SECTION 1

Physical Geography

TEKS 3A, 3B, 3C, 4D, 4E, 5A, 5B, 5C, 6A, 6B, 21B, 21C, 22D

What You Will Learn...

Main Ideas

1. The Andes are the main physical feature of Pacific South America.
2. The region's climate and vegetation change with elevation.
3. Key natural resources in the region include lumber, oil, and minerals.

The Big Idea

The Andes dominate Pacific South America's physical geography and influence the region's climate and resources.

Key Terms and Places

altiplano, *p. 279*
strait, *p. 279*
Atacama Desert, *p. 281*
El Niño, *p. 281*

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TAKING NOTES

Use the graphic organizer online to take notes on the physical geography of Pacific South America.

If YOU lived there...

You and your family fish for herring in the cold waters off the coast of Peru. Last year, however, an event called El Niño changed both the weather and the water. El Niño made the nearby ocean warmer. Without cold water, all the herring disappeared. You caught almost no fish at all. El Niño also caused terrible weather on the mainland.

How might another El Niño affect you?

BUILDING BACKGROUND Although most of the countries of Pacific South America lie along the coast, their landscapes are dominated by the rugged mountain range called the Andes. These mountains influence climates in the region. Ocean winds and currents also affect coastal areas here.

Physical Features

The countries of Pacific South America stretch along the Pacific coast from the equator, for which the country of Ecuador is named, south almost to the Arctic Circle. One narrow country, Chile (CHEE-lay), is so long that it covers about half the Pacific coast by itself. Not all of the countries in Pacific South America have coastlines, however. Bolivia is landlocked. But all of the countries in this region do share one major physical feature—the high Andes mountains.

Mountains

The Andes run through Ecuador, Peru, Bolivia, and Chile. Some ridges and volcanic peaks in the Andes rise more than 20,000 feet (6,800 m) above sea level. Because two tectonic plates meet at the region's edge, earthquakes and volcanoes are a constant threat. Sometimes these earthquakes disturb Andean glaciers, sending ice and mud rushing down mountain slopes.

Landscapes in the Andes differ from south to north. In southern Chile, rugged mountain peaks are covered by ice caps. In the north, the Andes are more rounded than rugged, and there the range splits into two ridges. In southern Peru and Bolivia these ridges are quite far apart. A broad, high plateau called the **altiplano** lies between the ridges of the Andes.

