



Forest Journey

Educator's Guide

Dear Educator,

Welcome to the Educator's Guide for the traveling exhibit "Forest Journey"! We hope that you and your class will enjoy your trip. Our goal is to help students realize why they should care about forests and that they can make a difference. To that end, the activities in this guide are arranged to support the following idea:

Trees have special functions that help them survive and are a crucial part of the forest ecosystem. Humans need to make choices about managing and caring for forests because they have a major effect on them.

The guide is grouped into three sections that discuss and support this idea:

- Forests help trees reproduce
- A forest is more than a bunch of trees
- Saving forests and how to make a difference

The sections build on concepts taught in previous sections, but you can mix and match the sections and activities to adapt the guide to your own classroom. Each of these sections has relevant **National Science Education Standards, pre-trip activities (with extensions), during trip activities, and post trip activities (with extensions)**. We also have a **reproducible student trip sheet** and an **annotated list of books and websites**.

Note: many of these activities require access to a living tree or preferably, a forest; however, if you do not have access to a tree, you may still do many of the activities in the guide.

Happy trails!



The
Franklin Institute

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Description of the traveling exhibit *Forest Journey*

Forest Journey is divided into five sections.

1. Botany:
describes the parts and functions of trees, such as the tree life cycle, tree reproduction, components of trees, and different types of trees.

2. Forests:
deals with the forest as a whole, such as the different types of forests, the forest as habitat for animals, the effects of erosion, and successful conservation efforts.

3. History:
talks about forests in the past, including historical uses of trees and tree evolution.

4. Cultural:
discusses the products we get from trees and the reasons for deforestation.

5. Science Connections:
explores the science behind forests, including photosynthesis, leaf color changes, carbon stabilization, and the greenhouse effect.



Forests Help Trees Reproduce

5 - 8

Standards: Content Standard C: Life Science

Pre-Trip Activity: Dissecting Flowers and Seeds

Objective: Discover how trees reproduce by dissecting flowers.

Materials: Scissors, knives (can be plastic), large flowers with well defined reproductive parts (i.e. gladiolas, lillies)

Things to Discuss:

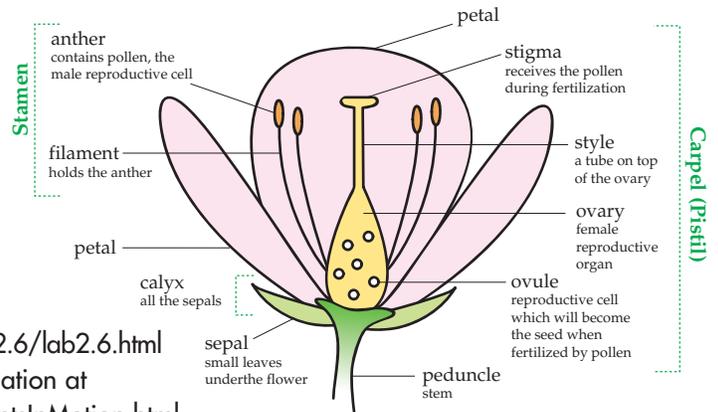
Ask students to bring in samples of flowers. Give examples. Talk about parts of flowers and what they produce. Discuss how flowers, fruit and seeds benefit the forest ecosystem and trees.

Things to Do:

1. Have students dissect flowers.
 - a) Carefully make a vertical incision to open the flower.
 - b) Pin petals and ovary to keep them open.
 - c) Slice open ovary to find ovules. When fertilized, ovules become seeds.
 - d) Have students draw and label parts of their flowers before, during, and after dissection.

Extensions:

- To dissect fruit, go to <http://naturalsciences.sdsu.edu/classes/lab2.6/lab2.6.html>
- Watch time lapse movies of flower openings and seed germination at <http://sunflower.bio.indiana.edu/~rhangart/plantmotion/PlantsInMotion.html>
- Cover fruit blossoms on a tree with a plastic bag. Later, compare the flower to adjacent flowers. The covered flower won't produce fruit because it cannot be pollinated.



