

The Aral Sea: Central Asia's Shrinking Water Source

26.1 Introduction

In 1960, Moynaq was a fishing town in the Soviet Union. It was nearly surrounded by the Aral Sea, a large lake in the Soviet republics of Uzbekistan and Kazakhstan. Visitors to Moynaq in 1960 saw fishing boats bobbing at its docks. At that time, Moynaq had a population of about 40,000 people. Its people farmed, fished, or worked in fish canneries.

All of that has changed. If you visited Moynaq today, you would find it surrounded by dust. Although a 20-foot welcome sign shows a fish and a seagull, you wouldn't see the Aral Sea anywhere. The shoreline of this **inland sea** has withdrawn, and not just a little bit. Now the water's edge is nearly 90 miles from Moynaq.

Moynaq and the surrounding area suffer from **water stress**. Water stress occurs when an area needs more water than it has. As the Aral Sea has shrunk, water stress has increased in this **region**. The area also suffers from **environmental degradation**. To *degrade* something means to damage it or wear it down. In the Aral Sea region, the environment has been degraded by misuse of what little water there is.

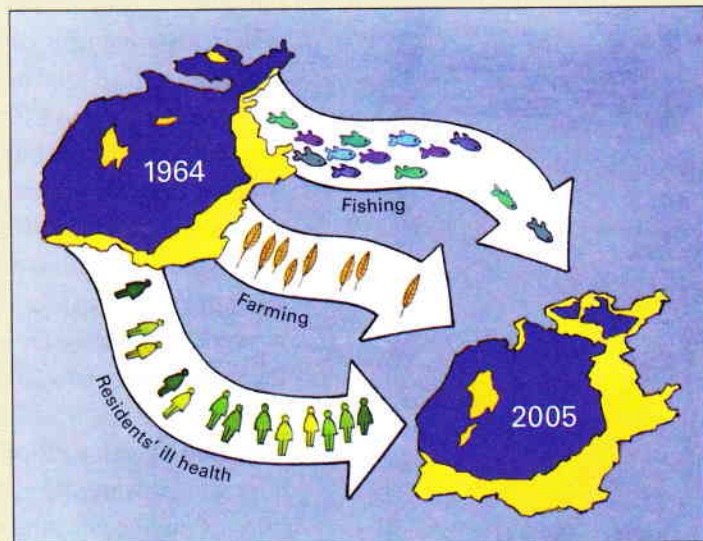
In this chapter, you will find out what caused the shrinking of the Aral Sea. You will learn about environmental degradation in the surrounding region. And you will see how damage to the environment has affected farming, fishing, and quality of life in this region.

Essential Question

How are humans affected by changes they make to their physical environment?

This illustration shows the Aral Sea at two different times. Note how much smaller it is in 2005 than in 1964. The arrows represent three aspects of life that have been affected by the shrinking of the sea. Keep this illustration in mind as you try to answer the Essential Question.

Graphic Organizer



The Aral Sea Region



A Central Asian Sea

The Aral Sea lies in two countries, Uzbekistan and Kazakhstan. The Amu and Syr rivers feed this inland sea. It was once a large, freshwater lake. Today it is a shrunken, salty sea.

26.2 The Geographic Setting

The Aral Sea is located in Central Asia. It lies in two countries: Uzbekistan and Kazakhstan. Before 1991, these two countries were part of the Soviet Union. Until the 1960s, when irrigation projects began, two rivers fed the Aral Sea: the Syr Darya from the northeast and the Amu Darya from the south. (*Darya* means “river.”)

From Freshwater Lake to Inland Sea The Aral Sea was first called a sea only because of its great size, not because it was salty. It was really a large lake containing fresh water.

Until the 1960s, the water in the Aral Sea was **potable**, which means that it was drinkable. Potable water can also be used to water crops. But even **freshwater** lakes and rivers have a little salt in them. This salt is washed out of the soil by the water. If the amount of salt in water is very low, we still call the water fresh. The term *salt water* refers only to water that is too salty to drink.

