Into the Outdoors

Educational Partners:

HOW HEALTHY MARKETS SUSTAIN FORESTS

Middle School Lesson – The Forest Marketplace

HOW HEALTHY MARKETS SUSTAIN FORESTS

The Forest Marketplace

Developed By: Gina Smith, LEAF – Wisconsin's K-12 Forestry Education Program

Target Grade Level: 6-8

Appropriate for 9-12
Appropriate for 4-5 if educators with support/modifications
K-3 Educators should refer to the Elementary lesson created for use with the How Healthy Markets Sustain Forests episode, *Cost-benefit Analysis of Play Structures*

Science Categories

Economics, Forestry, Wood, Sustainability, Climate Change

Time Frame ~2 hrs ; 2 – 3 class periods

- **Introduction:** Economics Vocabulary Word Web (15 minutes)
- **Activity 1:** Watch Into the Outdoors episode, *How Healthy Markets Sustain Forests (30 minutes)*
- **Activity 2:** Reading and Research of Forest Marketplace Scenario (45-60 minutes)
- **Conclusion:** Written Assessment (15-20 minutes)

Materials

- *Healthy Markets = Healthy Forests* episode
- Student Sheet: The Forest Marketplace_*Economics Vocabulary – Activity 1*
- Student Sheet: *The Forest Marketplace – Reading – Activity 2*
    - Make a copy of **The Forest Marketplace** required reading for each student
    - Make 1 copy of each *Supplemental Reading* for each group of students
- Student Sheet: *The Forest Marketplace Scenario – Activity 2*
- Students will also need access to one of three articles/web links for the Scenarios Activity
    - Scenario 1: *Birch Thefts Highlight Importance of Managing Wisconsin's Forests* by Scott Bowe (2023) https://wiscontext.org/birch-thefts-highlight-importance-managing-wisconsins-forests
    - Scenario 2: *Paper Cuts Deep* by Lydia Larsen (6 Dec 2022) (Required) https://badgerherald.com/features/2022/12/06/paper-cuts-deep-the-evolution-of-wisconsins-paper-industry/

- Scenario 3: *Adapting to Changes in Your Sugarbush* by Scott Hershberger https://maple.extension.wisc.edu/adaptation-menu/ (can download as a pdf)

- *Student Sheet: The Forest Marketplace – Assessment*

Key Words

- benefit, capital, capitalist economy, circular economy, circular flow, competition, consumer, cost, cost-benefit analysis, demand, ecological, economy, entrepreneur, export, factors of production, free market, forest management, forest product, forest values, goods, import, incentive, infrastructure, labor, labor market, land, market, market economy, opportunity cost, primary wood product, producer, product market, profit, roundwood, scarcity, secondary wood product, services, social, supply, sustainable, trade

Learning Objectives

Students will be able to:

- Explain the role of consumers and producers in the forest market
- Examine factors of production and how they work together to make goods and provide services in the forest market
- Investigate the relationship between supply and demand, scarcity and opportunity cost in the forest market
- Explain how sustainable forest management and strong markets for forest products conserve forests, benefit communities and fight climate change

Activity Summary

Students will work in groups for this lesson. Groups will begin by reviewing (or learning) economics vocabulary and building an understanding of how the words relate to each other. Students will then watch the Into the Outdoors episode, *How Healthy Markets Sustain Forests*. Students will be prompted to listen for the vocabulary words and how they apply to the forest market. After the episode, students will be presented with a forest marketplace scenario to consider. They will work with their group to explain the role of consumers and producers, examine factors of production, investigate the relationship between supply and demand, scarcity and opportunity costs. The lesson wraps up with students completing a written assessment to describe how sustainable forest management and strong markets for forest products conserve forests, benefit communities and fight climate change.

Vocabulary

Benefit: something that is good or helpful that comes from making a decision
Capital: tools, equipment, machines and factories used to produce goods or services
Capitalist Economy: economic system where private individuals and businesses own and control the factors of production and prices are determined by supply and demand
Circular Economy: based on the reuse and regeneration of materials or products in sustainable ways

Circular Flow: interaction between consumers and producers in the market; Producers provide wages to consumers and consumers provide workers for producers; producers sell goods and services to consumers and consumers buy goods and services from producers
Closed Loop System: circular system of producing products where there is no waste, the product is recycled, returned to original materials or returned to the environment as biodegradable waste without harming the environment
Competition: when two or more producers buy or sell the same goods or services; competition exists between buyers and between sellers; competition can lead to innovation and lower prices
Consumer: the buyer of goods and services for personal use
Cost: the money or resources needed by the decision; what can be lost from making a decision
Cost-benefit analysis: tool that helps you decide what action you want to take by looking at costs and benefits
Demand: the amount of good or service consumers are willing to buy at a specific price
Ecological benefits: relation of living organisms to one another and the physical environment that surrounds them
Economy: the way goods and services are produced and consumed
Entrepreneur: person or places that combine land, capital and labor to produce goods and services to make a profit
Export: sending goods or services to another country for sale
Factors of Production: the four resources needed to produce a good or service; land, labor, capital and entrepreneurship
Free Market: monetary exchange for goods or services is undertaken as a voluntary (free) agreement between two people
Forest Management: the use of techniques to promote, conserve, or alter forests to meet desired outcomes
Forest Product: an object produced from forest resources for sale to a consumer
Forest Values: social, economic, and ecologic worth given to forests
Goods: objects that people can buy; food, clothing, cars, etc.
Import: bringing in goods or services from another country to sell
Incentive: motivation to produce is the idea that consumers want/need what they are selling
Industrial: used in manufacturing
Infrastructure: the physical systems that include transportation, water, sewage, schools, communication, etc.
Labor: people and the efforts they put in to produce goods or services
Labor Market: Producers provide wages to consumers and consumers provide workers for producers
Land: natural resources or materials found in nature that are used to produce goods or services
Market: general term for monetary exchanges that take place in a society
Market Economy: producers are free to decide what to produce; consumers are free to buy what they need and want

