What is a Forest?

by Neicca Butts and Mark Larese-Casanova

This lesson can easily be modified to study desert ecosystems. If you don't live near a forest ecosystem, have students visit a nearby desert ecosystem, and then create desert terrariums as a class.

Correlations to Core Curriculum:
Third Grade

- Standard 2: Students will understand that organisms depend on living and nonliving things within their environment.
    - Objective 2: Describe the interactions between living and nonliving things in a small environment.
        - Indicator d: Compare a small-scale environment to a larger environment (e.g., aquarium to a pond, terrarium to a forest).

Background Information:

<u>How to create a forest terrarium</u>
To create one terrarium, you will need 2 empty 2-liter plastic bottles, scissors, 1 cup of small rocks or pebbles, 2 cups of soil, a little water, and plants. You may also choose to add insects or worms for your 'forest animals.' Pill bugs (also known as 'potato bugs' and 'rolly pollies') work well in the terrarium ecosystem. If you choose to use live insects, ensure that there is enough oxygen, food, and water for them to survive. Alternatively, small plastic animal toys work well.

For the forest ecosystem, plants such as grasses, small twigs, leaves, or small plants that won't grow more than 6 inches high work well together. If you would like to have the students plant tree seeds, it is recommended that you use honeylocust seeds, which are available from the Utah Nature Explorers website. For instructions on growing honeylocust trees, read this fact sheet from USU Forestry Extension: http://forestry.usu.edu/files/uploads/growatreefromseed.pdf.

Remember to leave enough space for all of the plants to grow without getting too crowded. As an alternative to planting seeds, you could plant a small tree or shrub, and then let your students watch it grow bigger over time. (Sometimes it takes too much patience to wait for seeds to grow into a plant.)

Time:
4 week unit --

- (2) 30 minute sessions of fieldwork in a forest/desert ecosystem (plus travel time)
- (3) 45 minute classroom sessions
- 3 weeks of 'observations' (Have students do 5-10 minutes of observation every day)

Level:
Grades 3-5
Standards selected for grade 3

Goals:
This lesson will provide students with an opportunity for hands-on exploration as they learn more about key elements and characteristics of forest ecosystems.

Objectives:
1. Using given supplies, students will be able to design and create a 'forest' terrarium, care for the terrarium over time, and make detailed observations about the terrarium over time in their science notebooks.

2. After visiting a forest ecosystem and creating a forest terrarium, students will be able to compare and contrast these two ecosystems, listing at least 3 differences and 3 similarities.

3. Using photos and observations from their forest fieldwork and their terrarium experience,

students will be able to visually demonstrate the similarities and differences between the forest and terrarium ecosystems, in such a way that they can present the information to other classmates or classroom visitors.

Materials listed with each individual lesson plan.

Start by cutting the top off of each of the 2-liter bottles. Pour in the rocks (this helps the water to drain) and soil into one of the bottles. Add your plants (or seeds), twigs, leaves, and anything else you are choosing to add. Add your insects or toys if they will be included in your terrarium.

Next, place the second 2-liter bottle on top of bottle you have filled with your terrarium objects. The bottles should fit snugly together. Place your terrarium outside or near a window so that it can get sunlight. Add water so that the soil is moist, but not soaking wet, and then monitor the water level as you let your plants grow. You have created your very own terrarium!

Nancy at 'First Grade W.O.W.' has some great pictures of terrariums that her fist graders created:

http://firstgradewow.blogspot.com/2014/01/terrific-terrariums.html

As another option, you may choose to use water bottles instead of 2 liter bottles to build your terrariums.

If you are building a desert terrarium, substitute sand for soil (or use soil with a high sand content), use desert plants (such as cacti), add desert insects (such as beetles) or animal toys, and add very little water to your system.

Did you know?

Assuming it lives at least 50 years, a tree exhales 6,000 pounds of oxygen in its life, or about 120 pounds per year.

http://www.defenders.org/forest/basic-facts

Lessons and Activities:

Unit Overview:

- Day 1 – Initial fieldwork experience in the forest
- Day 2 – Creating terrariums, making observations and predictions
- Next 3 weeks (Days 3-17) -- Observe terrariums daily, make notes, ask and answer questions, compare terrariums to a real forest environment

- Day 18 – Guest speaker experience*: City forester, biologist, National Forest Service worker, etc. OR *Bill Nye the Science Guy – Forests.* (The link is found in the lesson plan below.)
- Day 19 – Second fieldwork experience in the forest
- Day 20 – Create a visual presentation comparing terrariums and real forests

If you are focusing your unit on desert ecosystems, you may want to choose a guest speaker such as a National Park worker, ecologist, desert researcher, or biologist. As an alternative, you can watch 'Bill Nye the Science Guy – Deserts. (The link is found in the lesson plan below.)

