

Arthur Carhart National Wilderness Training Center's
Wilderness Investigations
A Subject-Integrated Curriculum for Grades 9 – 12
High School

Wilderness Applications/Lesson 7
Economic Benefits of Wilderness

Goal: Students will understand the concept of ecosystem services by exploring the economic benefits of wild places and wilderness areas.

Investigation Objectives

Audience: 9-12 grades

- Students will explore ecosystem services by making an ecosystem service web, calculating the value of nearby trees near, and journaling on who benefits from the ecosystem services of wilderness areas. (Behavior)
- Students will be given instructions on how to make a graphic organizer as well as an opportunity to measure trees and calculate their value using an online tree value calculator. (Condition)
- Students will be able to apply what they learned about ecosystem services through the web and online activity—to a journal entry on the ecosystem services of wilderness area. (Degree)

Common Core Standard Connections

NOTE: See Common Core Standards sections to see listed objectives for this and other lessons/activities.

Time Requirement: 50 minutes

Materials/Resources Needed and Pre-Investigation Tasks

- Tape measures (from hardware store)
- Paper
- Clip boards (or hard surface to write)
- Computer access
- National Wilderness Preservation Map <http://www.wilderness.net/map>

Teacher Background:

This lesson focuses on the economic benefits of wilderness—please stress to your students that the economic benefits of wilderness are valued equally to the intrinsic, biological, recreational, and all other values of wilderness.

Before teaching this lesson it is helpful to have a good understanding of what an ecosystem service is as well as what ecosystem services can be observed in

the immediate surroundings of the school as well as other ecosystem services that exist outside of the local environment—on a national and global scale.

It is also helpful to use the internet to find a webpage that has a calculator that can estimate the economic value of a given tree based upon the type of tree and the diameter of the tree. A good tree value calculator will also break down the total value into specific values, such as: storm water, property value, energy, air quality, carbon sequestration, etc. Try typing “online tree value calculator” into a search engine.

Additionally, it is important to find an area with trees so that the students can measure their diameters and enter the data into the online tree value calculator. The more trees the better! If your class can be broken into groups of three and each group can measure 2-3 trees—you will have a large data set. If your school is in an area without many or any trees, you can have your students measure the diameter of three trees near their home or around their town and bring their data to class.

Step-by-Step Presentation Instructions

Students will be told that they will be doing a lesson on ecosystem services. The teacher will ask the class “what are ecosystem services”? After a brief discussion, the teacher should write or project the definition on the board.

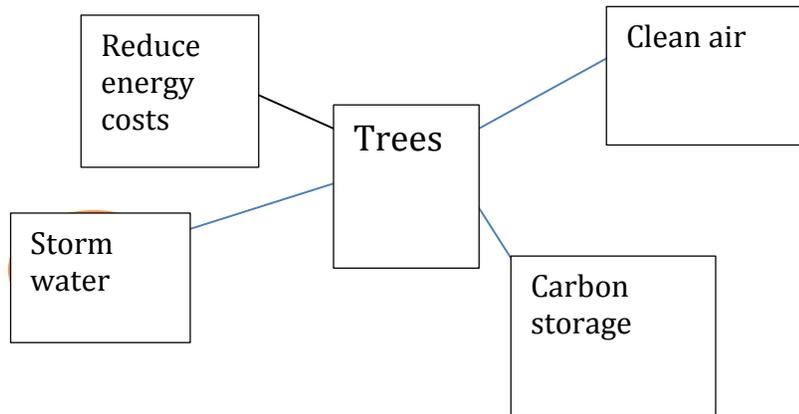
Definition: Ecosystem services are any benefit that an ecosystem provides to humans. These benefits can be direct or indirect, big or small.

Then the teacher will have the class brain storm parts of an ecosystem that provides services to humans. The teacher should first direct students to make observations about their immediate surroundings, such as: water, trees, wind, sunlight, pollinators, wildlife, aquatic life, soil, etc.

