

# Budongo Forest Reserve Education Center



## Primary 6 Curriculum May 2006



the Jane Goodall Institute  
FOR WILDLIFE RESEARCH, EDUCATION AND CONSERVATION



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# Budongo Forest Reserve

## School Field Trip Activities



# Budongo Forest Reserve School Field Trip Activities

The activities in this section have been developed using a variety of hands-on materials for pupils to use. We have suggested a sequence below, but the lessons and materials are flexible to meet the instructor's needs, number of pupils and time frame.

## Suggested Sequence of Activities

1. Welcome the pupils to Budongo Forest Reserve
2. Tell pupils what will be happening during their visit
3. Conduct pre-assessment with each group
4. The group will go into the education centre with Forestry Staff and participate in the following lesson plans:
  - How Big is Africa?
  - Animal Classification
  - Forest Walk
  - Threats to Wildlife
  - Help Protect Wildlife
5. Conduct post-assessment with pupils
6. Say good-byes



# **Overall Objectives For School Group Activities At Budongo Forest Reserve**

After a visit to the Budongo Forest Reserve, pupils will be able to:

- Tell about their favourite experience while walking in the Budongo Forest Reserve and how the forest made them feel.
- Classify two animals that live in the Budongo Forest Reserve according to class.
- Identify two important roles animals perform in nature.
- List two threats to wildlife in the Budongo Forest Reserve.
- Describe two ways they can help protect wildlife.



# **Assessment Of Pupil Understanding Of Budongo Forest Reserve School Program Messages**

## **Background information for facilitators on evaluation**

### **Evaluation**

Evaluation is the process of systematically collecting data (factual information) to determine if program objectives have been met. In order to ensure that your interpretive program is having the desired effect or that your key messages and actions are being taken away by visitors, you need to know which activities work and which do not, and you need to know why.

Evaluation identifies what you have accomplished, helps to identify why you were successful or less than successful, and gives clues as to how to improve.

When conducting an evaluation, you need to include the following steps:

- Determine the evaluation questions
- Decide on the scope of your evaluation
- Choose the method of information collection
- Analyse the data and interpret the results
- Communicate the evaluation results and act on them

### **Method**

For the purposes of the Budongo Forest Reserve School Program, a pre- and post-evaluation will be conducted with the pupils. When the pupils first arrive, the evaluator will hand out a questionnaire with a few questions before the program begins. After the program is complete, the evaluator will hand out a questionnaire with the same questions as in the pre-assesment. In this method of evaluation, the pupils' responses can be compared before and after the program to see what change has occurred in their understanding of the key messages and actions during the program.

In reviewing the data, there may be more correct responses after the program and this increase in correct responses can be recorded as percentages. Another option is that there is no change in correct responses or there are fewer correct responses after the program. In this case, the activities/methods of delivery may need to be changed or the facilitator may need to state key messages and actions more clearly to the pupils.

### **Questions**

When developing questions, it is important to identify which program objectives you wish to evaluate. Since the objectives for each lesson are already written using measurable language (describe, state, list, name), it is easy to write a question that supports the objective. Also, when writing questions be sure to use vocabulary that is easily understood by your pupils and finally be careful in phrasing questions so that you don't bias or influence their responses in one direction or another. If you are using written questions, be sure that your group has strong reading and writing skills. Otherwise, you may not learn what they took away, only that they couldn't read the question or write a response. If the pupils' English is not good enough to understand the questions, be sure to translate them verbally into the local language.

## **Brainstorm Creative and Positive Solutions**

Review the results of each evaluation and discuss the outcomes with the facilitators so that they can offer positive suggestions for improvements (what worked with the pupils and what didn't). This will allow you to test and adjust for the next program. This continued method of improvement should create a fun, supportive team atmosphere among the facilitators and ensure that everyone is conducting the best, most effective programs possible.

## **Tracking Data**

The evaluator will keep a log of student responses for all the programs. This is excellent qualitative data that demonstrates the effectiveness of programs over time. It will also show that the Budongo Forest Reserve staff and the Jane Goodall Institute is serious about offering credible, professional environmental programs that are regularly evaluated to ensure effectiveness.

## **Why is evaluation important?**

Once you have collected data, share with others. It can be used in reports to funding agencies or potential donors to justify their support, in presentations to your supervisors as an example of outstanding performance, in presentations to peers and professional organizations so they can learn from your experiences, and in meetings with the local community to build goodwill by demonstrating that you care about their needs and value their children's education.

# Budongo Forest Reserve School Program

## Pre-Assessment

Name of Pupil \_\_\_\_\_

Name of School: \_\_\_\_\_

1) Name two wild animals that live in the Budongo Forest.

1) \_\_\_\_\_

2) \_\_\_\_\_

2) Match the animals below to their correct classification group.

Amphibian	Chimpanzee
Mammal	Hornbill
Insect	Python
Bird	Butterfly
Reptile	Frog

3) Match the animals below to their important role in the forest

Chimpanzee	Pollinator
Leopard	Decomposer
Butterfly	Seed disperser
Millipede	Species control

4) Name two environmental problems in the Budongo Forest.

1) \_\_\_\_\_

2) \_\_\_\_\_

5) List two ways you can help wildlife and the environment.

1) \_\_\_\_\_

2) \_\_\_\_\_

6) Tick the words below that you think describe the forest:

- a. Enjoyable
- b. Frightening
- c. Important to my family
- d. Fun
- e. Beautiful
- f. Dangerous
- g. Home to wildlife
- h. A place to protect

# Budongo Forest Reserve School Program

## Post-Assessment

Name of Pupil \_\_\_\_\_

Name of School: \_\_\_\_\_

7) Name two wild animals that live in the Budongo Forest.

1) \_\_\_\_\_

2) \_\_\_\_\_

8) Match the animals below to their correct classification group.

Amphibian	Chimpanzee
Mammal	Hornbill
Insect	Python
Bird	Butterfly
Reptile	Frog

9) Match the animals below to their important role in the forest

Chimpanzee	Pollinator
Leopard	Decomposer
Butterfly	Seed disperser
Millipede	Species control

10) Name two environmental problems in the Budongo Forest.

1) \_\_\_\_\_

2) \_\_\_\_\_

11) List two ways you can help wildlife and the environment.

1) \_\_\_\_\_

2) \_\_\_\_\_

12) Tick the words below that you think describe the forest:

- i. Enjoyable
- j. Frightening
- k. Important to my family
- l. Fun
- m. Beautiful
- n. Dangerous
- o. Home to wildlife
- p. A place to protect

# Budongo Forest Reserve



## ***Background Information***

The Budongo Forest Reserve (BFR) lies in western Uganda and slopes upward towards the Albertine Rift in the Northwest. Uganda is rich in biodiversity. Among the countries in Africa, Uganda is ranked 2nd in mammalian diversity (9th in the world) and is home to more than half of the bird species found in Africa. The Budongo Forest Reserve is known for having a large population of wild chimpanzees and a wide variety of other primate species. Such as: baboons, redtail monkeys, blue monkeys and black and white colobus monkeys. BFR is also the only place in the world to find the rare bird - *Illadopsis puveli*.

The Budongo Forest Reserve, covering 435 km<sup>2</sup>, is a medium altitude (average 1100 meters) rainforest that is full of young, intermediate and mature, semi-deciduous tropical plants. On average, the BFR receives 1600 mm of rain a year. There is a major dry season from mid December to mid February and a minor dry season from June to July. Four rivers run through the BFR providing water in the dry seasons: River Sonso, River Waisoke, River Kamirambwa and River Siba.

Even though it is a young forest (300-500 years old), the BFR is the most extensive mahogany forest in East Africa and contains one third of all tree and shrub species found in Uganda (725 species of trees, epiphytes, lianas, herbs and shrubs). Three major forest types make up the BFR: maesopsis forest, woodland forest and swamp forest. Woodland forests contain mahogany and ironwood trees. Swamp forests can be found along rivers and contain wild palm plants and riverine tree species.

The Budongo Forest that exists today is the result of years of natural changes and human shaping. For over 60 years the BFR was selectively logged for mahogany and ironwood by British foresters. Mahogany and ironwood are highly valued exports that are used to make products such as furniture and flooring. Between 1926 and 1970, four sawmills existed in the Budongo forest. By 1960, the largest sawmill in Uganda was producing 600 tons of sawn timber each month, resulting in the loss of approximately 24,000 cubic meters of forest a year. Trees that had no commercial value like strangler figs and Lasiodiscus were treated with potent chemicals (arboricides) that kill trees. These practices were meant to eradicate the less valuable trees and promote the growth of the more valuable mahoganies and ironwood, however, the opposite happened. Strangler figs and other fleshy, fruit bearing trees were resilient to the arboricide and actually flourished. As a result, the BFR that was once primarily a Cynometra (Ironwood) forest became a mixed forest. Arboricide use decreased in the 1970's as more species of trees became marketable for commercial use and it became more difficult to import arboricides.

In the 1980's the National Forest Authority (NFA) gained responsibility for the Budongo Forest Reserve. To this day, the National Forest Authority manages the BFR and is committed to the protection and development of its economic assets.

*Adapted from “The Chimpanzees of the Budongo Forest” by Vernon Reynolds, 2005*

# How Big Is Africa?

*Africa is the second largest continent in the world.  
Learn first hand, how big it really is!*



**Level:**  
Primary 6

**Subject area:**  
Geography

**Duration:**  
10 minutes

**Setting:**  
Education centre

**Skills:**  
Identifying countries

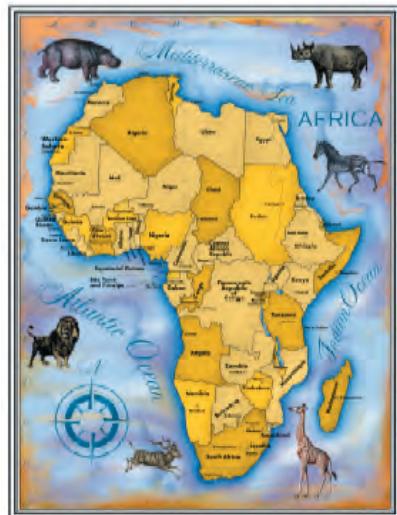
**Summary:** The continent of Africa is very large and contains 22% of the land surface on earth. Feel proud to be from this very special continent!

**Objectives:**

- To identify the continent of Africa
- To recognize how big Africa is in relation to the rest of the world
- To locate Uganda and the Budongo Forest Reserve on a map in Africa

**Materials:**

- Cloth map of Africa
- Three plastic copies of the U.S.  
(The United States is approximately 1/3 the size of Africa. It will fit in the continent of Africa three times.)



How Big Is Africa map

## Background Information

Africa is the second largest continent in the world (Asia is the largest). It contains approximately 53 independent nations. Within these countries there are hundreds of distinct cultures and languages. The landmass of the United States, India, China, Argentina, Europe and New Zealand all fit easily inside the continent of Africa.

Uganda sits on the equator in East Africa covering about 240,000 square kilometres. A beautiful, serene, green plateau, it is situated between the eastern and western branches of the Great Rift Valley. Uganda receives about 2,000 mm of rainfall a year. Lake Victoria, the world's second largest freshwater lake, and the legendary Nile River, cover about 25 percent of its surface. Uganda's lush rainforests, savannah, and semi-desert areas are home to a splendid array of plant and animal life. Its greatest asset, however, is the Ugandan people. They are friendly, quick to laugh, smile, extend an outstretched hand, and offer assistance. They are ever proud of the country they have helped to rebuild.

Three principal categories of protected areas are recognized in Uganda: National Parks, Wildlife Reserves and Forest Reserves. All support natural systems and are legally protected against any human settlement, cultivation or livestock grazing.

Today, Uganda has 31 nationally protected areas. Spectacular places like Murchinson Falls National Park and Queen Elizabeth National Park were the country's first national parks, established in the 1950's.



*Adapted from "Planning conservation areas in Uganda's Natural forests" by Howard, Davenport, Kigenyi, 1997; "African Rain Forest Ecology and Conservation" by Weber, White, Vedder, Naughton-Treves, 2001; Specturm Guide to Uganda by Camerapix, 1998.*

## **Procedure**

1. Sit pupils in front of the map of Africa. Ask the group if they know what continent they are looking at. Explain that the continent of Africa is the second largest continent in the world.
2. To demonstrate just how big Africa is, hold up the plastic copy of the U.S.A. Ask pupils if they know what country you are holding. Ask a pupil to place one of the U.S. pieces inside the map of Africa. Hand out the other two plastic copies of the U.S to other pupils and have them repeat the process. The pupils will see that the African continent is larger than three United States put together!
3. Now ask pupils to point to Uganda on the map. Ask them to locate the large freshwater lake and explain that it is Lake Victoria. Also ask them to point to the Nile River. Do they know where Budongo Forest Reserve is located in Uganda? Point to the northwestern portion of Uganda.
4. Summarize for pupils: Africa is a very large continent (2nd largest in the world); Uganda is a great country for people and wildlife; Budongo Forest Reserve is a beautiful forest in Uganda.

# Classifying Wildlife

*Which groups of animals live in the Budongo Forest Reserve?  
Why is each animal important to its habitat?*



**Age Level:**  
Primary 6

**Subject Area:**  
Science

**Duration:**  
20 minutes

**Setting:**  
Education centre

**Skills:**  
General knowledge of animal classification system and animal characteristics.

**Summary:** Locate and identify animals in the mural and classify them by their characteristics.

## Objectives:

- To classify a variety of animals living in the Budongo Forest reserve.
- To recognize the important roles animals have in nature.
- To inspire children to learn more about the animals that inhabit the Budongo Forest Reserve.

