Earth Science for a Sustainable World
Earth Science Activity Calendar, 2022–2023 School Year

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Earth Science Week 2022
American Geosciences Institute
www.americangeosciences.org

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A sustainable world is one in which living things can thrive, where people meet the needs of the present without compromising the ability of future generations to meet their needs. Geoscience is key to helping us achieve that aim.

Earth science — the study of interactions among the geosphere, hydrosphere, atmosphere, and biosphere — is necessary to meet the challenges that human activity can present to the goal of sustainability. That’s why Earth Science Week 2022 is celebrating the theme “Earth Science for a Sustainable World.” This year’s celebration is designed to support sustainability initiatives, such as by focusing attention on the United Nations’ 17 Sustainable Development Goals (SDGs). Each SDG outlines how an issue such as energy, climate change, the environment, natural hazards, agriculture, industry, or economic opportunity would be addressed in a sustainable world. The activities in this calendar are tagged with the SDGs to which they relate as well as relevant Next Generation Science Standards.

Help promote understanding of the geosciences’ vital role in informing, maintaining, and strengthening sustainability. Start with a visit to the Earth Science Week website (www.earthsciweek.org). Check out new links to educational materials and information. Engage young people and others in events that help them consider the vital role they can play in Earth science and sustainability.

And you can help keep the learning about the geosciences going throughout the school year. Use this calendar, which features education resources, important geoscience dates, and exciting academic activities. You can connect with geoscience learning — before, during, and after Earth Science Week — all year long!
This year, you’re invited to join the millions of participants in all 50 states and many nations worldwide who are celebrating Earth Science Week. Now in its 25th year, this exciting event has grown steadily in momentum and participation since the American Geosciences Institute held the first Earth Science Week in 1998.

Every year, people in schools, workplaces, civic centers, and elsewhere celebrate Earth Science Week to help build public understanding and appreciation of the Earth sciences, promote recognition of the value of Earth science research, and encourage stewardship of the planet. Earth Science Week serves the geoscience community by:

- giving students new opportunities to discover the Earth sciences,
- highlighting the contributions made by the geosciences to society,
- publicizing the message that Earth science is all around us,
- encouraging responsible stewardship of the planet through an understanding of Earth processes,
- providing a forum where geoscientists can share their knowledge and enthusiasm about the Earth and how it works, and
- making learning about Earth science fun!

Whether you are a faculty member, student, parent, geoscientist, museum educator, or interested citizen, you can play a leading role in Earth Science Week. On the Earth Science Week website at www.earthsciweek.org, you’ll find ideas and tips for planning activities in your community, along with contact information for geoscience resources in your area so you can work with local geoscience professionals to make great things happen.

In addition, this calendar features a variety of exciting activities that you can conduct — in the schoolyard, at home, or in any other places where people gather — to explore the theme “Earth Science for a Sustainable World.” This year’s theme emphasizes the essential role of Earth science in helping people make decisions that maintain and strengthen the planet’s ability to support thriving life.

Let us know how you are planning to celebrate! Send us an email at info@earthsciweek.org. Celebrate Earth Science Week: October 9–15, 2022!

How can you get involved? Explore the Earth Science Week website at www.earthsciweek.org. You’ll find a host of tools designed to make your event experience easy, fun, and rewarding!

On the website, you’ll see a list of tips to help you share your Earth science knowledge with young people, lead an excursion, or attend an event in your area: A planning checklist, tips for fundraising, recommendations for working with the news media, ideas for events, educational activities, ways to get official recognition, downloadable logos and images, kit ordering information, a map of potential partners and activities near you, and much more.

To stay up-to-date on the latest developments and upcoming activities, subscribe to the Earth Science Week Update electronic newsletter at www.earthsciweek.org. Check it out!
LEARNING ACTIVITY:

Exploring Your Community

GRADES 3–8

MATERIALS
• Piece of paper
• Pen or pencil
• Computer with internet access

Think about the weather and environment where you live. Have you ever been in a strong storm? Have you ever experienced flooding, a wildfire, or really hot days? These types of environmental hazards are happening more often because of climate change. Even though these events can be scary, there is so much you can do in your own community to make it better able to handle these challenges. When we work together to protect our communities from environmental hazards, we are building community resilience.

