



WOOD: A SCIENTIFIC WONDER

Elementary School Lesson – Forest Careers in Science & Engineering

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Forest Careers in Science & Engineering

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

Target Grade Level: K-5

For K-2 students, go through the reading material from Activity 1 as a whole class in more of a discussion format. Have them complete Activity 2 as a discussion or with a modified, simpler table. Describe Eloise’s accomplishments in 1-2 words (college, scientist). Put more focus on having them explain the character traits of Eloise Gerry than having them write about the character traits.

Appropriate for Middle School and High School with modifications - see Extending the Lesson Middle School / High School.

Science Categories

Forestry, Forest Products Lab, Forest Careers in Science & Engineering, Wood Products

Time Frame: 85 minutes

- **Introduction:** 15 minutes
- **Activity 1:** 20 minutes
- **Activity 2:** 30 minutes
- **Conclusion:** 20 minutes

Materials

- Wood: A Scientific Wonder Video; at minimum, segment about Center for Wood Anatomy Research and interview with Rafael Arevalo Burbano, Botanist-Collection Manager (4:39 - 8:09)
- Activity 1 Student Sheet: *The Incredible Work of Eloise Gerry*
 - It is best to copy the Reading Text and Table on separate pages (instead of back-to-back) to make them easier for students to use.
- Natural Inquirer Scientist & Engineer Cards (for Activity 2)
 - Cards may be ordered and shipped (free) from Natural Inquirer <https://naturalinquirer.org/product/full-set-of-scientist-engineer-cards/>
 - Cards may be downloaded and printed (free) from Natural Inquirer <https://>



naturalinquirer.org/product/full-set-of-scientist-engineer-cards/

- Cards may be borrowed (free) from LEAF – Wisconsin’s K-12 Forestry Education Program at the Wisconsin Center for Environmental Education <https://www.uwsp.edu/wcee/wcee/kits/>
- Student Sheet: Forest Careers in Science and Engineering – Career Flyer
- Visiting Student Sheet: Forest Careers in Science and Engineering

Key Words

- anatomy, botany, character traits, engineer, properties of wood, research, resin, scientist, turpentine

Learning Objectives

Students will be able to:

- Explain what the Forest Products Laboratory is and why it was created.
- Explain who Eloise Gerry was and the character traits she possessed that helped her be successful as the first female research scientist to work for the United States Forest Service.
- Examine the skills and character traits people need to work at the Forest Products Lab or in Forest Service Science and Engineering jobs.

Activity Summary

After watching the video, students participate in a class reading activity about Eloise Gerry and learn about her work at the Forest Products Lab. They discuss the characteristics Eloise Gerry had that helped her be successful at a time when women did not have many opportunities to work in science. In activity 2, students explore different forest-related jobs in science and engineering. They select one to become an expert on and create a recruitment flyer for the job. The lesson concludes with students participating in a “mock” career fair where they share about a forest career in science and engineering with students from another class.

Vocabulary

- **Anatomy:** The study of the structures of living things, wood anatomy is the study of the structure of wood and the types of cells that make it up (human anatomy is the study of the muscles, skeleton, heart, lungs, etc.).
- **Botany:** The study of plants.
- **Character Traits:** Qualities a person has like honesty, curiosity, courage, patience, kind, perseverance, etc.
- **Engineer:** Person who designs and builds products, machines and other things that solve problems. Engineers use scientific thinking.
- **Properties of wood:** The characteristics of wood like strength, flexibility, long lasting, color, etc.
- **Research:** Asking questions about something you want to know more about and looking for



answers.

- **Resin:** A thick, sticky liquid that is found in the bark of pine, fir and cedar trees. It is like sap but thicker and stickier.
- **Scientist:** Someone who studies and researches to understand how things work and discover new things.
- **Turpentine:** Something made from pine resin that is used to make paint thinner and as a scent for cleaners and soaps.

Background Information

The reading material included in activity 1 provides enough background information about Eloise Gerry. If you are interested in learning more about Dr. Gerry, consider using any of these resources:

- The Remarkable Legacy of Eloise Gerry –US Forest Service, Forest Products Lab Article <https://research.fs.usda.gov/fpl/news/featured/remarkable-legacy-eliose-gerry>
- Dr. Eloise Gerry - US Forest Service, Forest Products Lab video & article <https://www.fs.usda.gov/learn/our-history/women/dr-eliose-gerry> or <https://usda-fs.wistia.com/medias/vn0kbyux9>
- Biography Eloise Gerry – Forest History Society Worksheet <https://foresthistor.org/education/trees-talk-curriculum/behind-scenes-forest-forest-production-research/worksheet-3-made-wereare/worksheet-3-biography-eliose-gerry/>