Day 1 --

Materials:

Supplies –

- Science Journals
- Pencils

Equipment--

- Nearby forest ecosystem
- Transportation

This first day is an initial fieldwork experience for the students, to prepare them and get them excited about the forest ecosystem unit. The students should be reminded of forest fieldwork etiquette before beginning the field experience. Students should bring their science journals and a pencil. While walking on a well-paved trail in a forest ecosystem, students should make observations about the characteristics of a forest ecosystem. They should write down and draw sketches of at least 5 things that they notice that characterize forests. Before leaving, a class discussion should be held, in which the students can share the things they noticed and observed in the forest, and questions can be asked and answered.

Day 2 –

Materials:

Supplies –

- 18 2-liter plastic bottles (or water bottles)
- 18 cups of soil
- 9 cups of rocks
- Honeylocust Tree Seeds (available from www.utahnatureexplorers.org)
- Plants – grass seeds, bean sprouts, small plants that will grow quickly and less than 6" tall
- Worms, Pill Bugs,

Engage (15 minutes) – Initiate a class discussion on the key characteristics of forest ecosystems. Write down the characteristics that students name on the whiteboard for future reference.

Explain that, in small groups, students will be creating forest terrariums. These small forest ecosystems will be designed and maintained by the students, and it will be their responsibility to make sure that their forest ecosystem is thriving. Remind students that this includes making sure that their ecosystem has a correct amount of water, plants, and open space.

Explain that terrariums are more focused on plants than on animals, so the majority of their responsibility will be to determine the proper plants to go in the terrariums; however, they may also choose to include worms and/or 'potato' bugs, or plastic toys, as desired.

Plastic insect/animal toys (all optional)
- Water
- Science journals
- Pencils

Equipment--
- Shovels/scoops for soil
- Cups to pour water with

Did you know?

The average American uses about 749 pounds of paper every year and 95% of the houses built are done so using wood. That means the average person uses the equivalent of a 100-foot high, 16-inch diameter tree each year in wood, paper, and 5,000 other everyday products like chewing gum and aspirin!

http://www.timberlandsunlimited.com/forest_facts.php?id=1

Materials:

Supplies –
- Science Journals
- Pencils

Equipment--
- Camera

Materials:
- Guest Speaker or

Show students what the terrarium containers will look like. (If using 2 liter plastic bottles, explain that the water will generally cycle when the lid is put on.) Explain each of the soil types, plants, and bugs that they can choose to put inside their terrarium. Give important information, such as how tall plants will grow, so as to give students the ability to make informed choices as they design their terrariums.

Divide students into groups of 4 people each. Remind them to think about the real forest ecosystem they previously observed as they design their terrariums.

Explore (20-25 minutes) – In their assigned groups, students should spend at least 10 minutes (and up to 15) discussing and planning their terrarium. A preliminary sketch should be drawn in each of their science notebooks to show what their terrarium will look like.

After students have designed their terrarium, they can come get the supplies and spend the remainder of the 'explore' time building their terrarium.

If they finish building their terrarium before the explore time is over, they can make a sketch and write down observations about their terrarium. They can also write down a question that they can answer over time, such as "Will the worms and potato bugs get along together?" or "Will the grass grow at least 3 inches tall?"

Explain (5 minutes) – Ask students to share how they built their terrariums, the questions they asked about their terrariums, and their predictions. Remind students that over the next 3 weeks, they will be studying the changes and life in their terrariums, and comparing to the forest ecosystem that they previously observed.

For the next 3 weeks (Days 3-17) –
Have groups observe their terrariums every two or three days, as time permits. Have students spend 5-10 minutes writing down things they notice have changed, drawing scientific sketches, and making connections between their terrarium and the real forest ecosystem. On the last observation day, have each group take one picture of their terrarium to be printed.

Day 18 –
Invite a guest speaker to come and speak to your class about the importance of forests in our world. Have them talk about how the

Internet access

health of our forests affects our everyday lives, and how we can improve the health of our forests. If possible, have the speaker discuss connections between the class terrariums and the forests throughout the world.

If a guest speaker is not available, you may choose to show your class 'Bill Nye the Science Guy – Forests,' which can be found at the following link: https://www.youtube.com/watch?v=8jKZS6MNGe8 (Time-- 22:54)

'Bill Nye the Science Guy – Deserts,' can be found at the following link: https://www.youtube.com/watch?v=bhkzsJXHkeU (Time-- 23:06)

Day 19 –

Materials:

Supplies –

- Science journals
- Pencils

Equipment--

- Camera

Revisit the forest ecosystem for approximately 30 minutes. Take 3-5 pictures of the forest ecosystem (or assign a 'class photographer' to do this). While in the forest, have students write down at least 3 things that were similar between their terrarium and the forest, and 3 things that are different between these two ecosystems. Discuss these similarities and differences as a class, and if possible, create a Venn diagram to visually present this information.

Print the pictures of each classroom terrarium (only one per group), and pictures of the forest ecosystem (one per group).

