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ABSTRACT

This curriculum guide was developed for use with public television's Nature series. The materials in the guide are designed to help students actively participate in the study and experience of nature. Students are encouraged to view the programs as naturalists would, observing animals in their environment, noting their behavior, examining factors that affect their health, and drawing conclusions. Each lesson in the Teacher's Resource Guide includes: (1) a "Program Overview" that presents background information and brief synopses of the program to be viewed; (2) "Objectives" that provide the teacher with measurement goals; (3) "Vocabulary" that features definitions of unfamiliar terms; (4) "Before Viewing the Program" that familiarizes students with the subject and allows them to set purposes for viewing; (5) "After Viewing the Program" that provides discussion questions to help students assess the main points of the program; and (6) a "Naturalist's Guide" (student worksheet) to be duplicated and distributed to students. The programs highlighted in this guide focus on the spectacular hidden riches of the diverse lands of Russia and the Central Asian Republics. Program titles include "Green Jewel of the Caspian," "The Arctic Frontier," "The Red Deserts," "The Celestial Mountains," "Siberia-The Frozen Forest," and "Born of Fire." (WRM)

TEACHER'S GUIDE

REALMS OF THE RUSSIAN BEAR

NATURE

Thirteen·wnet NATURE is produced for PBS by Thirteen/WNET in New York.

The REALMS OF THE RUSSIAN BEAR videotape library and this special Teacher's Guide are made possible by a grant from the Liz Claiborne Foundation.

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ENTER THE WORLD OF THE NATURALIST

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The REALMS OF THE RUSSIAN BEAR videotape library and this special Teacher's Guide are made possible by a grant from the Liz Claiborne Foundation.

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TO THE TEACHER

INTRODUCTION

This special Teacher's Guide has been developed for use with public television's REALMS OF THE RUSSIAN BEAR, a six-part NATURE series. The six one-hour programs reveal the spectacular hidden riches of the diverse lands of Russia and the Central Asian republics. The miniseries travels across eleven time zones and the thousands of miles that comprise the huge landmass of the former Soviet Union, from the green shores bordering the Caspian Sea to Siberia to the Arctic and semi-tropical landscapes bordering the Pacific Ocean. Along the way the viewer will be introduced to a variety of wildlife, ranging from the polar bear and Siberian tiger to the raccoon dog, the ferocious tiger beetle, and the giant octopus.

Our guides for this fantastic journey are George Page, host of NATURE and director of science and natural history programming for WNET, and Dr. Nikolai Drozdov, author, professor of natural history at Moscow State University, and host of the popular Russian television series, IN THE WORLD OF ANIMALS. Dr. Drozdov's accounts of his childhood on the Russian taiga and his experiences as a naturalist bring a warm, personal touch to the series.

The Educational Materials

This Teacher's Guide has been designed to help students actively participate in the study and experience of nature. Students are encouraged to view the programs as a naturalist would, observing animals in their environments, noting their behavior, examining factors that affect their health, and drawing conclusions. Students should be encouraged to create naturalists' diaries in which to record their observations and activities. Discussion questions help assess the main points of the program, as well as explore the impact of human behavior on the environment. The student worksheets, entitled "Naturalist's Guides," provide activities that will help facilitate this kind of active viewing. Because this series explores parts of the former Soviet Union long hidden from view, you may wish to share these materials with teachers in the social studies department.

The components of each lesson are:

- *Program Overview* that provides a brief synopsis of the program to be viewed;
- *Objectives* that provide the teacher with measurable outcomes;
- *Vocabulary* that provides definitions of unfamiliar terms;
- *Before Viewing the Program* that familiarizes students with the program's subject and allows them to set purposes for viewing;
- *After Viewing the Program* that provides discussion questions to help students assess the main points of the program;
- *Naturalist's Guides* (student worksheets) that contain activities encouraging students to view the programs as a naturalist would in order to gain a better understanding of animals, their habits and habitats, and other factors that affect their existence. The activities contain both individual and cooperative learning activities.

Creating a Naturalist's Diary

Naturalists and conservationists often keep diaries to record their observations. In order to complete the activities presented in this guide, students will need to keep diaries of their own. They may set aside part of their science notebooks or may prepare separate booklets for this purpose. Diaries may include news clippings, drawings, photos, maps, charts, graphs, and other information as well as records of observations. Students may wish to share their diaries with others or use their entries to develop a bulletin-board display that reflects what they have learned as naturalists.

GREEN JEWEL OF THE CASPIAN

OBJECTIVES

Students will

- explore the seasonal patterns and the environment of the Caspian Sea and the Volga Delta
- examine how plants and wildlife have adapted to life in and around the Caspian Sea
- examine the nesting sites and types of nests birds build.

VOCABULARY

Introduce students to the vocabulary and the names of wildlife before viewing the program.

delta *noun:* a flat, plainlike area of sedimentary deposits at the mouth of a river or stream.

larva *noun:* the immature, wingless form of an insect that transforms itself into a pupa (or another stage) before it becomes an adult that possesses adult characteristics.

sediment *noun:* silt, clay, sand, or organic matter deposited by a river.

spawn *verb:* to shed large quantities of eggs and sperm directly into water, as done by many fishes, and mollusks.

Wildlife:

animal: Saiga (antelope)

insect: damselfly

birds: cormorant, penduline tit, egret, ibis, whiskered tern, greylag goose, teal, Dalmatian pelican, redpoll, willow ptarmigan, snipe, ruff, kittiwake, whooper swan

fishes: stickleback, pipefish, sturgeon

SUGGESTED READING

To students who want to learn more about the topics presented in this program, you may suggest the following:

Sparks, John. *Realms of the Russian Bear.* Boston: Little, Brown, 1992.

PROGRAM OVERVIEW

In the arid desert region of central Asia springs a lush green triangle at the northern edge of the Caspian Sea. The Volga Delta, one of Russia's most important wetlands, contains its oldest nature reserve, Astrakhan, where European, Asian, and African wildlife species mingle. Spring floods fertilize the delta and trigger the breeding of fish, amphibians, and birds. There in abundance is one of the world's favorite delicacies — caviar. As sturgeon and beluga migrate northward to breed, they are netted and stripped of their caviar, the "black pearls" of the Astrakhan. "Green Jewel of the Caspian," Program 1 of *Realms of the Russian Bear*, explores the seasonal cycles of the Caspian Sea and the Volga Delta and the life cycles of the plant life and wildlife that live in and around their waters. It spotlights the remarkable adaptations of some species, including penduline tits, birds that build intricately woven nests. It also focuses on the remarkable journeys undertaken by wildlife such as cormorants that make yearly migrations from the Persian Gulf.

