

Coral Reefs and Mangrove Swamps

Coral Reefs

Coral reef ecosystems thrive along the coastlines of Florida, Hawaii, Australia, the Sinai Desert, the West Indies, and other tropical and subtropical regions of the Earth. Coral reefs are formed by colonies of marine invertebrates called *coral polyps*. As the coral polyps grow, they secrete limestone that protects their bodies. When the coral polyps die, their outer skeletons remain, providing shelter for other marine organisms.

Coral reefs support one-fourth of all marine species and provide habitat for 10–15 percent of the world's marine fish catch (4 million to 8 million tons annually). Reefs also form natural barriers that help protect 15 percent of the world's coastline and provide food, jobs, and building materials for some of the world's poorest countries (Pacific Islanders obtain 90 percent of their animal protein from reef fish). The reefs' animals and plants are potential sources of chemicals that are used in cancer and AIDS research. In addition to the variety of resources that these ecosystems provide to both human and marine populations, coral reefs are valued for their natural beauty.

Unfortunately, coral reefs are easily degraded and are in danger of large-scale destruction. It is estimated that about 10 percent of the world's coral reefs have been degraded beyond recovery, and another 30



percent of the reefs are likely to decline significantly within the next 20 years. Most of the major threats to the survival of these ecosystems are caused by human activities such as the excessive use of reef resources, excessive domestic and agricultural pollution, increased sedimentation from poor land-use practices, coastal development, fishing, tourism (sport fishing and cruise ships), offshore oil drilling, and water pollution.

Coral polyps are extremely vulnerable to these human impacts because they cannot reproduce in murky, polluted waters. Polyps are also easily injured when handled by divers or struck by boats and anchors. Small amounts of sediment can reduce corals' growth and resistance to stress. Large amounts of sediment can bury whole coral communities. Destruction of the reefs affects the corals and the aquatic species that depend on the reef communities for food and shelter. It also affects the health of the coastlines and lagoons that are sheltered by the reefs, the mangroves and sea grasses that are protected from wave damage, and the human populations that depend on the reefs for their food and livelihood.

Mangrove Swamps

Mangrove swamps—many of which are large and impressive forests—are also found along tropical and subtropical coasts. Mangroves are plants (trees, shrubs, palms, and ferns) that can live in the intertidal zone (between low and high tide marks or along river edges affected by the tides). Although a saltwater environment is not necessary for mangrove growth, these plant communities live only in saltwater because they cannot successfully compete with freshwater flora.

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Mangroves are valued for their production of timber and fuel wood. Mangrove swamps also produce foliage that enters the marine food chain and that supports fish and invertebrates, such as the prized mangrove crab. Mangrove swamps provide breeding, nursing, and feeding grounds for approximately 2,000 species of fish, invertebrates, and plants. Mangrove swamps help protect the coast from erosion and reduce damage from hurricanes (called typhoons in Asia and the Pacific). The average economic value of mangrove swamps has been estimated at \$10,000 per hectare (2.5 acres). This value is based on the physical, commercial, and ecological benefits that mangrove swamps provide (the actual value depends upon the specific site).

Like coral reefs, the existence of mangrove swamps is threatened by human activities. Large areas of mangrove swamps may be killed by the indirect effects of nearby roads or stream diversions, as changes in water circulation may increase salinity or decrease oxygen. Mangrove swamps may also be damaged by pesticides that wash into the waters from nearby agricultural fields. In addition, when mangrove swamps are cleared by woodcutting or for aquaculture ponds, regrowth or planting is sometimes difficult if the area is opened to coastal erosion or currents that remove sediment

from the site. Recovery is nearly impossible when mangrove swamps are filled for urban or agricultural development.

A recent natural disaster shed some light on the importance of mangroves to a healthy, protected ecosystem. On December 26, 2004, a massive earthquake driven tsunami devastated several areas in Asia. According to Jeff McNeely, chief scientist of the Swiss-based World Conservation Union, in the last several decades human activities (for example, building coastal resorts and creating shrimp ponds) led to the destruction or removal of mangroves, which offered natural protection against things like tsunamis. McNeely said that the tsunami is "nothing new for nature" in a geologically active region, but that "what made it a disaster is that people have started to occupy part of the landscape that they shouldn't have occupied."

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