Opportunity Cost: the benefit you give up when you choose to do one thing instead of another
Primary Wood Product: Wood product made directly from raw wood; like logs, roundwood, woodchips, lumber
Producer: the maker or provider of goods and services for others
Product Market: producers sell goods and services to consumers and consumers buy goods and services from producers
Profit: the money earned when selling a good or service for more than it cost to make it
Roundwood: is wood that is in its natural state, with or without bark, used as a raw material
Scarcity: limited amount of resources available, forces a choice which leads to opportunity cost
Secondary Wood Product: wood product made from primary wood products; like furniture, cabinets, flooring, pallets, veneer
Services: actions people perform for a fee; fixing a car, mowing a lawn, taking care of children
Social benefits: cultural, spiritual, health (mental and physical) educational, recreational, tourism benefits
Supply: the amount of a good or service available to sell at a specific price
Sustainable: the ability of something to be maintained for use today and in the future
Trade: buying and selling goods and services

Background Information

Background information specific to the Forest Marketplace is included in the Student Sheet for Activity 1. Please make sure to review that before using the lesson.

The WI DNR Website is an excellent source of information about the forest economy in the State of Wisconsin.

- Forestry and the Wisconsin Economy (include fact sheets by year and county) https://dnr.wisconsin.gov/topic/forestbusinesses/factsheets
- Forest Inventory and Industry Trends https://dnr.wisconsin.gov/topic/forestbusinesses/publications
- Forest Products Industry Listings https://dnr.wisconsin.gov/topic/forestbusinesses/industries

Additional information about the forest economy in the State of Wisconsin can be found on the Wisconsin Economic Development website

- Forest Products
  https://wedc.org/key-industries/forest-products/
- Forest Products snapshot
  https://wedc.org/wp-content/uploads/2024/06/WEDC-Forest-Products-Snapshot-2024.pdf

Ideally students should already know a little about the market economy before they complete this lesson. A one class period lesson, *The Market Economy,* can be found on iCivics Education (ed.icivics.org) The Market Economy | Consumers & Producers Lesson Plan | iCivics if students do not have advanced background.

Alternately, you can use the background information (included below) about demand for forest resources, supply of forest resources and the economics of trade from the Wisconsin K-12 Forestry Lesson Guide, 9-12 Unit, Lesson 4: The Forest Marketplace (included below). This information is used with permission from LEAF – Wisconsin's K-12 Forestry Education Program. https://www.uwsp.edu/wcee/wcee/leaf/leaf-curriculum/k-12-forestry-lesson-guides/

The Demand for Forest Resources

Demand for products, including forest resources, is most heavily related to population, income, and societal trends. As human populations grow, so does the demand for **goods** and **services**.

As the average annual income increases, so does demand for goods and services. Yet, if the population of a given area grows but the total income remains stagnant, the demand will also remain stagnant in the long term.

The demand for goods is also related to societal trends. Trends begin in many ways, including innovation, marketing, and endorsement. A variety of trends have influenced the forest products industry. One notable trend was an increase in demand for exotic woods like teak and mahogany. That demand decreased after the harmful effects of rainforest clearcuts were widely understood. Increased use of technology has decreased the demand for printing and writing paper but increased the demand for paper packaging (cardboard). Some trends have the potential to stay for quite some time, for example, the installation and restoration of hardwood flooring in U.S. homes. Each of these trends in demand has had effects on the supply and, ultimately, price of products.

The Supply of Forest Resources

Forest resource supply in a given region can be determined by looking at three characteristics:

- Availability of forest resources
- Production capacity of the forest industry
- Supportive infrastructure

The availability of forest resources in a given region can be estimated using:

- Volume of standing timber (by species, size, and grade): to determine the total resource

- Net annual growth of trees: to determine productivity of the forest
- Forest ownership: to determine accessibility to the resource; landowners have different objectives; not all owners are willing to harvest trees

This information can be gathered from U.S. Forest Service surveys. The U.S. Forest Service conducts inventory and analysis in all the major forested states in the U.S. The statistics are published annually in some states and every five to 10 years in others. The surveys provide a variety of statistical information organized by tree species, size, ownership, region, and grade. The surveys are useful for determining timber supply and comparing the forest resources of the different states and regions of the U.S.

Production capacity of the forest industry in a given region can be estimated using:

- Number of forest products establishments
- Type and size of the forest products establishments
- Availability of skilled workers

These three indicators help to define the size and diversity of the industry, the potential gaps and surpluses in production, and the availability of human resources. The U.S. Forest Service publishes assessments of the timber industry in all the major forested states in the U.S. The assessments provide statistics on industry status, the volume of production of primary wood products, production efficiency, and timber growth and removals. The assessments are useful for comparing states and regions in the U.S. and determining the status and trends in the industry.

Supportive **infrastructure** helps businesses produce and transport their products and includes:

- Transportation systems
- Availability of water
- Waste disposal
- Education system
- Security
- Other services

Infrastructure is usually provided by the government and funded through tax monies. The tax rates and infrastructure of different countries and even different states in the U.S. can differ dramatically. Infrastructure can have a large influence on the productivity and efficiency of a company and this, along with tax rates, can influence when and where businesses construct new facilities.

