

## TEACHER GUIDE SR: HOME OF THE WORLD FALL 2008

Dear Teachers,

We would greatly appreciate your feedback on this guide and any past guides. Your input directly affects our decisions of what to include in future guides, so please feel free to send feedback and suggestions to [greentimes@urbaneco.org](mailto:greentimes@urbaneco.org). Also, you can visit [www.greenscreen.org](http://www.greenscreen.org) for more information and to download this teacher guide.

Thank you!

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### Background Information on:



Habitats are the natural environments of plants and animals. What makes a habitat unique? A combination of many things—including temperature, soil, rainfall, and geographic location—creates a habitat. Earth has many different habitats, from vast oceans to tropical rain forests, equatorial deserts to Arctic tundra. Between these extremes are others, such as grasslands, forests, rivers, lakes, and wetlands.



All animals have basic survival needs, and a suitable habitat will provide them. The four basic habitat requirements are

- Food
- Shelter from weather and predators
- Water
- A place to raise young



In addition, each species has its own special needs. Some animals, called generalist species, find what they need in a variety of habitats. They can cope with a large range of climate and vegetation types and easily adapt to different foods and environmental conditions. Examples of such species are squirrels, coyotes, raccoons, and crows.



Specialist species are less common than generalist species and can thrive only in a narrow range of habitats. These animals have limited climate and vegetation ranges and don't adapt well to new foods or environmental conditions. These species include grizzly bears, bobcats, and many types of birds.

Habitats can be changed in major ways by natural forces such as earthquakes, volcanoes, and hurricanes. People, too, now have the capacity to alter habitats in profound ways. As the world-wide population increases, and as people use more and more technology—for things such as transportation, heating, cooling, industry, agriculture, and forestry—entire ecosystems can be threatened.

## Title: Home in the Trees

*Students will consider the various roles that trees play for other species. Students will create a habitat map based from one tree near their school.*

Article/s Corresponds to: p. 1 Dear Reader, p.1 Animal Homes

### **Objectives & Related Science & Technology MA Frameworks:**

- ◆ Identify the ways in which an organism's habitat provides for its basic needs (plants require air, water, nutrients, and light; animals require food, water, air, and shelter).

### **Materials:**

- ◆ Hand lenses
- ◆ Pencils
- ◆ Clipboards
- ◆ Blank Paper

### **Additional Resources**

#### **Interactive Habitat Game:**

<http://www.activescience-gsk.com/module2/home.html>

### **Introduction**

Trees are great examples of habitats. Some organisms may never leave a certain tree in their entire lives. Others may use a tree just as a food source, or as a place to make their nest. For example, squirrels will use oak trees for food and sometimes for shelter, but not everything. Moss and lichen get everything they need from the oak tree where they live.

### **Procedures**

1. Review the four primary roles of a habitat for an organism (food, water, shelter, space). Habitats can be big or small, and today the class will be examining trees as habitats. Brainstorm a list of animals and plants that you might find on a tree. Think about what they might be doing on or near the tree. Eating, living there, drinking, just passing through? List answers on a chalkboard.
2. Have students go outside with hand lenses, pencils and clipboards. Assign students or groups of students to study an individual tree. They should check the bark, the leaves, and the ground beneath the canopy for any sign of life. Clues could include; chewed leaves, holes in the bark, anthills in the ground, bird calls, etc. Students can create a habitat map of their tree, identifying the sources of water, food, shelter and space for the different plants and animals that use the tree as their habitat.
3. Back in the classroom, have children share their maps and identify how each organism that they found outside benefits from the tree. What are some of the organisms that use the tree for all of their survival needs? How about the organisms that receive some but not all of their survival needs? How do the organisms affect the tree?

## Title: Terrariums- A Self Contained Habitat

*Students will construct self contained habitat in their classrooms and study a miniature ecosystem.*

Article/s Corresponds to: p. 1 Animal Homes

### **Objectives & Related Science MA Frameworks:**

- ◆ Keep accurate records while conducting simple investigations or experiments.
- ◆ Recognize that plants and animals go through predictable life cycles that include birth, growth, development, reproduction, and death.

