



---

3701 South 10th Street Omaha, NE 68107 402-738-2095

---

### **Madagascar Biodiversity Partnership (MBP)**

Principal Investigator: Edward Louis, Jr., DVM, Ph.D.

Director of Conservation Genetics

Henry Doorly Zoo

Grewcock's Center for Conservation and Research

3701 South 10<sup>th</sup> Street

Omaha, Nebraska 68107

Office: (402)738-2004

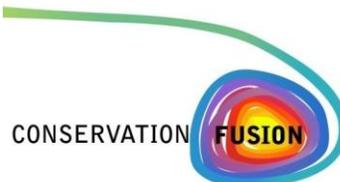
Tel (Madagascar): 261 33 297 1890

Lab: (402)738-2095

E-mail: [edlo@omahazoo.com](mailto:edlo@omahazoo.com)

Field E-mail: [kelynews1@yahoo.com](mailto:kelynews1@yahoo.com)

Currently, the MBP is partnering with the NGO Conservation Fusion for the education and community based programs. Dr Louis spends up to 10 months in the field. If you are interested in partnering with or supporting the MBP, you can also contact...



### **Conservation Fusion**

Program Director:

Susie McGuire

5820 Spring Street

Omaha, Nebraska 68106

Phone: (402)981-2975

E-mail: [conservationfusion@gmail.com](mailto:conservationfusion@gmail.com)

### **Background Information for the MBP**

Henry Doorly Zoo's Madagascar Biodiversity Partnership (MBP) was initiated by Dr. Edward Louis in 1998. In an effort to develop baseline molecular, distribution and census data on lemurs and other Malagasy flora and fauna, he has carried out and supervised extensive fieldwork on the island for over a decade. The MBP team, expanded to 50 Malagasy employees, has successfully immobilized and released over 4,000 lemurs from

over 112 sites across Madagascar. Remarkably, the MBP is responsible for discovering 21 new species of lemurs in addition to elevating the status and redefining ranges of multiple other lemur species, ultimately rewriting lemur taxonomy. The MBP is also responsible for successfully re-establishing two lemur species (*P. diadema* and *V. v. editorum*) back into their historical habitat. Not to mention, the re-discovery of the critically endangered *Prolemur simus* in 2008 at the Torotorofotsy Ramsar site. Conservation efforts of *P. simus* are continued with the MBP launching a multifaceted program involving research, community outreach and education at Kianjavato, intimately connecting the local people with the environment. Additionally the group has created and distributed 15,000 conservation-based coloring and activity books to Malagasy primary school children. The MBP works in collaboration with multiple NGO's, governmental agencies, and researchers worldwide and supports 40 Malagasy graduate students. By supporting conservation both in the wild and in captivity the MBP works with the Malagasy zoo, PBZT, improving animal husbandry and constructing several exhibits for endangered lemur breeding programs. Furthermore, numerous community outreach and conservation education programs along with grass roots reforestation projects have been initiated.

### **Background Information for Conservation Fusion**

Conservation Fusion is an educational non-profit based in Omaha. Conservation Fusion aims to engage communities in educational programs creating an awareness and understanding of the world's unique biodiversity while instilling ownership and ultimately empowering individuals to take responsible action for a sustainable future. Conservation Fusion envisions connecting Malagasy children with youth in the US, empowering kids to be the change needed to protect and preserve the world's biodiversity. Founded by long time MBP supporter and staff member Susie McGuire. She was employed at the Omaha Zoo where she has focused on conservation since 1997. In 2005, she began work as a lab technician at the zoo's Center for Conservation and Research in the molecular genetics department, where the MBP originated with Dr Louis. While at this position, she participated in research, community involvement and education. A key component to conservation is education. The MBP's conservation research program has grown exponentially over the past decade creating the need for an education component, therefore, Susie founded a nonprofit organization, Conservation Fusion. Ms. McGuire has mentored over 35 international students and spearheaded multiple education programs including the creation of a conservation-based coloring book entitled *Lemurs: Your National Treasure*, distributed to 15,000 Malagasy primary school children in 2007 and a novel conservation education program in Kianjavato, Madagascar in 2009.

## Used for "Education Suitcase" & Field supplies.



Sells at Wal-Mart for \$18.00. Is great for shipping and in the field. We have used them instead of suitcases to ship all of the field supplies for lemur immobilization etc. When the crate arrives, it can go straight to the field. Travels well, and the porters can easily carry them into the forest.

Also, you can put stickers on the outside to acknowledge sponsors. It is great to take a picture of the local teachers/kids getting the items out of the crate with a sponsor sticker on the lid! I always wait until it arrives in-country to add any stickers. (Just to make sure it doesn't look too tempting or exciting when going through customs!) When we have Malagasy students traveling to the USA, they bring the crates back so they can be used again.

\*\*\*They are in the automotive or the camping section!

I am including the information that we put together to go inside the crate. We took pictures of every item. This proved to be beneficial for the following reasons:

- Inventory of the items
- Evaluations from the teachers/kids utilizing the materials
- Reporting to funders

Each crate was accompanied by an instructional video on how to use each item, along with an evaluation sheet. The pictures helped, as local people often may not know what a "viewmaster" is, but can provide feedback about how it was received when they can associate it with a picture.

Additionally, the picture and video are helpful if there is a language barrier. For example, they can "see" you put your hand in a puppet. After lessons are taught, the items can all be returned and accounted for in a checklist using the pictures. Furthermore, evaluations can be filled out by circling pictures of the things that worked best. We even did a test for which evaluation method worked best. One form had a picture of the item and all the teacher had to do was circle a smiley face, a frowning face, or a confused face if they did not understand the game activity etc, so we could modify the instructions in the future.

Also, as Beth mentioned, all the pages are printed and put into a binder with clear pages. It is very important to protect everything from the elements, and makes things last longer.

We put all the books, binoculars, viewmasters etc in plastic bags (in the forest, anything not in a ziploc gets moldy etc from the humidity)

\*\*\*FYI: It is a good idea to factor in the cost of the cover pages and plastic bags when adhering to a budget, it can add up fast.

