CONSERVATION IN THE FIELD

Careers Where the Land Leads

The National Association of Conservation Districts | 2026 Careers in Conservation Guide

ABOUT THIS GUIDE

Conservation in the Field, Careers where the Land Leads was developed by the National Association of Conservation Districts (NACD) to introduce high school students to career opportunities in conservation. This guide highlights real-world job roles supported by local conservation districts and the Natural Resources Conservation Service (NRCS), with a focus on land stewardship, resource management, and community-based service.

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Cover Image: Digital artist rendition inspired by the **2024 NACD Photo Contest *"Conservation in Action"*** adult division winner. Photograph submitted by: Holly S. Dyer, Laramie Rivers Conservation District. Albany County, Wyoming

LAND, LEADERSHIP AND CAREERS IN CONSERVATION

In the 1930s, poor land management practices and years of drought led to one of the most damaging agricultural crises in American history. Known as the Dust Bowl, this period was marked by severe wind erosion that stripped the Great Plains of its topsoil. Productive farmland turned barren, crops failed, and thousands of families were forced to abandon their land. Soil scientist Hugh Hammond Bennett became a national figure during this time, urging lawmakers and landowners to take action. He argued that with better land management and practical conservation, such devastation could be prevented.

In response, the federal government created the Soil Conservation Service in 1935. This agency, now known as the Natural Resources Conservation Service, or NRCS, began working with farmers and ranchers to apply proven conservation practices that reduced erosion and improved the health and productivity of the land. Bennett also believed that conservation should be led by local people who understood the land best. As a result, states began establishing conservation districts, which brought local leadership and technical assistance together to meet the specific needs of each area.

In 1946, the National Association of Conservation Districts, or NACD, was formed to support these local districts and provide a unified national voice for their efforts. The partnership between NRCS, local conservation districts, and NACD remains one of the most effective models for voluntary conservation in the country. Together, they work to help landowners manage natural resources in a way that supports agriculture, protects infrastructure, and keeps land productive for future generations.

This work depends on a wide variety of careers. Engineers, soil scientists, conservation planners, foresters, rangeland specialists, and technicians are central to helping landowners and communities carry out effective conservation. These professionals design systems, analyze land conditions, and apply practices that make a measurable difference. In addition to fieldwork, careers in administration, communications, data management, and outreach play a key role in supporting conservation programs. Whether working directly on the land or behind the scenes, these careers contribute to a lasting legacy of service and land stewardship across the United States.

SOIL SCIENTIST

$50,000 – $98,000

EDUCATION

Bachelors Degree
Graduate/Post Graduate Degree

CAREER PATHWAY

High School Diploma
↓
College Degree in Soil Science or Environmental Science
↓
Soil Scientist
Soil Analyst
Land Use Planner

Soil scientists with NRCS study and evaluate the soils that support our nation's farms, forests, and communities. They classify soil types, analyze their properties, and map how soils vary across the landscape. Their work helps determine how land can be used responsibly for agriculture, conservation, and development. By understanding soil structure, composition, and behavior, they provide critical information for planning conservation practices.

These scientists collect soil samples in the field, conduct laboratory tests, and use tools like GIS and satellite imagery to interpret data. They also monitor changes in soil conditions caused by erosion, moisture, and land use.

A career as a soil scientist is ideal for those who are curious about the natural world and enjoy working both outdoors and with data. This role blends science, technology, and environmental stewardship. Soil scientists play a vital part in protecting our natural resources by helping landowners and agencies make informed decisions that sustain healthy soil and productive land across the United States.

Soil scientists often work with engineers, agronomists, and conservation planners to guide decisions about farming practices, water management, construction, and habitat restoration.

SKILLS

Observation
Environmental Science
Data Analysis

WORK LIFESTYLE

Full-time
Field and Office
Laboratory work

ENGINEER

$62,000 - $133,000

EDUCATION
Bachelors Degree

CAREER PATHWAY

High School Diploma
↓
College Courses
↓
Land Surveyor
Geologist
Environmental Engineer

Engineers at NRCS design and implement conservation solutions that protect natural resources and support working lands. They evaluate land conditions, survey sites, and develop construction plans that address both environmental and agricultural goals. Their work connects scientific knowledge with practical application, involving close collaboration with soil scientists, conservationists, and technicians to ensure each project meets technical standards and sustainability objectives.

SKILLS

Problem Solving
Math
Technology

WORK LIFESTYLE

Full-time
Field and office

These professionals design and oversee a wide range of structures, including irrigation systems, dams, streambank stabilizations, and erosion control features. Applying principles from civil and environmental engineering, they use their expertise in physics, mathematics, and design to address complex challenges. Their job balances fieldwork—such as inspecting job sites and monitoring progress—with office responsibilities like drafting technical drawings, modeling systems, and preparing project documentation.

If you enjoy problem-solving and have a passion for math, science, and technology, engineering could be a fulfilling path. NRCS engineers make a direct impact by helping communities conserve soil and water, improve land productivity, and enhance environmental resilience. Their work supports sustainable agriculture and natural resource protection for current and future generations.

Beyond the core responsibilities, engineering careers at NRCS offer the chance to specialize in areas like hydrology, structural systems, or geotechnical analysis. Engineers may assist in disaster recovery efforts, develop innovative water management strategies, or help restore wetlands. This career path blends public service with technical achievement, offering long-term professional growth and the opportunity to make a lasting difference across America's landscapes.

SOIL CONSERVATIONIST

Soil Conservationists with NRCS and conservation districts help landowners manage soil and water resources on private, public, and working lands. They assess erosion risks, soil health, and water movement to develop conservation plans tailored to each property. Their goal is to protect natural resources while supporting sustainable agriculture and land use practices.

They work closely with farmers, ranchers, and local partners to implement practices like cover crops, no-till planting, water management, and nutrient planning.

Soil Conservationists provide guidance on Farm Bill programs and assist with contracts and planning to meet conservation goals and compliance requirements.

$46,000 – $88,000

EDUCATION

Bachelor's Degree in Soil Science, Agronomy, Environmental Science, or a related field

CAREER PATHWAY

High School Diploma
↓
College Degree in Soil or Environmental Sciences
↓
Soil Conservationist
↓
District Conservationist or Area Resource Specialist

This career is well suited for individuals who enjoy fieldwork, environmental problem-solving, and building partnerships.

Soil Conservationists blend science, planning, and outreach to keep soil productive and water clean for generations to come.

SKILLS

Soil Health & Erosion Control
Conservation Planning
Field Surveys & Mapping

WORK LIFESTYLE

Full-Time
Field and Office
Outdoor Work with Travel

FORESTER

Foresters with NRCS and conservation districts manage forested lands for multiple use**s,** including timber production, habitat protection, watershed health, and recreation. They assess the condition of forests, develop management plans, and apply practices that support healthy growth and long-term sustainability. Their work helps landowners make decisions that protect forest resources while meeting economic and land use goals.

SKILLS
Tree and Plant ID
Resource Planning
Data Collection

WORK LIFESTYLE
Full-time
Field and Office
Sun/Skin Protection

Foresters collect data on tree species, age, density, and overall health. They create plans for timber harvest, invasive species control, and reforestation. They often work with landowners to implement practices like thinning, prescribed burning, or tree planting.

Mapping and monitoring forest land over time is also an important part of the job. Foresters often collaborate with soil scientists, conservation planners, and wildlife specialists to balance land use and conservation goals.

A career as a forester is a great fit for individuals who enjoy working outdoors, have strong observation and planning skills, and want to help landowners manage forest lands productively.

This career combines science, fieldwork, and decision-making. Foresters help ensure that forests remain healthy, safe, and productive across private and public lands.

$48,000 – $90,000

EDUCATION
Bachelor's Degree in Forestry or a related field

CAREER PATHWAY

High School Diploma
↓
College Degree in Forestry or Natural Resources
↓
Forester
Timber Specialist
Forest Planner

Forest conservation is often represented by familiar symbols or mascots that promote care and responsibility for the land. While NRCS foresters may not wear the same uniforms or use the same imagery seen in public campaigns, they share the same commitment to healthy, sustainable forests.

NRCS foresters work primarily on private and working lands, offering technical support and conservation planning. Though their role is less visible, they actively collaborate with public land agencies to protect and manage forest resources nationwide.

RANGELAND MANAGEMENT SPECIALIST

$46,000 – $88,000

EDUCATION

Bachelor's Degree in Rangeland Management or Natural Resources

CAREER PATHWAY

High School Diploma
↓
College Degree in Rangeland or Natural Resources
↓
Rangeland Management Specialist
Grazing Planner
Land Resource Advisor

SKILLS

- Plant Identification
- Grazing Planning
- Field Data Collection

WORK LIFESTYLE

- Full-time
- Primarily Field-Based
- Outdoors with Seasonal Travel

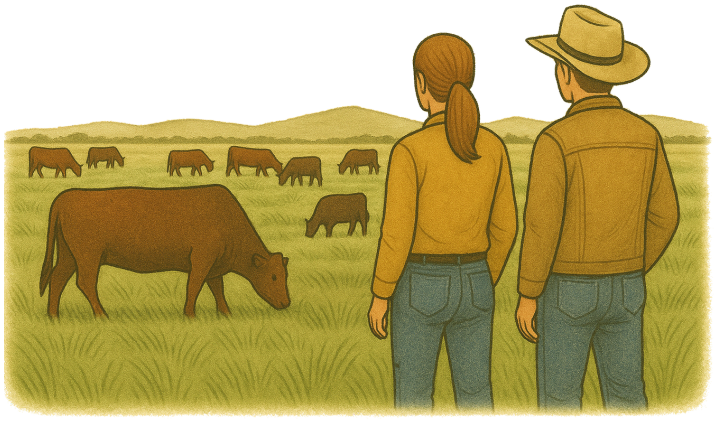
Rangeland Management Specialists design and oversee sustainable grazing systems that help maintain healthy landscapes for both livestock and wildlife. They create rotational grazing plans, develop strategies for distributing water across rangelands, and manage invasive plant species that threaten native ecosystems.