## Materials:

- Classifying wildlife boards
- Black lumber crayons
- Classification chart
- Wall mural
- Animal X-rays



Classifying Wildlife Boards

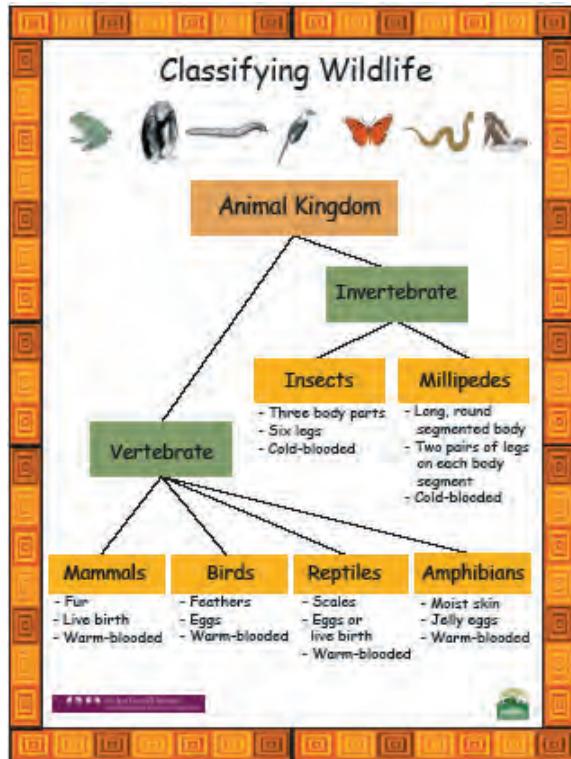
## Key Terms

<b>Biodiversity:</b>	The variety of life on earth and their interactions with each other.
<b>Classification:</b>	A scientific system used to group living things into specific categories based on their common characteristics.
<b>Cold-blooded:</b>	Animals that have a variable (changing) body temperature. They use external sources to heat and cool their bodies, like the sun or water.
<b>Decomposer:</b>	An organism that feeds on rotting plants and animals.
<b>Diurnal:</b>	An animal that is active during the day and sleeps at night.
<b>Exoskeleton:</b>	The hard outer covering of an invertebrate.
<b>Habitat:</b>	The place where an organism lives that provides all of its needs for survival including food, water, shelter and nesting sites.
<b>Incubation period:</b>	The time from when an egg(s) is laid to when it hatches.
<b>Metamorphosis:</b>	A growth process that animals go through with distinctive stages in their body appearance.
<b>Symbiotic:</b>	A relationships where two living things depend on one another for survival without harming one another.
<b>Warm-blooded:</b>	Animals that have a constant body temperature. They have an internally heated body, fueled by food.

## **Procedure**

1. Have pupils sit facing the wall mural. Ask them to name any plants and animals that they recognize in the mural. State that everything seen in the mural can be found in the Budongo Forest. Today we are going to learn how to classify the animals found here and learn about their specific characteristics.
2. Introduce the term classification. Classification is an easy way to group living things according to their similar characteristics. Point out the classification poster and the groups they will be learning about. The first group that we use to classify animals is based on a general characteristic, their skeleton. Does the animal have a backbone? If so they are grouped as a vertebrate. If the animal doesn't have a backbone, but has an exoskeleton then it's grouped as an invertebrate. Let's figure out what group humans are in! Ask the pupils to feel the middle of their backs. Ask them if they feel the hard bumps that make up their backbone. After the pupils have felt their backbone ask them what group humans belong to: vertebrates or invertebrates? The pupils should answer vertebrates. Examine the x-rays of various animals and locate their backbone.
3. Next, explain to the pupils that animals are then classified into more specific groups called Classes. Vertebrates are grouped into five classes: mammals, birds, reptiles, amphibians and fish (we will only be talking about four in detail). Invertebrates are grouped into eight smaller classes. We will only be talking in detail about two classes of invertebrates, insects and millipedes. Each class of animals share several key characteristics

4. Using the animal classification poster:



Read the name of each class and the key characteristics that are used to group the animals out loud to the pupils. Ask the pupils which class of animals do humans fit in, mammals, birds, reptiles or amphibians? The pupils should answer mammals. Explain to the children that they are going to have the opportunity to classify an animal using a classifying wildlife board and the wall mural!

**Note: Keep the poster out to use during the activity. This is not a complete listing of all characteristics and classification groups.**

5. Pair up the pupils and give each pair a classifying wildlife board.

6. Tell pupils that each board has a specific animal that must be found in the mural. Once each pair has located their animal they need to answer the multiple-choice questions to the best of their ability based on their observations in the mural. Allow the pupils 10-15 minutes to complete the activity. Observe children and help answer questions if having difficulty. **Note: Pupils may need help answering questions 4 and 5.**

7. When the pupils are finished with the activity have them sit with their partner facing the wall mural. Have the classification chart hanging for children to see.

8. Ask the pair with the butterfly board to come to the mural and point out the animal they classified. Next, using the classification chart, ask them:

• **Looking at the butterfly, would you classify it as a vertebrate or invertebrate?**

- o Pupils should respond invertebrate. Yes! Butterflies do not have a backbone, instead their bodies are covered in an exoskeleton.

Now that we know the butterfly is an invertebrate lets find out what group it belongs to! Next, ask the pupils:

- **What group does the butterfly belong to, insect or millipede?**

- o Pupils should respond insect. That's right! Butterflies are insects! They have three body parts (head, thorax and abdomen), six jointed legs and they are cold-blooded.

Next, lets find out why butterflies are important to the Budongo Forest. Ask the pupils:

- **Do butterflies help to replant the forest by spreading seeds?**

- **Do butterflies decompose rotting plants and animals?**

- **Do butterflies control animal species (by eating them)?**

- **Do butterflies pollinate plants?**

- o Pupils should answer that butterflies pollinate plants. Yes! Butterflies feed mainly on nectar. As they feed they carry pollen from plant to plant helping the plant to reproduce.

9. Ask the pair with the chimpanzee board to come to the mural and point out the animal they classified.

Next, using the classification chart, ask them:

- **Looking at the chimpanzee, would you classify it as a vertebrate or invertebrate?**

- o Pupils should respond vertebrate. Correct! Chimpanzees do have a backbone, this classifies them as a vertebrate.

Now that we know the chimpanzee is a vertebrate lets find out what group it belongs to!

Next, pointing to the classification chart, ask the pupils:

- **What group does the chimpanzee belong to: mammals, birds, reptiles or amphibians?**

- o Pupils should respond mammals. That's right! Chimpanzees are mammals! They have fur covering their bodies, they are warm-blooded and they give birth to live young.

Next, lets find out why chimpanzees are important to the Budongo Forest. Ask the pupils:

- **Do chimpanzees help to replant the forest by spreading seeds?**

- **Do chimpanzees decompose rotting plants and animals?**

- **Do chimpanzees control animal species (by eating them)?**

- **Do chimpanzees pollinate plants?**

**Note:** This question will be hard for the pupils to answer from looking at the mural. Chimpanzees are important to the forest as seed dispersers.

- o Pupils can answer that chimpanzees help to replant the forest by spreading seeds. As plant eaters, they spread the seeds from the fruit that they eat.

10. Ask the pair with the rock python board to come to the mural and point out the animal they classified.

Next, using the classification chart, ask the them:

- **Looking at the rock python, would you classify it as a vertebrate or invertebrate?**

- o Pupils should respond vertebrate. Yes! Rock pythons do have a backbone, this classifies them as a vertebrate.

Now that we know the rock python is an vertebrate lets find out what group it belongs to!

Next, pointing to the classification chart, ask the pupils:

- **What group does the rock python belong to: mammals, birds, reptiles or amphibians?**

- o Pupils should respond reptiles. That's right! Rock pythons are reptiles! They have scales covering their bodies, they are cold-blooded and they lay leathery eggs.

Next, lets find out why rock pythons are important to the Budongo Forest. Ask the pupils:

- **Do rock pythons help to replant the forest by spreading seeds?**

- *Do rock pythons decompose rotting plants and animals?*
- *Do rock pythons control animal species (by eating them)?*
- *Do rock pythons pollinate plants?*

**Note:** This question will be hard for the pupils to answer from looking at the mural. You may need to discuss background information about the rock pythons diet (meat eaters) to help the pupils answer the question.

- o Pupils should answer that rock pythons help to control animal species. Rock pythons are meat eaters that typically feed on small and large animals, such as hyrax, spring hares, antelope, birds, frogs and fish.

11. Ask the pair with the hornbill board to come to the mural and point out the animal they classified. Next, using the classification chart, ask the pupils:

- ***Looking at the hornbill, would you classify it as a vertebrate or invertebrate?***
- o Pupils should respond vertebrate. That's right! Hornbills do have a backbone, this classifies them as a vertebrate.

Now that we know the hornbill is an vertebrate lets find out what group it belongs to! Next, pointing to the classification chart, ask the pupils:

- ***What group does the hornbill belong to: mammals, birds, reptiles or amphibians?*** (Have all pupils answer the question.)
- o Pupils should respond birds. Yes! Hornbills are birds! They have feathers covering their bodies, they are warm-blooded and they lay hard-shelled eggs.

Next, lets find out why hornbills are important to the Budongo Forest. Ask the pupils:

- *Do hornbills help to replant the forest by spreading seeds?*
- *Do hornbills decompose rotting plants and animals?*
- *Do hornbills control animal species (by eating them)?*
- *Do hornbills pollinate plants?*

**Note:** This question will be hard for the pupils to answer from looking at the mural. You may need to discuss background information about the hornbills diet (plant and meat-eater) to help the pupils answer the question.

- o Pupils can answer that hornbills help to replant the forest by spreading seeds. Hornbills eat both plants and meat. When eating fruit they often drop seeds from their bill or eliminate (poop) the seeds. Since hornbills also eat meat they can also help control species of animals such as: small birds, bats, lizards, termites, beetles and cockroaches.

12. Ask the pair with the millipede board to come to the mural and point out the animal they classified. Next, using the classification chart, ask the pupils:

- ***Looking at the millipede, would you classify it as a vertebrate or invertebrate?***
- o Pupils should respond invertebrate. Yes! Millipedes do not have a backbone, instead they have a hard outer covering called an exoskeleton, which classifies them as an invertebrate.

Now that we know the millipede is an invertebrate lets find out what group it belongs to! Next, pointing to the classification chart, ask the pupils:

- **What group does the millipede belong to: insects or millipedes?**

- o Pupils should respond millipedes. Correct! Millipedes have long, round segmented bodies. Each segment of their body (except the first segment) has two pairs of legs.

Next, lets find out why millipedes are important to the Budongo Forest. Ask the pupils:

- **Do millipedes help to replant the forest by spreading seeds?**
- **Do millipedes decompose rotting plants and animals?**
- **Do millipedes control animal species (by eating them)?**
- **Do millipedes pollinate plants?**

- o Pupils should answer that millipedes feed on rotting plants and animals.

Millipedes are decomposers that eat rotting vegetation, when they eliminate (or poop), it adds beneficial nutrients to the soil that helps plants grow.

**Note:** *Millipedes do not decompose rotting animals.*

13. Ask the pair with the leopard board to come to the mural and point out the animal they classified.

Next, using the classification chart, ask the pupils:

- **Looking at the leopard, would you classify it as a vertebrate or invertebrate?**

- o Pupils should respond vertebrate. Correct! Leopards do have a backbone, which classifies them as a vertebrate.

Now that we know the leopard is an vertebrate lets find out what group it belongs to! Next, pointing to the classification chart, ask the pupils:

- **What group does the leopard belong to: mammals, birds, reptiles or amphibians?**

- o Pupils should respond mammals. That's right! Leopards are mammals! They have fur covering their bodies, they are warm-blooded and they give birth to live young.

Next, lets find out why leopards are important to the Budongo Forest. Ask the pupils:

- **Do leopards help to replant the forest by spreading seeds?**
- **Do leopards decompose rotting plants and animals?**
- **Do leopards control animal species (by eating them)?**
- **Do leopards pollinate plants?**

- o Pupils should answer control animal species. As meat eaters, leopards help control animal species such as: monkeys, rodents, reptiles, amphibians, large birds and antelope.

14. Ask the pair with the frog board to come to the mural and point out the animal they classified.

Next, using the classification chart, ask the pupils:

- **Looking at the frog, would you classify it as a vertebrate or invertebrate?**

- o Pupils should respond vertebrate. Yes! Frogs do have a backbone, this classifies them as a vertebrate.

Now that we know the frog is a vertebrate lets find out what group it belongs to! Next, pointing to the classification chart, ask the pupils:

- **What group does the frog belong to: mammals, birds, reptiles or amphibians?**

- o Pupils should respond amphibians. Frogs have moist skin, they are cold-blooded and they lay jelly eggs.

Next, lets find out why frogs are important to the Budongo Forest. Ask the pupils:

- ***Do frogs help to replant the forest by spreading seeds?***
- ***Do frogs decompose rotting plants and animals?***
- ***Do frogs control animal species (by eating them)?***
- ***Do frogs pollinate plants?***

**Note:** *This question will be hard for the pupils to answer from looking at the mural. You may need to discuss background information about the frogs diet (meat-eater) to help the pupils answer the question.*

- o Pupils should answer control animal species. Correct! As meat eaters, frogs help control animal species such as small mammals, lizards and invertebrates.



15. Make sure to tell the pupils that they are great at classifying wildlife. Discuss with the pupils that classification is a way to learn how animals are different from one another (classes) and how they are similar to one another (animals in the same class). In addition, we also learned that all of the animals that live in the Budongo Forest Reserve are important. Some of them help replant the forest, decompose rotting plants, control species of animals and pollinate plants. Without them, the forest wouldn't be the same! End with the message: "All animals, large and small, play an important role in the Budongo Forest Reserve."

