HERITAGE
museums & gardens

Eco-Adventure
Pre-Visit Materials

Things To Remember When You Visit

- For your safety, the safety of others, and of the collection please keep your hands to yourself.
- Do not touch artifacts or plants unless told you may.
- Walk, do not run.
- Please use appropriate voice levels.
- Stay with your group.
- Follow an extra rules that your Museum Instructor provides

Vocabulary:
Use these words in class discussion, in lab reports, or in experiments!

- **Producer:** an organism that is able to create its own food from inorganic substances.
- **Consumer:** an organism that feeds on plants or animals.
- **Decomposer:** An organism that helps to break down dead plants or animals.
- **Succession:** the progressive replacement of one community by another until a climax community is established.
- **Ecosystem**: a system formed by the interaction of a community of organisms with their environment.
- **Photosynthesis:** the process by which green plants change the energy in sunlight to a form of energy that can be stored for later use.
- **Silviculture:** The care and cultivation of a forest by humans.

Into the Woods

In this interactive observation program, students will uncover the inner workings of the forest ecosystem. They will identify the layers of the forest, discuss the life cycle of trees, and explore the process of forest succession. Students will work to compile data and record observations on the roles of producers, consumers, and decomposers in the process of energy transfer in the food web. Students will also consider human impact – both positive and negative – on the ecosystem.

The Eco-Adventure is an <u>outdoor</u> workshop:

Please dress appropriately for outdoor weather. Sneakers are encouraged. Bug spray and sun screen should be applied seasonally.

Activities:

Activate prior knowledge by asking students what they know about ecosystems. Can they name the different environmental ecosystems? Which ecosystems are present in the United States? Make a list of common plants and animals. Hypothesize how many will be observed on your field trip.

Remind students about the life cycle of a plant and what they need to grow. Design an experiment on some classroom plants to test the levels of needed light, water, soil, and space. Have students chart the plants' growth and draw conclusions about which biome the classroom plants are from. Track plant growth with pictures to create a fun flip-book of the experiment for parents and caregivers.

Discuss the roles of humans within an ecosystem. What do people do today that impacts the environment? Have students interview adults with questions on environmental change and analyze the findings. How are these changes viewed in our society? Learn about the Native American tribes in your area, like the Mashpee Wampanoag, and understand their use of the environment. Compare the Native American impact versus your own on the environment.

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Six Terrestrial Biomes

Many places on Earth share similar climatic conditions despite being found in geographically different areas. As a result, six comparable ecosystems have developed, called biomes, classified as: taigas, tundras, deciduous forests, grasslands, tropical rain forests, and deserts. Each biome is a collection both living and non-living things that are interrelated. The biotic, or living things, include plants and animals and the abiotic, or non-living things, include various land forms and the climate.


Denali, AK

Taiga: The largest of the terrestrial ecosystems, taigas are forests, usually found in the northern latitudes, known for sub-arctic climates with extremely cold winters and mild summers. They primarily consist of coniferous trees (pines) and large herbivores (moose, elk, bison) with a few omnivores (bears) and deciduous trees (spruce and elm) that have adapted to live in areas that receive little direct sunlight for much of the year.


Arctic Tundra by Andrew

Tundra: The tundra ecosystems are found primarily north of the Arctic Circle and consist of short vegetation and essentially no trees. The soil is frozen and covered with permafrost for a large portion of the year. Some notable animals are caribou, polar bears, and musk ox; species with shaggy coats that have adapted to keep them warm year-round.


Heritage Museums & Gardens, MA

Deciduous Forest: These forest ecosystems make up the eastern half of North America and a large portion of Europe. This is the ecosystem in which Heritage Museums & Gardens is found. They typically have an average yearly temperature of 50° F and an average rainfall of 30-60 inches per year. These forests are inhabited by a variety of wildlife, including deer, bear, and foxes, as well as numerous species of trees, shrubs, and flowers. You will learn more about these varieties on your field trip.

Flint Hills, KS

Grassland: These ecosystems are often called the plains or prairies; imagine the mid-western areas of the United States with tumbleweeds blowing , large herds of deer and buffalo wandering, and lots of farms producing crops. Grasslands are characterized by 20-35 inches of rain per year and a predominant covering of various grasses with very rich soil which makes them the perfect locations for growing food.