Every community has people, places, and resources that contribute to resilience. See if you can find these assets within your own community by answering the following questions. Make sure you enlist the help of a trusted adult as you go out in search of these things.

PROCEDURE

Write down your answers to the following questions. For some of them, you might want to look up information online or go outside and explore your community.

1. What is the name of your community?
2. Does your community have a city hall, city council, or other center for decision-making? Describe it. Is it at the center of your community?
3. Is there a community center or place that people like to gather? Why do you think people like to gather there?
4. Are there green spaces in your community, like parks or gardens, botanical centers, or other special natural areas like forests and mountains? Which is your favorite to visit (or if you haven’t visited it, which do you want to visit the most)?
5. Are there paths or sidewalks so that you can walk safely to the parks and learning centers in your community? Look up your community’s walkability score at www.walkscore.com.
6. Do you need a car to get around your community? Is there a bus system, train, subway/metro, or other public transportation? Are there bike lanes on the roads? Are there bike, scooter, or car share programs?
7. What environmental hazards affect your community? Examples of hazards include flooding, extreme heat, sinkholes, wildfires, hurricanes, winter storms, and tornadoes. What was the most recent hazard? Find a news article about it or get a first-hand account from a neighbor and write a short summary.
8. Are there organizations working to help your community become more resilient and prepare for environmental hazards? What is the name of one of these organizations, and what are they doing to improve the community?

To learn more about building community resilience to extreme weather, climate change, and other environmental hazards and to access an activity book full of activities, visit www.noaa.gov/resilience-activity-book. Complete the activity book to see what badge you earn!

NGSS CONNECTIONS:
SEP: Obtaining, Evaluating, and Communicating Information
DCI: Weather and Climate; Natural Hazards
CCC: Patterns; Cause and Effect

SDG CONNECTIONS:
11: Sustainable Cities and Communities
13: Climate Action

Illustrations by Jessica B. Bartram for NOAA; Badge by Keri Maxfield, Nurture Nature Center
Aug. 6–9, 2022: Geoscience Event: AIPG National Conference, American Institute of Professional Geologists, Marquette, Michigan

Did You Know? Eunice Foote’s Discovery of Carbon Dioxide as a Greenhouse Gas Is Presented at the American Association for the Advancement of Science (AAAS), 1856


Did You Know? Colonel Edwin Drake Drills First U.S. Oil Well in Titusville, Pennsylvania, 1859
Sources of Minerals

We are surrounded by objects that we depend upon for our everyday lives. From our clothes to our phones, bikes, cars, showers, plates, chairs, televisions, computers, and nearly everything else, we rely on objects made of a variety of materials. But where do those materials come from in the first place, and what happens when we run out of them?

In this investigation, you will choose some everyday objects and trace their materials to their sources. Then you will think about the supply of these materials and what humans need to do to continue that supply while protecting the environment. You are thinking of how sustainable the supply is.

PROCEDURE

1. “Take a tour” around a room in your home or school. Make a list of as many different objects (products) in the room as you can.

2. Choose six different objects to research. On a clean sheet of paper, make a table for your objects with these columns: Name of Object; Object’s Materials; Source of Materials; How Sustainable Is the Source of the Material.

3. Sort your six objects into groups based on their materials. For example, soft-cover books are made of paper, so “Paper” could be one of your groups. A soup pot can be made of copper metal, so “Metal” could be another group. Objects made of more than one material can be put into more than one group.

4. If you aren’t sure what an object is made from, research it. Start at the Min4Kids website: https://min4kids.org

5. Your next task is to find out where your objects’ materials come from. For example, what is the source of paper? Where do we get copper? How about plastic?

6. Next, you will be thinking about how sustainable the supply of materials is. For each material, find out: Is the material mined from Earth or is it grown? If it is mined, what parts of the world produce the material? What minerals make up the material? If it is grown, do the plants grow quickly, or do they take a long time?

7. Discuss: Which of your objects is made from easily found and replaceable materials? Which are made from materials that are harder to get or rarer? Based on this information, make a claim about which products are most sustainable. What ideas do you have about making the supply of materials more sustainable?