Additional background Information about forest-related careers in science and engineering can be found at:

- US Forest Service Careers in Engineering, Facilities, and Maintenance Careers <https://www.fs.usda.gov/working-with-us/careers/engineering-facilities-and-maintenance>
- US Forest Service Careers in Science and Research <https://www.fs.usda.gov/working-with-us/careers/science-and-research>

Learning Procedure

Advanced Preparation:

Find a class that is willing to attend your Mock Career Fair (Concluding Activity) to learn about Forest Careers in Science and Engineering. Determine how long the class will attend the career fair and how many jobs attendees need to visit during the career fair. It is recommended that students visiting the career fair learn about 3-5 jobs and spend at least 10 minutes at the career fair.

Introduction

Have students watch the Into the Outdoors video *Wood: A Scientific Wonder*. If time does not allow for students to watch the full episode, show the segment about Center for Wood Anatomy Research and interview with Rafael Arevalo Burbano, Botanist-Collection Manager (the second segment).



Discuss the following questions with students:

- What is the Forest Products Lab? Place where scientists study the anatomy of wood, test its durability and come up with new ways to use it.
- Why was the Forest Products Lab created? To better utilize all the materials in the forest by developing processes and products that use more of the tree and reduce waste.

FPL Goals:

- Cut a tree, grow 3
- Use the tree, all of the tree
- Reuse it as many times as we can
- Recycle it into other products
- Return it to the earth
- What is the Center for Wood Anatomy Research? Home of the largest historic geographically and taxonomically diverse research wood collection in the world. Has more than 105,000 specimens of wood representing more than 16,000 species of woody plants.
- What jobs do people do at the Center for Wood Anatomy Research? They study variations in wood and wood structure and the characteristics of each species and the type of wood they make. Some things they study include: how strong it is, how flexible it is, how long-lasting it is. They study this because billions of people still depend on wood for construction materials, food, medicine, climate mitigation, etc.
- What other jobs do people have at the Forest Products Lab? Director of Forest Products Laboratory, Materials Research Engineer, Forest Products Technologist, Engineering Mechanics and Remote Sensing Forest Products Technologist, Scientist, Advanced Composites Lab Scientist, Assistant Director of Communications and Science Delivery.

Activity 1: The Incredible Work of Eloise Gerry

Pass out Activity 1 – The Incredible Work of Eloise Gerry – Reading Text to every student. Explain to students that they are going to read about the first woman scientist to work in the forest products lab. Tell them that as they read the text, they should underline or highlight Eloise Gerry’s accomplishments (things she did or achieved). You can read the text aloud as a class, have students read the text with partners or have students read the text independently.





If you printed the reading text and table back-to-back, have students turn their paper over and look at the table – The Incredible Work of Eloise Gerry. If you did not print these pages back-to-back, pass a copy of the table – The Incredible Work of Eloise Gerry – to each student. As a class, discuss the accomplishments of Eloise Gerry that students read about and underlined or highlighted. Have students record Eloise Gerry’s accomplishments in the table – using 2-4 words to describe each one.

Accomplishments can include any variation/combination of the following:

- Went to college
- Earned a degree in science and forestry
- Earned a master’s degree
- Got a job at Forest Products Lab as a researcher/scientist
- First woman to work was research scientist for U.S. Forest Service
- Created the Wood Collection
- Did research in the lab and out of the lab
- Did research on Southern pine trees and their use and shared ways to collect resin that didn’t harm trees as much
- Earned a doctorate degree in botany
- Helped make better things – even those used by the army and navy during WWI and WWII
- Wrote books and papers
- First woman to be added to the Florida Society of American Foresters Hall of fame after her death

After the table is filled in with accomplishments, divide the class into groups of 2-4 students. Ask students if they know what **character traits** are. (Qualities a person has like honesty, curiosity, courage, patience, kindness, perseverance, etc.) Tell students that in the Character Traits of Eloise Gerry column of the table they should record what traits Eloise had that helped her achieve each of her accomplishments. Tell students they should list as many traits as they can think of related to each accomplishment and that they can use the same trait for more than one accomplishment.

When students have completed this task, have a whole class discussion on the character traits that helped Eloise Gerry be successful as a scientist. Ask them the following questions:

- What do you think it was like for Eloise Gerry to be one of the first women to earn degrees in science and work as a researcher and scientist?
- What character traits do you think were most important in helping Eloise Gerry become a successful student, researcher and scientist?
- Would Eloise Gerry have accomplished all the things she did if she didn’t have the character traits you identified? Explain.
- How can the character traits you develop help you in the future? At school? At a job? In your



personal life?

