



SOIL and WATER SCIENCE





SOIL and WATER SCIENCE

Level 2 • Grades 6–8

NOTE TO 4-H MEMBER

The 4-H Soil and Water Science curriculum is for youth who enjoy learning about science and two important natural resources: soil and water. Level 1 introduces basic terms and concepts. Activities focus on understanding important soil and water processes. Level 2 activities help you put the basic concepts into action to understand more advanced soil and water concepts and interactions with the environment. Level 3 activities are divided into chapters based on how you might use the information you have learned — as a homeowner, resident of a watershed, food and fiber producer (farmer), mayor, teacher, or legislator. Level 3 delves deeper into soil and water science concepts, and can prepare you to be well informed and to study these topics at a college or university.

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Words that are defined in the glossary are in bold the first time they appear in the text.

Additional resources are available from Purdue Extension's Education Store, www.edustore.purdue.edu.



CAREERS IN CONSERVATION



Can you list five careers that require knowledge of soil and water processes and conservation?

INTRODUCTION

An understanding of soil and water processes and **conservation** is important for everyone so we can protect these natural resources. The knowledge you gain in studying 4-H Soil and Water Science will help you be an informed homeowner, gardener, farmer, and community member. If you like to educate others, you can become a mentor to a younger 4-H member when you are in high school, and you can volunteer to teach this subject to youth through 4-H as an adult.

If you are interested in a career in conservation, it's never too early to start investigating your options and the high school and college education you will need. The activities below will help you explore careers that require knowledge of soil and water processes, and set goals for your future. Read through all the choices and complete one or more Do It activities based on your interests and life goals.

TOOL KIT

- Internet connection



- Find five job listings that require knowledge of soil or water processes.
- The following key words and careers might help you with your search.
- Complete the Careers in Conservation Table.

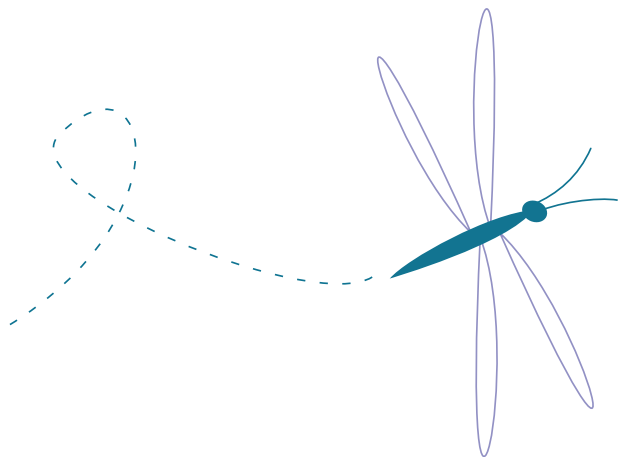


Courtesy USDA NRCS

KEY WORDS	CAREER SUGGESTIONS
<ul style="list-style-type: none"> • natural resource conservation • environmental protection • environmental science • soil conservation • water conservation • USDA (U.S. Department of Agriculture) • NRCS (Natural Resources Conservation Service) • SWCD (Soil and Water Conservation District) 	<ul style="list-style-type: none"> • Decision-maker: city planner • Education: middle school and high school science teacher, specialized college faculty, Extension educator • Engineering: agricultural engineer, civil engineer, surveyor • Environment: consultant, marine scientist, oceanographer, hydrologist, hydrogeologist, hydrologic technician • Governmental scientists and educators (USDA, NRCS, and SWCD) • Mining: mineral and oil exploration, mineralogist, mining engineer • Utilities: worker involved with water treatment, natural gas, petroleum, nuclear power, coal, electricity

CAREERS IN CONSERVATION

#	Title	Business	Education Required
1	Duties: Experience required: Contact information:		
2	Duties: Experience required: Contact information:		
3	Duties: Experience required: Contact information:		
4	Duties: Experience required: Contact information:		
5	Duties: Experience required: Contact information:		



Courtesy USDA NRCS



VOLUNTEER

- Contact a local office or person who works with soil and water, and volunteer to help for 2–5 hours.

SWCD office

County surveyor

County planner

- Complete your volunteer work and take pictures of what you did.

