Life Lab Science
Preview Sampler

Second Grade Edition
An Introduction to the
Life Lab Science Curriculum

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Investigating Water
Water Cycle Boogie

Written by Doug Greenfield

Evaporation, condensation, precipitation

Evaporation, condensation, precipitation

The water cycle boogie goes round and round

The water cycle boogie goes up and down

The sun gives the water cycle power to spin

The water goes up and down again

The surface of all water heats up with the sun

The vapor rises up and then the boogie's begun

What's that called? What's that called?

Evaporation

CHORUS: Evaporation, Condensation, Precipitation
Water cycle boogie goes round and round
Water cycle boogie goes up and down
Water holds together chemically
Hydrogen bonding is what you see
All those airborne vapors they squeeze together
to form a cloud that could change the weather
What's that called? What's that called?
(CONDENSATION)

CHORUS: Condensation, Precipitation, Evaporation
Water cycle boogie goes round and round
Water cycle boogie goes up and down
All those dark clouds can't hold together
Water boogies down bringing stormy weather
Fog, rain, hail, flurries, ice, and sleet
Splosh, splash, and crunch underneath your feet
What's that called? What's that called?
(PRECIPITATION)

CHORUS: Precipitation, Evaporation, Condensation
Water cycle boogie goes round and round
Water cycle boogie goes up and down
Two thirds of earth is water, it's true
Gives life to every plant and animal too
Respect water's power, only use your share
Don't waste a drop, there's none to spare
Let's do the water cycle boogie again
Let's go for another spin! (REPEAT 1ST CHORUS)

Arranged and ©1991 Banana Slug String Band
Slug Music
Music can be found on BSSB tape accompanying this curriculum
Sparkling in the light, pouring out of faucets, and billowing as vapor in clouds, water attracts us from the very beginning of our lives. It is, after all, a resource essential to all living things. Life on Earth would be impossible without water.

Children play in water and investigate it endlessly. While most children recognize everyday examples of evaporation, condensation, boiling, and melting, their understanding of these phenomena is often inaccurate or incomplete. For instance, a child may realize that water in puddles disappears, without understanding that the water has not vanished but has become a gas. Another child may know that ice cubes melt, but not connect the melting with heat energy.

Through the activities in this unit, children investigate the scientific explanations for their observations about water. In different activities involving evaporation and condensation, students explore how water changes. They are also introduced to the water cycle. To gain an understanding of how water changes, students observe what happens to ice cubes as they melt, what happens when water evaporates and condenses, and they create their own mini-terrariums. Change is a difficult concept for a second grader, but with careful observation and record keeping, students can understand what happens to water before and after it changes form.

In this unit, students continue to use the techniques of scientific investigation. First, they predict what happens to water under various conditions. Next, students test their ideas and then tell how their ideas compare with the results of their experiments.
Student Goals

Theme: Students will observe how and why water changes form from solid to liquid to gas.

Science Explorations: Students explore water as a natural resource that covers planet Earth and that is needed by all living things.

Process Skills: Students observe water changing form and make predictions based on these observations.

Science Concepts
In this unit students explore Life, Earth, and Physical science concepts through lessons that focus on observing changes and making predictions based on those changes.

Life Science: All living things need water to live and grow.

Earth Science: Most of our planet is covered by water; water continually moves through the water cycle.

Physical Science: Two of the ways water changes form are from liquid to gas and from liquid to solid. Both changes result from changes in temperature.

Science, Technology, and Society: Humans use and need water every day for food, health, recreation, and work.
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<td>In this preassessment activity, students investigate the properties of water and share their ideas about the substance.</td>
<td>Observing, Communicating</td>
<td>✓</td>
<td>✓</td>
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<td>Shape Changers</td>
<td>Groups of students predict what will happen to ice cubes placed in various locations and then test their predictions.</td>
<td>Predicting, Comparing</td>
<td>✓</td>
<td>✓</td>
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<td>Now You See It</td>
<td>Students observe water boiling and then form groups to test how evaporation occurs.</td>
<td>Observing, Comparing</td>
<td>✓</td>
<td>✓</td>
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<td>Water from the Air</td>
<td>After watching a demonstration, students monitor condensation on the outside of metal cans.</td>
<td>Observing, Comparing</td>
<td>✓</td>
<td>✓</td>
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<td>Mini-Terrariums</td>
<td>Students plant and then water seeds in two cups, one covered and one uncovered. They predict what will happen to the seeds.</td>
<td>Predicting, Applying</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
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<td>A Book of Water</td>
<td>In this postassessment lesson, students create group books about water to show what they have learned in this unit.</td>
<td>Communicating, Applying</td>
<td>✓</td>
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**Unit Planner**

