CHAPTER 23

PHYSICAL GEOGRAPHY OF South Asia

Why It Matters

A study of the physical geography of South Asia will explain the contrasts between the northern and southern areas of the region and how South Asia's large populations depend upon the seasonal monsoon rains that sometimes bring devastating consequences.

BIG Ideas

Section 1: The Land

Places reflect the relationship between humans and the physical environment. In South Asia's varied landscapes, large numbers of people depend on the region's physical environment, river systems, and natural resources for their livelihoods.

Section 2: Climate and Vegetation

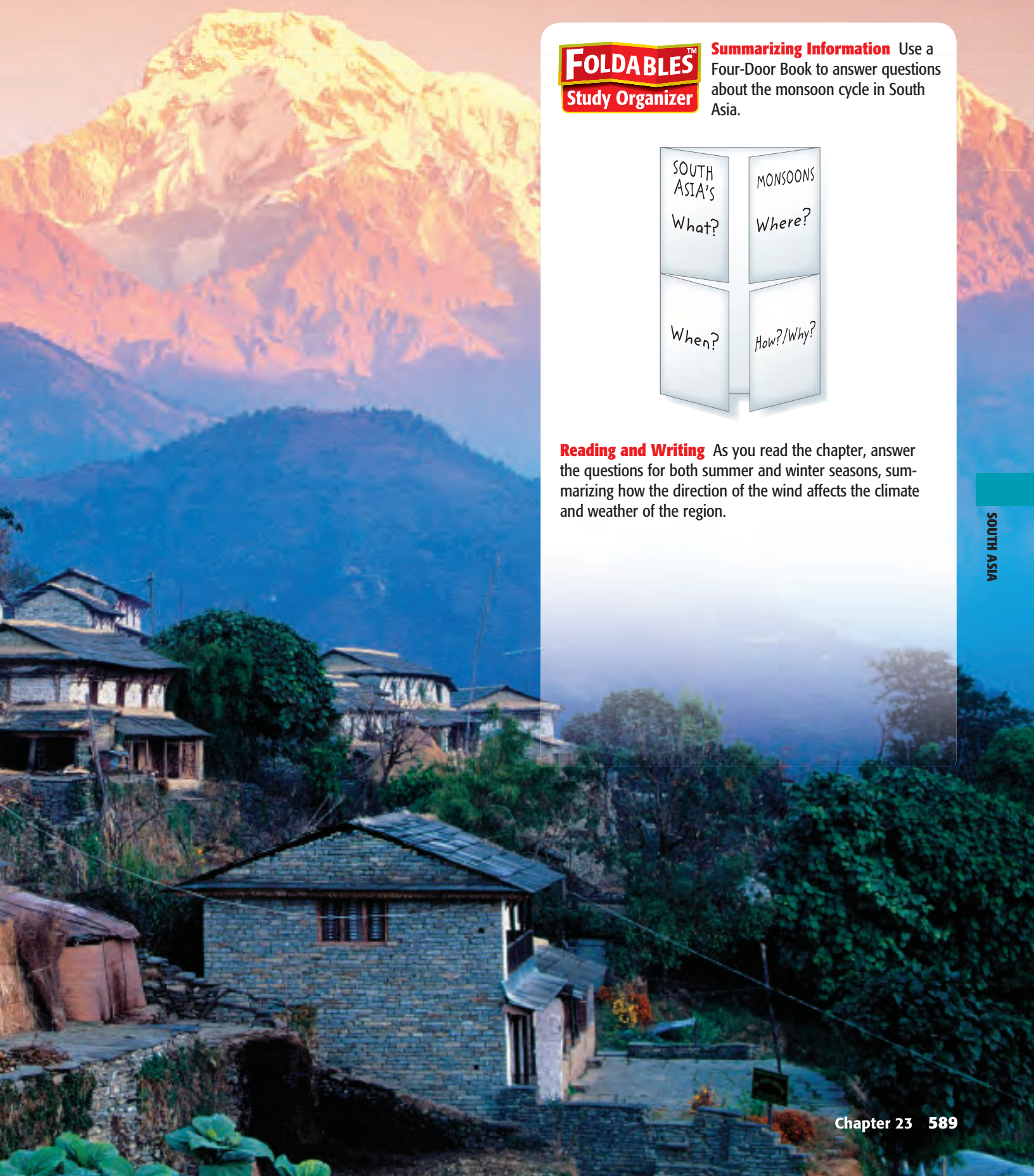
The characteristics and distribution of ecosystems help people understand environmental issues. Seasonal winds in South Asia strongly influence temperature and rainfall, which affect what crops people grow and how people and the environment are affected by too much or too little rain.

Geography ONLINE

Chapter Overview Visit the *Geography and History of the World* Web site at glencoe.com and click on Chapter Overviews–Chapter 23 to preview information about the physical geography of the region.

As part of the Himalaya, the Annapurna range in central Nepal is one of the world's most popular trekking areas.

age fotostock/SuperStock



FOLDABLES™ Study Organizer

Summarizing Information Use a Four-Door Book to answer questions about the monsoon cycle in South Asia.

Reading and Writing As you read the chapter, answer the questions for both summer and winter seasons, summarizing how the direction of the wind affects the climate and weather of the region.

SECTION 1

The Land

Guide to Reading

Section Preview

In South Asia's varied landscapes, large numbers of people depend on the region's physical environment, river systems, and natural resources for their livelihoods.

Content Vocabulary

- subcontinent *(p. 591)*
- alluvial plain *(p. 592)*

Academic Vocabulary

- eroded *(p. 591)*
- challenges *(p. 593)*
- generated *(p. 593)*

Places to Locate

- Himalaya *(p. 591)*
- Khyber Pass *(p. 591)*
- Gangetic Plain *(p. 591)*
- Vindhya Range *(p. 591)*
- Satpura Range *(p. 591)*
- Deccan Plateau *(p. 591)*
- Ganges River *(p. 592)*
- Brahmaputra River *(p. 592)*
- Indus River *(p. 592)*

Reading Strategy

Categorizing As you read about the physical geography of South Asia, complete a graphic organizer similar to the one below by describing the region's three major river systems.

