



The Educator's Guide to:

Penelope the Duck Learns about Drought

Penelope the Duck Learns About **DROUGHT**



Inside

- Essential questions for student inquiry
- Ready-to-use lessons to engage and explore
- Activities to extend learning
- Standards correlation
- Glossary of useful terms

Introduction

Drought can happen anywhere! This guide, a supplement to the kids' book *Penelope the Duck Learns about Drought*, provides educators and parents with essential background information, practical lessons, and hands-on investigations for educating children about drought. Large group activities ideal for the classroom and small group activities suitable for the home are designed to enhance student learning. Essential questions and lesson plans are linked to curriculum requirements and explore themes within topics such as science as inquiry, Earth science, and science in personal and social perspectives. The guide's activities aim to help children acquire skills that are significant in their developmental process—to collect, organize, and communicate ideas.

Essential Questions

What is drought?

A **drought** happens when it hasn't rained in a long time. Drought can happen anywhere and can lead to shortages in the **water supply**.

What can cause drought?

Droughts are often caused by **irregular weather**. A lack of **precipitation** (rain or snow) and high temperatures can lead to drought.

What are the effects of drought?

Droughts are very different from other natural disasters because their effects can last for a long time. Drought can affect you, your family, plants, animals, and soil, too. Lack of rainfall for long periods can cause a shortage of freshwater, soils to dry out and crack, water levels in local rivers and lakes to fall, and plants and trees to become dry and brown. If the soil becomes too dry, it can be difficult for farmers to grow and harvest crops for food. Without enough precipitation, farmers may need to use **irrigation**, which brings water to dry soil and crops.

How can drought affect you?

During a drought there's less water for playing, drinking, and bathing. We can't make it rain, but we can do a lot to help during a drought! There are many ways to save water at home, inside and out.

How can you save water in the yard?

- Grow native, **drought-resistant plants**, or plants that don't need a lot of water.
- Spread **mulch** over the soil. Mulch will help keep the water in the soil and prevent **evaporation**.
- Water your plants in the early morning or evening when it's not too sunny or windy.

- Try using a watering can instead of the hose. And remember to turn off the water when you're not using it.

How can you save water inside your home?

- Turn off the faucet while you brush your teeth.
- Ask an adult to check the faucets and toilet for leaks.
- Take a shower instead of a bath and make it quick!
- Don't flush trash down the toilet—use a trash bin instead.

What are some other ways you can help during a drought?

Volunteer to help plant trees or shrubs along a river bank to prevent erosion, which happens when dirt or soil breaks off from the land and falls into a river or lake. This can make the water very cloudy and hurt the plants and animals that live there.

Don't fish in areas with low water levels. Every year, fish swim up rivers to lay their eggs. When the water is low, not as many fish can make the journey.

Help the forest by not lighting campfires. During a drought, forest fires can start very quickly!



Lessons to Engage and Explore!

1. How Does Drought Affect Plants?

Introduction

Some plants need a lot of water to grow and thrive, and others have adapted to live in areas where water is scarce. If you live in an area where drought happens often, it's best to fill your garden with drought-tolerant plants. These plants don't need much water to live and can help save water for other uses!

Objectives and Learning Goals

Students will learn how lack of water or drought affects plants. Students will learn how lack of water or drought affects different types of plants.

Time and Groups

30 minutes for first session, and follow-up of 10–15 minutes per day for 2 weeks; whole class

Materials

2 like plants that need a lot of water to grow (try grass or a tropical variety)

2 like plants that do not need a lot of water to grow (try cacti or other drought-resistant desert plants)