These specialists conduct field surveys and plant sampling to evaluate soil conditions, forage quality, and vegetation health. Their assessments help determine how many animals the land can support without causing long-term damage.

They work closely with ranchers, landowners, and tribal land managers to develop conservation plans that include fencing layouts, replanting efforts, and water source development. Rangeland Management Specialists also collaborate with soil scientists, engineers, and conservation technicians to ensure plans are practical, science-based, and tailored to the local environment.

This career is ideal for individuals who enjoy working outdoors, have an interest in plant science and livestock systems, and want to contribute to the long-term sustainability of natural resources.

Many Rangeland Management Specialists are responsible for managing extensive areas of open land, sometimes covering millions of acres, making it one of the most far-reaching land-based conservation careers in the United States.



URBAN CONSERVATIONIST

$46,000 – $88,000

EDUCATION

Bachelor's Degree in Environmental Science, Natural Resource Management, or a Related Field

CAREER PATHWAY

High School Diploma
↓
College Degree in Environmental or Natural Resources
↓
Urban Conservationist
↓
Resource Conservation Planner or Program Coordinator

Urban Conservationists work with landowners, schools, community groups, and local governments to create conservation plans in developed areas. They help manage stormwater, improve soil health, support urban agriculture, and promote green infrastructure like rain gardens and native plantings.

They assist with planning and applying practices that reduce runoff and pollution, conserve water, and increase access to healthy green spaces.

Their work supports community goals around clean water, food access, and sustainable development. Urban Conservationists also help communities navigate Farm Bill programs and deliver technical support.

They often collaborate with engineers, biologists, and planners to design and implement site-specific solutions. Urban Conservationists also play a key role in educating the public about sustainable land use practices and fostering community stewardship of natural resources.

Urban Conservationists help neighborhoods grow greener, cleaner, and more resilient, bringing nature-based solutions to where people need them most.

This career is great for those who enjoy working with diverse communities and want to make a difference where people live, work, and play. The job blends outreach, science, and planning to improve the health of urban environments.

SKILLS
Soil Health & Urban Agriculture
Stormwater Management
Community Outreach & Education
Native Plant Use

WORK LIFESTYLE
Full-Time
Field & Community-Based
Local Travel

TECHNICIANS

HANDS-ON SKILLED

Behind every successful conservation project is a technician who helped make it happen. Whether it's surveying land for a new streambank restoration, installing a water control structure, or mapping a conservation plan for a farmer's field, technicians are the ones who bring conservation designs to life.

These careers are skill-bas**ed** and rooted in applied science. Technicians do more than study the land. They walk it, measure it, build on it, and improve it. They turn plans into reality and ensure that conservation practices are installed properly and perform as intended. Their work directly improves soil health, water quality, habitat restoration, and agricultural productivity.

SOIL CONSERVATION TECHNICIAN

SKILLS
Surveying & Design
Soil & Water Practice Installation
Construction Oversight
Agriculture Knowledge

WORK LIFESTYLE
Full-Time
Primarily Field-Based
Local Travel

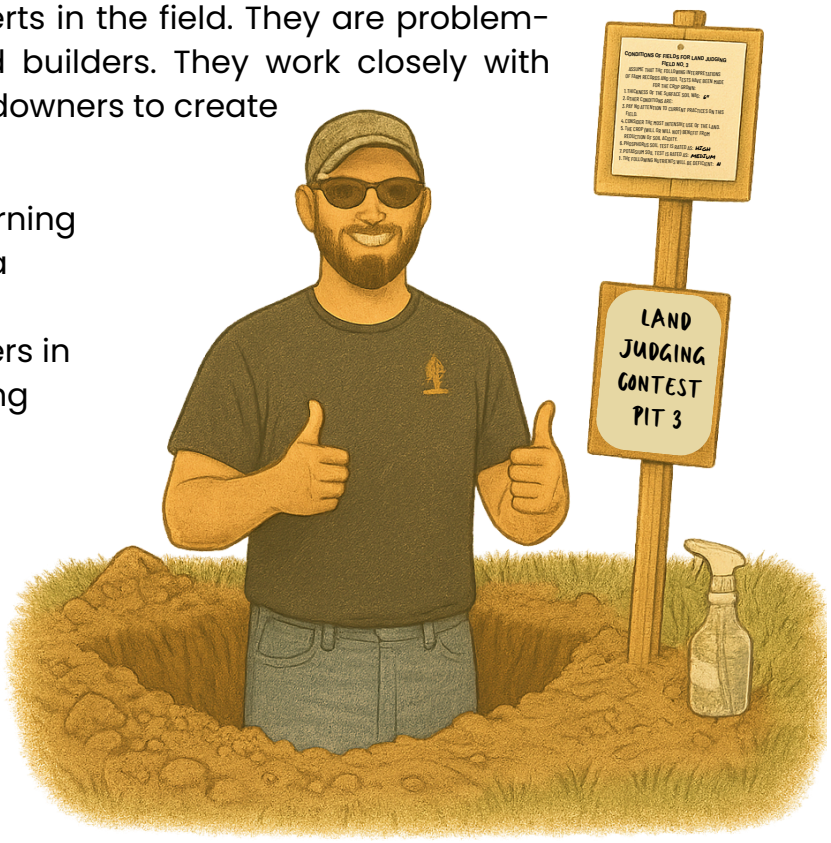
ENGINEER TECHNICIAN

SKILLS
Surveying & Drafting
Engineering Calculations
Project Inspection
Mapping & Cross-Sections

WORK LIFESTYLE
Full-Time
Office & Field
Travel for Project Oversight

Technicians are trusted experts in the field. They are problem-solvers, data collectors, and builders. They work closely with engineers, planners, and landowners to create long-lasting results.

For individuals who enjoy learning by doing and want to make a meaningful impact on the environment, technical careers in conservation offer a rewarding and essential path forward.



Conservation Technicians are involved in all kinds of hands-on work. You might even catch them helping dig soil pits for your land judging contest!

SOIL CONSERVATION TECHNICIAN

Soil Conservation Technicians with NRCS work directly with farmers, ranchers, and landowners to put conservation practices into action. They survey land, help design conservation systems, and ensure everything is installed to quality standards. From contour farming to buffer strips and waterways, technicians ensure that every inch of a plan works on the ground.

This position is ideal for those who enjoy working outdoors, operating equipment, and helping people solve environmental problems on their land.

It's a rewarding career where your daily work improves soil health, prevents erosion, and restores natural resources.

$40,000 – $65,000

EDUCATION

Associate Degree or experience in Agriculture, Environmental Technology, or a Related Field

CAREER PATHWAY

High School Diploma
↓
Technical or On-the-Job Training
↓
Soil Conservation Technician
↓
Soil Conservationist or Resource Specialist

ENGINEERING TECHNICIAN

Engineering Technicians with NRCS assist in designing and constructing conservation solutions. They collect and map land data, prepare engineering drawings, and assist in laying out construction features like terraces, dams, and stream crossings. They often serve as field inspectors, helping ensure safety and durability during implementation.

This role combines fieldwork and technical drawing, using math, computers, and observation to support engineering teams.

It's a great fit for someone who enjoys detail-oriented projects, outdoor work, and building long-term solutions for conservation.

$45,000 – $70,000

EDUCATION

Associate Degree, Experience in Drafting, Surveying, Construction Technology, or Engineering Fields

CAREER PATHWAY

High School Diploma
↓
Technical or On-the-Job Training
↓
Engineering Technician
↓
Civil Engineering Tech or Design Lead

CAREER EXPLORATION TOOLKIT

Connecting Students to Careers in Natural Resource Conservation

The Career Exploration Toolkit is designed to help educators introduce students to real-world careers in conservation—careers that protect our land, water, forests, and wildlife. Whether students are building models, analyzing data, or designing community projects, each activity in this toolkit connects directly to the work of professionals who solve environmental challenges every day.

From soil scientists and conservation technicians to urban planners, foresters, and engineers, this guide helps students understand the wide range of roles involved in managing and protecting natural resources. The toolkit supports project-based learning, encourages critical thinking, and builds awareness of career paths in conservation, including those at agencies like the Natural Resources Conservation Service (NRCS), conservation districts, and local environmental organizations.