River System	Description
Indus River	
Brahmaputra River	
Ganges River	

INDIANA ACADEMIC STANDARDS
Geography and History of the World

GHW.1.1, GHW.1.2, GHW.8.1, GHW.8.3, GHW.9.1

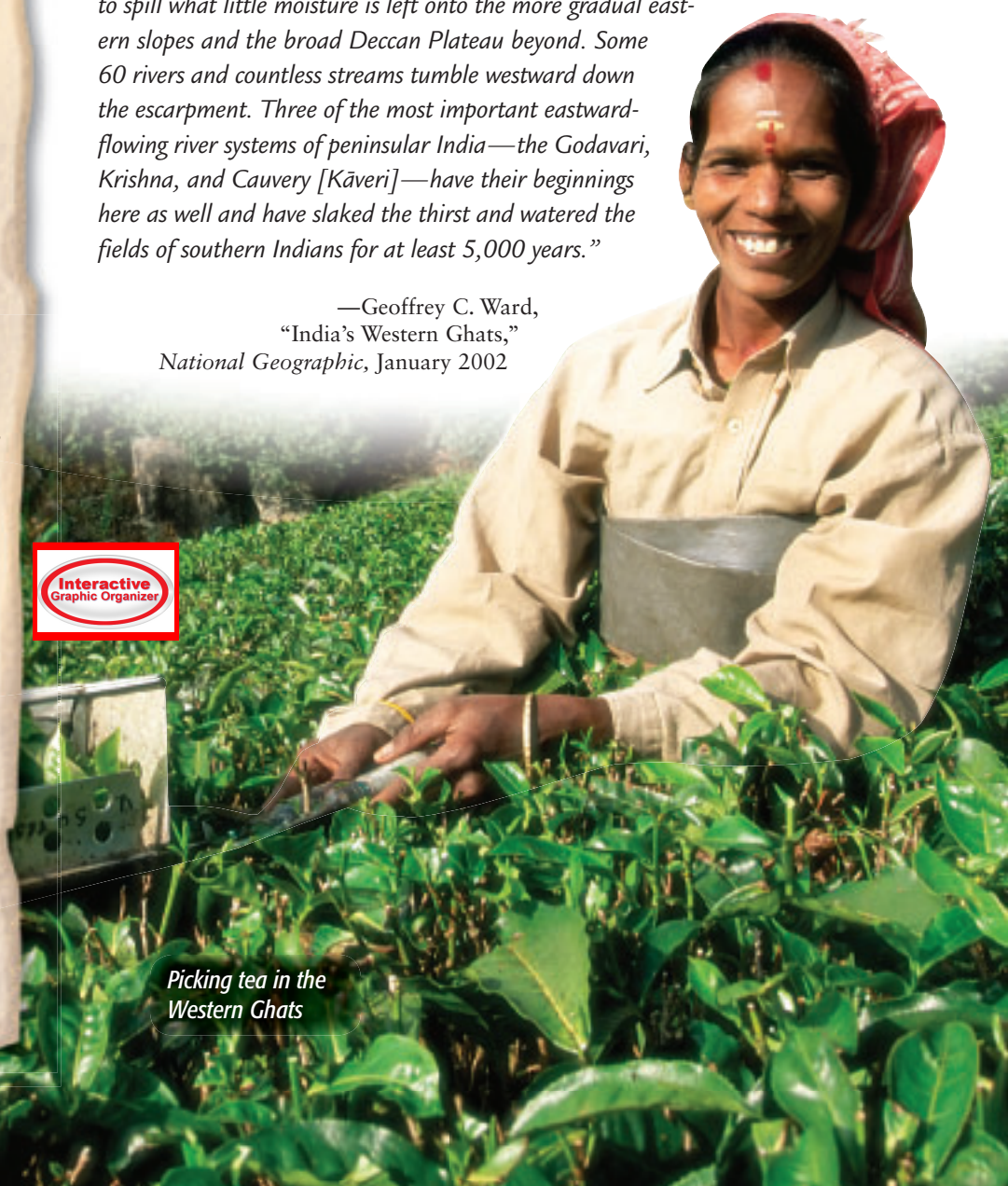
South Asia's southern lands include two chains of low mountain ranges—the Eastern Ghats and the Western Ghats. In ancient Sanskrit, the name for the Hindi word *ghat* means "benevolent mountain." For thousands of years, the Western Ghats have absorbed the monsoon rains and slowly released them, providing water that is essential for life.

NATIONAL GEOGRAPHIC Voices Around the World

"The Ghats serve as the principal watershed for all of peninsular India. Each June black, rain-heavy monsoon clouds sweeping in from the Indian Ocean are intercepted by the western summits and relieved of most of their burden—more than 29 feet of rain falls annually in some sections—before moving on to spill what little moisture is left onto the more gradual eastern slopes and the broad Deccan Plateau beyond. Some 60 rivers and countless streams tumble westward down the escarpment. Three of the most important eastward-flowing river systems of peninsular India—the Godavari, Krishna, and Cauvery [Kāveri]—have their beginnings here as well and have slaked the thirst and watered the fields of southern Indians for at least 5,000 years."

—Geoffrey C. Ward,
"India's Western Ghats,"
National Geographic, January 2002

Interactive Graphic Organizer



Picking tea in the Western Ghats

Gavin Hellier/Robert Harding World Imagery/Getty

Landforms

MAIN Idea South Asia's landforms affect where people live and influence seasonal rain patterns.

GEOGRAPHY AND YOU How do landforms affect human activities where you live? Read to learn about the varied landforms in South Asia and how they affect life in the region.

The seven countries of South Asia—India, Pakistan, Bangladesh, Bhutan, Nepal, Sri Lanka, and Maldives—are separated from the rest of Asia by mountains. As a result, South Asia is called a **subcontinent,** a large, distinct landmass that is joined to a continent.

Northern Landforms

According to the theory of continental drift, about 200 million years ago the Indian subcontinent was part of the same large landmass as Africa. After the subcontinent broke away, it collided with the southern edge of Asia. The force of this collision thrust up new mountain ranges, the **Himalaya.** As the physical map on page 582 of the Regional Atlas shows, these ranges spread about 1,500 miles (2,414 km) across the northern edge of the peninsula and are hundreds of miles wide. Mount Everest, the world's highest peak, rises to 29,028 feet (8,848 m) above sea level in the Himalaya.

The Himalaya meet the Karakoram Mountains in the northernmost part of South Asia. Farther west, the Hindu Kush range completes the chain. Together, they create a high wall of mountains between the subcontinent and the rest of Asia. In the past, invaders from the north could only enter the region through a few narrow crossing places, such as the famous **Khyber Pass** between Pakistan and Afghanistan.