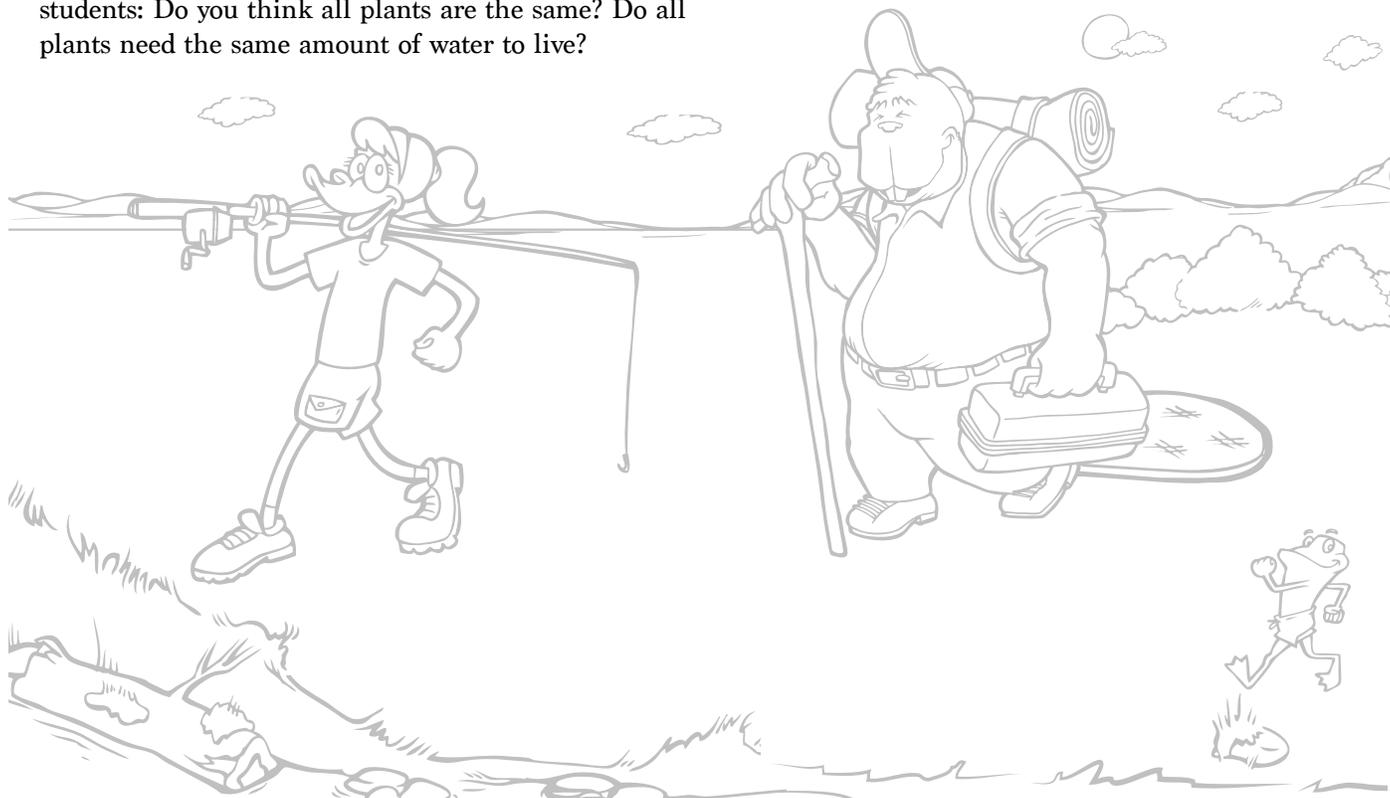
Activity Procedure

- Before beginning, have a class discussion. Ask the students: Do you think all plants are the same? Do all plants need the same amount of water to live?

- Introduce the two sets of plants. How are they different?
- Explain that one plant of each type will be watered and the other plant of each type will receive no water. The group that does not receive any water will represent a drought. Label the plants 1 through 4.
- For the next two weeks have students take turns watering the plants:
 - For the non-drought-resistant group (plants 1 and 2), water plant 1 regularly (add a small amount of water to the plant each day). Do not water plant 2.
 - For the drought-resistant group (plants 3 and 4), water plant 3 regularly (add a small amount of water to the plant each day). Do not water plant 4.
- Ask the students to observe and draw all four plants daily in their notebooks. Look for changes in the soil and the color of the plants.

Follow-Up Questions

What happened to the plants that were watered regularly (plants 1 and 3)? What happened to the plants that did not receive any water (plants 2 and 4)? Which plant looks healthier—plant 2 or 4? Why? What type of plants should you plant in your garden if you live in an area where drought happens often?



2. Make a Rain Gauge!

Introduction

It's hard to predict how long a drought will last or how severe it will be. However, monitoring tools that keep track of precipitation can help to warn a community that a drought may happen soon. An easy way to record precipitation is to build a rain gauge. Using your gauge, you can keep track of rainfall and compare it to the "normal" amount for your area. To get an idea of what's "normal," contact your local weather station or look online.

Objectives and Learning Goals

Students will learn how to measure rainfall.
Students will understand that a lack of precipitation can lead to drought.

