

# NATURE: DEEP JUNGLE

# RESOURCES & VOCABULARY

## WEB SITES

### Deep Jungle

[www.pbs.org/deepjungle](http://www.pbs.org/deepjungle)

### Trekking the Treetops, Zoogoer, September/October 2004

[nationalzoo.si.edu/Publications/ZooGoer/2004/5/treetops.cfm](http://nationalzoo.si.edu/Publications/ZooGoer/2004/5/treetops.cfm)

### Smithsonian Tropical Research Institute

[www.stri.org](http://www.stri.org)

### WesternGorilla.org

[www.westerngorilla.org](http://www.westerngorilla.org)

### Rainforest Alliance: Research & Resources

[www.rainforest-alliance.org/resources/](http://www.rainforest-alliance.org/resources/)

### Rainforest.org: World Rainforest Information Portal

[www.rainforestweb.org](http://www.rainforestweb.org)

### World Wildlife Fund

[www.wwf.org](http://www.wwf.org)

## VOCABULARY

### NEW FRONTIERS

**canopy** the uppermost layer of a rainforest; home to wildlife

**infrared** an invisible part of the light spectrum that can be sensed as heat

**infrared cameras** devices that take pictures revealing the infrared portion of the spectrum; one type of infrared imaging shows differences in heat

**technology** the application of science in industry or business, especially electronic and digital products

**tracker** a person whose specialty is tracking elusive animals by following clues they left behind (footprints, feces, remains of meals)

### MONSTERS OF THE FOREST

**pollination** the transfer of pollen within a plant, or from plant to plant, in order for it to reproduce

**tarantula** large, hairy spider that lives in warm climates; there are about 300 known tarantula species.

### THE BEAST WITHIN

**culture** the pattern of knowledge and behavior that depends upon learning and transmitting knowledge to succeeding generations; the customs of a social group

**descendants** animals or species from later generations

**habituation** the gradual process by which an animal gets used to the presence of anything new in its environment

**primate** a kind of mammal with a large brain, forward-facing eyes and complex five-fingered hands and feet; includes monkeys, apes and humans

**primatologist** a scientist who studies primates

**silverback** a dominant male gorilla

### EYES ON YELLOWSTONE

*Eyes on Yellowstone* is made possible by Canon. It assists with important scientific research and breaks new ground in conservation, endangered species protection and the application of cutting-edge science and technology that is essential to managing park wildlife and ecosystems. Canon technology is used for education to increase access to the wonder and magic of one of the most recognizable and popular parks in the world ([www.windowsintowonderland.org](http://www.windowsintowonderland.org)) and raises awareness about the importance of environmental protection and conservation.

## ACKNOWLEDGEMENTS

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### NATURE SCHEDULE APRIL-MAY 2005

<i>The Venom Cure</i>	April 3
<i>Cloud: Wild Stallion of the Rockies</i>	April 10
<i>Deep Jungle: New Frontiers</i>	April 17
<i>Deep Jungle: Monsters of the Forest</i>	April 24
<i>Deep Jungle: The Beast Within</i>	May 1
<i>Holy Cow</i>	May 8
<i>The Dolphin Defender</i> (working title)	May 15
<i>Condition Black</i>	May 22
<i>Earth Navigators</i>	May 29

### VIDEO ORDERING INFORMATION

To purchase copies of *Deep Jungle*, call 1.800.336.1917 or log on to [www.shopthirteen.org](http://www.shopthirteen.org).

**thirteen**  
WNET NEW YORK



450 West 33rd Street  
New York, NY 10001  
[www.thirteen.org](http://www.thirteen.org)  
[www.pbs.org](http://www.pbs.org)



NATURE®

TEACHER'S  
GUIDE



# DEEP JUNGLE

Same Planet. Different World.

PARK  
FOUNDATION

Canon



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**PARK  
FOUNDATION**

Dear Teachers:

Park Foundation is dedicated to encouraging excellence in education. Once again we are pleased to support NATURE and the teachers' materials that accompany the series.