At the foot of the Himalaya ranges, wide fertile plains are watered by the region's great rivers—the Indus, the Ganges (GAN•JEEZ), and the Brahmaputra. One-tenth of the world's people live in this crowded northern area referred to as the **Gangetic Plain** (or Ganges Plain). The Chota Nagpur Plateau, a high tableland of forests, is located in northeastern India.

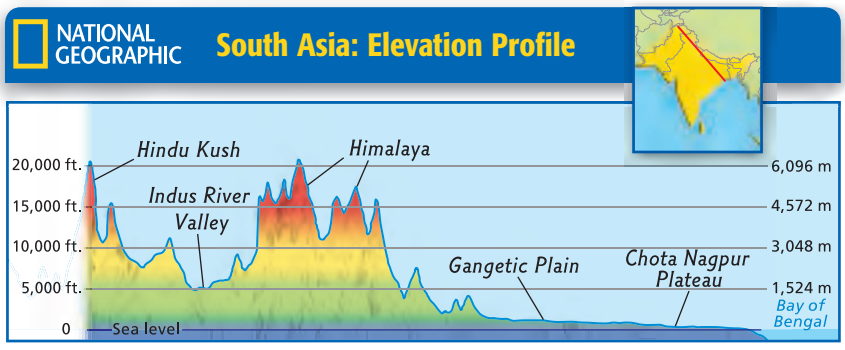
Central and Southern Landforms

The collision between the Indian subcontinent and Asia also pushed up mountain ranges in central India. Not as tall as the Himalaya, the **Vindhya Range** and the **Satpura Range,** with the Narmada River flowing through the valley between the two ranges, divide India into northern and southern regions. This physical division separates the two distinct cultures that have developed in India.

At the base of the subcontinent, two chains of **eroded** mountains—the Eastern Ghats and Western Ghats—form a triangle of rugged hills. Between them lies the **Deccan Plateau.** This plateau was part of the landmass from which the subcontinent broke away. Once covered with lava, the Deccan Plateau today has rich, black soil. The Western Ghats benefit most from the rain-bearing winds. Further inland on the plateau, grassland and scattered trees turn green during the short wet season. The Karnataka Plateau southwest of the Deccan Plateau receives considerable rains, so hills there are lush and green.

Sri Lanka (sree LAHN•kuh) is a teardrop-shaped island that broke away from the original Indian landmass. Maldives (MAWL•DEEVZ), the southernmost country in South Asia, is a chain of tiny coral atolls and volcanic outcroppings. Although Maldives covers 35,200 square miles (91,000 sq. km) of ocean, its land area totals only 116 square miles (300 sq. km).

READING Check **Regions** Why is South Asia called a subcontinent?



MAP STUDY

1. **Location** Where are the highest points in South Asia?
2. **Regions** Compare this profile to the physical map on page 582. How does the information presented on each map differ?

Maps in Motion Use StudentWorks™ Plus or glencoe.com.

SOUTH ASIA

Water Systems

MAIN Idea South Asia's major river systems bring fertile soil to the floodplains, serve as transportation routes, and provide hydroelectricity.

GEOGRAPHY AND YOU What river systems in the United States are important to agriculture? Read to find out how South Asia's rivers are important to life in the region.

From sources high in the Himalaya, three major river systems—the Ganges, the Brahmaputra, and the Indus—fan out across the northern part of the Indian subcontinent. These rivers carry fertile soil from mountain slopes onto their floodplains as the rivers swell with seasonal rains.

Ganges and Brahmaputra Rivers

The **Ganges River** flows east from the Himalaya. It is the most important river in South Asia, drawing waters from a basin covering about 400,000 square miles (about 1 million sq. km). Fed by water from snowcapped peaks, the Ganges retains its flow of water throughout the year, even during the dry season from December to June. During the summer monsoon, heavy rains can cause devastating floods along the Ganges. Named for the Hindu goddess Ganga, the Ganges is revered by Hindus, who consider its waters to be sacred.

Almost all of the Gangetic Plain has been cleared of grasslands and forests to make way for crops, such as rice, sugarcane, and jute. As India's most agriculturally productive area, the Gangetic Plain is the world's longest **alluvial plain,** an area of fertile soil deposited by river floodwaters. The Gangetic Plain is also India's most densely populated area.

The **Brahmaputra River** flows east through the Himalaya, west into India, and then south into Bangladesh. There it joins the Ganges, forming a delta before emptying into the Bay of Bengal. The Brahmaputra is a major inland waterway. Boats can navigate the river from the Bay of Bengal as far inland as Dibrugarh in the Indian state of Assam, about 800 miles (1,290 km) from the sea. The Brahmaputra also provides hydroelectricity.

Indus River

The **Indus River** flows mainly through Pakistan, watering orchards of peaches and apples before emptying into the Arabian Sea. It also serves as a transportation route. Historically, the Indus River valley is known as the cradle of ancient India, which, with Mesopotamia and Egypt, was one of the world's earliest civilizations.

READING Check **Place** Which rivers come together to form a delta before emptying into the Bay of Bengal?

NATIONAL GEOGRAPHIC *Fishing is an important economic activity in the Ganges Delta region.*

Human-Environment Interaction Why is the Ganges River important to agriculture?

Bojan Brecelj/CORBIS

Natural Resources

MAIN Idea South Asia has a variety of natural resources upon which large populations are dependent for their livelihoods.

GEOGRAPHY AND YOU How do water resources benefit people living in the United States? Read to find out why the management of water resources is a challenge in South Asia.

South Asian rivers are important for basic needs as well as for economic needs. They provide drinking water, alluvial soil, transportation, and hydroelectric power to the region's people. They also provide fish for local use and export.

Water resource management **challenges** South Asia because rivers cross national boundaries. Still, countries in the region work together on some projects. India funded the Chhukha hydroelectric project in Bhutan. In return, India receives some of the energy **generated** there.

Such massive projects, however, often have drawbacks as well as benefits. Dam projects in India meet with resistance when they threaten to flood existing settlements. The Tarbela Dam in Pakistan will soon be unusable because it is choked with built-up silt from the Indus River.

South Asia's mineral resources are diverse and widespread. India is a leading exporter of iron ore and mica, a layered rock used in making electrical equipment. Deposits of manganese, chromite, and gypsum await development. Nepal produces mica and some copper. Sri Lanka is one of the world's largest producers of graphite, the material used for the "lead" in pencils. Sri Lanka's other major mineral resources include precious and semiprecious stones.

Petroleum reserves lie along India's northwest coast, near the Ganges Delta, in northern Pakistan, and in the Arabian Sea. Natural gas fields are found in southern Pakistan, in the Ganges Delta, and in Bangladesh. India has a substantial uranium deposit north of the Eastern Ghats.