What's Inside:

- Ready-to-use career-based projects with real-world tasks
- Guest speaker tools to bring professionals into the classroom
- Worksheets, planning templates, and reflection prompts
- Activities aligned with community needs and conservation goals
- Opportunities for students to develop public speaking, problem-solving, and collaboration skills

How to Use This Toolkit:

- Integrate one project at a time or use several across a full unit
- Invite local conservation professionals to visit your class
- Use worksheets and presentations to build a career fair or capstone event
- Encourage students to explore how their personal interests align with conservation work

Who It's For:

This toolkit is designed for grades 9–12 and can be used in science, environmental studies, CTE, agriculture, or social studies classrooms. It's also ideal for 4-H groups, FFA chapters, scout troops, or informal conservation district education programs.

HANDS-ON PROJECTS FOR CONSERVATION CAREERS

INTRODUCTION TO THE LESSON PLANS

This chapter offers a collection of flexible and hands-on lesson plans to help high school students explore real-world careers in natural resource conservation. Designed for use in a variety of educational settings, including traditional classrooms, Career and Technical Education (CTE) programs, and field-based instruction, each module connects students with the daily work of conservation professionals.

Each career module includes:

- A concise career overview
- Three to four hands-on projects aligned with actual job duties
- Career exploration tools, such as mock interviews and pathway research
- Discussion prompts, vocabulary, and optional student worksheets

How to Use This Chapter: The lesson plans follow a suggested five-day instructional flow but can be adapted to meet the needs of your schedule, program, or setting.

Day 1: Introduction & Engagement
Start with classroom discussion, vocabulary, and a video or presentation highlighting the featured conservation career.

Day 2–3: Project-Based Learning
Engage students in one or more hands-on projects that reflect tasks performed by professionals in the field.

Day 4: Career Exploration
Facilitate role-play interviews, career pathway research, and student presentation preparation activities.

Day 5: Guest Speaker or Peer Showcase
Invite a local conservationist or host a classroom career fair or student showcase.

Implementation Options

- Traditional Classrooms: Use as individual or group assignments supported by class discussion and journaling.
- CTE Programs: Integrate with agriculture, environmental science, or engineering tech coursework aligned to program standards.
- Field-Based Programs: Partner with local conservation districts or use the activities as the basis for outdoor labs and site visits.

These lessons are designed to be engaging, adaptable, and grounded in real conservation work—providing students with valuable insight into careers that protect and sustain our natural resources.

TABLE OF CONTENTS FOR CAREER MODULES

Career Connection: Soil Scientist, Soil Conservationist, Soil Technician
Estimated Time: 45–60 minutes
Group Size: Pairs or small groups of *three to four* students

Objective: Students will simulate the effects of rainfall on both bare and protected soil to understand how erosion occurs and explore conservation practices that help reduce erosion and retain soil.

Materials (per group):

- Shallow plastic tray (paint tray or foil pan)
- Sand, soil, and small rocks
- Optional: grass clippings, shredded paper, or fake turf
- Mulch (straw, leave**s, or** pine needles)
- Water bottle with holes in lid (to simulate rain)
- Ruler or measuring stick
- Paper towels or runoff catch bin
- Student worksheet or notebook for observations

Instructions:

- Construct the Soil Landscape: Fill one end of the tray with a base of gravel, then cover with layers of soil and sand to form a small slope or hill. Leave the surface bare for the initial test to represent a field with no erosion protection.
- Simulate Rainfall: Slowly pour water from the perforated water bottle over the top of the slope to simulate rainfall. Observe what happens to the soil. Look at how much soil moves and how muddy the runoff becomes.
- Implement Erosion Control: Rebuild the slope and repeat the simulation using different materials—mulch, grass clippings, small rocks, or combinations of these. Be sure to change only one variable at a time so that each material's effectiveness can be tested separately.
- Compare Results: Measure and compare the amount of soil movement and the clarity of the runoff water for each version. Students may record soil displacement using a ruler or take qualitative notes based on visual observation.
- Optional Extension: Introduce a time-based variable—how long does it take for erosion to begin under each condition? Or test the impact of a more intense rainfall simulation.

Discussion Questions:

- Which erosion control method worked best? Why?
- What real-world conservation practices are similar to the methods you tested?
- How do soil conservation professionals apply these principles to prevent erosion on farms, construction sites, or natural areas?
- What are the consequences of uncontrolled soil erosion in areas with heavy rain or wind?

Student Reflection Prompt:
Based on your observations, explain why managing erosion is critical in conservation work. What role do conservationists and technicians play in protecting the land?

Career Connection: Soil Scientist, Soil Conservationist, Soil Technician
Estimated Time: 45 minutes ***Group Size: Individual or pairs***

Objective: Students will explore the physical structure of soil by analyzing a soil profile. They will identify and label distinct layers (horizons) and examine the properties of each to understand how soil depth, composition, and color affect plant growth and land use.

MATERIALS

- Clear containers or soil profile boxes (optional: 2-liter bottles cut lengthwise)
- Soil samples from different locations (or pre-layered jars)
- Sand, clay, topsoil, compost, and gravel (for demonstration)
- Spoons or scoops
- Paper towels or table covers
- Graph paper or printed soil profile worksheet
- Colored pencils
- Reference chart of soil horizons (A, B, C, O, R)

Instructions:

1. Construct or Observe a Soil Profile: Provide students with a pre-assembled soil jar showing multiple layers (sand, clay, topsoil, etc.) or allow them to build one themselves using materials that mimic natural soil horizons.
2. Label the Horizons: On graph paper or a printed worksheet, students will draw the layers they observe. They should label each horizon (O, A, B, C, or R), describe its color and texture, and note any organic material or root fragments.
3. Describe Layer Characteristics: Students will identify the role each horizon plays in supporting plant life. For example, the A horizon is typically rich in organic matter, while the B horizon contains minerals leached from above.
4. Soil Sampling Option: If safe and permitted, students may dig a shallow hole outside and observe a real soil profile. They should draw what they see and compare it to the classroom models.

Discussion Questions:

- Which horizon is most important for growing crops or supporting plant life?
- How does the depth of each layer affect land use and conservation planning?
- What do the color and texture of each layer reveal about soil history or health?

Student Reflection Prompt:
Describe what you learned from observing and drawing a soil profile. How does understanding soil layers help conservationists make decisions about farming, forestry, and construction?

Career Connection: Soil Scientist, Soil Conservationist, Soil Technician
Estimated Time: 60 minutes Group Size: Small groups (2-4 students)

Student Reflection Prompt: Students will evaluate soil health by testing for pH, texture, and organic content. They will compare samples and recommend conservation strategies to improve soil quality for farming, landscaping, or habitat use.

Instructions:

- Collect Soil Samples: Have students gather small samples from at least two locations. Encourage them to label each sample and note the collection site (e.g., near a tree, in the garden, along a sidewalk).
- Test pH Levels: Mix soil with distilled water in a cup and insert pH strips according to package directions. Students should record the pH level and note whether the soil is acidic, neutral, or alkaline.
- Observe Texture and Color: Using dry samples, students will feel the soil between their fingers and classify it as sandy, loamy, or clay-based. They can also note the color, smell, and any presence of organic material.
- Analyze Organic Matter (optional): Use a basic test (such as observing how quickly soil settles in a jar of water) or discuss visible clues like plant debris or insect activity. A higher presence of organic material often means better soil health.
- Compare and Evaluate: Students will compare data between locations and determine which sample is the healthiest. They will then brainstorm and list conservation practices to improve less healthy samples, such as composting, using cover crops, reducing tillage, or managing water runoff.

Discussion Questions:

- What did your pH results reveal about the soil?
- Why is soil texture important in conservation planning?
- How do land use and location affect soil health?
- What would happen to plants or water quality if soil health declines?

Student Reflection Prompt:

- Based on your test results, which soil was the healthiest and why?
- What conservation methods would you recommend to improve soil in the sample that scored lowest?

Materials:

- Soil samples from various locations (schoolyard, garden, roadside, etc.)
- Soil health test kits or pH strips
- Plastic or paper cups
- Popsicle sticks or plastic spoons for stirring
- Distilled water
- Zip-top bags for collecting soil
- Optional: magnifying glasses or digital scales
- Data recording sheets or a soil testing worksheet

COVER CROP OR RAINWATER RUNOFF MODEL

Career Connection: Soil Scientist, Soil Conservationist, Soil Technician
Estimated Time: 45–60 minutes Group Size: Small groups (2–3 students)

Objective: Students will explore how cover crops and vegetation impact soil health and prevent erosion. They will either design a crop rotation plan that includes cover crops or build a model to demonstrate how vegetation reduces runoff.

COVER CROP PLANNING (DESIGN-BASED PROJECT)

MATERIALS

- Graph paper or printed field layout sheets
- Colored pencils or markers
- Reference sheet with examples of cover crops (e.g., rye, clover, radishes)
- Access to internet or handouts for research

Instructions:

- Provide students with a field diagram and ask them to plan a year-round cropping schedule for a small farm.
- Students should choose one or more cover crops to include in the rotation and explain why.
- The design should label the planting timeline and include conservation benefits (e.g., reducing erosion, adding nitrogen, suppressing weeds).
- Students present their plans to the class or in small groups, explaining their conservation reasoning.

Discussion Questions:

- What are some benefits of planting cover crops between growing seasons?
- How do cover crops improve soil structure and fertility?
- Why might a farmer choose one cover crop over another?

