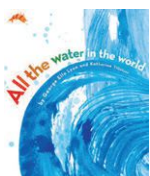


## All the Water in the World

By Emily Morgan and Karen Ansberry

When you look at a globe, water on Earth seems abundant. More than two-thirds of the surface of our planet is covered in water, but a closer look reveals that only a small fraction of that water is freshwater, most of which is located underground or frozen in glaciers and polar ice caps. In fact, only about 1% of all the water on Earth is accessible freshwater. This issue's column explores the locations and forms of water, how it is distributed in various reservoirs, and why we need to protect and conserve "all the water in the world."

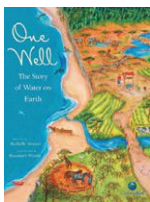
### This Issue's Trade Books



*All the Water in the World*  
By George Ella Lyon  
Illustrated by Katherine Tillotson  
Atheneum Books for Young Readers. 2011.  
ISBN: 978-1-4169-7130-6  
Grades K–2

### Synopsis

Rhythmic language and vibrant artwork describe why "all the water in the world is all the water in the world" that just keeps cycling through various forms and places.



*One Well: The Story of Water on Earth*  
By Rochelle Strauss  
Illustrated by Rosemary Woods  
Holiday House. 2010.  
ISBN: 978-1-55337-954-6  
Grades 3–5

### Synopsis

Beautiful paintings and informative text describe all the water on our planet as a single well that all living things share. Tables and graphs are used to inform the reader of the distribution of water on Earth and the need to conserve it.

### Curricular Connections

One of the goals of the *Next Generation Science Standards* is to increase coherence in K–12 science education (NGSS Lead States 2013). The NGSS were written using the learning progressions set forth by *A Framework for K–12 Science Education* (NRC 2012). Appendix E of the NGSS contains a comprehensive table that outlines the progression of disciplinary core ideas throughout the K–12 years by using grade band endpoints. This issue's column demonstrates the learning progressions for topic ESS2.C: The roles of water in Earth's surface processes. In grades K–2, the grade band endpoint states that by the end of grade 2, students should understand that, "water is found in many types of places and in different forms on Earth." This basic concept is built upon in grades 3–5, when students learn that "Most of Earth's water is in the ocean and much of the Earth's fresh water is in glaciers or underground" (NGSS Lead States 2013, Appendix E, p. 3). These foundational concepts build upon one another and set the stage for more sophisticated understandings about Earth's water that students will explore in middle and high school.

In this issue's K–2 lesson, students use images of the Earth from space to identify liquid and solid water on Earth and develop a model to show where the water on Earth is located. The lesson for grades 3–5 builds upon the K–2 concepts by exploring the actual percentages of salt water and freshwater on Earth and the distribution of water in various reservoirs. The two lessons are on the same topic but advance in level of sophistication. ■

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## Grades K–2: All the Water in the World

### Purpose

By observing actual images of Earth and reading a book about Earth’s water, students will identify where both liquid and solid water (ice) are found on Earth.

### Engage

Show students the famous NASA photograph titled, “The Blue Marble” (see Internet Resources). Explain that this photograph of Earth was taken in 1972 by the Apollo 17 astronauts as they were traveling to the Moon. Ask students why they think the photograph was titled, “The Blue Marble.” (Earth is the same shape as a marble, it is mostly blue, and the swirls of clouds look like the swirls on some marbles.) Ask students what makes the blue color on Earth (water/oceans). Then ask if they think there is more land or water on Earth. In order to answer this question, they will need to see the whole Earth, not just one side. Show students images from the more recent NASA photo gallery “The Blue Marble,” which includes animations of Earth’s rotation (see Internet Resources). Tell students that these newer pictures were taken by satellites orbiting Earth and because of improved technologies are much clearer than the original “Blue Marble” photograph from 1972. Students will realize from these photos that the amount of water on Earth greatly exceeds the amount of land.