Timber resources include India's sandalwood, sal, and teak woods. The forests of Nepal and Bhutan contain conifers, including silver fir, and hardwoods such as oak, magnolia, beech, and birch. Severe overcutting threatens Nepal's forests, however, and has resulted in massive soil erosion. In response, the government is implementing conservation and reforestation projects. To protect its remaining rain forests, Sri Lanka has banned timber exports since 1977.

READING Check **Regions** Why is water resource management a challenge in South Asia?

SECTION 1 REVIEW

Vocabulary

1. Explain the significance of: subcontinent, alluvial plain.

Main Ideas

2. How do South Asia's landforms affect where people live? Give two examples.
3. Describe how South Asia's southern landforms influence seasonal rain patterns.
4. What are the three great river systems on which life in South Asia depends? What do these rivers provide?
5. Create a table like the one below to identify South Asia's wide variety of natural resources, their importance to the livelihood of the region's population, and the challenges of protecting these resources.

Interactive Graphic Organizer

Natural Resource	Importance to Livelihood	Challenge to Protect

Critical Thinking

6. Why are population densities so high on the Gangetic Plain?
7. **Comparing and Contrasting** How does the landscape of the Himalaya differ from that of the Deccan Plateau?
8. **Analyzing Visuals** Study the physical map on page 582 of the Regional Atlas. What areas of South Asia would you expect to be most agriculturally productive? Why?

Writing About Geography

9. **Expository Writing** Write an essay explaining why potential conflict over water management exists among the countries of South Asia. Describe where those potential sites of conflict are located.

Geography ONLINE

Study Central™ To review this section, go to glencoe.com and click on Study Central.

STORY OF A Tsunami

Tsunami Glossary	
Richter scale	a way of measuring the magnitude of an earthquake
epicenter	the point directly above an earthquake's focus

Path of Destruction

Disaster The earthquake that caused the 2004 Indian Ocean tsunami was the fourth most powerful earthquake recorded since 1900. The ensuing waves caused by the earthquake resulted in nearly 200,000 deaths, some as far away as Africa. Entire villages were swept away when the tsunami waves crashed on the shorelines of over a dozen different countries. The economic impact of the catastrophe is still being felt.

The Indian Ocean tsunami hits Thailand.

The Environmental Impact The 2004 Indian Ocean tsunami destroyed numerous coral reefs, mangrove forests, and coastal wetlands and contaminated many wells used for drinking water. Large salt deposits, left behind by the tsunami's receding ocean water, ruined much of the farmland in the affected area.

An Indonesian man surrounded by the rubble that was his home.

Nature's Fury

On the morning of December 26, 2004, an earthquake measuring over 9.0 on the Richter scale caused the worst tsunami in recent history. With its epicenter located just west of Sumatra, the earthquake caused a massive displacement of ocean water, resulting in nearly 100-foot (30-m) waves that crashed over the nearby islands. The lack of a tsunami warning system left the people of the region unprepared for the death and destruction they faced.

2004 Indian Ocean Tsunami: Human Toll

Country	Fatalities	Missing	Total
Indonesia	130,736	37,000	167,736
Sri Lanka	35,322	–	35,322
India	12,405	5,640	18,045
Thailand	8,212	–	8,212
Maldives	82	26	108
Somalia	78	211	289
Malaysia	69	6	75
Myanmar (Burma)	61	–	61
Tanzania	13	–	13
Bangladesh	2	–	2
Seychelles	2	–	2
Kenya	1	–	1
Total	**186,983**	**42,883**	**229,866**

Source: UN Office of the Special Envoy for Tsunami Recovery.

An Indonesian woman receives medical treatment in a Korean-run clinic.

The World Responds In the days following the 2004 Indian Ocean tsunami, the global community came together to provide aid to the affected countries. As of 2005, nearly $13 billion had been pledged to help the recovery effort.

THINKING GEOGRAPHICALLY

1. **Environment and Society** What advantages might a tsunami warning system have provided people who lived in the affected area?
2. **Places and Regions** Research the 2004 Indian Ocean tsunami. Use the knowledge you gain to create a map of the area. On your map, show the epicenter of the earthquake and where the waves hit the shore.

SECTION 2

Climate and Vegetation

Guide to Reading

Section Preview

Seasonal winds in South Asia strongly influence temperature and rainfall, which affect what crops people grow and how people and the environment are affected by too much or too little rain.

Content Vocabulary

- monsoon *(p. 599)*
- cyclone *(p. 599)*
- tsunami *(p. 600)*

Academic Vocabulary

- period *(p. 598)*
- triggers *(p. 599)*

Places to Locate

- Bay of Bengal *(p. 597)*
- Sundarbans *(p. 597)*
- Thar Desert *(p. 598)*

Reading Strategy

Categorizing As you read about the climate of South Asia, complete a web diagram like the one below by identifying the three seasons that occur in the region.

INDIANA ACADEMIC STANDARDS
Geography and History of the World

GHW.1.1, GHW.9.1

Living at elevations above 11,000 feet (3,353 m), Sherpas of northeastern Nepal experience the rains of the monsoon season as well as the harsh snows of winter. A *National Geographic* journalist describes below a breathtaking view of life in a high-elevation landscape in Nepal.

NATIONAL GEOGRAPHIC Voices Around the World

". . . I trekked through a forest of birch and rhododendron at 11,400 feet to the quiet village of Thamo, a collection of four dozen rectangular homes perched like colorful Lego blocks on a steep slope about a 90-minute walk from Namche. It's hard to imagine a more dramatic place to live. Just to the east looms the majestic white pyramid of 18,901-foot Khumbila, to my eyes, the most beautiful peak in the whole Everest region—and one most sacred to Sherpas. Across a gorge to the west, a half dozen hundred-foot-high waterfalls crash down the cliff face to the rumbling Bhote Kosi river. On a chilly, misty day in mid-September, nearly all the residents of Thamo are out in their fields harvesting the potato crop, pulling a year's sustenance from the soil."

—T. R. Reid, "The Sherpas," *National Geographic*, May 2003

Interactive Graphic Organizer

Nepali children in the Everest region

Grant Dixon/Lonely Planet images

Climate Regions

MAIN Idea Much of South Asia has tropical climates with ample rainfall and a variety of vegetation; however, the climates vary widely in the north and west, where mountain ranges block rainfall.

GEOGRAPHY AND YOU How does climate affect rainfall in the region where you live? Read to learn about climate and rainfall in South Asia.