Although the Aral Sea’s water used to be fresh, now it is **saline**, which means salty. *Salt* and *saline* both come from a Latin word, *sal*, which means salt. Today the Aral Sea is too salty to drink and too salty for watering crops.

Salinization Affects Water and Land **Salinization** refers to water or land becoming salty or saltier. It can affect a body of water, such as the Great Salt Lake in the state of Utah. Salinization can also affect **groundwater**. Groundwater lies deep underground and supplies wells and springs.

To understand salinization, start with rain. Pure rain falls from the sky as fresh water. As this water seeps into the ground or runs off into streams, it picks up some salt from the soil. Most of that salt is carried by rivers to the ocean. This is why oceans are saline.

However, not all rivers flow directly into the ocean. Some end in lakes and inland seas. If water flows both into and out of a lake, the water that flows out carries some of this salt to the ocean. If no water flows out of a lake, the salt has nowhere to go. When water evaporates from a lake, the salt is left behind. The lake grows more and more saline over time, until it becomes an inland sea.

Salinization of land happens in a different way. When farmers irrigate, they bring water from lakes and rivers to their fields. Often this fresh water contains a little salt. When the water evaporates, it leaves the salt behind on the surface of the soil. There might not be enough salt to damage plants, at least at first. But if people don’t wash the salt away, the soil becomes saltier as the years pass. Very few plants can grow in salty soil.

Both the water and the land in the Aral Sea region have been degraded by salinization. The Aral Sea used to be the Earth’s fourth-largest freshwater lake. Now it is less than half that size, and it is as salty as any ocean. And much of the land around the sea is too salty to grow crops.