Activity 2: Forest Careers in Science & Engineering

Spread the Natural Inquirer Scientist & Engineering Cards around the classroom. Tell students that the cards have information about people who work for the U.S. Forest Service in Science or Engineering jobs. Tell students that they have about 3 minutes to walk around the room and look at the cards, silently, until they find one that seems interesting to them. When they find one that seems interesting, they should pick it up, return to their seat and start reading about the person and their career. Tell them that the cards are “first come, first serve” and that if they don’t choose a card within the time you give them, you will select a card for them.

Once all students have a card, tell them they are going to read their card two times. The first time through they need to read all the information on the card and look up (or ask you about) any words they don’t know or understand the meaning of. The second time through they should focus on learning the answers to these three questions:

- Who is the person and what is their job?
- What does a person with that job do?
- What important skills and character traits does someone need to have to do this job well?

After everyone has had enough time to answer the three questions about their person/career, have students participate in a Stand up, Hand up, Pair up activity to share what they have learned with their classmates. Follow this procedure:

- 1. Stand Up:** Tell students to stand up and slowly walk around the classroom (with their card) holding their hand in the air.
- 2. Hand Up:** Tell students to gently clap hands (or fist bump) a student who they think might like this career, or who they think would be good at it (or just have students connect with someone randomly).
- 3. Pair Up:** When all students have a partner, tell them they each have 1-minute to share the following information about their person/career:
 - Who is the person and what is their job?
 - What does a person with that job do?
 - What is one skill or character trait that helps a person do this job well?

Tell students that the person whose first name starts with a letter closest to the beginning of the alphabet should go first. Time them for 1 minute and then stop them and have the other person share.

- 4.** Repeat this process at least 3 times. Each time pick a different way to determine which student



should share first (letter closest to the end of the alphabet, person with birthday closest to a certain month or number, person wearing the most green, etc).

After 3-5 rounds, have a whole-class discussion of the following questions:

- Which careers sounded most interesting to you?
- What types of skills or character traits do you need to do well at those careers?
- What can students do to get those types of skills or character traits?

Conclusion: Assessment

Tell students that they are going to put on a Mock Career Fair for students from another class. Tell them which class it is, the grade level of the students and how long the career fair will last. It is recommended that students visiting the career fair learn about 3-5 jobs and spend at least 10 minutes at the career fair.

Tell students they must create a poster/flyer to share information about a Forest Career in Science or Engineering with students who attend the Mock Career Fair. They can use the career from the card they learned about during Activity 2 or pick a new career/card. Pass out the Wood: A Scientific Wonder Assessment – Forest Careers in Science and Engineering student sheet (Or a blank piece of paper of any size). Tell students they need to use the sheet to create a flyer about their career. Their flyer should include pictures and information and be easy to read. They must include the following information on their flyer:

- Job Title & Picture
- Job Description – What does a person with this job do?
- Skills Needed – What skills or character traits are needed for this job?
- What makes this a great career?

When students finish creating their flyers/posters, give them a few minutes to find a partner and have them take turns sharing the information from the poster with their partner. Remind them that they should try to keep eye contact and not just read from the poster.

When it is time for the career fair to begin, have students spread out around the room with their flyers/posters. Give a Forest Careers in Science and Engineering – Visiting Student Sheet to each visiting student (or, if you prefer, students can just listen and ask questions and not write anything down). Tell visiting students that they need to visit 3-5 different presenters to learn about different forest careers in science and engineering. Tell them they should make sure they learn something interesting about each career and the skills or character traits they need to have to be successful at the career. Remind students to rotate to a new career every few minutes.

When the designated time for the career fair is up, ask visiting students to share which careers were



most interesting to them and why. Also ask students which skills or character traits were needed most often for forest careers in science and engineering. Have the presenting students thank the visiting class for coming to the career fair.