Much of South Asia lies south of the Tropic of Cancer and has tropical climates with diverse vegetation. In the north and west, however, the climate varies widely, from the highlands of the Himalaya to the deserts near the Indus River. When the rain-bearing winds sweep in, the region's hot climates come alive.

Tropical Regions

Tropical wet climates, with a variety of vegetation, are located along the western coast of India, near the Ganges Delta in Bangladesh, and in southern Sri Lanka. In the path of seasonal rains from the southwest, South Asia's rain forests absorb great amounts of moisture. Rain forests in western Sri Lanka, in southwest India, and in areas north of the **Bay of Bengal** have ebony trees, lush vines, and orchids. Tropical coniferous and deciduous trees surround the rain forests near the Western Ghats. In hot, damp Bangladesh, tropical forests of bamboo, mango, and palm trees thrive. The **Sundarbans,** a swampy area in southwestern Bangladesh and the northeastern coast of India, has the world's largest protected mangrove forest. However, it is threatened due to rising sea levels and the flooding of salt water from the Bay of Bengal.

A tropical dry climate surrounds the central Indian steppe and is also located in eastern Sri Lanka. The grasslands and tropical-moist deciduous forests of the savanna experience wet and dry seasons. In Sri Lanka dry evergreen forests and moist deciduous forests give way to drier grasslands at higher elevations.

Midlatitude and Highland Regions

The Himalaya block the cold winds blowing south from Central Asia. As a result, a band of humid subtropical climate extends across Nepal, Bhutan, Bangladesh, and the northeastern part of India. Areas of temperate mixed forests stretch across the borders of these countries in this part of the region.

The coldest climate region of South Asia lies along its northern edge. In the Himalayan highlands and on the Karakoram peaks, snow is present year-round. At the highest elevations, little vegetation can survive. At lower elevations, however, the climate turns milder and more temperate. In the upper area of this more temperate zone, coniferous and hardwood trees flourish. Grasslands and stands of bamboo cover the lower Himalayan foothills.

1. **Regions** What effect does the location of the Himalaya have on the vegetation of the surrounding region?
2. **Human-Environment Interaction** What is the dominant vegetation in South Asia? Compare this map to the economic activity map on page 630. What type of land use is most common in the region?

Maps in MOtion Use **StudentWorks™ Plus** or glencoe.com.

Dry Regions

Along the lower Indus River in the northwestern part of South Asia, a desert climate keeps the land arid and windswept. The **Thar Desert** lies to the east of the Indus River. The vegetation here is desert scrub, low, thorny trees, and grasses. Livestock graze in some areas, and irrigation makes it possible to grow wheat near the Indus River. Much of this area, however, remains sandy with little vegetation.

Surrounding this desert, except on the coast, is a steppe climate. Few trees grow in this semiarid grassland. In northwestern India, rainfall averages less than 20 inches (51 cm) per year. Another steppe area runs through the center of the Deccan Plateau between the Eastern and Western Ghats in southern India. This area receives less rainfall than the coasts. As the summer monsoons approach the west coast of India, they rise up the Western Ghats and the air cools, releasing moisture as rainfall. However, as the winds make their way over the mountains, they lose most of their moisture. This reduced rainfall—a result of the rain shadow effect—makes the area relatively dry. Scrub and deciduous forests cover vast stretches of India's interior.

READING Check **Regions** How is vegetation related to climate in the northern part of South Asia?

Seasonal Weather Patterns

MAIN Idea Seasonal weather patterns bring much-needed rainfall to South Asia, but monsoon winds, as well as other natural disasters, can also bring devastating hardships.

GEOGRAPHY AND YOU In what locations in the United States have hurricanes recently caused severe damage? Read to learn about the effects of monsoon rains and other natural disasters that frequently occur in South Asia.

Both the high temperatures of the hot season and the heavy rains of the wet season deliver mixed blessings to South Asia, a region prone to natural disasters.

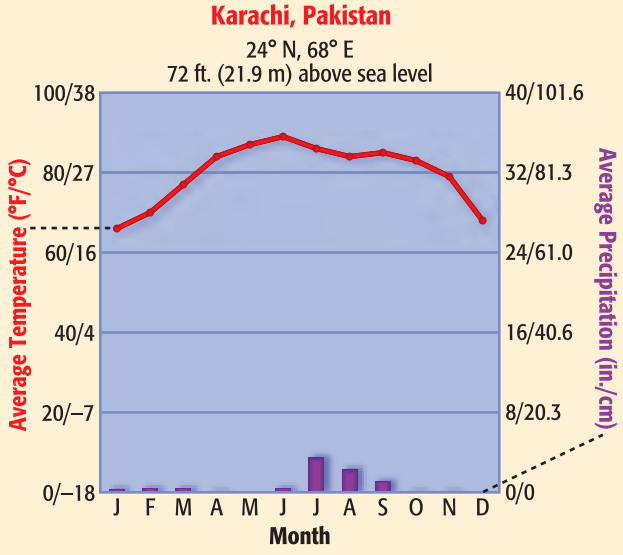
Monsoon Rains

Much of South Asia experiences three distinct seasons—hot (from late February to June), wet (from June or July until September), and cool (from October to late February). These **periods**

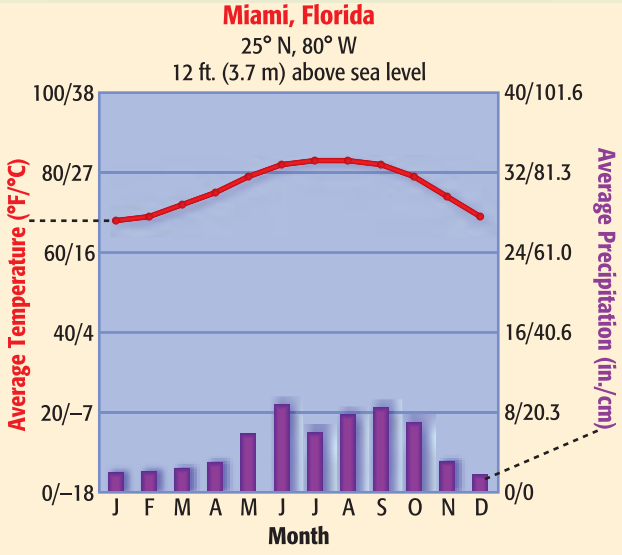
GRAPH STUDY

1. **Regions** During which months do Karachi and Miami receive approximately the same amount of rainfall?
2. **Place** According to the charts, which months make up Karachi's rainy season?