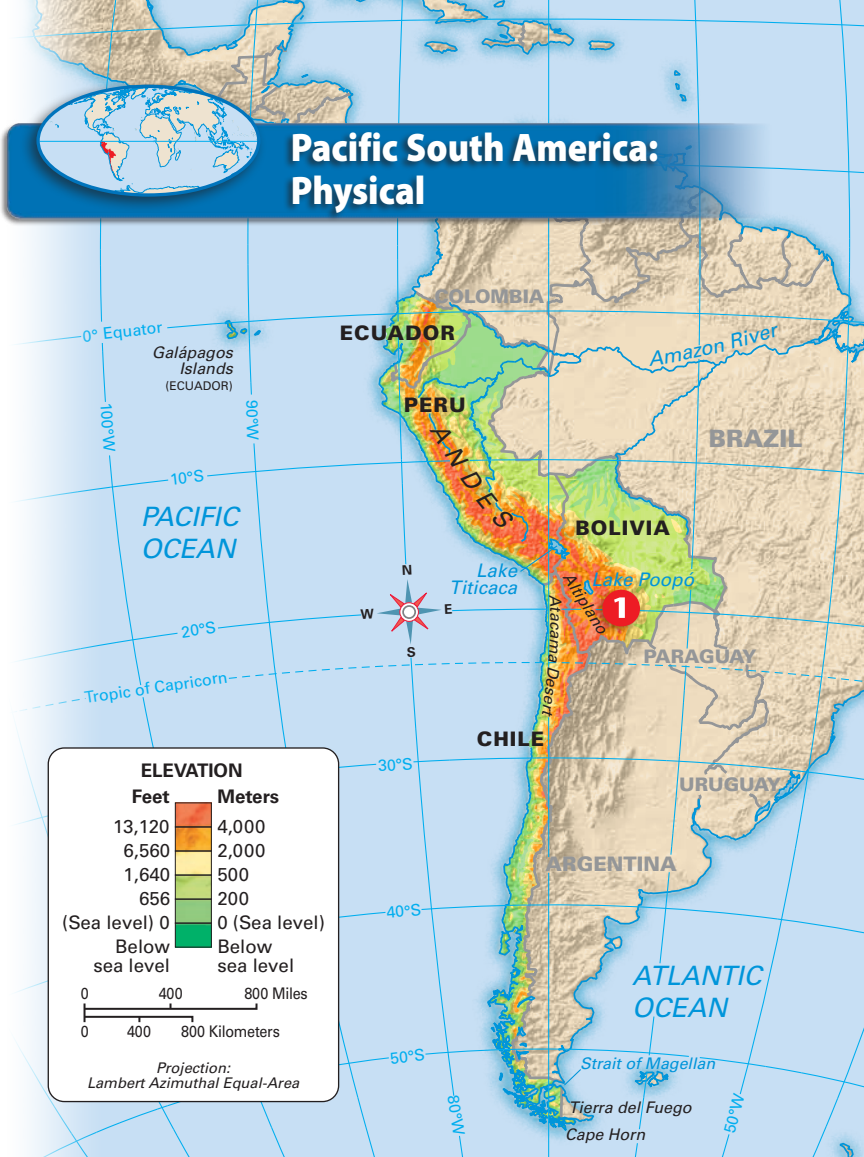
Water and Islands

Andean glaciers are the source for many tributaries of the Amazon River. Other than the Amazon tributaries, the region has few major rivers. Rivers on the altiplano have no outlet to the sea. Water collects in two large lakes. One of these, Lake Titicaca, is the highest lake in the world that large ships can cross.

At the southern tip of the continent, the Strait of Magellan links the Atlantic and Pacific oceans. A **strait** is a narrow body of water connecting two larger bodies of water. The large island south of the strait is Tierra del Fuego, or "land of fire."

Chile and Ecuador both control large islands in the Pacific Ocean. Ecuador's volcanic Galápagos Islands have wildlife not found anywhere else in the world.

READING CHECK **Contrasting** How do the Andes differ from north to south?



map zone Geography Skills

Regions The Andes stretch all through the countries of Pacific South America.

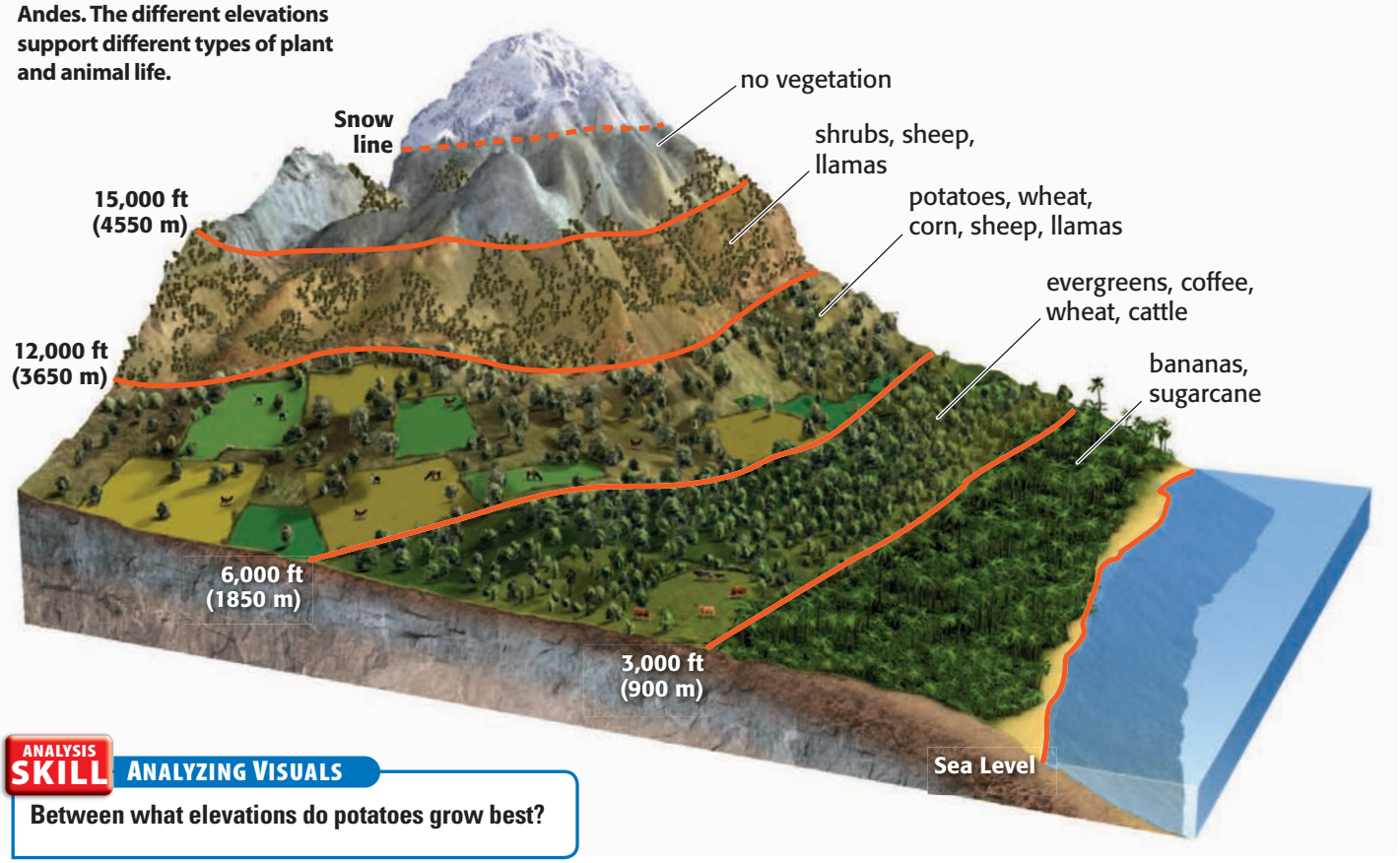
1. **Identify** To what country do the Galápagos Islands belong?
2. **Interpret** How do you think the Andes affect life in the region?