### **Materials (per terrarium):**

- ◆ Closed Jar/Bottle
- ◆ Gravel
- ◆ 2 trowel scoops of soil
- ◆ 5 dead leaves
- ◆ 1 piece of rotting wood
- ◆ 1 clump of grass with roots
- ◆ 1 rock
- ◆ 1 thing with moss on it
- ◆ 1 seedling with undamaged roots
- ◆ Notebook/journal for observations

### **Additional Resources:**

### **Procedures**

1. Ask the students to discuss what living things require in order to survive. Prompt them by using different ecosystems as examples. Are there certain requirements that all living things need whether they live in a desert, rainforest, or in the ocean? (food, water, shelter, space).
2. Ask the students whether or not life can exist inside a sealed bottle or jar. What would the jar have to have in it in order for this to be possible? Tell the students that they will be creating something called a terrarium, to find out what it takes for life to exist in a jar.
3. Explain that each terrarium will need certain materials that we can collect from the outdoors. The materials will then be combined to create two terrariums for the class.
4. Divide the students into teams to collect the materials needed. The amount of materials needed is dependent on how many terrariums you would like to build. Hand out trowels to each group for collecting soil. Give the students ten minutes to collect the materials needed. Lay the collected materials out on a large piece of paper. Put all of the soil into one bowl.
5. Once the materials have been collected and laid out in front of the class, have the students classify each one as biotic or abiotic.
6. Divide the class so there is one group per terrarium and give them 15 minutes to create their terrariums. Remind the students that the gravel and soil must be laid out according to the instructions, but the placement of the plants is their own decision. Monitor the students' work to make sure that they are planting the plants properly.
7. Once the terrariums are done, have the students write down initial observations on a piece of chart paper. In another column, have them write down predictions on what they think will happen over the coming weeks. Continue to monitor the terrariums every few days.
8. Students can use hand lenses to make closer inspections of what is happening in their terrarium. They can record these inspections on their observation sheets.

### **Assessments**

- ◆ Students should contribute to class discussions on terrarium observations.
- ◆ They need to record their observation during the experiment and use the notes to join group discussions.
- ◆ Use student's observation sheets to determine if they understand what is happening in their terrariums

Title: Strange Organisms – Students will explore the concept of biodiversity by talking about strange organisms that live in the world as well as creating some new ones.

Article/s Corresponds to: p. 4 "Ewww, What's That Smell?", p.6 "The Beautiful Tropical Rainforest"

**Objectives & Related Science and LA MA Frameworks:**

- ◆ Make informal presentations that have a recognizable organization. (LA)
- ◆ Write short poems that contain simple sense details (LA)
- ◆ Describe how organisms meet some of their needs in an environment by using behaviors (patterns of activities) in response to information (stimuli) received from the environment. Recognize that some animal behaviors are instinctive, and others are learned (Sci)

**Materials:**

Worksheet #1

**Additional Resources:**

- ◆ Project Learning Tree Environmental Education Activity Guide, Pre k-8, pgs. 30-34

**Procedures**

1. Ask your students to define the word *biodiversity*. Explain that the world is full of animals and plants, some that are well-known, and some that are just so strange and weird that they seem unreal.
2. Work with the students to create a list of all of the organisms that they consider strange. What makes them strange/weird? Why might these organisms be designed to look and/or act the way they do?
3. Hand out the worksheet and, as a class, read a few of the animals/plants.
4. Students should now be prepared to invent their own animal/plant. Students can use the worksheet to organize their ideas and designs.
5. You can either have each of your students present their organism as is, or you can have them write a short poem that describes their organism.

