

Desert Biomes: Essential and Endangered

1 videocassette..... 26 minutes

Copyright MCMXCV
Rainbow Educational Media
4540 Preslyn Drive
Raleigh, NC 27616-3177

Distributed by:
United Learning
1560 Sherman Ave., Suite 100
Evanston, IL. 60201
800-323-9084
www.unitedlearning.com |
www.unitedstreaming.com



CREDITS

Author and Producer: Peter Cochran

Principal Videography: Dan Duncan

Additional Videography: Manny Garcia

Narrators: Richard Cassell
Randy Kaye

Consultants: Craig Ivanyi
Michael Worosz

Stock Video: ABC NEWS VideoSource
Kaw Valley Films KUTV,
Tucson National Park
Service

Post Production: North Country Media

Audio Sweetening: Acme Recording Studios

Our appreciation to the
Arizona-Sonora Desert Museum

Produced for Rainbow Educational Media
by Cochran Communications

TABLE OF CONTENTS

Introduction.....	4
Program Summary.....	4
Objectives.....	7
Review Questions.....	8
Activities.....	11
Glossary.....	13
Bibliography.....	17
Related Videos.....	18
Appendix A: Places to Contact.....	19
Appendix B: Desert Parks in the United States....	21
Script.....	23

INTRODUCTION

When students think of deserts, they often picture dry, barren, and lifeless places. In truth, deserts support an amazing variety of life and are places of great beauty. *Desert Biomes: Essential and Endangered* examines these fascinating ecosystems. The video illustrates how plants and animals have adaptations that enable them to survive—even thrive—in dry conditions. It describes different features of desert landscapes and how they were formed. The program also examines the human impact on deserts, particularly the results of farming, irrigation, and urbanization.

The video is part of a series of Rainbow programs on biomes.

Grade level: The video is appropriate for classes from fourth to eighth grade.

SUMMARY

The video begins by describing the basic characteristics of deserts. It explains that the term "desert" originally meant a place with few if any people. Deserts in fact occupy 25% of Earth's land, but are homes to only 5% of the population. More modern definitions describe deserts as places that get under 10 inches of precipitation a year and have little vegetation.

The program describes different types of deserts. "Hot" deserts have temperatures that can reach a hundred degrees Fahrenheit in the shade during the day. "Cold" deserts, such as China's Gobi Desert, have winter temperatures that can dip to minus 40 degrees Fahrenheit. There are also "polar" deserts, such as Antarctica, that get little precipitation.

The program goes on to describe how deserts are the result of climatic patterns. Most North American deserts lie east of mountains that form a barrier to moisture-laden winds. The program notes that deserts are places of great contrasts in weather patterns. Clear air and lack of moisture make for hot days followed by much cooler nights. Long periods of dryness are punctuated by an occasional torrential downpour.

Desert Landscapes: This segment focuses on desert landscapes and how they were formed. It describes how dry desert stream beds called washes or arroyos can quickly flood after a rain, carrying gravel, sand, and even large boulders. Deposits of rock and sand form where the flood waters drop their load. The program also describes the effects of wind and shows images of shifting sand dunes. The video describes buttes and other unusual formations formed by erosion, and describes dry lake beds called playas.

Life in the Desert: This segment opens with images of ephemerals, plants that germinate and bloom rapidly after a heavy rain. The program then shows students

at the Cooper Environmental Science Campus near Tucson, Arizona, studying how different plants adapt to desert conditions. Examples include cactus plants that have spines rather than broad leaves that easily lose water. Besides cutting down on water loss, these spines shade the cactus and protect it from animals that might eat it. The video also shows how the broad root system of a cactus plant helps it soak up water. Mesquite plants have a long taproot that can reach water deep underground. The video also describes riparian areas that have cottonwoods and other plants that live along the banks of desert streams.

The video goes on to describe a variety of animals, including the lyre snake, rattlesnake, Gila monster, spadefoottoad, hummingbird, woodpecker, coati, javelina, tarantula, mountain lion, and others. The video emphasizes the interdependence of desert life by looking more closely at saguaro cacti and the many animals that depend on them for shelter and food.

The Flow of Energy: The video next looks at the flow of energy in the desert. It explains how the sun is the ultimate source of this energy, and how plants use the energy of sunlight to produce their own food through photosynthesis. Herbivores in turn eat plants, and carnivores eat animals that eat plants.

