperature ranges from 4°C to 13°C. Lophelia is not found in the Polar Regions. Madrepora oculata is another cold water coral species. The species is found in the north-east and western Atlantic and the Mediterranean Sea.

Classification

These 3 are the main reef types. The reef expands and will form an atoll, barrier or fringing reef.

- **Fringing reefs:** These reefs grow close to the coast in shallow waters.
- **Barrier reefs:** Barrier reefs, like the Great Barrier Reef, are large, continuous reefs. They are separated from land by a lagoon.
- **Atolls:** Atolls are ring-shaped and located near the sea surface. They get their shape from growing on top of underwater islands or inactive volcanoes.



Barrier reef



Fringing reef



Atoll reef

It is directly attached to the land. This is the most common type of coral reefs. Other special reef arrangements are apron, patch, ribbon, and table and bank reefs. Apron reefs are very similar to fringing reefs. Both are extending downward from the land margin, the former more gently sloping than the latter. Patch reefs are small, isolated outcrops of coral surrounded by sand and/or sea grass, and may form part of a fringing reef system. Ribbon reefs are the small and long components of a barrier or are connected to an atoll lagoon. Table reefs are future atolls, but are not yet connected to a lagoon. At last, bank reefs are similar to the patch, but are larger and often hemispherical.

Threats:

An important part of coral reefs is their calcium carbonate skeleton. If you follow ocean issues, you know that animals with calcium carbonate skeletons are under stress from ocean acidification. Ocean acidification causes a lowering of the ocean's pH, and this makes it difficult for corals and other animals that have calcium carbonate skeletons.

Natural causes are:

- ✓ Storms and tidal emersions.
- ✓ El Niño: increased sea surface temperatures, decreased sea level and increased salinity from altered rainfall.
- ✓ Predation by fishes, marine worms, barnacles, crabs, snails and sea stars.
- ✓ Dust outbreaks.

Other threats to reefs include pollution from coastal areas, which can affect reef health, coral bleaching due to warming waters, and damage to corals due to construction and tourism.

Human induced causes are:

- ✓ Chemical pollution
- ✓ Ocean acidification
- ✓ Fishery
- ✓ Land development
- ✓ Dredging and dumping

(N.B.: According to the question needs, you can little bit describe the human induced causes).