RAINWATER RUNOFF MODEL (HANDS-ON DEMONSTRATION)

Instructions:

- Set up two sloped trays. Leave one bare to represent exposed soil and cover the other with grass, mulch, or other vegetation.
- Pour equal amounts of water on each tray to simulate rainfall.
- Observe how water moves across each surface.
- Measure how much runoff collects and note how much soil is displaced.
- Compare the differences in water clarity, erosion, and flow rate between the two.

MATERIALS (PER GROUP)

- Two plastic trays or shallow containers
- Soil, grass clippings or turf, and mulch
- Water bottles with holes to simulate rainfall
- Protractor (optional, to angle trays evenly)
- Rulers, paper towe**ls,** or catch bins
- Notebook or worksheet

Discussion Questions:

- Which surface had more runoff and soil loss?
- How does vegetation slow water movement and protect the soil?
- What conservation techniques mimic what you saw in this model?

Career Connection: Soil Scientist, Soil Conservationist, Soil Technician
Estimated Time: 45 minutes Group Size: Pairs

Objective: Students will simulate a job interview for a soil-related conservation career to practice communication skills, deepen their understanding of the profession, and learn about real training pathways and certifications.

Instructions:

- Pair Up and Assign Roles: One student will act as the interviewer and the other as the job candidate. Assign roles or let students choose which soil career they will "apply" for: Soil Scientist, Soil Conservationist, or Soil Technician.
- Conduct the Interview:
  - The interviewer will ask questions based on a provided list or ones they create. Encourage thoughtful, career-specific responses. After 10–15 minutes, students will switch roles and repeat the interview.

Materials:

- Printed interview question sheets (or whiteboard with prompts)
- Career summary handouts for Soil Scientist, Soil Conservationist, and Technician roles
- Student notebooks or reflection sheets
- Internet access or printed guides for NRCS, USDA Pathways, or community college programs (optional)

Sample questions might include:

- What interests you about working in soil conservation?
- What education or experience have you had related to soil science?
- What is one conservation practice you believe is most important?
- How would you work with a landowner to improve soil health?

Explore Training Pathways: After the interview, students will research or be provided with brief overviews of real-life education and certification options. These might include:

- USDA NRCS Pathways internships, Community college or trade certifications in agriculture, environmental tech, or engineering.
- Bachelor's degrees in soil science, agronomy, or natural resource management.
- Technician training programs in surveying, drafting, or fieldwork.

Reflect on Career Fit: Students will answer written prompts to help them evaluate which soil career best matches their interests and strengths.

- **Discussion Questions:**
  - Which soil career role seemed the most interesting to you and why?
  - What surprised you about the education or certification requirements?
  - How can these roles make a real difference in local communities?

Student Reflection Prompt: *"After completing the role-play and reviewing career pathways, which soil conservation role would you most like to pursue and what steps would you need to take to get there?"*

ADDITIONAL PROJECT RESOURCES
NATURAL RESOURCES CONSERVATION SERVICE

A Soil Profile
Build a model of a soil profile using colored paper, felt, or natural materials layered to represent O, A, B, and C horizons. Label each layer and describe its function. Optional: Use clear jars to layer real soil samples.
Explore more: **NRCS Soil Horizons Guide**

Color of Soil
Compare wet and dry soil samples and describe the colors using your own words. Discuss how soil color can indicate organic matter, moisture, or mineral presence. Record observations and share findings.
Explore more: **NRCS Soil Color Resources**

Texture by Feel
Use the NRCS "Texture by Feel" method to determine whether your soil sample is sand, silt, clay, or loam. Follow the step-by-step guide to make ribbons and test stickiness. Record your classification.
Explore more: **NRCS Texture by Feel Guide (PDF)**

Soil Crayons
Use NRCS soil crayons (or a printable version) to color a soil horizon diagram or draw native plants in their matching soil zones. Compare crayon colors to real samples if available.
Explore more: **NRCS Soil Crayons**

Painting with Soil
Crush and sift dry soil from different locations to create natural pigments. Mix with a small amount of water or glue and paint a landscape or conservation scene. Label your colors with their location and composition.
Explore more: **NRCS Painting with Soil**

Munsell Soil Color App
Use the Munsell Soil Color Book or the free Munsell Soil Color App to identify hue, value, and chroma of various soil samples. Record and compare the color data between different locations.
Explore more: **Munsell Soil Color Tools**

Career Connection: Rangeland Management Specialist or Soil Conservationist
Estimated Time: 45–60 minutes Group Size: Individual or pairs

Objective: Design a grazing system that balances livestock needs with land conservation and promotes soil health.

Instructions:

- Begin by reviewing basic concepts of rotational grazing paddocks, rest periods, forage regrowth, and animal units per acre.
- Provide students with a blank "ranch" layout or allow them to design their own. They must divide the ranch into 4–8 paddocks and include a water source and fencing layout.
- Based on the scenario (e.g., 20 cow-calf pairs, 60 acres of pasture), students will calculate grazing days per paddock, rest periods, and needed rotations to avoid overgrazing.
- Students annotate their maps and explain their decision-making process.

MATERIALS:

- Graph paper or field layout template
- Colored pencils or markers
- Forage growth charts or grazing guide
- Calculators
- Scenario handout describing livestock needs and land acreage

Discussion Questions:

- How does rotational grazing help maintain healthy soil and plants?
- What signs would tell you a paddock has been overgrazed?
- How can grazing systems be adjusted or adapted to account for drought or low forage growth?
- In what ways does planning benefit the environment, livestock, and the landowner, including potential cost savings and long-term financial benefits?

Student Reflection Prompt:

What part of your plan do you think would be most difficult to implement in real life and why?

Extra Credit Activity: Grazing Budget Challenge

Using their grazing plan, students calculate the estimated cost of fencing, water troughs, and reseeding if needed. Provide cost-per-foot estimates or have them research prices. Students can write a short cost-benefit summary explaining how investing in rotational grazing may save money over time by improving pasture health and reducing feed costs.

Career Connection: Rangeland Management Specialist or Soil Conservationist
Estimated Time: 30–45 minutes Group Size: Individuals or small teams

Objective: Identify and evaluate plant species found on rangelands and understand their ecological roles in supporting sustainable land use.

Instructions:

- Introduce students to the importance of monitoring plant species on grazing lands. Review terms such as “desirable forage,” “invasive species,” “ground cover,” and “native plants.”
- Provide a sample set of plant photos or arrange for outdoor observation. Students record common name, growth form (grass, forb, shrub), and classification (native, non-native, invasive).

MATERIALS:

- Local plant identification guide books or cards
- Printed plant monitoring logs or checklists
- Field access or plant photo sets for classroom simulation
- Magnifying glasses
- Clipboard or notebook for field notes

- Have students reflect on each plant’s function. Does it support grazing, help prevent erosion, or indicate land overuse or degradation?
- Encourage students to consider how plant diversity relates to rangeland health and land management decisions.

Optional Extension:

Conduct a transect survey using string or a meter tape. Students tally each species found at fixed intervals along a 10-meter line and compare diversity between locations.

Discussion Questions:

- Why is it important to have a diverse mix of plants in rangeland ecosystems?
- What are indicators of healthy versus declining vegetation on rangelands?
- How might seasonal changes or land use affect plant diversity?

Student Reflection Prompt:

Choose two plants you observed and describe their characteristics and ecological role. How would the presence or absence of these plants affect grazing or conservation planning? What surprised you about what you observed or identified?

INVASIVE SPECIES CONTROL STRATEGY

Career Connection: Rangeland Management Specialist or Soil Conservationist
Estimated Time: 45 minutes Group Size: Individual or partners

Objective: Develop a realistic strategy to manage invasive plant species on rangeland and understand their impact on land health and biodiversity.

MATERIALS:

- Internet access or printed species profiles
- Region-specific invasive species lists
- Planning worksheets or poster paper
- Colored pencils or digital design tools
- Sample photos or press clippings showing invasive species in the field

Instructions:

- Students research one or two invasive plant species common within their conservation district, state, or region.
- For each species, they will identify how it spreads, the environmental damage it causes, and the specific challenges it creates for grazing, native wildlife, and land restoration.
- Students develop a detailed, step-by-step management plan that includes:
  - Early detection strategies
  - Mechanical, biological, or chemical control options
  - Follow-up restoration actions (e.g., reseeding with native forage)
  - A community or landowner outreach plan to support implementation
- Projects are presented in either poster format or as a digital slide deck with visuals and action steps.

Discussion Questions:

- Why do invasive species spread so quickly in rangeland ecosystems?
- What ecological services are lost when invasives dominate a landscape?
- How do rangeland management specialists balance short-term control with long-term land recovery?
- What makes a management strategy more successful when working with private landowners?

Student Reflection Prompt:

Which invasive species surprised you most and why? How would your control plan improve conditions for both livestock and wildlife? What was the most difficult part of creating a long-term strategy?

Bonus Challenge:

Research a successful real-world invasive species control project in your region. Summarize who led the effort, what techniques were used, and what results were achieved. Share your findings with the class or include them in your presentation.

Career Connection: Rangeland Management Specialist or Soil Conservationist
Estimated Time: 60 minutes Group Size: Teams of 3–4 students

Objective: Evaluate a rangeland site's condition based on environmental indicators such as soil stability, vegetation cover, forage availability, and water movement.