\*\*\*FYI: Many of the books in the crates I picked up at garage sales for only some pocket change...you can also have a book drive at a school etc to get books, animal cards etc...the thing to keep in mind is "simple & lightweight" The cardboard picture books with few words are great. They are sturdy, and we used a label maker to translate the few words into the Malagasy language.

If you want to translate something into French, it is easy through the web at <http://babelfish.yahoo.com/>. You just type in the text. (Be aware that the translations are not exact) Good Luck!

Some of the things we put together are specific to Madagascar, but hopefully this will give an idea of what may work for your project!

The following are the pages put into the binder that went into each "Education Suitcase"

## Inventory for the MBP Environmental Education Suitcase

JBZ Crate

### Puppets



Butterfly



Chameleon



Frog



Maki



Bat



Ladybug beetle



Tortoise



Owl



Toad



Tenrec

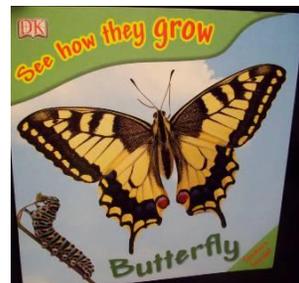
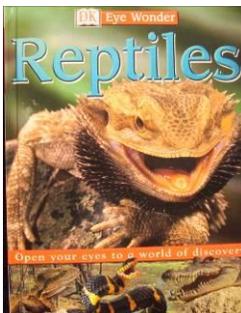
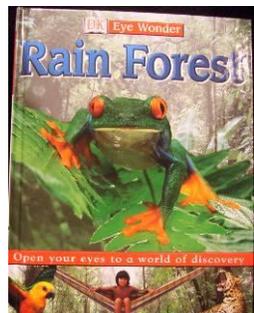
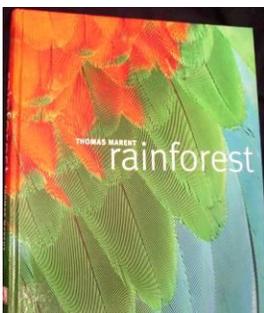
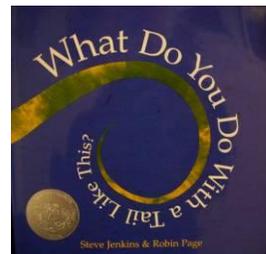
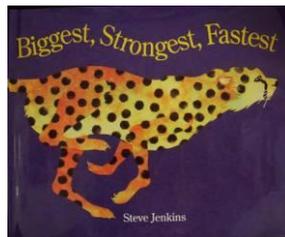
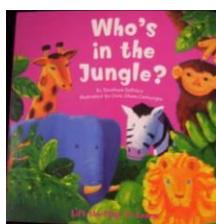
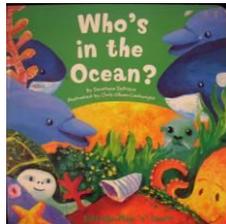
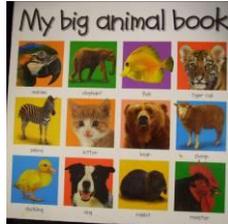
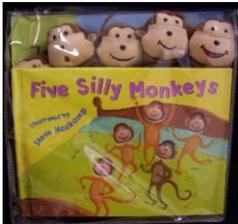


Snake

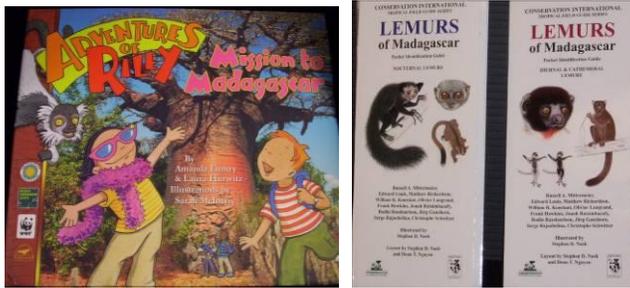
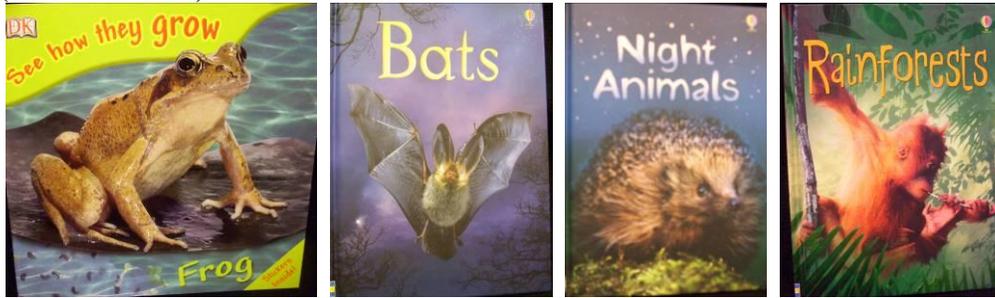


Bee

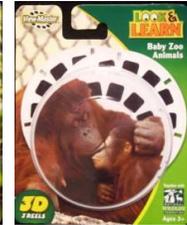
### Books



**(Books continued)**



**Viewmaster and Slides**



Rainforest

Jungle

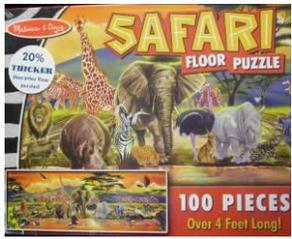
Baby Zoo Animals



Safari

Bugs and more

**Puzzles**



Safari



Rainforest

### Art Supplies



Paper



Crayons



Paint



Paint brushes

### Other Items



Instruments



Magnifying glasses



Globes



Binoculars



Parachute



Animal information cards

# View-Master & Slides



A view-Master is a slide viewer. There are several different round reels that can be inserted into the machine. Each reel has 14 slides, or images. Children can hold it up to their eyes and look into it. Often the images look better and are easier to see if the machine is held upward or toward a light source.