Daintree, Queensland

Tropical Rainforest: Tropical rainforests receive at least 70 inches of rain each year and have more than 15 million plants and animals due to high humidity and temperature. A rainforest grows in three levels: the canopy, the understory, and the floor. The canopy consists of tall trees that block most of the sunlight from lower levels. The understory contains a mix of small trees, vines, palms, shrubs, and ferns. The forest floor is where herbs, mosses, and fungi grow. Some well-known animals are the anteater, jaguar, lemur, orangutan, parrot, sloth, and toucan. Among the many plant species are bamboo, banana trees, rubber trees, and cassava.


Baja Desert, CA

Desert: These biomes are either hot and very dry, or cold and very dry, which means little or no life can survive in these areas. Scientists estimate that about one-fifth of the earth's land surface is desert; they can be found on every continent except Europe. Most of the plants are species of cactus, such as aloe or tall saguaro. A few animals, mainly reptiles and amphibians, are well adapted to the hot desert like the well-known camel, which can make water from the fat it stores in its hump. The Emperor and Adélie penguins characterize the living beings in the cold deserts.

Sources: http://www.factmonster.com/ipka/A0769052.html , http://www.physicalgeography.net/fundamentals/9k.html, http://education-portal.com/academy/lesson/what-is-a-terrestrial-ecosystem-definition-examples-types.html

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Post-Visit Materials

Fun Facts

The world's oldest and most massive tree is the giant sequoia. Some sequoias are over 3000 years old and can grow to be more than 250 ft. tall and 20 ft. in diameter!

One tree can absorb as much carbon in a year as a car produces driving 26,000 miles.

Only three kinds of animals fight battles in formations: humans, crows and ants.

Interdisciplinary Connections

Language Arts: Identify and discuss several environmental issues. Have students write a short poem that reflects their perception or opinion on the issue. Afterward, discuss poetry's value as a form of publicity and ask how their poems might distort or exaggerate an issue. Compare their poetry to media stories and popular music.

History: Break students into groups and investigate the historic lifestyles of the seven major Native American cultural regions. Have groups create presentations covering a specific tribe's culture, their role within their ecosystem, and their impact on the environment. Discuss how the cultures and ecosystems changed with Europeans colonization and the impact these historic occurrences had on our environment today.

Reflecting on Your Visit:

Graphing: Utilize the data each group collected in the Forest Detectives Stations to create a box plot of producers, a histogram of decomposers, and a dot plot of consumers to visually represent the data gathered. What does the data tell you about the types of organisms present at The Adventure Park at Heritage? Is the ecosystem healthy?

Class Built Ecosystems: Bring nature indoors and create terrariums! Have students observe the needs of each ecosystem and record their findings. Discuss the interdependence of producers, consumers, and decomposers and experiment by building key aspects of each terrarium then observing and recording data. Locate on map well-known examples of all six biomes for ideas on what to put in your ecosystems. For some ideas check out: http://www.stormthecastle.com/terrarium/

Food Web Mural: Have students illustrate elements of a woodland ecosystem as observed at Heritage Museums & Gardens. Create background features, such as hills and streams, then using photos, cartoons, and computer illustrations add in organisms previously studied. Place a push pin next to each plant and animal, and using string, connect organisms to plants and animals with which they directly interact to create a visual food web mural.

Energy Log: Review with students the concepts of energy transference. Explain to students that they experienced the difference between potential and kinetic energy as they ziplined through the trees. Have them create a log of all the types of energy they used throughout the day. Work on some word problems to understand potential and kinetic energy.

1. A 1200 kg automobile is traveling at a velocity of 100 m/s. Is its energy PE or KE? How much energy does it possess?
2. A flower pot weighing 3 Newtons is sitting on a windowsill 30 meters from the ground. Is the energy of the flower PE or KE? How much energy does it possess?

Additional Resources:

Hands on Nature: Information and Activities for Exploring the Environment with Children, Edited by Jenepher Lingelbach and Lisa Purcell
Project Learning Tree: Environmental Education Activity Guide, by The American Forest Foundation; https://www.plt.org
Populations and Ecosystems, Foss Middle School Project
The Missing Gator of Gumbo Limbo, by Jean Craighead George
Silverwing, by Kenneth Oppel
The Carbon Diaries, by Staci Lloyd
Environmental Protection Agency, http://www.epa.gov/students/teachers.html
National Science Teachers Association: Outstanding Science Trade Books K-12, http://www.nsta.org/publications/ostb/
American Indian Cultural Network, http://www.american-indians.net/index.htm
Nature Education Materials, nature-watch.com