



A forest gap created by a selective logging operation in the African rain forest.

**Bushmeat has become one of the most crucial issues in tropical Africa today.**

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## Logging in Africa: Where Did All the Animals Go?

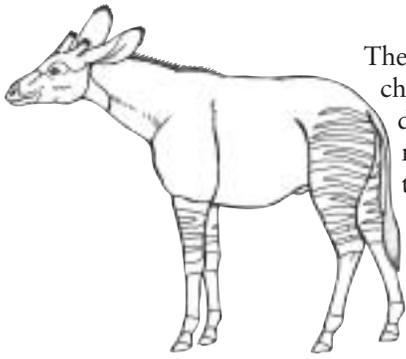
The rain forest of the African Congo River Basin is the second largest intact tropical forest in the world after the Amazon. This forest is losing its animals at a drastic rate. What is causing the problem? If you guessed logging, you're right. However, the clear-cut logging that occurs in the Amazonian rain forest is not a big problem in the Congo because of the remoteness of the forested areas and the high cost of transportation. Instead, selective logging is the common practice, with high-priced tropical woods such as mahogany as the targets. While selective logging might seem as if it would have less of an impact on the environment, there are still numerous problems associated with it. Two of the major concerns are the creation of artificial gaps in the forest and the building of roads.

While only target trees are taken in selective logging, each tree that is felled brings down other trees with it. This creates gaps in the forest canopy. Selective logging can remove anywhere from 7 percent of the canopy to 40 percent in a given area depending on the types of practices the logging companies use. The larger gaps created through logging may not be able to sustain tree regeneration. In Kibale Forest in Uganda, where more than 30 percent of the canopy was removed, trees were not able to recolonize the gap even 30 years after the logging. So although gaps are a natural part of the forest system, and allow new trees to replace old, large man-made gaps can lead to semi-permanent holes in the forest canopy.

### Road Building: A Wildlife Hazard

The second concern with selective logging is that it leads to the building of roads and paths through the forest, which create many difficulties for wildlife. Road-building first causes forest fragmentation. The logging companies build huge grids called transects through the forest in order to survey areas of concentration. Following these grids come the actual logging roads. The fragments of forest created can restrict the movement of small animals within the area. Secondly, the roads open up the forest to people. Hunting of wild animals for meat to eat or sell is a major problem. In Africa, this meat is called bushmeat.

Bushmeat has become one of the most crucial issues in tropical Africa today. If you were to fly over the forest, much of it would appear intact, but underneath the canopy near villages or hunting camps you would find no animals. The forests are falling silent as animals are removed for food. Logging is one of the major facilitators of the bushmeat trade. In one set of studies, David Wilkie, a researcher for the Wildlife Conservation Society (WCS), studied road-building by a logging company for one year in the late 1980s. In the one year that Wilkie monitored The Société Forestière Algero-Congolaise (SFAC), the company built 60 kilometers of primary road, 80 kilometers of secondary road, and 3,000 kilometers of transects. Wilkie then modeled how these roads changed the ability of people living in a nearby village to travel to any part of the forest. He found that the average trip traveled on foot dropped from over 9 kilometers to less than 400 meters. The time it took to reach any point in the forest also fell from an average of 12 hours to less than two, with the most remote parts of the forest now being accessible in a single day rather than in 3 or 4 days. Clearly, the easier it is to travel in the forest, the easier it is for hunters to find their quarry.



The logging roads are changing the entire dynamics of the community. Not only do the roads make travel and hunting easier, they also enable people to transport large amounts of meat out of the forest on logging trucks to be sold in city mar-

kets. The roads allow hunters to exploit larger animals such as gorillas and elephants, whose meat can not be carried to market easily without trucks. For the first time in history, elephants in the Congo are now worth more for their meat than for their ivory. Communities close to logging roads hunt more animals and trade the excess meat (almost 70 percent of their catch is used for trade) while more isolated communities hunt fewer animals and trade only 5 percent of their catch.

This decimation of animal populations is having serious consequences. People who live in the forest and depend upon wild meat for protein are having a difficult time finding food because of commercial hunters. In fact, the entire ecology of the forest is in jeopardy. Over 80 percent of African rain forest trees rely on animals for seed dispersal. Without animals to distribute their seeds, these plants could become isolated in tiny clumps and be unable to regenerate. The entire forest composition could change dramatically, most likely to the detriment of the ecosystem.