The Economics of Trade

CIRCULAR FLOW

The **circular flow** of economic activity describes the economic relationships that exist between households, businesses, and government. In the **product market**, households give money to businesses in exchange for goods and services and both households and businesses pay taxes to

the government in exchange for the goods and services they supply. In the **resource market**, the government and businesses pay households for their productive resources (jobs they do) and the government pays businesses for goods and services the businesses supply to the government. This simplified economic model illustrates how the three players exchange goods, services, productive resources, and money.

COMPETITION

Competition for resources is the core concept around which modern economics is built. Prices, wages, production methods, type and quantity of production, size and organization of business firms, distribution of resources, levels of environmental regulation and compliance, outsourcing, and tax rates all result directly or indirectly from competitive processes.

Competition acts as both stick and carrot (it can threaten punishments or offer rewards). If a worker does not perform, or if the living wage in a region is relatively high, the employer can replace the worker or can move production to a region where wages are lower. If the employer does not treat the employee as well as other employers would, the employee can quit and go somewhere else if a job is available. If a company is not run efficiently or is too small to compete with large companies, customers can choose to go where they find better service at the same price or equal service at a lower price. All companies are subject to replacement by those that can do the job better or more cheaply. On the other hand, if the job is done well (better service at a cheaper price), the company is more likely to be rewarded.

SUPPLY AND DEMAND

In a **capitalist economy**, **producers** combine natural, human, and financial resources (**factors of production** – land, labor, capital) to provide goods and services that **consumers** are willing and able to purchase. The market price of a product or resource is determined by the interaction of **supply-and-demand**.

The **costs** and **benefits** of purchasing a good or service determine the amount of a product that a consumer will buy in a given time period. This is known as **demand**. As costs or benefits change, the demand for a product will also change. In general, as prices decrease, demand increases.
The amount of a good or service that producers are willing to sell during a certain period is determined by the amount of profit they can make. This is known as supply. Producers intend to make the largest profit possible from their sales. Since profit is the difference between revenues and costs, anything that influences either can influence the amounts sellers want to sell. In general, the higher the price, the more producers will want to sell.

FREE MARKET

Market is a general term for the monetary exchanges that take place in society. Each exchange is undertaken as an agreement between two people. The individuals exchange economic goods, either

commodities or services, to satisfy their needs or wants. The modern, global framework of exchanges is known as the **free market.**

Production begins with natural resources, and eventually goods are sold to the consumer. At each stage of production, from natural resources to consumer goods, money is voluntarily exchanged for capital goods, labor services, and land resources. At each step of the way, terms of exchanges, or prices, are determined by the voluntary interactions of suppliers and demanders. This market is "free" because choices, at each step, are made freely and voluntarily.

Learning Procedure

Students will work in groups today. Groups of 5 are ideal for Activity 2.

Introduction: Economics Vocabulary Web

Pass one copy of the *The Forest Marketplace_Economics Vocabulary – Activity 1* student sheet to each group. Go over the directions with students:

1. Take turns reading each of the vocabulary words and discussing their meanings.
2. Think about how the words relate to each other. Refer to past knowledge for words that are familiar to you.
3. Cut the vocabulary words into strips and spread them out in your work area.
4. Create a web with the words showing how the different words connect to one another.
5. Be prepared to explain to other students and/or your teacher why you made the connections you did.

Allow student groups time to complete their webs. Upon completion, ask each group to share the process they used to create the web and how ideas are connected.

Activity 1: *How Healthy Markets Sustain Forests* – Into the Outdoors episode

Show student the into the outdoors episode, *Healthy Markets = Healthy Forests.* Prompt students to listen for the economic vocabulary words and think about how they apply to the forest market.

- After the episode, ask students to make connections between the episode and forest market and the vocabulary words/what they know about market economies.

Activity 2: The Forest Marketplace Scenarios

Continue to have students work with their groups. Assign each group one of three scenarios:

- Paper Birch Custom Furniture and Cabinet Manufacturer
- Private Landowner / Pulpwood Grower
- Maple Sap / Syrup Producer

Try to spread the scenarios evenly amongst all groups and make sure all three scenarios are covered. Pass out the corresponding *The Forest Marketplace Scenario – Activity 2* student sheet to every member of each group. Explain to students that they are going to investigate their assigned scenario from the forest marketplace to:

- Explain the role of consumers and producers
- Examine factors of production
- Investigate the relationship between supply and demand, scarcity and opportunity costs.
- Consider how production of their product can sustain forests, transition to a closed loop system and its connection to climate change

Tell students to review what they need to learn about their scenario. Read the **The Forest Resource** section from *The Forest Marketplace – Readings – Activity 2* student sheet that is required for all readers as a class. Tell students to think about how what you are reading relates to their forest product scenario. They can make notes on their Scenario student sheets where appropriate.

After you finish reading **The Forest Resource** as a class, tell students to read the Required reading specific to their topic as a group (the readings are listed under the Supply & Demand, Scarcity & Opportunity Cost segment of their student sheet for students to access online or may be printed from the links in the materials section; the resource for Scenario 3 is a website; if students are not able to access it online there is a link to print it as a pdf). Tell students to record information related to their scenario on their student sheet as they read.

- Scenario 1: Birch Thefts Highlight Importance of Managing Wisconsin's Forests by Scott Bowe (2023)
- Scenario 2: Paper Cuts Deep by Lydia Larsen (6 Dec 2022) (Required)
- Scenario 3: Adapting to Changes in Your Sugarbush by Scott Hershberger)

When students are finished with their whole-group reading task, pass out 1 copy of each *Supplemental Reading* to each group. Tell groups to divide those reading tasks among group members. Group members are responsible for:

- Reading their Supplemental Reading
- Recording information related to their scenario on their scenario sheet
- Sharing information related to their scenario with their group

As students wrap up with these readings, tell them if they still have questions they cannot answer from their student sheets, they are welcome to do online research. Remind them to use credible sources (.edu, .gov and some .org).

