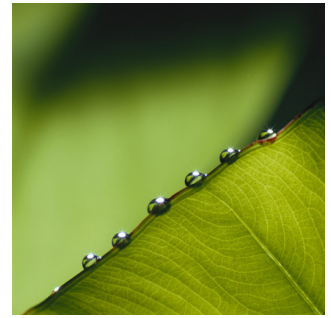


Primary Producers

the services plants provide to people



Contact:

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Standards addressed

NY State: Elementary standards for math, science and technology:

Standard 1 (Analysis, inquiry and design):

- Observe and discuss objects and events and record observations

Standard 4 (Science)

- Describe a variety of forms of energy and the changes that occur in objects when they interact with those forms of energy
- Describe basic life function of common living specimens
- Identify ways humans have changed their environment the effects of those changes.

Standard 6 (Interconnectedness)

- Observe and describe interactions among components of simple systems

Objectives

- Students illustrate that a forest is not just a collection of plants, but a complete ecosystem.
- Students classify the function of plant parts.
- Students understand the many ways that plants are connected to human food and survival.

Grade Level: 3-12

Duration: 2 hours

Background for teachers and older students- Please find “Plants Provide Vital Ecosystem Services” at http://www.ecostudies.org/ed_eco_field_programs.html

Vocabulary

- **PREDICTION-** A general statement about what will happen in the future based on an observation, experience, or scientific reason. A hypothesis also gives an explanation about an observation, but is different than a prediction because a hypothesis must be testable by scientific investigation.
- **LEAF-** flat, blade-like structure, attached to the plant stem. Photosynthesis and transpiration occur primarily in the leaf.
- **ROOT-** the part of the plant which absorbs water and nutrients, and attaches the plant to the ground, and is usually underground.
- **PHOTOSYNTHESIS-** the process by which plants use sunlight, water, carbon dioxide, and nutrients to make sugar food sources, and release oxygen.
- **STARCH-** plants store their food as this type of sugar
- **ECOSYSTEM-** the relationship between biotic (living) and abiotic (non-living) factors in an environment.
- **CARBON DIOXIDE-** the gas produced by plants and animals during respiration, and absorbed by plants during photosynthesis; a “greenhouse gas”, one of the best- absorbers of sunlight.
- **STOMATA-** tiny openings on the underside of plant leaves. Plants use stomata for gas exchange (takes in carbon dioxide, releases oxygen) and transpiration (releases water vapor)
- **TRANSPIRATION-** the method by which plants release water vapor through tiny pores called stomata

- o **CELSIUS**- the metric temperature scale in which freezing water is 0 degrees Celsius and boiling water is 100 degrees Celsius
- o **NUTRIENT CYCLING**- the movement of chemical food through an ecosystem, especially nitrogen (N), phosphorus (P), potassium (K), calcium (Ca) and magnesium (Mg). These chemicals come from weathering rocks, decomposing plants and animals, and fertilizers. We eat these nutrients, too!
- o **DECOMPOSITION**- the breaking down of dead plants and animals into simpler nutrients.
- o **CROP**- any plant that is grown, often in large quantities, for personal or economic use
- o **MATERIALS ECONOMY MODEL OR SUPPLY CHAIN***- network of organizations, people, activities, information and resources involved in moving a product or service from supplier to customer
- o **ECOSYSTEM SERVICES***- resources and processes which are carried out by natural ecosystems, including the breaking down of dead plants and animals, crop pollination and clean drinking water.

(*advanced students and highschool only)

Unit Synopsis

Pre- Program

Please download presentation slides (to print on transparencies or project) at http://www.ecostudies.org/ed_eco_field_programs.html

Elementary:

Introduction to Cary Institute and build a plant services concept map.	10 minutes
Scavenger Hunt/Hike: piecing together the forest ecosystem	30 minutes
Players in the Lyme Disease Forest Web: skit or story	
Signs of Photosynthesis. Discuss the ingredients and products of photosynthesis and discuss with students why they should care about photosynthesis. Conduct an iodine activity to determine the presence and absence of starch in different materials.	15 minutes
Where does your favorite food come from? Using maps, students determine where the 2 main crops of the favorite food are grown and how far those crops travel to get to them.	15 minutes
Transpiration observations. Students record the amount of water that transpired over the course of 5-10 days on different types of plants.	10 minutes
Digital microscope lab. View stomata and photosynthetic microbes	20 minutes
Revise the plant services concept map.	10 minutes

Post-Program activities: (can be found at http://www.ecostudies.org/ed_eco_field_programs.html)

Plant services jigsaw game

Students work collectively to understand the numerous services plants provide.

How much does it take to grow a hamburger?

Students draw diagrams or concept maps to think about the water, and other resources, needed to grow the main ingredients for one hamburger.

Highschool

Introduction to Cary Institute. Build a plant services concept map.	10 minutes
Forest ecosystem brainteaser- focus on the ecology of Lyme Disease and connect acorns to incidences of Lyme disease.	20 minutes
Outdoor Station 1 – Nutrient pumps. Students discover and draw the nitrogen cycle of our forest.	15 minutes
Outdoor Station 2 - Transpiration observations. Students record the amount of water that transpired over the course of 5-10 days on different types of plants. Students also measure the water stress of several trees.	15 minutes
Indoor Station 2 – Plants to iPods. Students use ecological and economic connections to trace two commercial products back to plants.	15 minutes
Indoor Station 3 - Where does your favorite food come from? Using maps, students determine where the 2 main crops of 2 main meals are grown, why those crops are grown in those regions, and how far those crops travel to get to them.	15 minutes
Digital microscope lab. View stomata and photosynthetic microbes	20 minutes
Revise the plant services concept map.	10 minutes

Post-Program activities: (can be found at http://www.ecostudies.org/ed_eco_field_programs.html)

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