



Vocabulary

- Annual: a flower that blooms for the entire season and then dies at the end
- Condensation: when gas or vapor changes to a liquid
- Conservation: to use an item wisely, such as water
- Consumption: to use items
- Drought: a period of dry weather, when there is no rain
- Drought Resistant: a plant that can survive a period of drought
- Evaporation: when water changes to a gas or vapor
- Groundwater: water that is stored under the ground
- Groundwater Discharge: groundwater that travels through the earth to a larger body of water (e.g. ocean)
- Infiltration: the process of surface water seeping into the ground and becoming groundwater
- Perennial: a flower that only blooms for part of the season, but comes back after winter
- Pollution: the introduction of harmful products into the environment
- Precipitate: to condense from a vapor and fall as rain or snow
- Rain Barrel: a large barrel used to catch and store rainwater
- Renewable Resource: a resource we can continually use
- Resource: a source of supply
- Surface Runoff: water that overflows from streams onto land or larger body of water
- Surface Water: water that is aboveground
- Transpiration: part of the photosynthesis process in which water that is absorbed by the roots moves through a plant and is released through its leaves

At the end of this lesson, students will be able to:

- Make connections between earth's water supply and human water use
- Visualize and explain ways to conserve water in the garden
- Identify some drought resistant plants
- Illustrate the water cycle

National Education Standards:

- NSTA National Science Education Standards
 - [ESS3.C: Human Impacts on Earth Systems](#)
 - [ESS2.C: The Roles of Water in Earth's Surface Processes](#)
 - [ESS3.A: Natural Resources](#)

What you'll find in this packet:

- Step-by-step Activity Guide
- Pre- and Post-Activity discussion ideas
- Background information on Rain Barrels and Drought-Resistant plants
- Water Cycle quiz

What you'll need:

- plastic container or bucket (large enough to hold 2 gallons)
- 5 water bottles/containers (preferably transparent)
- 1.75 gallons of water with blue food coloring
- labels for bottles/containers
- eyedropper
- measuring cup
- Water Cycle quiz (provided)

Teacher Preparation:

- Label the bottles according to water source:
 - Salt Water
 - Fresh Water
 - Polar Ice Caps
 - Air, Soil, and Underground
 - Fresh Surface Water
- Fill the bucket with 1.75 gallons of colored water and label it "Total Water Supply"
- Face the labels of the other bottles away from students



Pre-Activity:

- What do we need water for?
- Where does our water come from?
- Discuss the Water Cycle
- How much water or what percent of the Earth's water is available for human consumption?

Activity Procedure:

- Show students the first container/bucket representing the total earth water supply—224 oz. (1.75 gallons). Ask how much they think is fresh water vs. salt water.
- Measure out 6.7 oz. of water and set aside. Pour remaining water (217.3 oz.) into container labelled “Salt Water”—this represents 97% of the total water supply.
- Pour the 6.7 oz. of water (previously set aside) into bottle labelled “Fresh Water”—this represents only 3% of the total supply.
- Ask if this is all that is available for human consumption. Why or why not?
- Pour 5.4 oz. from “Fresh Water” into bottle labelled “Polar Ice Caps.” Note that while this represents 80% of the fresh water supply, it is not available for our use. Why not?
- Pour 0.97 oz. from “Fresh Water” into bottle labelled “Air, Soil, and Underground.” Is this available for human use? Why or why not? (No, because it evaporates in the air, within the soil, or underground in the water table.)
- Pour almost all of the remaining “Fresh Water” (0.33 oz.) into bottle labelled “Fresh Surface Water.” This only makes up 5% of available fresh water. Is this available for consumption? (No, because much of this is polluted and too dirty or unsanitary to drink.)
- What remains in the “Fresh Water” bottle is just 0.0067 oz. of water, representing the fresh surface water available for human consumption. This is only 0.0003% of the total water on the earth. Using the eyedropper, give each student two drops of water. Have them compare that with the water in the other containers and discuss the differences between the amounts available for each source. Is this enough?

Post-Activity Discussion:

- Divide class into small groups. Ask students to discuss the activity and answer the following questions:
 - Is water a renewable resource?
 - How can we conserve water in our lives?
 - How can we conserve water in our gardens?
 - Complete Water Cycle quiz (provided).
- Bring class back together and ask the groups to share some of their ideas.
- Discuss water conservation techniques in the garden.
 - Rain Barrels
 - What is a rain barrel?
 - How do they help to conserve water?
 - Drought resistant plants
 - What does drought resistant mean?
 - What is a perennial? What is an annual?



Rain Barrels

Lawn and garden watering make up nearly 40% of total household water use during the summer. ([Source](#))

Why Rain Barrels?

- Provide an alternative to tap water for flower gardens.
- Help reduce peak water demands during the summer months.
- Help reduce peak volume and velocity of stormwater runoff reaching lakes and rivers.
- Save money by lowering water bills.
- Many counties and municipalities currently offer homeowners a rebate for installing rain barrels on their property. Check with your local government to see if you are eligible.

Rain Barrel Use Restrictions

- If you are using a re-purposed 55-gallon barrel, make sure you know what material was in it prior to using it. It is preferable to use a food-grade barrel.
- Water collected in rain barrels is not recommended for watering fruit or vegetable gardens.
- Water collected in rain barrels is not suitable for human or pet consumption.
- Always put a fine mesh screen over the top of a rain barrel to discourage mosquitoes.

Additional Resources

[What is a rain barrel?](#)

[How to make a rain barrel](#)

Garbage to Gardens Takeaway:

Collecting water in a rain barrel helps conserve our limited water supplies by reducing the amount of “tap” water used in flower gardens. It also decreases the amount of surface runoff entering the sewer system.