NATURE continues to give its audience a greater appreciation of the natural world. This season's Teacher's Guide accompanies *Deep Jungle*, a miniseries that shows the excitement, challenges and benefits of doing research in rainforests. The programs explore how scientists are using new technology to discover secrets about the rainforest. Their findings illuminate the past and point toward a possible future.

We appreciate your working to motivate students to learn more about nature. We hope these materials help in your efforts.

Trustees  
Park Foundation

Park Foundation, Inc.  
P.O. Box 550  
Ithaca, New York 14851



William Clay Ford, Jr.  
Chairman of the Board  
Ford Motor Company  
One American Road  
P.O. Box 1899  
Dearborn, Michigan 48126-2798 USA

Dear Educator:

Because of our strong commitment to education and the environment, Ford Motor Company is pleased to bring you this Teacher's Guide and classroom poster for NATURE.

Making the world a better place is an important part of Ford's view of the world. This includes educating the next generation about society's role in the global ecosystem. The NATURE series, with its focus on preserving wildlife and natural habitats, is an inspiring and exciting way for children to encounter the environment in their classrooms. We are proud to be associated with NATURE.

This guide provides stimulating lessons and activities for teachers and students to use as they learn more about the excitement of scientific discovery. It focuses on the exciting three-part NATURE miniseries, *Deep Jungle*. The programs follow the explorers and scientists who are unraveling the secrets that lie within the world's rainforests. *Deep Jungle* shows the amazingly diverse ways that living things have adapted to the world's jungles, as well as the vitality, fragility and interdependence of species found there.

On behalf of all of us at Ford Motor Company, I salute your work and hope you find these NATURE materials a useful tool.

Sincerely,

William Clay Ford, Jr.

Visit our website at [www.fordvehicles.com/environment](http://www.fordvehicles.com/environment) for more information on Ford's environmental programs.



**Canon**

Canon U.S.A., Inc.  
One Canon Plaza  
Lake Success, NY 11042-1113

Dear Educator:

For the 15th consecutive year, Canon U.S.A., Inc. is proud to sponsor NATURE and to support this wonderful Teacher's Guide.

NATURE's *Deep Jungle* goes into rainforests around the world, following field biologists and archeologists researching there. The lessons in this Teacher's Guide discuss life in the world's jungles, and encourage students to learn more about ways that technology is being used to document the behavior of wildlife.

In the spirit of our corporate philosophy of *kyosei* — all people, regardless of race, religion, or culture, harmoniously living and working together into the future — Canon constantly strives to increase respect for the environment. This commitment has inspired several special educational conservation programs, such as:

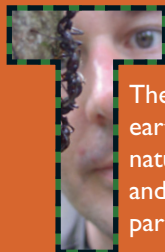
- The Canon Envirothon ([www.envirothon.org](http://www.envirothon.org)) — North America's largest high school environmental education competition is a yearlong learning process with this year's finals held in Missouri.
- The Canon National Parks Science Scholars Program — This program ([www.nature.nps.gov/canonscholarships](http://www.nature.nps.gov/canonscholarships)) encourages doctoral students to conduct innovative research on scientific problems critical to national parks.
- *Eyes on Yellowstone* is made possible by Canon. This educational and research program breaks new ground in conservation science. Learn more about this program on the back cover of this Teacher's Guide

Our newest relationships include the American Museum of Natural History, Cornell Laboratory of Ornithology and the Pennsylvania Institute for Conservation Education. Learn more about Canon's conservation and education efforts at [www.usa.canon.com/environment](http://www.usa.canon.com/environment) — and join us in watching NATURE every week.

Sincerely,

Kinya Uchida  
President and CEO  
Canon U.S.A., Inc.