**Assessments**

- ◆ Participation in classroom discussion, Worksheet answers and final presentation
- ◆ Poetry Assessment Rubric: <http://web.rbe.sk.ca/assessment/Rubrics/>

Vocabulary

**Adaptation** is when something or someone changes a part of them because of a change in their life that helps them fit in better.

**Amphibians** are a class of animals including frogs and toads, newts and salamanders, and caecilians. The young are usually aquatic, breathing by gills, and the adults are typically semi-terrestrial, breathing by lungs and through their moist skin.

**Balanced** means when something is in harmonious or proper arrangement.

**Buffer zone** is an area that is created to lessen or neutralize possible problems.

**Climate** is the overall weather conditions of a region, including temperature, air pressure, humidity, precipitation, sunshine, cloudiness, and winds, throughout the year, that can then be averaged over a series of years.

**Critical limiting factor** is one that controls a process, such as organism growth or species population size or distribution. The availability of food, predation

pressure, or availability of shelter are examples of factors that could be limiting for a species population in a specific area.

**Diverse** means when there are various kinds or forms of something.

**Ecosystem** is when all the plants and animals living in an area are functioning together with its environment, as a unit.

**Equator** is the great circle of the earth that is equally distance from the North Pole and South Pole

**Greenhouse effect** is the rise in the Earth's temperature caused by certain gasses in the atmosphere (water vapor, carbon dioxide, nitrous oxide, and methane) trap energy from the sun.

**Habitat** is the natural environment of an organism, the place that is natural for the life and growth of that organism.

**Ice shelves** are ice that is attached to land but projects out to sea

**Life cycle** is the series of changes that happen in each generation of an animal or plant, starting with birth and ending with death.

**Niche** is the function or job of an organism in a community of plants and animals.

**Organism** is a living thing, whether plant, animal, bacteria, protest or fungi.

**Predators** are organisms that live by preying on other organisms

**Productive** means having the power to create and doing so readily or abundantly.

**Reptiles** are animals such as a snake, lizard, crocodile, and turtle, which have scales or horny plates, lay eggs and breathe with lungs.

**Terrestrial** is an organism that lives on or in the ground; not in the water, in trees or the air.

**Vertebrates** is a classification of animals that includes the fishes, amphibians, reptiles, birds, and mammals, all of which have a segmented spinal column and a distinct well-differentiated head.

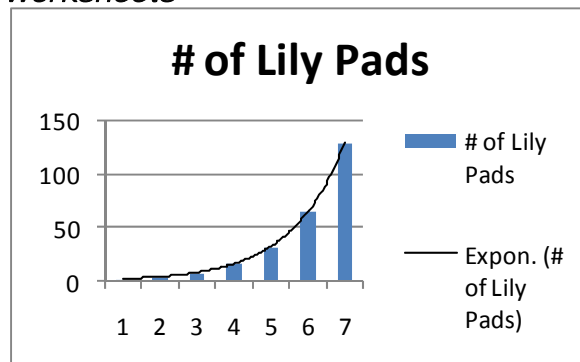
Answers to Worksheets

Worksheet 1 (Strange Organisms)

Creative Exercise: Answers will vary.

Worksheet 2 (Lily Pad Pop)

1. Day 1 - 2 Lily Pads
2. Day 2 - 4 Lily Pads
3. Day 3 - 8 Lily Pads
4. Day 4 - 16 Lily Pads
5. Day 5 - 32 Lily Pads
6. Day 6 - 64 Lily Pads (1/2 full)
7. Day 7 - 128 Lily Pads (FULL POND!)



**Title:** *Lily Pad Pop!* – Students will plot and interpret exponential growth of pond plants and its impact on a habitat.