The Human Impact: Finally, the video focuses on the human impact on deserts. This section shows how farmers have used irrigation to grow crops, obtaining

water from aquifers or from often distant sources like the Colorado River. The program also shows how an expanding human population has led to enormous growth in places like Phoenix, Arizona. The program notes that water is a scarce commodity in deserts and focuses on the dangers posed by using too much water.

A brief summary concludes the video.

OBJECTIVES

After viewing the program, students will be able to:

1. define the characteristics of deserts, including climate and location.
2. describe the conditions that give rise to deserts.
3. describe land forms found in different deserts.
4. give examples of animal and plant life in deserts.
5. describe different plant and animal adaptations that help them survive in desert environments.
6. describe how energy flows through desert communities from the sun to plants, from plants to animals, and from animals to other animals.

7. describe the human impact on deserts, particularly the effects of irrigation, farming, population growth, and demand for limited water.

REVIEW QUESTIONS

1. What is a biome?
A biome is an area that has a certain kind of climate and certain kinds of living things,
2. What kind of climate characterizes deserts?
Deserts are dry. They get less than 10 inches of rainfall a year.
3. What are several different kinds of desert and what are the major characteristics of each?
Examples in the program include hot deserts (e.g., the Sahara), cold deserts (e.g., the Gobi), and polar deserts (e.g., those in Antarctica).
4. What is a rain shadow, and how does a desert form in a rain shadow?
A rain shadow occurs when mountains form a barrier to winds full of moisture coming from the west. As these winds hit the cold air surrounding the mountains, the moisture condenses, clouds form, and it rains. When the winds reach the eastern side of the mountains, they've lost most of their moisture. This lack of moisture causes deserts to form.

5. In what ways are deserts places of great contrasts?
Answers may vary. Two examples in the video describe how deserts are often very hot during the day but much cooler at night. Also, deserts may go a very long time without rain and then experience a sudden torrential rain.
6. What is a wash or arroyo?
A stream bed that most of the time is dry is a wash or arroyo.
7. What is an alluvial fan and how is it formed? *An alluvial fan is a deposit of sand and gravel formed where a stream bed flows out onto a plain.*
8. How are buttes formed?
Buttes are formed when some parts of the land weather and erode more quickly than others.
9. What is a playa?
A dry lake bed is a playa
10. What are ephemerals?
Ephemerals are desert wildflowers that live only a very short time.
11. Give examples of ways in which different plants have adapted to desert conditions.

Some plants exist mainly underground with extensive root systems. Cacti store water in their trunks. Cacti have spines rather than broad leaves to cut down on water loss. Many plants have waxy leaves that prevent water loss. Students may be able to give other examples as well.

12. Give examples of ways in which different animals have adapted to desert conditions. *Some animals are nocturnal, coming out only at night to search for food. The spadefoot toad buries itself in the ground for most of the year to avoid drying out. Some animals nest inside the saguaro and other cacti to keep cool. Students may be able to provide other examples.*

13. Describe the flow of energy in the desert. *The ultimate source of energy is the sun. Plants use this energy in photosynthesis to manufacture their own food. Herbivores eat plants. Other animals eat animals that eat plants.*

14. How do people affect the desert biome? *Farmers irrigate deserts to grow crops. Cities have grown as people move to deserts for the climate and for recreation. Farming and other activities require a lot of water, a scarce resource in a desert. This makes less water available for desert plants and animals. Students may be able to think of other examples.*

ACTIVITIES

1. If students live in or near a desert, they can observe first hand the climate, landscapes and life of a desert. Often it is possible to arrange a tour with a naturalist at a state or national park (see Appendix B). Students can also photograph or illustrate a desert at different times of the year to show seasonal changes.
2. Ask students to research and report on a desert animal or plant and describe how it is adapted to its environment. Students can report in more detail on a plant or animal depicted in the video, or choose a different one.