NATIONAL GEOGRAPHIC **Comparing Climates**



Source: www.weatherbase.com



Source: www.weatherbase.com

depend on seasonal winds called **monsoons.** In the hot season, air across South Asia is heated and becomes unstable. It rises and **triggers** a change in wind direction. The winds carry moist ocean air from the south and southwest, bringing monsoon rains. The winds carrying moisture-laden air from the Indian Ocean cause heavy rainfall and flooding across the subcontinent. During the cool winter season, this pattern is reversed as air in the Asian interior cools and becomes more stable and blows south across the subcontinent toward the ocean. The air is dry and cool compared to the wet season.

Rains from the monsoons are heaviest in eastern South Asia. When the rains sweep over the Ganges-Brahmaputra delta, the Himalaya block them from moving north. As a result, the rains move west to the Gangetic Plain, bringing rainfall needed for crops. People celebrate the arrival of the monsoon rains because without them, the farmers will not produce as much food. India's 700 million farmers depend on the monsoon rains.

Natural Disasters

Temperature and rainfall impact agriculture in the region. High temperatures and water allow farmers to produce crops, including the rice that many people living in Bangladesh and India depend on year-round. The extreme heat, however, can result in evaporation, and without rainfall there is drought.

The monsoon winds also have benefits and drawbacks. Rainfall waters crops, but areas outside the path of the monsoon, such as western Pakistan, may receive little or no rainfall during the year. When the people of Bangladesh are planting rice, and those on the Gangetic Plain are planting winter crops, other areas may suffer from drought. Too much rain can also be a problem. In the low-lying lands of Bangladesh, monsoons may cause flooding that kills people and livestock, leaves thousands homeless, and ruins crops.

Cyclones, the same as hurricanes in the Atlantic Ocean, are a natural hazard in South Asia. They have high winds and heavy rains. A 1999 cyclone struck Orissa, India, with winds of more than 160 miles per hour (257 km per hour) and waves over 20 feet (6 m) high. The storm killed nearly 10,000 people and caused more than $20 million in damages.

NATIONAL GEOGRAPHIC

The same land in South Asia often looks quite different during the wet and dry seasons.

Regions From what direction do the winter monsoon winds come? What kind of weather do they bring?

Tectonic activity in the Himalaya and beneath the Indian Ocean affects countries such as India, Bangladesh, and Sri Lanka. Earthquakes and **tsunamis,** huge waves caused by underwater earthquakes, are also natural hazards. In October 2005, an earthquake of magnitude 7.6 devastated northern Pakistan and Kashmir. The earthquake killed more than 70,000 people within minutes and left millions of other people without food and shelter. In December 2004, a tsunami in the Indian Ocean struck parts of South Asia and Southeast Asia. In Sri Lanka, more than 30,000 people were killed and many fishing villages were destroyed.

READING **Check** **Location** In what part of South Asia are monsoon rains heaviest?

Geography ONLINE

Student Web Activity Visit glencoe.com, select the *Geography and History of the World* Web site, and click on Student Web Activities–Chapter 23 for an activity on the formation of the Himalaya and attempts to reach the summit of Mount Everest.

NATIONAL GEOGRAPHIC

Severe cyclones are common in coastal Bangladesh, causing loss of life, injury, and property damage.

Human-Environment Interaction What other weather events affect the countries of South Asia?

Interactive Graphic Organizer

SECTION 2 REVIEW

Vocabulary

1. Explain the significance of: monsoon, cyclone, tsunami.

Main Ideas

2. Describe the seasonal weather patterns that bring much-needed rain to South Asia.
3. How can monsoon winds and other natural disasters bring devastating hardships to South Asia?
4. Although much of South Asia has tropical climates, the region does have a variety of other types of climates and vegetation. On a chart like the one below, list and describe South Asia's climate regions and their corresponding natural vegetation.

Climate Region	Climate Conditions	Natural Vegetation
Tropical		

Critical Thinking

5. BIG Idea What impact do the summer monsoon winds have on the environment and people of South Asia?
6. **Analyzing Information** When do the three seasons occur in much of South Asia, and how would you describe each?
7. **Summarizing Information** How might climate affect patterns of population density in the northern part of India?
8. **Analyzing Visuals** Compare the climate map on page 587 of the Regional Atlas and the vegetation map on page 597. In what parts of the region are climates and vegetation most varied?

Writing About Geography

9. **Descriptive Writing** Think about the climate and vegetation of a country in South Asia you would like to visit. Write a paragraph describing the natural features of the country.

Geography ONLINE

Study Central™ To review this section, go to glencoe.com and click on Study Central.

PAKISTANI EARTHQUAKES: What challenges does Pakistan face in improving the response to earthquakes in the region?

Pakistan lies in the middle of three tectonic plates—the Arabian, Eurasian, and Indian. The collisions of these plates helped form the mountain ranges found throughout Pakistan. The collisions also cause earthquakes. In 2005 an earthquake occurred in the Pakistani region of Kashmir. The result was catastrophic. Over 73,000 people were killed, 128,000 injured, and three million displaced, mostly in the remote Pakistani northwest. A combination of physical and human challenges led to this massive loss of life.

What challenges does Pakistan face when dealing with earthquakes?

The Pakistani northwest, a region where earthquakes are frequent and severe, is geographically isolated. The mountainous terrain causes several problems when a severe earthquake strikes. Earthquakes may cause devastating mudslides, which increase the loss of life by blocking usual routes to safety. The quakes destroy roads, making vehicle access to mountain villages impossible and hindering rescue efforts. The region's weather may also impede rescue efforts. During winter, heavy snows can block access to routes needed for transporting aid and supplies to mountainous regions.

Homes lie ruined in a village in Pakistan that was heavily damaged by the 2005 earthquake. The mountainous terrain made relief difficult in what the head of the United Nations World Food Program called the "greatest logistics challenge the relief community has ever faced."

Human challenges hamper rescue efforts and the prevention of future deaths. The literacy rate in the northwest is very low, so the spread of information must be accomplished by word of mouth rather than by more efficient methods such as newspapers or the Internet. In 2005, many of the people in the region were unaware that earthquakes posed a threat. Although small tremors are not uncommon in the region, the last powerful quake in Pakistan occurred in 1935. Unaware of the risks, people did not build homes and businesses in the northwest to withstand the effects of an earthquake. The collapse of numerous buildings in the area, many of them made from heavy concrete, was the cause of most deaths in the 2005 earthquake. The region's poverty is another problem, given that many people cannot afford to effectively "quakeproof" their homes.