BEFORE VIEWING THE PROGRAM

Note: The first 12 minutes of this program present an overview of the series. You may want to preview the series with students by presenting this segment. The activity described below will introduce students to "Green Jewel of the Caspian." If you show the film in class, be sure to cue the tape to the beginning of "Green Jewel of the Caspian."

Introducing the Program

Write the word *wetlands* on the chalkboard. Ask students to identify the characteristics of a wetland, and the plants and wildlife found there. Write students' responses on the chalkboard to create a semantic map. Tell students that a large wetland area is formed each year in Russia when the Volga River overflows, creating a 125-mile-wide delta. Using a world map or a globe, help students locate the Volga where it empties into the Caspian Sea. Ask them why the Volga Delta might make a good breeding ground for wetland birds. Write their explanations on the chalkboard. Then tell students that the program they will see, "Green Jewel of the Caspian," examines the Volga Delta and the Caspian Sea, a breeding place for wetland birds, fish, and amphibians.

Distribute the Naturalist's Guide

Duplicate and distribute the Naturalist's Guide to students and preview it with them. Explain that they will be observing the plants and wildlife of the Volga Delta and the Caspian Sea as well as the seasonal cycles of this region. Encourage students to take notes and make sketches of the various plants and wildlife as they view the program.

AFTER VIEWING THE PROGRAM

Discussion

Encourage students to discuss the program and share their observations. The following questions may be used to stimulate discussion.

1. Why is the Volga River called the lifeblood of the Caspian Sea and the Volga Delta? Describe the cycle that creates the fertile delta and enriches the waters of the Caspian Sea. (Spring meltwaters in northern Russia cause the Volga to overflow. The sediment provides rich nutrients for the waters and soil, and triggers the breeding of insects, amphibians, fishes, and birds.)
2. In what ways are the Caspian Sea and the Volga Delta like refueling stations? Nurseries? (Migrating birds stop there to feed in order to rebuild strength for the continuation of their flight. Many species such as carp, heron, and ibis come to this area specifically to breed.)
3. What physical adaptations and behavior enable the various animals to protect themselves from predators and be successful hunters? (protective coloration, shape of body and body parts, stalking behavior, schooling or flocking behavior, etc.)
4. How are the issues that affect the Volga River and the Caspian Sea similar to issues that influence the environment of other bodies of water either in your area (e.g., the Hudson River or the Rio Grande) or in other countries (e.g., the Amazon, Ganges, Nile)? (Answers will vary.)
5. What did you learn from "Green Jewel of the Caspian" that can be used to help improve, preserve, or protect other areas or bodies of water? (Answers will vary.)

GREEN JEWEL OF THE CASPIAN

Complete the first activity and one other activity of your choice.

HOME, SWEET HOME

Some of the birds you will see in this program build nests atop trees, among reeds, suspended over water, or among water lilies. Take notes about birds, their nests, and nesting sites. Sketch the various nests you see. With a group, share your findings and fill in any information you might have missed. Discuss how each kind of nest and nesting site is beneficial to that species of bird. With your group, prepare a report. Use your sketches and diagrams to illustrate your findings.

The Volga Delta, at the northern end of the Caspian Sea, is one of Russia's most important wetlands and contains its oldest nature reserve, Astrakhan. Great black-headed gulls make their home on Djemchusny, a small island in the Caspian Sea. Ten thousand pairs breed on this island—nearly half the world population.

FLYING WITH THE JET SET

Many birds migrate to the Volga Delta or use it as a stopping-off place en route to somewhere else. Birds come from as far away as the Middle East, Africa, Siberia, and Asia. With a group, research the migration paths of the following birds: cormorants, herons, steppe eagles, whiskered terns, greylag geese, white egrets, snipe, teal, Dalmation pelicans, whooper swans. Illustrate the migration paths on a map. Use colored string or yarn to represent the different bird species. Include your own sketches of the birds. If possible, find news articles in conservation or wildlife magazines about the places where birds migrate. Mount the articles on or near the map. With your group, talk about how the destruction of habitats affects the migration patterns of these birds. Display your project on the bulletin board.

NEST BUILDING

With a partner, use appropriate material to build a bird nest piece by piece, as a bird would. Develop an awareness of the need for natural "building supplies" by using only what you can obtain from outdoors. Think about the amount of labor involved (how many flights back and forth for twigs, etc.) and the architectural intricacy of building sound nests. Display your nest and describe your nest-building efforts to your classmates.

THE DEAD SEA?

The Volga River's waters are dammed and used to generate electricity and irrigate fields. What negative effects might this have on the Volga Delta and the Caspian Sea? With a group discuss the possible environmental problems. Then, illustrate the problems in a poster, a series of diagrams, or a three-dimensional model and present your project to the class.

THE ARCTIC FRONTIER

OBJECTIVES

Students will

- explore the seasonal patterns of the Arctic tundra
- examine how plants and wildlife have adapted to life in the Arctic.

VOCABULARY

Introduce students to the vocabulary and the names of wildlife before viewing the program.

tundra *noun:* a treeless plain with permanently frozen subsoil found in Arctic or sub-Arctic regions.

permafrost *noun:* permanently frozen ground in frigid regions.

lichen *noun:* a plant partnership composed of an alga and a fungus in a symbiotic relationship — they live together advantageously as one unit.

fossil *noun:* preserved remains, traces, or imprints of an organism from past geological eras.

vixen *noun:* female fox

Wildlife:

birds: peregrine falcon, Ross's gull, Arctic tern, loon, phalarope, snow bunting, willow ptarmigan, Temminck's stint, guillemot, kittiwake, redpoll finch.

SUGGESTED READING

To students who may want to learn more about the natural history of the Arctic, you may suggest the following:

Caras, Roger. *The Endless Migrations.* New York: E. P. Dutton, 1985.

Salisbury, Michael. *Young Explorers: Arctic Expedition.* Milwaukee, Wis.: Gareth Stevens, Inc., 1989.