Examples of Animals

coyote jack rabbit
bat
horned lizard
burrowing owl
roadrunner
bighorn sheep
stink beetle
scorpion desert
tortoise pack rat

Examples of Plants

cholla
organ pipe cactus
barrel cactus
creosote bush
yucca
Joshua tree
ocotillo
agave
various wildflowers,
including lupine,
evening primrose,
owl's clover

3. Ask students to draw a desert food chain showing how energy flows from the sun to plants and from plants to animals. After students have illustrated different chains, have them combine their information to construct a more complex food web.
4. Ask students to compare deserts to another biome, such as a rainforest, grassland, wetland, temperate forest, or tundra. Have them compare a desert's climate, landscapes, and plant and animal life to those of the biome they have chosen. Ask them how the conditions of each biome affect the kinds of life that live there.
5. Ask students to research and report on a native American tribe that has or still lives in the desert. Their report should include information on their customs, religion, hunting and/or farming practices, and shelter. It should detail how these people adapted to life in the desert.
6. Students can research and report on ways that more recent settlers have changed a particular desert region. For example, they can trace the history of agriculture and ranching in a region; or they can chronicle the history of a desert city such as Phoenix or Las Vegas. Their report should include information about what threats are posed to a desert by human activity.

7. Students can research and report on ways to help protect deserts. Some important strategies are to:
- avoid buying snakes, lizards or other desert animals that are threatened or endangered.
 - conserve water.
 - use xeriscaping (landscaping with natural desert vegetation rather than lawns and other vegetation that require a lot of water).

GLOSSARY

aquifer: underground layer of soil or porous rock that yields water

alluvial fan: fan-shaped deposit of sand, silt, and gravel that forms where a stream slows down at the base of a mountain

arroyo: desert stream channel that is dry most of the time

biome: area such as a desert, grassland, or wetland that is characterized by a certain kind of community of plants and animals

butte: hill that rises above the surrounding area and has a flat top

carnivore: flesh-eating animal

coati: mammal related to and resembling a raccoon

cold desert: desert characterized by a cold climate

desert: barren area that has little precipitation

ecosystem: community of living things along with its physical environment

ephemerals: desert wildflowers that live only for a short time

erosion: movement of soil and other material by wind or water

fleabane: kind of wildflower

Gila monster: venomous lizard found in the southwest United States and western Mexico

herbivore: animal that feeds mainly on plants

irrigation: act of supplying dry land with water

javelina: pig-like mammal found in the southwest United States

jojoba: medium-size shrub with waxy leaves

kangaroo rat: rat with long hind legs adapted for jumping

larkspur: kind of wildflower

mesquite: small spiny shrub or tree with a long taproot

nocturnal: active during the night

nurse plant: plant such as a paloverde that shades a young saguaro cactus, enabling it to survive

ocelot: small desert cat

paloverde: spiny, nearly leafless bushy tree found in the southwest United States

photosynthesis: process by which green plants use the energy of sunlight, water, and carbon dioxide to manufacture carbohydrates while releasing oxygen as a by-product.

pit viper: any of various venomous snakes characterized by a heat-sensing pit below each eye.

playa: temporary desert lake

polar desert: desert found in polar regions such as Antarctica

rain shadow: area that receives little rain because a mountain or mountain range blocks the rain supply.

riparian habitat: area that has water available year round

saguaro: variety of cactus that can grow very large and is found in the southwestern United States and northern Mexico

succulent: plants with thick, fleshy leaves or trunks that store a great deal of water

taproot: main root of a plant that grows straight downward from the stem

tarantula: large, hairy, and fairly shy spider

tarantula hawk: wasp that stings and paralyzes a tarantula and then lays its eggs on the spider's body

wash: dry stream bed

BIBLIOGRAPHY

Ariritt, Susan. *The Living Earth Book of Deserts*. Pleasantville, New York: Reader's Digest, 1993.

Helms, Christopher L. *Sonoran Desert: The Story Behind the Scenery*. Las Vegas, Nevada: KC Publications, 1980.

MacMahon, James A. *Deserts*. New York: National Audubon Society Nature Guides, Knopf, 1985.

Page, Jake. *Arid Lands*. New York: Time-Life Books, 1984.

Pringle, Laurence. *The Gentle Desert: Exploring an Ecosystem*. New York: Macmillan Publishing Co., Inc., 1977.

Sayre, April Puley. *Desert*. New York: Twenty-First Century Books, 1994.

Wallace, Marianne D. *America's Deserts*. Golden, Colorado: Fulcrum Publishing, 1996.

Wiewandt, Thomas. *The Hidden Life of the Desert*. New York: Crown Publishers, 1990.

Williams, Lawrence. *Last Frontiers for Mankind: Deserts*. New York: Marshall Cavendish, 1990.