Instructions:

- Assign student teams to a designated "range site." This can be a physical outdoor plot, a sandbox or garden bed, or a classroom simulation using printed indicators and diagrams.

MATERIALS:

- Rangeland monitoring worksheet or scoring rubric
- Simulated outdoor site, sandbox, or classroom layout with vegetation and soil indicators
- Measuring tapes or stakes to mark boundaries
- Clipboards, notebooks, and optional tools like rulers or protractors
- Printed visuals or zone markers for classroom simulation (if outdoors is not available)

- Each team assesses the site using four main indicators:
  - Soil erosion: Look for signs of bare ground, surface crusting, erosion gullies, or slope instability that may affect root systems.
  - Vegetative cover: Rate the plant density, species diversity, and the percentage of ground covered by vegetation or organic material.
  - Forage availability: Note the type, quality, and spatial distribution of available grazing plants across the site.
  - Water flow and infiltration: Identify signs of soil compaction, surface pooling, or excessive runoff that could impact plant growth or water retention.
- Teams use a simple 1–5 scale (or customized rubric) to score each category and justify their ratings with written or verbal observations.
- Based on their assessments, each group develops a short list of practical recommendations to improve or maintain rangeland health—such as adding rest periods, reseeding, or improving water access points.

Discussion Questions:

- What patterns or problem areas did your team observe across the site?
- How do poor soil and water conditions impact grazing animals and vegetation recovery?
- What are the first signs of overuse or degradation on a rangeland?
- How could your recommendations improve long-term productivity and resilience?

Student Reflection Prompt:

- Describe the most critical issue you found at your site. What conservation actions would you prioritize, and how would you explain those choices to a landowner?

Career Connection: Urban Conservationist
Estimated Time: 60 minutes Group Size: Small Groups

Objective: Students will work in small groups to design a functional rain garden that manages stormwater runoff, encourages water infiltration, and supports native plants in an urban or school setting.

Instructions:

- Start with a discussion on the role of rain gardens in managing stormwater. Explain how they help prevent flooding, protect water quality, and provide habitat by slowing and filtering runoff. Ask students to select a real or imagined location for their design. Examples may include a corner of the schoolyard, the base of a downspout, or a space along a community sidewalk.
- Students sketch their rain garden on graph paper to scale, choosing a size that makes sense for the location they selected. Encourage designs around ten feet by five feet but allow flexibility.
- Designs should include an entry point for water flow, a clear layout with planting zones, and a mix of native species with shallow and deep root systems for maximum infiltration and resilience.
- After completing their sketches, students write a short description explaining how their garden will function, what plants they selected, and how the design supports local water conservation.
- Host a gallery walk or mini-presentation session where students share their designs and provide feedback to their peers.

Discussion Questions:

- What problems do cities face when too much stormwater overwhelms drains and surfaces?
- Why are native plants a smart choice for this type of garden?
- How does your design model the natural water cycle and filtration processes?

Student Reflection Prompt:
How could adding more rain gardens in your neighborhood or school improve the environment? What would you say to encourage others to build one?

MATERIALS:

- Graph paper or a printed rain garden layout template
- Colored pencils or fine markers
- Native plant guidebooks or digital access for research
- Sample roof or sidewalk runoff maps for context
- Rulers and basic calculators
- Images or slides of real rain gardens for design ideas

Career Connection: Urban Conservationist
Estimated Time: 30 minutes Group Size: Small Groups or partners

Objective: Identify and suggest enhancements for the distribution of green spaces in a developed area using mapping and planning tools.

Instructions:

- Begin by discussing the importance of green spaces in urban areas, highlighting their benefits, such as shade, recreation, biodiversity, stormwater absorption, and social well-being.
- Students will analyze a chosen urban map to identify regions that lack green infrastructure.
- Using their overlays or maps, students will propose 2–3 enhancements to green spaces, including:
  - A pocket park in an unused lot
  - A tree line along a street
  - A community garden situated between apartment buildings
- Each group will annotate their map, detailing the purpose, type of space, and potential beneficiaries.

MATERIALS:

- Printed or digital maps of a neighborhood, school, or city block
- **Transparent overlays** (or tracing paper)
- Colored markers or pens
- Definitions of green spaces (e.g., pocket parks, community gardens, tree rows)
- Tree canopy heat maps or urban planning resources

Discussion Questions:

- Which areas in your city or school community lack access to green spaces?
- How do green areas impact mental and physical health?
- What challenges hinder the creation or maintenance of green infrastructure?

Extension Activity: Green Space Pitch Challenge

Students will pitch their green space improvement or restoration idea to a mock city council or community board. Projects can include rain gardens, native plant parks, pollinator strips, pocket forests, bioswales, or revitalized community plots.

Presentation Should Include:

- Chosen location and justification (e.g., underused schoolyard corner, vacant lot, road median)
- Proposed native plantings or features (trees, shrubs, wildflowers, trails, benches, interpretive signage, etc.)
- Expected environmental and community benefits, such as: Stormwater management, pollinator habitat, urban cooling and shade, mental health and recreational value, educational opportunities

Career Connection: Urban Conservationist, Forester
Estimated Time: 45-60 minutes Group Size: Individual or pairs

Objective: Students will assess current tree canopy coverage in a neighborhood and propose a plan to increase tree cover to improve environmental quality, reduce heat, and enhance urban sustainability.

MATERIALS:

- Access to Google Earth, GIS tools, or local canopy mapping platforms
- Printed aerial or satellite images
- Rulers, calculators, and transparent grid overlays (for image analysis)
- Worksheets for data collection and analysis
- Planting plan template (for digital submission or drawing)

Instructions:

- Discuss the value of urban trees and how tree canopy is measured. Show a sample canopy map and walk through how to estimate the percent cover using aerial images or local observation.

Neighborhood Selection

- Students select a real neighborhood, block, or public space (e.g., schoolyard or sidewalk strip). Using online maps or printouts, they identify:
  - Current tree cover
  - Paved or exposed areas
  - High-priority zones like schoolyards, playgrounds, or low shade areas

Data Collection & Analysis

  - Using a grid overlay, students estimate canopy percentage.
  - Identify areas that would benefit most, such as heat-prone zones.

Plan Development

- Each group creates a simple tree planting plan that includes: Number of trees needed, native species suited to the site, proper spacing, projected benefits. (shade, air quality, stormwater control)

Presentation Format

- Plans can be hand-drawn or digital. A short written summary should explain why the location was chosen and how the trees will benefit the area.

Discussion Questions

- How does tree canopy reduce energy costs and urban heat?
- What challenges exist in maintaining trees in public vs. private areas?
- Why might some neighborhoods lack trees? How can this be addressed fairly?
- How does increased tree cover help with stormwater runoff and soil erosion?

Student Reflection Prompt

"Think about your neighborhood or school. Where could trees make the biggest difference? How would you explain the value of urban trees to someone who thinks they're a nuisance?"

PUBLIC AWARENESS CAMPAIGN

Career Connection: Urban Conservationist (Also Communications Specialist)
Estimated Time: 60–90 minutes - May span multiple class periods if needed
Group Size: Pairs or small groups

Objective: Students will design a campaign to raise awareness about a local urban conservation issue and inspire community action.

Instructions: Students select from the list below or identify an urban conservation issue relevant to their community.

- The importance of planting native species
- Reducing lawn fertilizer use to prevent runoff
- Tree planting and its climate or shade benefits
- Rain gardens and stormwater solutions
- Managing pet waste to protect waterways
- Pollinator-friendly yards
- Urban litter reduction
- Invasive plant awareness

MATERIALS:

- Poster board or Canva/Google Slides
- Internet access for research
- Markers, art supplies (if designing posters)
- Camera phones or video editing tools
- Access to local or regional conservation data

Research the Topic

- Key facts and data through local or national statistics
- Photos, maps, or real examples
- A clear call to action or behavior change

Create the Awareness Product

Choose one (or more) of the following:

- A colorful educational poster for school, library, or city display
- A one-minute social media video or PSA
- A slide deck or digital flyer to present to younger students or the public
- A radio script or podcast segment (optional media version)

Encourage persuasive language, visuals, and a community-specific message.

Share or Present: Groups present their campaign materials to the class or during a school/community event. Campaigns may also be displayed in public spaces, posted online, or submitted to local agencies.

Discussion Questions

- Why is education critical for solving urban environmental issues?
- What messaging techniques make a campaign persuasive or memorable?
- How can young people have a voice in shaping conservation practices?
- What could you do next to take your campaign beyond the classroom?

FOREST SPECIES INVENTORY

Career Connection: Forester
Estimated Time: 45–60 minutes Group Size: Pairs or Small Groups

Objective: Identify and catalog tree species in a forested area or simulated plot to assess biodiversity and evaluate forest health indicators used in conservation and forestry careers.

Instructions:

- Begin with an overview of common tree species in your local region. Use images, field guides, or physical samples to familiarize students with identification techniques.
- Set up a sampling plot outdoors (approx. 33ft x 33ft) or simulate a forest plot in the classroom using stations with labeled tree cards.
- Within each plot, students will:
  - Identify and record tree species
  - Estimate tree height and canopy spread
  - Measure trunk diameter using measuring or diameter tape
  - Observe and note tree health indicators, such as broken limbs, insect damage, or signs of disease
- Students sketch a simple map of the plot on graph paper, marking tree positions and types.
- After completing their inventory, groups summarize their findings by counting total species, noting dominant species, and identifying any notable absences or rare types.

