



4-H Water Wizards

Student Lab Book



UNIVERSITY OF CALIFORNIA
Agriculture and Natural Resources

4-H Youth Development Program

4-H Water Wizards

Student Lab Book



This Lab Book belongs to:

(Student Scientist)



UNIVERSITY OF CALIFORNIA
Agriculture and Natural Resources

■ 4-H Youth Development Program

Acknowledgements

4-H Water Wizards was developed in 2008 by Marianne Bird and Trisha Dixon with funding from the Toyota 4-H2O Community Partner Project Grant through the National 4-H Council.

Activities in the publication were tested and reviewed in partnership with staff from the Sacramento START afterschool program. Sam Sandoval and members of the UC ANR Water Program Team reviewed sessions for technical accuracy. The University of California conducted extensive evaluation of the project, and Aarti Subramaniam was instrumental in that process.

In response to the coronavirus pandemic in 2020, a team of afterschool program staff, science teachers, 4-H staff and academics worked to adapt the curriculum for virtual and small-group delivery. Members of the 4-H Water Wizards Virtual Task Force included:

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Cover design: Marianne Bird
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Sessions 2, 3, & 9 do not have any corresponding pages



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Become a Scientist



Welcome to the 4-H Water Wizards program! You are beginning a 12-week journey where you will have the opportunity to be a scientist as you conduct several hands-on experiments to increase your knowledge and understanding about water and its importance to the planet. In this program, you will learn about water and the environment, water properties, and service learning.

This Lab Book contains the pages you will need to participate in the many experiments you will conduct in the 4-H Water Wizards program, as well as a glossary of terms. Please note that there are no pages for sessions 2, 3, and 9. Check with your adult leader or teacher to find out about getting supplies for each of the experiments.

Session 1

Water Evaporation Experiment Data Sheet

Procedure:

1. Label the cups Sun, Shade, and Covered.
2. Using a measuring cup, partly fill the plastic cups with water so that there is the same amount of water in each cup.
3. Mark the water level on each cup with a permanent marker.
4. Cover cup labeled Covered with plastic wrap and secure with a rubber band.
5. Place cup labeled Sun and the cup labeled Covered in a place which receives a lot of sun light throughout the day. Place the cup labeled Shade somewhere out of the sun where it won't be disturbed.
6. After a day or two, mark the water level on each cup. Record any observations.

Predictions:

What do you think will happen to each of the three cups?

Data Collection:

Draw a picture of the three cups at the end of the experiment.

Date	Sun Cup Where placed:	Shade Cup Where placed:	Covered Cup Where placed:
	Beginning measurement:	Beginning measurement:	Beginning measurement:
	Ending measurement:	Ending measurement:	Ending measurement:

Observations: (Describe what happened)

Conclusion:

Session 4

How Much Water Do We Use?

Water Usage Chart

Water activity	Average number of gallons used
Brush our teeth	1 gallon
Flush the toilet	3 gallons
Hands and face washing	1 gallon
5 minute shower	25 gallons
10 minute shower	50 gallons
Face and leg shaving	1 gallon
Dishwater per load	15 gallons
Dishwashing by hand	8 gallons
Clothes washing (machine)	25 gallons
Glasses of water drunk	8 oz per glass = 1/16 th of a gallon

Information courtesy of USGS – Per Capita Water Use <https://water.usgs.gov/edu/activity-percapita.php>

Session 4

How Much Water Do We Use?

Student Tally Sheet

Water Use Activity	Put a check mark for each time activity took place.	Fill in number of gallons used each time for this water use.	Total number of gallons used.