Slide Sets:

## *Rain Forest Creatures – Look & Learn*

These slides have pictures of the animals found in the Rain Forest, such as the jaguar, Golden frog, clear-winged butterfly, tapirs and Sifakas. Talk to the kids about what they have seen. Ask questions. Here are some ideas to get things started!

Facts about Rainforest animals:

### **What are Rainforests?**

Tropical Rainforests are forests with tall trees, warm climate, and lots of rain. In some rainforests it rains more than 3cm every day!

### **Where are Rainforests found?**

Rainforests are found in the tropics.

### **Why do you think they are found in tropical areas?**

Because in this region the sun is very strong and shines about the same amount of time each day all year long making the climate warm and stable.

### **Why do rainforests have so many kinds of plants and animals?**

Rainforests support the greatest diversity of living organisms on Earth. Even though they cover only 2% of the Earth's surface, over 50% of plants and animals on the planet are found in the rainforest!

Rainforests have an great quantity of plants and animals for the following reasons:

- 1). Climate: There is a lot of sunlight that is converted (changed) into energy y plants. A lot of sun=A lot of energy! This energy is stored in plants which are eaten by animals. Because there is a lot of food, there are many species of plants and animals.
- 2). Trees and plants provide many places for animals to live.

### **Why are Rainforests Important?**

They provide homes to many plants and animals: Home to a large number of plant and animal species.

As forests are cut down, many species are doomed to extinction, this means there are no animals left...they are gone forever!

Help stabilize the climate of the entire planet

Protect against flood, drought and erosion

Are a source for medicines and food.

They are a beautiful and interesting place to visit. They provide jobs for local Malagasy people through research, as they can work as local guides or help scientists through the University. Local people can also benefit through eco-tourism as guides or selling crafts to visitors.

Tell the children many animals in Madagascar's rainforests are found No where else in the entire world! Ask them to name a few. Ask them if they recognized the Sifaka in the slides.

Have the children think of ways the forest is important to them and to their future.

## *Bugs and More – Look & Learn*

These slides have images of butterflies, caterpillars, beetles, bees and other insects! Talk to the kids about what they have seen. Ask questions. Here are some ideas to get things started!

After the kids have looked at the slides talk about pollination and the importance of insects in the “circle of life”. The circle of life means that all things in the world are somehow connected, forming a circle that goes on and on. For example: Plants grow from the Earth and are eaten by Animals, when the animals die, their bodies turn back into the Earth, forming a circle.

Ask the children to think about different bugs. What are some things that are the same about bugs? What is different? Get out the puppets and act out a song about bugs. Why are they important? Bugs are valuable because they help pollinate plants that give us food and medicine. Bugs help continue the Circle of Life by providing food for other animals like frogs, snakes, chameleons and lemurs. You can act out a life cycle by showing that a tenerec may eat an insect, and a snake may eat the tenerec or other bugs. Snakes help us by reducing rodent populations. (Snakes eat the mice and rats that can sometimes get into rice and other human foods) By protecting the bugs, we are ultimately protecting ourselves!

# Education Crate Resources & Activities



## Animal Movement

### Activity #1

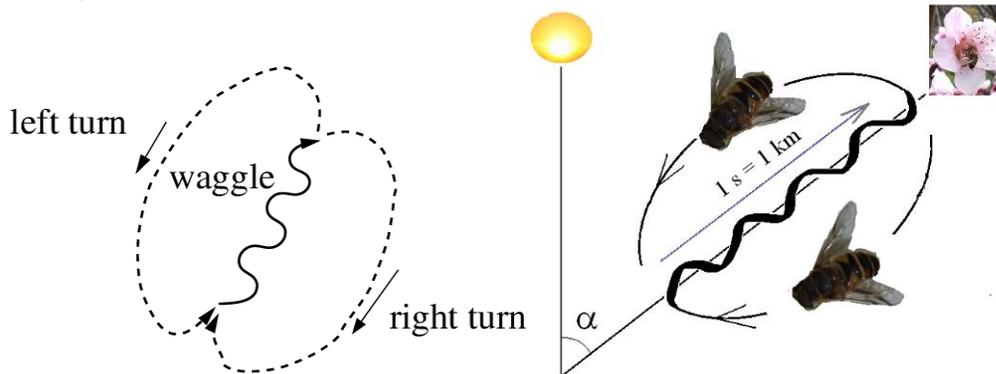
Talk about how different animals move. How does a frog move? How does a lemur move? How does a fish move? How does a bird move? How fast do they move? Is a tortoise fast or slow? Hand out the puppets to the students and have each student demonstrate how each animal moves. Have the other students act out how different animals move.

### Activity #2

Divide the class into pairs, and have one child flap their arms as many times as they can in 10 seconds while the other child counts. The teacher can tell the students when to start and when to stop after the 10 seconds. A small bird called the Rufous hummingbird can flap its wings 500 times in 10 seconds! Can anyone do the same?

## Communication

### Activity #1 Bee communication



Honeybees dance to communicate to other honeybees where they can find flowers which have nectar (food for honeybees). Use the puppet to show a dance. Divide the students into two groups. One group will dance to tell the others where the flowers are, and the second group will then fly off to search for nectar.

### Activity #2 How does a baby animal find its mother?

Use the bat puppet when giving these instructions to the students. Divide the class into pairs. One student will be the mother bat and the other student will be the baby bat. Have each pair create their own unique family noise. Then have the babies close their eyes, while the mother's hide and begin making their unique noises. Have the baby bats listen for their mother's noise and navigate toward her.

