

10. What is an adaptation? Why do desert animals and plants need adaptations to survive?
11. Why are many desert animals nocturnal?
12. Why is being venomous an adaptation of many desert animals?
13. What does the term "ectothermic" mean?
14. Why are many desert animals cold-blooded?
15. How has the sidewinder snake successfully adapted to desert life?
16. What adaptations do camels possess that make life in a desert possible for them?
17. What unique plant adaptations have proven successful in deserts?
18. What is desertification? What human activities can accelerate this process?

Follow-up Discussion

Research indicates that students will retain their previous misconceptions about a topic, in preference to new information, until they actively recognize and correct their own errors. Therefore, it is important to have your students re-examine the facts/beliefs they put on their "Everything We Think We Know About..." list. It might also be helpful to review the list by marking each entry with a "+" or "-" to show which facts were correct and which were incorrect.

Thought-provoking discussions provide a good way to assess the overall depth of student understanding. The following are some suggested discussion topics.

- Why do you think that more ancient artifacts are found in deserts than in rainforests?

Follow-up Activities

- Cacti and other succulents can be grown easily in the classroom. Observe desert plants growing under different conditions to test variables that affect desert plants the most. Variables to control include: amount of water, hours/intensity of light, soil types and temperature.
- Have pairs of students choose a desert to study, focusing on its unique characteristics. Ask them to prepare a report describing the geography of their region as well as its plant and animal life.
- Have students research the amount of biodiversity in the major biomes and rank all the biomes in order according to the level of species diversity.
- Distribute maps of the United States or the world to each student, and have the class find specific deserts. Have students shade in the desert areas on their maps.

Suggested Internet Resources

Periodically, Internet Resources are updated on our Web site at www.LibraryVideo.com

- www.cotf.edu/ete/modules/msese/earthsysflr/biomes.html
These pages from the Earth Science Explorer site contain information and images that describe the major biomes found on Earth.
- horizon.nmsu.edu/ddl3/dbwelcome.html
The Digital Desert Library is a Web site developed as a teaching resource about the Chihuahuan Desert and contains a searchable database on many desert creatures and plants.
- www.desertmuseum.org/infocards.html
These pages for kids from the Arizona-Sonora Desert Museum contain images and information about many of the living things found in the Sonoran Desert.

Suggested Print Resources

- Jablonsky, Alice. *101 Questions About Desert Life*. Southwest Parks & Monuments Association, Tucson, AZ; 2001.
- Wallace, Marianne. *America's Deserts: Guide to Plants and Animals*. Fulcrum Publishing, Golden, CO; 1996.
- Wentworth-Lazaroff, David W. *Arizona-Sonora Desert Museum Book of Answers*. Arizona-Sonora Desert Museum Press, Tucson, AZ; 1998.

TEACHER'S GUIDE CONSULTANT

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TITLES

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Deserts

Grades 5–8

Students in grade 5-8 classrooms possess a wide range of background knowledge. Student response to this video program is sure to be varied, so the teachers at these grades need all the help they can get! This guide has been designed to help the 5-8 science teacher by providing a brief synopsis of the program, preview and follow-up questions, activities, vocabulary and additional resources.

Before Viewing: Extensive research tells how important it is for the teacher to discover what the students know — or think they know — about a topic, before actually starting a new unit. Therefore, after prompting discussion with the pre-viewing questions, lead your class to create an "Everything We Think We Know About..." list. You may also wish to preview key vocabulary words, and have students raise additional questions they hope will be answered.

After Viewing: Have your students share video excerpts that fascinated or surprised them, then challenge your students to prove or disprove the accuracy of the facts they put on their "Everything We Think We Know About..." list. Discuss what else they learned and use the follow-up questions and activities to inspire further discussion. Encourage students to research the topic further with the Internet and reading resources provided.



Program Summary

Biomes are “life zones” — large regions of the world that share similar features. Each biome is made of many distinct ecosystems, which are communities of plants and animals and the nonliving environment that surrounds them. Climate is the main determining factor in biomes; desert biomes receive less than 25 cm or 10 inches of rainfall annually. Deserts cover approximately 20% of the Earth and are present in all three climate zones.

In every ecosystem there are many abiotic, or non-living factors, including water, air, sunlight, minerals, soil quality and temperature. Living components of an ecosystem, like plants and animals, are called biotic factors. There is constant interaction between the abiotic and biotic factors of an ecosystem, resulting in organisms that are uniquely adapted to survive in their particular environment.

Many deserts are formed as a result of airflow and geography. The “rainshadow effect” helps create many deserts. Moist air masses blowing from oceans or lakes rise up the side of a mountain and drop their moisture as rain and snow. The air mass, now dry, continues down the other side of the mountain, creating a situation in which evaporation exceeds precipitation. As a result, deserts form in this arid mountain “rainshadow.”

