

Biomes: Adapting to Deserts and Other Ecosystems: Teacher's Guide

Grade Level: 6-8

Curriculum Focus: Life Science

Lesson Duration: Three class periods

Program Description

Animals inhabit nearly every environment on Earth, including many places that seem inhospitable to life. As they experience these daunting climates and conditions, students learn about the developments that enable life to flourish in some of Earth's most challenging environments. This program includes one feature segment and two short segments.

Onscreen Questions

- What adaptations make crocodiles good predators?
 - How have animals living in the deserts of Asia adapted physically and behaviorally to this environment?
 - What strategies do the takhi horses use to breed, feed, and protect their young?
 - What adaptations enable birds to fly?
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Lesson Plan

Student Objectives

- Discover that an animal must be physically and behaviorally adapted to the conditions of its environment to survive.
- Learn how desert-dwelling animals have physical and behavioral adaptations suited to their environment.

Materials

- 4" x 6" index cards (three for each student)
- Small chalkboards or dry-erase boards and appropriate writing utensils
- Reference materials about deserts and desert animals, including library books, encyclopedias, and Internet resources

Procedures

1. Students will learn about the adaptations of desert animals through individual research and the classroom activity "Adaptation Jeopardy." Before class begins, create a list of desert animals; the number should equal the number of students in the class. Choose animals from these four categories: mammals, birds and fish, reptiles and amphibians, and insects and spiders. Examples include geckos, roadrunners, ravens, turkey vultures, Gila monsters, camels, and iguanas. For more animals, visit these Web sites:
 - <http://www.desertusa.com/animal.html>
 - <http://mbgnet.mobot.org/sets/desert/animals/index.htm>
2. Hold a class discussion of desert biomes. Ask students what they know about deserts, in particular what people must do to take care of themselves in the desert. (drinking extra water, wearing sunblock, etc.) Ask students to name deserts around the world (the Sahara in Africa, the Gobi in Asia, the Sonoran in North America, etc.); then review their common characteristics:
 - Deserts receive less than 10 inches of rainfall annually.
 - Deserts may receive only a few rainfalls in a year.
 - Deserts are generally very hot in the daytime (often more than 100° F, or about 38° Celsius), but they can be cold at night (50° F, 10° Celsius, or below)
3. Explain that for any animal to survive, it must be adapted physically and behaviorally to its environment. Tell students that physical adaptation refers to characteristics such as fur, eye structure, and color. Behavioral adaptation refers to hunting strategies, breeding patterns, and social habits.
4. Give each student one animal name from the list and three index cards. Have students write the name of their desert animal on one side of each card. Explain that the cards will be used in Adaptation Jeopardy, a game about desert animal adaptations.
5. Tell students that they will use print and Internet reference materials to research and identify three adaptations for their animal. On the back of each index card, students should write one adaptation and an explanation of how it helps the animal survive. (Example: "This animal sleeps underground during the day, avoiding the extreme heat.") Explain that these adaptations will be used as clues in the game, so students should not reveal the name of the desert animal on this side of the card. Allow students time to complete their cards. Tell students to hand in their cards by the end of the class period.
6. Collect the cards, make copies, and return the card copies. Students must write a paragraph about a day in the life of their animal that includes details about the three adaptations and why they are necessary to survive in a desert biome. Tell students they will present their paragraphs during the next class period.

Assessment

Use the following three-point rubric to evaluate students' work during this lesson.

- **3 points:** Students wrote complete descriptions of a desert animal's physical and behavioral characteristics and clear, thoughtful explanations of how the animal is adapted to life in the desert.
- **2 points:** Students wrote partial descriptions of a desert animal's physical and behavioral characteristics and somewhat clear explanations of how the animal is adapted to life in the desert.
- **1 point:** Students wrote partial descriptions of a desert animal's physical or behavioral characteristics and incomplete explanations of how the animal is adapted to life in the desert.

Vocabulary

adaptation

Definition: A physical or behavioral characteristic of an organism that helps it survive in its biome

Context: A camel's double eyelashes are an adaptation that helps it live in an environment that has fierce sandstorms.

biodiversity

Definition: The number and variety of organisms found within a specified geographic region

Context: The desert has great biodiversity because thousands of animal species live there.

camouflage

Definition: To conceal by disguise or protective coloring

Context: The vulture did not spot the kangaroo rat, which was camouflaged against the sand.

extinct

Definition: No longer existing

Context: Some animals have become extinct because they did not adapt to changes in their habitats.

habitat

Definition: The place an animal or plant normally lives

Context: The gecko can camouflage itself, which helps it survive in its habitat.

nocturnal

Definition: Active at night

Context: Many animals are nocturnal so they can avoid daytime heat.



Academic Standards

National Academy of Sciences

The National Science Education Standards provide guidelines for teaching science as well as a coherent vision of what it means to be scientifically literate for students in grades K-12. To view the standards, visit <http://books.nap.edu>.

This lesson plan addresses the following science standards:

- Life Science: Populations and ecosystems

Mid-continent Research for Education and Learning (McREL)

McREL's Content Knowledge: A Compendium of Standards and Benchmarks for K-12 Education addresses 14 content areas. To view the standards and benchmarks, visit <http://www.mcrel.org/>.