# Background Information

## Biodiversity

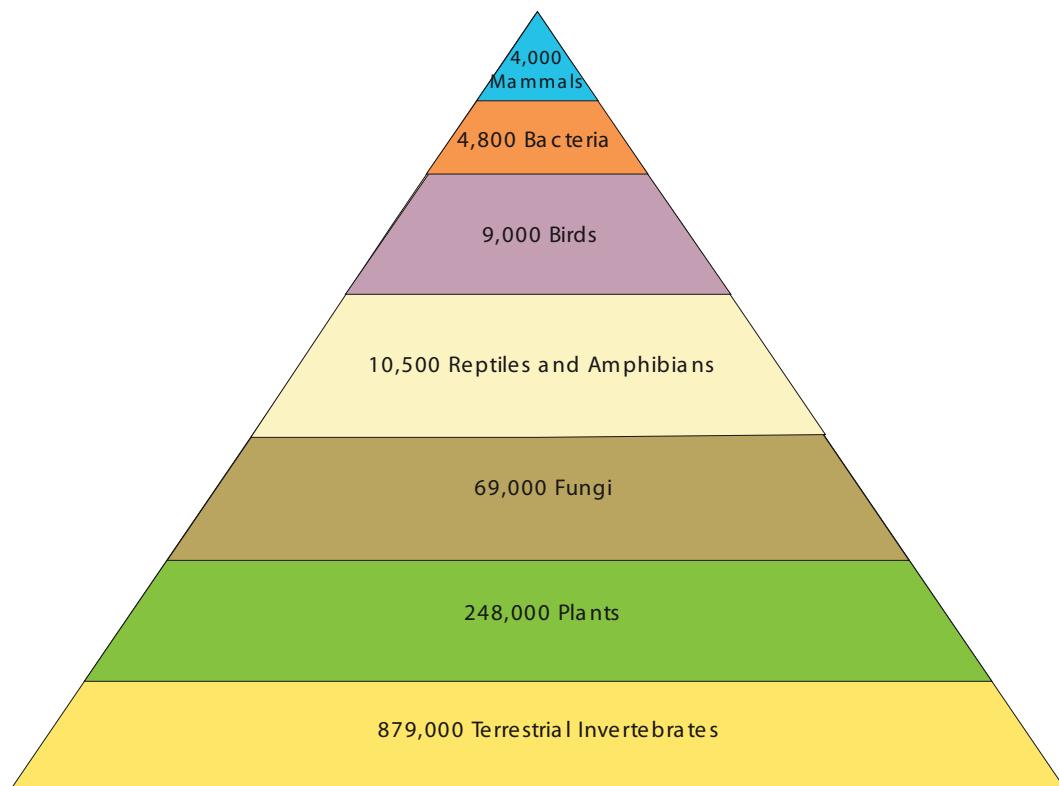
Biodiversity, simply stated, is the variety of life on earth and their interconnections. Biodiversity can be broken down into three different levels: species diversity, genetic diversity and ecosystem diversity.

- Species diversity is the variety of living organisms on the earth. (All of the different plants and animals in the Budongo Forest Reserve)
- Ecosystem diversity is the variety of habitats and ecological processes in the natural world. (Budongo forest vs. grasslands at Murchison Falls National Park)
- Genetic diversity is the variety of genes within a species. (Differences between individual animals within a specific species (i.e. coloration, size etc.) )

The more species diversity within an ecosystem, the more resilient that system is likely to be; similarly, the more genetic diversity within a species, the more successful that species is likely to be.

## Diversity of Terrestrial Species

Scientists have identified about 1.7 million species on earth. But they predict that there are millions more yet to be discovered, especially small animals and plants like flies, beetles, bacteria and fungi. The diagram below shows the number of species for each group of animals and plants.



# The Classification System

All living things are classified and identified in a classification system. The classification system groups living things into a specific kingdom, phylum, class, order, family, genus and species according to their common characteristics. Some common characteristics used to classify living things are: reproduction, number of legs, respiration, colour, size, body segments, movement, body covering, shape and how they obtain food and eat it. The purpose of the classification system is to create an organized way for people to understand living things.

The first classification category, the kingdom, is the broadest of all classification categories. There are five kingdoms to consider when classifying living things: animal kingdom, plant kingdom, bacteria kingdom, protist kingdom and fungi kingdom. Each kingdom can then be further divided into smaller categories such as: phylum, class, order, family, genus and species.

For the Classifying Wildlife and Forest Walk activity we will be focusing on the animal and plant kingdoms.

## Plant Kingdom

Plants are organisms that are not capable of movement and have the ability to make their own food.

### Flowering plants and Non-Flowering plants

To further classify plants in the plant kingdom, they are classified into two major groups: *flowering plants* and *non-flowering plants*. Flowering plants reproduce by seeds. Some examples of flowering plants are mahogany and strangler fig. Non-flowering plants reproduce by spores and cones. Some examples of non-flowering plants are conifers and ferns.

## Animal Kingdom

Animals are a group of organisms that are capable of movement, feed on other organisms and have the ability to sense their environment.

To further classify animals in the animal kingdom they are classified into two major groups based on the type of skeleton they possess, *invertebrates* and *vertebrates*.



# Invertebrates

By current estimates, 95% of all animals in the world are invertebrates! They are central to the stability of the earth's ecosystems. Invertebrates maintain the soil structure and fertility upon which plants and other organisms depend, cycle nutrients by consuming decaying matter, pollinate food crops, disperse seeds, and perform a host of other biologically essential functions.

All invertebrates share two key characteristics:

1. **Cold-blooded:** Invertebrates have variable (changing) body temperature. They use external sources to heat and cool their bodies, like sun or water.
2. **Exoskeleton:** Invertebrates are animals that do not have a backbone. For them, their bones are on the outside of their body. This hard outer covering is called an exoskeleton. Exoskeletons protect invertebrates from predators and are also shed (molt) as they grow.

Just like vertebrates, invertebrates can be classified into smaller classes, or families that share one or more characteristics. The invertebrates are divided into eight classes: *worms, arachnida, arthropoda* (insects), *crustacean, mollusks, chilopoda, coelenterates, echinoderm*.

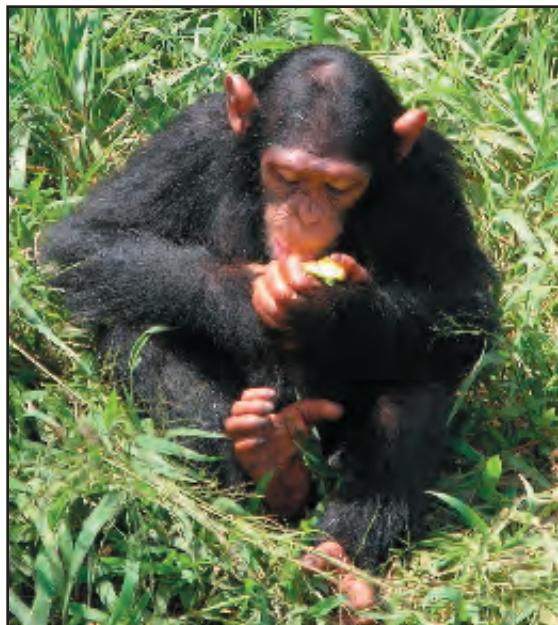
**Insects:** Insects are invertebrates with three body parts: head, thorax and abdomen and they have three pairs of jointed legs. Insects have compound eyes and breathe through holes in their thorax and abdomen called spiracles. Insects reproduce by laying eggs that will hatch and either go through complete or incomplete metamorphosis. Complete metamorphosis involves four stages of development: egg, larvae, pupa and adult. Insects such as butterflies, mosquitoes and flies go through complete metamorphosis. Incomplete metamorphosis involves three stages of development: eggs, nymph and adult. Insects such as cockroaches, grasshoppers and locusts go through incomplete metamorphosis. Insects are animals such as: butterflies, cockroaches, houseflies and grasshoppers.

**Millipedes:** Millipedes are classified in the Class Diplopoda. They have long, round segmented bodies and each segment of their body (except the first segment) has two pairs of legs. Like all other invertebrates, millipedes shed their exoskeleton as they grow.

Some examples of invertebrates that live in the Budongo Forest Reserve are: cockroaches, termites, butterflies and millipedes.

# Vertebrates

Vertebrates are animals that have a backbone and a internal skeleton. However, vertebrates share many other key characteristics. For example, they have a brain, their body is covered in a protective layer known as skin, they have an organized nervous system and they are symmetrical, meaning that one side of the body is a mirror image of the other. Vertebrates are divided into five classes: *mammals, birds, reptiles, amphibians* and *fish*.



## Mammals

There are approximately 1.7 million discovered species of animals on earth and only about 4,000 are mammals!

All mammals share several key characteristics:

1. **Warm-blooded:** Mammals have a constant body temperature. They have an internally heated body, fueled by food.
2. **Fur:** All mammals have fur at some time during their lives. Some have fur covering their entire bodies while others have fur that covers part of their bodies. Fur can serve a specific purpose for animals. For example, quills are used for protection from predators, while whiskers are used for sensing their environment.
3. **Birth:** Most mammals give live birth (other mammals, in the order monotremata, lay eggs). After fertilization the young develop and grow in the placenta. After birth, the young receive nourishment from milk produced by the mammary glands.
4. **Mammary glands:** Most mammals have mammary glands that supply milk to feed their young.
5. **Lungs:** Mammals use lungs to breathe oxygen.

Examples of mammals found in the Budongo Forest Reserve are: duiker, chimpanzee and fruit bat.

# Birds

Birds are probably the most easily recognised animals. They can be found living in all parts of the world including the North and South poles. There are about 9,000 different species of bird on the earth.

Birds share several key characteristics:

1. **Warm-blooded:** Birds have a constant body temperature. They have an internally heated body, fueled by food.
2. **Feathers:** All birds have feathers! It is the most common characteristic they share. Feathers are lightweight, strong and flexible. Feathers are made up of many different parts known as the shaft, barbs and barbules. Barbules are used to zip and un-zip the barbs. Zipping is important to a bird because it allows the barbs to stay together so that air cannot pass through the feather during flight, but instead air passes around the feather. Birds will lose their feathers at least once a year in a process called molting. Old feathers are shed to allow new ones to grow.
3. **Egg laying:** All birds lay hard-shelled eggs that hatch outside of the body. Bird's eggs come in many shapes, sizes and colour depending on the species. Eggs have a hard, porous shell (made of calcium) that protects the growing chick.
4. **Wings:** All birds have wings that are used for flight in the air or in the water. (Large flightless birds known as ratites, like ostrich, have underdeveloped wings that are not used for flight. Penguins have wings that are underdeveloped for flight in air, but well adapted to flight in water. Birds fly for three main reasons: to escape danger, to collect food and to migrate.
5. **Beaks:** All birds have beaks. Beaks are adapted for feeding on specific foods.
6. **Skeleton:** Bird skeletons are strong but lightweight. Their bones are hollow and filled with air sacs that make them lightweight enough to fly.

In general, birds have excellent eyesight and hearing but a poor sense of taste and smell. Birds are beneficial to the forest. Many birds feed on smaller animals such as insects, which helps control insect populations. Others are great pollinators and assist in the growth of new plants.

Some examples of birds in the Budongo Forest Reserve are: hornbill, crowned eagle and African emerald cuckoo.

# Reptiles

Reptiles are an ancient group of animals that have not changed since prehistoric times. There are about 7,400 different species of reptiles. Unlike mammals, reptiles have a three-chambered heart.

All reptiles share several key characteristics:

1. **Cold-blooded:** Reptiles have variable (changing) body temperature. They use external sources to heat and cool their bodies, like sun and water.
2. **Scaly skin:** Reptiles have dry, scaly skin that prevents them from drying out. As they grow, they shed (molt) their old skin to make room for the new skin. Reptiles shed by rubbing their bodies against rocks or between branches. For snakes, the old skin is usually shed starting with the face and then the remaining skin is shed. The old skin is shed inside out; when complete the new skin is already there. Turtles, tortoises and lizards typically shed their skin in pieces rather than one piece.
3. **Lay eggs:** Depending on the species, reptiles can either lay leathery eggs or give live birth. Typically, reptiles lay eggs by digging a burrow, laying their eggs and leaving them to hatch on their own. Some snakes will lay the eggs and curl around them to keep them warm until hatching. Reptiles rarely care for their young because they are fully developed and independent at birth/hatching.
4. **Lungs:** Reptiles use their lungs to breathe air.

Many reptiles and all snakes are meat-eaters. Many lizards eat insects and smaller vertebrates. However, there are lizards that are plant eaters and some that eat both meat and plants. Most turtles eat both plants and meat while most tortoises are plant-eaters. Reptiles mainly hunt by using their vision and smell. It is believed that reptiles have well developed colour vision. In all snakes and some lizards a clear scale called a spectacle covers each eye and protects them by keeping dust out and moisture in. Reptiles that have a spectacle do not have eyelids that open and close, which gives the impression that they stare.

Reptiles are classified into four different groups:

1. Lizards and snakes
2. Crocodiles and Alligators
3. Turtles and Tortoises
4. Tuatara

Reptiles help in balancing animal populations by feeding on insects, birds and small mammals.

Some examples of reptiles in the Budongo Forest Reserve are: African rock python, puff adder and chameleons.

# Amphibians

There are about 3,100 different species of amphibians. Amphibians change and grow by a process called metamorphosis.

All amphibians share several key characteristics:

1. **Cold-blooded:** Amphibians have variable (changing) body temperature. They use external sources to heat and cool their bodies, like sun or water.
2. **Moist skin:** Most amphibians have moist skin. Their skin is permeable to air and other substances in their environment like water and chemicals. In addition to breathing air into the lungs, amphibians obtain oxygen from the environment through their permeable skin. To protect themselves from predators, amphibians have a noxious or toxic secretion that comes from glands on their skin.
3. **Lay eggs:** All amphibians lay jelly-like eggs in the water. Once hatched, they breathe through gills, and over time they will metamorphose into a land living, air breathing amphibian complete with lungs.

Most adults are meat-eaters feeding on a variety of invertebrates. However, some will feed on small mammals, birds and other amphibians. Amphibians locate their prey by sight. Most amphibians are opportunistic feeders that wait for their food to come to them. Some amphibians use their tongue to catch prey. Their tongues have a sticky mucous gland on the tip that sticks to their prey.

Amphibians are classified into three different groups:

1. Frogs and toads
2. Salamanders and newts
3. Caecilians

Amphibians help in balancing animal populations by feeding on insects, birds and small mammals. Amphibians are also great indicator species. A drop in their populations often tells us when the water quality in lakes and rivers and the air becomes unhealthy.

Some examples of amphibians in the Budongo Forest Reserve are: tree frogs and geckos.

# A Forest Walk

Use all your senses to find and classify wildlife in the forest and search for clues they left behind.

**Level:**

Primary 6

**Subject:**

Environmental Science

**Duration:**

1.5 hours

**Setting:**

Forest path

**Skills:**

Observation and listening skills

**Summary:** By spending time in nature, pupils will discover the special secrets and stories of the forest and its wildlife. The Forest Walk Lesson supports the idea: “I hear and I forget, I see and I remember, I do and I understand.”