8. Other factors also need to be considered when determining if a product is sustainable, such as how much energy or water is used during its production. Conduct research to see which products require the most energy usage or water usage and add this to your claim about which products are most sustainable. Did your answers change? What other factors might you consider when determining sustainability?

NGSS CONNECTIONS

CCC: Cause and Effect; Energy and Matter; Stability and Change
SEP: Constructing Explanations and Designing Solutions
DCI: Earth’s Materials and Systems; Natural Resources
SDG CONNECTIONS
11: Sustainable Cities & Communities
12: Responsible Consumption & Production
Sunday | Monday | Tuesday | Wednesday | Thursday | Friday | Saturday
---|---|---|---|---|---|---
Federal Holiday: Labor Day | Protect Your Groundwater Day | International Day of Clean Air for Blue Skies | | | | 
Did You Know? 136°F (58°C) is the Highest Ever Recorded Temperature, Measured in El Azizia, Libya, 1922 | | | | | | 
Did You Know? The Montreal Protocol of the Vienna Convention Is Adopted By All 198 UN Member States to Impose Restrictions on the Use of Ozone-Destroying Gases, 1987 | International Day for the Preservation of the Ozone Layer | | | | | 
World Water Monitoring Day | | | Zero Emissions Day | | | 
World Rivers Day | World Environmental Health Day | | International Day for the Universal Access to Information | | National Public Lands Day | 
American Geosciences Institute | www.americangeosciences.org
September 2022
**LEARNING ACTIVITY:**

**Wetland in a Water Bottle**

**GRADES 4–6**

**MATERIALS**
- Clean, empty 2-liter bottle (recycled soda/water bottles work well)
- Measuring cup
- Funnel
- 1 cup of small rocks
- ¼ cup water
- 1 cup of soil
- Leaves, twigs, or other organic matter
- Small plant with roots attached (such as bean sprouts, herbs, etc.)
- Twig or stick that is longer than the bottle
- One or two worms

**PROCEDURE**

1. Remove the bottle cap and use a funnel to slowly add the materials to the bottle in this order:
   a. 1 cup small rocks
   b. ¼ cup water
   c. 1 cup soil
   d. Leaves, twigs, or other organic material
   e. Small plant with roots (use the twig or stick to help push the roots into the soil)
   f. Worm/s
2. Secure the cap to the bottle and place the bottle where there is sunlight or artificial light.
3. You have made a miniature wetland! This self-contained, closed system supports plant and animal life. Observe your mini-wetland over time, at least a week. What do you notice? Take pictures or notes to record these changes.
4. How do you think the plants and animals (worm/s) survive without air holes in the bottle?
5. Research the water cycle. What parts of the water cycle do you observe in your mini-wetland?
6. Research what plants and animals need to survive. Does that help to answer your question in step 4?

**EXTENSIONS**

1. If you were to make a larger wetland in an aquarium or plastic bin, what else could you add? Why?
2. Is there a wetland near your home or school? If so, visit the wetland and describe what you see with an adult in your life.

**USGS science for a changing world**

Source: U.S. Geological Survey. Adapted with permission.

**NGSS CONNECTIONS**

**SEP:** Developing and Using Models

**DCI:** Earth’s Materials and Systems; Interdependent Relationships in Ecosystems; Cycles of Matter and Energy in Ecosystems

**CCC:** Systems and System Models; Scale, Proportion, and Quantity

**SDG CONNECTIONS**

13: Climate Action
14: Life Below Water
15: Life on Land
Did You Know?
The US National Oceanic and Atmospheric Administration, Now a World-Leader in Climate Research, Is Founded, 1970

Oct. 3–5, 2022: Geoscience Event:
SPE Annual Technical Conference and Exhibition, Society of Petroleum Engineers, Houston, Texas

Oct. 4–10, 2022: World Space Week
Energy Efficiency Day

Oct. 6–8, 2022:
Geoscience Event:
AISES National Conference, American Indian Science and Engineering Society, Palm Springs, California
International Geodiversity Day

Oct. 9–12, 2022:
Geoscience Event:
GSA Annual Conference, Geological Society of America, Denver, Colorado
Minerals Day
Earth Observation Day
No Child Left Inside Day
National Fossil Day
Geoscience for Everyone Day
International Geodiversity Day

Oct. 16–22, 2022:
National Chemistry Week
Did You Know?