PROGRAM OVERVIEW

The Arctic tundra is treeless, contains stunted vegetation, and is frozen and snow covered for most of the year. Sedges, lichens, and mosses appear only when summer temperatures, which average 70° F., melt the top layer of permafrost. Long, nearly endless days of light help compensate for the short, two-month growing season, and flowers are incredibly abundant. Meltwaters, which cannot be absorbed by the frozen subsoil, collect on the surface, forming wetlands. These waters are breeding areas for caddis flies and mosquitoes and homes for fish and crustaceans as well as their predators — millions of swans, ducks, and geese. Musk oxen, reindeer, and lemmings feed on vegetation. Lemmings, in turn, are staples in the diet of many predators, including the Arctic fox and the peregrine falcon.

"The Arctic Frontier," Program 2 of *Realms of the Russian Bear,* documents the summer awakening of the tundra. It shows how some species breed and raise their young in the abbreviated Arctic summer. Remarkable footage includes scenes of a young polar bear that is seeing the world for the first time and red-breasted geese nesting near a bird of prey — the peregrine falcon — for protection.

BEFORE VIEWING THE PROGRAM

Introducing the Program

Write the word *frontier* on the chalkboard. Have students offer a definition of this term. (Answers may include the outer limits of a settled place.) Write the word *Arctic* on the board. Tell students that they will be viewing a film entitled "The Arctic Frontier." Using a globe or a world map, have students locate the Arctic and name the countries in this region. Also, have students note the Arctic's location in relation to their own location. Help them develop an overall picture of what the Arctic is like by asking them to tell what they know about its geography, climate, plants, and wildlife. Then tell students that the program they will view, "The Arctic Frontier," explores summer in the Arctic and the Arctic's inhabitants as well as the variety of wildlife that migrate there to breed.

Distribute the Naturalist's Guide

Duplicate and distribute the Naturalist's Guide to students and preview it with them. Explain that they will be observing the plants and wildlife of the Arctic tundra during one brief summer. As they watch the program, ask students to think about what brings wildlife to this region. Encourage them to take notes and make sketches of the various birds and animals as they view the program.

AFTER VIEWING THE PROGRAM

Discussion

Encourage students to discuss the program and share their observations. The following questions may be used to stimulate discussion.

1. What are some of the characteristics of the Arctic tundra in summer? In winter? (Summer: low-growing plants bloom; meltwaters form pools that become breeding grounds for small crustaceans, insects, and fish; high animal activity such as breeding, rearing of young; a lot of insects; daylight of almost 24 hours a day; temperatures 70° F. Winter: no sunlight until the end of January; temperatures -60° F.; reduced animal activity; land covered by ice and snow.)
2. Why do millions of birds migrate to the Arctic tundra each year? (There is an abundant supply of insects, crustaceans, and fish that birds feed on and use to feed their young. Twenty-four-hour sunlight enables birds to feed their young around the clock.)
3. In what way is the red-breasted goose dependent on the peregrine falcon? (The red-breasted goose nests near a falcon's nesting site for protection. The falcon's preferred prey is the Arctic fox, an enemy of the goose.)
4. How does the size of the lemming population affect other species? (Many species can rear more young when there is a large supply of lemmings on which to feed. When the lemming population is low, animals such as the Arctic fox and the rough-legged buzzard must rely on hunting other prey such as birds.)

THE ARCTIC FRONTIER

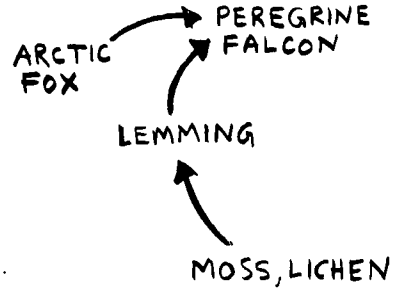
Complete the first activity and one other activity of your choice.

ARCTIC FOOD WEB

As you watch the program, record what each of the following birds, animals, and people eat. After the program, talk with a family member or a classmate to fill in any information you might have missed.

ANIMAL	WHAT IT EATS
polar bear	walruses, seals
peregrine falcons	Arctic foxes
Arctic foxes	
Ross's gulls	
lemmings	
willow ptarmigan	
reindeer	
the Chukchi People	

A food web is a diagram that shows the plants and animals of a habitat according to what each utilizes as a food source. Using the information you have gathered, create a food web. Here is the beginning of one to get you started.

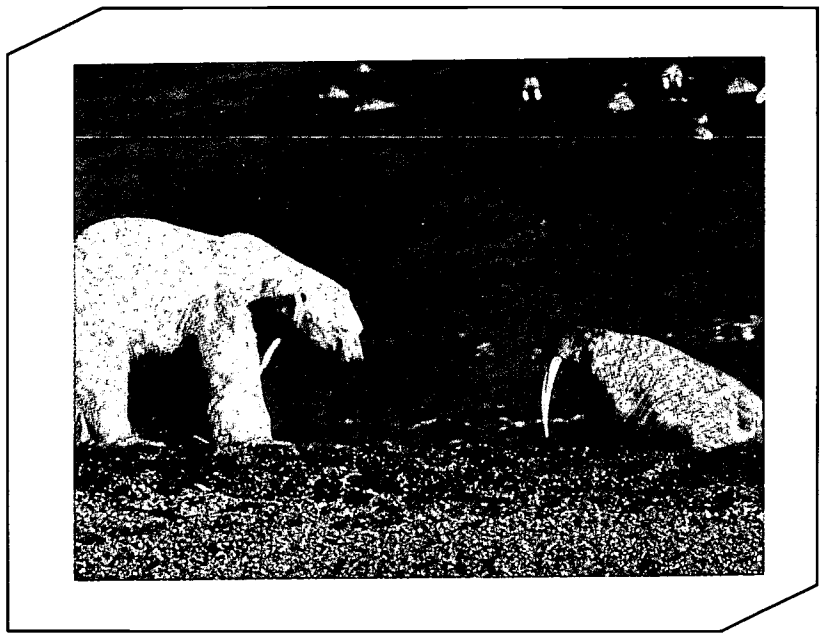


DESERT FOX, ARCTIC FOX

With a partner or a group research facts about two types of foxes: the fennec, whose habitat is the deserts of Africa, and the Arctic fox. Then create a fable about the fennec and the Arctic fox based on "City Mouse, Country Mouse." Include as many facts about the foxes and their habitats as you can. The moral: There's no place like your own habitat.