Day 20 –

Materials:

Supplies –

- Printed pictures for each group
- Markers
- Glue
- Poster board

Equipment--

- Classroom visitors (optional)

Give each group the picture of their terrarium and a picture of the forest ecosystem they visited. Give each group a small poster board, markers, glue, and any other necessary supplies for their presentation.

Give students 25-30 minutes to create a visual presentation comparing and contrasting the forest ecosystem with their home grown terrarium. Both pictures should be displayed and labeled, and students should list at least 3 similarities and 3 differences between the two ecosystems. Each group member should actively participate in this process, and each group members' name should be displayed in a prominent place on the poster.

If possible, have the principal or another prominent adult at the school visit the classroom to view the final products. If a visitor does come, you may choose to have each group formally present their poster in a 1-3 minute presentation, or you may choose to have the adult walk around informally and ask questions about the project.

After the visual presentations have been created, presented, and graded, they should be displayed in the hall or throughout the classroom.

Assessment:
The assessment for this unit will be the final visual presentation created on the last day of the unit. The rubric at the end of the lesson plan has been created for this project. The students should be made aware of the requirements before they begin the project.

If desired, you may also choose to give a formal assessment on forests or deserts when you have finished your unit.

Extensions:

- Math – Calculate the amount of growth that happens each for one plant throughout the unit. Make a graph showing the growth of that plant, with a title and labeled axes.
- Social Studies – Look at the history of forests (or deserts) in Utah. How have they changed over time? Discuss why things have changed, and predict how they will change in the future. Discuss what we can do to help our forests remain healthy and strong.
- Explore how our choices affect the environment. Have students take care of their virtual forests as they make everyday choices, such as what to buy at the grocery store, when to charge their MP3 player, and how to recycle various items. Visit the following link: http://www.scholastic.com/growgreen/virtualforest/. This experience will take most students between 10-15 minutes, and is a great extension to help students understand their role in taking care of forests.
- Take a virtual field trip to the forest! Although this is a Finnish forest, the information is still very valuable, and it is fun for students to see forests from around the world. Follow this link: http://w3.upm-kymmene.com/upm/forestlife/index.html#lang=0&pid=219&sid=11&hid=219
- For a fun virtual field trip to the desert (and games to go along with it), visit http://www.electronicfieldtrip.org/saguaro/10modules.php Students can use a dichotomous key to label desert plants and see various desert sites!

Did you know?

The Boreal Forest is the world's largest land-based biome. Also called Taiga, the Boreal forest spreads in many places over the globe.

http://biologistsbeyondborders.weebly.com/fun-facts.html

Resources:

Books

- *Utah Master Naturalist Mountains Textbook* *http://extension.usu.edu/utahmasternaturalist/files/uploads/UMNP_Mountains_Text.pdf*
- *Utah Master Naturalist Deserts Textbook* *http://extension.usu.edu/utahmasternaturalist/files/uploads/UMNP_Deserts_Text.pdf*
- *Forest* by DK Publishing
- *Forest Explorer: A Life Sized Field Guide* by Nic Bishop
- *Explore the Deciduous Forest* by Linda Tagliaferro
- *Explore the Desert* by Kay Jackson
- *A Walk in the Desert* by Rebecca L. Johnson
- *A Desert Habitat* by Bobbie Kalman

Websites

- PBS Virtual Forest Activity -- http://www.scholastic.com/growgreen/virtualforest/
- Virtual Field Trip to the Forest **--** http://w3.upm-kymmene.com/upm/forestlife/index.html#lang=0&pid=219&sid=11&hid=219
- Virtual Desert Visit Activity (This website has photos, games, and even downloadable lesson plans created from an activity at Saguaro National Park) -- http://www.electronicfieldtrip.org/saguaro/10modules.php
- Defenders of Wildlife: Forest Facts -- http://www.defenders.org/forest/basic-facts
- Defenders of Wildlife: Desert Facts -- http://www.defenders.org/desert/basic-facts
- U.S. Forest Service -- http://www.fs.fed.us/
- National Geographic: Deserts -- http://environment.nationalgeographic.com/environment/habitats/desert-profile/

Forest vs. Terrarium Presentation

A picture of the forest and a picture of the terrarium are on the poster, and each picture is labeled. *(10 points)*	A picture of the forest and a picture of the terrarium are on the poster, but they are not labeled. *(5 points)*	No pictures are displayed or labeled on the poster. *(0 points)*
3 similarities and 3 differences are clearly listed between the forest ecosystem and the terrarium ecosystem. *(20 points)*	3 similarities or 3 differences are clearly listed between the forest ecosystem and the terrarium ecosystem. *(10 points)*	No similarities or differences are listed on the poster. *(0 points)*
Each group member participates in putting the poster together, and every group members' name is listed clearly on the poster. *(10 points)*	Some group members participate in putting the poster together, and every group members' name is listed clearly on the poster. *(5 points)*	A few group members participate in putting the poster together, and not every group members' name is listed on the poster. *(0 points)*

Student Name:

Points: /40