Oct. 27–29, 2022:
Geoscience Event:
SACNAS National Diversity in STEM Conference, Society for Advancement of Chicanos/Hispanics and Native Americans in Science, San Juan, Puerto Rico
LEARNING ACTIVITY:
Collecting Real World Data

GRADES K–12

MATERIALS
• Phone or tablet with internet access

Scientists collect data to understand Earth and how it changes. Quantitative data involve taking measurements, while qualitative data are observations and descriptions of phenomena. When it comes to climate, scientists try to collect as much and as many types of data as possible to be able to analyze how climate is changing and what effects it is having. Because climate affects all areas of the world, collecting this data is a large undertaking. This is where you can help.

Many climate scientists seek help in collecting data through projects that allow any and all individuals to collect and submit data. Data collected in these types of projects are often in the form of images, but can also include measurements, depending on what scientists need to understand a specific phenomenon. This activity will help you get involved in collecting data through The GLOBE Program, a worldwide community of students, teachers, and lifelong learners. Observations you contribute will be included in the GLOBE database.

PROCEDURE
1. Go to https://go.nasa.gov/3s7yzYP to learn about climate change and some types of data that are collected to understand climate.
2. Go to https://observer.globe.gov/do-globe-observer for information on measurements you can make via The GLOBE Program.
3. Read about each of the GLOBE measurements to find one that interests you or that is most relevant to the place where you live:
   - Clouds
   - Mosquito Habitat Mapper
   - Land Cover
   - Trees
   - Eclipse
4. Download the GLOBE Observer app to a phone or other mobile device. If you are 13 or younger, use the app with a parent or teacher.
5. With adult supervision, go outside and start collecting data.
6. Discuss: How do each of GLOBE’s measurements relate to climate and sustainability? Which measurement did you choose and why? What data are you helping to collect and for what purpose will it be used? What other data might scientists use to analyze climate change? Explain how these data will help in the understanding of climate change.

ADDITIONAL RESOURCES
To find more NASA science projects, go to: https://science.nasa.gov/citizenscience

NGSS CONNECTIONS
SEP: Obtaining, Evaluating, and Communicating Information
DCI: Weather and Climate; Human Impacts on Earth Systems
CCC: Patterns; Cause and Effect; Stability and Change

SDG CONNECTIONS
13: Climate Action
15: Life on Land
Nov. 6–9, 2022: Geoscience Event: ASA-CSSA-SSSA International Annual Meeting, Baltimore, Maryland

Nov. 7–18, 2022: Geoscience Event: 2022 United Nations Climate Change Conference (COP27), Sharm El-Sheikh, Egypt

Nov. 14–18, 2022: Geography Awareness Week

Nov. 14–18, 2022: America Recycles Day

Nov. 14–18, 2022: Geographic Information Systems Day (GIS) Day


Nov. 14–18, 2022: International Day of LGBTQIA+ People in STEM

Nov. 25–26, 2022: Federal Holiday: Thanksgiving

Nov. 26, 2022: Veterans Day

Did You Know?

LEARNING ACTIVITY:

Maintaining Soil Moisture

GRADES 5–9

MATERIALS

• Germination tray (approximately 21” long and 2–4” deep)
• Soil (preferably collected from your area)
• 4–6 small plants
• Watering can
• Soil moisture meter
• Small dowels
• Lamp (optional)
• Materials specific to your design

Soil is a vital component of almost every ecosystem, and its health often determines the viability of the whole ecosystem. If a soil cannot support the living organisms within it — such as insects, bacteria, fungi, and plant roots — then it is likely that the entire ecosystem will suffer. The same is true on farms. The success of crops is dependent on the health of the soil.

One component of soil health is its ability to maintain moisture, which is needed not only by plants, but by all the organisms within the soil. Common farming practices include tilling and the use of mulch or fertilizer. Each of these practices influences soil moisture. Sustainable farming practices have been developed to help maintain soil health. In this activity, you will test ways to help maintain soil moisture and relate it to sustainable farming practices.

PROCEDURE

1. Evenly space your small plants in the germination tray. If the root bulb is too tall for the tray, you may need to break up the root bulb a bit.

2. Fill the area around the plants with soil. Be sure the soil is an even depth throughout the tray. Avoid packing down the soil.