### Materials

- Computers or tablet devices
- Google Maps and internet connection
- Projector or interactive whiteboard
- Paper plates (1 per student)
- Art supplies, such as clay, paint, and markers

### Explore

Ask students where else water can be found on Earth besides the oceans (lakes, rivers, streams, ponds, puddles, and so on). Then ask, “Where is the closest water source to our school? How can we find out?” Students might suggest looking at a map. Project the Google Maps app and enter your school address. Tell students that this is a map of the area around the school and that on this map, water appears as the color blue. Slowly zoom out and stop when you see a body of water. Determine if it is a pond, stream, lake, or river. Keep zooming out, pausing to take note of the bodies of water on the map, until you can’t zoom out any farther. Ask students what the green colors on this map represent (land); what the white areas represent (ice); and if ice is water (yes). Show students the areas at the north and south poles that are covered with ice, which is water in a solid form.

### Explain

Show students the cover of *All the Water in the World* and tell them that this book is about Earth’s water—where it can be found and what forms it can take. Read the book aloud and stop after reading page 11, which says, “Water doesn’t come. It goes. Around.” Ask students what they think the author means by those lines. Have them listen for the answer on the following pages (CC ELA Connection: Reading: Informational Text – Integration of Knowledge and Ideas). From the reading, they should recognize that all the water in the world has been here before in different places and different forms. Make a list together of the different bodies of water they can think of that are found on Earth, including oceans, rivers, lakes, ponds, streams, glaciers, and ice caps. Reread the last five pages of the book, in which the author asks the reader not to waste water. Ask students why anyone would need to worry about wasting water if most of the planet is covered with water. Refer back to the “Blue Marble” pictures in the engage phase. Remind students that most of the Earth’s water is in the oceans. Explain that ocean water is salt water and that we cannot drink salt water. It would make us very sick. Our crops cannot be watered with salt water because the plants would die. Most land animals cannot survive by drinking salt water either. So, most of the water on Earth is not us-

able water. Next, point out the ice caps on the North and South poles. Explain that this water is not usable either because it is frozen. Explain to students that a very small fraction, only about 1%, of the water on our entire planet, can be used by us. So, it is extremely important to conserve that water to keep us and all the living things on our planet healthy.

## Elaborate

Reread pages 18–22 of *All the Water in the World*, which describes how some places on Earth have a “wealth of water” and others are desperately waiting for rain. Have students guess where the wettest places on Earth might be (the places with the most rainfall per year). Then model how to find your answer using an internet search. (If you have devices for each student or pair of students, have them locate these places on the map, taking note of the surrounding bodies of water and zooming out to see where they are located on Earth). For example, according to the Guinness Book of World Records, the wettest place on Earth is Mawsynram, India, at 467 inches of rain per

year. Have students enter the name of the city and country in the search box of Google maps. Then, have them make observations of the surrounding bodies of water. Next, re-search the driest places on Earth and have students find them using Google maps, noting the closest bodies of water and their locations on Earth.

## Evaluate

Challenge students to develop a model to represent the land and water visible on one of the images from the 2002 NASA Blue Marble gallery. They can create their model on a sturdy paper plate using art supplies such as clay, markers, and/or paint. They must also create a key that identifies land, liquid water (oceans, lakes, rivers), and frozen water (ice caps and glaciers). Students can display their models in the classroom.



## Connecting to the Next Generation Science Standards (NGSS Lead States 2013)

Grades K–2

2-ESS2 Earth’s Systems

[www.nextgenscience.org/2ess2-earth-systems](http://www.nextgenscience.org/2ess2-earth-systems)

Performance Expectations	Connections to Classroom Activity
<i>The materials/lessons/activities outlined in this article are just one step toward reaching the performance expectations listed below. Additional supporting materials/lessons/activities will be required.</i>	
2-ESS2-3 Obtain information to identify where water is found on Earth and that it can be solid or liquid.	Students use Google maps to locate liquid and solid water on Earth.
K-2-ESS2-2 Develop a model to represent the shapes and kinds of land and bodies of water in an area.	Students create a model based on one of the “Blue Marble” images of Earth and develop a key to show liquid water, solid water, and land.
Science and Engineering Practice	
Obtaining, Evaluating, and Communicating Information	Students obtain information from a read aloud and Google maps to determine where water is located on Earth.
Disciplinary Core Idea	
ESS2.C The Roles of Water in Earth’s Surface Processes <ul style="list-style-type: none"> <li>Water is found in the oceans, rivers, lakes, and ponds. Water exists as solid ice and in liquid form.</li> </ul>	Using the features of Google maps, students locate sources of solid and liquid water on Earth.
Crosscutting Concept	
Stability and Change	Students will explain that some events take a long time to happen whereas other events happen rapidly.