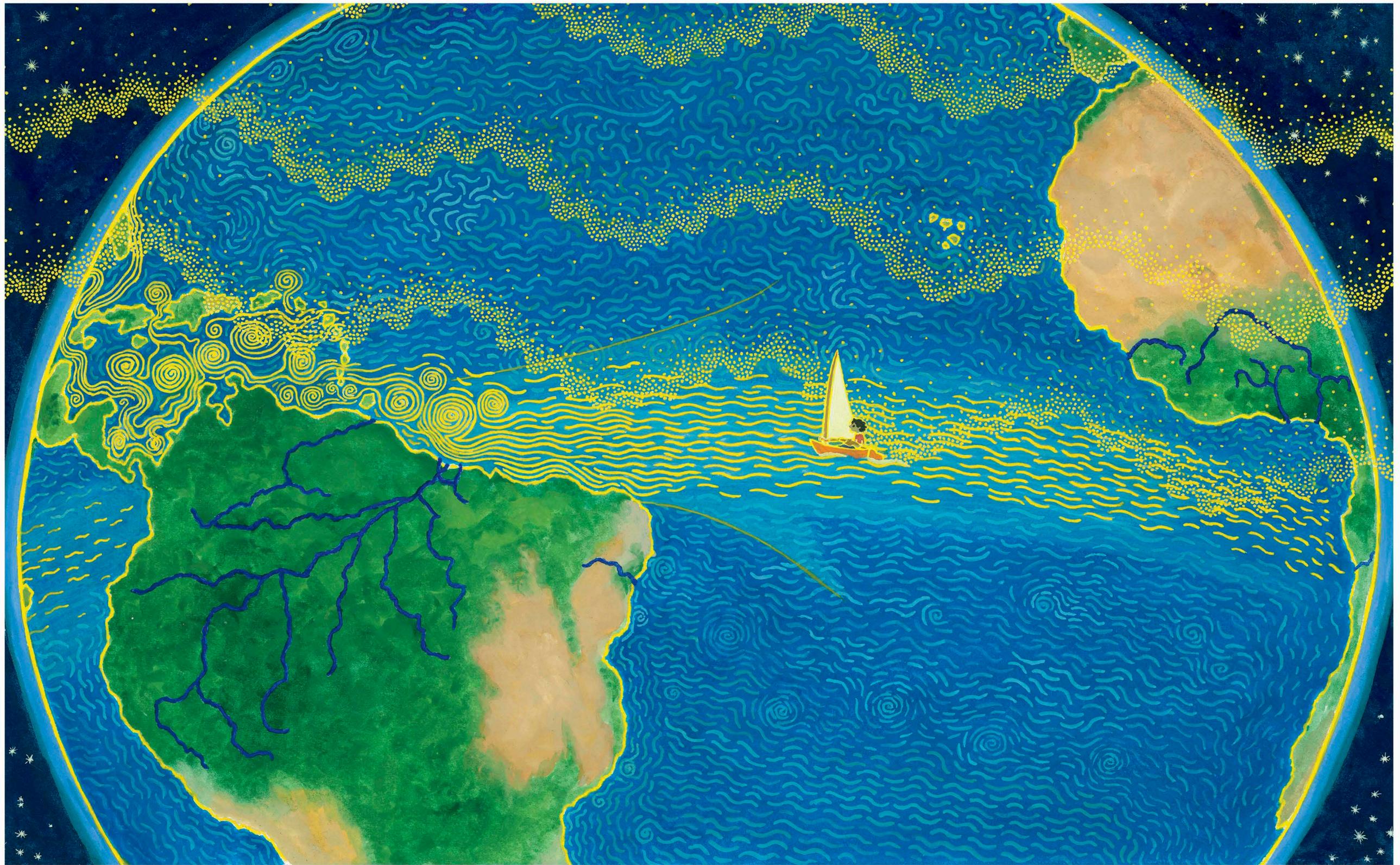


THE SUNLIGHT SERIES

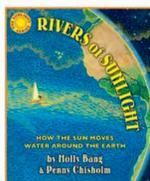
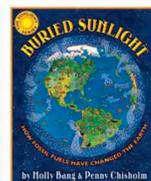
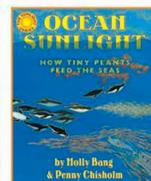
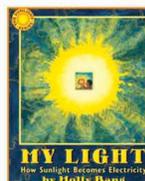
NONFICTION PICTURE BOOKS ABOUT HOW THE SUN CHANGES OUR WORLD