**Objectives:**

- To create first-hand, inspirational experiences in nature for pupils.
- To observe and listen to the natural world.
- To make connections between wildlife and the pupils that promotes an appreciation of the natural world and people's role in it.
- To classify wildlife in the forest.

**Materials:**

- Backpack with field guides (Animal tracks, African Birds, African Wildlife), skull (colobus monkey), magnifying lenses, binoculars, plant press, compass, and specimen containers
- Forest Walk Activity boards with crayons for recording their nature discoveries.
- Five “Unnatural Objects” placed along the trail for pupils to discover (3 pieces of litter, a plastic frog and a plastic lizard)

Forest Walk		
Make a mark to record all that you see and hear and circle the level of forest where it is found.		
Mammals		Canopy Middle Floor
Birds		Canopy Middle Floor
Reptiles and Amphibians		Canopy Middle Floor
Invertebrates		Canopy Middle Floor
Flowers and plants		Canopy Middle Floor
Footprints		Canopy Middle Floor
Dung		Canopy Middle Floor
Other clues (leaves, webs, nests)		Canopy Middle Floor

## **Making Connections:**

This exploration through the forest will give pupils their own real experiences in nature and help them understand and appreciate the importance of the forest and its wildlife.

## **Background**

Love for nature is the fertile soil in which environmental concern can take root and grow. This activity takes the pupils on a walk through the forest to observe its many wonders and curiosities. Through direct exploration along the forest path, pupils will gain experiences and understand the connections among living things.

The forest is made up of air, soil, water, plants and animals. The arrangements of these factors are critical to its survival as a healthy habitat. During the Forest Walk, all of these elements will be pointed out and discussed.

### **Air**

Air is all around us. It is very important to all living things, yet we hardly stop to think about it. Air can be described as cold, hot, warm, dry, humid, clean or windy. Air moves because of differences in temperature (wind). Air also carries small particles of water causing humidity, including rain. Sometimes people change the quality of the air. Automobile fumes, for example, can make the air thick with chemicals, thereby making it difficult to breathe.

### **Soil**

Soil is made from plant material (leaves, buds, fruits and twigs) that fall to the ground. Additionally, soil is created when plants breakdown rocks. Soil can be described in terms of hardness, moisture, colour and animal life. The type of soil in a particular place often determines the types of plants found in that habitat.

### **Water**

Every living thing in the world depends on water. In the forest, water is found in a variety of places. On the forest floor it can be found as small puddles or rushing streams. In the trees, it can be found trapped in crevices in the bark or held by cup-shaped leaves. Plants find ways to reach and absorb water using their roots. Animals may drink water from leaves high in the forest canopy or drink from puddles on the forest floor. Some animals don't have to drink water at all, because they get enough from the plants they eat.

### **Plants**

Green plants either directly or indirectly serve as the source of food for all other life on earth. They also produce surplus food that is used to constantly replenish the world's oxygen supply. Lichens, algae, mushrooms, grasses, vines, shrubs and trees are all important to the forest habitat. Plants are the most visible organisms in the forest. Some plants ward off predators while others attract pollinators. Other plants may have large thorns to prevent animals from eating them. Plant fragrances are important adaptations, designed to attract insect pollinators. Understanding how plants and animals depend on one another is important in understanding how to conserve wildlife.

Plants that live in a forest can be grouped according to the layer of the forest in which they grow: canopy (or treetops), middle and floor. Each layer has many different types of plants that live there.

**Canopy:** The canopy is the tallest layer of the forest and is filled with the leaves of the tops of mature trees. This layer is exposed to the most sun. The leaves of the canopy block a majority of the sunlight to the remaining layers of the forest.

**Middle:** Just beneath the canopy is the middle of the forest also known as the understory. It is in this level that shade tolerant trees, tall shrubs and saplings live. The growth of saplings that live in this level of the forest is stunted because of the lack of sunlight available. If a mature tree in the canopy dies, an opening occurs and a sapling will quickly grow to fill the space and become a part of the canopy.

**Floor:** The forest floor is the final layer of the forest and gets the least amount of sunlight. Here you will find grasses, flowers and decaying plant matter. Many of the plants that grow here have short life cycles due to the lack of sunlight. As leaves fall from other plants in the forest they land on the forest floor where decomposers like millipedes and fungi turn it into nutrient rich soil. The plants of the forest use the nutrient rich soil to grow and develop new leaves that will fall to the floor. This process, nutrient recycling starts the cycle over again to ensure the life of the forest.

Plants can be divided into smaller classes such as: trees, shrubs, grasses and flowering plants. Each class share several key characteristics.

**Trees:** Trees are the largest of all plants. They have thick and woody stems that divide into branches. Each species of tree has its own unique shape and pattern of branches. Some trees are tall and narrow, others are wide and round. A tree's trunk is made up of a system of living cells that move water and nutrients to every part of the tree. The trunk is protected by dead cells called bark. Bark can vary in texture and size depending on the species of tree. As a tree grows, the bark will split and form cracks and crevices where other plants (moss) and animals (beetles, spiders, etc) find shelter. In addition to providing shelter for other plants and animals, trees also provide oxygen. Most trees grow to reach the canopy layer of the forest.

**Shrubs:** Shrubs, also known as bushes, are low woody plants with several branches. Shrubs are usually less than 6 metres tall and do not have a trunk. Instead they have multiple stems covered in bark that branch out. (Shrubs can grow on the floor and can reach the middle layer of the forest depending on the species of shrub.)

**Grass:** Grasses are plants that have long, narrow leaves that grow in the floor layer of the forest.

**Flowers:** All flowers have four basic parts: *sepals* (enclose the flower as it grows), *corolla* (also called petals), *stamen* ("stalks" of a flower that hold pollen) and *carpels* (part of a flower where the seed grows). Most flowers are large and brightly colored to attract insects to feed from them which helps the flower reproduce by pollinating it. Flowers are the reproductive part of a plant. Pollen, the male part

of a flower, is part of the stamen. Eggs or ovules are the female cells and are inside the carpel. Fertilization happens when pollen gets inside the carpel and fertilizes the egg. Most flowers grow in the floor layer of the forest. However, depending on the species, flowers can also be found in the middle layer of the forest, wedged between the branches of trees (example: orchids).

## Animals

Animals range in size from microscopic protozoa and worms that live in the soil and water, to birds and mammals of various sizes. Many easily observed animals are invertebrates, animals with a bony external skeleton or exoskeleton. Invertebrate animals commonly seen on land include snails, slugs, worms, insects, millipedes, centipedes and spiders. These small animals are more numerous than the better-known vertebrate animals, both in number of species and actual number of individuals. They play important roles in decomposition, pollination of plants and aerating/adding nutrients to the soil. The vertebrate animals that can be found on land belong to one of four groups or classes. These classes include amphibians, reptiles, birds, and mammals.

In the forest, it is often very difficult to see animals because they depend on their ability to blend into their habitat (camouflage) in order to keep from being seen by a predator or prey. Also, the dense vegetation and large number of forest plants hide many animals from view. But there are ways, besides actually seeing them, to discover which animals frequent a particular area. Animals often leave clues behind of their presence after they leave. These clues can be in the form of footprints, eaten food, dung, dropped feathers or clumps of hair, webs, mounds of dirt and scratches on trees.

*(Adapted from Ten-Minute Field Trips by Helen Ross Russell, National Science Teachers Association)*

## Procedure

### **Step 1 – Set-up for the school group's arrival**

First thing in the morning, before pupils arrive, take a quick walk along the forest path to see what wildlife visited the night before and what clues they may have left behind. Then you can point them out to the pupils. Place the “Unnatural Objects” along the forest path. Be sure all the Forest Walk boards are clean and have crayons available. Check the contents of the backpack to be sure that all the books and objects you use are in their proper place.

### **Step 2- Safety tips**

Gather the pupils in a circle at the start of the forest trail. Go over the safety guidelines for a forest walk. The forest staff will begin by telling pupils that they will be going into a safe part of the forest today to observe and listen for wildlife.

Ask pupils why it is important to obey the forest rules, regulations, and recommendations whilst in the protected area. Pupils should respond that it is important to follow these rules and regulations for our safety and for the safety of the plants and animals in the forest. Forest walk rules, regulations, and recommendations are then explained including each of the following:

1. Wear proper forest attire. *(Appropriate forest attire is recommended for the protection of the wearer against ants, snakes, thorns, sharp sticks, etc.)*
2. Make as little noise as possible. *(By making as little noise as possible, visitors to the forest have a greater chance of seeing and hearing the animals. Noise tends to scare animals away. Noise may also disturb and interfere with researchers who are studying in the forest.)*

3. No litter is to be left in the forest. (*Apart from being unattractive, litter can be dangerous to the health and well-being of the animals should they somehow get caught in it or swallow it. Animals have been known to lose limbs after being caught in rubbish; others have died after swallowing plastic for example.*)
4. If a person has to urinate or defecate whilst on a walk it must be done off the trail system. All faeces must be buried. (*To prevent the spreading of diseases or parasites from humans to forest animals, it is important to bury faeces. Example - the transfer of worms or dysentery.*)
5. Remain at least 8 metres away from mammals and do not approach large animals. (*For the health and safety of both humans and animals this is important. Some diseases or viruses can be transferred from humans to other animals or from other animals to humans. Large mammals including elephants, chimpanzees, and buffaloes may attack if they feel threatened.*)
6. Do not damage, scare, threaten, or harass any plants or animals in the forest. (*The plants and animals are protected by law. Animals have feelings just like humans and they have the right to live a peaceful, undisturbed life in their home. They deserve respect and should be treated accordingly.*)
7. No plant or animals should be picked up and carried out of their home. (*All plants and animals from the protected area should be left there.*)
8. No food should be taken into the forest and any containers used for drinks should always be carried out of the forest and disposed of properly.
9. Any person who is visibly sick or is known to be carrying a contagious disease should not enter the forest.

*(Adapted from the Jane Goodall Institutes Earth Education Curriculum)*

### **Step 3- Nature Tales**

### **Duration: 20 minutes**

The forest staff will then talk about the forest as a very special wild place to visit. The forest staff will share a short story about an adventure he or she had that illustrates a discovery about nature and how inspirational and special it can be.

**Example story:** Early one morning I was walking the forest path with another guide to see what animals had passed by during the night. It had just stopped raining and the morning fog was still thick along the path. We were walking in silence looking for any clues that animals had left behind, like footprints. I was intently focused looking down at the path for clues. The call of a bird pierced the thick, humid air. I heard several pant-hoots from a chimpanzee group in the distance. As we rounded a bend in the path, my friend grabbed my arm. I stopped dead in my tracks knowing that this was often a signal of trouble ahead. I looked up to see a tiny blue duiker standing in the middle of the path. Although many blue duikers live in the forest, they are rarely seen because they are very shy and flee at the sound of people. So this was my first sighting of this tiny animal that I knew only from pictures in a book. It stood for a moment looking at us as if it knew that we meant it no harm. Then just as fast as it had appeared, the duiker dove, without a sound, into the underbrush and was gone. I looked at my friend to be sure that we had both really seen it. We were astonished at our luck and returned excited to tell the other guides about our amazing duiker encounter. What a great way to start the morning!

Ask the pupils if they have any special nature stories to share. Go around the circle letting pupils tell their stories. At the end, ask these questions:

- What did you discover about nature?

- Can you remember one thing you did to not harm the plants and animals in your story?
- What things can you do to respect and protect the wildlife and wild places you visit?

*(Adapted from Wild Adventures by Jeanette S. Malone, Simon & Schuster Custom Publishing)*



#### **Step 4 – Looking and Listening in the Forest**

Hand out the Forest Walk Boards with crayons to the pupils. Tell them that they will be using these boards to record what they see and hear on the Forest Walk. Identify each of the diagrams on the boards, giving examples in case it's something the pupils are unfamiliar with. Any time they find an animal or a clue, the pupils should make a mark in the right hand column of the marker board next to the appropriate box. Explain that, for example, if you hear a bird call, make a mark in the box next to the picture of the bird. If you see a bird nest, make a mark in the box next to the picture of the nest. At the end of the walk, they will count the total number of marks on their board to show the number of animals and clues they identified. Pupils should also note what level of the forest the animal was found. Let pupils know that they should be on the lookout for objects that don't belong in the forest and point them out as soon as they spot them.

At appropriate places on the forest walk try these activities:

**Sounds** – Have pupils sit or stand comfortably and get quiet. Close eyes and raise hands with a closed fist. Have them listen carefully. Each time they hear a different sound in the forest, raise one finger. After a few moments, discuss what sounds the pupils heard, what made the sound and from what direction. Afterwards, pupils can record these sounds on their boards. Use your field guide to show what animals may have made a particular sound. *(Adapted from Sharing Nature with Children, Joseph Cornell, Ananda Publications.)*

**Unnatural Objects** – Place 5 human-made objects along a section of the trail. Some items should stand out and others should blend with the surroundings. Have pupils call out when they discover one of these objects. Discuss what they found. When they find the frog and snake, explain that this is a great example of camouflage and how easy it is to spot certain items but not others. Make the point that animals too are well camouflaged to help them hide in the forest and keep from being eaten. Others use bright colours to warn predators that they might be poisonous. Also, discuss what should and shouldn't be in the forest and how we can help wildlife by picking up litter that could be harmful.