### Activity #3 Echolocation



With older children discuss how bats use echolocation. Echolocation is a sensory system in certain animals, such as bats and dolphins, in which usually high-pitched sounds are emitted and their echoes interpreted to determine the direction and distance of objects. This activity should take place in a large, open area free of any obstructions. An area should be designated for a bat cave. Choose one student to be the bat and the rest of the group will be the insects. Blindfold the bat and have the insects spread out within the designated area. The bat calls out "BEEP BEEP BEEP" and the insects call out "BUZZ BUZZ BUZZ". The insects walk around, trying to avoid the bat. The bat tries to tag the insects by listening for their sound. A tagged insect must sit in the bat cave. The last person tagged becomes the new bat and the game starts over.



## Biodiversity

### Activity 1: Understanding biodiversity

- Introduce the idea of variety by giving the students a one minute challenge to name all the plants, animals and insects they know.
- Explain that 'diversity' is the name that we give to this variety. Develop the idea that this diversity is what makes life interesting.
- Introduce students to the concept of variety in nature. Can they imagine a world where there was only one type of tree or bird? For example only pine trees and owls.
- Can they imagine a world with only buildings and roads and no green spaces? What would it be like to live in this type of environment?
- Explain that this variety of life is called biodiversity (short for biological diversity).
- Challenge students to expand the following examples of biodiversity:
  - the differences between animals or plants of the same species, e.g. different types of ducks
  - different species who live in a particular area, e.g. birds, fish, insects, plants, fungus could all live in a forest
  - differences between different environments (ecosystems) e.g. forests, wetlands, lakes etc.
- Using the school and the local environment as a resource have students identify examples of the three different categories of biodiversity, e.g.
  - birds, insects, trees, animals living in the local area
  - identify and count the number of different bird species
  - identify and name particular environments within a local area ( bush, wetland, stream...).
  -

### **Activity #2 "Clump" Game**

The Circle - In Native American cultures, the circle is connected with every aspect of life, which is thought to be continuous and never-ending. Included in the circle are the individual, family, neighbors, school, community and nature.

Have students "clump" together in a cleared area of the room (or outdoors). Each student reaches into the clump and takes someone's left hand in his or her right hand and someone else's right hand in the left. Then, without letting go (hands may pivot if necessary), untangle the clump by going over, under, etc. The clump eventually becomes a circle. This shows how everything from animals to plants to people are all collected.

### **Activity 3: Mouse Lemur Game**

This is a game where students adopt a role in an ecosystem and observe that organisms rely on each other.

Divide the class into the following:

- 15 trees (or more)
- 4 mouse lemurs (or more)
- 1 owl (up to 2)

Spread the trees over an area to represent the forest. The mouse lemurs can move between trees. When they touch a tree they are safe because it is where they obtain food and safety from predators such as an owl. Each mouse lemur has to move between trees to find food. The owl tries to catch the mouse lemurs as they move between the trees. When a mouse lemur is caught it must sit down. No two mouse lemurs can be in the same tree. Owls cannot attack mouse lemurs when they are in the trees.

Play the game once and repeat, gradually removing the trees as they are cut down. Discuss between each game the significance of the trees and the vulnerability of the mouse lemurs if their habitat is removed or destroyed.



Margot Marsh's or Antafondro mouse lemur



## **Butterflies**

Teach the children about the butterfly life cycle and then play this fun game!

### **Activity: BUTTERFLY RELAY RACE**

#### **Materials:**

Two objects to mark the start and finish lines.

#### **Preparation:**

Set up the start and finish lines outside in an open area.

#### **Procedure:**

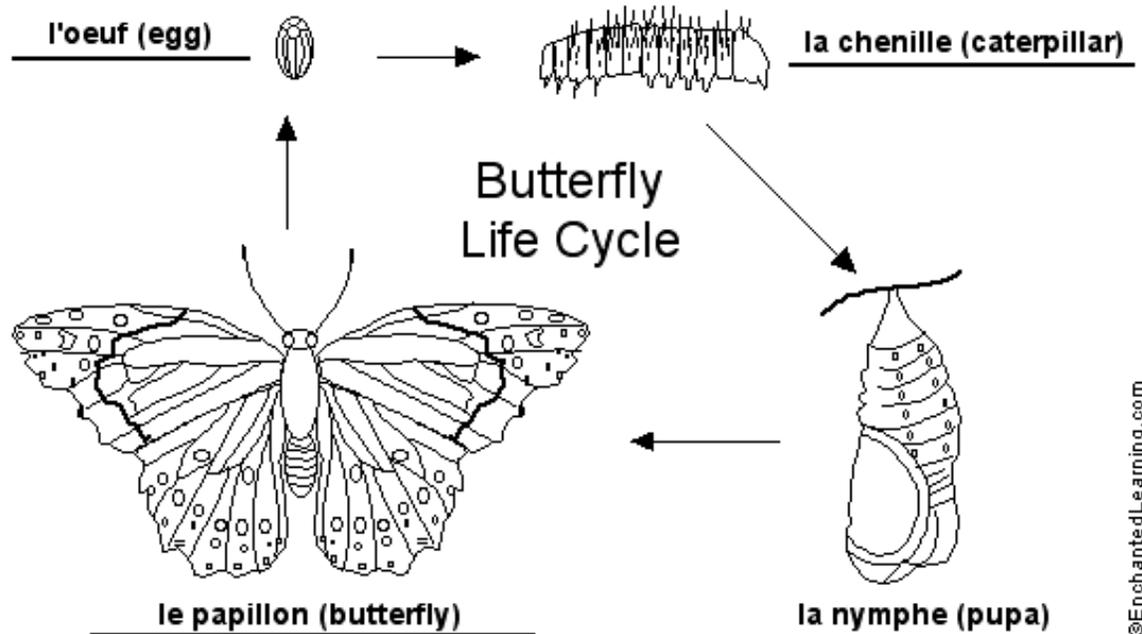
1. Divide the children into groups of four.
2. The first child in the group will represent the first life cycle stage (egg), the second child represents the second stage (larvae), etc. Each team should consist of an egg, a larvae (or caterpillar), a pupa, and a butterfly.
3. Explain each child's role, and how they fit into the butterfly's life cycle
4. To reach the finish line, all four team members must travel to the finish line in a unique way (see #5 below), and back to the group, to touch hands with the next member, until all four team members have gone and returned. The first group to finish wins!
5. Rules:

