

## INTERTIDAL ZONES

**OBJECTIVES**

- *Explain the processes that contribute to the formation of salt marshes and mangrove swamps.*
- *List several human activities that damage intertidal habitats.*

The intertidal zone is located along the shoreline of the world ocean. The **intertidal** (in-ter-TI-duhl) **zone** *alternates twice each day between periods of exposure at low tide and periods of submersion at high tide.* Organisms in the intertidal zone must be able to survive both exposed and submerged conditions. These organisms must also be able to withstand the constant pounding of the surf. Some organisms attach themselves to the rocks. Others burrow into the sand.

Because intertidal zones occur where the water meets the land, they are often surrounded by wetlands, such as tidal salt marshes and mangrove swamps. Like other types of wetlands, salt marshes and mangrove swamps are vulnerable to human activity.

### Salt Marshes

*Salt marshes* are flat, muddy wetlands that often surround estuaries, bays, and lagoons. Most salt marshes are influenced by tides. The mud flats of tidal salt marshes are exposed during dry periods and low tides, but submerged during wet periods and high tides. Salt marshes are a common form of wetland along the coast of the United States, especially the east coast and the shores of the Gulf of Mexico.

Many of the environmental roles of wetlands described in Chapter 10 also apply to coastal salt marshes. One of the most important functions of salt marshes is their role in supporting migratory bird populations. Migratory birds use salt marshes for feeding and resting during their long journeys. Salt marshes are also essential in supporting the ocean ecosystem. The abundant plant life, especially grasses, of the salt marsh supports a rich community of fish and invertebrates. Many of the commercial fish and shellfish harvested in the United States spend at least part of their life cycles in the salt marsh. The plant material becomes food for the animals that breed, hatch, or grow in the water. Many of these animals then move out to sea or become food for ocean animals.

Salt marshes form when streams flow into the calm waters of an estuary or other shallow, neritic waters. The slowing of the water causes sediments, picked up by the stream, to be deposited at the mouth of the stream. The sediments build up over time, forming a delta. *The weight of the accumulated sediments causes the delta to sink under the water in a process called **subsidence** (sub-SID-ents).* To remain stable, there must be a balance between the rate



**Figure 11.8** Most migratory birds that summer in the tundra and other cold regions rely on coastal salt marshes to rest and feed during their journey.

of sediment deposition and the rate of subsidence in a salt marsh. Sometimes, the course of the stream may change as a result of these two factors. The Mississippi River delta undergoes a 5000-year cycle of sediment accumulation, subsidence, and change in the river's course. With every change in the river's course, the Mississippi delta changes shape. The salt marshes of the Mississippi River delta account for 40 percent of the coastal wetlands of the United States.

## Mangrove Swamps

*Mangrove swamps* are a type of coastal wetland that occurs only in warm climates. Frost kills the plants in a mangrove swamp. Therefore, mangrove swamps can exist only in areas that do not freeze for more than one or two days each year. The dominant plant life in a mangrove swamp is the mangrove, a woody plant that can be either a tree or a shrub. There are about 800 species of mangroves worldwide, of which only 10 live in the United States. The red mangrove is the most common U.S. type.

The water in mangrove swamps typically has very little dissolved oxygen. Mangroves are adapted to the low oxygen by having roots that emerge from the water. Some species have roots that grow up from the bottom of the plant, with tips that stick out above the water. Other species have roots that grow from high up on the tree's trunk. The roots make the plant appear to be up on stilts. These elaborate root structures trap sediments, causing soil to accumulate behind the plants. This soil enables other plants to grow. In some parts of the world, such as Southeast Asia, mangrove swamps can develop into extensive mangrove forests.

Mangrove swamps and forests support complex ecosystems full of organisms with unique adaptations. Like many ecosystems worldwide, some species that live in the mangrove swamps are endangered due to loss of habitat. In the Philippines, for example, the 5000 km<sup>2</sup> of mangrove swamps that existed in the 1920s have been reduced to less than 1400 km<sup>2</sup> today. The swamps are destroyed for many reasons, including the creation of aquaculture ponds used for raising commercial fish and shrimp. Other reasons for mangrove swamp destruction include coastal construction projects and waste dumping.



**Figure 11.9** The tangled, stiltlike roots of the red mangrove trap sediments that accumulate as mud behind the trees. Other swamp plants then take root in the mud, causing the growth of mangrove forests.

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## SECTION REVIEW

1. Why are salt marshes considered part of the intertidal zone?
2. In what parts of the United States would you expect to find mangroves?
3. **Apply** Much of the Mississippi River has been contained by levees, dikes, and other flood-control structures. How do you think this change has affected the river's delta?