Arboretum Ecosystem: Standing Tall at Cheekwood

Arboretum (60 minutes) | 4th and 6th | 60 student maximum

About

During this nature expedition, students will learn all about trees in the arboretum of Cheekwood. They will learn about the invasive Emerald Ash Borer (EAB) and the threats to Ash trees in Middle Tennessee. Through movement activities and creative games, students will learn just how central trees are to the forest ecosystem. They will explore the underground communication networks between trees. Students will leave the arboretum with new knowledge and an appreciation that encourages them to be stewards of trees and wildlife.

Objectives

1. Make connections between invasive species (EAB) and their harmful effects.
2. Experiment with the concept of population dynamics and food webs
3. Discover and recall what trees communicate about in their underground networks.

Pre-Visit

Prior to attending the field trip, it is beneficial to review the vocabulary listed and introduce the topics of discussion. We will be walking and exploring our gardens and arboretum. Please share with us additional topics that you are discussing in class, and we will incorporate them if we can.

Overview of the Day

1. Greetings and guidelines
2. Break into preassigned groups of 20 students
3. Stations

ACTIVITY 1: *Invasive Species (20 minutes)*
Students will learn about the Emerald Ash Borer and the damage it causes. Students will look at Emerald Ash Borer specimens and ash trees that have been affected, and participate in an activity.

ACTIVITY 2: *Population Dynamics and Food Web (20 minutes)*
Students will participate in an activity that highlights the importance of food web, population dynamics, and the interactions of decomposers, producers, and consumers.

ACTIVITY 3: *Mycorrhizal Networks and Tree Communication (20 minutes)*
Students will review tree communication and then play a game to strengthen understanding.

Vocabulary

Arboretum – a place devoted to growing a collection of trees for scientific and educational purposes

Botanical Garden – a place dedicated to the collection, cultivation, preservation, scientific study, and display of a wide range of plants

Consumer – organisms that eat producers or other consumers to survive like deer, bears, and squirrels

Decomposer – organisms that break down dead animals and plants (consumers and producers) into their nutrient components (organic material) so that plants can use them to make more food, like fungi, bacteria, or worms

Ecosystem – a community of organisms and their physical (living or non-living) environment interacting with each other through cycles of energy and nutrients

Emerald Ash Borer (EAB) – a green buprestid (jewel beetle) native to north-eastern Asia that feeds on ash trees

Endangered Species – an organism that has become so rare that it is in danger of becoming extinct

Forest Ecosystem – consists of both living and nonliving things such as trees, animals, plants, soil, water, and air all working together to make up a forest ecosystem, which is dominated by trees growing in a closed canopy and undergrowth

Invasive Species – an introduced or non-native organism (disease, parasite, plant, or animal) that establishes itself, invades new areas, and disrupts the environment, having the potential to cause great harm to the environment, like the emerald ash borer

Mycorrhizal Networks - the underground web of threads of fungi connecting the roots of different plants, allowing them to share water, nutrients, and messages

Population Dynamics – studies the size and age of populations as changing systems, and the biological and environmental processes driving them (such as birth and death rates, and by immigration and emigration)

Producer – organisms that create their own food or energy, many through the process of photosynthesis like trees, plants, and grass

Standards Covered

4.LS2.1 - *develop and use models to illustrate the flow of matter through a food web/food chain beginning with sunlight and including producers, consumers, and decomposers*
4.LS2.2 - *using information about the roles of organisms (producers, consumers, decomposers) in an ecosystem, evaluate how those roles are interconnected in a food web, and communicate how the organisms are continuously able to meet their needs in a stable food web*
4.LS2.3 - *develop and use models to determine the effects of introducing a species to, or removing a species from, an ecosystem and how either one can damage the balance of an ecosystem*

6.LS2.1 - *use data to evaluate and communicate the impact of environmental variables, both living/nonliving, on population size within a system*
6.LS2.2 - *construct an explanation that predicts patterns of competitive, symbiotic, and predatory interactions among organisms across ecosystems*
6.LS2.3 - *use a model to construct an explanation about the transfer of energy through a food web and energy pyramid in an ecosystem*
6.LS2.5 - *analyze existing evidence about the effect of a specific invasive species on native populations in Tennessee and design a solution to mitigate its impact*

Post-Visit

Each student will receive a grade-level book from Cheekwood called *Listen to the Language of the Trees: A Story of how Forests Communicate Underground* by Tera Kelley. This program also offers the option to have a native tree planted at the school. Encourage students to take ownership over tree conservation by using books, art, and storytelling. Have them choose an invasive species to present to the class. Incorporate nature into the classroom by taking students outdoors at school to do tree and leaf rubbings using crayons and paper.

Post-Visit Book Suggestions

Can You Hear the Trees Talking?: Discovering the Hidden Life of the Forest (Peter Wohlleben)
Listen to the Language of the Trees: A Story of how Forests Communicate Underground (Tera Kelley)
The Gentle Genius of Trees (Philip Bunting)

Background on the Cheekwood Arboretum

With over 130 species of trees and shrubs across our 55 acre estate, our Arboretum provides a serene place to unwind and take in the beauty of nature.

The Arboretum at Cheekwood was awarded a Level 4 accreditation with the regional organization, Tennessee Urban Forestry Council (TUFC) in 2010. In 2020, the estate was granted a Level II status by the global organization, ArbNet and will apply for a Level III status in 2022. Within the over 2,100 trees on the property, Cheekwood has documented 1,267 deciduous trees; 576 evergreens; 16 deciduous conifers; and 238 dogwoods.

Cheekwood's three primary tree collections include the Nationally Accredited Cornus Collection™, the historic collection, and trees native to the southeastern United States. The one-of-a-kind collection of dogwoods weave together a series of distinct gardens along the property's eastern ridge, ending at the base of the Mansion & Museum, the property's historic core. The landscape is embraced by a woodland sculpture trail, with a fourteen-acre forest that serves as the primary venue for the native tree collection.