Materials:

- Tree identification guides or field cards
- Clipboards and pencils
- Graph paper or printed data collection sheets
- Measuring tape or diameter tape
- Colored flagging tape or string to mark plot boundaries
- Laminated tree images or sample specimens for indoor simulation

Discussion Questions:

- What does the tree diversity and health in your plot suggest about forest management in this area?
- Which tree species were most common, and what might explain their prevalence?
- How could foresters use this data when making decisions about replanting, harvesting, or thinning?
- What signs of environmental stress or good management did you observe?

Student Reflection Prompt: What did your group learn about the condition of this forest or sample site? If you were advising a landowner, what steps would you suggest based on the species mix and overall health?

Career Connection: Forester
Estimated Time: 45–60 minutes **Group Size: Small Groups**

Objective: Design a practical wildfire prevention plan that reduces risk while balancing public access, habitat protection, and forest health.

Instructions:

- Begin with a class discussion on wildfire risks in forested areas. Review common causes of wildfires, including lightning, campfires, and equipment sparks. Introduce key prevention strategies like fuel reduction, firebreaks, and controlled burns.

Materials:

- Printed forest maps or aerial satellite images
- Colored pencils or fine-tipped markers
- Scenario cards (e.g., hiking area with cabins, wildlife reserve, overgrown trail system)
- Firebreak and fuel management diagram sheet
- Laptops or tablets with simple GIS or mapping tools

- Provide each group with a map and a forest land-use scenario. Their task is to assess the landscape and design a wildfire prevention plan that protects the land, supports safe recreation, and reduces fire risk.
- Student plans should include:
  - Marked firebreak locations that interrupt potential fire paths
  - Zones identified for thinning or prescribed burns
  - Protective buffer areas around structures or campsites
  - Accessible routes for fire response vehicles
- Groups draw and label their plans directly onto the maps. Each group also writes a short explanation of their design decisions, referencing terrain, vegetation, infrastructure, and risk zones.

Discussion Questions:

- What strategies are most effective in reducing wildfire risk in forested areas?
- How does human activity influence wildfire management plans?
- What trade-offs exist when managing both forest health and public safety?
- How might your plan change if the forest experienced several years of drought?

Student Reflection Prompt: What was the most difficult part of creating your wildfire prevention plan? How would you explain your design to a community living near this forest area?

Extension Activity: Simulated Fire Response
Once plans are complete, present a wildfire ignition point on the map. Each group explains how their design would help contain or respond to the fire. Students describe where the fire might spread, which areas are most protected, and how firefighters could respond. This brings a real-world sense of urgency and decision-making to the activity.

Career Connection: Forester
Estimated Time: 60 minutes Group Size: Teams of 4 to 6 students

Objective: Explore how conservation professionals balance competing needs in forested landscapes by simulating a collaborative land-use negotiation among stakeholders.

Materials:

- Forest plot map template with zoning areas, such as wetlands, slopes, and timber stands
- Stakeholder scenario cards, including roles such as logger, hiker, wildlife biologist, tribal leader, forest landowner, and municipal planner
- Forest planning worksheet for group decisions and mapping
- Optional items, such as printed role badges or name tents, for added engagements

Instructions:

- Begin by introducing students to the concept of multiple-use forest management. Discuss the wide range of forest values, including timber production, wildlife habitat, watershed protection, recreation, and cultural significance.
- Assign each student a stakeholder role, ensuring that each team has a mix of priorities and perspectives. Review each role's objectives and concerns.
- As a team, students collaborate to create a forest use plan on the map template. The plan should include:
  - Designated zones for harvesting, recreation, and conservation
  - Planned access routes, such as roads and walking trails
  - Strategies for reducing user conflict and protecting sensitive areas
- Once completed, teams present their final forest plan and explain how it meets the needs of each stakeholder while preserving forest health. Encourage them to describe the process of negotiation and compromise.

Discussion Questions:

- Which roles were the most difficult to accommodate in your group's plan?
- How do real-world foresters manage competing priorities from the public, industry, and conservation groups?
- What compromises or changes helped improve your plan overall?

Student Reflection Prompt: Which stakeholder perspective did you find most persuasive or surprising? What did this simulation teach you about decision-making in conservation?

Extension Activity: Simulated Fire Response

Assign a few students to act as a mock review board, representing the state forestry office. After each group presents, the board asks follow-up questions and evaluates each plan for sustainability, fairness, and feasibility. This helps simulate the process professionals go through when proposing and reviewing forest plans.

CARBON SEQUESTRATION STUDY

Career Connection: Forester
Estimated Time: 60 minutes Group Size: Individual or pairs

Objective: Estimate the amount of carbon stored in trees and explore the role forests play in reducing atmospheric carbon through long-term storage.

Instructions:

- Begin with a brief discussion on carbon sequestration and its importance in regulating Earth's climate. Explain how trees absorb carbon dioxide through photosynthesis and store it in wood and roots.

Materials:

- Tree measurement data sheet or access to trees on school grounds
- Carbon storage formula, using volume times carbon factor or a digital carbon calculator
- Carbon conversion chart by tree species
- Calculators, pencils, and clipboards

- Provide students with tree size data or allow them to measure real trees using diameter tape and height estimates.
- Students calculate the approximate volume of each tree and convert it into carbon stored, using either the chart or a basic carbon storage equation.
- Once individual trees are calculated, students estimate how much carbon a full stand or acre of trees might store based on their sample.
- Encourage students to consider how these numbers scale up in large forests and how management practices affect total storage.

Discussion Questions:

- In what ways do forests function as carbon sinks, and how long can that carbon remain stored?
- Which tree species or forest types are more effective at carbon storage?
- How might foresters or landowners use this kind of data when making land use or restoration decisions?

Student Reflection Prompt: What surprised you most about how much carbon is stored in just one tree? How would you explain the value of forest conservation to someone unfamiliar with carbon sequestration?

Extension Activity: Simulated Fire Response

Give each group a different land use scenario, such as replanting native trees, converting forest to pasture, or preserving an old-growth stand. Students use their calculations to compare how each option affects carbon storage over time. Have students present their scenario to the class and make the case for which choice offers the greatest environmental benefit.

Step 1: Understand the Landowners Goals

- [ ] Reforestation
- [ ] Timber Harvesting
- [ ] Wildlife Habitat
- [ ] Forest Farming
- [ ] Other
- [ ] Fuel Reduction for Wildfire Prevention
- [ ] Invasive Species Control
- [ ] Another
- [ ] Another

What constraints or concerns does the landowner have?

Step 2: Identify Potential Risks

Environmental Risks

Human or Economic Risks

Step 3: Recommended Actions

List 3-5 actions that could help balance goals and reduce risks.

Step 4: Long-Term Considerations

How long will this plan support forest health over time?

How might the plan impact other stakeholders?

Final Proposal Summary (1 Paragraph)

Write a one-paragraph summary of your plan, including main goals, strategies, and why your approach makes sense.

EROSION CONTROL STRUCTURE MODEL

Career Connection: Engineer, Engineering Technician
Estimated Time: 45–60 minutes Group Size: Small groups

Objective: Build a small-scale model of a structure used to prevent soil erosion and evaluate how well it holds up under simulated rainfall. Students will explore real-world solutions used by engineers and technicians in conservation setting.

Instructions:

- Begin by introducing erosion and why it poses a serious threat to landscapes, waterways, infrastructure, and agricultural productivity. Explain how conservation engineers design solutions to reduce runoff, stabilize slopes, and protect soil.
- Present several common erosion control techniques, such as:
  - Terracing Riprap (layered rock barriers)
  - Check dams
  - Silt fences or straw wattles
  - Vegetative buffers
- Each group selects one method and builds a model in a shallow plastic tray using natural and classroom materials, such as soil, clay, sticks, cardboard, rocks, and mesh.
- Simulate rainfall by pouring water from bottles with small holes over the model slope. Observe how the model performs.
- Students record the amount of soil movement, water clarity, and any points of failure.

Materials:

- Cardboard, tape, scissors
- Soil and gravel
- Plastic trays or shallow containers
- Water bottles with small holes
- Mulch, sponge strips, or modeling clay
- Observation worksheets

- Groups may revise and test their models again to improve performance.

Discussion Questions:

- Which model slowed erosion most effectively and why?
- What materials or shapes helped protect the soil best?
- How do your designs reflect real erosion control structures used in conservation engineering?

Student Reflection Prompt:

Why is erosion control essential in conservation work? Based on your test results, describe the role engineers and technicians play in designing practical solutions to protect soil and water.

Career Connection: Engineer, Engineering Technician
Estimated Time: 45–60 minutes Group Size: Individual or pairs

Objective: Create a functioning water filter using natural materials and analyze its ability to remove visible impurities.