When all student groups have had time to complete their scenario sheets, tell them they will need to report the following information about their scenario to the class:

- Who produces/consumes the product
- A summary of the supply and demand for the product
- A summary of scarcity / opportunity costs of the product
- One of the following:

- How their product can sustain forests
- How their product can be produced in a closed loop system
- How their product will be effected by climate change / or can be part of a climate solution

Allow all groups time to share. Consider letting groups who worked on the same scenarios meet with each other prior to sharing and do one presentation for their scenario.

Conclusion: Written Assessment

Have students complete a written reflection to assess their understanding. Tell them they must use and cite at least three pieces of evidence from the lesson to answer the prompt below. Their answer should be written in complete sentences and include a minimum of three paragraphs, one paragraph for each piece of evidence. Remind them to use correct grammar, punctuation and spelling.

Writing Prompt

Explain how sustainable forest management and strong markets for wood products conserve forests, benefit communities and fight climate change.

Extending the Lesson (Optional)

ELEMENTARY SCHOOL RECOMMENDATIONS

Use the K-5 lesson from this Into the Outdoors episode, *How Healthy Markets Sustain Forests – Cost-Benefit Analysis,* with students in grades 2-5.

The following LEAF lessons may be used for early elementary learners:

LEAF K-1st Grade Forestry Lesson Guide, Lesson 4: Forest Products Time Machine

- Students learn about historical uses of forest resources. Students begin by sharing ways we use the forest while playing a game of Hot Pine Cone. Next, the class explores forest resources used to create products of the past, while relating them to present-day goods. To conclude, students examine forest products and draw a picture of one they use every day. https://www.uwsp.edu/wp-content/uploads/2023/11/leaf-k-1-lesson-4-forest-product-time-machine.pdf

LEAF K-1st Grade Forestry Lesson Guide, Lesson 5: Animals Need Forests Too

- Students explore what the forest provides for its animal residents. Cooperatively, students create a forest ecosystem with their classmates, and enter the forest as animals in search of food, water, shelter, and space.

LEAF 2nd-3rd Grade Forestry Lesson Guide, Lesson 4: Forests Are Important to Me!

- Students explore and graph their personal forest values. Using a checklist, they discover how many of the forest products they use are made right here in Wisconsin and map them. As a conclusion, students create a collage and write about why they value forests. https://www.uwsp.edu/wp-content/uploads/2023/11/leaf-2-3-lesson-4-forests-are-important-to-me.pdf

LEAF 2nd-3rd Grade Forestry Lesson Guide, Lesson 5: Decisions, Decisions

- Students learn about forest management by making a plan for a schoolyard. Using a card game similar to Old Maid, students learn about some of the people involved in managing

forests. As a conclusion, they act out the roles of people involved in forest management and sing a song about what forests can be managed for. https://www.uwsp.edu/wp-content/uploads/2023/11/leaf-2-3-lesson-5-decisions-decisions.pdf

High School Recommendations:
High school students should complete the 9-12 lesson from this Into the Outdoors episode, *Healthy Markets = Healthy Forests.*

Student Pages
See additional documents that will need to be included:

- Student Sheet: The Forest Marketplace_Economics Vocabulary – Activity 1
- Student Sheet: The Forest Marketplace – Reading – Activity 2
- Student Sheet: The Forest Marketplace Scenario – Activity 2
- Student Sheet: The Forest Marketplace – Assessment

Standards

WISCONSIN STANDARDS FOR SCIENCE

- SCI.CC6.m Students model complex and microscopic structures and systems and visualize how their function depends on the shapes, composition, and relationships among their parts. They analyze many complex natural and designed structures and systems to determine how they function. They design structures to serve particular functions by taking into account properties of different materials and how materials can be shaped and used.
- SCI.PS1.A.m The fact that matter is composed of atoms and molecules can be used to explain the properties of substances, diversity of materials, states of matter, phase changes, and conservation of matter.
- SCI.ETS2.B.m All human activity draws on natural resources and has both short- and long-term consequences, positive as well as negative, for the health of people and the natural environment.

WISCONSIN STANDARDS FOR SOCIAL STUDIES

- SS.Econ1.a.m Predict the opportunity costs of various decisions and explain why the opportunity cost might differ from person to person or in different situations.
  Assess how limited resources (e.g., money, land, natural resources, workers, time) impact the choices of individuals, households, communities, businesses, and countries.
- SS.Econ2.a.m Analyze the role of consumers and producers in product markets.
  Provide examples of how individuals and households are both consumers and producers.
- SS.Econ2.b.m Investigate the relationship between supply and demand.
  Evaluate the extent to which competition exists in product markets, and its relationship to price and quality of goods and services.

- SS.Econ2.c.m Categorize factors of production and how they are combined to make goods and deliver services. Evaluate how profits influence sellers in markets.
- SS.Geog3.a.m Analyze the relationship between the distribution of resources and patterns of human settlement within states, countries, and regions of the world now and in the past.
- SS.Geog5.a.m Analyze how technology interacts with the environment and how increased use of technology affects the burden and use of natural resources.
- SS.Geog5.b.m Analyze how distribution of natural resources such as fisheries and crops (renewable and nonrenewable) creates systems of commerce between groups.

WISCONSIN STANDARDS FOR ENVIRONMENTAL LITERACY AND SUSTAINABILITY

- ELS.EX3.B.m Examine the relationships among resource use, environmental quality, and human health and well-being.
- ELS.EX5.C.m Examine how historical and contemporary factors shape a sustainability issue.