The egg must ROLL to the finish line and back

The caterpillar must CRAWL to the finish line and back

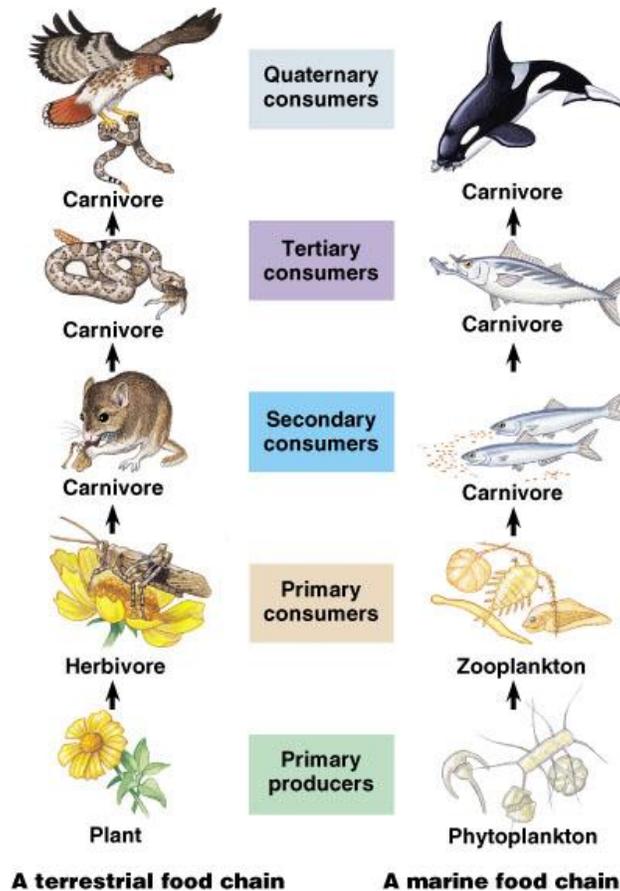
The pupa must SPIN to the finish line and back

The butterfly must flap her wings and "FLY" to the finish line and back



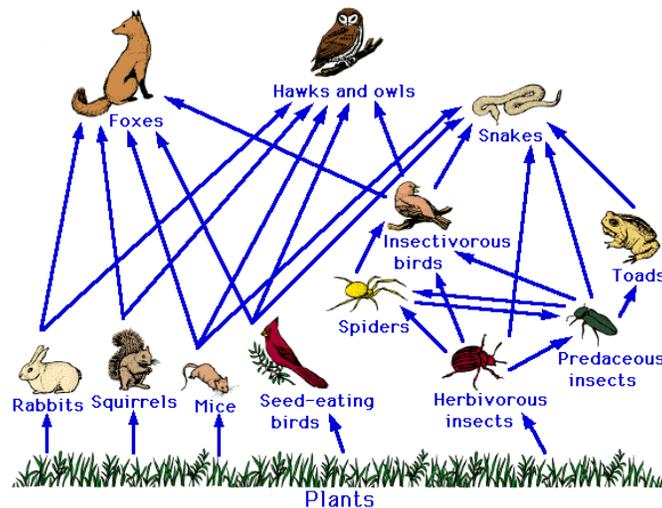
## Food Chains

**Predators** are animals that catch, kill and eat other animals. The animals that are eaten are called **prey**. Those predators that are not prey to others are called **top predators**. Both predators and prey are links in what is called a food chain. The **food chain** is the cycle of energy through a habitat. The sun is the source of energy within a food chain. A food chain's energy is transferred in sequence; for example, energy from sunlight, to green plants, to animals that eat plants, and to animals that eat other animals. Green plants use the sun's energy directly to make food. When animals eat green plants and other animals eat those animals, the energy moves from one living thing to another along the food chain. When plants and animals die, the energy still contained within their bodies is fed on by scavengers, beginning the process of decomposition. Other organisms known as **decomposers** (insects, fungi and bacteria), recycle dead organisms back into nutrients and soil. The energy cycle then begins anew as the plants then use the nutrients and soil to grow.



## Food Web

Food webs are more complex than food chains. They consist of several food chains that are interconnected. The following example is a series of food chains, which together make a food web.



### Activity #1 Predator-Prey Game

Teach the children about predators and prey. A **predator** is an animal that eats other animals. **Prey** is the animal that is being eaten. Show the frog puppet and explain how it is the predator that eats insects (demonstrating with the insect puppets) which are the prey. Designate an area to be the “pond”. Have one child be the hungry frog and stand in the middle of the pond. The other children will be the insects. Have the insects stand in a line on one side of the “pond”. The insects will then run across the pond to the other side, while the frog tries to tag or eat as many insects, before they get to the other side. Whoever gets caught first will be the new hungry frog. The children will then start over and run across the pond.



### Activity #2: Circle of Life Game

The purpose of this activity is to have the children understand the importance of the food chain and to make our own circle of life! Divide the students into groups of five. Assign one of each of the students in the group to be an animal in a food chain (**producer/plant, primary consumer/animals that eat plants, secondary consumer/animals that eat other animals, tertiary consumer/animals that eat secondary consumers, or decomposer**). Have the students stand in a circle, gently resting their hands on the shoulders of the person in front of them. Make sure the students are in the same order as in the food chain. Then at the count of three, have them carefully sit down on the lap of the person standing behind them. When done properly, they should be stable. This may take more than one attempt. Explain that all of these creatures are part of the circle of life, and all of them are needed to help the others survive.

Some people think that the decomposers aren't important. What would happen if they weren't there? Have the decomposers leave the circle. When they do, the circle will collapse.