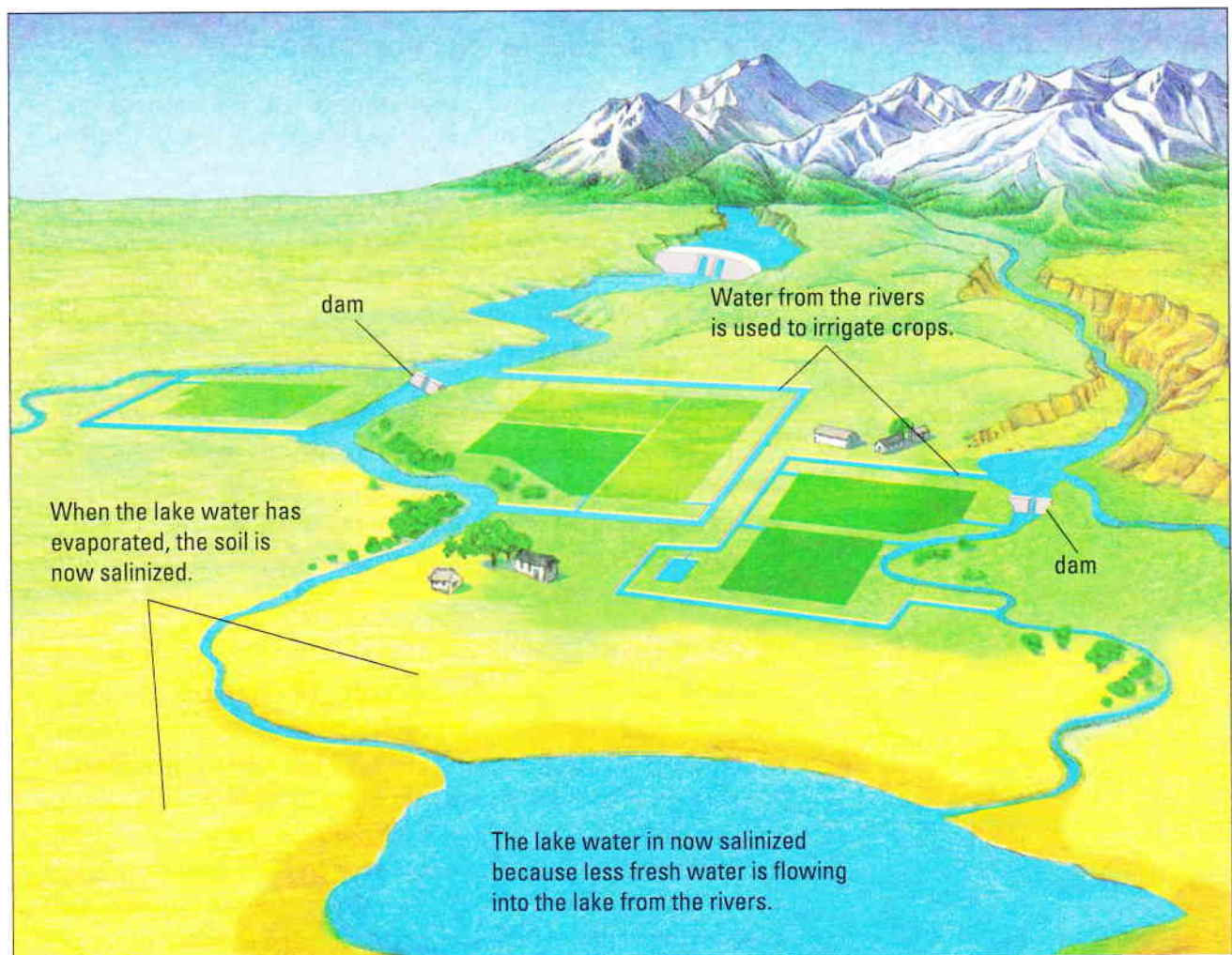
► Geoterms

environmental degradation damage to or destruction of the natural environment. When such damage occurs, habitats are destroyed, biodiversity is lost, or natural resources are used up.

groundwater water lying deep under the ground that supplies wells and springs. Over half the people in the world depend on groundwater for their drinking water.

salinization the buildup of salt in soil or water

water stress the condition that occurs when people don't have enough clean fresh water to meet their everyday needs



Salinization of Inland Seas

A lake with no outlet to the ocean is likely to grow saltier over time. When water evaporates from a lake, any salt that was dissolved in that water is left behind. Over time, salt builds up in the lake. This process happens faster when water from the rivers that feed into a lake is used for irrigation. With less water coming in, the lake shrinks. At the same time, the concentration of salt in the lake water increases.



The Power of Cotton

Growing cotton in the desert meant more money for the people who lived there. The “white gold” crop became a central focus of life in desert communities. The city of Tashkent, Uzbekistan’s capital, called its soccer team the Cotton Pickers.

26.3 The Shrinking Sea and Farming

Cotton is sometimes called “white gold.” It’s a **cash crop** that earns farmers a good income. But cotton needs a long, warm growing season and lots of water to thrive.

For the government of the former Soviet Union, finding a place to grow cotton posed a problem. Some areas had enough rain but were too cold. Others were warm enough but too dry. The solution was to plant cotton in a **desert** region of Central Asia. The cotton would be irrigated with water diverted, or taken, from two rivers.

From Desert to Cotton Kingdom The Soviet government provided water to cotton farms by building dams on the Amu and Syr rivers. The water stored behind the dams was used to irrigate large areas. Large amounts of chemical fertilizers and **pesticides** were used to increase production in this new cotton kingdom. At first, irrigating a desert to grow cotton seemed to work well. The new crop provided jobs for local people.

Salinization Creates a New Desert An unplanned effect of the damming of the rivers was the degradation of the Aral Sea. About 90 percent of the rivers’ water was stored behind the dams. Only 10 percent reached the sea. As water evaporated from the Aral, the sea began to shrink. Large areas of dry seabed became a salty wasteland.

The shrinking of the sea changed the region’s **climate**. When the sea was full, the Aral cooled the surrounding land in summer and warmed it in winter. As the sea shrank, summers became hotter and winters colder. The growing season decreased from the 200 days a year needed for cotton crops to only 170 days. As the climate cooled, some farmers turned from cotton to rice because rice has a shorter growing season. But like cotton, rice needs a lot of water.