WISCONSIN STANDARDS FOR ENGLISH LANGUAGE ARTS

- ELA.R.6-8.1 Cite textual evidence to support an analysis of what the text says explicitly/implicitly and make logical inferences.
- ELA.R.6-8.2 Summarize texts, from a variety of genres, to determine a theme or central idea and how it is developed by key supporting details over the course of a text.
- ELA.W.6-8.3 Create writing that utilizes organization: introduce a topic; organize ideas, concepts and information; provide a concluding statement appropriate to the mode of writing.
- ELA.W.6-8.4 Produce clear and coherent writing in which the development, organization and style are culturally sustaining and rhetorically authentic to task, purpose and audience.
- ELA.SL.6-8.1a-d Engage effectively in a range of collaborative discussions with diverse partners on topics, texts, and issues, building on others' ideas and expressing one's thinking clearly.
- ELA.SL.6-8.2 Analyze the main ideas and supporting details presented in diverse media and formats and explains how it contributes to a topic, text, or issue under study.

Resources

- United Nations. (2024). Global Issues Population. United Nations. https://www.un.org/en/global-issues/population.
- LEAF – Wisconsin's K-12 Forestry Education Program. (2021). Unit 9, Lesson 4: The Forest Marketplace. LEAF. https://www.uwsp.edu/wcee/wcee/leaf/leaf-curriculum/k-12-forestry-lesson-guides/.
- FAO. 2020. Global Forest Resources Assessment 2020 – Key findings. Rome.
- FAO. 2024. The State of the World's Forests 2024 – Forest-sector innovations towards a more sustainable future. Rome, https://doi.org/10.4060/cd1211en
- USFS. (no date) Private Land. https://www.fs.usda.gov/managing-land/private-land
- WIDNR. 2020. 2020 Statewide Forest Action Plan, Madison. https://dnr.wisconsin.gov/topic/forestplanning/actionplan2020.

Into the Outdoors

Educational Partners:

HOW HEALTHY MARKETS SUSTAIN FORESTS

The Forest Marketplace – Activity 1 – Economics Vocabulary

INSTRUCTIONS:

With your group:

1. Take turns reading each of the vocabulary words and discussing their meanings.
2. Think about how the words relate to each other. Refer to past knowledge for words that are familiar to you.
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Trade: buying and selling goods and services

Into the Outdoors

Educational Partners:

HOW HEALTHY MARKETS SUSTAIN FORESTS

The Forest Marketplace –
Required and Supplemental Readings – Activity 2

THE FOREST RESOURCE – REQUIRED READING

The *Global Forest Resources Assessment 2020,* published by the Food and Agriculture Organization of the United Nations (FOA) states, "The world has a total forest area of 4.06 billion hectares, which is 31% of the total land area." Earth's forests grow in different climates (Tropical, Boreal, Temperate, and Subtropical) and in different places. 45 percent of forests grow in tropical climates and over half of the world's forests grow in one of five countries – the Russian Federation (Europe), Brazil (South America), Canada (North America), the United States (North America) and China (Asia). Research shows that while the total forested area of the Earth is decreasing, the rate which Earth is losing forests has slowed down. Today, about 30% of all forests on Earth are managed primarily for the production of forest products – both wood and non-wood products.

Forests provide us with numerous benefits. **Ecological** benefits of forests support humans and other living organisms. Forests provide a habitat for diverse wildlife and are a part of important nutrient cycles. They produce oxygen through photosynthesis – and absorb carbon dioxide which helps regulate Earth's climate. Forests maintain water and air quality and prevent erosion. Forests provide **social** benefits to humans as well. Social benefits can be cultural, spiritual, educational, recreational and contribute to both our physical and mental health. Forests also provide people with **economic** benefits. They give us raw materials, food and energy and create jobs.

While the majority of the world's forests are publicly owned, the *Global Forest Resource Assessment* indicates that 22% of the world's forests are under private ownership. The percentage of private forest ownership is highest in North America, South America and Oceana (the continent that includes Australia). In the United States, more than half the forest land is owned and managed by private owners. The U.S. Forest Service says that private forest lands provide over 90% of the forest products produced in the United States including the timber used to build homes. Private forest lands and support 2.4 million jobs.

In Wisconsin, even more forest land is under private ownership. According to the *2020 Statewide Forest Action Plan* published by Wisconsin Department of Natural Resources, approximately 68% of forest land (11.5 million acres) in Wisconsin is privately owned. Most of the private acres are owned by family forest owners (9.7 million acres). The plan states that 1,200 wood-using companies produce nearly $25 billion in forest products every year and create over 160,000 jobs. Not only that, but according to the plan, Wisconsin's private forests also provide ecological benefits like clean water, wildlife habitat and erosion control and social benefits like places for recreation, beauty and solitude.

The world's forests and human populations are all interconnected. How forests are managed has an impact on the ecological systems that rely on the forests and the social and economic benefits people get from the forests.

The **forest market** is the trade of forest resources which is interconnected with the world's forests and human populations as well. Consumer choices in the United States may impact forests growing in other parts of the world and wildfire in Canada may impact forest resources that people throughout the world rely on.

How does private ownership of forest resources affect the forest market?

People and the Forest Market (Supplemental Reading)

The global population will change a lot in the next 100 years. The Global Issues Population report published by the United Nations says that world population is projected to increase from 8 billion people in 2022 to 9.7 billion people by 2050, with a peak population of 10.4 billion people by 2100. The population of India (the world's most populous country since April 2023) and the continent of Africa is expected to increase while the population of China and many European countries is expected to decrease.

How will the change in global population affect the world's forests and the forest market?