3. Use a spray bottle to water the plants. Insert the soil moisture meter at three to five spots to test that the soil is evenly and well watered throughout the tray. Be sure to test some spots under the plants, as well as in the middle of the tray. Place a dowel at each test spot, so you can consistently test the same areas.

4. Place the tray in an area where the plants will get enough sun or under a lamp. Test the soil moisture every 24 hours for three days. Record your data.

5. On the third day, add enough water to get the soil back to its original moisture content.

6. Research common farming practices, then plan out and test it on the tray. For example, to test tilling, you could use a gardening fork to mix the soil between the plants each day.

7. Place the tray in the same area as in step 4. Test the soil moisture every 24 hours for three days. Record your data.

8. Discuss: Did the farming practice you tested help maintain soil moisture, or did the soil dry out faster? Why do you think this is? Is the practice you tested considered sustainable or traditional? How does your data support this? Research other components of soil health. How are they measured? Test out the farming practice you chose to see if it affects these other soil health components.

NGSS CONNECTIONS

SEP: Obtaining, Evaluating, and Communicating Information; Asking Questions and Defining Problems
DCI: Earth's Materials and Systems; Human Impacts on Earth's Systems
CCC: Cause and Effect; Influence of Science, Engineering, and Technology on Society and the Natural World

SDG CONNECTIONS

2: Zero Hunger
15: Life on Land
### Did You Know?

#### Dec. 6–8, 2022: Groundwater Week
- **Did You Know?**
  - The Intergovernmental Panel on Climate Change (IPCC) is founded to review climate change data and make recommendations for how to respond, 1988

#### Dec. 12–16, 2022: Geoscience Event
- **International Mountain Day**

#### Did You Know?

#### Did You Know?
- The Endangered Species Conservation Act Is Enacted by Congress, 1973

### Federal Holiday:
- **Christmas**

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LEARNING ACTIVITY: Composting Materials and Rates

GRADES K–6

MATERIALS
- Composting materials listed in the April calendar activity
- 2–5 items to test in the compost

Soils are a key component of the interface between the biosphere (life) and the geosphere (land). Soils support life. “Our soils support 95 percent of all food production, and by 2060, our soils will be asked to give us as much food as we have consumed in the last 500 years,” according to Living Soil by The Soil Health Institute.

Composting is one action to help people move toward a more sustainable world. This activity builds on another activity in this calendar to investigate what materials can be used to renew soils via composting. Specifically, you will explore if and how various materials break down into compost.

PROCEDURE

1. Food scraps and plant matter break down into compost, but what about other materials? Collect 2–5 items and cut them into small pieces that are no longer than 5 cm long.
3. Make predictions: What materials do you think will break down the fastest? Which will break down the slowest? Do you think any won’t break down at all? Why? What will the materials look like as they break down?
4. Begin filling a compost bin using the procedure outlined in this calendar’s April activity by the Soil Science Society of America.
5. When the container is about half full, add pieces of your test materials into the middle of a brown layer that is a little thicker than the other layers.
6. Add a piece of tape to the outside of the container that lines up with the layer where you placed the objects to allow you to find them more easily when you dig them up later.
7. After adding your test materials, continue filling up your container.
8. After five days, check the test items to see whether they are beginning to break down. Write descriptions of each item’s appearance and/or take photographs of them.
9. Shake or stir the bin and moisten with water if necessary. Re-bury your items.
10. Repeat steps 8 and 9, continuing up to eight weeks. Think about these questions, then discuss them with a partner and/or your classmates:
   - Did your predictions match what happened?
   - How might you explain the differences in decomposition rates?
   - Did any of the results surprise you?
   - How might you adjust this procedure to test other factors related to decomposition rates?
   - Look at the “Compost Life Cycle” figure at https://bit.ly/compost-life-cycle. What might happen if you threw out the apple core instead of composting it? What other cycles are you familiar with related to Earth’s systems?