AS THE WORLD TURNS

With several classmates create a demonstration that shows why the Arctic region has nearly endless summer days and nearly endless winter nights. Refer to an earth science reference or astronomy book for guidance. Equipment that you may need includes a flashlight, a globe or a beach ball. Present your demonstration to your class.



By early August, the first signs of winter appear on Wrangel Island. This is when tens of thousands of walruses gather on traditional beaching sites for a few weeks. They may attract polar bears, which prey on pups or weak adults. Although a polar bear is the most powerful of all four-legged predators, a healthy thick-skinned walrus is just too large for it to handle.

OBJECTIVES

Students will

- explore the seasonal patterns and the environment of the Badkhyz and the Kara Kum deserts
- examine how plants and wildlife have adapted to life in the desert
- examine the impact of desertification.

VOCABULARY

Introduce students to the vocabulary and the names of wildlife before viewing the program.

arid *adjective:* excessively dry; with insufficient rainfall to support agriculture.

rodent *noun:* a mammal such as a mouse, a squirrel, or a beaver that has chisel-shaped incisors used for gnawing.

savannah *noun:* a tropical or subtropical grassland that contains scattered trees.

grub *noun:* the immature, larval form of a beetle.

carrion *noun:* dead flesh.

herbaceous *adjective:* having to do with nonwoody plants (herbs) such as grasses.

Wildlife:

animals: kulan (wild ass), zeren or goitered gazelle, three-toed jerboa (rodent), toad-headed agama (lizard), putorak (shrew), mouflon (sheep)

birds: hoopoe, roller, houbara bustard, bee-eater

insects: tenebrionid beetle, scarab beetle

SUGGESTED READING

To students who may want to learn more about the topics presented in this program, you may suggest the following:

Jensen, Anthony. *Explorers: Desert Trek.* Milwaukee, Wis.: Gareth Stevens, Inc., 1989.

THE RED DESERTS

PROGRAM OVERVIEW

The Russian deserts of central Asia, which cover an area larger than the whole region of western Europe, boast an abundance of wildlife. In the far south lies Badkhyz, a nature reserve that is barren and waterless for most of the year but becomes ablaze with color in springtime when melting snows bring poppy fields and pistachio groves to life. Vultures wheel over limestone canyons; desert monitors hunt fast-breeding giant gerbils; and kulan — wild asses of central Asia —roam the savannah with herds of gazelles. Farther north is the Kara Kum Desert, central Asia's equivalent of the Sahara. There camels exist on tiny, tufted marsh sedges in the sand; harvester ants keep subterranean granaries; sand boas hunt lizards; and at sunset the desert is filled with the ghostly cry of the eagle owl. "The Red Deserts," Program 3 of *Realms of the Russian Bear*, chronicles how wildlife and plants meet the harsh challenges of these regions. Nighttime footage documents how many nocturnal animals beat the heat. The camera also takes the viewer for a look at giant gerbil burrows inhabited by more than 70 species that escape summer's heat and winter's chill.

BEFORE VIEWING THE PROGRAM

Introducing the Program

Have students work in small groups to talk about the desert environment. Allow five minutes for them to describe the characteristics of a desert, including the climate, seasonal variations in weather, and variations in day- and night-time temperatures. Have them also generate a list of wildlife and plants that are found in the desert. Have a group member report each group's findings. Then tell students that the program they will see, "The Red Deserts," examines Badkhyz and Kara Kum, desert areas in Turkmenistan, near the border of Afghanistan. Call on a student to locate the areas on a map. Have another student locate the nearby mountain ranges of Pamir and Tien Shan. Point out that mountains prevent the weather (rain) that originates in tropical regions from reaching these areas. Point out also that this natural barrier is one factor that led to the formation of these deserts.

Distribute the Naturalist's Guide

Duplicate and distribute the Naturalist's Guide to students and preview it with them. Explain that they will be observing how wildlife species have adapted to life in the desert. Encourage students to take notes and make sketches of the various plants and wildlife as they view the program.

AFTER VIEWING THE PROGRAM

Discussion

Encourage students to discuss the program and share their observations. The following questions may be used to stimulate discussion.

1. What are the characteristics of the Badkhyz? The Kara Kum? (Badkhyz: an arid grassland with hot summers and cold winters; winter snows provide water in spring. Kara Kum: Saharalike desert with rolling dunes; plants such as mustard and cress sprout after rainfall.)
2. What are some adaptations that wildlife species have made to life in the Badkhyz and the Kara Kum? (To avoid the extreme summer heat and winter cold, some species such as the Horsfield's tortoise are active only in the spring. Others are nocturnal. To survive in dry climates, animals obtain moisture from the prey they consume. Others such as the giant gerbil, store food underground for lean times.)
3. What are some adaptations found in the plant life in these areas? (Tulips store moisture and nutrients in the bulbs to help them survive the extreme heat and cold; plants such as fennel mature quickly before the summer heat destroys them; the seeds of some species lie dormant for years until a rainfall enables them to germinate.)
4. How do animals find water between rainfalls? (They eat plants and other animals that contain moisture; they find moisture on plants and rocks at night when cooling temperatures condense moisture in the air.)

THE RED DESERTS

Complete the first activity and one other activity of your choice.

LIFE IN THE DESERT

Take notes to record how plants and animals have adapted to desert life. You do not have to record them all. Choose those that interest you the most. After the program, talk with a family member or a classmate to fill in the information about any species you might have missed. Here is one format that you might use.

SPECIES	ADAPTATION TO DESERT LIFE
Giant Fennel	grows 6 feet high in 7 weeks; matures before summer comes
black vultures	nest on pistachio trees; use wings to shield baby from sun
Sand geckoes	nocturnal; no eyelids; removes dust with tongue