Session 5

Water Taste Test Score Sheet

Individual Scores

Water Sample	Score	Rank	Comments
A			
B			
C			
D			

Key

5 = Excellent

4 = Very Good

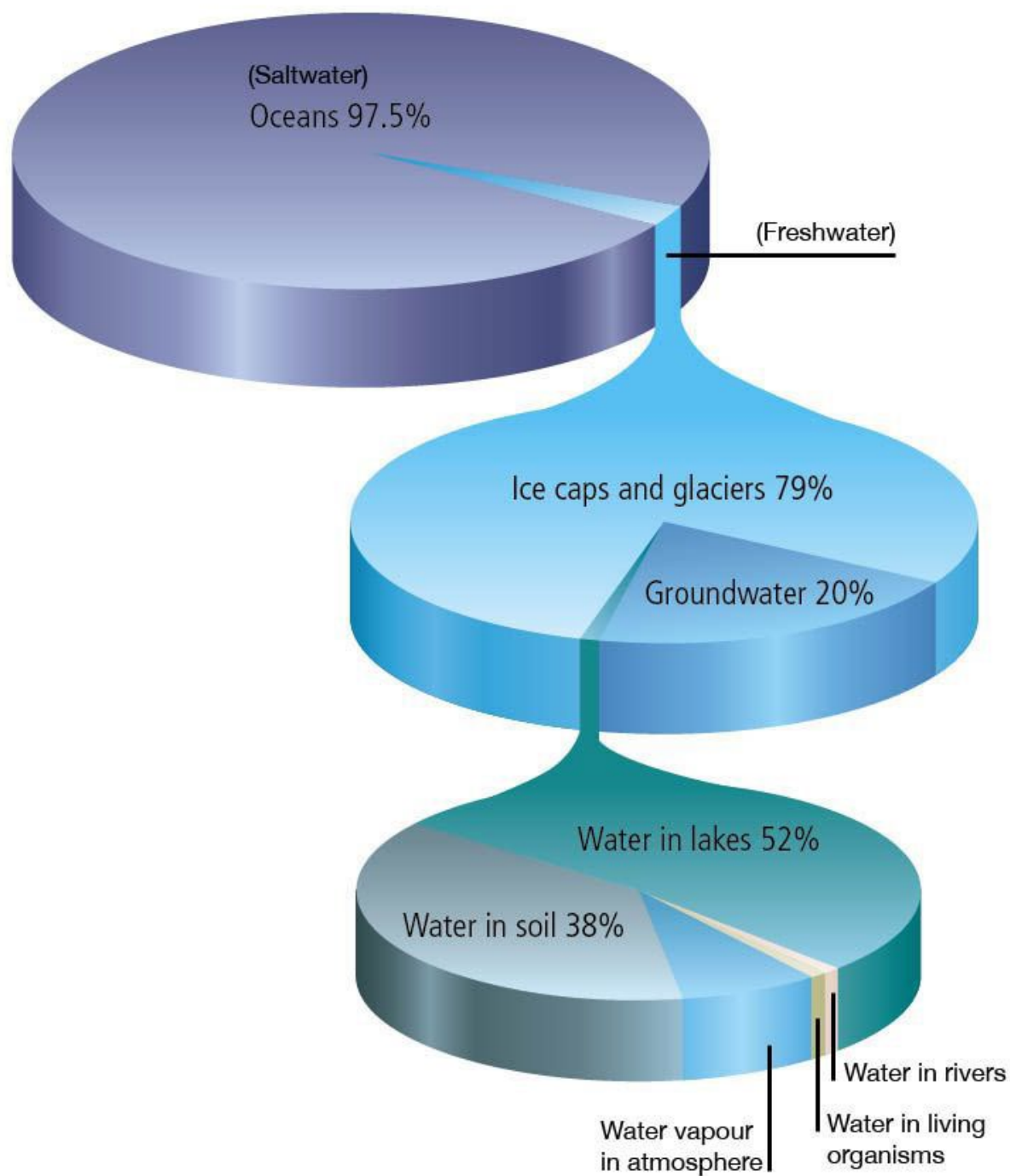
3 = Passable

2 = Not Very Good

1 = Really Awful

Session 6

Water Distribution on Earth



Earth Forum, Houston Museum of Natural Science

Session 6

Seed Test: How does saltwater affect seed growth?

Purpose: Test the effect of saltwater on the germination and growth of plants.

	Sample A	Sample B
Variable: amount of salt water		
Hypothesis: I think		
Results		
Day 1: How many seeds germinated?		
Day 2: How many seeds germinated?		
Day 3: How many seeds germinated?		
Day 4: How many seeds germinated?		
Day 5: How many seeds germinated?		
Conclusion: I learned		

Session 6

Water Salinity Graph

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12				
11				
10				
9				
8				
7				
6				
5				
4				
3				
2				
1				
ppt*	Sample A	Sample B	Sample C	Sample D

* Parts per thousand

Session 7

Water Density Chart

		Color of Water
<div>Density of Water</div>	Light (not dense)	
	Heavy (very dense)	

Session 8

Soap Suds Data Sheet

Let's look at four (4) different samples of water:

Distilled
Tap
Bottled
Salt water

Predictions:

Which type of water do you think is the softest and will make soap suds the quickest?

Which type of water do you think is the hardest and will take the longest to make suds?

Observations:

Type of Water	Number of Drops
Distilled water	
Tap water	
Bottled water	
Salt water	

Session 10

Project Timeline

Every project needs a detailed project plan. The plan will outline all the tasks that need to be done, who will do them, and when they will be accomplished.

- Identify specific tasks to be accomplished to address your community problem.
- Decide when each task needs to be done. Make sure that you give enough time for each task.
- Decide who will be the team leader for each task.

Project Name			
Project Goal			
Target Completion Date			
Action Item	Who Will Do It	Due Date	Done
			<input type="checkbox"/>
			<input type="checkbox"/>
			<input type="checkbox"/>
			<input type="checkbox"/>
			<input type="checkbox"/>
			<input type="checkbox"/>
			<input type="checkbox"/>
			<input type="checkbox"/>
			<input type="checkbox"/>

Session 11

Project Evaluation

Project Name			
Project Goal			
How did the project meet the needs of our school or community?	Describe how you felt about the project.		
What worked well in the project?	If you were going to do this project again, what would you do differently?		

Glossary of Terms

Accumulate – To pile up, gather, collect.

Accuracy – The correctness or truthfulness of something; the ability to be precise and avoid errors.

Agriculture – The occupation, business, or science of cultivating the land, producing crops, and raising livestock to produce food.

Atmosphere – The layer of air surrounding the earth.