THE BLUE SKY PRESS



SCHOLASTIC



by Molly Bang
& Penny Chisholm

About the Sunlight Series

This series teaches students some of the basic concepts about how life on Earth works. *My Light* introduces the sun as the narrator and shows how humans change sunlight into electricity. The rest of the series shows the sun's role in the biosphere and how all life depends on the sun. These books describe photosynthesis on land (*Living Sunlight*), in the sea (*Ocean Sunlight*), and its role in creating fossil fuels (*Buried Sunlight*). *Rivers of Sunlight* shows how the water cycle is essential to life on Earth and how the total amount of water on Earth stays the same, and presents information about pollution, the overuse of water, and the effects of climate change on the Earth's water cycle.

These picture books are intended to elucidate the science for everyone. Even many adults don't understand that photosynthesis produces living matter from the sun's energy and carbon dioxide in the air, and is the foundation of the entire biosphere. Because this fundamental concept is so important, the sun is the narrator of the books and photosynthesis is the thread that unites them.

Incorporating pictures into class discussions

The concepts in these books are clarified by the details of each illustration. Use the information below and in the notes at the end of each book to help guide your initial discussion and understanding of the elements of the illustrations. If children understand what the pictures are saying, they'll be able to describe the scientific concepts in words.

Yellow dots: These represent energy and its movement. Energy is often described as both waves and particles, or photons, so it is shown in these books as waves of yellow dots.

Molecules: Molecules are shown as combinations of fuzzy dots of consistent colors that represent specific atoms: Hydrogen is the smallest atom and blue; carbon is the next in size and black; and oxygen is the largest and white.

Arrows: Arrows, composed of clusters of molecules, indicate the direction that energy moves in. The yellow outlines around animals also show the consumption and movement of energy.

Illustration panels: For more complicated concepts, boxed-off illustration panels throughout show an enlarged image with more details or a series of steps.

About the Authors



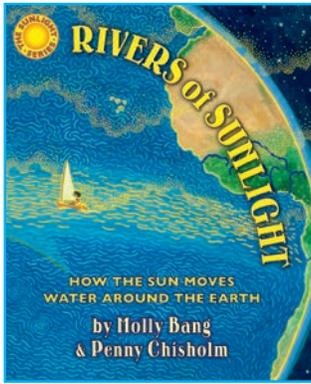
Photo credit: Jim Green

Molly Bang has written and illustrated more than twenty books for young readers, including three Caldecott Honor Books: *When Sophie Gets Angry—Really, Really Angry...*; *Ten, Nine, Eight*; and *The Grey Lady and the Strawberry Snatcher*. Bang divides her time between Falmouth, Massachusetts, and Northern California.



Photo credit: James Long

Penny Chisholm is a professor at MIT where she has been teaching Ecology for more than thirty-seven years. She and her students do research on phytoplankton—tiny plants that feed all life in the oceans. Her long list of prestigious awards includes the National Medal of Science, awarded at the White House in 2013. She lives in Massachusetts.



Rivers of Sunlight: How the Sun Moves Water Around the Earth

Rivers of Sunlight explains the importance of the sun in relationship to Earth's water, demonstrating how the sun moves water around the earth and sky. It describes how the sun affects the ocean and its vital currents. The book concludes with concerns about humans polluting and overusing water, and the effects of climate change on water around the world.

Hardcover: 978-0-545-80541-4 · Ebook: 978-0-545-80542-1 · \$18.99 (CAN \$25.99)

★ *Booklist* ★ *Kirkus Reviews* ★ *SLJ* ★ *PW*

Discussion Questions

For all students:

1. Who is narrating the book? Why do you think the authors chose to tell the story of the water cycle through that voice?
2. What is the relationship between evaporation and rain? What does the "flying river in the sky" do? How does the sun keep the Ocean Conveyor Belt moving?
3. Throughout the book, a child in the illustration is doing something that mirrors or relates to the action of the water. Choose an illustration and explain what is happening and the connection between child and water.