Drought Tolerant Container and Landscape Plants

Annuals

Pelargonium (Geranium)
Lantana (Shrub verbena, Lantana)
Verbena (Vervain)
Portulaca (Moss Rose)
Begonia (Wax Begonia)

Helichrysum (Licorice Plant)
Gazania (Treasure Flower)
Eschscholzia (Golden Poppy) *
Senecio (Dusty Miller)
Helianthus (Sunflower)

Perennials

Lavandula (Lavender)
Artemisia (Sagebrush)
Sedum (Stonecrop)
Sempervivum (Hens & Chicks)
Dianthus (Carnation)

Stachys (Lamb's Ear)
Santolina (Lavender Cotton)
Rosmarinus (Rosemary)
Opuntia (Prickly Pear) *
Nepeta (Catnip)

Trees

Ginkgo biloba (Maidenhair Tree)
Gleditsia triacanthos var. inermis (Thornless Honeylocust) *
Sophora japonica (Japanese Pagoda Tree)
Abies concolor (White Fir) *
Juniperus virginiana (Eastern Red Cedar) *
Pinus nigra (Austrian Pine)

Shrubs

Morella pensylvanica (Northern Bayberry) *
Aronia arbutifolia (Red Chokeberry) *
Vitex agnus-castus (Chaste Tree)
Pinus mugo var. mugo (Mugo Pine)
Rhus typhina (Staghorn Sumac) *

**Denotes a plant native to North America*

Additional Resources:

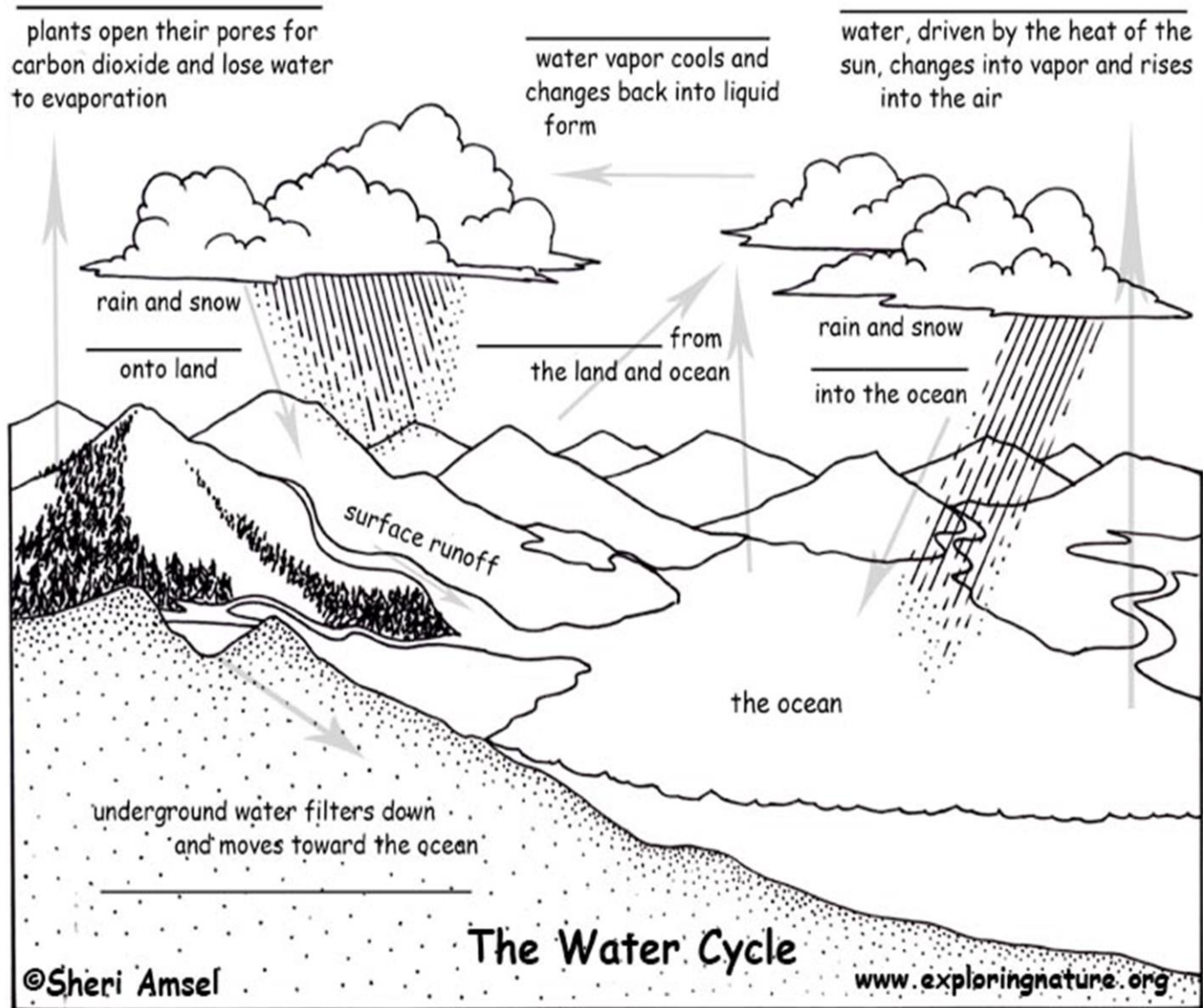
[Penn State Extension](#)

[University of Delaware Cooperative Extension](#)

[The Ohio State University Extension](#)



FILL IN THE BLANKS



Fill in each of the blanks with one of these appropriate terms:

- Condensation
- Evaporation (use twice)
- Groundwater Discharge
- Precipitate (use twice)
- Transpiration

Source: [Exploring Nature](http://www.exploringnature.org)