



# SUSTAINABLE FORESTRY

**GRADE LEVELS**

Middle School - Grades 6-8

**CONTENT AREA**

Life Science

**UNIT THEME**

Ecology

**TOPIC**

Sustainable Forestry

**TIME REQUIRED**

Two 45-minute periods



## OVERVIEW

Sustainability is a system's ability to remain productive over a long time. It needs to continuously "sustain" the health of the system that may contain air, water, soil, trees, and animals. One of the things that can affect the sustainability of a system is the impact of humans consuming vital parts of the system. Forests are a good example of a sustainable system because forests can naturally regrow while "sustaining" the other parts of the system. And though forests can regenerate naturally over time, they can achieve higher levels of sustainability when they are professionally managed. In this activity, students will develop a comprehension of sustainability by considering its applications as they pertain to forestry practices and decisions.

In this lesson, students will develop an understanding of the concept sustainable forestry and the relationship with modern forest management.

**CONCEPTS:** Sustainability, Forest management

## ENDURING UNDERSTANDING:

Because forestry is a major economic industry in Wisconsin, students should know how forestry and sustainability practices could work together to ensure that this valuable natural resource will be sustainable for generations to come.

## LEARNER OBJECTIVES:

Students should be able to apply their understanding of sustainable forestry to a school forest or local park in order to analyze its quality as an ecosystem.

## PROCESS OBJECTIVES:

Students will work in small and large groups to process new information and use evidence to come to a conclusion.

## MATERIALS NEEDED

- Student Worksheet
- Writing Utensil
- Butcher paper or dry erase boards
- Access to a local forested area



## CONTENT OBJECTIVES - Students should be able to:

- Define sustainability and provide an example how a resource can be used in a sustainable fashion.
- Demonstrate the importance of forestry to the environment and economy of Wisconsin.
- Define the practice of forestry and provide specific example of what actions are a part of a professional logger or forester's job.
- Explain why a professional logger or forester are needed for a healthy, diverse forest ecosystem.
- Identify key components of sustainable forestry.
- Identify types of forestry professionals (ie: foresters and professional)
- Describe the following techniques of sustainable forestry: clear cutting, selective harvesting, timber stand improvement.
- Determine which techniques for sustainable forestry are applicable to a forest ecosystem near their school based on the type of species present there as well as threats to that ecosystem.

## PROCEDURES

Begin by having students discuss what 'sustainability' means. In groups of four, have them create their own personal definition of sustainability.

Ask the questions, "How can we tell if a resource is being used sustainably?" Do a *Think-Pair-Share* with the class. Students take a few minutes to think or write their answers individually, then share it with a partner, and finally share out to the whole class.

Put students in groups of 2-3 and hand out the Forestry worksheet to each student.

Describe the activity to the students. Tell them that they will first consider a hypothetical forest and how they would address the concerns if they were a professional logger or forester.

Before moving onto Scenario 2 for the second day, there should be a class discussion about questions 1-3 to help reinforce the idea of forestry practices by hearing other thoughts and ideas about it.

**Student Portion** – Charts, graphs, worksheets, Journal Pages (attached)

## PROCEDURES *(continued)*

Prepare students in advance for going outside and cover the following considerations with them:

- Where will we be going?
- What are the boundaries for this activity?
- What time will we start the activity?
- What time will we end the activity?
- Where will we meet when we are done?
- How should we dress for this activity?
- What do you do if there is a problem or if someone is hurt?
- What safety precautions should we take before moving outside?
- Note that if you are going outside the school building, it may be a good idea to obtain signed parent permission in advance.

On Day 2 of this activity, have students meet at the designated area and hand out the forest rubrics to groups of 2-3 students. Review the activity and safety precautions before allowing students to assess the forest. Encourage them to explore the forest within the stated boundaries. 10-20 minutes should be sufficient for this activity depending on the size of the forest.