The use of river water for irrigation also degraded the land. Year by year, salt carried by the rivers has built up on farm fields. Some areas have become too salty to grow crops. Many farmers were left with nothing but salty desert.

26.4 The Shrinking Sea and Fishing

A shocked visitor to Moynaq in 2001 described a spooky sight. Rusting hulks of fishing boats lay scattered across a desert. The abandoned boats were surrounded by junk. Fiberglass, metal, rusty springs, and cigarette butts littered the ground. A boat's propeller lay half-buried in the sand. The sight was so strange that the visitor almost expected to find that space aliens had left the boats there! Instead, the boats are reminders of a time when the Aral Sea was home to many fisheries. A **fishery** is a place where fish are caught, processed, and sold.

A Sea Once Rich in Fish Until about 1980, many of these boats had docked at Moynaq. Before it began to shrink, the Aral Sea was rich in fish. About 95 million pounds of fish were harvested from the lake each year. Fish canneries in Moynaq produced 20 million cans of seafood a year. This thriving industry supported about 35,000 workers.

The Collapse of the Aral Sea Fishing Industry The shrinking of the Aral Sea destroyed the fishing industry. As the sea began to withdraw, fisheries were left high and dry. Today Moynaq is some 90 miles from the water's edge.

The small amount of water that remains in the sea is very salty. Very few organisms can live in such saline conditions. Most of the 100 species of fish that once lived in the sea are gone. Commercial fishing ended in 1982. As a result, fishing crews and cannery workers lost their jobs.

Most of these workers have not been able to find other jobs nearby. The highest level of joblessness in Kazakhstan is in the Aral Sea region. Thousands of people have left to seek work elsewhere. Often men **migrate** alone. They leave their families behind in dying towns. The women and children survive on whatever money the men send home. Of the 40,000 people who once lived in Moynaq, only about 3,000 remain.



The Aral Sea's Dying Industry

Fresh water used to cover the seabed in this photograph. As the sea has shrunk, the fish that once lived here have disappeared. Thousands of people who once worked in fisheries around the sea have lost their jobs as result. Many have left the region to look for work.



Searching for Fresh Water

Today the Aral Sea is too salty to drink. People in the region have turned to other water sources, such as rivers and groundwater. This woman relies on groundwater from her well. Unfortunately, that water may be polluted and unsafe to drink.

26.5 The Shrinking Sea and Quality of Life

Strong winds pick up sand that used to be at the bottom of the Aral Sea. People call these dust storms “black blizzards.” They are a sign of the declining quality of life in the Aral Sea region.

From Plentiful Fresh Water to Water Stress Before the 1960s, the Aral Sea provided water for nearby towns. There was enough water for household use and to irrigate crops on small farms.

Today the Aral Sea region faces severe water stress. Because the water in the Aral Sea is too salty to drink, people have turned to rivers and groundwater to meet their water needs. But much of that water is unfit to drink, too. It has been polluted by salt, **sewage**, and **toxic chemicals** used on farms.

Pollution Damages the Health of Residents Many people living around the Aral Sea have become ill from drinking polluted water. Stomach problems and liver disease are common.

Air pollution poses another threat to health. The region’s “black blizzards” carry toxic chemicals along with dust. People who breathe in these chemicals develop many health problems. These problems range from throat cancer to deadly lung diseases like tuberculosis.

Widespread poverty only makes these health problems worse. Nearly all pregnant women in the Aral Sea region suffer from anemia. This is a disease caused by poor nutrition. Many babies are born sick. A large number of them die before their first birthday.

An Uncertain Future Many scientific reports and news stories have been written about the Aral Sea region. But this reporting has done little to help the people there. As one Moynaq resident said, “If every scientist and journalist who visited the Aral Sea brought with them a bucket of water, the sea would be filled again.”