Discuss what happened. What happened when all parts of the circle of life were doing their job? What happened when the decomposers weren't there to do their job? Decomposers make food for plants. If the decomposers weren't there, what would happen to the plants (**producers**)? (they'd die) Then what would happen to the **herbivores** (animals that eat plants)? The **carnivores** (animals that eat meat) and **omnivores** (animals that eat plants and meat)? The scavengers? What does this tell you about all the parts of the circle? They're all important!

### Activity #3 Creature Café

Create a menu for a creature café! List the name of several animals. Then come up with dishes to suit each animal's diet and list them under the animal's name.

### Activity #4 Lion Hunt

Review what the students have learned about food chains. Where does a lion fit in the food chain? It is a carnivore. What do carnivores eat? Other animals. Because they hunt other animals for food, we call them predators. The animals they eat are called prey. Lions live and work together in a group called a pride. What do you think will happen when the pride gets bigger? Let's find out.



1. Play in a large, open area. Have the students spread out. Select one to be a lion. The rest are zebras.
2. The lion tries to tag the zebras. When s/he does, the zebra freezes in place. If they are tagged by another zebra, they may move again. If all the zebras become frozen, the prey is gone and the game is over.
3. With one lion, the zebras should be able to continually replenish their numbers. After a few minutes of play, add a second lion. Play several times, adding another lion each time.

Discuss what happened. What happened when there was just one lion? What about when there were three? Five? More? What does that tell you about predators and prey? (There must be many more prey animals than predators for them to survive)

Play the game again, this time paying close attention to the balance of predators and prey. How many lions could hunt without depleting the herd?

### Activity #5 Hot Food

Directions:

1. Sit in a circle. Hand one student a puppet.
2. Pass the puppet around the circle. You may sing a song if you wish.
3. When the teacher calls out "Hot Food!" whoever has the puppet has been caught by a predator (fossa, owl, civet). If they can answer a question about food chains, they continue in the game. If not, they must spend one round in the center of the circle. They may return to play the following round.
4. Play until all have had a turn.

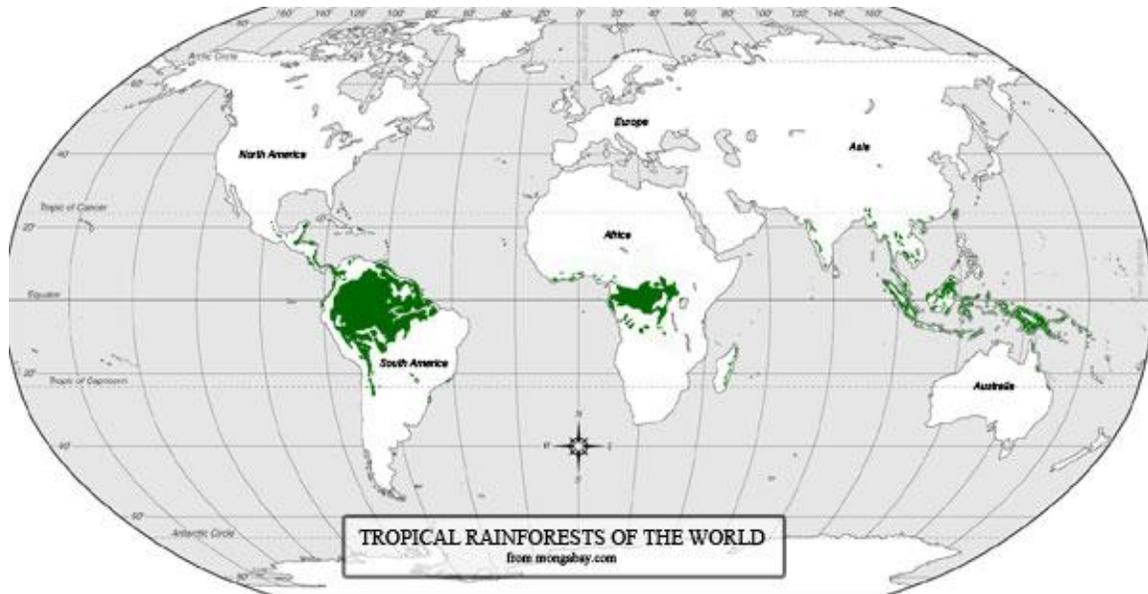


## Rainforests

### **What is a Tropical Forest?**

Tropical rain forests are very special places. They cover only about 7% of the earth's land, but they are home to half of the earth's animal and plant species. These hot and humid regions have yearly rainfalls of at least 190cm. In some places 825cm of rain may fall in a year! Also, temperatures in tropical rainforests are fairly constant, ranging between 20°C and 29°C both day and night all year long.

### **Where are rainforests located?**



Rainforests are found in the tropics, the region between the Tropic of Capricorn and Tropic of Cancer. In this region the sun is very strong and shines about the same amount of time every day all year long making the climate warm and stable.

### **What makes a Rainforest?**

Each rainforest is unique but there are certain features common to all tropical rainforests.

1. **Location:** rainforests lie in the "tropics"
2. **Rainfall:** rainforests receive at least 203cm of rain per year
3. **Canopy:** rainforests have a [canopy](#) which is the layer of branches and leaves formed by closely spaced rainforest trees. Most of the plants and animals in the rainforest live in the canopy. The canopy may be 30m above the ground.
4. **Biodiversity:** rainforests have a high level of biological diversity or biodiversity. Biodiversity is the name for all living things -- like plants, animals, and fungi -- found in an ecosystem. Scientists believe that about half of the plants and animals found on earth's land surface live in rainforests.
5. **Symbiotic relationships between species:** species in the rainforest often work together. A symbiotic relationship is a relationship where two different species benefit by helping each other. For example some plants produce small housing structures and sugar for ants. In return the ants protect the plants from other insects that may want to feed on the plant's leaves.