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| Investigating Water | Part 1: 45 min  
Part 2: 30 min | Send home Parent Letter; set up space for children to investigate water in garden or surrounding area; arrange for aide or volunteer.                                                                                                                                 | Shulevitz, *Rain Rain Rivers*          |
| Shape Changers  | Part 1: 30 min  
Part 2: 45 min | Provide ice cubes that are uniform in size.                                                                                                                                                                          | Krensky, *Snow and Ice*                |
| Now You See It | 60 min, including monitoring | Plan activity for sunny day; arrange for hot plate or electric pot.                                                                                                                                                 | Peters, *Good Morning, River!*         |
| Water from the Air | 40 min  | Acquire empty metal cans and ice.                                                                                                                                                                                     | Cummings, *C.L.O.U.D.S.*               |
| Mini-Terrariums | Part 1: 30 min  
Part 2: 20 min  
Note: Part 2 occurs two weeks after Part 1.                                                                                                                   | Two previous activities are prerequisites for this one; acquire radish seeds and potting soil.                                                                                                                                 | Russell, *The Stream*                  |
| A Book of Water | Part 1: 30 min  
Part 2: 30 min | Collect nature-oriented magazines for students to cut up.                                                                                                                                                            | Peters, *Water's Way or Branley, Rain and Hail* |

**Life Lab Videodisc**

Find out ways to incorporate the Life Lab Videodisc into this unit by turning to Section 2.3 Investigating Water in the *Videodisc Guide*.

**Life Lab Center**

The Life Lab Center provides a place for students to store and display their work, browse through science-related books, and monitor ongoing experiments. Allow time each day for students to explore the Center. You might also want to do one or more of the following:

- Make a bulletin board display of students' ideas and questions about water.
- Set up a station equipped with water, cups, balance scales, and other measuring tools, and a variety of other liquids like soda, juice, or detergent and water, for simple experiments.
- Assemble a large terrarium so that children can observe the water cycle.
- Assemble an aquarium to show how plants and animals live in a water environment. Ask students what in the aquarium is alive and whether the water in the aquarium is living or nonliving.

**Garden Activities**

- Transplant seedlings from the Mini-Terrariums lesson.
- Observe water evaporating from puddles in the garden.
- Observe where rain goes when it falls on the garden.
- Practice watering techniques. (See *Gardening Know-How for the '90s*, pp. 13–14, 45, 47, 72–74, for information on watering.)
- Set up water conservation experiments in the garden.
Recommended Literature

Story Books


Keats, Ezra J. *The Snowy Day*. New York: Viking, 1962. This is a story about the adventures of a boy in the city on a very snowy day.


Mendez, Phil. *The Black Snowman*. New York: Scholastic, 1989. By the power of an ancient, magical *kente*, a garment once worn by a tribal man of strength, a black snowman in the city comes to life and helps Jacob discover the beauty of his African heritage and his self-worth.


Peters, Lisa Westburg. *Good Morning, River!*. New York: Arcade, 1990. Kate and her elderly friend Carl spend their days on the river, observing it in all seasons—its thick crust of ice in winter, the floodwaters that rise in the spring thaw, and more.


In this wordless story, two children play in their backyard during a rainy day.


Reference Books


*Snow Is Falling*. New York: Crowell, 1986. This book illustrates both the benefits snow brings to plants, people, and other animals, as well as the hardships it creates.

Dorros, Arthur. *Follow the Water from Brook to Ocean*. New York: Harper, 1991. Follow the progress of water as it flows from brook to stream to river, over waterfalls, through canyons and past dams to eventually reach the ocean.


Parker, Steve. *Pond and River*. New York: Knopf, 1988. This photo essay examines the range of plant and animal life found in fresh water throughout the year.

Russell, Naomi. *The Stream*. New York: Dutton, 1990. Here is an entertaining journey through the water cycle, starting with a cloudburst and ending at the ocean, where vapors rise once again into clouds. The book tells how humans and other animals are connected to the cycle.


Some of these books may be available in Spanish-language editions. Check with your local bookstore for Spanish titles currently in print and available by special order.
Dear Parent or Guardian:

For the next few weeks, we will be studying water as part of our Life Lab Science Program. We will be investigating water’s physical properties and exploring how and why water changes form. There are a number of ways you can enhance your child’s study of water:

- Whenever your child encounters water, ice, or steam, ask for observations and discuss any changes that are taking place. Is the ice melting? Is water boiling? Is steam condensing?
- Conduct your own experiments at home with water. Encourage your child to figure out ways to make ice melt faster or more slowly. Or you might boil the liquid to see how heat makes the water evaporate.