**Article/s Correspond to:** p. 1 Community, p. 2 Environment, p. 3 Boston Goes Green, p. 3 Air Pollution, p. 4 Diesel, p. 5 Let's Go, p. 7 Suburbs

**Objectives & Related Science and Math MA Frameworks:**

- ◆ Present and explain data and findings using multiple representations, including tables, graphs, mathematical and physical models, and demonstrations. (Sci/Math)
- ◆ Draw conclusions based on data or evidence presented in tables or graphs, and make inferences based on patterns or trends in the data. (Sci)

**Materials:**

- ◆ Worksheet
- ◆ Colored Pencils

**Procedures**

1. Hand out the worksheet and read the pond scenario out loud.
2. Have the students complete the lily pad growth graph on the worksheet and answer the follow-up mathematical questions. If this is a new type of graphing for your students, provide 64 blocks, paper-clips, index cards, etc. to represent one lily pad. Have the students construct a physical representation of the lily pads per day (2 lily pads on day 1, 4 lily pads on day 2, etc.) This information can then be transferred to the graph.
3. Either in small groups or as a class discuss the following questions:
  - \* What day would you have to visit the pond to see it 100% full of lily pads?
  - \* What do you think is happening to the other plants that share the pond habitat with the lily pads?
  - \* What would happen if the classroom was like the pond, and students were like the lily pads? What would the living situation be like?

**Assessments**

Questions:

1. What are the impact on the lily pad population's essential resources found in the pond habitat's as the population grows? What will happen the day after the population reaches 100%?
2. What would happen to your town if the population were doubled? Where would people live? What would they eat? What would they drink? Would there be more or less competition for these pieces of the habitat? What would be consequence if there is more competition?

**TERRARIUMS: BACKGROUND INFORMATION ON NATURAL CYCLES**

∞ A terrarium is a jar containing rocks, soil, water, plants, and perhaps a few small animals. The jar is often sealed shut so that the water can't escape and the terrarium doesn't dry out.

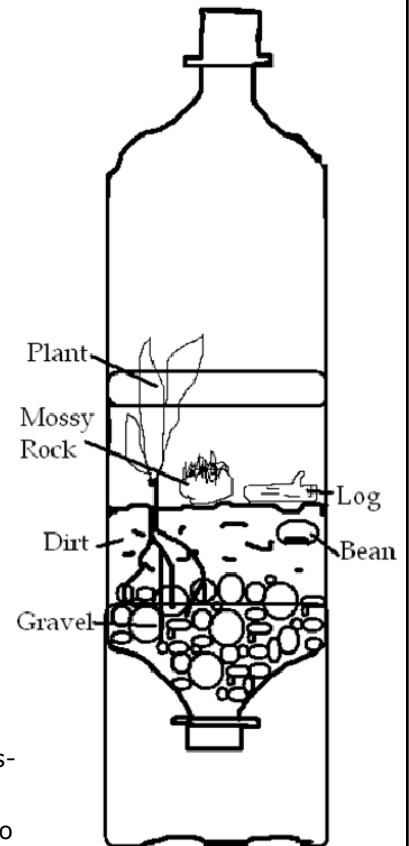
∞ A terrarium offers the opportunity to study a miniature ecosystem. Surprisingly, this ecosystem within a jar works much the same as the outside world. The water cycle is one example of a process that takes place both within the jar and throughout the entire Earth.

∞ The first stage of the water cycle is evaporation, which happens when water in the soil, rivers, lakes, and oceans absorbs heat from the sun and rises into the air as water vapor. Another form of this stage is transpiration, which occurs when plants, aided by the sun's heat, suck up water from the ground and give it off through their leaves as vapor. Both evaporation and transpiration happen within a terrarium, which allows the sun's light in through its clear walls.

∞ Once the water vapor rises high enough in the sky, it becomes colder and condenses into liquid form. This is called condensation. We see the result of condensation when we look at clouds in the sky, which are collections of tiny water droplets. Condensation occurs within a terrarium when water vapor from the soil and plants touches the sides of the container. The sides of the container are usually colder than the air inside the bottle, so the water vapor condenses onto the sides of the container.

∞ The final stage of the water cycle is precipitation. The condensed water drops down from the sky in the form of rain or snow. In a terrarium, the water doesn't actually form clouds and rain, but it does run down the sides of the container and back into the soil, where the cycle begins again.