This lesson plan addresses the following national standards:

- Science – Life Sciences: Understands relationships among organisms and their physical environment, Understands biological evolution and the diversity of life
 - Language Arts – Writing: Gathers and uses information for research purposes
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Support Materials

Develop custom worksheets, educational puzzles, online quizzes, and more with the free teaching tools offered on the Discoveryschool.com Web site. Create and print support materials, or save them to a Custom Classroom account for future use. To learn more, visit

- <http://school.discovery.com/teachingtools/teachingtools.html>
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DVD Content

This program is available in an interactive DVD format. The following information and activities are specific to the DVD version.

How To Use the DVD

The DVD starting screen has the following options:

Play Video – This plays the video from start to finish. There are no programmed stops, except by using a remote control. With a computer, depending on the particular software player, a pause button is included with the other video controls.

Video Index – Here the video is divided into four parts (see below), indicated by video thumbnail icons. Watching all parts in sequence is similar to watching the video from start to finish. Brief descriptions and total running times are noted for each part. To play a particular segment, press



Enter on the remote for TV playback; on a computer, click once to highlight a thumbnail and read the accompanying text description and click again to start the video.

Curriculum Units – These are specially edited video segments pulled from different sections of the video (see below). These nonlinear segments align with key ideas in the unit of instruction. They include onscreen pre- and post-viewing questions, reproduced below in this Teacher's Guide. Total running times for these segments are noted. To play a particular segment, press Enter on the TV remote or click once on the Curriculum Unit title on a computer.

Standards Link – Selecting this option displays a single screen that lists the national academic standards the video addresses.

Teacher Resources – This screen gives the technical support number and Web site address.

Video Index

I. Crocodile Fears (5 min.)

Crocodiles are fierce predators that move as well on land as they do in the water. Explore the characteristics of these skillful hunters.

II. Life in the Gobi (17 min.)

The Gobi's extreme seasons make it a difficult place to live, but this desert is hardly uninhabited. Discover the many animals that populate the Gobi.

III. Seasons on the Steppe (21 min.)

Life changes along with the seasons for the animals that live in Central Asia. Investigate autumn and winter on the steppe.

IV. Built to Fly (3 min.)

Unlike humans, birds can spread their wings and fly. See the physical adaptations that help birds take to the skies.

Curriculum Units

1. A Fierce Hunter

Pre-viewing question

Q: What would you do if you encountered a crocodile?

A: Answers will vary.

Post-viewing question

Q: Why do crocodiles prefer to hunt at night?

A: Answers will vary.



2. Reptiles Keeping Warm

Pre-viewing question

Q: What is an ectotherm?

A: These animals, which produce very little body heat on their own, rely on their environment to warm their bodies.

Post-viewing question

Q: What functions do a crocodile's scales serve?

A: Scales help crocodiles absorb the sun's heat – they act like miniature solar heat collectors, warming the animal's blood before it circulates through the rest of the body. The scales also work as camouflage, allowing a crocodile to remain hidden from its prey until it is too late for the unsuspecting animal to escape.

3. Wild Horses

Pre-viewing question

Q: What wild animals live in your area?

A: Answers will vary.

Post-viewing question

Q: What are the distinguishing features of Takhi horses?

A: Also known as Przewalski's (poheh-'vål-skEz) horse, a Takhi horse is distinguished by its upright mane, lack of a forelock, and the stripes on the backs of its short legs.

4. Surviving Desert Extremes

Pre-viewing question

Q: How does the environment in your area change with the seasons?

A: Answers will vary.

Post-viewing question

Q: What animal is best adapted to life in the Gobi?

A: Answers will vary.

5. Night and Day

Pre-viewing question

Q: What is the largest predatory threat to desert animals?

A: Answers will vary.

Post-viewing question

Q: Are nocturnal animals safer than those active during the day?

A: Answers will vary.

6. A Late Summer

Pre-viewing question

Q: Why do some animals produce more offspring than others?

A: Answers will vary.



Post-viewing question

Q: If marmots became extinct, what would be the repercussions?

A: Answers will vary.

7. Horses on the Move

Pre-viewing question

Q: How might living in a herd benefit an animal?

A: Answers will vary.

Post-viewing question

Q: What qualities does the leader of a Takhi herd need?

A: Answers will vary.

8. Migration of the Gazelles

Pre-viewing question

Q: What problems occur when there is too much rain in the desert?

A: Answers will vary.

Post-viewing question

Q: Should humans intervene when disaster strikes a group of animals?

A: Answers will vary.

9. Mating Contests

Pre-viewing question

Q: What are some mating rituals in the animal kingdom?

A: Answers will vary.

Post-viewing question

Q: How do Chinkara males establish their mating territory?

A: To mark the boundaries of their mating territory, they rub bushes with the scent glands on their foreheads. Chinkara males also claim ownership of territory by leaving small piles of dung.

10. A Winter Invitation

Pre-viewing question

Q: During winter, what kinds of wildlife do you see in your area?

A: Answers will vary.

Post-viewing question

Q: Is it wrong to encourage animals to winter in a specific area?

A: Answers will vary.

11. Enduring Winter

Pre-viewing question

Q: How do summer and winter months differ in your area?

A: Answers will vary.



Post-viewing question

Q: What keeps the winter temperatures and humidity low in Central Asia?

A: The Asiatic anticyclone, a huge pressure system in the atmosphere that covers the continent in the winter

12. Taking to the Air

Pre-viewing question

Q: Which takes more energy, walking or flying?

A: Answers will vary.

Post-viewing question

Q: How does the shape of a bird's wing help it fly?

A: A bird's wing is arched on the top and flat on the bottom. To travel simultaneously across both sides of the wing, air must move faster over the longer top arch. The difference in air pressure that results – low pressure above the wing, high pressure below it – creates an upward force, called lift.