We would appreciate your collecting magazines, particularly nature-oriented magazines, for the class to use in various activities. Please send the magazines to school with your child by ______________. As always, we would enjoy having your help at school with our Life Lab activities. If you can join us, please complete the form below and return it to me.

Sincerely,

Name_________________________________________ Phone________________________

____Yes. I’d like to help in the classroom. Please call me.
____No. I can’t help, but please keep me informed.
Mini-Terrariums

Students plant and then water seeds in two cups, one covered and one uncovered. They predict what will happen to the seeds.

Outcome
Students apply their knowledge about evaporation and condensation.

For the Teacher
Students have now explored the idea that water can take three forms: liquid, solid, and gas. They have also investigated the idea that water evaporates and condenses. These concepts are not easy for children to understand. For example, accepting the concept that water can become a gas in the air may upset a long-held belief that water disappears. This activity will help students test their new knowledge of how water changes state, and provide students with an opportunity to apply their knowledge of condensation and evaporation to mini-terrariums. As students work, circulate among them and ask questions about what will happen to their terrarium.
Teacher to Teacher

Many students in my class thought that when water gets hot enough “it just goes away.” After the investigations of the different phases of water, a lot of them decided that they wanted to revise their ideas. When we discussed the terrarium investigations, I was careful to give the scientists’ understanding of condensation and evaporation as only one of the many ideas in the class. Then we discussed the pros and cons of each one based on what we had observed. That way I wasn’t providing “ready-made” answers to the kids, and they felt their theories were valued.

—Helene Finkelman, Palmetto Elementary School, Miami, FL

Preparation
1. Prepare a sunny place in the classroom to store the mini-terrariums.

2. Cover a table with newspaper to use as a planting station. Set up planting materials at the station.

3. Place a 2-inch strip of masking tape on the side of each plastic cup.

4. Fill two of the plastic cups with soil to use in the Getting Started section.

Getting Started
Discuss how covering the cup with plastic will help keep the soil moist through condensation.

What do you think would happen to a plant if you watered it once and did not give it water again? What do you think would happen if we planted seeds in this uncovered cup and watered them only once? Why? Plant three seeds in the cup and water once. What would happen to the seeds if we watered them once and then covered the cup with plastic wrap? Why? Plant three seeds in a second cup and cover with plastic wrap. Have student pairs record their ideas on their lab sheets.

Part 1

Action
1. Divide the class into pairs. Give each pair 2 clear plastic cups labeled with tape. Instruct students to write their name on the tape.

2. Demonstrate how to:
   - fill cups halfway with soil;
   - plant seeds at the proper depth by making a hole the depth of a pencil point;
   - water the soil with the spray bottle;
   - secure the plastic wrap over the top of 1 cup with a rubber band.
3. Allow appropriate numbers to rotate through the planting station.

4. Give each pair 6 seeds to plant, 3 for each container.

5. Allow students to mist the soil with the water sprayer until the top of the soil is soaked. Then have them cover 1 cup with the plastic wrap. Leave the other uncovered.

6. Ask students to place their cups in a sunny location in the classroom.

7. Plan to check the mini-terrariums again in 2 weeks. Mark the date on the Garden Log as a reminder.

**Part 2 (two weeks later)**

**Action**

1. Ask students to check their mini-terrariums and then record the results on their lab sheet.

2. Write two headings on the chalkboard: Covered and Uncovered. Then record the number of sprouts in each set of cups. Record, too, how the soil felt in each cup. Which was still moist? Which was dry?

**Assessment**

Discuss with students what they think will happen to the seeds.

What did you predict would happen to the seeds in the uncovered cup? Why? What did you predict would happen to the seeds in the covered cup or mini-terrarium? Why?
Digging Deeper

- Make a larger terrarium out of a fish tank or gallon jar. Place soil, plants, and small animals such as worms and snails in it. Seal the top and let students observe the terrarium at the Life Lab Center.

- If any seeds germinated in the mini-terrariums, cover the sides of these cups with dark paper to keep light off the roots. Remove the paper occasionally to observe the roots as the plant grows. As the plant becomes root-bound, discuss whether the plants need to be transplanted.

- In the garden make plastic coverings from gallon milk jugs for some of the plants. Test to see if they need less water than uncovered plants.

Teacher Reflections

- Did students make any reference to condensation or evaporation in their predictions?

- Did students use condensation or evaporation to explain what happened in the cups?

- Did students seem to understand how evaporation and condensation affect plants?
The Life Lab Science—Scope and Sequence
A Full Program of Life, Earth, and Physical Sciences

The Life Lab Science Scope and Sequence demonstrates that Life, Earth, and Physical science concepts are integrated in a systems approach to science. As the garden grows and changes throughout the seasons, it provides a natural laboratory for studying how the science disciplines are interrelated. You will also discover numerous opportunities for integrating science with math, language arts, and social studies.