DESERT POETRY

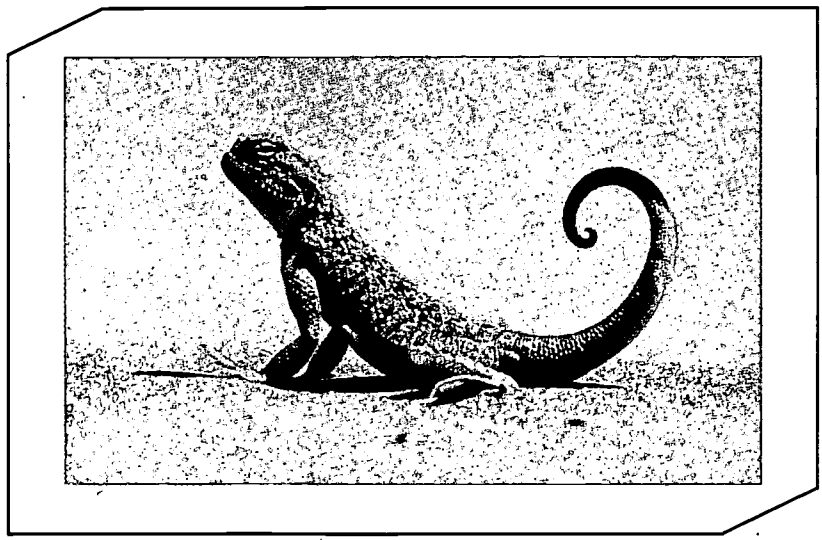
Although deserts are hot and arid, they are not deserted places. Write a poem describing the desert and the plants and wildlife that live there. Collect the poems of other classmates to create a book of poetry or hold a poetry reading for the class.

DESERT FORMATION

With a group, research how deserts are formed. Begin by finding topographical maps, locating desert areas, and examining the geographical features of the deserts and the areas surrounding them. Write down your ideas of how deserts are formed. Then use library resources to research more information about the formation of deserts. Present your findings along with any charts and diagrams to your classmates.

BURROWS

Diagrams called cross sections are used to show what the inside of something looks like. With a group or a partner, create a cross section of a giant gerbil burrow. Use what you have seen in the program along with library research to help you. Include chambers for storing food, tunnels, and nurseries. Include other animals that use the burrows in your cross-sectional diagram.



The desert agama, encased in waterproof scales, is well designed for the desert. "Solar-powered," it needs the heat of the sun for its high-speed activity.

THE CELESTIAL MOUNTAINS

OBJECTIVES

Students will

- describe the climate and environment of the Tien Shan and Pamir mountain ranges
- observe and describe the wildlife that inhabit the Tien Shan and Pamir mountain ranges.

VOCABULARY

Introduce students to the vocabulary and the names of the wildlife before viewing the program.

camouflage *noun:* behavior or protective coloration that enables wildlife to be overlooked by predators.

carnivorous *adjective:* feeding on animal flesh.

territorial *adjective:* occupying and defending against members of its own species an area used for breeding, nesting, or food gathering by an individual or group.

Wildlife:

animals: snow leopard, ibex (mountain goat), arkhar (wild sheep), yak, marmot, white-clawed bear, pika, markhor (screw-horn goat).
birds: Himalayan snowcock, paradise flycatcher, ibisbill, Persian robin, Himalayan rubythroat, white-winged grosbeak, brown-headed gull, bar-headed goose, raven, mongolian plover, lammergeier.

SUGGESTED READING

To students who may want to learn more about topics presented in this program you may suggest the following:

Colinvaux, Paul. *Why Big Fierce Animals Are Rare: An Ecologist's Perspective.* Princeton, New Jersey: Princeton University Press, 1978.

Rees, Robin, Senior Editor. *The Way Nature Works.* New York: Macmillan, 1992.

PROGRAM OVERVIEW

The Tien Shan and Pamir mountain ranges form a natural border between Russia and parts of China and Afghanistan. Only migrating birds freely travel across these ranges, whose tallest peaks are over 24,000 feet above sea level. The icy peaks of the Tien Shan run for hundreds of miles along the border between central Asian republics and China. This is the realm of the elusive snow leopard and the rare white-clawed bear, the haunt of ibex and Marco Polo sheep. In spring, the melting snows water a flush of flowers, as the red marmots emerge from their winter burrows. Kirghiz herders have settled here, tending horses, sheep, and hardy yaks. In the higher Pamir mountains, the dry frozen plateau is broken only by soda lakes, nesting place of the high-flying bar-headed geese who migrate across the Himalayas from India.

"The Celestial Mountains," Program 4 of *Realms of the Russian Bear,* is a mountain climbing adventure to some of the highest peaks in the world. The adventure includes a view of wildlife in their yearly migrations both on the mountainsides and across national borders at nesting time. It also includes a look at the remarkable adaptations of wildlife. But primarily, this program is a celebration of falling political barriers, which for many decades have made trips such as these impossible.

BEFORE VIEWING THE PROGRAM

Introducing the Program

Using a globe or world map, help volunteers locate the Pamir and Tien Shan mountain ranges on a map of central Asia. Have them name the countries these mountain ranges border. Tell students that the Tien Shan mountain range rises to an elevation of 24,000 feet. Have students compare this with the elevation of the Rocky Mountains, the Adirondaks, or the Appalachians. Ask them to speculate what the climate and environment of the Tien Shan mountains might be like and write their responses on the board. Ask students what an animal might need to survive in the Tien Shan mountains. Tell students that they will be viewing a film entitled "The Celestial Mountains," which explores the Tien Shan and Pamir mountain ranges and the abundant and unusual wildlife that live there.

Distribute the Naturalist's Guide

Duplicate and distribute the Naturalist's Guide to students and preview it with them. Explain that they will be observing the plants and wildlife of the Tien Shan and Pamir mountain ranges. As they watch the program, ask students to think about what animals need to survive on the mountain slopes of the Tien Shan and on the high plateau of the Pamir. Encourage students to take notes and make sketches of the various birds and animals as they view the program.

AFTER VIEWING THE PROGRAM

Discussion

Encourage students to discuss the program and share their observations. The following questions may be used to stimulate discussion.

1. How do the activities of the various animals of the Tien Shan change as spring approaches? (Answers may include: snowcock begin their courtship rituals; marmots emerge from hibernation, clear out their burrows, gather new bedding, and begin replacing the weight they've lost; wild pigs forage; bears mate, birds arrive from other parts.)
2. How are animals such as the ibisbill, the lammergeier and the marmot well-adapted to life in the Tien Shan? (The ibisbill's long, curved beak allows it to probe for food among the small rocks and pebbles of the stream; the lammergeier eats carrion and bone —animals killed during avalanches are frozen in the snow and become available as food in spring when the snows melt—marmots hibernate most of the year, feed on vegetation during the spring and summer.)
3. How did wildlife such as the snow leopard, ibex, markhor, and bar-headed goose help to open international borders? (Countries bordering the Tien Shan and Pamir ranges have united to develop a chain of preserves to protect these species.)