Aquifer – A layer of permeable rock, sand, or gravel through which groundwater flows, containing enough water to supply wells and springs.

Aqueduct – Human made canals that carry water from its source (rivers, lakes, and other bodies of water) to their place of use (towns, cities, agricultural fields).

Artesian well – A body of ground water that is held under the surface between layers of hard rock under pressure that is strong enough to cause the water to flow upwards without the need for pumping. The water may even spurt out of the ground if the natural pressure is high enough and there is an outlet for the water to pass through.

Average – A mathematical value calculated by adding several numbers together and dividing that sum by the number of numbers added.

Bedrock – The solid rock beneath a layer of soil, rock fragments, or gravel.

Brackish – A mixture of fresh and salt water.

Buoyancy – The tendency of an object to float.

Civic Engagement – Working to make a difference in your community.

Combustion – The burning of a fuel, through rapid oxidation (a chemical process) in which a substance (the fuel) reacts vigorously with oxygen to produce heat and light (seen as a flame) and a small amount of water, in the form of vapor. Examples: a car engine, or a fire.

Community – A group of people that either live in the same place or have something in common.

Condensation – The conversion of vapor to gas to a liquid.

Conservation practices – Things done (including rules followed) to preserve, manage and take care of natural resources (such as water, forests, animals).

Controlled Experiment – A way to search for cause and effect by testing, limiting, or controlling variables.

Dam – A barrier to prevent the flow of water partially or fully for storage or diversion purposes.

Data – Information, often in the form of a list of numbers, facts or figures obtained from experiments or surveys, used as a basis for making calculations or drawing conclusions.

Debris – Scattered pieces left behind after something has been broken down or destroyed.

Delta—Where a river meets the sea or ocean.

Density – Mass per volume (how heavy compared to how large something is).

Drainage basin – An area of land that is drained by a river.

Earth's topography – The surface features of a region including hills, valleys, rivers, lakes, canals, bridges, roads, cities, etc.

Estuary – Where a river joins the ocean and freshwater and saltwater meet.

Evaporation – To remove moisture; to change a liquid or a solid into vapor.

Expelled – Eliminated, thrust out.

Flood – Any relatively high flow of water that overflows natural or artificial banks of a stream, river, lake, or body of water inundating the floodplain or the valleys.

Flood plain – A strip of relatively flat land bordering a stream, river, or lake that can accommodate the overflow of flood waters.

Germination – Beginning to grow.

Grassed waterways – Streams, creeks, sloughs, lakes that have grass growing at their edges or in the shallow edges of the waterway.

Ground water – Water found in pores or cracks in sand, gravel, and fractured rock beneath the land surface.

Habitat – The landscape of natural and modified conditions in which plants, animal and humans live, e.g., forest, desert, or wetlands.

Hydrology – The study of water, its properties, laws, and distribution.

Hydrometer – An instrument used to measure the salinity of water.

Infiltrate – To pass through a substance by filtration, or to make a liquid or gas pass through a substance by filtration.

Inhospitable – An area that does not offer protection or refuge, an area that is difficult to live in, an area with poor habitat conditions, that is barren.

Irrigation – To bring a supply of water to a dry area, especially to help crops to grow.

Intercept – To prevent from reaching a destination or target by stopping or diverting.

Infiltrate – To filter or travel through; permeate.

Molecules – The smallest parts of an element or compound that can exist and keep the characteristics of that element or compound.

Non-point source pollution – Pollution that comes from many sources indirectly through run-off into water sources.

Objective – Not influenced by personal feelings or opinions in considering and representing facts.

Percolate – To make a liquid or gas pass, or filter through, a porous substance; to pass slowly through something or spread throughout a space.

Point source pollution – Pollution that flows from pipes or comes from specific points such as industrial plants, sewage treatment plants, or storm water drains.

Precipitation – Rain, hail, sleet, and snow.

Preference – The choice of one thing over another.

Reservoir – A place where large amounts of water are collected and stored for use.

Respiration – The process by which a living organism or cell takes in oxygen from the air or water, utilizes it and gives off products of oxidation such as water vapor and carbon dioxide.

Respire – To breathe air in and out.

Retained – Held back.

Runoff – Water that drains or flows off surfaces to collect elsewhere.

Salinity – The amount of salt dissolved in water.

Seep – v. To pass, flow or ooze gradually through a porous substance, *n.* a small pool or spring where liquid from the ground escapes to the surface.

Service Learning — A form of education where learning occurs through helping others.

Spring – A source of water that flows out of the ground as a small stream or pool.

Terrace – A flat raised strip of beach or ground that has been formed naturally along the coast, beside a river or lake, or along the side of a valley by erosion.

Transpiration – The passage of water through a plant from the roots, through the vascular system in the leaves, to the atmosphere.

Vapor – A gas, such as mists, fog, steam, and or clouds.

Variable – Any factor, trait, or condition that can exist in differing amounts or types. An experiment usually has three kinds of variables: independent, dependent, and controlled.

Volunteer — A person who does something without being paid

Water Density – The weight of water per its volume.

Watershed – The land area that drains water to a stream, river, lake, or ocean.