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<td>Change: Living and nonliving things change: There are patterns of change in the natural world. The garden is a model of an environment that is always changing. Living things need resources to survive and change. Resources change as they are used, recycled, or depleted.</td>
<td>Living things can be distinguished from nonliving things. Living things change in patterns called life cycles. Living things need certain resources from their environment to survive and grow.</td>
<td>The Earth, its atmosphere, and the sun provide resources for living things to grow. Nonliving resources go through patterns of change. Humans can conserve and recycle the Earth's limited resources to limit our impact on the environment.</td>
</tr>
<tr>
<td><strong>Sensing Changes</strong></td>
<td>Change: Living things change and have characteristics that distinguish them from nonliving things.</td>
<td>We use our senses to discover the physical properties of objects, and to determine similarities and differences.</td>
<td>The garden provides resources for things that live there.</td>
</tr>
<tr>
<td><strong>Investigating Plants</strong></td>
<td>Change: Plants are living things and need certain resources to grow. Plants change as they grow. There is a pattern of change, or a life cycle, in plant development.</td>
<td>Plants are living things. Plants need certain resources from their environment to grow.</td>
<td>The Earth, its atmosphere, and the sun provide resources such as soil, water, air, and energy for plants to grow.</td>
</tr>
<tr>
<td>Life Lab Science</td>
<td>Grade 2</td>
<td>Change Around Us</td>
<td>Scope and Sequence</td>
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<td><strong>Investigating Water</strong></td>
<td><strong>Theme Connections</strong></td>
<td><strong>Life Science</strong></td>
<td><strong>Earth Science</strong></td>
</tr>
<tr>
<td>Change: Water changes form. Water goes through a pattern of change called the water cycle. Water is a natural resource needed by all living things.</td>
<td>All living things need water to grow.</td>
<td>Most of Earth is covered by water. Water continually moves through the water cycle.</td>
<td>Water has observable properties. Water changes form, from solid to liquid to gas. Heat energy causes water to change form.</td>
</tr>
<tr>
<td><strong>Investigating Air</strong></td>
<td><strong>Change: Air is a non-living resource that living things need. Air changes. Air moves and can move things.</strong></td>
<td>Almost all living things need air to grow.</td>
<td>Air surrounds the Earth.</td>
</tr>
<tr>
<td><strong>Investigating Food</strong></td>
<td><strong>Change: Living things need food to grow and stay healthy. Energy in food is changed to energy used to grow and move. Food changes as it is processed.</strong></td>
<td>Food is a resource that humans need. Food comes from plants and animals. Humans get energy and nutrients from food.</td>
<td>Food changes as it is processed. Food gives us energy. Energy is necessary to make things work.</td>
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<td><strong>Physical Science</strong></td>
</tr>
<tr>
<td>Investigating Food Chains</td>
<td>Change: The garden is an environment that is always changing. There are patterns of change within the garden. Living things change in the garden.</td>
<td>Living things need energy and nutrients to survive. Energy and nutrients are passed through the food chain. Plants make their own food. Animals get food energy by eating plants or other animals.</td>
<td>The physical environment provides resources that living things need.</td>
</tr>
<tr>
<td>Investigating Resources</td>
<td>Change: Humans use natural resources for many different purposes. Humans change resources as they use them. Natural resources go through patterns of change. The amount of natural resources can change; some natural resources can be used up.</td>
<td>Living things need certain resources to survive and grow. Humans use plants and animals as resources. The Earth has a limited amount of natural resources.</td>
<td>Everything humans use originates from natural resources. Human use of resources affects the physical environment.</td>
</tr>
<tr>
<td>Conserving Resources</td>
<td>Change: Resources change as they are processed and used. Humans can change the physical environment. Humans can conserve natural resources.</td>
<td>Living things are interdependent. Human use of resources has an impact on other living things. Wise resource use will save resources for other living things.</td>
<td>Human use of resources has an impact on the physical environment. Humans can conserve and recycle the Earth's limited resources.</td>
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Life Lab Science

Change Around Us

Developed by Life Lab Science Program
Mini-Terrariums

Names ___________________________ Date ________________

**GUESS**
Draw what you think will happen to the seeds in the two cups.

Why do you think this will happen?
TEST
Tell how you will test your ideas.
List what you did to cup 1.

List what you did to cup 2.

TELL
Date____________________
Draw what happened to the seeds in the two cups.

How does the soil feel in cup 1?

How does the soil feel in cup 2?