Efficiency, Closed Loop Systems and the Forest Market (Supplemental Reading)

Increasing efficiency of the forest product industry can help meet the demand for forest products. Forest products companies have been working to become more efficient. They try to use every single part of a tree to make products. They also reuse and recycle paper and wood products into new products as many times as they can. According to *The State of The World's Forests 2024,* published in 2022 by the Food and Agricultural Organization of the United Nations, 15% more finished products were produced from the same volume of roundwood in 2022 than could be produced from that volume of roundwood in 1961.

Forward thinking producers of forest products are taking efficiency one step further by using wood resources in **closed loop systems**. A closed loop system does not create any waste. In a closed loop system, every part of the tree is used – including the sawdust created from sawing logs (in the forest, it returns to the soil and provides nutrients, in the mill it is collected and used for animal bedding, composting or fuel). Nicolet Hardwoods, featured in the Into the Outdoors *How Healthy Markets Sustain Forests* is a great example of closed loop production for hardwood flooring – every part of every tree is used. Closed loop systems also don't produce waste at the end of the life of a product. Everything produced in a closed loop system is reused, recycled for use in other products, or returned to the earth (biodegraded/composted) in a way that is not harmful to the environment. Closed loop systems are the basis for a **circular economy**, an economic system based on the reuse and regeneration of materials or products in sustainable ways.

Closed loop systems for generating forest products don't just reduce waste, they are also an important climate solution. Trees and forest products store carbon which helps keep it out of the atmosphere. A closed system of forest product production keeps as much carbon as possible in trees, raw materials and products within the system.

What effect do closed loop systems have on the world's forests and the forest market?

WOOD - Economic Growth and the Forest Market(Supplemental Reading)

Global production/consumption of forest products has increased. It is predicted that the production/consumption of forest products will continue to increase to meet **demands** of the future. This will have an impact on the forest market. The Food and Agricultural Organization of the United Nations (FAO) collects data on the global production of the following forest products:

- wood and wood products (including secondary wood products other than furniture)
- wooden furniture
- pulp and recovered paper
- paper and paper products
- non-timber forest products.

FAO's recent publication, *The State of The World's Forests 2024,* reports that global wood (roundwood) production has reached record levels; approximately 4 billion m^3 per year. **Roundwood** is wood that is in its natural state, with or without bark, used as a raw material. In 2022, just over half of global roundwood production was used as a raw material to make sawn wood, wood panels, and wood pulp. The remaining (just under) half of global roundwood production was used as wood fuel.

More than 50% of **industrial** roundwood is produced in Europe and North America. Because roundwood is used as a raw material for **primary wood products** and processed to make **secondary wood products**, the timber from the forest remains valuable after it is cut and creates jobs for people. This helps create a strong **economy.** In addition, countries that have a good supply of roundwood, like the United States also benefit from being able to **export** wood products which also helps their economy. (Note…some countries that export wood products also import other wood products.)

Many countries in Africa, Asia and South America must use their forest resources for fuel. 90% of wood grown in Africa is used for heating and cooking. The production of wood fuel does not create as many jobs as the production of primary or secondary products does. And, when the wood fuel is burned, the value of the wood is gone. Countries that must use their forest resource for fuel (or have limited forest resources) often have a struggling economy and must **import** wood products if they are needed.

The State of the World's Forests 2024, indicates production/consumption of roundwood is projected to increase 4-8% by 2030 and 6-32% by 2050. It also states that if we begin to use wood in innovative ways – mass timber or cross laminated timber (for construction), cellulosic wood fibers (for textiles), nanocellulose (for a wide variety of applications including electronics) and woodfuel (for bioenergy), roundwood consumption/production could increase 49% by 2050.

How will the increased demand for roundwood affect the world's forests and the forest market?

PAPER - Economic Growth and the Forest Market (Supplemental Reading)

Global production/consumption of forest products has increased. It is predicted that the production/consumption of forest products will continue to increase to meet **demands** of the future. This will have an impact on the forest market. The Food and Agricultural Organization of the United Nations (FAO) collects data

on the global production of the following forest products:

- wood and wood products (including secondary wood products other than furniture)
- wooden furniture
- pulp and recovered paper
- paper and paper products
- non-timber forest products.

Paper production/consumption is also projected to increase in the future. While the demand for newsprint, writing paper and printing paper has decreased, the demand for paper packaging and paper materials to replace single-use items made from plastic has increased. Since many paper products can be manufactured using pulp from recycled paper products, the growth of paper production/consumption is only projected to increase by 1-2%.

How will the increased demand for paper affect the world's forests and the forest market?

NONWOOD FOREST PRODUCTS – Economic Growth and the Forest Market

(SUPPLEMENTAL READING)

Global production/consumption of forest products has increased. It is predicted that the production/consumption of forest products will continue to increase to meet **demands** of the future. This will have an impact on the forest market. The Food and Agricultural Organization of the United Nations (FAO) collects data on the global production of the following forest products:

- wood and wood products (including secondary wood products other than furniture)
- wooden furniture
- pulp and recovered paper
- paper and paper products
- non-timber forest products.

In the past people didn't include the value of non-timber forest products in the forest market. According to the FOA, non-timber forest products have increased in market value over the last two decades. Demand for non-

timber forest products has increased because people seek the health benefits of food from the forest and want foods that are natural and sustainably sourced. The increase in demand for wood products, paper products and non-timber forest products will require an increased supply of forest resources and the ability for communities to provide the people, businesses and infrastructure to make them.

How will the increased demand for non-wood forest products affect the world's forests and the forest market?