THE CELESTIAL MOUNTAINS

Complete the first activity and one other activity of your choice.

ANIMALS OF THE CELESTIAL MOUNTAINS

As you watch the program, select an animal. Observe and record how it moves, protects itself, plays, rests, and mates. Also include what it eats and how it obtains food. You may choose the marmot, lammergeier, ibisbill, pika, markhor, or another animal of your choice. You may have to do a little library research to fill in any information that was not included in the program. Present a report about the animal you have chosen to your class. Include sketches you have made to illustrate your report.

THE YETI: TRUTH OR FICTION?

The abominable snowman, or yeti, is said to be a human-like creature over seven feet tall. Dr. Nikolai Drozdov claims that people have seen its tracks, heard it in the snow, and even caught a glimpse of it. Could the yeti be real? Knowing what you do about life in the Tien Shan mountains, write a paragraph describing how the yeti might move, protect itself, play, and rest. Include where the yeti would shelter itself, what it would eat and how it would obtain its food. Draw a picture of the yeti to illustrate your report. How would the discovery of the yeti affect the environment of the Tien Shan? Discuss this question with a group and present your findings to the class.

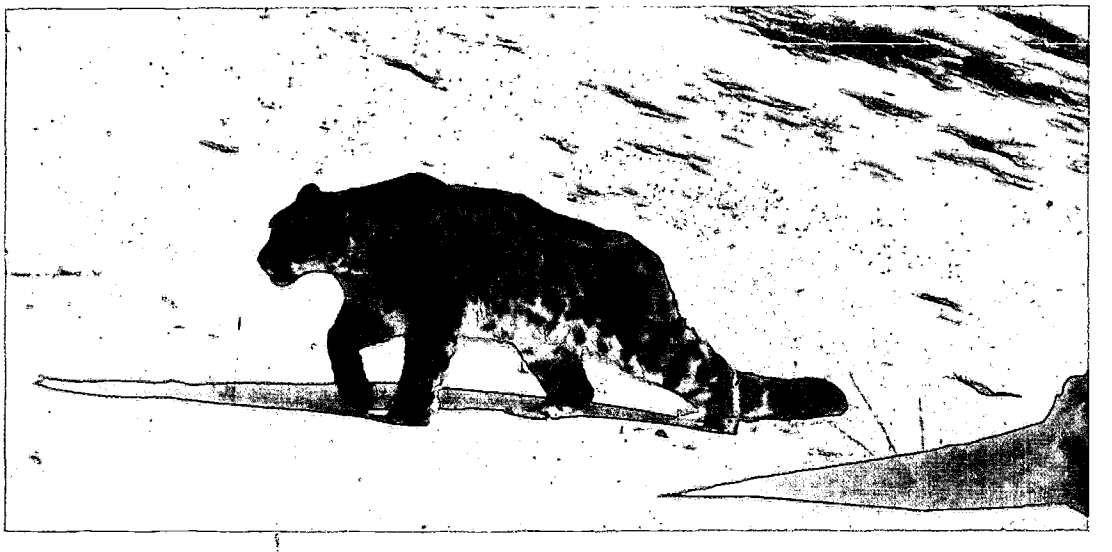
ENDANGERING A SPECIES?

In this program, Dr. Nikolai Drozdov said that humans are the marmot's greatest predator. Humans value the marmot's fur and its fat, which has medicinal properties. Yet Dr. Drozdov and his students fed baby marmots, making them less suspicious of people and perhaps more vulnerable to hunters. With a group of your classmates, debate this question: *Should naturalists intervene in the lives of the animals they study?*

GENGHIS KHAN, MARCO POLO, KUBLAI KHAN

In the program you heard the names, Kublai Khan, Genghis Khan, and Marco Polo, people whose travels over the Tien Shan mountains helped shape history 600 to 700 years ago. Use library resources to find out more about Genghis Khan, Marco Polo, and the court of Kublai Khan. Report your findings to your class.

There are barely two thousand snow leopards scattered throughout the Tien Shan mountain range. Solitary and elusive, they are very seldom seen. Each needs a large area of land to roam. Snow leopards prey on various animals, but especially ibex, a kind of mountain goat.



OBJECTIVES

Students will

- explore the seasonal patterns and the environment of the Russian taiga
- examine how plants and wildlife have adapted over time to life in the taiga
- explore the environment of Lake Baikal and the variety of plants and animals that live in and around it.

VOCABULARY

Introduce students to the vocabulary before viewing the program.

conifer *noun:* plants such as larch, spruce, pine, and fir trees whose seeds are produced in cones.

habitat *noun:* the kind of place in which an organism lives, for example, tundra, taiga, fresh water; *not* geographical location.

permafrost *noun:* permanently frozen ground in frigid regions

taiga *noun:* a subarctic coniferous forest.

SUGGESTED READING

To students who may want to learn more about the topics presented in this program, you may suggest the following:

Belt, Don. "Russia's Lake Baikal: The World's Greatest Lake," *National Geographic*, vol. 181, no. 6, (June 1992): pp. 2-39.

Brooks, Bruce. *Nature by Design*. New York: Farrar Straus and Giroux, 1991.

SIBERIA – THE FROZEN FOREST

PROGRAM OVERVIEW

Siberia has long been synonymous with exile and despair. After all, life in its frozen forests is awesomely harsh. Winter lasts a bitterly long eight months. Recorded temperatures are among the lowest in the northern hemisphere often dipping as low as -88° F. Siberia's underlying soil, called permafrost, is permanently frozen, and only the top layer, about a foot or so, defrosts in summer. Yet its coniferous forests, wetlands, lakes, and rivers are home to a variety of wildlife, including Siberian jays, golden eagles, ermine, musk deer, bears, seals, nutcrackers, and marmots. Life for many of these creatures is a continual struggle to find and store enough food to last through the long winter. "Siberia — The Frozen Forest," Program 5 of *Realms of the Russian Bear*, raises the curtain on a long-hidden area of the world. It looks at how wildlife have adapted over time to the harsh Siberian climate. The program also examines the unique life-forms found in and around the world's oldest and deepest lake: Lake Baikal.