The threat of terrorism in the region is one of the most severe and difficult challenges facing Pakistan. Northwestern Pakistan borders Afghanistan. After the United States-led invasion of Afghanistan, many leaders of the Taliban, the terror-sponsoring government of Afghanistan, fled into Pakistan. Their presence makes the area a dangerous place to operate. Many parts of the border region are controlled by Taliban, rather than Pakistani, forces. The Kashmir region is also dangerous. This region is claimed by both India and Pakistan, and each government has fortified the areas they control. Due to concerns about the terrorist groups and India's military, the government has restricted access to satellite and other maps of the region to protect information about government facilities. Without access to satellite maps, and unable to operate on the ground, seismologists, or scientists who study earthquakes, have been unable to study the fault lines throughout the region in detail. With further study, scientists may be able to identify areas at risk for a severe quake so that the government can prepare emergency plans more effectively.

What modifications have been made to deal with the threat?

After the 2005 earthquake the government of Pakistan began seeking ways to improve its ability to withstand the impact of future severe earthquakes.

Universities in Pakistan, with the help of government funding, are attracting more people to the field of seismology, the study of earthquakes. With more seismologists, the government can fully map out the fault lines crisscrossing the country and make predictions about where quakes are most likely to occur. Pakistan is also spending more money on other education programs to help inform people of the risks of an earthquake. The government has developed a new seismic building code to reduce the amount of damage done in the next quake. However, the government distributed the new code after reconstruction had already begun, so many new structures are still not built to withstand a severe earthquake.

One of the most difficult problems the government faces is ridding the northwest frontier of the Taliban and terrorist groups. Earlier attempts to dislodge the groups failed. The militant groups were better funded and better trained than the paramilitary groups the government sent in to remove them. Currently, the government is sending in more experienced and better trained troops, who are successfully clearing out the terrorist strongholds.

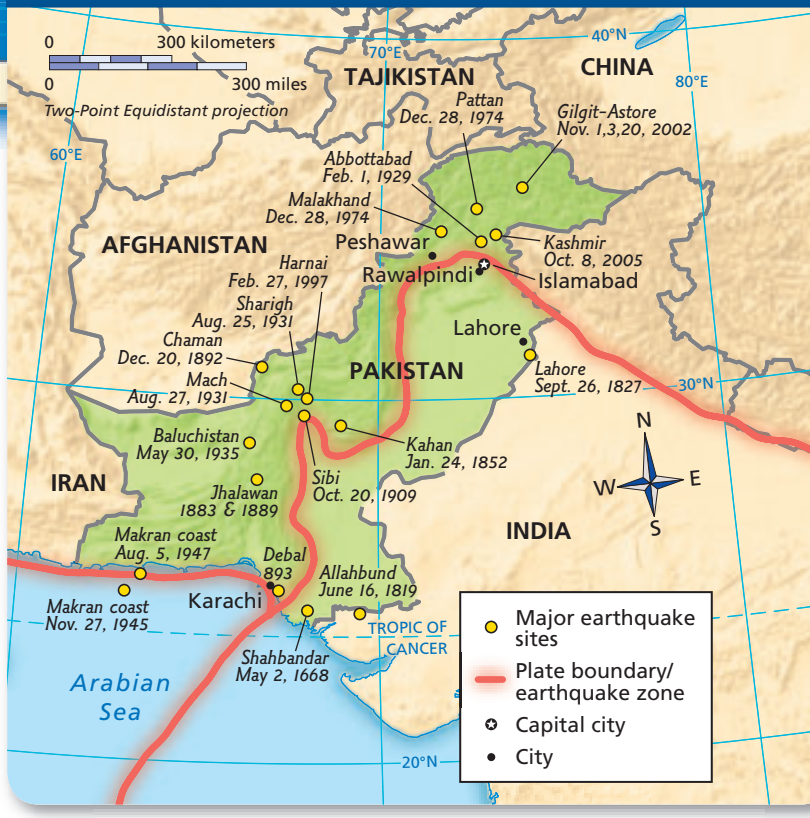
How have international organizations dealt with the challenges?

After the earthquake in 2005, international organizations donated money, goods, and manpower to help survivors recover. Two organizations, the United States military and the UNHCR, the United Nations refugee agency, sent aid to Pakistan immediately after the earthquake. Their quick response time was due to both groups' presence in the area. The U.S. military was carrying out combat and reconstruction missions in nearby Afghanistan, while the UNHRC was assisting Afghan refugees in Pakistan. Both organizations dispatched people and equipment to help the affected areas.

Although the aid groups reached the scene quickly, government infrastructure in the region had been demolished, making it impossible to coordinate with local agencies. Because they lacked knowledge of the region, aid groups pressured the government to release satellite images of remote places hit by the earthquake. The satellite images helped the organizations locate and rescue people in isolated areas. International aid groups set up camps for the three million people who were left homeless by the quake. Thanks to donations from all over the world, aid organizations fed and housed displaced Pakistanis until reconstruction began. Aid agencies met the disaster's challenges with a combination of technology, experience, and vast amounts of resources from international donors. Their efforts prevented a second wave of deaths from exposure to the weather and the disease often seen in poor camp conditions.

While some challenges, such as mountainous terrain, will always pose a problem, Pakistan's other challenges can be overcome. Its education efforts have helped remote populations understand the threat earthquakes pose. Building codes have been implemented to make homes and businesses more resilient to the effects of a quake. Pakistan can also learn from countries that are experienced in dealing with earthquakes. In Japan and the United States, powerful earthquakes are much less deadly due to the efforts of scientists and engineers. While the U.S. and Japan have access to more resources than Pakistan, Pakistani leaders are reviewing ideas from these countries, hoping to implement them and minimize the impact of future earthquakes.

Fault Lines and Earthquakes in Pakistan



THINKING CRITICALLY

1. **Explaining** What are the challenges that Pakistan faces when dealing with an earthquake?
2. **Evaluating** Are Pakistan's steps to prevent future deaths sufficient? Why or why not?
3. **Analyzing** What other steps could Pakistan take to prevent future deaths from severe earthquakes?

CHAPTER 23 VISUAL SUMMARY

Study anywhere, anytime by downloading quizzes and flashcards to your PDA from glencoe.com.