Unexpected Events and the Forest Market (SUPPLEMENTAL READING)

Trade is the buying and selling of goods and services in a market. In the forest market, countries (people) with a lot of forest resources trade forest materials and products to countries (people) that don't have as many forest resources. Countries (people) that don't have forest resources and don't have **capital** (money or other resources) to trade for forest resources must find other ways to meet their needs.

Sometimes, unexpected events can affect trade in the forest market. The Russian Federation (Russia) is a large producer and exporter of timber. After Russia invaded Ukraine in 2022, many countries like the United States, Canada, and the European Union placed sanctions on Russia. The Sanctions are like rules that stop Russia from exporting timber products to the countries making the sanctions. This hurts the Russian economy because they lose **profit** i from the sale of forest products. It also disrupts the forest market for other countries too. It causes a decrease in the **supply** of products. A decrease in the supply of a product can increase the **demand** for the product which can lead to an increase in the price of the product. While Russia is under sanctions, some countries, like the U.S., have tried to produce more of these products to meet the increased **demand**. While this may solve one problem, it can cause others. Wood used in the replacement products is no longer available to make other products. Or, if producers decide they need to cut more wood, it can be difficult for forest managers and landowners to manage their forests sustainably.

Russia's invasion of Ukraine has also affected Ukraine's forest market. Like Russia, Ukraine is a large producer and exporter of timber and forest products. Military operations taking place in Ukraine make it difficult to harvest timber. In addition, the invasion by Russia has led to deforestation, wildfires and contamination of forests. This has disrupted Ukraine's ability to produce forest products. This hurts the Ukranian economy because it limits their profit.

Weather events, like tornados and high winds, can also impact trade in the forest market. In July 2019, a massive derecho (straight line wind) windstorm flattened a large stretch of trees in private forests and the Chequamegon-Nicolet National Forest in Northern Wisconsin. It took over five years to clean up devastated areas and salvage downed timber. The event also challenged public and private forest managers to come up with new management plans to sustain their forests. In a separate wind event in June 2022, straight line winds flattened 12 million board-feet of timber, more than a year's typical harvest, in the Menominee Tribal Forest. Menominee Tribal Enterprises had to abandon their logging schedule for nine months to salvage the downed timber. In both cases, the trees that needed to be harvested because of the wind were not the trees planned to be harvested. This caused there to be a decrease in the supply of some wood species and an increased supply (in both cases a greater supply than markets could handle) of other wood species which impacted the trade of

wood and wood products for multiple years.

How do unexpected events affect the world's forests and the forest market?

Forest Health and the Forest Market (Supplemental Reading)

Trade can have a positive effect on the overall health of forests. The sale of forest products provides money that can be used to help manage forests in ways that keep the forests healthy so they can be enjoyed and used in the future. This is called sustainable forest management. Sustainably managed forests provide ecologic, social and economic benefits for humans while maintaining the health of ecosystems and the environment. Forest products that come from sustainably managed forests are called certified forest products. When people purchase certified forest products, their money helps sustain the forests the products came from. If people do not purchase products from sustainable forests, the forest landowners and managers may not be able to afford the cost of managing the forest sustainably.

The forest market (trade) can have a positive effect on the overall health of Earth too. Climate change is one of the biggest threats to Earth. Climate change is caused by an increased amount of carbon dioxide in the atmosphere that comes from burning fossil fuels. Trees absorb carbon dioxide from the atmosphere. During photosynthesis, they turn carbon dioxide and water into sugar (which contains carbon) and oxygen. The carbon (in the sugar) is stored in the wood of the tree as it grows. It stays in the wood for the life of the tree. If the tree is turned into a forest product, the carbon remains in the forest product. The carbon does not return to the atmosphere until the tree or wood product burns or decays. This means that both forests and forest products are climate solutions – they keep carbon in trees and wood products and out of the atmosphere and help regulate Earth's temperature.

Slowing climate change is not just good for the overall health of Earth, it is good for the health of our forests too. Climate change causes an increase in temperatures and extreme weather events. Increased temperatures can put stress on forests which makes it easier for pests, invasive species and other diseases to harm trees. Increased temperatures can also shift the zones trees can grow in causing some trees not to be sustainable in the forests where they have always grown. Increased extreme weather events, like windstorms and thunderstorms, damage and kill trees and impact the overall health of the forest. In addition, pests, invasive species and other diseases are a greater threat to damaged trees than healthy trees. Can you see how having a healthy forest can help slow climate change which can help keep forests healthy?

The effects of trade on forests is not always positive though. Sometimes trade can lead to poor management and exploitation (unfair use of and benefit from) of forests too. Free trade with no regulations can be harmful to forests and communities. It can lead to forests being harmed when they are cut at inopportune times – or forests being clear-cut. It is also not a good way to support workers whose jobs rely on earning wages by managing the forest, cutting trees, and creating forest products in a **circular flow**. Regulations are created to promote sustainable forest management and help ensure workers are treated well.

How do regulations affect the world's forests and the forest market?

