

GLOBIO-created Learning Activity Guides are designed to simplify integration of Glossopedia based learning into classroom and extra-curricular activities and curriculum. Each activity is designed around the use of Glossopedia articles and subjects, incorporating technology into interdisciplinary instruction. Learning Activities are intended to be fun, inquiry-driven, and interesting; exciting for students and helpful to teachers.

Activity

Getting to the Roots ~~~~~ Pages 2-3

Activity Sheet: Getting to the Roots ~ Page 4

Concepts

- Temperate forests grow between the tropic and the polar regions and have four distinct seasons.
- Temperate forests have large plant, animal and human populations.
- Temperate forests provide people with resources that must be conserved.

Extension

Root-viewer ~~~~~ Page 5

Related Topics

- Bears
- Environments
- Plants
- Animals
- China

Standards



Standards Key available at
www.globio.org/standards

Recommended Outside Links

- Missouri Botanical Garden Biomes of the World - <http://www.mbgnet.net/>
- EcoKids Forests - http://www.ecokidsonline.com/pub/eco_info/topics/forests/index.cfm

Vocabulary

- Deciduous
- Conifer
- Broad-leaved evergreen
- Compost
- Chlorophyll
- Recycle
- Nocturnal
- Clear cut

Getting to the Roots

For Teachers: Temperate Forest Background

In temperate forests, the biomass (all life) in the subterranean layer can be greater than what is seen above ground! This layer holds millions of microorganisms, insects and fungi, but most of the biomass is plant roots. Roots come in many sizes and shapes. They carry water and minerals from the ground to the plant and anchor the plant in the soil. Roots create a web that holds soil together and helps prevent erosion from wind and water. Roots can create soil by mechanically wedging rocks apart, and dissolving them with plant chemicals.

Preparation:

Set up stations with the materials for 4-6 groups. If there aren't enough of some of these items for each group, place them in a central location.

Instructions:

After students have read the article *Temperate Forests* in Glossopedia, including the Fast Facts and interactive photograph, ask them to return to the interactive *Temperate Forest Layers* and read about the forest floor layer.

PART 1

- Discuss plant parts with the class.
 - The interactive in the *Plants* article in the *Plant Parts* section is a great reference.
- Have children name the three major plant parts (leaves and buds, stem, roots).
- Discuss the jobs of each part (leaves absorb energy from sun and convert it to nutrients; stems support the leaves and buds and provide a conduit for nutrients, water and minerals; roots collect minerals and water from the soil, and hold plants in the ground).
- Divide students into small groups of 4-6
- Students will begin by drawing a picture of their plant on the back of their activity sheet.

Time:

- 1 hour

Materials:

- 5-6 potted plants
- Magnifying glasses
- Clear tape
- Markers
- Printer paper
- Newspaper
- Bamboo skewers and/or tweezers
- Gram scales
- Rulers
- Calculators
- Paper
- Pencils
- Activity Sheets: *Getting to the Roots*

Glossopedia:

- www.globio.org/glossopedia/temperateforests



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- Instruct students to carefully remove their plant from its pot on the newspaper.
- Have them place a sheet of paper on the scale and record its weight on their activity sheet.
(**Tare weight:**_____)
- Ask students to pick up their plant, being careful not to shake off the soil, and place it on the piece of paper on the scale. The soil that falls onto the newspaper must be replaced in the pot.
- Place the plants back on the newspaper and have the students gently shake and tease as much soil as possible from the roots, then place the plant back on the scale.
- They must now subtract the tare weight to find out how much soil the root system was holding.
- (**Plant & Soil: Weight #1**_____)
- Instruct students to weigh the plant alone.
- (**Plant: Weight #2**_____)
- They may subtract Weight #2 from the Weight #1 to find out how much soil was held by the roots:
(**Weight #3**_____)
- Have them calculate what percentage of the total weight was soil; plant.
- Instruct groups to record the following observations on the activity sheet.
- **Observations:**
 - Describe the roots' appearance.
 - Are they forked or branched at the tips? Do they cross over each other?
 - How are the roots different from the plant that is above the ground?
 - Are all the roots the same, or are some different? Are they all the same size?
 - How would you describe the whole mass of roots?
 - How do roots help anchor the plant in the ground? Which roots do this the best?
 - What do you think the smallest roots are for?
 - How do roots help the plant? The forest?
- Model how to carefully spread the plant on a sheet of paper and tape it in place.
- Ask them to label each major plant part on the paper.
- Have students examine the size and shape of the leaves, stems and roots, as well as their color and texture. Have them note their observations on the paper or in a lab journal.