A The Himalaya

- Created by collision of tectonic plates; extend more than 1,500 miles (2,414 km) across northern edge of South Asia
- Includes Mount Everest, the world's highest peak at 29,028 feet (8,848 m)

B Gangetic Plain

- World's longest alluvial plain
- Watered by the Ganges, Brahmaputra, and Indus Rivers; agriculturally productive area
- India's most densely populated area

C Vindhya and Satpura Ranges

- Mountains in central India created by collision of tectonic plates
- Separate the distinct cultures of northern and southern India

D Indus River

- Flows mainly through Pakistan; empties into Arabian Sea
- Known as the cradle of ancient India
- Remains an important transportation route

E Deccan Plateau

- Plateau region in southern India; located between Western Ghats and Eastern Ghats
- Rich soil with wet and dry seasons

F Ganges River

- Flows east from the Himalaya; empties into Bay of Bengal
- Drainage basin covers about 400,000 square miles (about 1 million sq. km)
- Named for Hindu goddess Ganga; sacred to Hindus

G Brahmaputra River

- Flows through India and Bangladesh
- Joins the Ganges River to form a delta; empties into Bay of Bengal
- Major inland waterway; also provides hydroelectric power

H Monsoons

- Hot season is from late February to June
- Wet season is from June or July to September
- Cool season is from October to late February

INDIANA STATEWIDE TEST PRACTICE

TEST-TAKING TIP

When you have finished, check your work to be sure you have answered all the questions.

Reviewing Vocabulary

Directions: Choose the word or words that best complete the sentence.

1 **A(n) _____ is a large, distinct landmass that is joined to a continent.**

A island
B peninsula
C country
D subcontinent

2 **An area of fertile soil deposited by river floodwaters is called a(n) _____.**

A glacier
B alluvial plain
C plateau
D loess

3 **_____ are winds that change direction with the season.**

A Monsoons
B Foehns
C Chinooks
D Mistrals

4 **A storm like a hurricane in South Asia is called a _____.**

A monsoon
B typhoon
C tornado
D cyclone

Reviewing Main Ideas

Directions: Choose the best answers to complete the sentences or to answer the following questions.

Section 1 *(pp. 590–593)*

5 **_____ border South Asia on the north.**

A Rivers
B Plains
C Mountains
D Plateaus

6 **What is the source of the major rivers in the northern part of South Asia?**

A Karakoram Range
B Western Ghats
C Eastern Ghats
D the Himalaya

Section 2 *(pp. 596–600)*

7 **Why is there a band of humid subtropical climate across Nepal, Bhutan, Bangladesh, and the northeastern part of India?**

A This region is in the low latitudes.
B This region is only a few feet above sea level.
C The Himalaya mountain ranges block the coldest winds blowing from Central Asia.
D This region is near the sea.

8 **Monsoon winds can have positive effects by providing needed rain, but can also cause natural disasters including _____ and _____.**

A tornadoes, loess
B hurricanes, cyclones
C flooding, drought
D hurricanes, flooding

Go On

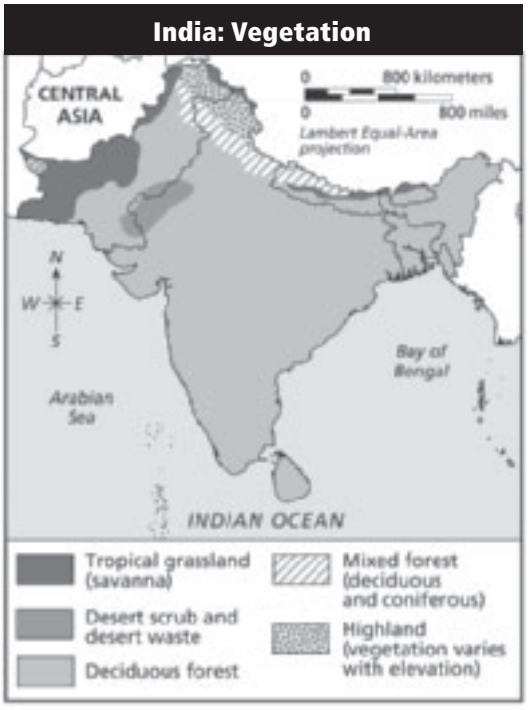
Critical Thinking

Directions: Choose the best answers to complete the sentences or to answer the following questions.

9 What changes has Pakistan made in response to the threat of earthquakes?

A Restrictions on building size have been enacted to minimize collapses during plate shifts.
B Educational efforts, new building codes, and information learned from other countries prepare Pakistan for future earthquakes.
C Sophisticated new satellite imagery, donated by the United States, enables Pakistanis to predict where earthquakes will occur.
D Large-scale evacuations from highly susceptible areas reduce the threat of death to the Pakistani population.

Base your answer to question 10 on the map and on your knowledge of Chapter 23.



10 What kind of vegetation is found throughout most of India?

A mixed forest
B deciduous forest
C tropical grassland
D highland

Constructed Response

Directions: Analyze the passage and write a short essay to answer each question that follows. A well-written essay will:

- completely answer each question
- cite examples from the passage
- draw on information from the chapter to explain or elaborate on ideas
- present ideas in a logical order

In July 2004 particularly disastrous flooding struck Bangladesh during the summer monsoon.

> *The death toll in flooding that has submerged half of Bangladesh and affected more than 19 million people rose Friday to 185 as floodwater spread to parts of the capital Dhaka, the official news agency BSS said.*
>
> *It said the number of people affected had risen from 11 million to more than 19 million out of a total population of 140 million.*
>
> *The flooding, the most serious since Bangladesh's worst ever floods of 1998, has now also inundated parts of north, northeast and southeast Dhaka, forcing some residents to wade through waist high water.*
>
> *"My house has three feet (90 centimetres) of water in it so we [are] sitting on chairs on top of tables and sleeping on bamboo platforms," [said] Ram Das, a resident of the flooded Basabo area, two kilometres (1.2 miles) east of downtown Dhaka. . . .*
>
> *Bangladesh, a low-lying country criss-crossed by 230 rivers including major arteries carrying melting snow from the Himalayas, suffers annual flooding affecting at least 20 per cent of the country.*
>
> —"Death toll in Bangladesh floods rises to 185, more than 19 million affected," www.terradaily.com, July 23, 2004.

11 Based on information from the excerpt and this chapter, why might Bangladesh be particularly vulnerable to flooding?

12 Which parts of Dhaka were affected by the flooding?

STOP

Geography ONLINE
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Need Extra Help?												
If you missed questions. . .	1	2	3	4	5	6	7	8	9	10	11	12
Go to page. . .	591	592	598	600	591	592	592	599	GT 601A-GT 601B	603	603	603