BEFORE VIEWING THE PROGRAM

Introducing the Program

Help students locate Siberia on a globe or world map. Have them note its proximity to the Arctic. Point out that Siberia stretches 6,000 miles across the continent and spans 11 time zones. Have students look at the number of cities and towns in Siberia and compare those numbers to those in western Russia. Explain that Siberia is a less populated area than western Russia because of its harsh winters. Winter lasts about eight months, and the temperatures often drop to -88° F. Have students imagine that they live in Siberia. Ask them to discuss how they would dress for the cold, what they would eat, and how they would obtain food during the cold winter months. After the discussion, tell students that the program they will see, "Siberia —The Frozen Forest," examines the environment, the seasons, and the plants and animals of Siberia, a huge frozen forest.

Distribute the Naturalist's Guide

Duplicate and distribute the Naturalist's Guide to students and preview it with them. Explain that they will be observing how wildlife species have adapted to the harsh Siberian winters. Encourage students to take notes and make sketches of the various plants and wildlife as they view the program. Tell them that in the program Dr. Nikolai Drozdov recounts how his experiences as a child on the taiga inspired his love for nature. Ask students to think about what motivated Dr. Drozdov to become a naturalist.

AFTER VIEWING THE PROGRAM

Discussion

Encourage students to discuss the program and share their observations. The following questions may be used to stimulate discussion.

1. What are the characteristics of the Siberian taiga? (coniferous forest; little daylight in winter; 8-month-long, frigid winters; only surface soil thaws in spring; unabsorbed meltwaters form wetlands; long daylight hours in summer)
2. What is hibernation? How does it differ in the various hibernating animals? (A period of dormancy during which the body's functions are slowed dramatically and body temperatures are drastically lowered; hibernating species expend reduced amounts of energy and slowly absorb the fat their bodies stored in the fall; they therefore can survive the long Siberian winters when food is scarce; the length of time between periods of dormancy and the need to awaken and hunt for food are two ways in which hibernation varies from species to species.)
3. How do nonhibernating species survive the harsh winters? (They: are insulated by fur, down, or feathers; burrow under snow for warmth; eat food stored in the autumn; migrate.)
4. What are some species found in Lake Baikal? Why are these species found only there and nowhere else? (cottid fish, Baikal horse, omul; the lake's age, its depth, and its isolation have all contributed to the evolution of unique species)
5. What led Dr. Nikolai Drozdov to become a naturalist? Would you consider becoming a naturalist? Why or why not?

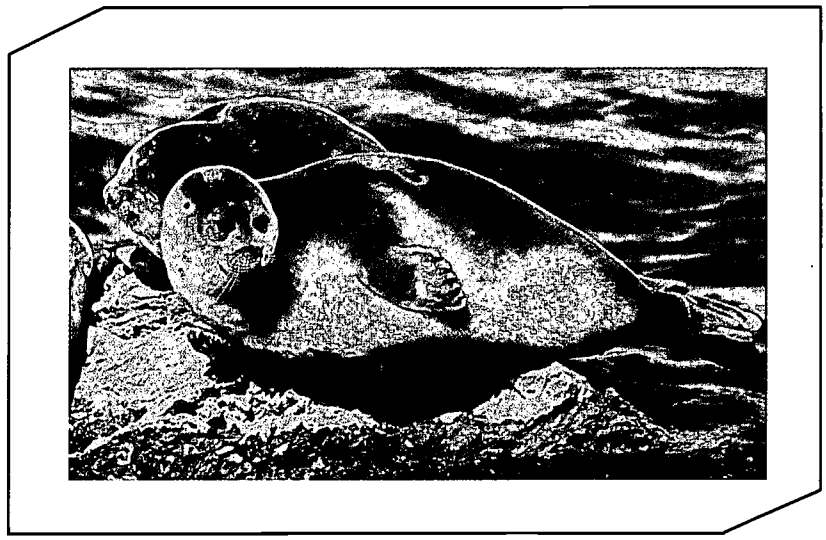
SIBERIA – THE FROZEN FOREST

Complete the first activity and one other activity of your choice.

WILDLIFE IN WINTER

Observe and record how different animals spend the eight-month-long Siberian winter. Use a chart like the one below to record your observations.

SPECIES	WINTER ACTIVITY
Siberian jay	feeds on buried stores of pine nuts
Caterpillar	hibernates in "tents" of leaves sewn together by silk
Siberian marmot	
Chipmunk	
Vole	
Shrew	



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Lake Baikal is over 20 million years old and home to a host of unusual creatures. Among them is the Baikal seal, one of the world's smallest seals. Its ancestors probably became landlocked after swimming up one of the great Siberian rivers.

LICHEN

Lichen is a plant partnership, two plants — a fungus and an alga — that live together advantageously as one unit. Using library reference material, illustrate and label a lichen to show how it grows. Use the illustration to explain to your class or to a small group how the partnership works.

WINTER WISE

With a group, discuss what you have learned about the wildlife in "Siberia — The Frozen Forest" that would help you survive, work, and even enjoy very cold climates. Discuss the clothing you wear in the winter. Do you dress in down or fur? Do you layer your clothing? In the program Dr. Nikolai Drozdov recalled this Russian expression, "There is no poor weather, only poor clothing." Work with your group to create an experiment to determine which provides better insulation: one thick layer of cloth or many thin layers of cloth. Write your hypothesis, method, materials, and manipulated and controlled variables. Conduct your experiment and write your results and conclusions.

DESCENT INTO LAKE BAIKAL

Lake Baikal is home to many strange and curious creatures, some of which we met when the small submarine *Pisces* descended to the depths of the lake. What other mysterious creatures might lurk there? Write an adventure story or a short play about a submarine trip to the bottom of Lake Baikal. Read your story or present your play to the class.

OBJECTIVES

Students will

- explore the environment of the Kamchatka Peninsula and Ussuriland
- examine the plants and wildlife of the Kamchatka Peninsula and Ussuriland.

VOCABULARY

Introduce students to the vocabulary and the names of wildlife before viewing the program.

geyser *noun:* a natural spring that throws forth intermittent jets of heated water and steam.

parasite *noun:* an organism that lives in or on a different host species in order to get nourishment.

Wildlife:

birds: auk, puffin, Steller's sea eagle, crested auklet, Brunnich's guillemot, ancient murrelet, mandarin duck, Japanese red-crowned crane

animals: goral (a type of goat-antelope), Siberian tiger, yellow-throated marten

SUGGESTED READING

To students who may want to learn more about the topics presented in this program, you may suggest the following:

Erickson, Jon. *Volcanoes and Earthquakes.* New York: McGraw-Hill, 1988.