Most deserts have high winds and high temperatures. However, not all deserts are the same. Tropical deserts, such as the Sahara in northern Africa, are mostly sandy, exceedingly hot and arid, with droughts lasting for years at a time. Temperate deserts, such as the Mojave of the southwestern United States, are rocky, contain cacti and sagebrush, and experience extremes in temperature from day to night and from season to season. Many scientists consider parts of the polar zones to be cold deserts because of the low annual precipitation. Because of the dry conditions in deserts, the decay of dead organic material is much slower than in moist environments. As a result, soils of deserts lack humus, which provides important nutrients to plants. Plants and animals of deserts must be highly adapted for survival, given these extreme abiotic factors.

Many desert animals are nocturnal, coming out of burrows at night to hunt, rather than risking the heat and sun of the day. A number of desert animals, such as snakes, scorpions and tarantulas, are venomous. Others, such as the kit fox, have large ears that help them to hear movements of their limited prey and to shed body heat like a radiator. Camels can regulate their body heat to save water and store fat in their humps as a fuel source. Plants have adapted ways to retain moisture, reflect sunlight and discourage animals from eating them. Some have adapted deep taproots to reach underground water sources, while others have an extensive network of shallow roots that immediately absorb any moisture that comes from infrequent rainfall. Though many plants die in the arid conditions, their seeds are well protected and can remain dormant for years, until the next rainfall.

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When humans try to build towns and farms on or near deserts, they must irrigate the land with enough water to germinate seeds and maintain crops. This can create problems, such as rapidly lowering river and groundwater levels. Over time, overgrazed or unprotected topsoil can dry out quickly, and return the area to desert conditions — a process known as desertification. More than in any other biome, people who live in desert areas must know how to conserve water and adapt to changes in this harsh but beautiful biome.

Vocabulary

The following words are included for teacher reference or for use with students. They are listed in the order in which they appear in the video.

biomes — Large regions of the world that have similar characteristics, usually named for the dominant plant life in the area. Biomes contain specific kinds of plants and animals.

desert — An area with an extremely dry climate, receiving less than 25 cm of annual rainfall. Many are sand-covered, while some are rocky.

climate — An environment’s average weather conditions, including temperature and rainfall. Climate is the most important element in determining what kinds of organisms can live in an area.

polar zone — The frigid areas found in bands around the North and South poles, characterized by freezing conditions, minimal sunlight and low diversity of plant and animal life.

tropical zone — The geographic area found in a broad band around the equator, characterized by the greatest amount of sunlight and annual rainfall and the greatest diversity in plant and animal life.

temperate zone — Large areas located in the bands between the polar and tropical zones; characterized by a climate consisting of a warm season and a cold season with equal lengths.

rainshadow — An effect in which moisture is lost from clouds as they pass over a range of mountains. As the air loses its moisture, it becomes drier and the area on the other side of the mountain range gets little rainfall. This effect contributes to the formation of desert ecosystems.

windward — The side of a mountain hit by moist air, which drops its moisture before descending down the other side.

leeward — The side of a mountain where evaporation exceeds precipitation, near which many deserts are formed.

drought — The absence of precipitation for long periods of time.

abiotic factors — The nonliving components of an ecosystem such as temperature, light, water, soil and minerals.

biotic factors — All the living or once-living organisms in an ecosystem.

arid — Very dry; without moisture.

humus — Decayed remains of once-living plants and animals; a major component of rich topsoil.

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adaptations — Physical features or behaviors that enable a living thing to survive the specific conditions of their habitat.

nocturnal — A term describing animals that sleep during the day and are active at nighttime.

ectothermic — The scientific term for cold-blooded animals.

venomous — Having a gland that secretes poisons into prey, usually through a bite or a sting.

herpetologist — A scientist who studies snakes and other reptiles.

domesticated — Adapted to live closely with humans.

dormant — To remain in an inactive state.

germinate — To begin to grow.

irrigate — To supply land with water in order to grow crops.

aquifer — A layer of underground rock that is filled with water.

desertification — The process by which other ecosystems become deserts due to unwise farming techniques, drought, wind or overgrazing by animals.

Pre-viewing Discussion

Before students generate their list of “Everything We Think We Know About...” for this topic, stimulate and focus their thinking by raising these questions so that their list will better reflect the key ideas in this show:

- What are some things you would need to have in order to survive in a desert?
- How do plants grow in a place without water?

After the class has completed their “Everything We Think We Know About...” list, ask them what other questions they have that they hope will be answered during this program. Have students listen closely to learn if everything on their class list is accurate and to hear if any of their own questions are answered.

Focus Questions

1. What is a biome? What factors define a biome?
2. What is an ecosystem?
3. Are all desert ecosystems the same? Explain.
4. What is the average amount of annual rainfall received by deserts? How does that compare to rainfall in tropical rainforests?
5. What is the “rainshadow effect”? What does it have to do with desert formation?
6. Name, locate and describe some of the world’s deserts.
7. Why do some scientists consider the polar regions to be deserts?
8. What are biotic and abiotic factors?
9. What are some abiotic factors that affect desert ecosystems?

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