# INTRODUCTION

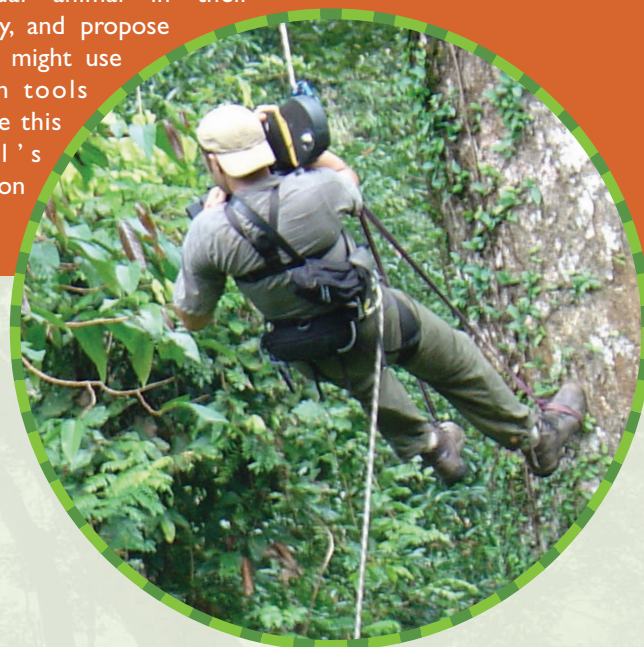


his Teacher's Guide accompanies the NATURE miniseries, *Deep Jungle*.

The world's rainforests are home to half of all life on earth. *Deep Jungle* tells the story of the scientists and naturalists who are using new technologies to explore and understand these complex, exciting and mysterious parts of the world.

Lessons in the guide use the programs as a starting point for discussions about the diversity and interdependence of plants and animals in the jungle, as well as the technologies that are available to researchers who are studying life in the rainforest.

This guide includes three teacher's pages (one per program) and one student activity master that can be used with any or all of the programs. Please photocopy that page and hand it out to students in class. The objective of the student activity is for students to identify an unusual animal in their community, and propose how they might use high-tech tools to capture this animal's behavior on film.



## Web Resources

In addition to using the video and this guide, please ask your students to look at the **NATURE Web site (pbs.org/deepjungle)**. It may be helpful to copy and distribute other Web addresses we've included, or to have your students do Web searches on topics we've covered in the programs.

## Using NATURE Videos in the Classroom

You may wish to use questions on the Teacher's Page to spark discussion about a program from *Deep Jungle*. By posing these questions to students before they watch the video, you can help focus their viewing experience. You may stop the video periodically, so students can discuss the subject matter while it is fresh in their minds.

If you are going to use the programs in school, please prescreen them to find the segments you'd like to use. **Each program is one hour.** If time is limited, consider using clips that follow one scientist or researcher in the episode, or that highlight the use of a specific technology in field research.

## Teaching Deep Jungle with Standards

The following National Science Education standards for **Grades 5 – 8 apply when using these materials:**  
 LIFE SCIENCE: Content Standard C — Populations and ecosystems, Diversity and adaptations of organisms;  
 SCIENCE AND TECHNOLOGY: Content Standard E — Understanding about science and technology;  
 HISTORY/NATURE OF SCIENCE: Content Standard G — Science as a human endeavor.  
**For more information on the Web, go to [www.nap.edu/readingroom/books/nses/html/6d.html](http://www.nap.edu/readingroom/books/nses/html/6d.html).**

The following National Council of Teachers of English standards apply when using these materials:  
 Standard 8: Students use a variety of technological and information resources (e.g., libraries, databases, computer networks, video) to gather and synthesize information and to create and communicate knowledge. **For more information on the Web, go to [www.ncte.org/about/over/standards/110846.htm](http://www.ncte.org/about/over/standards/110846.htm).**

## Videotaping Rights

You have the right to tape the programs and play them for instructional purposes for one year after they are broadcast.

## Deep Jungle Broadcast Dates

Most PBS stations are broadcasting *Deep Jungle* on the dates below. Broadcast times and dates vary in some areas. Please check your local TV listings to confirm when your PBS station will show the programs.

<i>New Frontiers</i>	April 17
<i>Monsters of the Forest</i>	April 24
<i>The Beast Within</i>	May 1

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# NATURE: DEEP JUNGLE

# NEW FRONTIERS



**BROADCAST DATE: APRIL 17, 2005**

## AT A GLANCE

**Theme:** Rainforests are among the most challenging places for scientists to explore. Nevertheless, in search of answers, some intrepid scientists and researchers venture into the jungle with the latest technological devices.

