

Coral reefs

Coral reefs are the most luxuriant and complex of all benthic communities; and they are found all around the world. The term "coral reef" generally refers to a marine ecosystem in which the main organisms are corals that house algal symbionts within their tissues. These form the largest biogenic reefs in the world. Over a vast region (millions of square miles) of the tropics, the shallow inshore waters are dominated by the formation of coral reefs, and they are often used to define the limits of the tropical marine environment. These are the largest living structures (biogenic reef) on earth, and there are over 4,000 species of reef fish, making coral reefs the home for one fourth of all the fish species found on the earth.

Coral reefs are often referred to as 'tropical rainforests of the sea' since they are one of the most diverse, productive, and beautiful marine ecosystems in the world.

Coral reefs resemble tropical rainforests in the following ways

- Both thrive under nutrient-poor conditions (where nutrients are largely tied up in living matter), yet support rich communities through incredibly efficient recycling processes.
- Both exhibit very high levels of species diversity.
- Coral reefs are noted for some of the highest levels of total (gross) productivity on earth. The net primary productivity of coral reefs is approximately 2,500 grams of carbon per square meter per year, compared to 2,200 grams of carbon per square meter per year for tropical forests and only 125 grams of carbon per square meter per year in the open ocean.

The extraordinary diversity of reefs makes them biologically important and, like rainforests, they have provided valuable scientific insights into the nature of underwater ecology. It is a diverse collection of species that interact with each other and the physical environment. The sun is the initial source of energy for this ecosystem. They are considered to be one of the most sensitive to any change. When they are environmentally stressed they lose much of the algae that give them the color along with other pigments. When this happens the corals appear white in colour and are referred to as bleached.

A coral colony may consist of thousands of polyps. Polyps are typically carnivorous, feeding on small particles floating in the water. Corals reproduce both sexually and asexually. An entire colony many meters in diameter can start out as a single polyp. On a few nights of each year, many of the corals on the reef reproduce in an event called mass spawning. Tens to hundreds of species of corals release their eggs and sperm into the water on the same night. The eggs float to the ocean's surface where they can be fertilized, forming new coral larvae called planulae. The coral planulae swim in the ocean for several days to weeks until they settle on the reef bottom and grow into new corals. Corals can also reproduce asexually by budding. During budding the coral polyp will divide to make a nearly identical copy of itself that will remain

attached to the parent polyp. A coral colony will form after repeated rounds of budding and can grow to contain hundreds and even thousands of polyps. As new polyps form they overgrow older polyps that die and add their calcium carbonate skeleton to the foundation of the reef.

Types of corals

There are two main types of coral: non-reef builders (ahermatypic) and reef builders (hermatypic). Ahermatypic corals, such as soft corals and solitary hard corals, and they do not form reefs as they do not possess the symbiotic algae, Zooxanthellae in its internal body wall. Soft corals are colonial corals that have a flexible skeleton and depend on toxic chemicals in their tissues to protect themselves from predators. Hermatypic corals are reef forming corals and this is possible for them because they are known to harbour Zooxanthellae in their body wall. These are hard corals that form large colonies from thousands of connected polyps living together, sharing food and energy. Hard corals use zooxanthellae, to combine calcium and carbonate from the water and for respiration. The zooxanthellae are the coral's solar panels and provide enough energy to build their skeletons rapidly. Generation after generation of polyps add to the skeleton, corals are known to attain variety of shapes and sizes. Coral colonies can grow bigger than a small house and can be several hundred years old. Over thousands of years, the skeletons of many coral colonies living together form reefs.

Major types of coral reefs

There are three major types of reefs: fringing reefs, barrier reefs and atolls. Fringing reefs extend along the shoreline, close to land or separated only by a narrow stretch of water, but that can extend out to sea long distances. This reef type exists in shallow waters. Barrier reefs form farther offshore, usually 10-100 kilometers from the coast, and often form massive walls of coral separated from the coast by a large channel or lagoon. Atolls are circular reefs surrounding a lagoon that form when volcanic islands sink into the ocean over millions of years.

Distribution of Coral Reefs

Coral reefs occur throughout the tropical region, on either side of the equator where conditions favour their growth. The coral reefs of the central Indo-Pacific and the Caribbean hold the greatest diversity of marine life. The most diverse region of the world for coral reefs is centered on the Australia, Philippines, Indonesia, Malaysia and Papua New Guinea, with between 500 - 600 species of corals. Large portions of world's coral reefs occur within the Indian Ocean.

India has four major reef ecosystems, having all three reef types, atoll, fringing and barrier. The total area of coral reef in India is estimated to be about 2,375 km² which is less than 1 % of all the coral reef areas in the world. The mainland coast of India has two widely separated areas containing reefs, the Gulf of Kachch is located in the northwest (Gujarat state) and the Palk Bay and Gulf of Mannar are located in the southeast (Tamilnadu state). The Andaman and Nicobar Islands in Bay of Bengal have fringing reefs around many islands, and a long barrier reef (329

km) on the west coast. The Lakshadweep in the Arabian Sea also has extensive reefs especially atolls.

Factors limiting the distribution of coral reefs

Coral reefs are sensitive to even for a slight change in the environment. Wide varieties of environmental factors are known to influence the distribution of coral reefs. There are six major physical factors that limit coral reef development and distribution viz., temperature, depth, light, salinity, sedimentation, exposure to air, etc.