∞ The water cycle is just one of the many ways in which a terrarium mimics larger ecosystems. Nutrients, carbon, and oxygen go through their own cycles as well, aided by the living things inside the terrarium. If a terrarium is built carefully, it can exist for years with no help from the outside world.



Name: \_\_\_\_\_

Date: \_\_\_\_\_

## **STRANGE ORGANISMS WORKSHEET**

### **GREENTIMES SR: HOMES OF THE WORLD**



#### **YETI CRAB**

Discovered in 2005 by scientists researching the hydrothermal vents in the South Pacific Ocean, the Yeti crab is covered with lots of blond "fur". But the fur isn't meant to keep this crab warm and toasty. The fur is actually home for special bacteria, which then helps remove poisonous minerals from the water where the crab lives.



#### **STRANGLER FIG**

Born from a small seed at the roots of another tree, the strangler fig lives up to its name as it grows up. The roots, stems and leaves wrap themselves around their host tree, using all of the water and blocking the sunlight from the host tree. The host tree slowly dies because it cannot make the food it needs to survive.

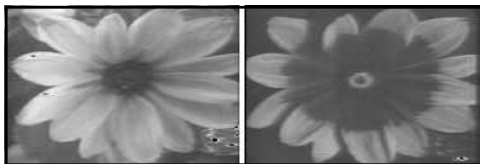
#### **RAFFLESIA**

A parasite of a plant, Rafflesia has the world's largest bloom, over 3 feet across. It has no leaves, stems or roots but manages to live off another plant, a vine. It is spotted and has a hole in the center that can hold up to 6 liters of water. It smells horrible, like rotted flesh, which attracts flies to it, who help pollinate it.



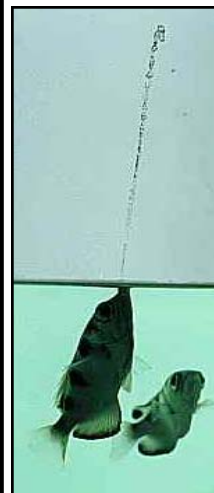
#### **AYE-AYE**

The Aye-Aye combines teeth like a rat with a very long, thin finger to eat just like a woodpecker. It is the world's largest nocturnal primate and has a unique way of eating. It will tap on a tree to find grubs and then chews a hole through the bark and then puts its finger through the hole to get to the



#### **BLACK EYED SUSAN**

Black Eyed Susan flowers may look like any other flower you might see in a garden but if you were to hold the flower under a black light you would see some amazing designs on the petals that can only be seen by insects. These designs are like advertisements for the insects to collect the



#### **ARCHER FISH**

When this fish is hungry it just has to look up at the branches near the water to find a fat insect to eat. It then takes a little bit of water and makes a spit ball to knock the insect off the leaf it is sitting on. As soon as the insect hits the water, the archer fish pounces and enjoys its meal.

USE THE BACK OF THIS WORKSHEET TO DESIGN AND WRITE ABOUT YOUR WEIRD ORGANISM 

Name: \_\_\_\_\_

Date: \_\_\_\_\_

**LILY PAD POP WORKSHEET**  
**GREENTIMES SR: HOMES OF THE WORLD**

You are visiting a pond and discover an interesting variety of lily pad. This lily pad species reproduces quickly, doubling every day (doubling rate=1 day). When you first visit the pond there are 2 lily pads. When you return the next day, there are now 4 lily pads. The third day you return to find 8 lily pads. It is a pretty big pond so you don't think there is any reason to worry about the lily pads growing so quickly. When you go back a week later you are surprised to find that the pond is now half full of lily pads, WOW! You count the number of lily pads to find that there are 64 lily pads in the pond. Amazing! This brings up good questions.

1. How long will it be until the pond is 100% full of lily pads?
2. What day will the pond have too many lily pads that it can't support any more?

Complete the graph below to find the answers to these questions.