Extending the Lesson (Optional)

ELEMENTARY SCHOOL RECOMMENDATIONS

Into the Outdoors Video: INTO FORESTRY: HEROES OF THE FOREST

- This episode explores a variety of careers in the field of Forestry, from silviculturists to data analysts, fire fighters to GIS specialists. <https://intotheoutdoors.org/segments/heroes-of-the-forest/>

Natural Inquirer, NSI: Nature Science Investigator

- Use the NSI guide to become a scientist by investigating the world around you. https://cdn.naturalinquirer.org/wp-content/uploads/2024/02/nsi_v1-no2-en.pdf
- The NSI guide is also available in Spanish <https://cdn.naturalinquirer.org/wp-content/uploads/2024/04/NSI-SpanishArticle.pdf>
- The guides can also be searched for (by title) on the Natural Inquirer website <https://naturalinquirer.org/>

LEAF 4th Grade Forestry Lesson Guide, Careers Exploration

- Students learn about 15 professionals in Wisconsin with a wide variety of careers connected to the forest. Students discover the skills used in each profession and create a help wanted poster for the career that can be displayed in the school. https://drive.google.com/drive/folders/1h5jyiPXBkMifY_3FWDNzRtFlrsLrFHMR?usp=drive_link

MIDDLE/HIGH SCHOOL RECOMMENDATION

Activity 1: Eloise Gerry, the Forest Products Lab and the Wood Anatomy Collection

Ask students to use online resources, like the ones below to discover who Eloise Gerry was and what contributions she made to the Forest Products Laboratory and study of wood anatomy.

- The Remarkable Legacy of Eloise Gerry – US Forest Service, Forest Products Lab Article <https://research.fs.usda.gov/fpl/news/featured/remarkable-legacy-eliose-gerry>
- Dr. Eloise Gerry - US Forest Service, Forest Products Lab video & article <https://www.fs.usda.gov/learn/our-history/women/dr-eliose-gerry> or <https://usda-fs.wistia.com/medias/vn0kbxyux9>
- Biography Eloise Gerry – Forest History Society Worksheet <https://foresthistor.org/education/trees-talk-curriculum/behind-scenes-forest-forest-production-research/worksheet-3-made-wereare/worksheet-3-biography-eliose-gerry/>
- Center for Wood Anatomy Research – US Forest Service, Forest Products Lab Article <https://research.fs.usda.gov/fpl/centers/war>



Activity 2: Forestry Careers Exploration

LEAF 7th & 8th Grade Forestry Lesson Guide, Careers Exploration

- Students read about eight professionals working in forestry-related careers. They examine the skills, education, and experience necessary for each career and decide if it is a job they are interested in. <https://www.uwsp.edu/wp-content/uploads/2023/11/leaf-7-8-careers-exploration.pdf>

LEAF 9th-12th Grade Forestry Lesson Guide, Careers Exploration

- Students review profiles of Wisconsin college students who are working towards degrees in natural resource fields. Students study the profiles and select education, work experiences, skills, and other qualifications to create a resume. Students then choose one of five career fields and match their resume to the qualifications required to fill a vacancy announcement. <https://www.uwsp.edu/wp-content/uploads/2023/11/leaf-9-12-careers-exploration.pdf>

Related Links

- Shared in background information and throughout the lesson.

Related Links

See additional documents that will need to be included:

- Activity 1: K-5_The Incredible Work of Eloise Gerry_Activity 1
- Student Sheet: Forest Careers in Science and Engineering – Career Flyer
- Visiting Student Sheet: Forest Careers in Science and Engineering

Standards

WISCONSIN STANDARDS FOR CAREER READINESS

- **WCRS.CAR.1** Know how interests, skills, and strengths connect learning to career opportunities in their future.
- **WCRS.CAR.2** Explore multiple career and educational choices to evaluate how they compare and contrast to personal interests and skills.
- **WCRS.LIF.2** Use interpersonal skills to interact with others for positive outcomes and collective success.

WISCONSIN STANDARDS FOR SCIENCE

- **SCI.CC6.e-i** Students understand different materials have different substructures, which can sometimes be observed, and different substructures have shapes and parts that serve functions.
- **SCI.SEP8.e-i** Students use developmentally appropriate texts to obtain scientific and technical information. Students communicate information with others in oral or written formats.
- **SCI.ESS3.C.e-i** Things people do can impact the environment but they can make choices to reduce their impact.



- **SCI.ETS2.B.e-i** Every human-made product is designed by applying some knowledge of the natural world and is built by using natural materials. Taking natural materials to make things impacts the environment.

WISCONSIN STANDARDS FOR ENGLISH LANGUAGE ARTS

- **ELA.RF.3-5** Read grade-level text with purpose and understanding.
- **ELA.R.3-5.1** Locate and refer to relevant details and evidence when explaining what a text says explicitly/implicitly and make logical inferences.
- **ELA.R.3-5.2** Summarize texts.
- **ELA.W.K-5.7** Conduct short inquiry projects that build knowledge about a topic.
- **ELA.W.K-5.9** Recall and use facts from information texts to support reflection and inquiry.
- **ELA.SL.K-5.1** Engage effectively in a range of collaborative discussions with diverse partners on topics and texts, building on others' ideas and expressing one's thinking clearly.
- **ELA.SL.K-5.4** Report on a topic or text with facts and relevant details, speaking clearly at an understandable pace.