RELATED VIDEOS FROM RAINBOW

Amphibians: Amazing Animals

Animal Profile Series

Beyond the Bars: Zoos and Zoo Animals

Cool Creatures: Reptiles

Grassland Biomes: Essential and Endangered

Oceans: Our Last Frontier

Our Changing Earth

Reduce, Reuse, Recycle: Environmental Concerns

Source of Life: Water and the Environment

Struggling to Survive: Tropical Rain Forests

Threats to Biodiversity: Why We Should Care

Treasures of the Deep: Our Ocean Resources

Wetland Biomes: Essential and Endangered

**APPENDIX A
ORGANIZATIONS TO CONTACT**

Arizona-Sonora Desert Museum
2021 North Kinney Road
Tucson, AZ 85743

Chihuahuan Desert Research Institute
P.O. Box 1334 Alpine, TX 79831

The Desert Protective Council, Inc.
P.O. Box 4294
Palm Springs, CA 92263

Friends of the Earth 218
D Street, SE
Washington, DC 20003
(202)543-4312

National Audubon Society
700 Broadway
New York, NY 10003

National Wildflower Research Center
2600 FM 973 North Austin, TX 78725-
4201 (512)929-4201

National Wildlife Federation
1412 Sixteenth St., NW
Washington, DC 20036

National Resources Defense Council
40 W. 20th St.
New York, NY 10011

The Nature Conservancy 1800
North Kent Street Arlington, VA
22209 (703) 841-5300

Sierra Club
30 Polk Street
San Francisco, CA 94109

The Wilderness Society 900 17th
St., NW Washington, DC 20006

**APPENDIX B DESERT
PARKS IN THE U.S.A.**

Arches National Park
Moab, UT

Bandelier National Monument Los
Alamos, NM

Big Bend National Park TX

Canyon de Chelly National Monument
Chinle, AZ

Canyon Lands National Park
Moab, UT

Capitol Reef National Park
Torrey, UT

Carlsbad Caverns National Park
Carlsbad, NM

Chiricahua National Monument
Willcox, AZ

Death Valley National Monument CA

Grand Canyon National Park
AZ

Guadalupe Mountains National Park Salt
Flat, TX

Joshua Tree National Monument
Twenty-Nine Palms, CA

Organ Pipe Cactus National Monument
Lukeville, AZ

Saguaro National Monument
Tucson, AZ

White Sands National Monument
Alamogordo, NM

Zion National Park
Springdale, UT

SCRIPT

Title: Desert Biomes: Essential and Endangered

Male Narrator:

Like a dry ocean, the Sonoran Desert in Arizona stretches to distant mountains, offering views uninterrupted by tall trees or houses. The word "desert" originally meant a "deserted place." Deserts occupy 25% of earth's land, but are home to only 5% of its people.

Deserts are a biome, an area like a tropical rainforest or a grassland that has a particular kind of climate and certain kinds of living things.

A tropical rainforest, for example, gets over two and half meters or a hundred inches of rain a year, and its lush plant life is a result of this kind of climate.

The modern definition of deserts describes them as places that get under 10 inches or 25 centimeters of rain or snow a year, and the kinds of life in deserts reflect these dry conditions .

Female Narrator:

But within this broad definition, there are many kinds of deserts.

There are "hot" deserts, like the Sahara in Africa. The Sahara desert has temperatures that are often well over 100 degrees Fahrenheit or 38 degrees Celsius.

The world's largest desert, the Sahara stretches across northern Africa from the Atlantic Ocean to the Red Sea.

The Gobi Desert in China is a so-called "cold" desert. In the winter, temperatures can reach a low of minus 40 degrees Fahrenheit.

Some call the Arctic and Antarctic "polar" deserts because they, too, get very little precipitation. What little snow they get evaporates very slowly.

Male Narrator

With the exception of the Arctic and Antarctic, most deserts lie in two belts between 15 and 35 degrees north and south of the equator. Along these belts, large masses of dry air form and, like giant sponges, soak up moisture.

Some deserts form because they lie in what are called "rain shadows." Most North American deserts lie east of mountains that form a barrier to winds full of moisture picked up from the Pacific Ocean. As these winds come in from the west, they hit the cold air surrounding the mountains. The moisture condenses, clouds form, and it rains. By the time the winds reach the eastern side of the mountains, they've lost most of their moisture.