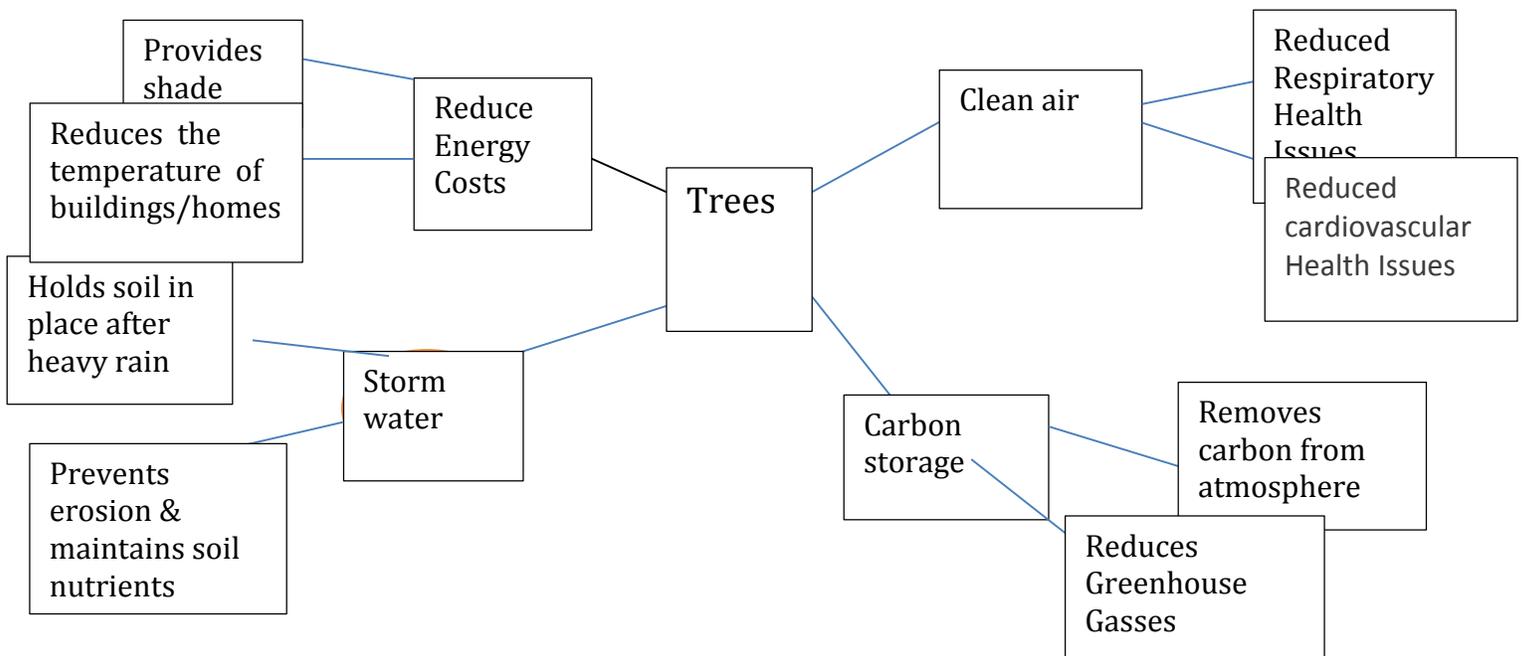
Then the teacher should direct students’ attention to ecosystem services on a larger scale. For example: wetlands, glaciers, jungles, coral reefs, minerals, forests, etc. The teacher should record the class generated list of the parts of an ecosystem that provide humans with services.

As a class, the teacher will guide the students to make a web of an ecosystem service. For this lesson, it is best to start with trees in the center of the web. The teacher will ask the students what services are provided to humans by trees.

The web may look like this:



The teacher should then go through each of the four spokes of the web and ask students to give more specific details about what exactly is being provided, for example:



The teacher should then break the class into groups of two and assign each group one aspect of an ecosystem from the class generated list on the board and instruct the groups to make their own web.

Once the groups have made their webs, each group can draw a branch of their web onto the white board. You could have students draw their entire web, but it may take too much time and space.

Next the students will take it a step further (first as a class and then in student groups). They will be asked to think about how and what humans would have to do if one of their web's ecosystem services was removed? For example, what would humans have to do if air clean air was not being made available by trees? Students may talk about how this would require humans to filter and clean the air or would require humans to always wear oxygen tanks. The goal is to drive students to consider the economic value of an ecosystem service as well as the quality of life provided by ecosystem services. Students should consider—if nature did not provide the service—how much would it cost to artificially replicate?

Next, student groups should pick an ecosystem service from their web, imagine if it was no longer provided by nature for free, devise a way for humans to artificially provide the service that nature once provided, and present their idea to the class.

The next step is to get students outside to calculate the economic value of trees in their surrounding area. This can be done by using an online tree value calculator. There are many on the internet, simply type in "online tree value calculator" and choose the one that would work best for you and your class.

Next, have students get into groups of three. Each group will have a clip board, pencil, tape measure, and tree identification guide. The students should identify the type of tree and take the diameter at the largest part of the tree. Students should do this to at least three trees. It would be best if each group of students could measure three different trees; however, if there are not enough trees around—it works just find to have students repeat trees or use data from home.

Once the measurements are taken, have each group return to the classroom and use the online tool to calculate the annual value of their measured trees. The class should write each value on the board. The teacher should add up each value and get a total annual value of the surrounding trees.

Once the final value is gathered, the class can discuss what services the trees provide, such as: storm water, property value, energy, air quality, carbon sequestration, etc.

Activity/Assessment:

The final step is for students to consider the ecological services provided by wilderness areas. This can be done by giving students a map of the National Wilderness Preservation System and the journal prompt: Considering ecosystem service, who benefits from Wilderness areas?

Grading Scale: 12 total points

	Excellent	Good	Fair	Poor
Stances on issue	4	3	2	1
Support from articles	4	3	2	1
Support from survey	4	3	2	1
Other:				