- Record:

Name of contact person and title

County

Business address

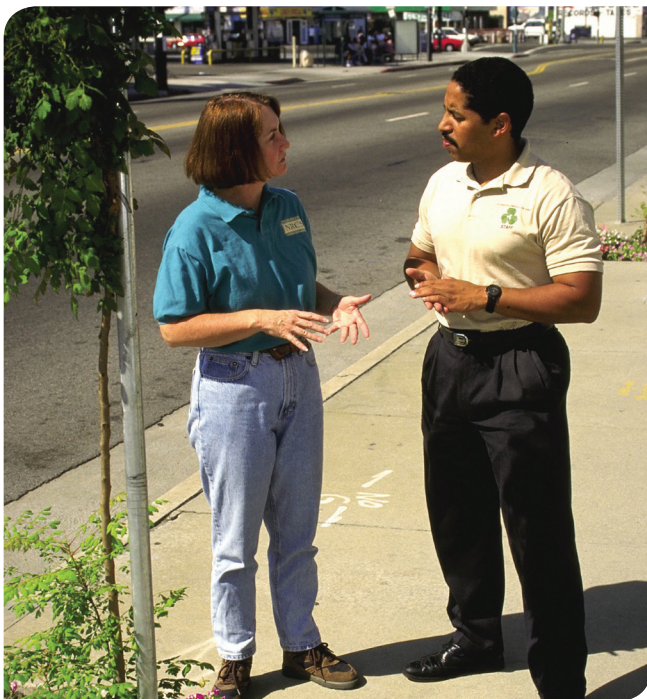
Phone number

Website

Hours worked

Duties

What you learned



Courtesy USDA NRCS



SHADOW A PROFESSIONAL

- Contact your local Extension or SWCD Office, and ask if you can shadow a professional such as an Ag and Natural Resources Extension educator or SWCD employee for a day.

- Shadow the professional and take pictures.

- Record:

Name of contact person and title

County

Business address

Phone number

Website

Hours worked

Duties

What you learned



ATTEND AN EDUCATIONAL WORKSHOP

- Contact your local Extension or SWCD office and ask about workshops planned in your area that relate to soil and/or water conservation and management.

- Attend the workshop and take pictures as appropriate.

- Record:

Workshop name

Date

Location

Presenter(s)

What you learned



COLLEGE PLANNING

- Find three college degrees that would prepare you for a career in soil and water conservation.
- The key words and careers from Do It #1 might help you in your search.
- Record:
 - Area of study
 - Department
 - College or university name
 - Admission requirements
 - Courses required for the degree
 - What you learned

Note: Choices you make now, like the courses you take in high school, will impact your ability to meet job qualifications. Math and science courses are usually required.

LIFE SKILLS

- Acquiring knowledge
- Exploring careers



Share What Happened:

- Which Do It activity (or activities) did you complete?
- What did you learn?

Apply: How will your new knowledge help you plan your future?

Generalize to Your Life: How could you use the information you gained from completing this activity even if you do not pursue a career in soil and water conservation?

LIFE SKILLS

- Acquiring knowledge
- Being a responsible citizen
- Conserving natural resources
- Using natural resources wisely

NOTES:



Who is responsible for keeping your water clean and safe?

INTRODUCTION

Water is a fundamental requirement for life. The Federal Water Pollution Control Act of 1948 was the first major U.S. law to address water pollution. In 1972, Congress amended the law, and it became known as the **Clean Water Act**. This activity will help you learn more about our water resources and important legislation that helps keep our water clean.

TOOLKIT

- Pencil
- Clean Water worksheet, page 10



- Complete the Clean Water worksheet.
- Discuss the Chat questions with your facilitator.

LIFE SKILLS

- Acquiring knowledge



Share What Happened: How much of the water quality and quantity information presented in the worksheet did you know before starting it?

- a little some a lot

Apply: Why is it important for everyone to know water quantity and quality facts?

Generalize to Your Life: How can your actions help conserve water and maintain water quality?



DIG DEEPER

- Use these two United States Geological Survey (USGS) websites to answer the six questions below.

The USGS Water Science School, <http://water.usgs.gov/edu/>

Groundwater depletion, <http://ga.water.usgs.gov/edu/gwdepletion.html>

1. Where is the earth's water? What percentage of it is usable by humans?
 2. Rain: How many gallons of water fall when 1 inch of rain falls on one acre of land?
 3. Rain: What five factors affect rain after it falls?
 4. Groundwater wells: What three types of wells do the websites describe?
 5. What are some effects of groundwater depletion?
 6. How far in feet has long-term pumping in Chicago lowered groundwater levels?
- Learn more about Rachel Carson and her influence on environmentalism at the EPA website, <http://www2.epa.gov/aboutepa/rachel-carson>

DID YOU KNOW?