During Trip Activity to Forest Journey (see trip sheet)

Suggested exhibits: Tree reproduction, Forest as Habitat

Post-Trip Activity: Making Seed Models

Objective: Learn how trees need the forest for reproduction by making seed models.

Materials: construction paper, glue, scissors, tape, cardboard, cotton balls, paper helicopter patterns, Velcro, ping pong balls, powder...

Things to Discuss:

Discuss the exhibit. Were there any surprising seed dispersal or pollination techniques? How does the rest of the forest help, and is helped, by tree reproductive techniques?

Things to Do:

1. Have students bring in seeds from trees.
2. Have students make a model of a seed or a pollination technique (ex. paper seed helicopter). Have students label their models and describe how their seed or pollination technique works, how it helps the tree, and how it helps the rest of the forest.
3. Students can exhibit their seed models in a "seed museum" or demonstrate their models to the rest of the class.

Fruits and seeds from trees:

Coconuts, walnuts, almonds, hazelnuts, apples, oranges, lemons, peaches, pears, apricots, pecans, chestnuts, figs, cloves, olives, coffee, chocolate, pine nuts. . .



A Forest is More Than a Bunch of Trees

5 - 8

Standards: Content Standard C: Life Science, Content Standard A: Science as Inquiry

Pre-Trip Activity: Forest Walk

**Note: if you do not have access to a forest, use the post-trip activity*

Objective: To discover the intricate ecosystem of a forest.

Materials: A picture of a tree farm, clipboards, pencils, paper, magnifying glasses, access to a forest

Things to Discuss:

Before the Activity: Talk about the difference between a tree farm and a forest. Unlike tree farms, forests contain a variety of trees and plants and therefore homes and food for a variety of animals. They also have a natural, continuing cycle of decay and growth. http://www.carolinafraserfir.com/photos/farm_475w.jpg

<http://www.greenviewtreefarm.com/IMAGES/home01.jpg>

After the Activity: Discuss the students' findings, hypotheses, and questions. What can they say about the way all the organisms are a part of the forest ecosystem? What would happen to the forest ecosystem if the trees were chopped down?

Things to Do:

1. Take your students on a forest walk. Have students to pick a patch of the forest about 3' X 3' with a tree in that area.
2. Have students make detailed drawings of what they see in their squares, noting hypotheses and questions about the relationship between plants and the things around them. Draw their attention to evidence that animals live in the forest, such as nests, holes, droppings, and half-eaten nuts.

Extensions:

- Have students design experiments to investigate their questions and hypotheses. Ex., they may say that mushrooms grow in dirt; students may want to systematically analyze where and on what mushrooms grow.
- With permission, conduct a forest floor dig. Check out One Small Square: Woods by Donald M. Silver.

During Trip Activity to Forest Journey (see trip sheet)

Suggested exhibits: Tree reproduction, Forest as Habitat

Post Trip Activity: Web of Life Activity

Objective: To realize the interconnectedness of the forest ecosystem.

Materials: A ball of yarn, notecards, markers

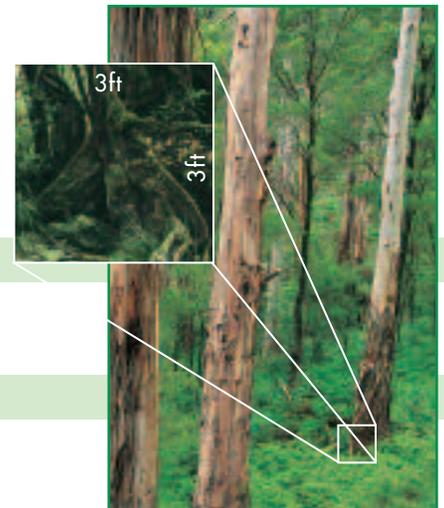
Things to Discuss:

Discuss findings from field trip.

What were some of the interactions between trees, plants, and animals?