### Decreasing the Impacts of Logging: What Can We Do?

There are many things that can be done to help decrease the impact of logging on the rain forest, and WCS is working with logging companies to help implement some of these strategies. The first step is to protect large areas of wilderness. Recently, WCS brokered a deal between a logging company, Congolaise Industrielle des Bois (CIB), and the government of the Republic of Congo. CIB made an unprecedented move and gave up its right to log a 100-square-mile area of rain forest, known as the Goulougo Triangle. This land has reverted back to the government, which has added it to the existing Nouabalé-Ndoki National Park and thus protected it from development. This move came about after an in-depth survey conducted by CIB and WCS revealed that the area is rich in wildlife and may have been isolated from humans for hundreds of years.

CIB has taken other measures to minimize its impact on the environment. The company has made a commitment to curtail its role in the bushmeat trade. It prohibits the transport of bushmeat on its logging trucks and has agreed to fire workers who break this rule. With the help of WCS, the company is also limiting the use of snares and creating zones within the logging concession where

animals can find safe refuge from hunting.

These measures are helping to reduce the impact of logging on the rain forest in the Congo. As a consumer, you can contribute to solving this problem by buying only certified timber. Timber certification ensures that the lumber or product you buy did not come from pirated logs or companies not using environmentally sound logging practices. Several big-name companies have made the move toward using only certified timber in their products (IKEA and Home Depot). You can also help by learning more about the bushmeat trade. With these simple measures, you can help protect the unique and impressive rain forest of the Congo Basin.

### What Do You Know about the Congo Basin Forests?

Rain forests have inspired the hearts of people across the United States to support the conservation cause. While you might think of the Amazon first, the rain forest of the African Congo River Basin covers more than two million square kilometers and accounts for one-fifth of the world's remaining tropical forest. It extends across the political boundaries of many countries in the western-central portion of the continent, including Cameroon, Congo-Brazzaville, Central African Republic, Gabon, Equatorial Guinea, and the Democratic Republic of Congo.

The African rain forest is one of the least studied of all the world's tropical forests. It conjures up images from Joseph Conrad's "Heart of Darkness" — a dense tangle of vegetation. Parts of the forest are truly thick with undergrowth, and it could take a person a full day to travel just a couple of miles. However, other parts are more like a cathedral, with towering trees forming a vaulted ceiling, and the column like trunks rising from the ground. Elephant trails provide easy walking paths.

Scattered in the midst of the forest and near the rivers are large clearings where you find swamps. The swamps, or *bais* as they are called, are sources of leafy vegetation and minerals that elephants, gorillas, sitatungas, and other forest animals rely on as part of their diet. The *bais* also offer great opportunities for researchers, tourists, and poachers to view the animals that can be so difficult to see among the trees of the forest.

The forest is an important resource. It is rich in animal and plant life and has an extremely high number of endemic species — species that are found no other place on Earth. The forest serves as a source of food and medicine for the people who live in it, and increasingly, governments are seeing the importance of maintaining the forest in hopes of attracting eco-tourists to their countries. While eco-tourism is slowly beginning to show profits, the forest also offers a source of income in the form of logging and its companion, hunting.

# Profile in Conservation: Dr. Elizabeth Bennett Wildlife Under Fire

“The wildlife trade, including what is widely known as the bushmeat trade, hits everything. It’s not just the big endangered species...,” says Dr. Elizabeth Bennett, director of the Hunting and Wildlife Trade Program for the Wildlife Conservation Society. “It’s all caused by exactly the same thing. Start opening tropical forests up and start allowing people access to more weapons and they hunt. They sell what they hunt for whatever they can get money for – whether it’s meat, whether it’s bones, it’s all the same thing.”

Dr. Bennett became involved in conservation, and subsequently hunting and wildlife trade issues, when she conducted the first detailed ecological study of the proboscis monkey in Sarawak, Malaysia, in 1984. She has a degree in zoology from Nottingham University in England and she studied the ecology of the banded langur, a leaf-eating monkey, for her PhD in primate ecology from Cambridge University.

During the 1990s, Dr. Bennett initiated a series of studies on the effects of different types of human activities (including logging, hunting, and shifting cultivation) on wildlife and examined ways to mitigate these effects. The government of Sarawak then asked Dr. Bennett to head a team to prepare and implement a master plan for wildlife in Sarawak—the comprehensive policy document that would detail all the steps needed to conserve and manage wildlife in Sarawak.