PART 2

Have students do the following:

- Measure the length of one long root.
- Measure the lengths of the smaller roots that branch off of the long root.
- Add their measurements and write the total on their sheets.
- Try to measure the even smaller roots that branch off of those and add them to the total.
- Challenge them to calculate the percentage of the one long root that all the small roots make up when added together. (If the long root is 10 cm long and all the small roots together add up to 5 cm, then the small roots are 50% of the large root's length.)
- Estimate the total length of all the roots on the plant together.

Activity Sheet: Getting to the Roots

Group members: _____

Tare weight of paper: _____

Weight #1: _____ plant and soil

Weight #2: _____ plant

Weight #3: _____ soil held by roots

Observations

- 1) Describe the roots' appearance.
- 2) Are they forked or branched at the tips? Do they cross over each other?
- 3) How are the roots different from the plant that is above the ground?
- 4) Are all the roots the same, or are some different? Are they all the same size?
- 5) How would you describe the whole mass of roots?
- 6) How do roots help anchor the plant in the ground? Which roots do this the best?
- 7) What do you think the smallest roots are for?
- 8) How do roots help the plant? The forest?

Measurements

Length of: longest root: _____

small roots attached to it: _____

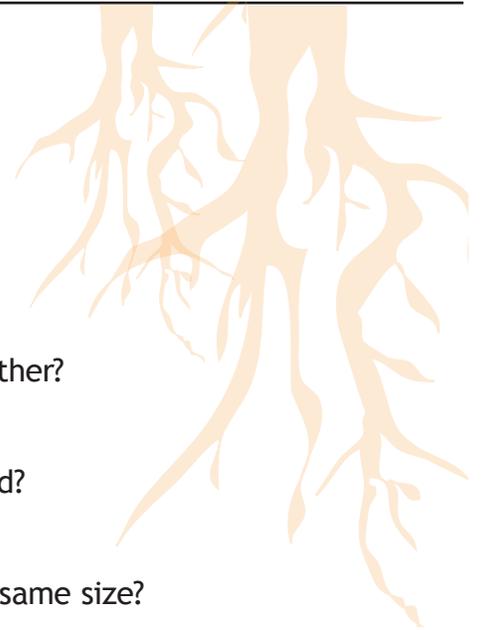
smallest roots attached to it: _____ (optional)

Total length: _____

Challenge

Estimate the percentage of roots measured: _____

Estimate the length of all the roots together: _____



Extension:

Root-viewer

Avocado

- Peel a ripe avocado and give a sample to each student, or save it for making a dish like guacamole together. Pass the seed around for them to look at. Discuss the size of the seed and any special qualities they observe and chart them together on a large sheet of paper. Wash the seed and poke three toothpicks around the middle of the pit. Set the seed in a clear jar or glass, balanced on the rim with the pointed end up. Fill until water so covers 1/3rd of the pit. Place the jar or glass near a window, out of direct sunlight. Fill with clean water once a week and as it evaporates. Record daily changes in a class log. As roots and a sprout begin to grow, have students draw pictures and record measurements of their progress in their lab journals.

Sweet potato

- Buy a sweet potato that has sprouts or buds already showing. Poke three toothpicks around the middle, and follow the same steps as with the avocado. Fill the jar or glass until the water just covers the bottom of the tuber and change it every week. Record changes and growth in a lab journal, as above.