Time and Groups

45 minutes; students can work individually or in small groups of 2-3

Materials

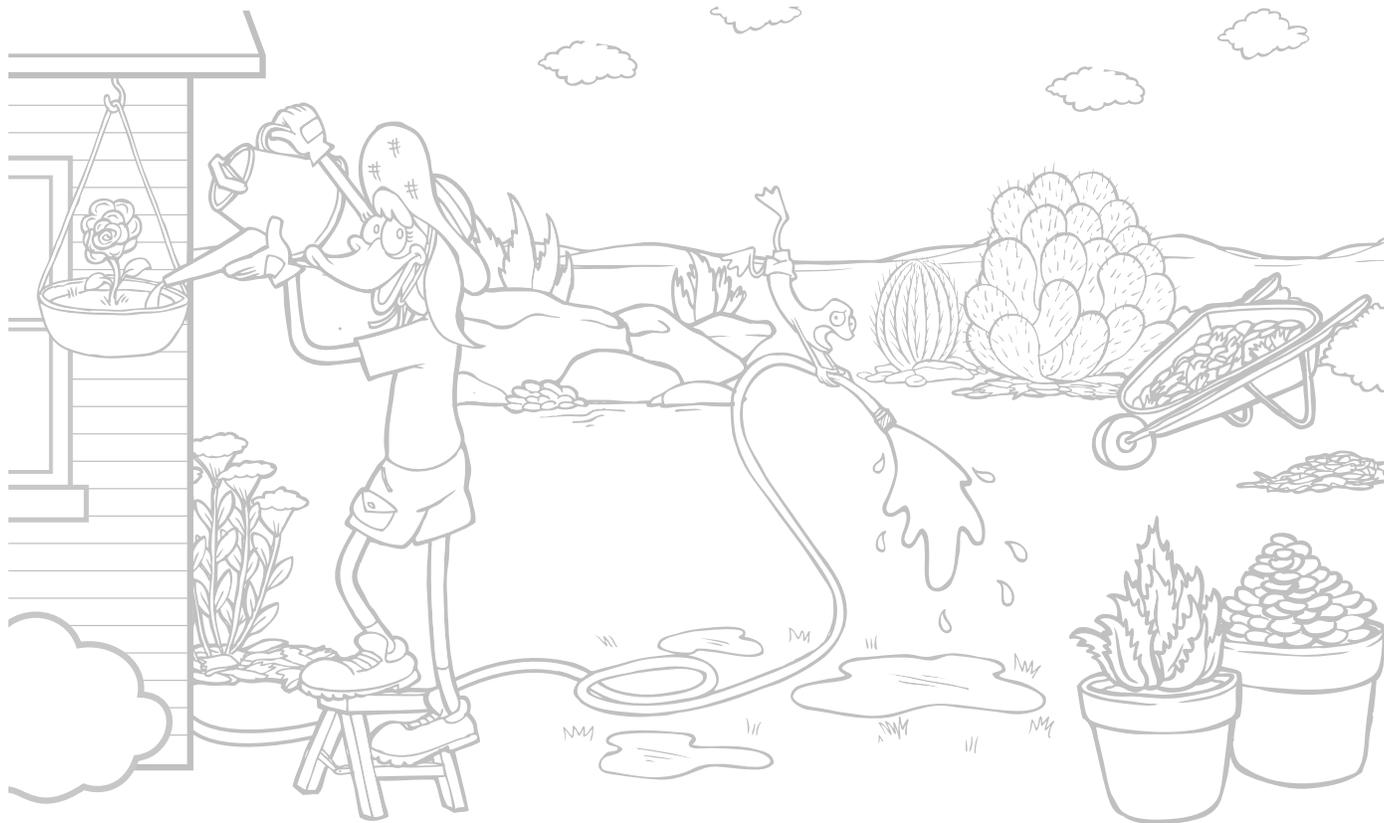
Plastic bottles, stones or pebbles, masking tape, markers, rulers, a notebook to record findings

Activity Procedure

- ▶ Before class, cut the tops off the bottles for the students. Make sure to save the tops!
- ▶ Divide students into groups and distribute materials.
- ▶ Ask the students to place some stones in the bottom of their plastic bottle (this will make the rain gauge steady against the wind). Turn the top upside down and place it into the bottle.
- ▶ Put a piece of masking tape vertically on the outside of the bottle. Use a ruler and marker to make a scale on the bottle (start the scale a little bit above the pebbles), using centimeters (cm) or inches (in).
- ▶ Pour water into the bottle until it reaches the bottom of the masking tape scale.
- ▶ Put the rain gauge outside on a level surface where it can collect water when it starts raining. Students may check to see how far the water has risen daily or after a rainstorm. Remind students to make sure they are eye level with the top of the water when reading the scale, and record the findings in a notebook.