Things to Do:

1. Brainstorm plants, animals, and trees that live in a forest using the students' trip sheets from the forest walk.
2. Write one organism on each notecard and pass them out to students.
3. Have the class sit in a circle. As the sun, start the activity by wrapping one end of the ball of yarn around your hand. Pass the ball to a student who will wrap the yarn around his hand and pass it on, stating the connection between the sun his organism. Repeat with each student in turn. Have them connect the last organism to their own.
4. Pick one student to tug gently on his string. When the other students feel a tug, they should tug too; students will see that the entire ecosystem is interconnected.
5. Pretend the trees in the forest have been chopped down. Ask students who are trees to drop their strings and the rest of the class to tug gently; students will see that the ecosystem will fall apart.



Have students do a detailed drawing of a 3ft by 3ft section in the forest.

Saving Forests and How To Make A Difference

5-8

Standards: Content Standard F: Science in Personal and Social Perspectives

Pre Trip Activity: Forest Management from Different Perspectives

Objective: To research various points of view on forest management that will be used in a debate.

Materials: None needed

Things to Discuss:

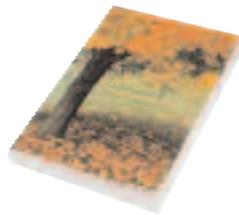
Have students name people or groups that have a stake in how forests are managed, such as environmentalists, recreational users, politicians, and commercial logging companies.

Things to Do:

1. Research and present an issue facing your own local or regional forest (<http://www.americanlands.org/forestweb/yearbook.htm> for forest issues by state) or use a case study.
2. Pick several of the special interest groups in this specific issue, including a forest management group, and have students choose a group. Have them conduct research about the views, issues, and arguments of their particular groups. The forest management group should research plants, wildlife, and problems. For different views of forest management, check out <http://www.onsi.org/visit/life/forestpuzzles/management/four/>

Extensions:

- Look at historical and current pictures of neighborhoods and interview long-time residents. How have local forests changed over time?
- Look at satellite pictures of rainforest and US deforestation. <http://earthobservatory.nasa.gov/Newsroom/LCC/>



During Trip Activity to Forest Journey (see trip sheet)

Suggested exhibits: Contemporary Deforestation, Conservation, Tree Products

Post trip Activity: Forest Management Debate

Objective: Critically analyze competing interests in forest management.

Materials: None needed

Things to Discuss:

Reflect on the debate. What can students say about forest management? How can students make a difference in their own lives?

Things to Do:

1. Before the debate, have each group write a proposal and three points to back up their argument.
2. Conduct a debate between the various interest groups on what should be done. The forest management group first will summarize the issues and their findings. Next, each group will state their proposals and arguments. Students will then ask questions of each other and present rebuttals to opposing arguments.
3. The forest management group will decide on a course of action.

Extensions:

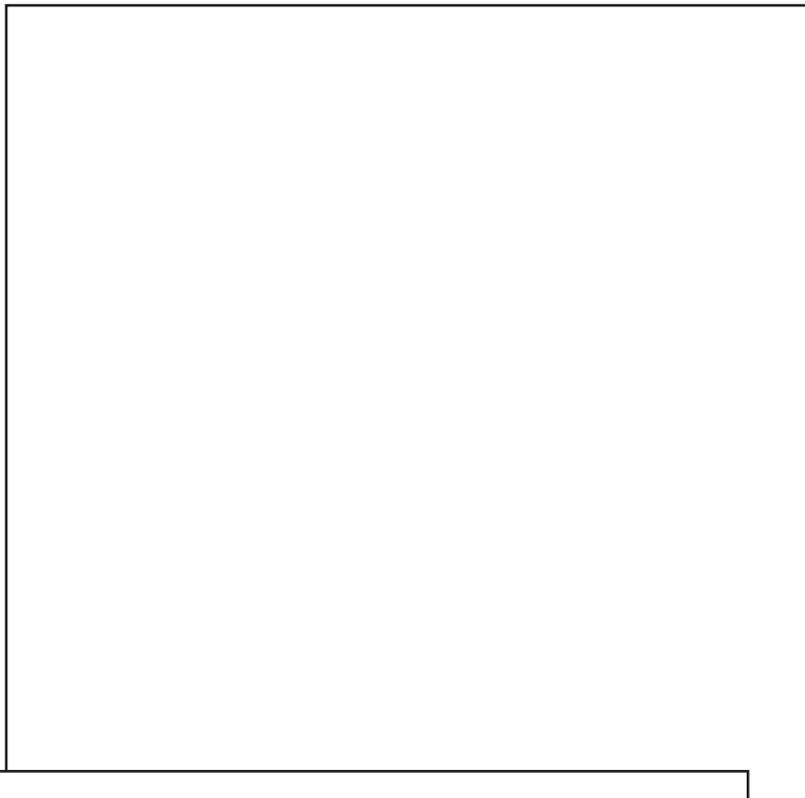
- Compare forest management practices in different countries around the world.
- Plant trees and take care of them as a class.