## PROGRAM HIGHLIGHTS

- 🦋 Creating 3-D maps of the rainforests of Borneo involves a combination of daring athleticism and computer expertise. Biologist Roman Dial often works 150 feet above the ground for days at a time, using lasers to measure and map the forest. His maps show how the jungle's complex ecosystems work.
- 🐅 Tigers were once plentiful throughout Sumatra. Today, only about 500 survive in the wild. Naturalist Jeremy Holden and cameraman Gavin Thurston attempt to be the first to catch one of these elusive animals on video, setting up motion-sensitive cameras that activate when an animal passes in front of an infrared beam.
- 🦋 In 1862, Charles Darwin studied a bizarre orchid found on Madagascar. Darwin predicted that its survival probably depended on a gigantic moth with a 12-inch tongue. In this program, biologist Phil DeVries uses an infrared camera to finally catch this strange insect in action.

## BEFORE VIEWING THE PROGRAM

Ask students to describe what a jungle is. Explain that jungles are also known as rainforests. Using a physical map of the world that identifies forests in green, ask students if they can find where the world's jungles are located. Mention that there are many jungles around the world, and they all tend to have similar climates. Show five different photographs of animals found in the Amazon rainforest. (You can find these in library books or Web sites, such as: [www.junglephotos.com](http://www.junglephotos.com)). Ask students to discuss what kind of climate these creatures would need to survive. To help orient them for the first segment of the program, have students find the island of Borneo in Southeast Asia. Encourage students to pay special attention to the different technologies that help the scientists do research in the rainforest.



## OBJECTIVES

*Students will:*

- 🦋 Observe unusual plant and animal species that exist in the world's rainforests.
- 🦋 Discuss how biologists use infrared cameras and other technology to explore jungles.

## DISCUSSION QUESTIONS

- 🦋 Why do you think there is so much variety of life in the world's rainforests?
- 🦋 Infrared cameras use an unseen portion of the spectrum and often show differences in temperature. What are some advantages of using an infrared camera to explore a jungle?
- 🦋 What are the benefits of using a laser measurement device to map a rainforest?
- 🦋 Imagine that you wanted to create a 3-D map of a square mile of forest. What challenges do you think you'd face?
- 🦋 If you could tag along with one of the naturalist/explorers in this program, whom would you select, and why?

**FUN FACT: THE TERRITORY OF A SINGLE SUMATRAN TIGER IS ABOUT HALF THE SIZE OF NEW YORK CITY.**

## FOLLOW UP

- 🦋 Use a laser pointer to highlight images in the video or related illustrations you have posted on your bulletin board. Please remind students that lasers can be dangerous if they are pointed at people's eyes!
- 🦋 Liquid crystal technology, like an infrared camera, shows different temperatures as different colors. Use a liquid crystal thermometer to map the temperature of different areas on your skin. Which is warmer, your hands or your face?
- 🦋 Use the Internet to research laser measurement, infrared cameras, infrared remote control devices, remote tracking devices, or other technologies mentioned in the program.



BROADCAST DATE: APRIL 24, 2005

## AT A GLANCE

*Theme:* When scientists study wildlife in the rainforest, they often discover that the survival of plants and animals depends on the rare life forms that live nearby. When human actions upset the fragile interrelationships among species, the results can be disastrous.

## PROGRAM HIGHLIGHTS

- 🦋 How does the Brazil nut tree reproduce? To answer this question, scientists insert magnets into Brazil nut pods and scatter them on the ground. They then use metal detectors and hidden cameras to learn that the agouti, a South American rodent, opens the pods and buries the nuts it doesn't eat.
- 🦋 Does the chicken-eating spider really exist? British tarantula expert Martin Nicholas has come to the Amazon to investigate. Tracking down this rare – and possibly fictional – giant tarantula takes a combination of bravery, resourcefulness and technology.
- 🦋 Environmental changes in a jungle sometimes happen very gradually. Scientists at the Smithsonian Tropical Research Institute in Panama use time-lapse photography to help them observe a year's worth of environmental changes in a matter of seconds.