- 40 percent of Indiana households drink **surface water**, including Fort Wayne and Indianapolis.
- 60 percent of Indiana households use **groundwater**, including everyone who uses a well.

CLEAN WATER WORKSHEET

INTRODUCTION

Water is a fundamental requirement for life. The average adult needs 2.5 quarts of water per day to maintain health, but we use much more than that. Each U.S. citizen uses an average of 80–100 gallons of water each day (USGS). The amount of water used per person varies widely throughout the world, with developed nations generally using the most water per person. According to a United Nations

report, 783 million people, or 11 per cent of the global population, remain without access to an improved source of drinking water.

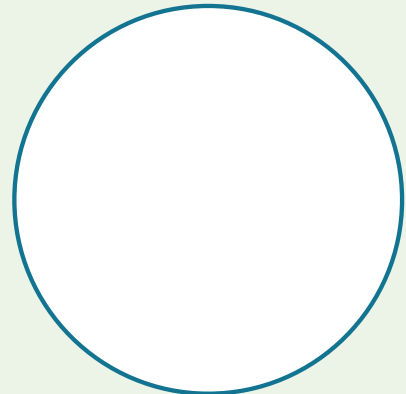
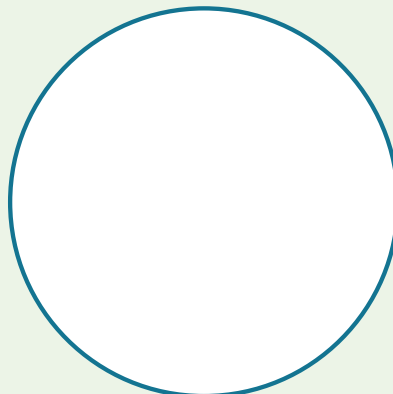
Nearly 80 percent of the earth's surface is covered with water, but only 1 percent is available for drinking. Complete the questions below to learn why so little of our water is available for drinking and where our fresh water comes from.

QUESTIONS

- Name the ways that you use water.
- The average adult needs _____ quarts of water daily.
- Americans use about _____ gallons (_____ quarts) of water each day.
- Use the following values to show (approximately) the relative amounts of fresh and salt water in the Fresh and Salt Water pie chart below.
 - a. Fresh water – 2.4%
 - b. Salt water – 97.6%
- Use the following values to show (approximately) the estimated relative amounts of fresh water sources in the Fresh Water Sources pie chart below.
 - Fresh, surface water – 0.8%
 - Groundwater – 12%
 - Ice and snow – 87.2%

FRESH AND SALT WATER

FRESH WATER SOURCES



CLEAN WATER WORKSHEET *continued*

- Liquid fresh water is found in the six places listed below. Rank these sources 1–6, with 1 supplying the highest percentage of fresh water and 6 supplying the least amount of fresh water. Guessing is fine. Estimate the percentage of fresh water that each source supplies.

Fresh Water Source	Rank	% of World Supply
Atmosphere		
Groundwater (soil moisture)		
Lakes and reservoirs		
Moisture in plants and animals		
Rivers and streams		
Wetlands		

The water taken from various sources fits into two major categories: **water consumption**, the water that humans use; and **water withdrawal**, which includes all water uses for any purpose, including water used for cooling in manufacturing and other industrial uses. Food production requires water. Some farming methods such as irrigation, especially flood irrigation, use a lot of water. As a result, global agriculture consumes a significant portion of the available fresh water: two-thirds (67 percent) of the total amount of water withdrawal; and more than four-fifths (85 percent) of water consumption.

Clean water is vitally important to human welfare, so scientists and researchers study both water quality and water quantity. Scientists predict a steadily increasing demand for water because of population growth and an overall rise in usage. They also cite the following concerns:

- Estimated U.S. withdrawal rate will be 10–20 percent above 1995 levels by 2025.
- The threat of drought will increase significantly due to rising temperatures from climate change and global exploitation of water resources.
- Two-thirds of the United States is likely to be drastically drier by 2030.

Questions

- What percentage of water is withdrawn from fresh water supplies for agricultural uses? What farming practice do you think uses the most water?
- What was the conclusion of scientists who predict an increasing demand for water and possibly more droughts?

The discussion above addresses water quantity concerns, because the amount of fresh water is limited, and the demand for fresh water is increasing as the population grows and more people want a higher standard of living.