Materials:

- One clean 2-liter bottle (cut in half and inverted)
- Cotton balls or coffee filters
- Activated charcoal
- Clean sand and small gravel
- Dirty water sample (muddy water with leaves, soil, etc.)
- Measuring cups or beakers
- Optional: pH strips or turbidity test tools
- Worksheet or lab notebook

Instructions:

- Begin by reviewing how physical and chemical filtration systems work in natural and engineered settings. Discuss the function of each material used in the filter (e.g., sand for sediment, charcoal for impurities, cotton for fine particles).
- Have students layer their filtration materials inside the inverted top of the bottle: cotton or filter at the base, followed by charcoal, then sand, and finally gravel on top.
- Slowly pour the dirty water into the top of the filter and collect the filtered water in the bottom half of the bottle.
- Observe and record changes in water clarity, color, and smell. Optionally, test pH or sediment levels before and after.
- Have students compare different filter setups if materials are rearranged, added, or omitted.

Discussion Questions:

- Which materials removed the most visible debris or discoloration?
- How does this filtration model compare to real-world water treatment systems used in rural or emergency settings?
- What limitations would this type of system have in producing safe drinking water?
- What environmental challenges influence water availability and treatment needs in rural communities?

Student Reflection Prompt: If you had to improve your filter design, what would you change and why? How do you think engineers balance simplicity, cost, and safety when developing water systems for areas with limited infrastructure?

Extension Activity: Design a Portable Filter
Challenge students to redesign their water filter for portability and reuse. They should create a sketch or model suitable for emergency kits or remote fieldwork. Encourage them to think creatively with features like carry handles, replaceable filter layers, or compact storage.
Optional: Host a class showcase where students present their designs and vote on the most practical, creative, or eco-friendly solution.

Career Connection: Engineer, Engineering Technician
Estimated Time: 45–60 minutes Group Size: Pairs or small groups

Objective: Practice basic land surveying and mapping techniques used in conservation engineering projects.

Instructions:

- Begin by explaining the role of surveying in conservation engineering. Discuss how accurate measurements support planning for construction, erosion control, and habitat restoration.

Materials:

- Measuring tapes, meter sticks, stri**ng, o**r twine
- Graph paper or printed plot grids
- Clipboards, pencils, and rulers
- Optional: stakes or cones to mark corners
- Optional: bubble levels or simple leveling tools

- Designate a small plot (indoors or outdoors) for students to survey, ideally 15' x 15' but flexible depending on space.
- Students measure the plot's boundaries, calculate total area and perimeter, and draw the plot to scale on graph paper.
- They map key features within the area, such as trees, pavement, slope direction, or surface materials.
- Optionally, introduce basic elevation or slope mapping using string and a level stretched between two stakes.

Discussion Questions:

- Why is accurate measurement essential in conservation and engineering work?
- What problems might occur if data collection during surveying is incorrect?
- How does land surveying connect to construction, erosion control, or water flow?

Student Reflection Prompt: If you were designing a conservation project for this site, what feature would you improve or protect first and why?

Try This:

Invite each group to name their survey plot and assign it a creative land-use purpose. Possibilities might include designing a wildlife corridor, a small pollinator habitat, a rain garden, or even an outdoor classroom space. Students should consider the features they observed during surveying and how those would influence real-world use of the site.

Once their idea is finalized, each group can give a short "elevator pitch" to the class. In their presentation, they should describe their proposed land use, highlight key measurements and site features, and explain how surveying played a role in shaping their plan. This activity encourages practical thinking, creativity, and real-world application of engineering skills.

STREAMBANK OR DAM MODEL

Career Connection: Engineer, Engineering Technician
Estimated Time: 60 minutes Group Size: Small groups

Objective: Build and test a small-scale model of a streambank stabilization or dam to understand water control and erosion protection techniques used in conservation engineering.

Instructions:

- Begin by discussing the role of conservation engineers in designing systems that manage water flow and reduce erosion. Explain how natural and engineered materials are used to stabilize slopes, protect streambanks, and control runoff.
- Assign each group to build two small streambank or slope models in trays or bins:
  - One model with no stabilization (natural or untreated bank)
  - One model reinforced using materials like rocks, mesh, vegetation, or a compacted clay dam
- Simulate water flow by gently pouring water over each model using the prepared bottles. Observe how water moves through or around the models and note the effects.
- Students measure and record differences in water clarity, amount of displaced soil, and whether any parts of the model collapsed or failed under flow.

Materials:

- Modeling clay, small rocks, soil, and sand
- Trays or large plastic bins (to contain water flow)
- Water bottles with holes poked in the cap (to simulate rainfall or flow)
- Rulers, clipboards, and notebooks
- Mesh fabric, sticks, bark, or straw to represent vegetative stabilization

Discussion Questions:

- Which materials were most effective in preventing erosion or water overflow?
- What signs of failure or erosion did you observe in the untreated model?
- Why is it especially important to plan for water flow in construction or restoration projects?
- How do conservation engineers help communities prepare for flooding or protect natural waterways?

Student Reflection Prompt: If you were working with a landowner to stabilize a real streambank, what solution would you recommend based on your model? What other factors (like cost, location, or habitat impact) would you need to consider?

Career Connection: Engineer, Engineering Technician
Estimated Time: 45–60 minutes Group Size: Individual

Objective: Create a simplified engineering drawing that communicates the layout, materials, and function of one of the conservation models built in class.

Instructions:

- Begin with a short review of blueprint elements used in conservation engineering. Highlight components like title blocks, legends, directional arrows, top and side views, and labeling of physical features.
- Students choose one of their completed hands-on models, such as a water filter, dam, slope stabilization project, or survey plot, and create a technical drawing of it.

Materials:

- Blank paper or printed blueprint templates
- Rulers, pencils, and colored pencils
- Reference sheet with basic engineering symbols (e.g., elevation lines, water direction, plant cover, rock barriers)
- Notes or photos of completed hands-on models

- They include a clear layout or cross-section, showing materials used, structural design, water flow direction, and any key landscape features.
- Students label all components and write a short explanation describing how the system works and what problem it addresses.
- Encourage attention to spacing, alignment, and the use of standardized symbols.

Optional: Display completed blueprints on a classroom wall, or collect them in a personal student portfolio as a record of project-based learning.

Discussion Questions:

- How do blueprints and diagrams help engineers share ideas and plan projects?
- What information is most important to include in a technical sketch or site plan?
- What tools or software might engineers use to create more detailed, scaled versions of these designs?
- Why is accuracy in drawings important when planning real conservation work?

Student Reflection Prompt: What did you find most challenging about creating your blueprint? How might an engineer use this drawing in the real world? Would you trust someone to build from your plan?

Extension Activity: Invite students to convert their hand-drawn design into a digital version using free design tools like SketchUp, Tinkercad, or a basic CAD-style app. Those who finish early can explore how layers, zoom, and measurement tools are used to enhance precision in professional plans. Have students share screenshots or printed versions of their digital layouts if available.

Career Connection: Engineer, Engineering Technician
Estimated Time: 45–60 minutes Group Size: Individual

Objective: Create a simplified engineering drawing that communicates the layout, materials, and function of one of the conservation models built in class.

Instructions:

- Begin with a short review of blueprint elements used in conservation engineering. Highlight components like title blocks, legends, directional arrows, top and side views, and labeling of physical features.
- Students choose one of their completed hands-on models, such as a water filter, dam, slope stabilization project, or survey plot, and create a technical drawing of it.

Materials:

- Blank paper or printed blueprint templates
- Rulers, pencils, and colored pencils
- Reference sheet with basic engineering symbols (e.g., elevation lines, water direction, plant cover, rock barriers)
- Notes or photos of completed hands-on models

- They include a clear layout or cross-section, showing materials used, structural design, water flow direction, and any key landscape features.
- Students label all components and write a short explanation describing how the system works and what problem it addresses.
- Encourage attention to spacing, alignment, and the use of standardized symbols.

***Optional*:** Display completed blueprints on a classroom wall or collect them in a personal student portfolio as a record of project-based learning.

Discussion Questions:

- How do blueprints and diagrams help engineers share ideas and plan projects?
- What information is most important to include in a technical sketch or site plan?
- What tools or software might engineers use to create more detailed, scaled versions of these designs?
- Why is accuracy in drawings important when planning real conservation work?

Student Reflection Prompt: What did you find most challenging about creating your blueprint? How might an engineer use this drawing in the real world? Would you trust someone to build from your plan?

Extension Activity: Invite students to convert their hand-drawn design into a digital version using free design tools like SketchUp, Tinkercad, or a basic CAD-style app. Those who finish early can explore how layers, zoom, and measurement tools are used to enhance precision in professional plans. Have students share screenshots or printed versions of their digital layouts if available.

GUEST SPEAKER VISIT
CONNECTING CLASSROOMS TO CONSERVATION CAREERS

BRINGING CONSERVATION CAREERS TO LIFE

Guest speakers help students connect classroom learning to real conservation careers. Many professionals are eager to share their work with youth. Start by reaching out to your local USDA NRCS office, conservation district, or state forestry or agriculture department. Extension agents, 4-H, and FFA leaders are also great resources for contacts. Professionals in roles such as conservation engineers, soil scientists, urban conservationists, foresters, or technicians often have firsthand experience and stories that inspire students.

Sample Email Template

Hello, my name is [Your Name and Title] from [School or Organization]. I am currently teaching a high school unit on natural resource conservation and would like to invite a professional from your agency to speak with our students. We are exploring careers in fields such as soil science, forestry, conservation planning, and natural resource engineering.