Female Narrator

Deserts don't have an insulating blanket of moist air to protect their surface from the sun's rays. During the day, the sun bakes the ground, and the temperature

rises quickly. However, when the sun sets, the desert rapidly loses heat because there is little moist air to keep the heat in. Hot days are followed by much cooler nights.

Deserts are places of great contrasts. They can go months, even years, without rain. Sometimes, when it does rain, the droplets never reach the ground. They evaporate when they hit a layer of hot air. This is called a "ghost rain."

At other times a year's worth of rain may pour down in a few minutes, causing flash floods that alter the way a desert looks.

Subtitle: *Desert Landscapes*

Male Narrator:

Water is scarce in a desert, but it plays an important role in sculpting many features of a desert landscape.

This is Craig Ivanyi of the Arizona-Sonora Desert Museum.

Craig Ivanyi:

We're standing in the middle of a wash, and what a wash is—it will also be called arroyos or draws depending on where you go—is a type of river bed, but basically it's a dry river bed for almost the entire year except in the rainy season, particularly the summer rains. When those come, water can come down this wash and inundate this area all the way up to the banks

sometimes. So, you can go from an entirely dry area to what appears to be a large river very quickly.

Male Narrator:

The flood waters from a storm can cause rapid erosion. Erosion is transporting or moving of rock and soil from one place to another. As water runs down a mountain, it can carry sand and even boulder-sized rocks with it. As the water reaches flatter land, it slows down and drops its load. At the base of many desert mountains, there are large deposits of debris called alluvial fans that have been formed as the result of many floods over long periods of time.

Water changes a desert in other ways. In some places, there are desert rivers whose water comes from beyond the desert itself. Over millions of years the rivers have cut deep canyons, like the Salt River Canyon near Phoenix, Arizona.

Female Narrator:

Like water, wind plays an important role in shaping the desert through erosion. The wind picks up loose pieces of rock and sand and moves them .

Wind erosion is more common in a desert biome than elsewhere because there are fewer plants to anchor the soil. In the Great Sand Dunes National Monument in Colorado, the wind blows grains of sand that form ever-changing patterns of waves.

Male Narrator:

In the rapid heating and cooling of the desert days and nights, rock expands and contracts. The stress can cause pieces of rock to crack and break off, a process called weathering. Some types of rock weather more quickly than others. This leads to many unusual shapes in the more durable rock that is left when the material around it has weathered and eroded. In Arches National Park in Utah, weathering and erosion have created odd-shaped pillars and flat-topped formations called buttes that stand high above the floor of the Great Basin Desert.

Female Narrator:

In some deserts, like Death Valley, you can find dry lake beds called *playas*. These hold water briefly after a rainfall. As the water evaporates, salt and other material in the water forms a crust on the desert surface.

As its name suggests, Death Valley is a desolate place, but even here, and in many deserts, there is a surprising variety of life,

Subtitle: *Life in the Desert*

Male Narrator:

In Arizona, the Sonoran Desert blooms with purple larkspur, white flea bane, and other wildflowers after winter rains. These wildflowers are called *ephemerals*, which means "living for a short time." For months

and even years, the seeds from which these plants grow lie dormant—or inactive—in the desert soil. Only after a heavy rain do the seeds spring to life. The plants sprout, grow, blossom and then die—all within a few weeks.

Female Narrator:

Despite the shortage of water, there is a great deal of plant life in many deserts, but many plants that are common in other places could not survive in desert conditions. For instance, many trees, like this oak, have broad leaves that help them capture the energy of sunlight which they need to grow; but such leaves also lose water very easily, a tremendous disadvantage in a desert.

Desert plants have adapted to conditions where water is scarce. These students at the Cooper Environmental Science Campus near Tucson, Arizona, are looking closely at some of the features of different desert plants that enable them to survive and even thrive.

Doris Evans (teacher):

We were just talking about how leaves are water losers, but here we have a plant that has a lot of leaves. I'd like you to try something. Get up close to these bushes and with your fingernails scratch the surface of the leaves, and look at the leaf to see what happens.

Student:

It's waxy.

Male Narrator

Many desert plants, like this jojoba shrub, have small leaves covered with a wax coating that prevents moisture from escaping.

Cactus plants have a different strategy. Instead of having a broad surface, their leaves are actually thin sharp spines, a shape that helps cut down on water loss. The spines of a cactus serve several purposes. They protect the plant from animals that might otherwise eat it. They also shade the trunk of the plant from the harsh sunlight, and create air currents around the plant that help cool it.