Follow-Up Questions

How can you use a rain gauge to predict drought?
What is the "normal" amount of rainfall for your local climate? In what season does it rain the most? The least?



3. Spread the Word!

Introduction

It's important to know what to do during a drought. Thanks to Penelope the Duck, you have learned many ways to help.

Objective and Learning Goals

Students will learn to communicate the ways to help during a drought to their school community.

Time and Groups

45–60 minutes; small groups of 2–3 students

Materials

Poster paper, colored pencils or markers

Activity Procedure

- ▶ Divide the students into small groups.
- ▶ Ask students to create posters to hang up around the school to spread the ways kids can help during a drought.



At Home Activities to Extend Learning!

I. Water Use Audit

Overview

Have you ever wondered how many gallons of water you use each day? But what's a gallon? A gallon is a measurement of liquid. You can think of it as the amount of liquid that can fit into a big bottle of milk or a big can of paint.

Exploration

With an adult helper, record your water usage in gallons using the information below.

Water Use:

1. Showers! Every minute in the shower equals 4 gallons of water. Figure out how many gallons of water you use in the shower per day by multiplying the number of minutes spent in the shower by 4.

_____ (number of minutes) x _____ (4 gallons) = _____ (total gallons of water used in the shower!)

2. Baths! Each bath uses about 36 gallons of water. Figure out how many gallons of water you use in the bath per day by multiplying the number of baths per day by 36.

_____ (number of baths) x _____ (36 gallons) = _____ (total gallons of water used in the bath!)

3. Toilets! Each flush of the toilet uses about 2 gallons of water, and on average each person in the house will flush about 4 times per day. That's about 8 gallons per person. Figure out how many gallons of water you use by multiplying the number of flushes by 2.

_____ (number of flushes) x _____ (2 gallons) = _____ (total gallons of water used by the toilet)

4. Laundry! Each load of laundry uses about 30 gallons of water. Figure out how many gallons of water you use by washing clothes each day by multiplying the number of laundry loads by 30.

_____ (number of laundry loads) x _____ (30 gallons) = _____ (total gallons of water used for laundry)

5. Outside! Using the hose to wash your bike uses about 6 gallons of water each minute. Figure out how many gallons you use by multiplying the number of minutes you use the hose by 6.

_____ (number of minutes) x _____ (6 gallons) = _____ (total gallons of water used by the hose)

6. Faucet! We use the faucet for washing up and brushing teeth. Faucets use about 2 gallons of water per minute. Figure out how many gallons you use by multiplying the number of minutes you use the faucet by 2.

_____ (number of minutes) x _____ (2 gallons) = _____ (total gallons of water used by the faucet)

We use water in other ways, too. Can you name a few? Add up all the gallons you use each day to find out your total water use per day. On average, each person uses about 100 gallons a day!

Extension

What can you do to use less? It's important to be a conscious consumer of water all year, but especially during a drought! Your community may even put water use restrictions into effect to help conserve water.

2. Design Your Own Drought-Resistant Garden

Overview

Different types of plants require different amounts of water to live. If you live in a dry area where drought occurs often, it's best to plant drought-resistant plants that won't need a lot of water to survive. It may be helpful to use research tools to make a list of drought-resistant plants.

Exploration

Map out and design your own garden using drought-resistant plants. Which plants will you use? Think about where to plant them based on their needs (such as shade or sun).

Extension

Talk to an adult about implementing your design.

3. Water at Home

Overview

Saving water during a drought is important. Families use water in many ways at home, both inside and out. How does your family use water?

Exploration

With an adult helper, list or draw how you use water in each room of the house and outside, too.

Extension

Be a water saver detective! Do you see any ways you can save water? How can you use less? You can also ask an adult to get in touch with your local water agency. Some offer free water use inspections and can help you check for leaks and offer additional tips on how to save water and lower your family's monthly water bill.



Glossary of Useful Terms

Drought A span of time with below-normal precipitation.

Drought-resistant plant A plant that has adapted to dry conditions and is able to live without a lot of water.

Evaporation The changing of liquid water into water vapor (gas), often through heating.

Irregular weather Unusual weather that is not the norm for an area.

Irrigation When farmers bring water to their crops.

Mulch An organic material such as decaying leaves or bark that is spread over soil.

Precipitation Rain, snow, sleet, or hail that falls to the ground.

Water supply A source of freshwater that is used by utilities, industry, and individuals.

Correlation to Standards

This educator's guide can be correlated to the standards listed below for students in grades K–5. The activities provided in this guide allow children to use appropriate techniques to collect, organize, communicate, and visualize data. Selected lessons also enable the use of mathematics to ask questions and form conclusions.