## ASSESSMENT

Students should complete an exit slip before they leave class in which they answer the following questions:

- Describe why we must use resources sustainably.
- How can a professional logger or forester ensure that trees are available for humans and animals for years to come? State 3 things that a forestry professional can do.
- If a forest was completely ignored, would this be a "sustainable" use of the forest? Could living species be harmed by this? Explain.



### SPECIAL CONSIDERATIONS:

There are always risks involved with taking students outside the school building. While this can be incredibly enriching for students, be sure to review student allergy and safety information, obtain parent permission, and obtain administrative approval. Students should dress in long pants and shirts and closed-toed shoes. First aid kit and cell phones are advised in case of emergency.



## EXTENSION ACTIVITIES

- Have a DNR Warden, local forester or professional logger visit your class to offer a firsthand view of their work. If unable to visit in person, Skype or Facetime can bring the world of a forestry professional into your classroom as well. A recorded chat with a forestry professional can also aid student comprehension of their daily work.
- Have students explore the work of Gifford Pinchot, the first chief of the US Forest Service using credible internet sources. Have them consider how Pinchot changed the public's perception of sustainable use of our forests.
- Have students research the Peshtigo Fire and explore how unsustainable forestry practices led to this terrible disaster.

## RESOURCES

- Wisconsin Woodland Owners Association. 2004. One Hundred Years of Wisconsin Forestry, 1904-2004. Trails Custom Publishing, Black Earth WI.
- Farlee, Lenny. Rathfon, Ron. 2002. A Landowner's Guide to Sustainable Forestry. Purdue University Cooperative Extension Service, West Lafayette, IN.

## ADDITIONAL RESOURCES

- A resource for identifying invasive species can be found from the WDNR at; [http://dnr.wi.gov/topic/Invasives/documents/WI\\_common\\_inv\\_Montage\(3-25\).pdf](http://dnr.wi.gov/topic/Invasives/documents/WI_common_inv_Montage(3-25).pdf)



The following **Student Proficiency Standards** can be met by teaching **SUSTAINABLE FORESTRY**:

#### WISCONSIN STATE STANDARDS AND BENCHMARKS

F.8.8 Show through investigations how organisms both depend on and contribute to the balance or imbalance of populations and/or ecosystems, which in turn contribute to the total system of life on the planet.

H.8.2 Present a scientific solution to a problem involving the earth and space, life and environmental, or physical sciences and participate in a consensus-building discussion to arrive at a group decision.

G.8.4 Show how a major scientific or technological change has had an impact on work, leisure, or the home.

G.8.2 Explain how current scientific and technological discoveries have an influence on the work people do and how some of these discoveries also lead to new careers.





The following **National Common Core Standards** can be met teaching **SUSTAINABLE FORESTRY**:

#### **NATIONAL COMMON CORE STANDARDS**

College and Career Readiness (CCR) Anchor Standard 1: Write arguments to support claims in an analysis of substantive topics or texts, using valid reasoning and relevant and sufficient evidence.

#### **Grade 8**

Write arguments to support claims with clear reasons and relevant evidence.

- a. Introduce claim(s), acknowledge and distinguish the claim(s) from alternate or opposing claims, and organize the reasons and evidence logically.
- b. Support claim(s) with logical reasoning and relevant evidence, using accurate, credible sources and demonstrating an understanding of the topic or text.
- c. Use words, phrases, and clauses to create cohesion and clarify the relationships among claim(s), counterclaims, reasons, and evidence.
- d. Establish and maintain a formal style.
- e. Provide a concluding statement or section that follows from and supports the argument presented.

The following **Wisconsin Teacher Standards** which may be met teaching **SUSTAINABLE FORESTRY**:

**Standard 1: Subject matter**

This curriculum provides information not readily available in other forms. A teacher using this material will be well-informed about the subject matter.

**Standard 2: Broad range of ability**

This curriculum provides instruction that supports their intellectual, social, and personal development.