*(Adapted from Sharing Nature with Children, Joseph Cornell, Ananda Publications.)*

**Finding Animal Clues** – Stop at places along the forest path to allow pupils to explore the habitat. Point out any clues that the animals may have left behind:

- Ask pupils to take a deep breath. How does the air feel? Wet, dry, cold, warm, clear? Clean air is important to the plants and animals that live in the forest. The forest trees and plants provide clean air.
- Have pupils examine the soil along the forest path. Ask them to describe it. Is it hard or soft, dry or moist, red or black? Then do this activity again at another location to compare a different type of soil.
- Have pupils use magnifying lenses to see small invertebrates in the leaf litter or binoculars to see birds at a distance. Ask students if its a vertebrate or invertebrate. Is it an insect or millipede?
- Examine some unusual plants or parts of plants that you find on the forest trail. Look for tall vines that climb up to the canopy in search of light, epiphytes that don't need to be planted in soil and plants with fragrant leaves or flowers. If you find footprints, use the African Animal Tracks field guide to measure the length of a track and ask pupils to make a guess as to what animal left it.
- Look for animal dung. Ask pupils if the dung is large or small, if they can tell what the animal might have eaten and use the African Animal Tracks guide to ask pupils to guess what animal might have left it. Why might animals leave their dung in plain sight or in plain "smell" along a trail? (They are marking their territory to tell other animals of their presence.)
- Show the colobus skull (but don't tell pupils what it is) as a clue that an animal has died in the forest. What features does it have to help you identify the animal? (forward facing eye sockets, big eyes, teeth that look like ours, large rounded skull that probably had a big brain for the size of the animal) Ask pupils to guess what animal it might be.
- Spot nests, feathers, hair, webs, exoskeletons and other evidence of wildlife. You might carry some of these objects with you to pull out to show pupils. Look under leaf litter to see what's there.
- Be sure that pupils spot the "unnatural objects" along the path. Talk about camouflage and how important it can be for an animal's survival. Discuss how litter might be harmful to wildlife. Talk about how you can help protect wildlife by picking up litter.

### **Step 5 – Memory Circle**

**Duration: 10 minutes**

1. Gather the pupils together in a circle to review the discoveries that they made on the Forest Walk.
2. Have pupils share their favourite memories of their forest adventure.
3. Review their activity boards to see what everyone found, even the "unnatural objects" along the trail.
4. Ask these questions as a final review: What are one or more things you really appreciate about wild animals? What are one or more things you really appreciate about the forest habitat? How can you help care for the forest and its wildlife?

*(Adapted from Wild Adventures by Jeanette S. Malone, Simon & Schuster Custom Publishing)*

## Possible responses to why we appreciate the forest and wildlife might be:

1. It provides a home and protection to a large number of animal species, some of which are endangered, including chimpanzees.
2. It supports a large number of plant species.
3. It brings in tourists, which bring money into the park, the local community, and Uganda as a whole.
4. It provides local people with employment opportunities in various positions including park wardens, field assistants, cooks, maintenance workers, etc.
5. It provides local people with raw materials to make handcrafts.
6. It allows people access to medicinal plants.
7. It has scientific value and researchers come to do field studies.
8. It has helped improve infrastructures in some parts of the country such as roads.
9. It helps improve the amount of rainfall in the area by modifying the climate.
10. The trees prevent soil erosion by binding the soil particles so they are not washed away by water or blown off by the wind.
11. It improves the soil fertility in areas bordering it.
12. It acts as a water catchment area.
13. It brings in people to the area who can form friendships within the local community, which may lead to donations, sponsorship, assistance to schools, etc.
14. The plants provide oxygen, which animals and people need to live, and they absorb carbon dioxide from the air.

*(Adapted from the Jane Goodall Institutes Earth Education Curriculum)*



# Threats to Wildlife

*What impacts do our decisions have on the forest and its inhabitants?*



**Level:**

Primary 6

**Subject area:**

Environmental Science

**Duration:**

~30 minutes

**Setting:**

Education centre

**Skills:**

Problem solving,  
identification of threats to  
wildlife.

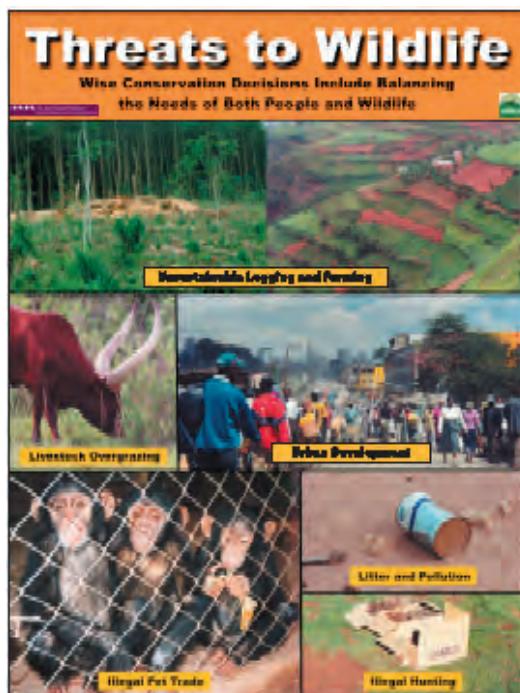
**Summary:** Use problem-solving skills to identify threats to wildlife and the importance of protecting the forest.

**Objectives:**

- To identify the threats to wildlife in Budongo Forest Reserve.
- To encourage creative problem solving for the protection of wildlife by pupils.
- To deliver the conservation message “Your actions can help protect wildlife.”

**Materials:**

- 15 plastic hoops
- 5 laminated scenario sheets
- Threats to Wildlife poster
- Snare
- Can of pesticide
- Litter that could harm wildlife
- Wood carving



Threats to Wildlife poster

### **Making Connections:**

Children are fascinated with wildlife. By building on lessons learned in the previous activities pupils will be inspired to conservation action.

### **Background Information:**

Animals need food, water, and shelter to survive. If there is not enough of one of these elements, the animal must move on to a new area to find what it needs. This can sometimes result in animals ending up in the villages because they have nowhere else to go. There are several human activities, which result in loss of habitat for wildlife.

### **Unsustainable farming**

Object- Can of pesticide

People need farms to survive and feed their families, but it can have a significant impact on wild animal populations. With more and more people in the world, we need more and more farms to feed them. Almost always, this means taking land that is being used by wildlife and changing it into farmland, which is no longer a suitable habitat for wildlife. Also, the use of chemicals to improve plant growth can sometimes be very dangerous to animals that come in contact with them. It is important to have farms, but we should also save space for wildlife as well.

### **Pollution**

Object- Litter

There are several different types of pollution; all have a negative impact on wildlife and people. One of the most common is litter. When garbage is not properly disposed of it can become a potential health risk to humans as well as wildlife. Also, the emissions from cars release chemicals into the air that hurt all living things, including the plants, animals and people.

### **Illegal Hunting**

Object- Snare

Hunting is not allowed in the Budongo Forest Reserve. Illegal hunting can deplete the number and types of animals living in the reserve. One type of hunting, such as the use of snares, captures any animal that happens to wander too close, even if it is not an animal used for food. Also, in the case of chimpanzees, they might not die but could still lose a hand or foot in the process. This makes survival even harder for them in the future.

### **Pet Trade**

Object- Image on poster

Many wild animals are being captured and sold as pets. This is not only a bad choice of a pet; it is very damaging to wild populations. Wild animals do not make good pets. They have very specific needs for their health, that most people cannot provide, and most simply do not live well in close contact with humans. Some animals that may not harm you when they live in the wild can be very dangerous when kept in your home as a pet. Wild animals that end up in the market to be sold as pets are often very unhealthy and could transmit diseases to people.

### **Unsustainable logging and farming**

Object- Piece of cut timber/ mahogany carving

Humans use wood for many different reasons. It is an important resource for people, as well as wildlife. To ensure that there is always forest for all of us, the wood we use needs to be planted and harvested in sustainable ways. This means replanting trees once they are harvested and always leaving some of the forest intact for wildlife use. People should only gather firewood from places where replanting occurs and not in the reserve or along the rivers where animals depend on the cover to survive.

### **Overgrazing**

Object- Image on poster

Cattle are another important resource for people. We eat their meat and use their hide. However, cattle can often compete with wild animals for food. When their grazing goes unchecked they can quickly eliminate grasses in an area. This means less food for wildlife. In order to save habitat for wildlife in the forest, it is necessary to find other grazing land for domestic cattle.

## **Procedure for the Activity**

1. Begin by showing the pupils the poster called Threats to Wildlife.
2. Ask pupils to identify the threats shown on the poster. Ask them what they know about these threats.
  3. Discuss each threat using the corresponding prop or image on the poster.
    - Unsustainable farming- Do you know what this can of pesticide is used for? Can you name some problems this might cause for wildlife?
    - Pollution- Have you ever left or seen litter on the ground? How could this hurt a wild animal?
    - Illegal Hunting- Do you think this snare would hurt if you got caught in it? Why is it important not to hunt in this reserve?
    - Pet Trade- What might you do if you see a monkey being sold in the market?
    - Unsustainable Logging- What kind of things can this piece of a tree be used for? How do animals use trees?
    - Overgrazing- How much do you think this animal can eat? What wild animals might need this food?
  4. Now play the Wildlife Threats Game - Have the children pick an animal that they would like to be; possibly one of the animals used in the previous activities. (More than one of a species is fine).
  5. Pass out one hula-hoop to each child. Have the children place the hoop on the ground.
  6. Children start the game by standing inside their own hoop; the hoops represent an animals' habitat.
  7. Rules: Children must have at least one foot fully in a hoop to be safe, however, if only one foot is inside the hoop then that animal is considered endangered. Sharing of habitat is allowed, and encouraged. No more than 2 ½ people per hoop.

8. While each scenario is being read, pupils will walk around the circle of hoops, passing through each hoop as they go along.
9. When the teachers says “stop” pupils should jump into the nearest habitat/hoop. After the scenario has been read, the teacher will either remove or add a hoop to the circle. If there are no hoops available for the pupils to put at least one foot into, they have lost their home and are out of the game for now.
10. Follow the instructions on the scenario sheet and adjust the hoops accordingly. Note, at the beginning of the game you will be removing hoops. However, half way through the game, you will be adding hoops back into the circle. So pupils that may have lost their habitat will be able to rejoin the game.
11. When the game is finished, talk to the pupils about what they have learned and how they feel. Many will have lost their original habitat/hoop, and others will be very crowded in the remaining habitat. Discuss solutions, compromises, and actions, which could benefit wildlife and the people who share these same resources.

*Adapted from the Bushmeat Crisis Task Force Educational Activities*



# Threats to Wildlife Game Scenarios

*Read these scenarios out loud to the pupils as they walk from “habitat.” To see how the habitat changes, review the diagrams on the following page.*

Start everyone walking. Read Scenario #1.

1. Local people go into the forest and cut down living trees for charcoal burning. This will mean fewer trees for wildlife homes and food.  
Remove 2 circles. Two students will have to share a habitat with others.

Start everyone walking. Read the Scenario #2.

2. Local school children go into Kalinzu Forest Reserve on a guided hike with forest reserve staff. They leave behind litter that could harm the animals and the environment.  
Remove 2 circles. Two students will have to share a habitat with others.

Start everyone walking. Read the Scenario #3.

3. With more people now going into the forest, people are hunting wildlife to eat. Fewer animals in the forest could mean less food for other wild animals.  
Remove 2 circles. Two students will have to share a habitat with others.

Start everyone walking. Read the Scenario #4.

4. People go into the forest to capture wild animals. Adult animals are killed for bushmeat and baby animals are sold for money. As people enter and leave the forest, plants and trees are destroyed.  
Remove 2 circles.

Have everyone stop for a moment and look around. Ask the students:

“What has happened to your habitat?” (Response: It has gotten smaller. All habitats have more animals depending on the same food, water, and shelter.)

Start everyone walking. Read the Scenario #5.

5. While walking to get water, local school children yell and throw sticks at the animals to frighten them away. Frightened animals may abandon their homes and move into other forest animals’ homes.  
Remove 2 circles from the centre.

Have everyone stop for moment and look around. Ask the students:

How many animals are endangered? (Response: 1 or 3 depending on how many start.)

Start everyone walking. Read the Scenario #6.

6. While walking to school, children pick flowers and trample on plants destroying animal homes and food sources.  
Remove 1 circle.

Have everyone stop for a moment and look around. Ask the students:  
What happened to these “animals” over here? (Point to students eliminated from the game.)  
Response: They had to leave because there was no more room in any of the habitats.

Start everyone walking. Read the Scenario #7.

7. Children get tree saplings from a conservation group and plant a small plot of trees to use just for firewood and building.

Give back 1 circle.

Start everyone walking. Read the Scenario #8

8. A school group joins a wildlife club that picks up litter that could harm wildlife and the environment.

Give back 1 circle.

Start everyone walking. Read the Scenario #9.

9. A school group plants flowers in the schoolyard creating a special place to observe butterflies.

Give back 2 circles.

Start everyone walking. Read the final Scenario #10.

10. The local community continues to reuse as many items as possible such as soda bottles, plastic bags and jerry cans. If it can't be reused, the community creates a special place for composting and burnables.

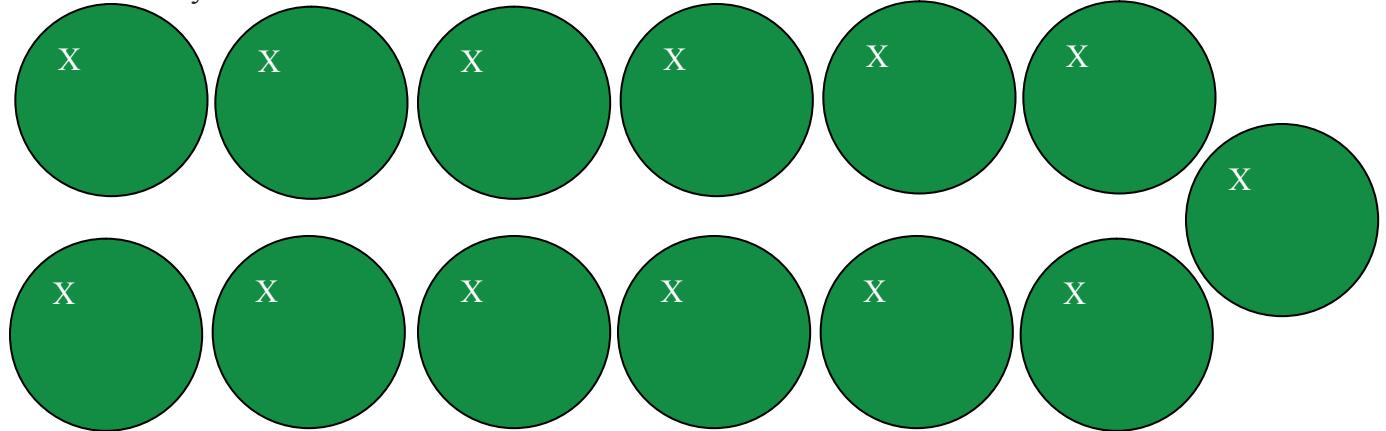
All students rejoin game and find habitat to share.