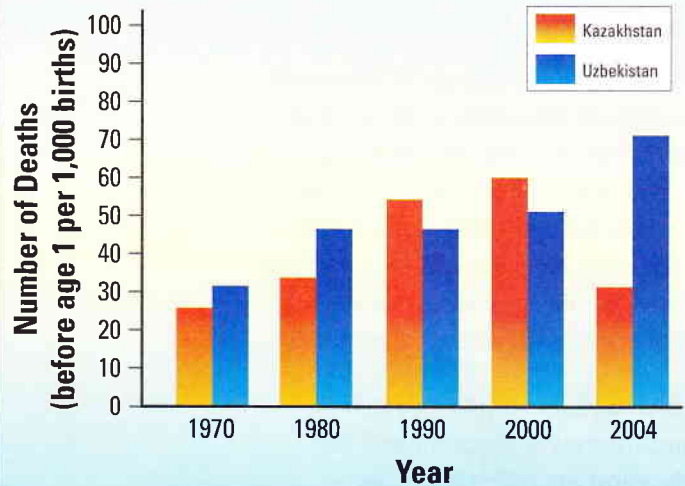
All who study the region agree that repairing the environmental degradation will require costly changes. First, less water should be taken out of the Amu and Syr rivers for irrigation. This will allow more water to flow into the Aral Sea.

Farming practices need to change as well. With less water for irrigation, farmers will have to plant less thirsty crops. They will also need to be more careful using fertilizers and pesticides.

Finally, governments need to improve their water management. They need to build water systems to provide safe drinking water to residents. They also need to build water treatment plants. These plants treat sewage and **wastewater** to reduce water pollution.

These changes will cost many billions of dollars. This is far more than any country in the region can afford. But there is hope. International agencies like the United Nations and the World Bank are working to help the Aral Sea region. Also, this part of Central Asia has large reserves of oil. In the future, the countries around the Aral Sea may be able to use money earned by selling oil to improve the quality of life in this region.

Infant Death Rates



Source: Central Intelligence Agency, "CIA World Factbook," www.cia.gov/cia/publications/factbook/.

A Poor Place to Be Born

Infant mortality in the Aral Sea region rose as environmental degradation increased. New mothers are no longer advised to nurse their babies. Toxic chemicals in the air and water have polluted their milk.

26.6 Beginning to Think Globally

In this chapter, you learned about environmental degradation in the Aral Sea region. You saw how dams on the Amu and Syr rivers reduced water flowing into the Aral Sea. The sea has shrunk as a result. It has also become very salty. Increased irrigation with river water has caused widespread soil salinization. Air and water pollution have increased as well. These changes have created an environmental disaster around the Aral Sea.

The Aral Sea region is not the only part of the world facing water stress. Wherever people live, they need water. Many places, however, don't receive enough rainfall to meet people's water needs. In such places, people turn to other water sources such as rivers or groundwater. Egypt, for example, is a desert country. For thousands of years, Egyptians have depended on the Nile River to meet all of their water needs. Without the Nile, life would be impossible in Egypt.

Water stress results when a region's need for water becomes greater than its supply. Think about this as you look at irrigation around the world in the next section.

Women Sick with Tuberculosis

These women in Uzbekistan are suffering from a lung disease known as tuberculosis, or TB. TB used to be one of the most common causes of death in the world. Today it is found mainly in developing countries. TB usually strikes people whose health has been weakened by bad water, dirty air, or poor nutrition.