National Science Education Standards K–5

Content Standard A: Science as Inquiry, A1. Abilities necessary to do scientific inquiry, A2. Understanding about scientific inquiry

Content Standard B: Physical Science, B3. Light, heat, electricity, and magnetism

Content Standard E: Science and Technology, E2. Understanding about science and technology

Content Standard F: Science in Personal and Social Perspectives, F3. Types of Resources, F5. Science and technology in local challenges

Next Generation Science Standards

Scientific and Engineering Practices: Asking questions and defining problems; Planning and carrying out investigations; Analyzing and interpreting data; Obtaining, evaluating, and communicating information

Disciplinary Core Ideas: ESS3.A Natural resources; ESS3.C Human impacts on Earth systems; PS3.A Definitions of energy

Crosscutting Concepts: Structure and Function

Common Core Standards

English Language Arts & Literacy in History/Social Studies, Science, and Technical Subjects K–5

Reading: Informational Text

Key Ideas and Details: CCSS.ELA-LITERACY.RI.K.1, 1.1, 1.2, 1.3, 1.4, 1.5; CCSS.ELA-LITERACY.RI.K.2, 1.2, 2.2, 3.2, 4.2, 5.2

Craft and Structure: CCSS.ELA-LITERACY.RI.K.4, 1.4, 2.4, 3.4, 4.4, 5.4

Integration of Knowledge and Ideas: CCSS.ELA-LITERACY.RI.K.8, 1.8, 2.8, 3.8, 4.8, 5.8

Range of Reading and Level of Text Complexity: CCSS.ELA-LITERACY.RI.K.10, 1.10, 2.10, 3.10, 4.10, 5.10

Writing

Text Types and Purposes: CCSS.ELA-LITERACY.W.K.1, 1.1, 2.1, 3.1, 3.1.A, 3.1.B, 4.1, 4.1.A, 4.1.B, 5.1, 5.1.A, 5.1.B

Production and Distribution of Writing: CCSS.ELA-LITERACY.W.K.5, 1.5, 2.5, 3.5, 4.5, 5.5

Research to Build and Present Knowledge: CCSS.ELA-LITERACY.W.K.8, 1.8, 2.8, 3.8, 4.8, 5.8

Speaking & Listening

Comprehension and Collaboration: CCSS.ELA-LITERACY.SL.K.1, K.1.A, K.2.B, 1.1, 1.1.A, 1.1.B, 1.1.C, 2.1, 2.1.A, 2.1.B, 2.1.C, 3.1, 3.1.A, 3.1.B, 3.1.C, 3.1.D, 4.1, 4.1.A, 4.1.B, 4.1.C, 4.1.D, 5.1, 5.1.A, 5.1.B, 5.1.C, 5.1.D

Presentation of Knowledge and Ideas: CCSS.ELA-LITERACY.SL.K.5, 1.5, 2.5, 3.5, 4.5, 5.5

Language

Vocabulary Acquisition and Use: CCSS.ELA-LITERACY.L.K.4, 1.4, 2.4, 3.4, 4.4, 5.4

Mathematics Standards K–5

Counting & Cardinality: CCSS.MATH.CONTENT.K.CC.B.4, B.4.A, B.4.B, B.4.C; CCSS.MATH.CONTENT.K.CC.C.6

Operations & Algebraic Thinking: CCSS.MATH.

CONTENT.K.OA.A.1, 1.OA.A1, 2.OA.A1, 3.OA.A1, 4.OA.A1, 5.OA.A1

Measurement & Data: CCSS.MATH.CONTENT.K.MD.B.3; CCSS.MATH.CONTENT.1.MD.C.4

References

- Drought.gov, www.drought.gov
- NOAA Education Resources, www.education.noaa.gov
- The USGS Water Science School, water.usgs.gov/edu
- U.S. Environmental Protection Agency, water.epa.gov

National Governors Association Center for Best Practices & Council of Chief State School Officers. (2010). *Common Core State Standards*. Washington, DC: Authors.

This book is published by Project Energy Savers. For information about Project Energy Savers, go to www.projectenergysavers.com

Notice: This book was produced by Project Energy Savers™, LLC. Neither Project Energy Savers™, LLC, nor any person acting on behalf of Project Energy Savers™, LLC, makes any warranty, expressed or implied, with respect to the use of any information disclosed in this booklet, or assumes any liability with respect to the use of, or for damages resulting from the use of, any information contained in this booklet. The recommendations, statistics and information provided are strictly for the purposes of informing the user.