Now, what have the positive actions of the students, children and community done to help wildlife?

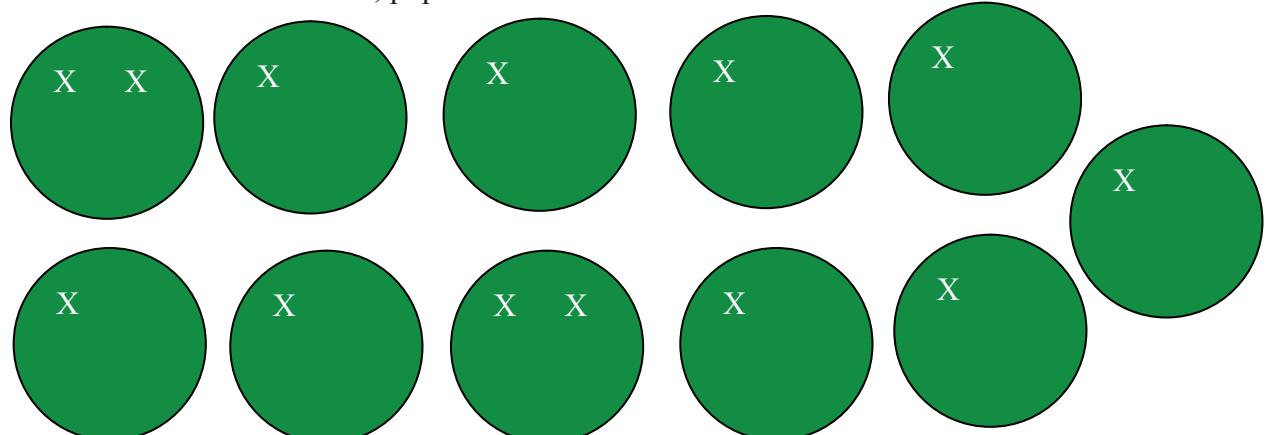
### Threats To Wildlife Game Diagram

Here is a visual picture of what happens during the game. We suggest using 12-13 pupils for this game.

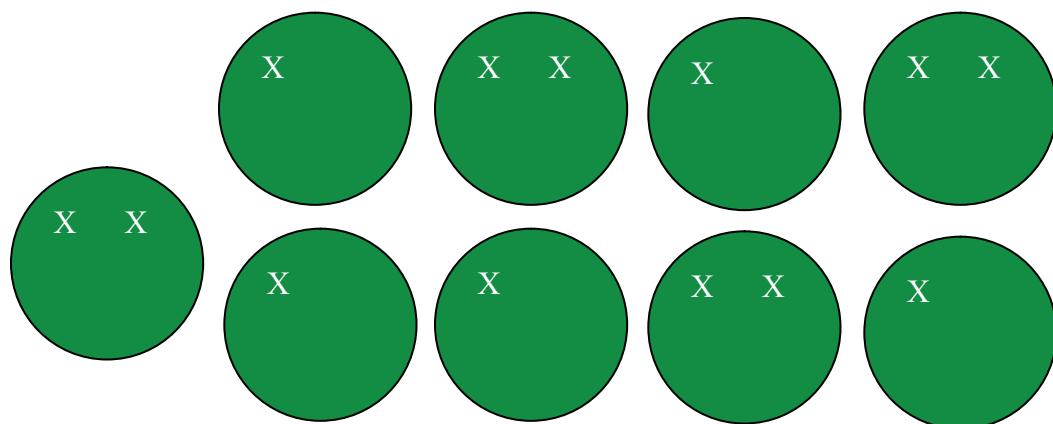
To start: Everyone has their own habitat.



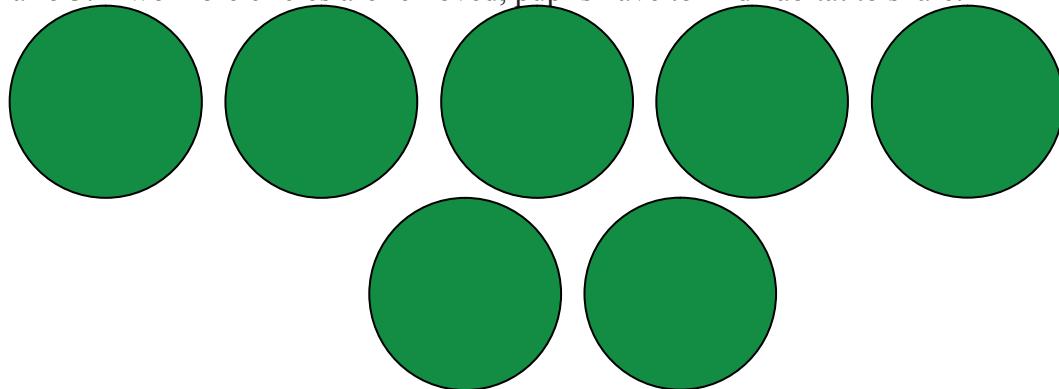
Scenario 1: Two circles are removed; pupils have to find someone's habitat to share.



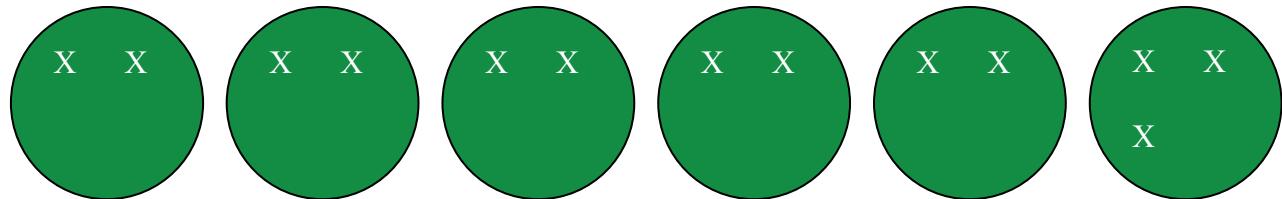
Scenario 2: Two more circles are removed, pupils have to find habitat to share.



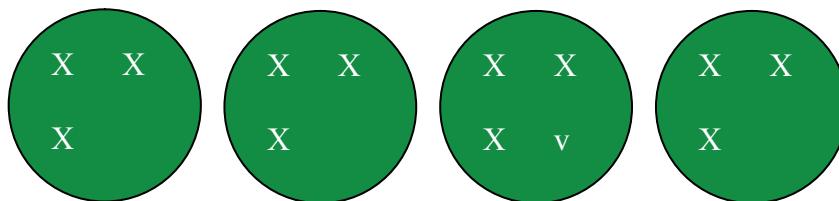
Scenario 3: Two more circles are removed, pupils have to find habitat to share.



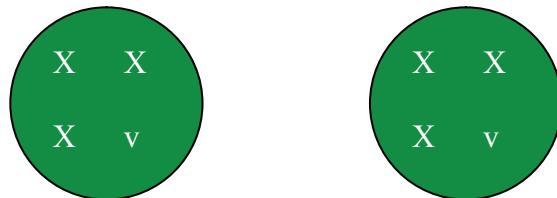
Scenario 4: One circle is removed, pupils have to find habitat to share.



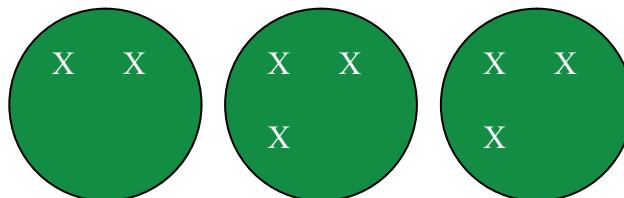
Scenario 5: Two more circles are removed, pupils have to find habitat to share. One pupil is only half in the habitat (they are endangered.) (v = endangered)



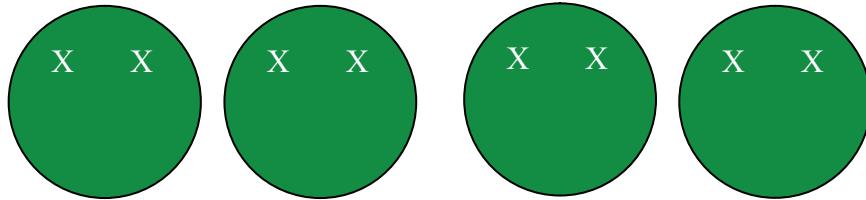
Scenario 6: Two more circles are removed, pupils must find habitat to share. Two pupils are only half in the habitat and five pupils have lost their homes.



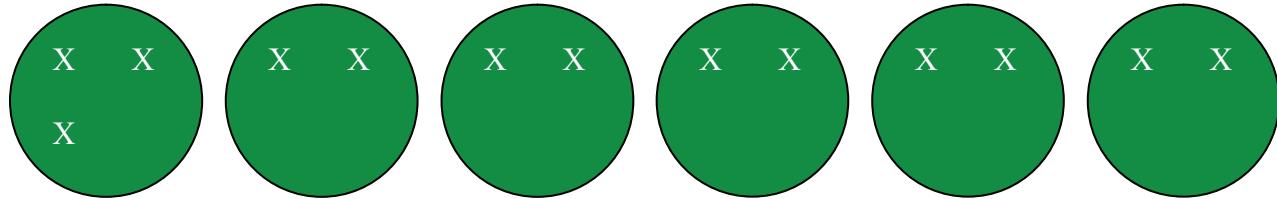
Scenario 7: One circle is returned, pupils spread out using all available habitat.



Scenario 8: One more circle is returned, pupils spread out to use all available habitat.



Scenario 9: Two more circles are returned. All pupils rejoin game and share habitat.



# Concluding Activity: Help Protect Wildlife

*What can you do to help protect wildlife and wild places?*



**Level:**  
Primary 6

**Subject Area:**  
Wildlife and habitat  
conservation

**Duration:**  
20 minutes

**Setting:**  
Indoors or outdoors

**Skills:**  
Drawing conclusions,  
creative thinking

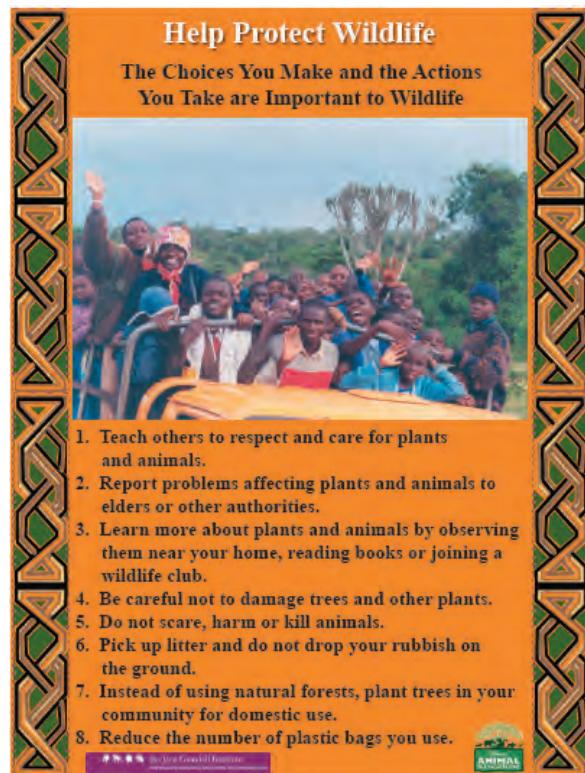
**Summary:** Pupils review messages learned during their visit to Budongo Forest Reserve and brainstorm what they can do when they return home to help protect wildlife and wild places.

## Objectives

- To review the variety of animals found in the Budongo Forest.
- To re-state why the forest habitat is important to the survival of these animals.
- To recognize that people's daily decisions have an effect on wildlife and their habitat.
- To give pupils specific action items that they can do when they return home.

## Materials

- Mural of local animals
- Posters "Threats to wildlife" and "Help Protect Wildlife"



Help Protect Wildlife poster

## Procedure for Activity

1. Ask pupils what animals they saw, heard, or found evidence of during their forest walk. Then ask them what other animals live here in the forest, but they were unable to see today (the boards from the classifying wildlife activity and the mural can be used to help refresh pupil memories).
2. Ask pupils what were some of the threats to wildlife that they learned about today (pollution, illegally cutting down trees, snares, illegal hunting, overgrazing, unsustainable logging and farming, more people living in forest area, etc.). Refer to the poster as each is mentioned.
3. Ask the pupils what they can do to help protect wildlife when they return home. Possible actions include:
  - Planting trees
  - Picking up trash
  - Telling family and friends about their experience at Budongo
  - Join a wildlife club
  - Don't cut trees that are in areas along rivers
  - Learn more about laws protecting animals
4. Storytelling is a way to share experiences. Together create a story about their visit today that they can then tell to family and friends when they return home.

Example:

Today I went to the Budongo Forest Reserve. There are many different animals that live in the forest. Some animals that live there are \_\_\_\_\_ (Have pupils fill in the blanks with some of their favourite animals.) These animals are classified in many ways. Two groups that animals belong to are \_\_\_\_\_ and \_\_\_\_\_. (Fill in blanks with groups of the pupils' choice.) On our walk through the forest, we discovered \_\_\_\_\_. It was an interesting day in Budongo! However, these animals' lives are in danger. They are losing their homes due to \_\_\_\_\_. Some animals are injured and die because of \_\_\_\_\_. They need our help. We can help protect animals by \_\_\_\_\_ and \_\_\_\_\_.

# Animal and Plant Fact Sheets



# African Rock Python

**Length:** 7.5 - 9.8 m

**Lifespan:** 20-30 years



## Background Information

**Identification:** African rock pythons are heavy bodied, terrestrial snakes that spend the majority of their time on the ground as adults. Their bodies are covered in thick scales that help them to retain moisture in their bodies and prevent them from drying out.

**Habitat:** Live in central and southern Africa, including Uganda. They have diverse habitats and are able to inhabit: tropical savanna's near water and the forests' edge, crevices in rocks, thickets, reedbeds. They take shelter in holes or warthog and porcupine burrows and they even spend time in water. Rock pythons are good swimmers and often look for prey in the water.