Into the Outdoors

Educational Partners:

HOW HEALTHY MARKETS SUSTAIN FORESTS

The Forest Marketplace Scenario – Activity 2

SCENARIO 1 – PAPER BIRCH CUSTOM FURNITURE & CABINET MANUFACTURER

Furniture & Cabinet Maker / Woodworker **Northern Wisconsin** **Trees: Paper Birch** **Product: Custom birch furniture, cabinets and toys**	**Scenario:** You are a small business owner living in northern Wisconsin. You build custom furniture, cabinets and toys from Paper Birch. You take pride in creating quality, hand-built pieces using trees that were grown and milled locally. Your business was originally run by your father and grandfather. You worked with them to earn money for college. You earned a degree in forestry from UW-Stevens Point and got a job with the WI DNR. After a few years, you missed working with your hands so you moved back home to join the family business. Your have customers from Wisconsin, the Midwest – and as far away as the East and West Coasts.
Describe the characteristics of Paper Birch that make it good for furniture and cabinet making.	
Who are producers?	
Who are consumers?	
FACTORS OF PRODUCTION FOR PAPER BIRCH	
Land	
Capital	
Labor	

SUPPLY & DEMAND, SCARCITY & OPPORTUNITY COST FOR MANUFACTURES WHO USE PAPER BIRCH IN WI	
READ: The *Forest Resource* (Required) **READ:** Birch Thefts Highlight Importance of Managing Wisconsin's Forests by Scott Bowe (2023) (Required) https://wiscontext.org/birch-thefts-highlight-importance-managing-wisconsins-forests Each Member **READ** one *Supplemental Reading* • People, Efficiency & Closed Loop Systems, WOOD, Unexpected Events, Forest Health	
Describe the Market (Supply and Demand) for Paper Birch (in general, not just in your products) in Wisconsin.	
How does supply and demand for paper birch affect scarcity? What are the opportunity costs of continuing to work with paper birch?	
SUSTAINABILITY AND PAPER BIRCH	
What measures can be taken to help sustain paper birch in Wisconsin forests?	
Describe how the production of furniture made from paper birch could be transitioned into a close-looped system.	

How will climate change affect those who rely on paper birch for ecologic, cultural, social and economic benefits?	

SCENARIO 2 – PRIVATE LANDOWNER – PULPWOOD GROWER

Private Landowner **Central Wisconsin** **Trees: Aspen, Sugar Maple, Northern Red Oak** **Product: Pulpwood for paper packaging**	**Scenario:** You are a private landowner who owns 120 acres of forest in central Wisconsin. You have worked with a DNR forester on a management plan for your land. According to the management plan, it is time for you to thin some stands on your land. The forester has already marked the trees that should be cut. They include aspen, sugar maple and northern red oak that have a diameter at breast height (dbh) of 5-9 inches – all good trees for pulpwood.
What is Pulpwood?	
Who are producers?	
Who are consumers?	
FACTORS OF PRODUCTION FOR PULPWOOD	
Land	
Capital	
Labor	

SUPPLY & DEMAND, SCARCITY & OPPORTUNITY COST – PULPWOOD PRODUCTION IN WI	
READ: The *Forest Resource* (Required) **READ:** *Paper Cuts Deep* by Lydia Larsen (6 Dec 2022) (Required) https://badgerherald.com/features/2022/12/06/paper-cuts-deep-the-evolution-of-wisconsins-paper-industry/ Each Member **READ** one *Supplemental Reading* • People, Efficiency & Closed Loop Systems, PAPER, Unexpected Events, Forest Health	
Describe the Market (Supply and Demand) for Pulpwood in Wisconsin.	
What are the Opportunity Costs of using forest land for pulpwood instead of other products or purposes?	
SUSTAINABILITY AND PULPWOOD	
What measures can be taken to ensure that forests that supply trees for pulpwood are sustained for future use for ecologic, social and economic benefits?	
Describe how the production of pulpwood could be transitioned into a close-looped system.	

How can the production and use of pulpwood help fight climate change?	

SCENARIO 3 – MAPLE SAP / SYRUP PRODUCER

Maple Sap Producer **Northern Wisconsin** **Trees: Sugar Maple** **Product: Maple Syrup, Maple Cream & Maple Sugar**	**Scenario:** You are a private land and business owner who owns 240 acres of hardwood forest / sugarbush in northern Wisconsin. You have worked with a DNR forester on a management plan for your land – specifically to support maple sap production. You collect sap, process it, bottle it and distribute it to provide income for your family. Other trees on your property include yellow birch, basswood, white ash, eastern hemlock, white pine, red oak and paper birch.
What is Maple Sap?	
Who are producers?	
Who are consumers?	
FACTORS OF PRODUCTION FOR MAPLE SAP (Syrup, Cream & Sugar)	
Land	
Capital	
Labor	

SUPPLY & DEMAND, SCARCITY & OPPORTUNITY COST FOR MAPLE SAP/SYRUP PRODUCTION IN WI	
READ: The *Forest Resource* (Required) **READ/USE:** *Adapting to Changes in Your Sugarbush* by Scott Hershberger web version: https://maple.extension.wisc.edu/adaptation-menu/ (can download as a pdf) Each Member **READ** one *Supplemental Reading* • People, Efficiency & Closed Loop Systems, NONWOOD FOREST PRODUCT, Unexpected Events, Forest Health	
Describe the Market (Supply and Demand) for maple sap / syrup in Wisconsin.	
What are the Opportunity Costs of using forest land for maple sap /syrup instead of other products or purposes?	
SUSTAINABILITY AND MAPLE SAP/SYRUP	
What measures can be taken to ensure that forests that are home to sugarbushes are sustained for future use for ecologic, social and economic benefits?	
Describe how the production of maple syrup could be transitioned into a closed-looped system.	

How will climate change affect those who rely on maple sap / syrup for ecologic, cultural, social and economic benefits? **How does the production of maple syrup help fight climate change?**	

Into the Outdoors

Educational Partners:

HOW HEALTHY MARKETS SUSTAIN FORESTS

The Forest Marketplace – Assessment

THE FOREST MARKETPLACE WRITTEN REFLECTION

Use and cite at least three pieces of evidence from the lesson to answer the prompt below. Your answer should be written in complete sentences and include a minimum of three paragraphs, one paragraph for each piece of evidence. Use correct grammar, punctuation and spelling.

WRITING PROMPT:

Explain how sustainable forest management and strong markets for wood products conserve forests, benefit communities and fight climate change.