A 30-minute classroom visit, either in-person or virtual, would greatly enhance our lessons by giving students a real-world connection to these career paths and a chance to ask questions directly from someone in the field.

Thank you for supporting youth career awareness in conservation. I look forward to hearing from you.

Sincerely,

[Your Full Name]
[Your Title]
[School/Organization Name]
[Phone Number]
[Email Address]
[Website, if applicable]

Please be sure to include your full email signature with your title, school or organization, and contact information so the guest speaker can easily follow up.

GUEST SPEAKER OUTLINE

Thank you again for taking the time to visit with our students and share your experience in the field of conservation. Your insight brought the curriculum to life in a way that only a real-world perspective can provide, and your contribution was a meaningful part of their learning journey.

To help support your visit and keep the session aligned with our learning goals, I've provided a brief reference card for you. This card outlines the key objectives of the lesson, suggested talking points, and an overview of the students' prior activities. It's designed to make your time with the class smooth, organized, and impactful. Feel free to adapt it as you see fit within the time frame allotted.

Your role as a conservation professional helps shape the next generation of stewards, and we are incredibly grateful for your involvement.

1. Introduction & Daily Tasks

- Your name, title, and organization.
- A typical day on the job: Field visits, office work, tools or vehicles used.

2. Career Path & Education

- What schooling, certifications, or training you needed.
- What inspired you to choose this field.
- Internships, mentors, or early jobs that helped you start out.

3. Projects & Tools

- Bring photos, maps, soil samples, or equipment.
- Briefly describe one to two local projects you're proud of.

4. Why Your Work Matters

- Real-life impacts of conservation, such as agricultural production, forestry, clean water, reduced flooding, wildlife protection, etc.
- What you enjoy most about your job and why it's meaningful.

5. Student Q&A – Encourage students to ask about:

- Your career journey.
- Fieldwork vs. office work.
- Advice for students interested in environmental careers.

GUEST SPEAKER VISIT

STUDENT WORKSHEET **NAME:** _____

PART 1: LISTEN & LEARN:

As you listen to our guest, take notes below:

Name: _____

Job Title: _____

Organization: _____

What does their typical workday look like? (List 2–3 tasks or tools they use)

_____

_____

What education or training did they need for their job?

_____

_____

What led them to choose this career path?

_____

_____

What projects or tools did they share with the class?

_____

_____

Why do they think conservation work is important?

_____

_____

PART 2: ASK & REFLECT

Write down one question you'd like to ask the speaker:

_____

_____

What's one thing you learned that surprised or inspired you?

_____

_____

Teachers: Collect these after the visit to review student engagement, or have students pair up and share what they learned aloud to reinforce career takeaways.

GUEST SPEAKER STUDENT WORKSHEET

USDA PATHWAYS PROGRAM

Many conservation careers begin with early exposure to fieldwork, volunteering, or student internships. This page provides educators and students with entry points into real-world experience through national and local programs that support youth involvement in environmental stewardship.

The USDA Pathways Program provides paid internships and entry-level positions for high school and college students interested in federal careers, including natural resource conservation, environmental science, and agriculture.

Program Highlights:

Internships available year-round with USDA agencies, including NRCS positions may be part-time during school and full-time in the summer. Students gain experience in engineering, soil science, biology, GIS, and office administration. Some internships may lead to permanent employment through non-competitive conversion.

How to Apply:

Visit www.usajobs.gov and search for the "Pathways Internship" filter by agency (e.g., USDA or NRCS) and location. Create a resume using the USAJOBS resume builder and submit applications online.

ENCOURAGE REAL-WORLD EXPLORATION

Educators are encouraged to help students find local or virtual opportunities to get involved in conservation work. Many programs count toward school credit or service hour requirements.

Suggestions for Students:

- Volunteer with your local conservation district or parks department
- Apply for summer internships or job shadowing experiences
- Join or start an environmental club at school
- Explore dual enrollment courses in agriculture, biology, or earth science
- Participate in field days, service-learning projects
- Participate in science fairs related to conservation

Earth Team Volunteers

The Earth Team is the official volunteer program of the USDA Natural Resources Conservation Service (NRCS). It connects students, adults, and community members with local conservation work.

For High School Students:

- Opportunities to assist NRCS field staff in soil and water testing, conservation planning, outreach events, and more.
- Gain supervised field experience and community service hours
- Flexible volunteer schedules (school-year or summer)
- Insurance coverage provided while volunteering

How to Join:

Contact your local NRCS field office and ask about Earth Team opportunities. Fill out a one-page volunteer agreement form with a guardian signature if under 18.

RESOURCES FOR EDUCATORS:

Curriculum and Handouts
Poster contest materials (NACD)
Soil and water cycle handouts
Career flashcards or role cards
NRCS YouTube Channel

Links:
NRCS Careers
NACD Education Hub
Soils 4 Teachers
My American Farm
Agclassroom

ROLE PLAY EXERCISE

Distribute a card to each student featuring a different conservation career . Students take turns acting as professionals in their role. They must introduce themselves, explain one key responsibility, and describe one tool or method they use in their job.

Classmates will ask one follow-up question, and the "professional" must answer in character.

This exercise builds communication skills and reinforces job understanding through realistic dialogue.

Soil Scientist	**Engineer**
Soil Conservationist	**Urban Conservationist**
Forester	**Rangeland Management Specialist**
Soil Technician	**Engineering Technician**

JOURNALING PROMPT

What is one conservation career you didn't know existed before this unit?

_____

_____

What surprised you about the work or the people who do it?

_____

_____

Write 4 sentences reflecting on what you learned and how it may connect to your own interests or goals.

_____

_____

_____

_____

What Did You Learn? (Student Self-Assessment)

Place a check next to each statement that applies to you:

□ I can describe at least three conservation careers.

□ I participated in a hands-on project related to land or water.

□ I understand how soil, water, and wildlife are connected.

□ I practiced presenting ideas or speaking in a role-play.

□ I know where to find more information about internships.

Next Steps

Choose one way to continue learning about conservation careers:

□ Visit your local conservation district office or website

□ Join or volunteer for a local environmental or outdoor event

□ Participate in an Envirothon team, FFA event, or 4-H project

□ Interview someone who works in a conservation-related job

□ Read an article written by a conservation professional or watch a video about a conservation career that interests you

Write one sentence about which step you'll take and why:

_____

_____

Continuing Your Conservation Career Journey

Your exploration of conservation careers doesn't end here. There are many ways to continue learning, gaining experience, and preparing for a meaningful career in natural resource conservation.

Join Local Conservation Groups

- Join 4-H to explore environmental science, agriculture, and natural resource projects through hands-on learning and youth leadership programs.
- Become active in FFA (Future Farmers of America) to gain experience in sustainable agriculture, conservation competitions, and community service.
- Volunteer with the NRCS Earth Team to assist professionals with on-the-ground conservation work. Opportunities may include field surveys, tree planting, educational outreach, and streambank restoration projects.

Participate in Contests and Camps

- Compete in **Envirothon**, an academic competition that challenges students to apply knowledge in soils, forestry, wildlife, aquatic ecology, and current conservation issues.
- Attend Youth Conservation Camps organized by state or regional agencies that focus on outdoor skills, natural resource management, and leadership development.
- Join a Soil Judging or Land Judging Team to learn about soil classification, land use planning, and conservation best practices in a team-based setting.

Research Internships and Volunteer Opportunities

- Apply for NRCS internships through the Pathways Program, which offers paid positions with career development opportunities for high school and college students.
- Explore USDA programs like AgDiscovery, a free summer outreach experience designed to introduce students to careers in agriculture and natural resources.
- Contact your local conservation district office to ask about summer internships, shadowing opportunities, or volunteer openings.

Watch Documentaries and Follow Real Conservation Work

- Watch conservation-focused documentaries to gain insight into real-world challenges and solutions.
- Follow conservation projects on NRCS and NACD websites, YouTube channels, or through interviews with professionals working in the field.
- Read about real conservation careers to understand the impact of this work and the different paths professionals have taken.

Explore College and Career Pathways

- Research college programs in environmental science, forestry, agricultural engineering, range management, and natural resource conservation.
- Consider land-grant universities, community colleges, Historically Black Colleges and Universities (HBCUs), Tribal Colleges, and Hispanic-Serving Institutions with conservation-related majors.
- Talk with counselors, teachers, or local conservation professionals about scholarship options and dual-enrollment programs that support your goals.

COMPLETION CERTIFICATION

This certificate is intended to recognize students who have actively participated in the Exploring Conservation Careers program. It acknowledges their effort and engagement in learning about natural resource careers, completing project-based activities, and developing real-world skills related to conservation.

Portfolio & Resume Value:

- Encourage students to include this certificate in their academic portfolios or work-based learning binders.
- For older students, this certificate can be referenced on job applications or résumés as evidence of career exploration and participation in environmental learning experiences.
- This may also be used as documentation for service learning hours, career readiness credits, or community-based instruction, depending on your school's policies.

Certificate

of Completion

THIS IS TO CERTIFY THAT

_____

Has successfully completed

Exploring Conservation Careers Modules

Instructor

Date

National Association of Conservation Districts

USDA United States Department of Agriculture

Natural Resources Conservation Service