**FUN FACT: BRAZIL NUT TREES OFTEN REACH THE AGE OF 1,000 YEARS.**

## BEFORE VIEWING THE PROGRAM

Pass around two Brazil nuts—one in its shell, and one shelled (ready-to-eat). Ask students if they know what kind of nut it is. Then explain that the Brazil nut comes from one of the world's tallest trees, reaching heights of 180 feet (60 meters), and that it is native to South America. If possible, show a photograph of the large, cannonball-like pods that hold Brazil nuts. Explain that Brazil nuts are sold around the world at profits of more than 50 million dollars a year.

Tell students that in the program they are about to watch, scientists will be exploring two mysteries: First, why do Brazil nut trees only reproduce in large areas of intact "virgin" forests? Second, in the Amazon rainforest, is there really a spider that is large enough to kill and eat a chicken? As they watch the program, have them look for the answers to these mysteries—and notice the methods that the scientists use to solve them. To help focus students' viewing, consider breaking the class into groups based on the themes of technology, webs of life and dangerous creatures. Ask each group to make notes on their special topic.

## OBJECTIVES

*Students will:*

- 🦋 Observe several examples of the webs of life that thrive in the Amazon rainforest.
- 🦋 Discuss their own ideas for answering scientific questions about life in the jungle.

## DISCUSSION QUESTIONS

- 🦋 How do bees help Brazil nut trees reproduce? What role do orchids play in the process?
- 🦋 What are some ways that naturalists can protect rainforests from people who want to tear them down for lumber or farmland?
- 🦋 If you had a "tarantula-cam," what kinds of underground creatures would you like to spy on?
- 🦋 If you were a naturalist studying a rainforest, what questions about wildlife or the environment would you like to answer? Why? What technologies might you need?
- 🦋 If you were exploring the Amazon rainforest, what species of wildlife would you definitely want to avoid?



## FOLLOW UP

- 🦋 Make a concept map of the Brazil nut tree community including the organisms that help it and those that hurt it.
- 🦋 Compare the role of agoutis in the rainforest to the role of squirrels in the temperate forest.
- 🦋 Use the internet to visit web cams at zoos around the world. Use the key words: web + cam + zoo; web-cam + zoo; web cam + animal; webcam + animal.

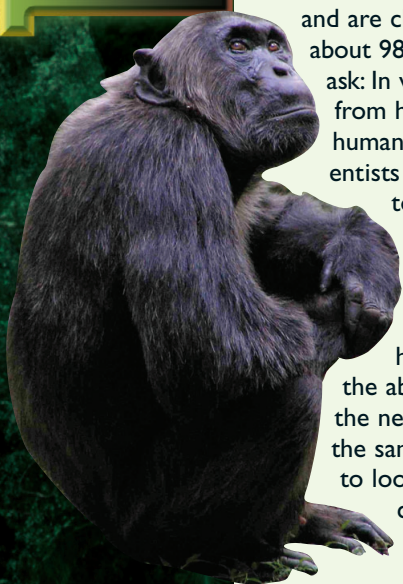


# NATURE: DEEP JUNGLE

# MONSTERS OF THE FOREST

## NATURE: DEEP JUNGLE

# THE BEAST WITHIN



**BROADCAST DATE: MAY 1, 2005**

### AT A GLANCE

**Theme:** What can the jungle teach us about the origins and limits of human culture? Recent evidence from primatologists shows that chimpanzees and capuchin monkeys are tool-users. Archeologists are studying societies that once thrived in what is now dense jungle. Did overpopulation and deforestation cause the collapse of these civilizations?

### PROGRAM HIGHLIGHTS

- The Western Lowland gorillas that live in the Congo rainforest are in danger of becoming extinct. Primatologist Chloe Cipolletta believes that local people will stop endangering them if they understand the economic benefits of eco-tourism. With the help of the BaAka people, she habituates these gorillas to her presence.
- In Uganda, primatologist David Watts studies chimpanzees to understand the evolutionary origins of politics and warfare.
- In Tanzania, scientists study chimpanzees that create simple tools from reshaped branches. These tools help them extract termites from their hiding places.
- In Cambodia, archeologists study the ancient ruins at Angkor Wat. Archeologist Charles Higham believes that the Angkor people cleared such large areas of the rainforest that it may have led to the collapse of their civilization.