A cactus is a kind of plant called a succulent. Succulents store water in their trunks or leaves. This saguaro cactus has a huge root system that soaks up water after a rain. The accordion-like pleats on its trunk enable it to swell up when water is available. A saguaro can hold several tons of water. The trunk shrinks as the saguaro uses up water during long dry periods.

Other plants have different ways of dealing with the dry desert conditions.

The mesquite has a very long root, called a *taproot*, that goes straight down to get water from deep underground streams or lakes.

Female Narrator:

Deserts have many different kinds of environments. Riparian areas are ribbons of green that form along desert streams. In these moister conditions, you'll find plants that you won't see elsewhere in the desert. On the bank of a desert stream, you might find cottonwoods. These drop their seeds in the water, which carries them downstream.

In these riparian streams, there also are animals that don't exist elsewhere in the desert— like the river otter, which feeds on trout and other fish.

Male Narrator:

Like desert plants, most desert animals have to deal with conditions where water is scarce, and the temperature during the day is very high.

At the Cooper Environmental Science Campus, the students have found a lyre snake escaping the daytime heat by holing up in a sandy cliff. Their teacher uses a mirror to reflect light into its cool refuge.

Like the lyre snake, the western diamondback rattle snake would die if exposed too long to the desert sun. During the day it, too, hides in shady places, waiting to come out to hunt at night. Rattlesnakes are pit vipers. They have two heat-sensing pits, one on each side of their heads. These help them detect mice and other possible meals.

Another kind of rattlesnake, the sidewinder, gets its name from the distinctive sideways looping motion it uses to crawl across the ground.

Female Narrator:

There are many unusual reptiles in the desert. Gila monsters spend most of their time in rocky crevices or burrows. They come out mainly in the early morning, particularly in the spring. They eat eggs and small animals, but when food is scarce it lives off the fat stored in their tails.

The chuckwalla is another kind of desert lizard. Like all reptiles, it is cold-blooded, which means that it depends on its environment to regulate its body heat. In the early morning, it basks in the sun until its body gets warm enough. It then starts looking for plants it likes to eat.

There are even amphibians in the desert...animals that we usually associate with much wetter environments.

Listen to Craig Ivanyi.

Craig Ivanyi:

This is a Couch's spadefoot, perhaps the most adapted amphibian of the Sonoran Desert...an animal that spends maybe up to 11 months of the year underground, kind of a hibernation you might say. When the

rains come in the summertime, the vibrations bring them up and they'll actually pop out of the ground, and do all their feeding and breeding in a very short period of time.

They've got these little spades on their back foot that allows them to dig, and they'll do that in a corkscrew fashion, digging down into the ground where they'll spend the remainder of the year.

Male Narrator:

Many deserts are far from being desolate and lifeless. There are about a dozen species of hummingbirds in Arizona's Sonoran desert, like this Rufous hummingbird and this Costas. Hummingbirds use up an enormous amount of energy. Their hearts beat as much as 500 to 1200 beats a minute. To fuel their tiny bodies, they eat several times their own weight in nectar and small insects every day.

This broad-billed hummingbird feeds her offspring by thrusting her long bill into their throats.

Female Narrator:

There are unusual mammals in the desert, such as the coati, a raccoon relative.

The gray fox often has its den among the boulders along the slopes of rocky ridges.

Javelinas are small wild hogs that travel in herds..

Because of its beautiful fur, the ocelot has been hunted to near extinction.

Male Narrator:

There are many myths about desert animals. Movies have made us fear the tarantula, but the tarantula is actually a very gentle spider. Tarantulas live a very long time. Males live to be about 12 or 13, and females can live twice that long.

Perhaps the spider's worst enemy is the tarantula hawk, a wasp whose sting paralyzes a tarantula. It then lays an egg on the spider's body. When it hatches, the wasp larva feeds on the spider.

Female Narrator:

The plants and animals of the desert do not live in isolation from each other.

They are all part of a community of living things in which each member depends on others.

The saguaro cactus, found only in the Sonoran Desert, offers a vivid illustration of this interdependence. The flowers of the saguaro bloom only one night each year, although not all bloom at the same time. Each flower stays open through only part of the next day. During this brief time, birds and insects take advantage of its nectar.