For older students:

4. Explain how the amount of salt in the sea is related to sunlight. Why doesn't the sea keep getting saltier? How is the balance of salt in the sea maintained?
5. Describe at least three causes of erosion mentioned in the book. How does erosion change the Earth's landscape?
6. What is an aquifer? How are aquifers helpful to humans? Discuss problems with aquifers that are caused by humans and what might help reduce those problems.

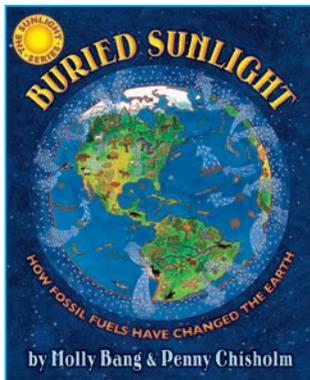
The questions above can help meet Common Core Anchor Standards *R. 1,2,3,4,7,10*; *SL. 1,2*

Activities

Before each of these simple experiments, have students predict what they think will happen and why. After each experiment, compare the outcomes to the predictions and discuss what took place and how that relates to their understanding of Earth's water cycle.

1. **LIQUID, SOLID, GAS:** Put water in ice trays, place them in a freezer, and leave them until they become ice. Set one of the ice cubes in a bowl and watch what happens. Later, take that same (melted) water and boil it in a pan or kettle to see the resulting steam.
2. **EVAPORATION:** Stir salt into a small bowl of water. Discuss where the salt went. Put a piece of black construction paper on a tray. Pour some of the salt water on the paper and put it in the sun. Keep checking until the water is gone. Discuss what happened.
3. **WATER DENSITY:** Fill a glass half full of room-temperature water. Fill a second glass with a very small amount of ice water and add 2 drops of blue coloring to it. Pour it slowly into the glass of clear water along the inside edge. Repeat the same process using red-dyed salt water poured slowly into a half-full glass of tap water. What happens to the ice water? What happens to the salt water? What does this show?

These activities can help meet Common Core Anchor Standards *W. 7*; *SL. 1,4*



Buried Sunlight: How Fossil Fuels Have Changed the Earth

Buried Sunlight describes the story of fossil fuels. The book explains how coal, oil, and gas are really “buried sunlight,” energy captured in the chemical bonds of plants that were trapped and compressed beneath Earth’s surface millions of years ago. The book ends by describing how burning these fossil fuels is changing our atmosphere.

Hardcover: 978-0-545-57785-4 · \$18.99 (CAN \$20.99) · Ebook: 978-0-545-57786-1 · \$18.99 (CAN \$18.99)

★ *Booklist* ★ *The Horn Book* ★ *Kirkus Reviews*

Discussion Questions

For all students:

1. How did tiny green plants that lived in the sea billions of years ago change Earth forever?
2. How are oil and coal made? What is the origin of the energy stored in these substances?
3. How long did it take for fossil fuels to form? How long have we been burning them? Does this matter, and if so, why does it matter?

For older students:

4. There has been a tiny imbalance in the cycle of life over the history of Earth. How has this made a big difference in our atmosphere, and how has that changed the whole planet?
5. How is burning fossil fuels similar to the respiration of animals? How is it different?
6. How is the planet likely to change if we continue to burn fossil fuels, and what measures might we take to slow these changes?
7. How is the buildup of carbon dioxide in our atmosphere different from the “pre-human” changes?

The questions above can help meet Common Core Anchor Standards *R.1,2,3,4,7,8,10; SL.1,2*

Activities

The Greenhouse Effect

Adding CO₂ to air raises its temperature in the presence of light energy. A number of lesson plans demonstrating the greenhouse effect can be found on the Internet. One of these lessons (found here: http://www.srh.noaa.gov/jetstream/atmos/ll_gas.htm) is adapted below.

Before performing the experiment, discuss with your students what they think might happen. Afterward, discuss what did happen and why, based on what they learned from the book and other research.