### BEFORE VIEWING THE PROGRAM

To familiarize students with the primates in the program, show close-up photographs (from a library book, or from the Internet) of Western Lowland gorillas, chimpanzees, black-capped capuchin monkeys, and Colobus monkeys. Have students identify some of the characteristics that these different primates have in common. Explain that humans are primates, and are closely related to chimpanzees. (We share about 98% of the same DNA with chimps.) Then ask: In what ways are these creatures different from humans? How are they similar to humans? Explain that for many centuries, scientists thought that only humans created tools to solve problems. In this program, they'll see that this is not the case.

Explain that tool use in primates may allow us to explore the origins of human culture. Culture depends upon the ability to learn and transmit knowledge to the next generation. Different cultures may do the same task in different ways. Ask students to look for the different ancient and modern cultures in this episode.



### OBJECTIVES

*Students will:*

- Compare the tool-making behavior of several primate species to that found among humans.
- Observe how infrared imaging technology and other modern devices are used to investigate scientists' questions about ancient civilizations.

### DISCUSSION QUESTIONS

- What is habituation? Why must the habituation of gorillas be a gradual process?
- What did you find interesting or surprising about the BaAka culture?
- Other than getting meat for food, what purpose does hunting have for chimps? What might we learn about human behavior by studying chimpanzees?
- How are the pod-opening skills that adult capuchin monkeys pass to their offspring similar to the kinds of skills that human adults teach their children?
- Why might the fates of the ancient Angkor and Mayan civilizations have significance for our own society?



**FUN FACT: CHIMPANZEES ARE HUMAN'S CLOSEST RELATIVES. WE SHARE AT LEAST 98% OF THE SAME DNA.**

### FOLLOW UP

- Design and make a tool for a particular task using only natural materials (e.g., plant fibers, sticks, stones).
- Try to use a tool with your thumb taped to your palm. Why might tool-using be a uniquely primate ability?

## COOL TOOLS FOR NATURE EXPLORATION

In this activity, you will identify an interesting or unusual animal in your community, and then write a plan for how you might use hi-tech tools to capture this animal's behavior on film.

*Time Needed:* One class period (plus field trip, if possible).

Many of the scientists featured in *Deep Jungle* use cutting-edge technology to answer their research questions. Imagine that you have access to some of these cool tools. What animals in your area would you want to catch on camera? What challenges might you face along the way?

### WHAT TO DO

- 1 Read the following descriptions of four state-of-the-art tools used by the *Deep Jungle* scientists.
- 2 Find a location in your area that's rich in wildlife. It might be a forest, a national or state park, or even a local park near your home or school.
- 3 Take a 20-minute walk around this location with a notebook in hand. Write down the names of several kinds of animals (vertebrates or invertebrates) you see. If you don't know the name of an animal, describe it as well as you can, or even make a sketch. Jot down notes about anything that you find especially interesting or surprising.
- 4 Choose an animal. Ask yourself: If I could use any one of the hi-tech tools described here, which would I pick to learn something new about this animal? Why? Find out more about the animal by researching it online or at your library.
- 5 Write a plan for investigating the animal using the hi-tech tool you picked. Your plan should include: the kinds of animal behaviors you hope to capture on camera; how you would use the tool you picked; and why you are interested in the animal and its life.



Jeremy Holden/fauna and flora international

#### MOTION-SENSITIVE CAMERA

This video camera emits an invisible beam of light. When an animal passes in front of the beam, the camera switches on.



Michael Lock

#### TRACKING COLLARS WITH GLOBAL POSITIONING SYSTEM

A tracking collar attaches to an animal's leg or neck and sends out a signal much the way a cell phone does. Scientists use a computerized device called a Global Positioning System (GPS) to show the animal's location on a map of the area.



Rupert Barrington/Granada Media Group

#### TARANTULA CAM

A scientist invented this sneaky gadget for peering into a poisonous spider's den. It's a small video camera taped to a toy bike. Its controls are at the end of a long extension, so it can be operated from a safe distance away.



#### NIGHT VISION INFRARED CAMERA

This kind of camera takes pictures in the dark by photographing animals' body heat.

# NATURE: DEEP JUNGLE STUDENT ACTIVITY