Many animals depend on the saguaro. The kangaroo rat and other rodents eat its seeds. The saguaro trunk is like a desert apartment house. Woodpeckers drill

out holes in which they nest. When they leave, other birds move in. The inside of the saguaro offers cool shelter from the desert sun.

Male Narrator:

Early in its life, the saguaro cactus depends on other plants for its own survival. Seeds that fall on the open desert soil rarely survive. Young saguaros grow best under the protection of a *nurse* plant, like this palo-verde.

Saguaros grow very slowly. They take 25 years to reach a height of only two feet, or sixty centimeters. They don't begin to form branches until they're 65 or 70 years old. No two saguaros grow branches in exactly the same way. The patterns they form are as unique as fingerprints are to people. Saguaros can live to be 150 to 200 years old and reach heights of 50 feet or 15 meters. This saguaro began life many years before the Civil War.

Subtitle: *The Flow of Energy*

Female Narrator:

The plants and animals of the desert are bound together by their common need for energy. The ultimate source of this energy is the sun. Through a process called photosynthesis, plants use this energy to manufacture their own food in the form of sugars and starches. These sugars and starches are stored in a plant's leaves, stems, and roots.

Many animals depend upon the stored energy in plants for their food. Birds like this woodpecker eat seeds.

Bees and other insects eat the nectar of flowers.

Javelinas eat cactus plants, spines and all.

Male Narrator:

Plant-eating animals like this deer are called herbivores.

Other animals, like this mountain lion, are meat-eaters, or carnivores.

Some animals are both plant and meat eaters, Besides eating seeds, the grasshopper mouse survives by eating small animals like this scorpion, which itself fed on small insects.

Here, a kangaroo rat has become a meal for a rattlesnake.

A snake may become food for a hawk. And so energy flows from sun to plants, plants to animals, and animals to other animals.

There are other living things that have an impact on the complex ecology of the desert. Humans probably have the greatest impact of all.

Subtitle: *The Human Impact*

Female Narrator:

Humans have changed the desert landscape. Large areas of desert have turned green as farmers use irrigation to grow crops. Canals and pipes bring water from distant rivers to desert farms. Farmers also pump water from underground lakes called aquifers, and divert water from rivers like the Colorado. Irrigation has made desert farms and orchards an important source of food for people in many parts of the world.

Male Narrator:

Farms are not the only reason why more and more people have been moving to deserts. With their dry, warm climate and spectacular scenery, deserts have become popular places to live. Some of the fastest growing cities in the United States are desert communities such as Las Vegas, Nevada and Phoenix, Arizona.

Female Narrator:

Such communities require a lot of water, something that by definition is scarce in deserts. Critics argue that much of this water is needlessly wasted.

Water is used to create golf courses where there was once only rocky and sandy soil. Water is used for lawns that could not otherwise exist. Water is even used to make ponds and lakes that have become features of many new housing developments.

As with agriculture, this water comes from underground aquifers, or is piped in from other sources such as the Colorado River. The Colorado seems powerful as it rushes through the Grand Canyon, but so much water is being diverted from this river for farming and other purposes that it often dries up entirely before reaching the Gulf of California.

Male Narrator:

Water from aquifers is rapidly being used up as well. It took many hundreds of years for water to accumulate in these underground sources, but at the rate this water is now being pumped out of the ground, we risk using it up in a matter of decades.

Using this water is rapidly lowering the water level in places, so that it will be out of reach of the roots of many desert plants.

There are other problems. As the number of people who live and work in deserts increases, the risks to desert life from air and water pollution also rise.

Deserts are rugged environments, but the growing human presence has shown that they are fragile as well.

Female Narrator:

Deserts are many things. Some are seas of constantly shifting sand dunes. In others, desert rivers carve deep

canyons, and pillars and buttes are shaped by weathering and erosion.

Male Narrator:

Deserts are places of great contrasts. Extremely hot days are followed by much cooler nights. Months without rain are punctuated by storms that flood what only a short time before were dry river beds.

Some deserts seem lifeless and desolate, but others are full of life.

Female Narrator:

Deserts have taught us much about how life can adapt to conditions where water is scarce.

Deserts are complex communities of living things, where different plants and animals depend on each other for survival,

and deserts vividly illustrate the flow of energy from the sun to plants, from plants to animals, and from animals to other animals.

Male Narrator:

We humans have become an important part of the desert community of living things. As our own presence grows, we face a challenge to protect these beautiful environments as we use and enjoy them.

End