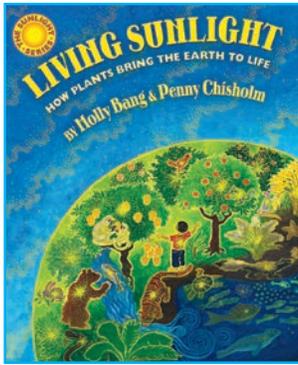
Procedure:

1. Fill two clear one-liter bottles halfway with water. Put a stopper with a thermometer through the middle in one so the recording end is suspended in the air of the bottle. Record the temperature.
2. Drop 2–3 Alka-Seltzer tablets into the other bottle. The bubbles produced are made of carbon dioxide (CO₂), which break as they rise into the air, filling the air with CO₂. Put the stopper and thermometer into the hole and measure the temperature of the air.
3. Turn on a lamp and direct it toward the bottles, making sure both are the same distance from it.
4. At the end of an hour, check the temperatures in both bottles. The temperature in the bottle with the added CO₂ should be considerably higher than the one without.

A video demonstration can be found here: <https://www.youtube.com/watch?v=kwtt51gvaJQ>

A more complex demonstration can be found here: <http://cleanet.org/clean/community/activities/c2.html>

This activity can help meet Common Core Anchor Standards *W.7,8; SL.1,4*



Living Sunlight: How Plants Bring the Earth to Life

This book explores how our sun gives us life through photosynthesis. It describes how that process connects all of life, how all life shares the same atoms, and how these atoms cycle on our planet.

Hardcover: 978-0-545-04422-6 · \$18.99 (CAN \$20.99)

★ *Booklist*

Discussion Questions

For all students:

1. What is photosynthesis?
2. Where do plants get their energy to live and grow?
3. Where do all animals (including humans!) get their energy to live and grow?
4. Using their sunlight-energy, what food do plants make to feed themselves?
5. What do plants breathe in and out? What do animals breathe in and out?

For older students:

6. What do plants do with the water they suck in through their roots?
7. Where does ALL the oxygen in our air come from?
8. Plants use sunlight-energy to make sugar. What three elements make up sugar? What holds the elements together in the sugar molecule? Where does the energy come from that holds it together?
9. What do animals do to sugar so it gives them energy?

For advanced students:

10. Define and explain the process that takes place during respiration. Do the same for photosynthesis. How are the two processes related?

The questions above can help meet Common Core Anchor Standards *R.1,2,3,4,7,10; SL.1,2*

Activities

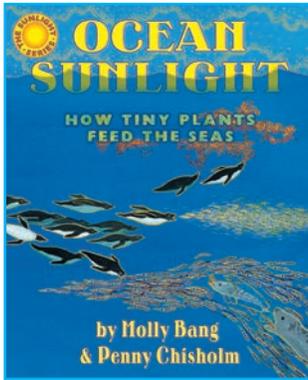
The activity below demonstrates how the concepts from *Living Sunlight* work in real life. Be sure the students understand the question their experiment is trying to answer.

Water, Water (Almost) Everywhere!

Main Question: What do plants need in order to live?

Have students put a pea, bean, or radish seed in each of six paper cups filled with wet soil. Place all six on a sunny windowsill. Wait until all six seeds have sprouted. Keep two containers on the windowsill and continue to moisten the soil. Keep another two on the windowsill but stop watering. Then put the last two containers into a dark closet but keep them watered. Have the children check on the changes they see over the next two weeks and explain why things happened the way they did.

This activity can help meet Common Core Anchor Standards *W.7,8; SL.1*



Ocean Sunlight: How Tiny Plants Feed the Seas

This book is about how photosynthesis feeds life in the oceans. This process is carried out by microscopic plants called phytoplankton that are the base of ocean food webs. This book also shows how all life in the oceans—both in the sunlit surface waters and the deep, dark sea—is connected through the phytoplankton, ocean currents, and the nutrients they carry.

Hardcover: 978-0-545-27322-0 · \$18.99 (CAN \$20.99)

★ *Booklist* ★ *Kirkus Reviews* ★ *PW*

Discussion Questions

For all students:

1. What are phytoplankton and why are they so important to life in the oceans?
2. How are phytoplankton similar to plants on land?
3. Do phytoplankton live both at the surface and the bottom of the ocean? Why or why not?
4. How do phytoplankton reproduce? How long does it take for them to double in number?
5. How much of the oxygen in our air comes from phytoplankton? How much from the plants on land?