## Layers of the Rainforest

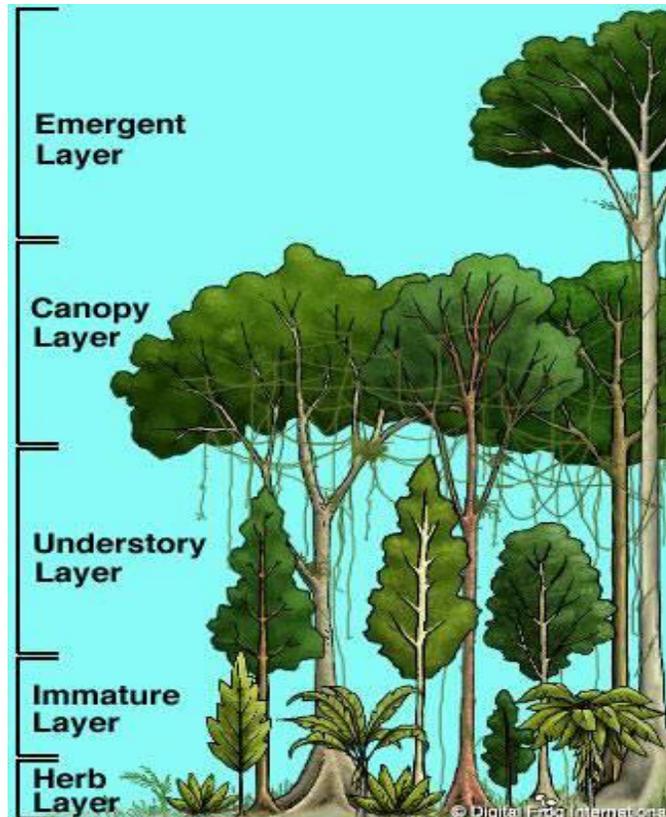
There are **four** very distinct **layers of trees in a tropical rain forest**. These layers have been identified as the **emergent**, **upper canopy**, **understory**, and **forest floor**.

**Emergent** trees are spaced wide apart, and are 30 to 73m tall with umbrella-shaped canopies that grow above the forest. Because emergent trees are exposed to drying winds, they tend to have small, pointed leaves. Some species lose their leaves during the brief dry season in monsoon rainforests. These giant trees have straight, smooth trunks with few branches. Their root system is very shallow, and to support their size they grow buttresses that can spread out to a distance of 9 meters.

The **upper canopy** of 18 to 40m trees allows light to be easily available at the top of this layer, but greatly reduced any light below it. Most of the rainforest's animals live in the upper canopy. There is so much food available at this level that some animals never go down to the forest floor. The leaves have "drip spouts" that allows rain to run off. This keeps them dry and prevents mold and mildew from forming in the humid environment.

The **understory**, or lower canopy, consists of 18m trees. This layer is made up of the trunks of canopy trees, shrubs, plants and small trees. There is little air movement. As a result the humidity is constantly high. This level is in constant shade.

The **forest floor** is usually completely shaded, except where a canopy tree has fallen and created an opening. Most areas of the forest floor receive so little light that few bushes or herbs can grow there. As a result, a person can easily walk through most parts of a tropical rain forest. Less than 1 % of the light that strikes the top of the forest penetrates to the forest floor. The top soil is very thin and of poor quality. A lot of litter falls to the ground where it is quickly broken down by decomposers like termites, earthworms and fungi. The heat and humidity further help to break down the litter. This organic matter is then just as quickly absorbed by the trees' shallow roots.



There are many different species of animals that live in rainforest habitats throughout the world. They live under leaves, along the ground, in trees, under tree bark, and in the treetops. Many rainforest animals are not found anywhere else on earth!

### Why do Rainforests have so many different kinds of plants and animals?



Tropical rainforests support the greatest diversity of living organisms on Earth. Although they cover less than 2% of Earth's surface, rainforests house more than 50% of plants and animals on Earth. Here are some examples of the richness of rainforests:

- Rainforests have 170,000 of the world's 250,000 known plant species
- The United States has 81 species of frogs, while Madagascar which is smaller than Texas (one of the 50 states), may have 300 species.
- Europe has 321 butterfly species, while a park in the rainforest of Peru (Manu National Park) has 1300 species.

Rainforests have an abundance of plants and animals for the following reasons:

1. **Climate:** because rainforests are located in tropical regions, they receive a lot of sunlight. This **sunlight** is converted to **energy** by plants through the process of **photosynthesis**. Since there is a lot of sunlight that means there is a lot of energy in the rainforest. This energy is stored in plant vegetation which is eaten by animals. Because there is a lot of food there are many species of **plants** and **animals**.
2. **Canopy:** the **canopy** structure of the rainforest means there are more places for plants to grow and animals to live. The canopy offers new sources of food, shelter, and hiding places, provides another world for interaction with between different species. For example there are plants in the canopy called **bromeliads** that store water in their leaves. Animals like **frogs** use these pockets of water for hunting and laying their eggs.

## **Why are Rainforests important?**

Rainforests are important to the global ecosystem.

- provide a home to many plants and animals;
- help stabilize the world's climate;
- protect against flood, drought, and erosion;
- are a source for medicines and foods;
- support tribal people;
- are an interesting place to visit

## **Why are Rainforests being destroyed?**

Every year 22,608 km<sup>2</sup> of rainforest is cut down and destroyed. The plants and animals that used to live in these forests either die or must find a new forest to call their home. Why are rainforests being destroyed?

**Humans are the main cause of rainforest destruction or deforestation.** Humans are cutting down rainforests for many reasons, including:

- wood for both timber and wood for making fires;
- agriculture for both small and large farms;
- land for farmers who don't have anywhere else to live;
- grazing land for cattle; and
- road construction

## How can kids help protect rainforests?

If deforestation continues at the current rate, there could be a time when rainforests around the world disappear. It is up to all of us to act responsibly. You can help protect ecosystems and the people and wildlife that depend on them. Most importantly, **keep learning** about rainforests and teach your friends and family how important they are. Because our lives are so intertwined with the forest's great bounty, our fate -- as well as the fate of millions of plants and animal species -- is at stake. It is up to all of us to act responsibly and to be good stewards by contributing to the sustainable production of all the goods and services that the Earth's tropical forests provide.