**Diet:** African rock pythons are nocturnal but will hunt opportunistically during the day. Rock pythons are carnivores that feed on a wide range of meat. They will eat small and large animals such as: rodents, hyrax, antelope, birds, frogs, fish, lizards, warthogs, monkeys, crocodiles and baboons. They are ambush hunters, hiding under bushes until their prey passes by. Rock pythons strike their prey by grabbing them with their strong jaws and long teeth and pulling them in towards their body. The rock python then wraps its body around its prey and constricts (squeezes) until its prey suffocates. Even though the rock python suffocates its prey it doesn't squeeze it hard enough to crush the animals bones.

**Reproduction:** Rock pythons lay eggs. The female seeks out a suitable site to lay her eggs such as a bush, crevice in a rock or a deep and moist hole in the ground. The female can lay 16 to 100 eggs at a time, laying them in a single pile. She will then coil around the eggs to protect and incubate them. Female pythons "shiver" at regular intervals to keep her body temperature and the clutch of eggs warm. The female will remain on the eggs for 65 to 80 days until they hatch and will leave only to drink. At hatching, the hatchlings are 46 to 61 centimetres long and independent.

**Role in nature:** Wild dogs, hyenas and humans are the rock python's main predators. They are killed for their beautiful skins, and for meat. However, African rock pythons are beneficial to the environment by controlling animal populations.

# Butterflies

## Approximate Lifespan:

Egg: 10 days  
Caterpillar: 4-8 weeks  
Chrysalis: 10 days  
Adult: about 2 weeks



**Background Information:** Butterflies are classified as a diurnal insect with six jointed legs, three body parts (head, thorax, abdomen) and two antennae. Butterflies have an exoskeleton and are cold-blooded. The wings of a butterfly are covered in scales that overlap one another. The bright colors and patterns of a butterfly may be caused by either the pigment of the scales or by light shining off of the scales. As a result, the color of a butterfly may change depending on the amount of available light.

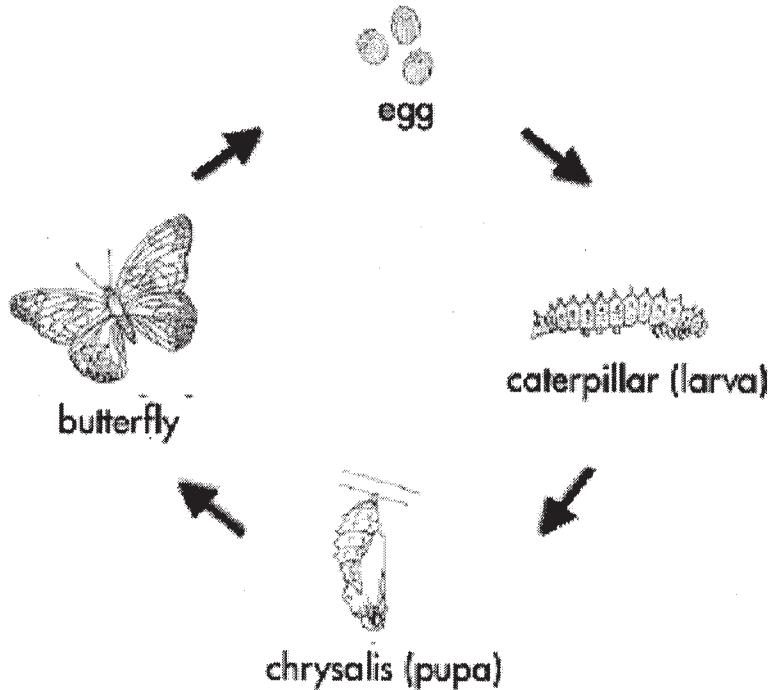
**Habitat:** Middle of the forest and on the forest floor resting/feeding on plants.

**Habits:** Once the metamorphosis into a butterfly is complete, they may only live for about two-six weeks. During that time their primary purpose is to find a mate and reproduce.

**Diet:** Butterflies primarily eat liquid food in the form of nectar from flowers. However, some butterflies also eat decaying fruit and animals, tree sap, and moisture from the ground. All butterflies feed by using their proboscis, a straw-like mouthpart. To feed, they extend the proboscis into their food and sip the liquid. When at rest the proboscis is rolled up under the head of the butterfly and their wings are held upright. The size of the proboscis is dependant on the size of the butterfly and the type of flower that they feed upon.

**Reproduction:** Butterflies grow through a process known as complete metamorphosis. Complete metamorphosis happens in four stages: egg, larvae (caterpillar), pupa (chrysalis) and adult. An adult female butterfly will often lay her eggs (one by one or in bunches) on the underside of leaves of a particular plant (host plant) so that the eggs are hidden from predators. In addition, the plant that the eggs are laid on is often the primary food source for the larvae and butterfly. Once the egg hatches (in about 10 days) a caterpillar (also called the larvae) will emerge. Oftentimes, the larvae's first meal is the eggshell (rich in fat protein) from which it just hatched. Butterflies remain in the larvae stage for 4-8 weeks. Their time as a caterpillar is spent eating and molting until they grow large enough to be able to complete the next phase in metamorphosis, the pupa. Once the caterpillar is ready to molt for the last time, silk is secreted from its mouth and it grabs onto this silk with its hind legs and molts. This time the caterpillar's exoskeleton hardens to form the pupa, or chrysalis.

Chrysalis' come in a variety of shapes and colors! Some are camouflaged to resemble the plant that they are on, others mimic dew or water droplets on the plant, some are brightly colored and/or shiny and serve as a warning to animals that the chrysalis is poisonous and shouldn't be eaten, and some chrysalis' even mimic faeces.



Life Cycle of a Butterfly

In about 10 days the caterpillar transforms into a winged adult and it will emerge from the chrysalis only when it is fully mature. It can take approximately 5 minutes for the butterfly to pull itself out of the chrysalis and approximately 10 minutes for them to fully inflate their wings. After emerging the butterfly may need 2-6 hours for their wings to dry and harden enough to fly.

**Role in nature:** Butterflies are important to the forest. They pollinate many of the plants, fruits and flowers within it.

# Chimpanzee

**Height:** 1m

**Weight:** 30-55 kg

**Lifespan:** 50 years



## Background Information

Chimpanzees can be found in 21 countries in Africa and approximately 584 individuals live in the BFR. Chimpanzees are an endangered species.

**Identification:** Chimpanzees are active during the day (diurnal) and sleep at night. They spend most of their day in the trees, and at dusk they build nests for sleeping that are 6-25 meters high in the trees. When they come down from the trees they will usually walk on all four limbs. Chimpanzees have specific adaptations to help them live in the forest. Their arms are longer than their legs, allowing them to move quickly through the trees, and on ground. Chimpanzees also have thumbs on their hands and feet that help them grasp tree branches, objects and food.

**Habitat:** Chimpanzees can live in a wide range of woodland and forest types, including both woodland and open savannas.

**Habits:** Chimpanzees are highly social animals that live in groups known as communities. Communities can have 20-100 individuals and each community has a dominant male called the alpha male. A community inhabits a home range that is many square kilometres in size. In addition to their social lifestyles, chimpanzees also have an elaborate communication system comprised of grooming, gestures, postures, facial expressions and vocalizations. One way that chimpanzees keep up their social bonds is by grooming. Grooming occurs between all chimpanzees. Chimpanzees also communicate through vocalizations. One call in particular is known as a pant-hoot, a loud and complex call (four phases: introduction, build-up, climax and let down) given by individuals, or by several animals to make an impressive chorus. In addition, chimpanzees also have a wide range of facial expressions that they use to show emotion.

**Diet:** Chimpanzees eat both plants and meat (omnivores). Chimpanzees will forage all day, eating mostly in the morning and evening when temperatures are cooler. Their diet is mainly fruit (particularly figs), as well as insects, eggs and nestlings. Chimpanzees also hunt, kill and eat monkeys such as black and white colobus. Chimpanzees use tools like sticks and blades of grass to obtain food from hard to reach places. For example, they use sticks to “fish” for termites from termite mounds.

**Reproduction:** Female chimpanzees mature and become sexually active when they are 7-9 years old and give birth to their first baby when 11-12 years of age. Males reach maturity at about 10 years of age. On average, pregnancy lasts about 225-240 days (7 ½ months). Typically, a single baby is born and occasionally twins. After the baby is born it will remain in constant contact with its mother, often clinging to her stomach, for six months. After six months the baby will still remain within a close distance of its mother (typically riding on her back) and begin to eat some solid foods. The baby will begin to travel independently of its mother around 5 years of age when weaning occurs.

**Role in nature:** Chimpanzees are endangered and protected in Uganda. Chimpanzees are important to the forest. They disperse seeds from the fruit that they eat. These seeds will help new trees to grow. Habitat loss and the bushmeat trade have contributed to the chimpanzees' endangered status.

# Black and white casqued hornbill

**Lifespan:** unknown but it has been recorded that they have lived up to 31 years.

**Size:** 60-70 cm



## Background Information

The Budongo Forest Reserve is rich in diversity and has approximately 366 species of birds living in it. Birds that live in the BFR depend on the forest for their survival, including the black and white casqued hornbill.

**Habitat:** Black and white casqued hornbills live in the canopies of the forest and can even be found along the edge of the forest.

**Habits:** Hornbills spend most of their day in the canopy of trees where their main food source, fruit and insects, can be found. Black and white casqued hornbills also make loud, slow and mournful calls.

**Diet:** As an omnivore, black and white casqued hornbills feed on a variety of foods. Their diet consists of: figs, paw-paws, small birds, bats, lizards, winged termites, beetles, caterpillars, cockroaches, mantids, crickets and lichen. Hornbills pluck fruit from the canopies and even tear off loose bark from trees in search of insects to eat.

**Reproduction:** Black and white casqued hornbills mate for life and can be seen roosting together as a pair on the outer branches of trees. Hornbills gather in groups of 20 at feeding sites to mob predators. Between October and March they build a nest and lay eggs. Hornbills are cavity nesters. They seek out a hole about 9-30 m above ground in a large tree and sometimes use a hole in a rock. Once a hole has been found the male begins to seal the female in the nest. He will swallow soil, sometimes from termite mounds, feces and food and he will regurgitate it as sticky pellets and begin to seal around the outside of the nest. Bark, small sticks and wood chips are also brought to the nest to be used on the inside as a lining. When complete, the only opening to the nest is a slit large enough for the male to pass food to the female.

Once enclosed in the nest the female black and white casqued hornbill will usually only lay 2 eggs. The incubation period of the eggs is unknown but it has been recorded that black and white casqued hornbills have hatched after 42 days. The female will remain in the nest with the eggs until they hatch. During this time it is the males job to bring her food. When the eggs hatch they do not hatch at the same time. Unfortunately, usually only the older chick will survive. After the chicks hatch the female will throw the eggshells out of the nest. For the remainder of the time the male feeds his mate and their growing chicks through the small slit opening. At 20 days old, the chicks eyes are open and their feather quills have begun to grow. When the chicks are ready to leave (fledge) the nest at about 95-112 days they will break away the mud with their mother and leave the nest.

**Role in nature:** Hornbills are seed dispersers. When eating they often drop seeds from their bill or poop the seeds out. By doing this, hornbills help to replant the forest!

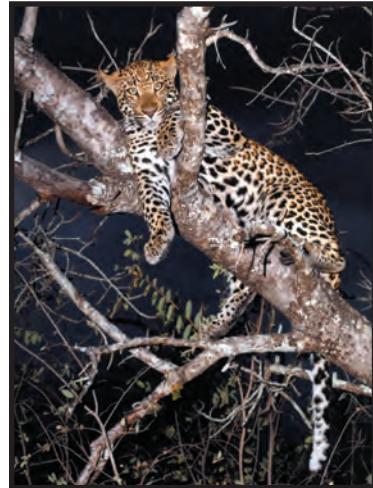
# Leopard

**Height:** 45-78 cm

**Length:** 91-191cm (body)  
58-110 cm (tail)

**Weight:** 36-90 kg (male)  
28-60 kg (female)

**Lifespan:** 12-15 years



## Background information

Habitat loss and overhunting have contributed to their endangered status.

**Identification:** Leopards are amazing athletes that can leap forward 6 metres in a single bound and can jump 3 metres high. They are also skilled climbers and strong swimmers. Leopards are carnivores that hunt their prey alone at night. They use their camouflage, vision and keen hearing (leopards can hear 5 times more sounds than humans) to help them hunt. A leopard's body is covered in flower shaped, solid spots called rosettes. These spots help leopards hide from their prey by blending into the forest or grassland.

**Habitat:** Leopards can live in almost any habitat: coastal plains, high altitude mountains, semi-desert areas and tropical forests.

**Habits:** Leopards are solitary. Female leopards inhabit territories that vary in size from 10 to 32 square kilometres. Males inhabit territories that are larger than a female's territory and may overlap females' territories. Leopards identify their territories by spraying urine onto logs, branches and tree trunks and will defend their territory if necessary.

**Diet:** Leopards hunt by stalking it and will rarely chase their prey over long distances, even though they are capable of running up to 58 km an hour in small bursts. They aren't picky eaters and will eat any animal that they can find: monkeys, rodents, reptiles, amphibians, large birds, fish, antelope and even porcupines. Occasionally, leopards will eat prey that is larger and heavier than them. While hunting they grab their prey or swat at it using their retractable claws. Once caught, the leopard bites it at either the back of the neck or throat. Once killed, the leopard uses its incredible strength to carry the animal in its mouth (even animals heavier than itself) up into a tree. Doing this allows the leopard more time to feed on its kill and keep it hidden from other predators like lion and hyena's.

**Reproduction:** Leopards mature at 3 years of age. After a gestation period of 90-105 days a female will give birth to a litter of 1 to 6 cubs (2-3 is common) that are blind and fully furred and often spotted. In about 10 days the cubs will open their eyes and within 6 to 8 weeks they will begin to follow their mother. At 3 months the cubs are weaned and begin feeding on a diet of meat. Mothers will care for her cub(s) until they are about 18 to 20 months old. During this time leopard cubs learn many survival skills through play. By play stalking, pouncing and chasing their siblings and mother

the leopard cubs are practicing and learning how to survive when they get older. When males reach 2 to 3 years of age they leave the territory they grew up in and settle in territories elsewhere. Females probably take over part of their mother's territory.