26.7 Global Connections

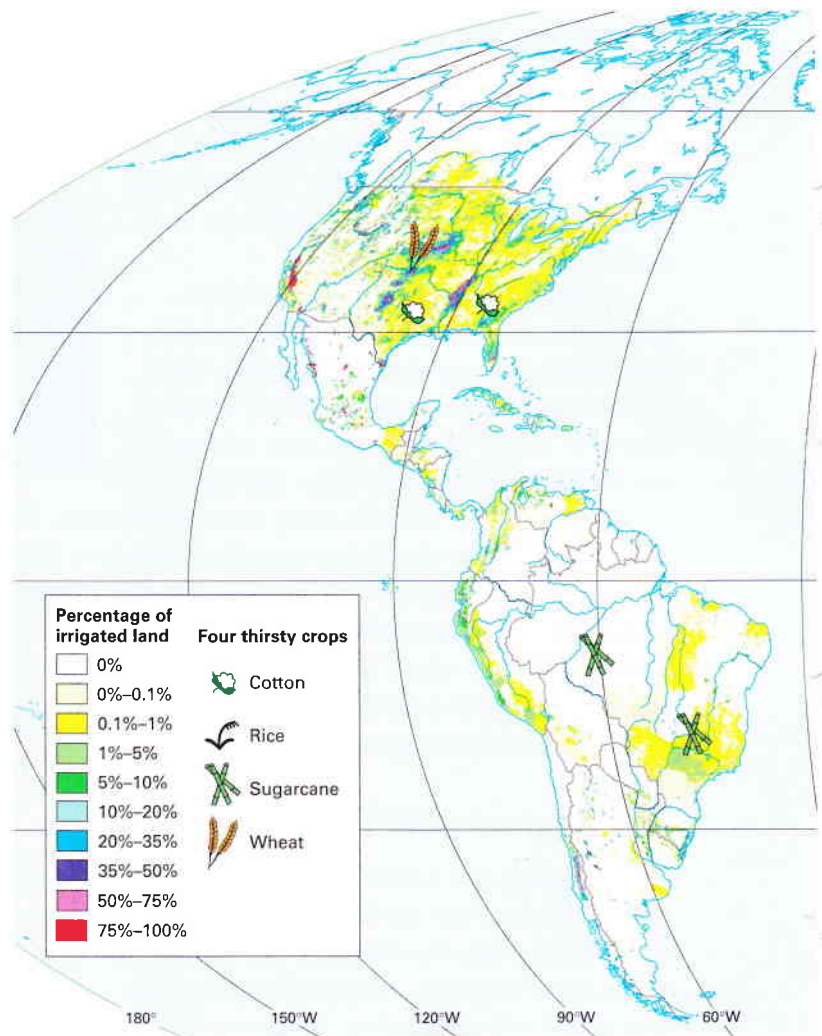
This map shows regions of the world that rely on irrigation to grow crops. The colors indicate the percentage of land in each area that is irrigated. Symbols for four crops that are heavy water users are shown in the countries where the majority of the total world production of each crop is grown.

What factors might affect how much water a region uses for irrigating crops? One factor is **population density**. The more people in a region, the more food local farmers must grow to feed those people. Another factor is climate. Areas with a lot of year-round rainfall need little irrigation. Those with little rain depend on irrigation. A third factor is the type of crop being grown. Some crops are thirstier than others.