Resources

- U.S. Forest Service, Forest Products Laboratory. (17 March 2023). The Remarkable Legacy of Eloise Gerry. U.S. Forest Service. <https://research.fs.usda.gov/fpl/news/featured/remarkable-legacy-eloise-gerry>
- Weger, Travis. (nd) Celebrating Dr. Eloise Gerry Research Scientist. U.S. Forest Service. <https://usda-fs.wistia.com/medias/vn0kbxyux9> or <https://www.fs.usda.gov/learn/our-history/women/dr-eloise-gerry>



WOOD: A SCIENTIFIC WONDER

Activity 1 – Reading Text

THE INCREDIBLE WORK OF ELOISE GERRY

US Forest Service, Forest Products Laboratory, 17 March 2023

Adapted 30 Sept 2024 by Gina Smith – LEAF, Wisconsin’s K-12 Forestry Education Program

Eloise Gerry was a very smart woman who lived in Boston in the early 1900s. When she was growing up, not many women went to college—only about one out of five. Eloise Gerry was one of those women! She went to Radcliffe College for Women which was part of Harvard University.

Eloise studied science with a special focus on forestry. She used microscopes to examine different kinds of wood and what it is made of (**anatomy**). She earned her first degree in 1908. Eloise kept studying until she earned an even higher degree, called a master’s degree, from Radcliffe in 1909.

After finishing college, Eloise wanted a job where she could use what she learned. At the same time, the United States Forest Service started the Forest Products Laboratory at the University of Wisconsin in Madison. In 1910, Eloise saw an ad that said the lab wanted to hire someone to **research** (study) the anatomy of different types of wood. This was exactly what Eloise had learned how to do! But, in the early 1900s, most places only wanted to hire men. Eloise applied for the job anyway. When no man wanted the job, the Forest Products Lab hired Eloise. She became the first female research **scientist** to work for the United States Forest Service.

When Eloise started working at the Forest Products Lab, she collected wood from all around the United States. She cut thin samples from each piece and examined its anatomy with a microscope. She also studied **properties of wood** to see how strong, flexible and long-lasting the wood was. These samples of wood were the start of the wood anatomy collection at the Forest Products Lab.

In 1916, Eloise told her boss that she wanted to research wood outside the lab too. She was allowed to travel to places like Alabama, Florida, Georgia, Louisiana and Mississippi. Eloise did a lot of research on Southern pine trees and how they were used to make **turpentine**.

Turpentine comes from **resin** which is found in the bark of pine trees. Resin is thicker and stickier than sap. Some people call it “pitch”. Only certain trees, like pine, fir and cedar, make resin. Turpentine is used in products that help make paint thinner and easier to use. It is also added to cleaners, soaps, perfumes and Vicks VapoRub to give them a scent. Eloise’s research on Southern



pine trees and turpentine helped people learn how to collect resin from pine trees in ways that didn't hurt the trees as much.

Because the Forest Products Lab was at the University of Wisconsin, Eloise was able to go back to college to learn more. She studied **botany** (plants) and earned a doctorate degree, the highest degree possible, at the University of Wisconsin, in 1921.

Eloise worked at the Forest Products Lab for many years. Her wood research made many things built from wood better—even supplies used by the army and navy during World War I and World War II. Eloise wrote many books and papers so others could learn from her work.

Friends and people who worked with Eloise said she was kind and that she loved kids and dogs. She gave tours of the Forest Products Lab to children and even wrote stories for children. Eloise stopped working in 1954 and died in 1970. Eloise was not forgotten though. In 2022, Eloise was added to the Florida Society of American Foresters Hall of fame for all the great work she did. She was the first woman in history to get this honor.



The Incredible Work of Eloise Gerry

Accomplishments of Eloise Gerry	Character Traits of Eloise Gerry



WOOD: A SCIENTIFIC WONDER

Forest Careers in Science and Engineering – Visiting Student Sheet

Career	What is most interesting about this career?	What skills do I have that would help me do well in this career?



WOOD: A SCIENTIFIC WONDER

Forest Careers in Science and Engineering – Assessment – Career Flyer

JOB TITLE & PICTURE

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JOB DESCRIPTION

What does a person with this job do?

--

SKILLS NEEDED

What skills or character traits are needed for this job?

--

WHAT MAKES THIS A GREAT CAREER?

--