1 Llamas graze on the high, dry altiplano. The climate on the altiplano is too dry for trees to grow.

Close-up

Climate Zones in the Andes

Five climate zones exist in the Andes. The different elevations support different types of plant and animal life.



ANALYSIS SKILL **ANALYZING VISUALS**

Between what elevations do potatoes grow best?

Climate and Vegetation

FOCUS ON READING

What can you infer about the location of mountains in Ecuador?

Climate, vegetation, and landscapes all vary widely in Pacific South America. We usually think of latitude as the major factor that affects climate. However, in Pacific South America, elevation has the biggest effect on climate and vegetation.

Elevation

Mountain environments change with elevation. For this reason, we can identify five different climate zones in the Andes. You can see these different climate zones on the diagram above.

The lowest zone includes the hot and humid lower elevations near sea level. Crops such as sugarcane and bananas grow well there. This first zone is often found along the coast, but it is also found inland in eastern Ecuador and Peru and northern Bolivia. These regions are part of the Amazon basin. They have a humid tropical climate with thick, tropical rain forests.

As elevation increases, the air becomes cooler. The second elevation zone has moist climates with mountain forests. This zone is good for growing coffee. In addition, many of Pacific South America's large cities are located in this zone.

Higher up the mountains is a third, cooler zone of forests and grasslands. Farmers grow potatoes and wheat there. Many people in Pacific South America live and farm in this climate zone.

At a certain elevation, the climate becomes too cool for trees to grow. This fourth climate zone above the tree line contains alpine meadows with grasslands and hardy shrubs. The altiplano region between the two ridges of the Andes lies mostly in this climate zone.

The fifth climate zone, in the highest elevations, is very cold. No vegetation grows in this zone because the ground is almost always covered with snow and ice.

Deserts

Pacific South America also has some climates that are not typical of any of the five climate zones. Instead of hot and humid climates, some coastal regions have desert climates.

Northern Chile contains the **Atacama Desert**. This desert is about 600 miles (965 km) long. Rain falls there less than five times a century, but fog and low clouds are common. They form when a cold current in the Pacific Ocean chills the warmer air above the ocean's surface. Cloud cover keeps the air near the ground from being warmed by the sun. As a result, coastal Chile is one of the cloudiest—and driest—places on Earth.

In Peru, some rivers cut through the dry coastal region. They bring snowmelt down from the Andes. Because they rely on melting snow, some of these rivers only appear at certain times of the year. The rivers have made some small settlements possible in these dry areas.

El Niño

About every two to seven years, this dry region experiences **El Niño**, an ocean and weather pattern that affects the Pacific coast. During an El Niño year, cool Pacific water near the coast warms. This change may cause extreme ocean and weather events that can have global effects.

As El Niño warms ocean waters, fish leave what is usually a rich fishing area. This change affects fishers. Also, El Niño causes heavy rains, and areas along the coast sometimes experience flooding. Some scientists think that air pollutants have made El Niño last longer and have more damaging effects.

ACADEMIC VOCABULARY
cause to make something happen

READING CHECK **Finding Main Ideas** How does elevation affect climate and vegetation?