“Following the recommendations of the master plan, the Sarawak Government did two key things to control hunting,” says Dr. Bennett, “They limited the number of shotgun cartridges issued, thereby reducing the overall level of hunting, as well as specifically reducing the hunting of smaller animals, and they placed a total ban on all commercial sales of wildlife and wildlife products.” It’s been approximately two and a half years since the new regulations and laws were implemented and monitoring is continuing—it will be a while yet before results are seen since it takes time for animal populations to rebound.



Dr. Elizabeth Bennett making observations in the field.

controls were the rural people,” continues Dr. Bennett. “They are now keeping the resources in their areas

rather than sending them to towns where people didn’t really need them.”

## What is Bushmeat?

Meat from wild animals provides food for many people around the world. In Africa, it is called “bushmeat” because there the forest is often called “the bush” (bushmeat is a direct translation from the French *viande de brousse*). Approximately 24 million people who live in the forest areas of Central Africa rely on meat from wild animals as their main source of protein. Bushmeat includes elephants, gorillas, chimpanzees, duikers, porcupine, bush pigs, cane rats, pangolins, monitor lizards, and guinea fowl, among other animals.

Studies have shown that a tropical forest can sustainably support the protein needs of approximately one person per square kilometer (.3861 square miles) if wild meat is the sole source of protein. On average, the number of people per square kilometer of remaining forest is 46 in Latin America, 99 in West and Central Africa, and 522 in South and Southeast Asia. This is well above the carrying capacity of these ecosystems since there are so many people per square kilometer.

Due to overhunting, tropical forests face what is known as “empty forest syndrome.” When the seed-dispersing animals are gone, many plant species are lost. This results in a change in the composition and distribution of the trees and an alteration in the structure and function of the forest. Then, of course, when forests no longer shelter any prey species, there is a subsequent loss of predators.

## Commercialization of Bushmeat

The current harvest of meat in Central Africa is one to five million metric tons (984,200 - 4,921,000 tons) per year. Since the maximum sustainable production of wild meat from tropical forests is 102 kilograms (224.4 pounds) per square kilometer per year, wildlife is being taken from the forest at more than six times the sustainable rate. As large animals disappear, hunters kill smaller and smaller ones. The meat is either transported and sold in cities or sold to workers of logging companies; the roads that the logging companies build into the forest improve access for hunters and have been identified as a major factor in the increase in the trade in wildlife.

Conservationists are attempting to address these issues by working with logging companies to close unused roads and restrict access. In one model, a logging company that controls a large logging concession in northern Congo is taking many measures to prevent illegal hunting of endangered species, and strictly limit the sale and transport of wildlife within its concession. Conservationists are also trying to strictly control commercial hunting through partnerships with international agencies and the governments of individual countries across the humid tropics while at the same time allowing some species to be hunted for food by local people.

## The Importance of Education

“The role of education is huge. It needs to be across the board because there are so many misconceptions,” says Dr. Bennett. “People think hunting for bushmeat is broadly just a problem for Africa, which it’s not; it’s a global problem. They think it’s broadly just a problem for local markets within Africa, which it’s not; again, it’s a global problem, including major markets for tropical forest wildlife in temperate countries of northern Asia, Europe, and North America. They think it’s broadly just a problem with endangered species, which it’s not; it affects hundreds of species from elephants to rats, bats to songbirds.”



People in many countries hunt primates for their meat.

Officers of aid and development agencies also need to be educated, according to Dr. Bennett, because they don’t see the connection with their building of a road through habitat and the resulting loss of wildlife. “This is an issue because the first people who are adversely affected are the real, true forest people,” maintains Dr. Bennett, “because they lose their resources and they’re at a stage of development where they actually don’t have many choices.”

Generating awareness and an understanding of the hunting and wildlife trade crisis is a first step toward a solution. Alternative protein substitutes need to be developed for local people who depend on wild animals for food. There also needs to be improvement in the use of renewable forest resources for economic development.