NGSS CONNECTIONS
SEP: Developing and Using Models; Asking Questions and Defining Problems
DCI: Earth’s Materials and Systems
CCC: Systems and System Models; Cause and Effect
SDG CONNECTIONS
12: Responsible Consumption and Production
15: Life on Land

Image credits: Jessie Bersson/Creative Commons
Sunday  
1  Federal Holiday: New Year’s Day  
Did You Know? The Sustainable Development Goals Are Adopted by World Leaders at the UN Summit, 2016  
Jan. 1–31, 2023: Hawai‘i Volcano Awareness Month  

Monday  
2  Did You Know? World Climate Research Programme (WCRP) Is Founded by the International Council of Scientific Unions and the World Meteorological Organization, 1980  

Tuesday  
3  

Wednesday  
4  

Thursday  
5  

Friday  
6  

Saturday  
7  

8  Jan. 8–12, 2023: Geoscience Event: AMS Annual Meeting, American Meteorological Society, Denver, Colorado  

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15  Federal Holiday: Martin Luther King Jr. Day  

16  

17  Did You Know? Greenhouse Gases Observing Satellite (GOSAT), the First Spacecraft to Monitor Atmospheric Concentrations of Carbon Dioxide and Methane, Is Launched from Tanegashima Space Centre, Japan, 2009  

18  International Day of Education  

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January 2023
LEARNING ACTIVITY:

Iron Minerals on the Moon

GRADES 6–8

MATERIALS

- Cup of iron-fortified breakfast cereal (Total® or Cornflakes® work well)*
- Strong magnet
- Water
- Clear plastic drinking cup or a resealable plastic bag
- Large spoon and bowl, or mortar and pestle (for crushing cereal)
- Spoon
- Scale (optional)

* Not an endorsement or recommendation.

This easy exercise models one of the processes currently being researched at four U.S. universities to enable recovery of iron and other materials found on the moon to construct an inhabited workstation. Research is being done to perfect magnetic separation techniques to recover iron-bearing minerals from the lunar soil.

Magnetic separation is used to separate iron from other materials in iron ore processing. Magnetic separation is also used when recycling Portland Cement Concrete Pavement to remove the reinforcing steel from the crushed materials. In this exercise, students will use magnetic techniques to separate the iron from iron-fortified breakfast cereal.

PROCEDURE

1. Put the cereal into a large bowl or mortar. Hold a magnet over the cereal to observe the attraction of the iron in or on the cereal flakes as they interact with the magnetic field created by the magnet.

2. Crush the cereal using a spoon or pestle until it is a fine powder. Don’t use the bag to crush the cereal, as the bag will be punctured.

3. Place the crushed cereal in a clear plastic drinking cup or a zipper closure bag, then add enough water to make a suspension or slurry.

4. While swirling the slurry in the plastic drinking cup or closed bag, hold the magnet against the outside surface of the container. Notice the iron fragments (dark colored particles) that collect on the inside of the plastic container next to the magnet.

5. Use the spoon to scrape the iron fragments from the inside surface of the container and reclaim them for further examination and analysis if desired.

6. If you have a scale, take the mass of the reclaimed iron.

7. Find the iron content of the cereal by looking at the nutrition label on the cereal box (often reported in milligrams, mg). If possible, conduct this test with other cereals and compare their iron content. Hypothesize whether you expect to reclaim more or less iron with the other cereals you test.

8. Discuss: Why are there particles of iron in the cereal? How was that iron originally obtained? Where is iron mined in the United States? What are some other uses for iron?

Go to https://mineralseducationcoalition.org/esw to learn more about iron, iron mining and the research into magnetic separation on the moon.

NGSS CONNECTIONS

SEP: Planning and Carrying Out Investigations
CCC: Energy and Matter
DCI: Earth’s Materials and Systems; Natural Resources

SDG CONNECTIONS

9: Industry, Innovation, and Infrastructure
12: Responsible Consumption and Production
Did You Know?
The First World Climate Conference Is Held in Geneva, Switzerland, 1979

Feb. 19–25, 2023: National Engineers Week

Did You Know?
Iceland Becomes the First Country to Propose Switching to All Renewable Energy in 1998, and Is the Closest to Achieving This Goal, 2022

Did You Know?
The First Plastic Recycling Plant Is Constructed in Conshohocken, Pennsylvania, 1972

Feb. 19–25, 2023: National Engineers Week

Federal Holiday: Presidents' Day

Did You Know?
Iceland Becomes the First Country to Propose Switching to All Renewable Energy in 1998, and Is the Closest to Achieving This Goal, 2022

