Section 3
Resources from the Ocean

Key Concept The ocean is an important source of living and nonliving resources.

What You Will Learn
- The ocean is an important source for food, salt, fresh water, oil, tidal energy, and minerals.
- Oil is the most valuable resource obtained from the ocean.

Why It Matters
Many of the things you eat and the materials you use are made from resources from the ocean.

Did you know that without seaweed, your favorite ice cream would be a runny mess? A seaweed called *kelp* is used as a thickener for many food products, including ice cream. Food, raw materials, energy, and drinkable water are all harvested from the ocean. The ocean offers a large number of resources.

Living Resources
People have been harvesting plants and animals from the ocean for thousands of years. Today, harvesting food from the ocean is a multi-billion-dollar industry. As human populations have grown, the demand for these resources has increased. However, the availability of these resources has not.

Fishing the Ocean
Almost 75 million tons of fish are harvested each year. With improved technology, such as the drift nets shown in **Figure 1,** fishers have become better at taking fish from the ocean. Fish are considered a renewable resource. In other words, they can reproduce at the same rate at which they are consumed. However, many people are concerned that we are overfishing our oceans. In addition, animals other than fish, such as dolphins and turtles, can be accidentally caught in fishing nets. The fishing industry is now making efforts to prevent both overfishing and damage to other animals.

Figure 1 The drift nets on this ship from a California fishing fleet are used to catch fish.

Standards Check Why are fish considered a renewable resource?

Farming the Ocean

Overfishing reduces fish populations. Recently, laws regulating fishing have become stricter. Because of this, it is becoming more difficult to supply our demand for fish. Many people have begun to raise ocean fish in fish farms to help meet the demand. **Figure 2** shows one such farm.

Figure 2 In Eastport, Maine, this fish farmer shovels salmon chow to Atlantic salmon he is raising in pens at a fish farm.
Fish are not the only seafood harvested in a farmlike setting. Shrimp, oysters, crabs, and mussels are also raised in enclosed areas near the shore. Even seaweed is harvested. Kelp is a seaweed that is harvested and used as a thickener in jellies and ice cream. Seaweed is also high in protein and is a part of the diets of people around the world.

Standards Check How is seaweed used as a resource?

Nonliving Resources

Humans also harvest many nonliving resources from the ocean. These resources provide raw materials, drinkable water, and energy for our growing population. Some resources are easy to get, whereas others are very difficult to obtain.

Fresh Water and Desalination

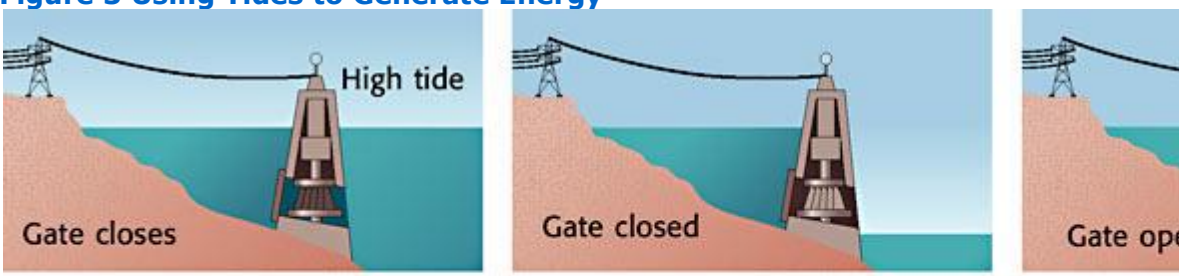
Because of the water cycle, fresh water is considered a renewable resource by most countries. However, in parts of the world that have dry climates, fresh water is limited. These countries must desalinate ocean water to obtain fresh water. **Desalination** is the process of removing salt from sea water. Most desalination plants heat ocean water to cause the water to evaporate. Fresh water

evaporates and is collected for use. Salt from the water remains behind and is also used as a resource. Unfortunately, desalination can be a very expensive process.

Tidal Energy

The ocean can generate energy simply by its constant movement. The gravitational pulls of the sun and the moon cause the ocean to rise and fall as tides. Energy generated from the movement of tides is called *tidal energy.* Humans tap tidal energy by building power plants, as shown in **Figure 3.** Tidal energy is a clean, inexpensive, and renewable resource. Unfortunately, tidal energy is practical only in areas that have a coastline with shallow, narrow channels and a large tidal range.

Figure 3 Using Tides to Generate Energy



1 As the tide rises, water enters a bay behind a dam. The gate closes when high tide reaches its peak.

2 The gate remains closed as the tide falls.

3 At low t and wat the dam the turb electricit

La Rance is a tidal energy power plant along the coast of France. It is the largest tidal energy power plant in the world. It can generate 240 megawatts of power, and it supplies energy to over 200,000 homes!

Standards Check How can tides be used to generate energy?

Oil and Natural Gas Resources

The most valuable resources in the ocean are oil and natural gas. Oil and natural gas form from the buried remains of living things. The remains take millions of years to

change into oil and natural gas. For this reason, oil and natural gas are nonrenewable resources.

Offshore oil and natural gas deposits are found between layers of impermeable rock along continental margins around the world. Engineers must drill a well through the rock to reach these resources. About one-fourth of the world's oil is now obtained from offshore wells. The offshore well shown in **Figure 4** is located off the coast of California.

Figure 4 This offshore drilling rig is located near the Channel Islands Park near Santa Barbara.

After oil is obtained from the wells, manufacturers refine the oil to make gasoline. Gasoline is used to power vehicles and generators that make electricity. Oil is also used to make plastic and other synthetic materials.

Sea-Floor Minerals

Many different kinds of minerals can be found on the ocean floor. The minerals are commonly in the form of nodules. *Nodules* are potato-shaped lumps of minerals that crystallize from ocean water. These nodules are made mostly of manganese. Manganese can be used to make certain kinds of steel. Nodules also contain iron, copper, nickel, and cobalt. Other nodules are made of phosphates. Phosphates are commonly used to make fertilizer.

Nodules form from dissolved substances in sea water that stick to solid objects, such as pebbles. As more substances stick to a pebble, a nodule begins to grow. Manganese nodules, shown in **Figure 5,** can be as small as a marble or as large as a soccer ball. However, these nodules are located in the deep parts of the ocean and are costly and difficult to mine.

Figure 5 Manganese nodules are difficult to mine because they are located on the ocean floor in the deep part of the ocean.

Standards Check List five minerals that can be found on the sea floor.

Section Summary

- Humans depend on the ocean for living and nonliving resources.
- Fish and other marine life are caught in the ocean and are being raised in fish farms to help feed growing human populations.
- Nonliving ocean resources include oil and natural gas, fresh water, minerals, and tidal energy.

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