Natural Resources

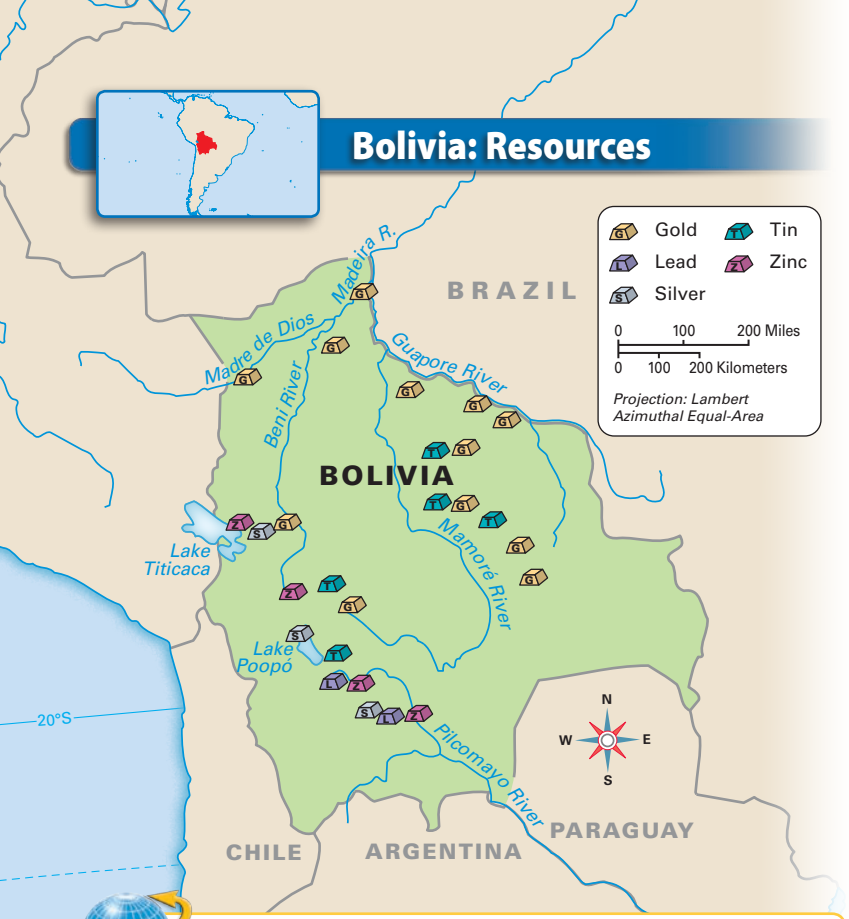
The landscapes of Pacific South America provide many valuable natural resources. For example, forests in southern Chile and in eastern Peru and Ecuador provide lumber. Also, as you have read, the coastal waters of the Pacific Ocean are rich in fish.

Satellite View

Atacama Desert

The Atacama Desert lies between the Pacific coast and the Andes in northern Chile. In this image you can see two snow-capped volcanoes. The salt in the top right part of the image is formed from minerals carried there by rivers that only appear during certain months of the year. These seasonal rivers also support some limited vegetation.

Drawing Conclusions Why do you think there is snow on the volcanoes even though the desert gets hardly any precipitation?



map zone Geography Skills

Place Bolivia has many valuable mineral resources.

1. **Locate** Where are most of Bolivia's gold resources found?
2. **Interpret** What do you notice about the location of the mineral resources and the rivers?

In addition, the region has valuable oil and minerals. Ecuador in particular has large oil and gas reserves, and oil is the country's main export. Bolivia has some deposits of tin, gold, silver, lead, and zinc. Chile has copper deposits. In fact, Chile exports more copper than any other country in the world. Chile is also the site of the world's largest open pit mine.

Although the countries of Pacific South America have many valuable resources, one resource they do not have much of is good farmland. Many people farm, but the region's mostly cool, arid lands make it difficult to produce large crops for export.

READING CHECK **Categorizing** What types of resources do the countries of Pacific South America have?

SUMMARY AND PREVIEW The Andes are the main physical feature of Pacific South America. Next, you will learn how the Andes have affected the region's history and how they continue to affect life there today.

Section 1 Assessment

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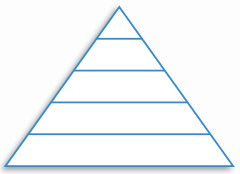
Reviewing Ideas, Terms, and Places

1. **a. Identify** What is the main physical feature of Pacific South America?
   b. Analyze How is Bolivia's location unique in the region?
2. **a. Define** What is **El Niño**, and what are some of its effects?
   b. Draw Conclusions Why are parts of Ecuador, in the tropics, cooler than parts of southern Chile?
3. **a. Identify** What country in this region has large oil reserves?
   b. Make Inferences Why do you think much of the region is not good for farming?
   c. Geographic Questions Look at the map on this page. Pose and answer a question about the distribution of mineral resources in Bolivia.

Critical Thinking

4. **Categorizing** Review your notes on climate. Then use a diagram like this one to describe the climate and vegetation in each of the five climate zones.



FOCUS ON SPEAKING my WriteSmart

5. **Describing Physical Geography** Note information about the physical features, climate and vegetation, and resources of Pacific South America. Write two questions and answers you can use in your interview.