Whether people hunt animals for their families to eat or to sell to city markets, the result is the same – a decline in, and possible extinction of, wildlife species. And the problem isn’t only occurring in Africa. “If you look globally at the wild meat trade, it is more of an immediate threat to wildlife in Asia, than it is in Africa,” maintains Dr. Bennett. “One of the reasons that the problem in Asia doesn’t get the fuss is because people are not hunting gorillas and chimpanzees, so it’s not emotional in the same way. In Asia, all of the big animals are gone in the areas where they are hunting.” However, people aren’t only hunting for meat, but also to supply animal products for traditional Chinese medicines.

## Wildlife Trade: The Bigger Picture

Hunting for wild meat is not the only wildlife trade issue. Wildlife is taken for the pet trade, and other products, such as traditional medicines and clothing are developed from wild plant and animal species. For example, in the past 30 years, 12 species of large mammals and birds have become extinct in Vietnam due primarily to hunting; more than half of the prime protected areas in tropical Asia have lost at least one large mammal species. Here are a few examples of the extent of the trade in Asia:

- \* More than half of Asia’s turtle species are in danger of extinction due to hunting;
- \* More than 2 million pounds of snakes are imported into Shanghai, China each year for food and traditional medicine;
- \* More than 350,000 birds are sold annually in one bird market in Jakarta, Indonesia.

In order to address the problem of wildlife trade in Asia it is important to manage the flow of meat and other items going through Thailand and Vietnam into China. The Wildlife Conservation Society is working with border patrol officers, particularly along the borders with Cambodia and Lao P.D.R. south of China. The wildlife trade needs to be better regulated and enforcement of laws must be improved across East and Southeast Asia.

## What Can People Do to Help?

People can help alleviate the impact of the wildlife trade in several ways. First, become informed about the issues. Avoid purchasing wildlife pets whose origin is not known, as well as medicinal products or other types of products that are made from animal parts, such as tiger bones. Buy only certified or “green” timber products. This can have a considerable impact in some places, such as Africa, especially is conserving tropical hardwoods, such as mahogany. Unfortunately, purchasing “green” timber has less of an impact in Southeast Asia where much of the logging industry is illegal.

In addition, you can contribute to organizations that have projects to help enforce current laws and develop new hunting policies in Asia, Africa, and Latin America. If the trade in wildlife, including bushmeat, is slowed and brought under control, this will give organizations such the Wildlife Conservation Society time to work with governments and other agencies to help develop alternative sources of food and income for people around the world, so it is possible to save wildlife from extinction.

## Web sites

For more information on the certification process and which stores feature certified timber, contact the Rain forest Alliance SmartWood Program ([www.smartwood.org](http://www.smartwood.org)) or the Forest Stewardship Council ([www.fsc.org/principal.htm](http://www.fsc.org/principal.htm)).

Check out the Bushmeat Crisis Task Force web site at [www.bushmeat.org](http://www.bushmeat.org) for more facts and a brochure on this issue.

# Conservation News Flash



## ATLANTIC SALMON FACE EVEN MORE THREATS

### IT'S FIRE SEASON, AGAIN



A fire raging through a forest.

acres before firefighters were able to control it. Although two of the fires were sparked by humans, the third in Nevada was caused by lightning.

Fire is thought to be a natural part of these ecosystems however nearly a century of human fire suppression has created unnatural conditions of hugely increased amounts of dry wood and brush that can fuel highly intense fires. Whether by natural or unnatural causes, the conditions are ripe for more dramatic fires in years to come. Currently the interagency fire team, a board that meets regularly throughout the year, is surveying various sites for potential threats to human life and property.

Source: *NY Times*, 2002

### SMILE, YOU'RE ON CAMERA!

Daniela De Luca, a WCS researcher working in Tanzania, found an interesting creature had tripped one of her camera traps. Camera traps operate by running an infrared beam from point to point. They are usually positioned on an active animal trail. When the beam is broken, it triggers a flash and a camera exposure. These devices have allowed researchers to photograph and census many secretive and nocturnal species. Upon further inspection of the photo, the small, cat-like animal was identified as a Lowe's servaline genet. Not actually a felid at all, genets are related to mongoose but form their own subfamily along with most of the civets of Africa. It was the first time a Lowe's servaline genet had been sighted in the seventy years since its discovery.

This rediscovery is important because it suggests that, despite our high technology and many thousands of researchers in the field, modern science does not have a fix on all of the animals that populate this diverse world.