For older students:

6. What do animals who live in the deep ocean eat? Where does the energy in that food come from?
7. Phytoplankton need a supply of nutrients (“fertilizer”) to grow. How does that supply of nutrients get recycled into the sunlit surface waters?
8. Does sunlight-energy get recycled? Why or why not?
9. When you eat fish, where does the carbon and energy in your food originate?

The questions above can help meet Common Core Anchor Standards *R.1,2,3,4,7,10; SL.1,2*

Activities

Grow Your Own Phytoplankton

Collect some pond (or puddle) water and put it in eight one-cup containers. Put four in the dark and four on a windowsill. Add 1–2 drops of Miracle-Gro plant fertilizer to two of each set of four. Wait a week and observe what happens. Those with Miracle-Gro, and in the light, should turn green with phytoplankton. Ask the students to explain how sunlight and nutrients affected the phytoplankton.

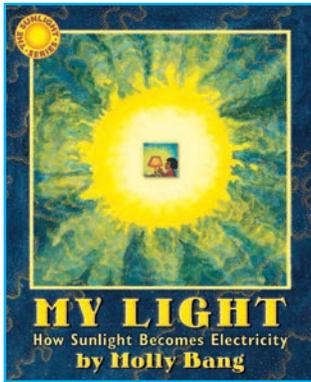
This activity can help meet Common Core Anchor Standards *W.1,7; SL.1*

Phytoplankton Population Boom

Put students in pairs and give each pair a bag of dried peas. Remind them that phytoplankton reproduce by splitting in two over the course of about a day. Start with one pea and let it divide to make two over a virtual day by taking another pea from the bag and placing it next to the first one. Then let those two “divide” to make four over the next virtual day by laying out two more peas. Continue doing this for another few virtual days. Ask students how many phytoplankton they would have after five virtual days.

To illustrate how this feeds the food chain, have one of the students be a zooplankton and start “eating” (removing) only the “new phytoplankton” as fast as they appear. This will demonstrate how the numbers of “phytoplankton” remain stable while still feeding up the food chain.

This activity can help meet Common Core Anchor Standards *W.7; SL.1*



My Light: How Sunlight Becomes Electricity

This book describes how humans capture energy from sunlight and change it into electricity. On the most basic level, it shows how the energy from sunlight is changed into other forms of energy—wind, moving water, etc.—and how we use that energy to make electricity.

Hardcover: 978-0-439-48961-4 · \$18.99 (CAN \$20.99)

★ *Booklist*

Discussion Questions

Even very young children can understand the basic message of the book: (Almost all of) our electricity comes from sunlight! But *My Light* introduces older children to more complex concepts. Be sure your students can answer the following questions:

1. Who is the narrator of this story?
2. What do the end pages show?
3. Describe what is illustrated on the title page and the first page of the story.
4. How does the energy from sunlight create wind? How does it create moving water?
5. How is the energy from sunlight stored in wood and coal?
6. How does electricity move from the generators to our cities and homes?
7. There is one picture that shows electricity produced by nature and NOT by humans. Find that picture. What do we call that form of electricity?
8. What are solar cells? How is the way they generate electricity different from all the other ways of generating electricity?

The questions above can help meet Common Core Anchor Standards *R.1,2,3,4,6,7,10; SL.1,2*

Activities

Blowing in the Wind

There are many activities that help children understand how wind, water, and heat hold energy that can then turn a turbine. Try one of these examples with your students. Make sure to ask them what they think will happen beforehand and, afterward, have them describe why and how these experiments worked.

- Make pinwheels and either blow on them—requiring energy from breath!—or hold the pinwheels in the wind and watch them spin.
- Pour water onto one side of a rodent wheel to show that falling water holds energy that turns a turbine.
- Show the energy of heat by making a “candle carousel.”

There are many websites that you can use to help design these experiments in more detail, such as http://www.nrel.gov/education/educational_resources.html.

These activities can help meet Common Core Anchor Standards *W.7,8; SL.1,4*