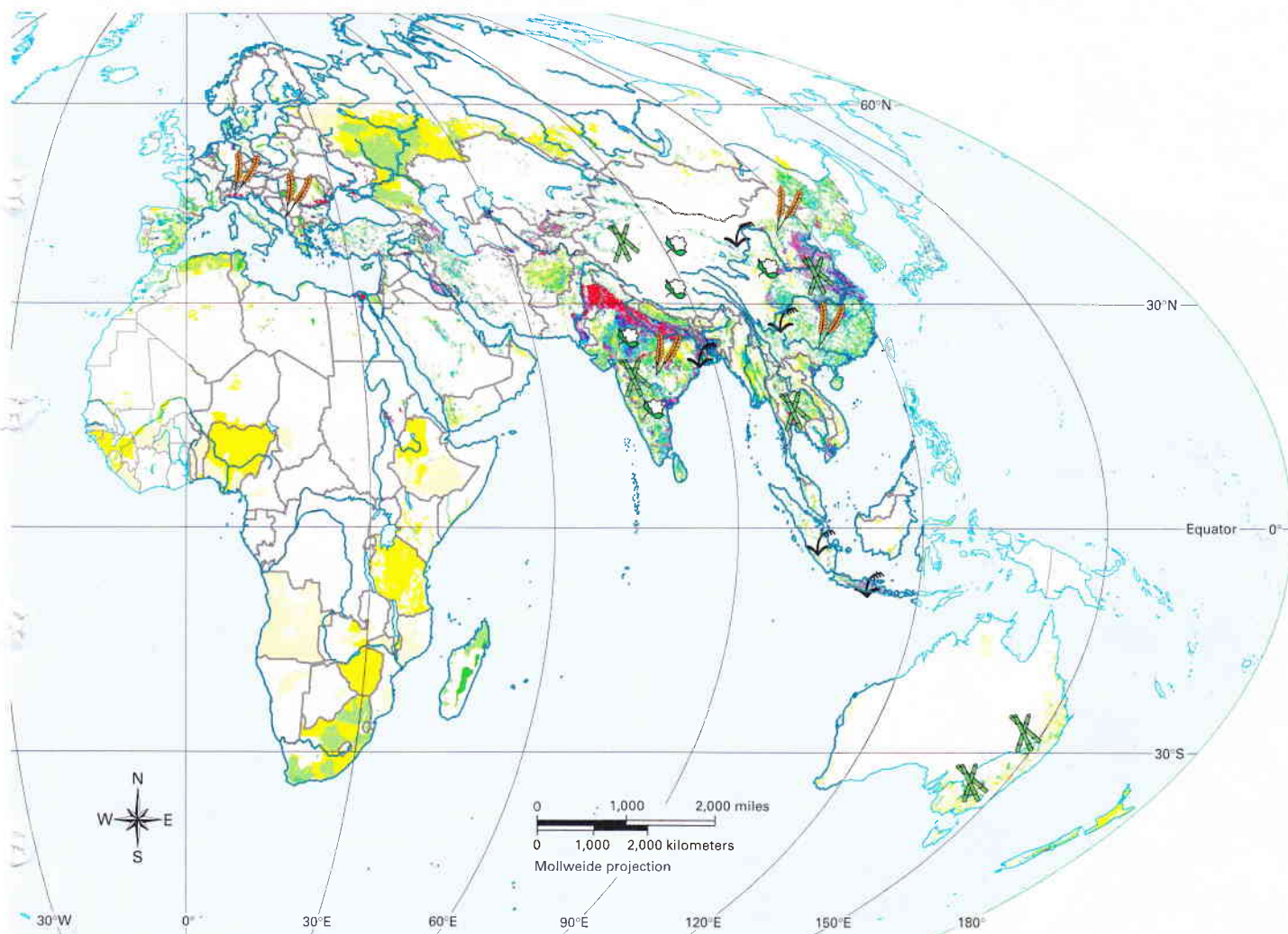
What areas are most likely to experience water stress? Areas with dry climates and high population densities are most likely to face water stress. Most of California, for example, is **arid**. Farmers there rely on irrigation to grow large amounts of cotton, fruits, and vegetables. But the **urban** population of California is growing. As a result, farmers have to compete with cities for limited water supplies.

What choices can people make to reduce water stress? The best way to reduce water stress is to reduce water needs. For farmers in arid regions, this means growing less thirsty crops. Switching from cotton to wheat, for example, can cut water use by more than half. For families, this means using less water for daily living. For example, fixing one dripping faucet can save 3,000 gallons of water per year.

Irrigated Lands Around the World







Irrigation of a rice field



Source: Food and Agriculture Organization of the United Nations, "Aquastat: Land and Water Development Division," www.fao.org.

Four Thirsty Crops

Crop	Symbol	Water Needed to Grow 1 Pound of Crop	Major World Producers
Cotton		840–3,500 gallons	China, United States, India
Rice		360–600 gallons	China, India, Indonesia
Sugarcane		180–360 gallons	India, Brazil, Thailand, Australia, China
Wheat		110 gallons	China, India, United States, Europe

Source: World Wildlife Fund, www.wwf.org.uk.