Source: [www.wcs.org](http://www.wcs.org)

Several wild-fires tore through Colorado, Nevada and Arizona early this summer. The Arizona fire was the largest fire on record in that state, consuming nearly a half million

The US delegation to the North Atlantic Salmon Conservation Organization (NASCO) meeting this year agreed to allow commercial harvest of wild Atlantic salmon by other nations even though the salmon are federally listed as an endangered species. In the past, allowances have been made for subsistence fisherman to catch limited quantities. However, this latest move to allow commercial harvest marks a shift in the US policy away from aggressively protecting our endangered species that spend time outside our national boundaries. The bulk of the salmon harvested will be used as dog food and other animal feeds.

This all comes at an especially bad time for the Atlantic salmon population. The anadromus (fishes that swim upstream from the ocean to spawn) salmon are limited now in distribution to eight rivers in Northern Maine. The fish also face danger from farm-raised salmon that escape and threaten them with both genetic pollution and contagious diseases.

Source: [www.worldwildlife.org/news/headline.cfm?newsid=362](http://www.worldwildlife.org/news/headline.cfm?newsid=362)



Mexican Wolf

### THE BLUESTEM PACK

Nine Mexican gray wolves were released this past June in a multi-agency cooperative group consisting of the U.S. Fish and Wildlife Service,

Arizona Game and Fish Department, New Mexico Department of Game and Fish, USDA-Wildlife Services, U.S. Forest Service, the Turner Endangered Species Fund, and the White Mountain Apache Tribe. The organizations worked together to orchestrate the transport, acclimation and release of the wolves into the Apache-Sitgreaves National Forest, a reserve in Arizona. The release is part of the USFWS effort to repopulate the wolves into much of their former range in the American Southwest. The pack was put into a holding pen that allowed for self-release (this method of release allows the pack to leave on its own and without the additional stress of human intervention). Several hours later, the pack was free. The group consists of an alpha male, an alpha female, a young male, a young female and five pups. In wolf packs, the alpha pair is the only pair that reproduces. The so-called Bluestem pack (their name is based on the native grasses that grow in the area) will be monitored and fed with road-killed elk and deer until they are observed to be feeding on their own.

Source: [www.fws.gov](http://www.fws.gov)

## Gorillas on the Move

How do scientists use the data they collect? After spending many hours tracking and watching animals of a particular species, field scientists can use their data to help them determine what places they need to protect in order to help the species. Behavioral data help field scientists learn how the animals use the forest, how much space they need, what they eat and how often, how much competition they face from other animals, and so on. This information is essential for protecting the animals.



**Julia, a female gorilla living in the Gorilla Forest at the Bronx Zoo.**

Scientists look at the patterns of animal movements over a long time to determine which areas they use for finding food, water, and shelter. In this lesson, students will have an important mission—they will design their own protected reserves using behavioral “data” similar to what they recorded at the zoo. Their mission will be crucial, because gorillas are gravely threatened.

1. Go over the opening questions with students. Divide students into groups. Give each group a copy of the *Field Notes* on gorilla behavior and the *Gorilla Range Data* map. Tell them that field biologists conducting a behavioral study have collected this data. It is now up to students to analyze the data and make a recommendation about creating a reserve.

2. Before plotting the data, have students make their predictions about the areas they think gorillas would be most likely to use by drawing an outline in pencil on the map. Students should then plot on their *Gorilla Range Data* sheet the points where gorillas have been spotted. (Answer to first student question: Gorillas need shrubs, high forest, and wild ginger in their areas.)

3. Have students then discuss where gorillas spent their time and why students think those areas were used and other areas were not. What part of the map would make a good reserve? Why? During the discussion, students can choose their reserve boundaries and revise them as necessary on their maps.

4. A representative from each group will then present its findings and describe which reserve area it selected as best for gorilla protection.

### Student Directions

Here is a set of field notes from a scientist. It is up to you to interpret the data and make a recommendation for where the gorilla reserve should be located. Remember that you will have to explain the reasons for your decision.

Before you look at the field notes, consider these questions:

1. What three things do gorillas need for their reserve?
2. What areas on the map do you think they will use?
3. Make a prediction about which area would make a good reserve.