Grove, Noel. "Volcanoes: Crucibles of Creation," *National Geographic,* vol. 182, no. 6 (December 1992): 5-41.

BORN OF FIRE

PROGRAM OVERVIEW

The "Ring of Fire" — a chain of volcanoes that encircles the Pacific — includes Kamchatka and Ussuriland in the far east of Russia. Both regions were formed by volcanic action. Parts of Kamchatka's terrain, however, are still being violently shaken by 33 active volcanoes. Although Kamchatka's winters are extended and frigid due to Arcticlike conditions, the richness of the ocean sustains its wildlife. Millions of seabirds, including tufted puffins, auklets, and cormorants, fish in the waters off Kamchatka's rocky coast. Sea lions, seals, and sea otters also depend on the ocean for sustenance. Enormous brown bears feast on the plentiful salmon, while Steller's sea eagles catch fish and scavenge.

Ussuriland's now dormant volcanoes form the foundation of its forests, which are coniferous in the north and semitropical in the south. Ussuriland is home to both Siberian and Asian species of animals and plants, including mandarin ducks, Japanese cranes, Siberian tigers, Siberian salamanders, rhododendrons, and pine.

"Born of Fire," the sixth and final program of *Realms of the Russian Bear,* explores the Kamchatka Peninsula and Ussuriland, two neighboring yet very different areas of Russia.

BEFORE VIEWING THE PROGRAM

Introducing the Program

Discuss with students the five previous programs they have seen from *Realms of the Russian Bear.* Discuss the variety of plants, wildlife, and habitats that the series has presented. Tell students that the final program they will see, "Born of Fire," visits the Kamchatka Peninsula and Ussuriland on the Pacific coast. Have students find these two areas on a globe or a world map. Have them note the proximity of these two areas to Japan and China. Tell students that Kamchatka is dominated by 33 active volcanoes, whereas Ussuriland is a dense tropical forest. Also tell them that in this region, Arctic waters, which are full of nutrients, mix with the warm Pacific to create an abundance of life that supports the wildlife in these areas.

Distribute the Naturalist's Guide

Duplicate and distribute the Naturalist's Guide to students and preview it with them. While they watch the program, students should note the geographical differences of the two areas and the unique wildlife found in each. Encourage them to take notes and make sketches of the various plants and wildlife as they view the program.

AFTER VIEWING THE PROGRAM

Discussion

Encourage students to discuss the program and share their observations. The following questions may be used to stimulate discussion.

1. What are the characteristics of the Kamchatka Peninsula? Ussuriland? (Kamchatka: Remote, active volcanoes, rocky land, sheer cliffs make ideal nesting sites for seabirds; Ussuriland: Ancient volcanoes form the foundation of tropical forests; nurtured by moisture from the Pacific; animals and plants from both Asia and Siberia; plants include spruce, maple, birch, and pine from the north and subtropical lianas.)
2. Why is the coast of Kamchatka a good breeding ground for seabirds? (Birds can nest in the steep cliffs. Nutrient-rich Arctic waters mix with warm Pacific currents to produce an abundance of sea animals that provide birds with food with which to nourish their young. Its remoteness allows birds to breed in relative safety.)
3. How do the hunting and feeding strategies of the red-crowned crane, Brunnich's guillemot, and the puffin differ? How do these strategies compare to those of birds you are familiar with? (The crane is an omnivorous wader; the puffin flies out to sea to obtain food; the guillemot dives as deep as 80 feet to catch fish. Answers will vary.)

BORN OF FIRE

Complete the first activity and one other activity of your choice.

ANIMAL COLORATION

Many of the animals in "Born of Fire" have brilliant or unusual coloring. As you watch the program, sketch some of the animals. You may choose the mandarin duck, Japanese red-crowned crane, Siberian tiger, cushioned star, Oriental fire-belly toad, or an animal of your choice. Use colored pencils or markers to highlight their coloring. Then do library research to discover why animals have coloration. Share your findings with a group. Then create a bulletin board display, using your sketches and the information you have found.

Stretching from the River Amur to the borders of China and Korea, Ussuriland has a unique combination of animals, including the Siberian tiger and plants from both Asia and Siberia. The Siberian tiger, which stalks Ussuriland forests, stands four feet tall at its shoulder and is twelve feet long, from its nose to the tip of its tail.

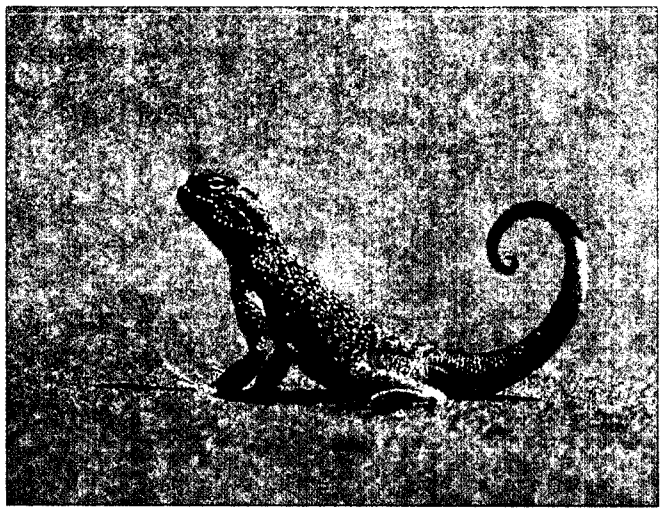
ENDANGERED SPECIES

In this program we learned how both the Siberian tiger and the Japanese red-crowned crane are being protected through the efforts of several countries. How is the natural wildlife of your area being protected? With a group do research to find out what species of plants and animals live or once lived in your area. Discuss possible reasons why these species have either diminished or disappeared. Talk about what can be done to reintroduce these species. If possible, visit a local environmental center to learn more about your habitat. You may want to send a copy of your findings to the City Council or other local agency.

VOLCANOES

In this program we learned that Kamchatka is part of the "Ring of Fire," a chain of volcanoes that stretches from Antarctica to the tip of South America. How do volcanoes work? With a partner do library research to find out more about volcanoes. Draw a cross-sectional diagram or make a model showing how a volcano works. Use the diagram or model to describe to your class how volcanoes work.

GREAT BLACK-HEADED GULLS © Rusanov/BBC Enterprises



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