**Standard 3: Adapt instruction**

This curriculum provides suggestions for learners with a variety of intelligences and levels of ability.

**Standard 4: Instructional strategies**

This curriculum includes the use of technology to gain information and suggestions for using research in extending learning.

**Standard 5: Individual and group motivation**

Both prior knowledge and carefully designed group projects promote motivation for students to learn.

**Standard 6: Verbal and nonverbal communications**

Instructional media and technology that promotes active learning are key parts of this curriculum.

**Standard 7: Organizes and plans systematic instruction**

This curriculum is organized to support teacher knowledge, to draw on and motivate students to engage in active learning, and promotes active inquiry, collaboration, and supportive interaction in the classroom.



## Student Worksheet

You have been asked by your community to examine a local forest in a public park. This forest has many old trees that are showing signs of disease. Most of the trees are same species as each other and very few new trees or new species of trees are growing in this ecosystem. A lot of new trees are competing with weeds and invasive plants for nutrients and sunlight. Some trees are also being strangled by an excessive amount of vines. Very few people have been using this forest because it is overgrown and looks like it has been neglected. The leaders of your community have the following questions:

1. What are three things that are wrong with this forest?
2. What would an ideal forest contain for? a) the number of species of trees, and b) the ages of trees.
3. What are three recommendations that you have for improving this forest?

Foresters have some techniques for changing a forest. These include:

- Clear Cutting – if a forest is too overgrown with old trees, foresters may completely clear large sections of that forest in order to give sun-loving trees the chance to grow from seed.
- Selective Harvesting – if a forest has a healthy mix of trees, a forester may choose specific older or damaged trees to remove in order to give the more productive trees a greater chance to grow and mature.
- Timber Stand Improvement – if a forest is not healthy at all, a forester may wait to harvest trees. In the meantime, he or she will work to improve the forest habitat by removing dying or diseased trees, eliminating weeds and invasive species, and check for harmful insects and diseases.

1. For the forest described above, which of these techniques do you think would be most useful?
2. Explain why you selected the answer that you chose above.
3. If the choice you made above is successful, what do you think would be the next technique a forester would use? Why?

On the next page, you'll find a rubric to use in an actual forested area. Visit a nearby forest (such as a school forest or park) and use the rubric to assess this wooded area. You'll be playing the part of a forester and you will take into account all of the things that a forester must consider. For each category, assign a score. Then calculate the total score and percent score for this forest and assign a grade to this forested area.

Criteria	Score	Healthy (2 points)	Unhealthy (1 point)	Very Unhealthy (0 points)
<b>This forest has a mixture of tree species.</b>		There are lots of different kinds of trees.	There are only a few kinds of trees.	There are only two or three species of trees.
<b>This forest has a healthy understory.</b>		There are species of young trees and bushes below the large mature trees.	There are some small wooded species and grasses, but not much.	There is no understory in this forest.
<b>This forest has minimal impact from invasive species.</b>		There are no invasive species that can be found.	There are a few invasive species.	There are large numbers of invasive species.
<b>This forest has minimal impact from disease</b>		There are no diseased or dying trees that can be found.	There are a couple trees missing their leaves or rotting.	There are numerous leafless trees or standing rotting trees.
<b>This forest has a mixture of young and old trees.</b>		There is an even mix of young and old trees.	There are mostly old trees.	There are only old trees.
<b>This forest has minimal impact from human development and pollution.</b>		The forest is unaffected by human activity.	The forest is a little impacted by human activity.	The forest is totally affected by human activity.
<b>TOTAL</b>		<i>To calculate your percentage score, divide your total score by 12.</i>	<b>Percentage Score</b>	

1. For the forest you described above, which of these techniques (Clear Cutting, Selective Harvesting, Timber Stand Improvement) do you think would be most useful?
2. Explain why you selected the answer that you chose above.
3. If the choice you made above is successful, what do you think would be the next technique a forester would use in this particular? Why?

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