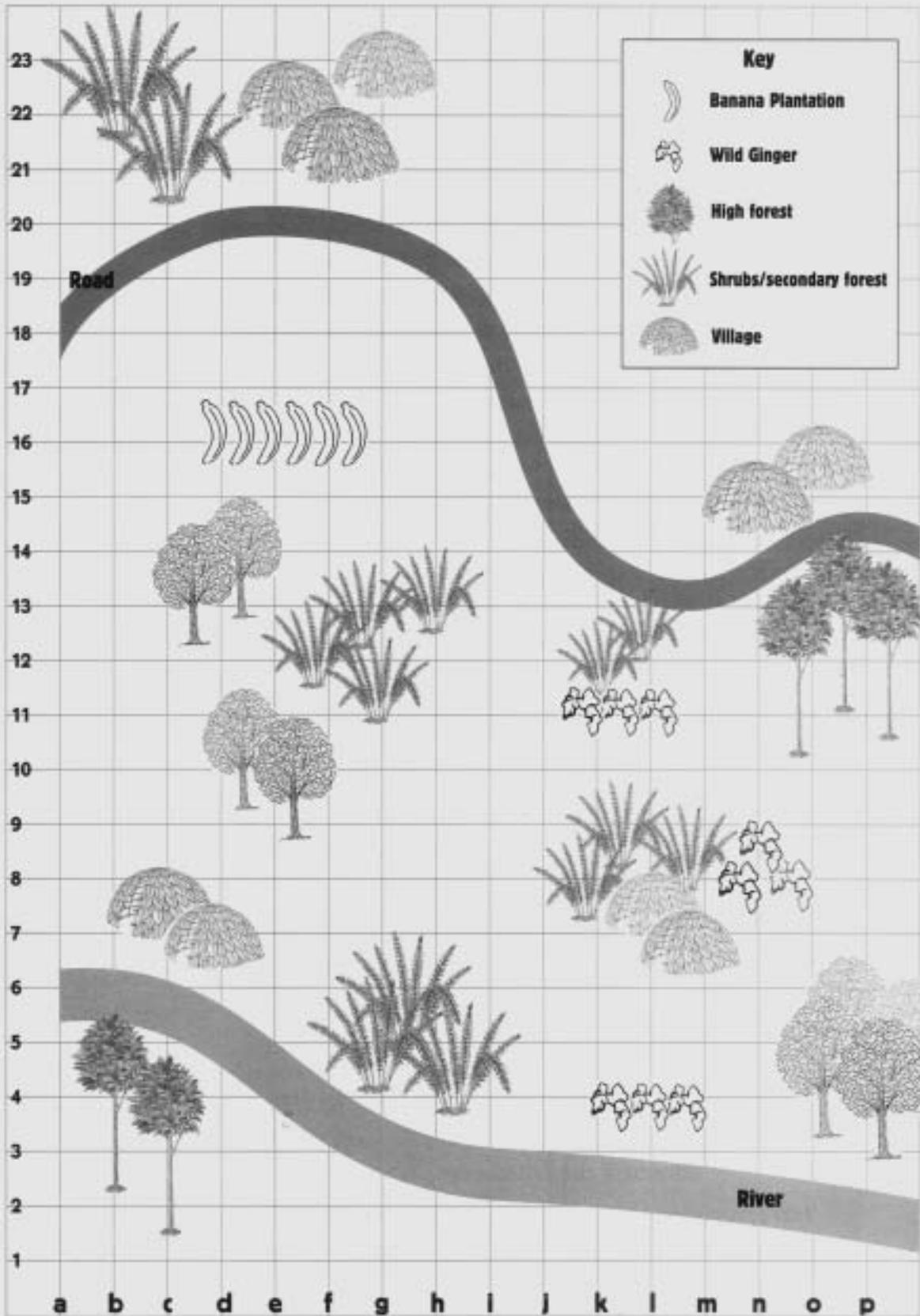
Sketch out the area you would choose in pencil on your map.

Use the information below to plot the spots gorillas use on your *Gorilla Range Data* worksheet. Then draw the reserve boundaries you think would be the best to protect these gorillas. Your reserve can be no larger than 10 squares by 12 squares total. List on your map at least three reasons why you would place your reserve where you did. Note whether your initial prediction was right or wrong based on what you found.