### Endangered Species

It is difficult to imagine what our world would be like without any animals, plants or people. Most species of animals and plants that used to live on Earth no longer exist. When there are no more animals of a certain species alive, then that species is said to be **extinct**. All the different species of dinosaurs are extinct, and many other animals are close to becoming extinct. Scientists have come up with ways to describe the amount of danger a species is in. Animals like the Madagascar tree boa (*Sanzinia madagascariensis*) are described as **vulnerable** or **threatened** because their numbers have become dangerously low. If the



population of a species, like the Black and white ruffed lemur, continues to decrease, moving closer to becoming extinct, then that species is labeled **endangered**. All lemurs, which can only be found in Madagascar, are threatened or endangered. A species is **critically endangered** when the number of remaining individuals is so low it is likely to become extinct in the near future.

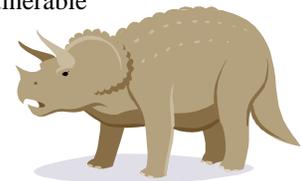
The Greater bamboo lemur (*Prolemur simus*) is critically endangered since there are only about 200 left in the wild (and they only are found in Madagascar!). When an animal species is labeled as vulnerable or endangered, the remaining animals of that species are protected by law.

Recently, people have been responsible for speeding up the extinction of animals by destroying habitats to build homes and farms. When this happens, many of the animals have no place to go. When people clear forests, they also remove food sources. When trees are removed by people, there is no food left for animals. Human pollution, like oil spills in the ocean, is also responsible for the loss of many animals. In the last 100 years, the speed at which species are disappearing from the Earth has increased. **Right now, plant and animal species are disappearing at least 1,000 times faster than any other time in the last 65 million years.** It also claims that habitat loss is accounting for almost 75% of the extinctions occurring now. Humans have always hunted animals for food. However, when humans hunt endangered animals, they are breaking the law. That is called **poaching**. Fortunately, many humans are now working hard to protect and help endangered and vulnerable animals.



### **How Does Extinction Happen?**

Species disappear because of changes to the earth that are caused either by nature or by the actions of people. Sometimes a terrible natural event, like a volcano erupting, can kill an entire species. Other times, extinction will happen slowly as nature changes our world. When these kinds of changes occur in the environment, animals can adapt, they can move to a different environment or they can die. In the case of the dinosaurs, scientists believe the weather changed rapidly when a huge **meteorite** hit the Earth around 65 million years ago. A giant dust cloud blocked the sunlight, causing an ice age. Because dinosaurs were not able to adapt to the cold conditions, they died.



People can also cause the extinction of plants and animals. The main reason that many species are endangered or threatened today is because people have changed the homes or **habitats** upon which these species depend. A habitat includes not only the other plants and animals in an area, but all of the things needed for the species' survival -- from sunlight and wind to food and shelter.

People can also endanger plants and animals by moving, or introducing, new species into areas where they do not naturally live. Some of these species do so well in their new habitat that they endanger those species already living there, called the native species. These introduced species are called **invasive species**. For example, when some fish are introduced into a lake or stream, they may prey upon, or eat the food of the native fish. The native species may then have to find a new source of food or a new home, or face becoming endangered or extinct.

Another way that people harm animals and plants is by taking them from the wild. Others might capture a wild animal for a pet, or pick a flower because it's pretty. In addition, some people illegally hunt animals for food, skins, or fur this is called **poaching**.



### **Why Protect Endangered and Vulnerable Species?**

Can you imagine walking in the forest without hearing birds singing in the trees, or seeing flowers blooming? Our plants and wildlife make the world more interesting and beautiful place. More importantly, all living species, including people, depend on other species for survival. For example, if a fish becomes extinct, all of the species that rely on it for food will also suffer and may become threatened or endangered. We all depend upon plants and wildlife. From studying them, we have learned new ways of growing foods, making clothing, and building houses. Scientists have discovered how to use certain plants and animals as sources of medicines. If we fail to protect threatened or endangered species, we will never know how they might have improved our lives.

## **Endangered and threatened species need our help!**

### **Ways that wildlife biologists are working to save endangered species.**

- (1) Research
- (2) Monitoring and tracking species
- (3) Conserving habitats
- (4) Reintroducing and restoring endangered populations
- (5) Captive breeding



### **There Are Many Ways You Can Help!**

Individuals CAN make a difference, just by changing their own attitudes about wildlife. Listed below are some of the many ways that YOU can help save endangered species.

- 1) Don't buy or take animals from the wild.
- 2) Don't buy or make products made from wild animals.
- 3) Don't disturb wildlife or their homes.
- 4) Help others learn about endangered species by writing articles, drawing posters, making bulletin boards, or starting a nature club.
- 5) Write letters to representatives in government.
- 6) Learn as much as you can about the endangered species in your area.
- 7) Support zoos that are breeding endangered species.
- 8) Join a wildlife organization.

## Some Endangered Species Found in Madagascar



1. Coquerel's Sifaka  
(*Propithecus coquereli*)



2. Indri  
(*Indri indri*)



3. Red Ruffed Lemur  
(*Varecia rubra*)



4. Collared Brown Lemur  
(*Eulemur collaris*)



5. Fossa  
(*Cryptoprocta ferox*)



6. Large-eared Free-tailed Bat  
(*Otomops martiensseni*)



7. Jenkins Shrew Tenrec  
(*Microgale jenkinsae*)



8. Malagasy Giant Rat  
(*Hypogeomys antimena*)



9. Western Woolly Lemur  
(*Avahi occidentalis*)



10. Perrier's Sifaka  
(*Propithecus perrieri*)



11. Sahafary Sportive Lemur  
(*Lepilemur septentrionalis*)



12. (*Mantidactylus guibei*)



13. (*Platypelis tetra*)



14. Radiated Tortoise  
(*Astrochelys radiata*)



15. Madagascar Big headed Turtle  
(*Erymnochelys madagascariensis*)