**Role in nature:** As predators, leopards help to balance the populations of prey animals in the forest.

# Millipedes

**Length:** 28 cm

**Lifespan:** 6-8 years



## Background information

**Identification:** Millipedes are invertebrates that have many body segments. On average, adults have 60 or 70 segments and each segment has 2 pairs of legs. However, the first body segment does not have legs. Adults will typically have about 250 legs.

**Habitat:** Millipedes can be found under leaf litter, log piles, fallen and decaying trees and under rocks.

**Habits:** For defense, millipedes may wrap themselves up into a ball and only expose their hard exoskeleton. Many species of millipedes emit a noxious substance to help prevent predation by making it undesirable to eat. Millipedes are mostly nocturnal, spending most of the daytime in underground burrows. There are few predators of these animals, however, shrews, hedgehogs, and mongoose seem indifferent to the noxious fluid they emit.

**Diet:** Millipedes are one of nature's best decomposers and recyclers! They eat rotting vegetation and even soil and then poop it out! Millipedes are capable of producing and dispersing a large amount of dung, making the soil full of nutrients. Millipedes are also burrowers and help to aerate the soil.

**Reproduction:** Females will lay many eggs (can be over a hundred) into the soil. The eggs will hatch 3 months later. Once hatched the young are the size of a grain of rice, white, or cream in color, and have only 2 or 3 pairs of legs. As they grow, they molt their exoskeletons, and get more segments and more legs. Many reach maturity in 2-3 years.

**Role in nature:** Millipedes are important to the forest. They are capable of decomposing rotting vegetation in the forest. They then produce and disperse a large amount of dung that makes the soil full of nutrients.

# Tree frog

**Size:** Ranges from .97 cm to 36 cm

**Weight:** Depends on the species.

**Lifespan:** Ranges from 2-25 years



## Background information

**Identification:** Tree frogs do not have tails or necks. This combined with their slender bodies, bulging eyes and long, powerful legs gives them a very distinctive appearance. Tree frogs also have special toepads that help them “stick” to things.

Frogs are amazingly adapted to their specific environments. A frog’s long legs can allow it to jump more than 20 times its body length and hold onto their perches. Tree frogs also come in an incredible range of colors. Most of the time, these bright colors are to warn predators away from their toxic skin. Others are coloured to blend into their surroundings. Some frogs’ colour is dependent on their body temperature, darker in colour when cool and brightly coloured when warm.

Frogs have bulging eyes on top of their head. This allows them to see in front of, to the sides and partially behind them. They have excellent night vision and are sensitive to motion.

Frogs were the first land animals with vocal cords. Many males also have a vocal sac. These are pouches of skin that can be filled with air that can resonate sounds loud enough that they can be heard for miles. Ironically most frogs have excellent hearing and must produce special vibrations in its body to partly block the sound of its call. A frog’s eardrum is on the outside of its body just behind the eye. They cannot hear the highest or lowest sounds that we can hear.

**Habitat:** Tree frogs can be found living in the trees of the forest, while other types of frogs live in or around a body of water. Some frogs may even live underground only coming to the surface after heavy rains. Because of their moist, sensitive skin tree frogs will spend the majority of their lives in or around a constant source of moisture.

**Habits:** Many male frogs attract mates using a loud vocal call. Scientists actually use the unique calls to tell some species apart since they look so similar. Only the males call, females in turn choose their mate based on a call’s quality.

**Diet:** Insects, small mammals and lizards. When a frog swallows food, it pulls its eyes down into the roof of its mouth to help push the food down its throat.

**Reproduction:** Methods of reproduction vary greatly in frogs. However, the most common reproduction is for frogs to begin their lives as jelly eggs laid in water that hatch into swimming tadpoles, and finally metamorphose into adults. The key for all the methods is to provide a moist, safe environment for the next generation. However, tree frogs don't have to leave the trees to mate and lay their eggs! Females lay their eggs in moist leaves of trees and plants or in water filled cavities of trees. Once hatched the tadpoles will drop to the ground. Most frog eggs are fertilized outside the body. The male will hold the female around the "waist" in a mating hug, he then fertilizes the eggs as she lays them. The number of eggs laid varies depending on the species, but they usually number from a few hundred to tens of thousands. Most frogs simply leave the fertilized eggs to hatch and develop on their own into tadpoles and then froglets.

**Role in nature:** Frogs are sensitive to their environment. Human activity through pollution causes their numbers to decline. Some of the major causes of their decline are: habitat destruction, introduced species, chemical pollution, climate changes, over collection from the wild for pets, and disease.

Frogs help humans in more ways than one. One of their most important roles is that they are natures bug zappers! Frogs eat billions of insects each year, not to mention the insect larva eaten by tadpoles and froglets. On the other end of the food chain, frogs provide a critical food source for birds, fish, snakes, and other wildlife... including us.

Frogs also play another important role as environmental indicators. When pollution or other environmental changes affect a habitat, frogs are often the first casualties. These delicate creatures provide an early warning for endangered ecosystems. If we simply pay attention, frogs can tell us all kinds of information about the effects of pollution on our environments.

# Mahogany

**Height:** 46 m

**Leaves:** Leathery. Clusters of yellow flowers

**Trunk:** 5.5 m round

**Buttresses:** 4.6 m

## Background information

International trade of mahogany trees has been occurring for more than 450 years. Since it is a hard wood, it is desirable to make products like furniture and is used also for boat and instrument building. However, much of the mahogany that is logged today is logged illegally. Illegal logging of mahogany trees has a negative impact in the forests that they grow, causing habitat destruction and deforestation.

**Identification:** Mahogany is one of the largest trees found in the forest standing up to 46 metres tall. Often the trunk of the tree doesn't have branches until 27.4 metres high and is approximately 5.5 metres round. Mahogany also has large buttresses that can reach 4.6 metres long. The leaves are leathery with six pairs of oval leaflets and when in bloom, the clusters of flowers are yellow. The fruit pod of the mahogany is round and holds about 50 hard winged seeds. The outer bark of the mahogany is thick and is shed in circular patches while the inner bark is bright red.

**Habitat:** Found in West Africa from Senegal to the Congo and into Sudan and East Africa. It grows well in riverine forests and can also live in parts of the savannah woodlands where rainfall is high.

**Reproduction:** Once the seed has been planted it only takes about 14 days to germinate. In the first year of its growth, the seedling will develop a strong and deep taproot that will help it survive through harsh droughts and floods.

**Conservation information:** The trade of mahogany is regulated by the Convention on International Trade in Endangered species of Wild Fauna and Flora (CITES). Extensive logging of mahogany is harmful to the forest and the wildlife that lives there. Trees are important to the survival of the forest. They act as lungs to provide oxygen to breathe, they provide habitats for a wide variety of animals to live and they provide shade for the animals and organisms that live on the forest floor. We each have the ability to help the forest and prevent deforestation by obtaining a permit to legally and sustainably remove mahogany. In addition, we can plant more trees to replace the ones that were removed.

# Strangler Fig

**Height:** up to 45 m

**Leaves:** 4-8 cm long, waxy

**Buttresses:** can grow distances of 9 m



## Background information

Strangler figs are one of the important trees in the BFR. It is considered a keystone species because there are many animals that depend on the strangler fig for their survival. Interestingly enough, the strangler fig also depends upon animals and other trees for its survival. This relationship is called a symbiotic relationship, a relationship of mutual benefit or dependence.

**Identification:** Strangler figs are tall canopy trees of the forest that can reach heights of 45 meters! Its bark is light in color and has an umbrella shaped canopy. The leaves are simple and oval in shape, about 4 – 8 cm long, and waxy. The waxy leaves protect the strangler fig from the elements like wind and sun and help it from drying out. Strangler figs have hollow flower bearing structures called cyconia.

**Habitat:** There are close to 1,000 different species of fig trees. Fig trees can be found in every major rainforest, tropical continents and tropical islands around the world.

**Reproduction:** Strangler figs are epiphytes meaning that they do not have nor need an attachment to the ground or another nutrient source to grow. Epiphytes get their water and nutrients from the rain. Strangler figs rely upon animals to “plant” its seeds for growth. Chimpanzees, bats and hornbills are just a few of the animals that eat figs. Once the seeds have passed through the animal’s digestive tract they are eliminated. The sticky seeds typically land high in a tree (host) where it will then begin to grow.

The seedling grows slowly at first, getting its nutrients from the sun, rain and any leaf litter that has accumulated on the host tree. Over time, the seedling will begin to send out many thin roots that dangle down on the trunk of the host. When the roots reach the ground they will dig into the soil and begin to grow rapidly. At this time the strangler fig will begin to compete with the host tree for water and nutrients. The strangler fig will also send out a group of roots that surround the host tree and fuse to it. As the roots grow thicker, they will squeeze the trunk of its host, eventually cutting off its flow of nutrients.

In addition to this, the leaves at the canopy of the strangler fig begin to grow larger and thicker. Over time the leaves block the sunlight from the host tree. The combination of insufficient sunlight, root competition and strangulation by the strangler fig's roots, the host tree will die. All that will remain of its host is a hollow center. The hollow center of the strangler fig provides animals (bats, birds, other animals) with shelter and a place to raise their young. Some root systems of figs develop into thin buttresses that can spread out to 9 meters.

Once mature, strangler figs rely completely upon a tiny wasp that is about 2 mm long (Agaoninae species) to pollinate its flowers. Each fig species has a specific wasp species that pollinates it. This

wasp is the only animal small enough to enter the opening at the bottom of the flower structure (cyconia). Cyconia are the hollow flowers of the fig tree (often thought as the fruit), inside each one is hundreds of male and female flowers. The male flowers carry the pollen and the female flowers bear the seeds. However, there are two different types of female flowers, one is short and the other is long.

Once the female wasp is inside the flower, she pollinates the long style flowers and will lay her eggs in the short styled flowers (these eggs will eventually hatch, chew through the wall of the cyconia and repeat the process all over again). After the female lays her eggs she will continue on to another flower to pollinate it, lay more eggs, etc. Strangler figs will bear fruit several times a year.

**Conservation information:** Strangler figs are important to the forest because a wide variety of animals (birds, bats, chimpanzees) eat figs as a part of their diet and depend upon them for shelter. Strangler figs are also important to people. Their hollow centers provide shade to visitors of the forest and the inner bark can be used to make rope. Although strangler figs are still abundant, old forests that contain mature figs are lost every year because of logging.

# **Complete Materials List**

## **How Big is Africa Materials:**

- Cloth map of Africa
- Three plastic copies of the U.S.

## **Animal Classification Materials:**

- Classifying Wildlife boards
- Black lumber crayons
- Classification chart
- Wall mural
- Animal x-rays

## **Forest Walk Materials:**

- Backpack with field guides (Animal tracks, African Birds, African Wildlife), skull (colobus monkey), magnifying lenses, binoculars, plant press, compass, and specimen containers
- Forest Walk Activity boards with crayons for recording their nature discoveries.
- Five “Unnatural Objects” placed along the trail for pupils to discover (3 pieces of litter, a plastic frog and a plastic lizard)

## **Threats to Wildlife Materials:**

- 15 plastic hoops
- 5 laminated scenario sheets
- Threats to Wildlife poster
- Snare
- Can of pesticide
- Litter that could harm wildlife
- Mahogany carving

## **Help Protect Wildlife Materials:**

- Mural of local animals
- Posters “Threats to wildlife” and “Help Protect Wildlife”

# Acknowledgements

**Activities in this guide have been adapted from the following sources:**

- *African Rain Forest Ecology and Conservation* by Weber, White, Vedder, Naughton-Treves, 2001.
- *Bushmeat Crisis Taskforce Educational Activities*.
- *Engaging the public on Biodiversity, A Road Map for Education and Communication Strategies* by The Biodiversity Project, 1998.
- *Jane Goodall Institutes Earth Education Curriculum*.
- *Project Wild K-12 Curriculum and Activity Guide*.
- *Sharing Nature with Children*, Joseph Cornell, Dawn Publications.
- *Spectrum Guide to Uganda* by Camerapix, 1998.
- *Ten-Minute Field Trips* by Helen Ross Russell, National Science Teachers Association.
- *Wild Adventures* by Jeanette S. Malone, Simon & Schuster Custom Publishing.

## Resources

Reynolds, Vernon. *The Chimpanzees of the Budongo Forest. Ecology, Behaviour and conservation.* Oxford University Press: New York, 2005.

Cogger, Dr. Harold G., and Dr. Richard G. Zweifel. *Encyclopedia of Reptiles and Amphibians.* Second edition. FogCity Press: San Fransisco, CA, 1998.

Spawls, Stephen., et al. *A Field Guide to the Reptiles of East Africa.* Academic Press: San Diego, CA, 2002.

Parsons, Alexandra., and Claire Watts. *Plants.* World Book Inc: Chicago, IL, 1997.

Fry, Hilary C., et al. *The birds of Africa.* Vol. 3. Academic press: San Diego, CA, 1988.

Reynolds, Vernon (1993). *Sustainable forestry: the case of the Budongo Forest, Uganda.* SWARA. 16: 13-17

Plumptre, A.J., and Vernon Reynolds (1994). *The effect of selective logging on the primate populations in the Budongo Forest Reserve, Uganda.* Journal of Applied Ecology. 31: 631-641

Bakuneeta, C., et al. *Human uses of tree species whose seeds are dispersed by chimpanzees in the Budongo Forest, Uganda.* African Journal of Ecology. 33: 276-278

Plumptre, A.J. *Changes following 60 years of selective timber harvesting in the Budongo Forest Reserve, Uganda.* Foerst Ecology Management 89: 101-113

Dickson, Langoya C., Catherine Long and Jennifer Vigano. *Environmental Education in Uganda's Tropical Forests.* 2002

Roberston, B. *Growing African Mahogany in Northern Australia.* Agnote: December 2002

Romer, Alfred S. *The Vertebrate Story.* Fourth edition. The University of Chicago Press: Chicago, 1959

## Websites

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

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

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

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

[www.socialsciences.ucsd.edu/Budongofauna.html](http://www.socialsciences.ucsd.edu/Budongofauna.html)

[www.mtnforum.org/resources/library/langx97a.htm](http://www.mtnforum.org/resources/library/langx97a.htm)

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

[www.britannica.com](http://www.britannica.com)