### Field Notes

- 6:00 a.m. Gorillas spotted waking from nests at D13. Female grooms baby.
- 7:00 a.m. Gorillas eating wild celery near nest sites at D13.
- 8:00 a.m. Group on the move from D13-E16.
- 9:00 a.m. Group eating vegetation in plantation at E16.
- 10:00 a.m. Group on the move from E16-G14-H12-L11.
- 11:00 a.m. Group eating figs, wild ginger at L11.
- 12:00 a.m. Group eating at L11. Two young gorillas play with each other.
- 1:00 p.m. Group resting at L11.
- 2:00 p.m. Group moves from L11-N8. Silverback leads the way.
- 3:00 p.m. Group eating at N8. Adult female nurses baby.
- 4:00 p.m. Group eating/resting N8.
- 5:00 p.m. Group resting at N8. Two young gorillas play.
- 6:00 p.m. Group moves to L4. Single male gorilla in area. Silverback chases him away.
- 7:00 p.m. Group resting at L4. Leopard spotted in tree to east.
- 8:00 p.m. Group moves to P4, nests for night.

# GORILLA RANGE DATA



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# WINTER 2002/2003 INSTITUTES FOR TEACHERS

*Pablo Python Looks at Animals* (Grades K – 3)

**November 23, December 7, 14, 2002**

Cost: \$200 Time: 8:30 AM – 3:30 PM

An early childhood, life science curriculum for children of all abilities; it promotes observation skills by focusing on animal colors, sizes and shapes, textures and patterns, sounds, movement and more.

*What Do You Wonder? Science as Inquiry* (Grades K – 8)

**January 11, 2003**

Cost: \$40 Time: 8:30 AM – 3:00 PM

What is Inquiry? Engage in the process and phenomena of inquiry-based activities that you can take back to the classroom. Participate in “Arctic In a Cup” and “The Nose Knows.” Get messy with “The Foam Activity” and explore “You Are What You Eat.”

*Voyage from the Sun* (Grades 4 – 8)

**February 1, 8, 22, 2003**

Cost: \$200 Time: 8:30 AM – 3:30 PM

A twenty-lesson interactive module designed to introduce students to the major ways in which energy is important in living systems; how plants and animals use and conserve energy in a “Race for the Rain forest.”

*Habitat Ecology Learning Program* (Grades 4 – 6)

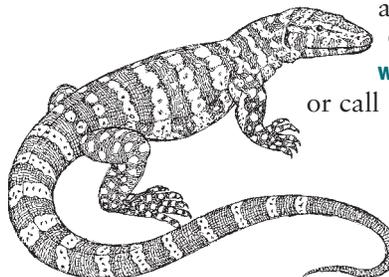
*Rain Forests and Deserts*

**March 8, 15, 2003**

Cost: \$125 Time: 8:30 AM – 3:30 PM

A hands-on inquiry-based curriculum that explores the climate, plants, animals, and indigenous people of the Rain Forest and Desert habitats.

For more information on the various curricula and for an application, visit the Wildlife Conservation Society’s Web site [www.wcs.org/education/workshops](http://www.wcs.org/education/workshops) or call 1.800.937.5131.



## Featured Products

### NEW from the Bronx Zoo’s Education Department!

*Elly Jelly Looks at Marine Animals* is a grade 1-3 life science curriculum modeled on the Bronx Zoo’s popular *Pablo Python Looks at Animals*. It includes a strong emphasis on literacy, and promotes the use of inquiry, observation, and investigation to guide students through an exploration of animals that live in the oceans of the world.

The program consists of six units, each of which includes the following:

- A beautifully illustrated informational storybook;
- A Teacher’s Guide filled with science activities that cut across the curriculum;
- A literacy-based Student Activity Book.

NOW AVAILABLE:

Unit One: *Elly Jelly’s Surprise* introduces students to the world of sea jellies, corals, and anemones.

COMING SOON:

Units Two – Six cover the topics of movement, color, size, feeding, and defense in the marine world.

To order call 1.800.937.5131.



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Call 718.220.7755 or 1.800.937.5131 for more information on teacher institutes and curricula. Or e-mail [lmerlini@wcs.org](mailto:lmerlini@wcs.org).

## Become a National Teacher Member!

Would you like to receive our newsletter on a regular basis? Sign up as a national teacher member of the Bronx Zoo Education Department and access the newsletter on-line. You’ll also find quality lesson plans on animals, habitats and conservation, essays, and information on innovations in wildlife field research and zoo technology. Go to [www.wcs.org/home/education/ntmp](http://www.wcs.org/home/education/ntmp) and register today!