For ways students can conserve:

<http://www.worldwildlife.org/forests/forest.cfm?sectionid=184&newspaperid=17>



1. Draw a type of tree reproduction, such as a pollination or dispersal technique.



How does the forest help a tree to reproduce this way?

How does the tree reproduction help or involve other organisms in the forest?

type of reproduction: _____

2. Is there a common wood product people use in the exhibit that surprised you? Why?

3. What is one bad thing that happens when forests are cut down?

Additional Resources

Books:

Blashfield, Jean F. and Black, Wallace B. *Recycling*. (1991). USA: Children's Press, Inc.

Grades 5-12

This insightful book describes the magnitude of our garbage problem, what happens to our garbage, and what we can do to reduce our garbage. It also describes the carbon cycle and composting solutions, the methods, benefits, and issues of recycling various materials. Students are challenged to think about the consequences of their decisions, by presenting issues in their everyday lives.

Burnie, David. *Tree*. (1988). New York: Alfred A. Knopf.

Grades 4-8

This Eyewitness Book contains all the hallmarks of the series: amazing photographs, detailed, clear, but not overwhelming information, and fun facts. Students can gain a broad overview about many aspects of trees.

Gallob, Edward. *City Leaves, City Trees*. (1972). New York: Charles Scribner's Sons.

Grades 1-7

This is a clear, easy to use tree identification book about the most common city trees. It is organized by type of leaf, and has includes pictures of the leaves, seeds, flowers, and fruits of the trees to make matching easy.

Hughes, Meredith Sayles. *Hard to Crack: Nut Trees*. (2001). Minneapolis: Lerner Publications Company.

Grades 5-12

Beautiful illustrations and photographs complement fascinating information about a variety of nuts that come from trees. Nuts profiled include pecans, walnuts, almonds, pistachios, cashews, and macadamias. Each chapter focuses on a different nut, where readers can find tidbits about how each nut grows, historical context, nutritional facts, how the nuts are harvested, modern day uses for the nuts, and delicious recipes such as Pistachio Pasta Salad.

Overbeck, Cynthia. *How seeds travel*. (1982). Minneapolis : Lerner Publications Co.

Grades 3-6

Describes the many methods seeds use to move around.

Web links:

<http://www.americanforests.org/resources/howtoplanttrees/>.

This website gives directions on how to plant a tree.

www.arborday.org

This website contains good information about trees, including a tree identification guide, benefits about trees, and tips to celebrate Arbor Day. Best of all, for a \$10 membership fee, you can receive 10 free trees to plant.

www.enature.com

The National Wildlife Federation offers an excellent resource to discover the plants and animals in your own neighborhood. You may search for trees by zip code or perform an advanced search. Detailed pictures and descriptions make tree identification easy.

http://na.fs.fed.us/spfo/ce/content/for_teachers/index.cfm

The USDA Forest Service offers a wealth of curriculum to teachers. Here, you can find many detailed, well-written graded lessons about forests.