February 2023
LEARNING ACTIVITY:
Solar Updraft Tower

MATERIALS
• 2 pieces of construction paper (one black, one any color)
• White cardstock
• 10” wooden skewer or long dowel
• Needle
• Scissors
• Clear tape
• Thermometer
• Small piece of modeling clay
• Desk or heat lamp
• Computer with internet access

PROCEDURE
1. Roll one piece of construction paper into a cone with a 1 ½” diameter at the top and a 3” diameter at the bottom. Use tape to hold the cone shut. The cone should be able to stand on its own.
2. Cut three notches out of the bottom of the tower, each ½” tall and 1 ½” wide.
3. Make a propeller using the cardstock and the template found online at https://bit.ly/3MimFTX.
4. Place the modeling clay on a flat surface where you will be testing your tower.
5. Use tape to secure the needle to the top end of the skewer. Insert the bottom of the skewer into the modeling clay.
6. Place the tower over the skewer, making sure the needle sticks out about 1 ½” above the tower.
7. Balance the propeller on the needle with the blades bent downward, and make sure the propeller can spin easily.
8. Measure and record the temperature inside and outside the tower.
9. Place a lamp 2” from the bottom of the cone and observe for about five minutes. Record the temperature inside and outside the tower again.
10. Turn off the lamp and observe for five more minutes. Record the temperatures again.
11. Repeat using the other color construction paper for the cone.

12. Discuss: Was there a difference between how well the two towers worked? Use evidence from your observations. What other parts of the tower could you change to affect how well it works? Why would you expect these changes to have an effect? If possible, test these changes. Explain how a solar updraft tower works, using these energy-related terms: electrical, kinetic, solar, thermal. Research more about solar updraft towers and other emerging energy technologies. Describe some benefits and drawbacks.

NGSS CONNECTIONS
SEP: Developing and Using Models
DCI: Earth’s Materials and Systems; Human Impacts on Earth’s Systems; Global Climate Change
CCC: Systems and System Models; Influence of Science, Engineering, and Technology on Society and the Natural World
SDG CONNECTIONS
7: Affordable and Clean Energy
9: Industry, Innovation, and Infrastructure
13: Climate Action
Did You Know? Yellowstone National Park, Containing Half of World’s 1,000 Known Geysers, Becomes First National Park, Established 1872

World Wildlife Day Did You Know? The United States Geological Survey Is Founded, 1879

World Engineering Day for Sustainable Development

International Women’s Day

Global Recycling Day

Vernal Equinox Renewable Energy Day World Water Day

Mar. 23–26, 2023: Geoscience Event: NSTA National Conference on Science Education, National Science Teaching Association, Atlanta, Georgia


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March 2023
LEARNING ACTIVITY:
Sustaining Living Soil with Composting

GRADES 4–7

MATERIALS
• Plastic storage bin with lid (the darker the color the better, 25 gallon)
• Drill (3/16” bit recommended)
• “Greens”: fresh vegetable/fruit scraps (no meat or dairy) or fresh grass clippings
• “Browns”: dried leaves or grass, pine needles, straw, sawdust, or dryer lint
• Soil (topsoil, not potting soil)
• Shredded newspaper
• Small shovel or spading fork
• Spray bottle with water
• Soil temperature thermometer (optional)
• Another plastic bin with lid (optional)

Composting is the decomposition of organic waste materials in the presence of water, air, and microorganisms to produce organic fertilizer. Organic matter improves soil quality by feeding soil organisms, provides plants nutrients for growth, and enhances soil structure and water holding capacity, all while reducing our dependence on synthetic fertilizers.

A key part of a healthy compost pile is a balance of green and brown organic matter. Greens are rich in nitrogen that help microorganisms grow. Browns are rich in carbon and provide food for soil microorganisms. In this activity, you will learn how to construct a simple compost bin, creating the right environment for microbial decomposition, to make a natural fertilizer that your soil will love.

PROCEDURE

1. Carefully drill holes on all four sides and the top of the plastic bin to allow air to circulate. Drill 10 holes in the bottom to allow for water to drain.
2. Fill the container about ¼ of the way with shredded newspaper, then add a soil layer (up to halfway).
3. Add a layer of browns on top of the soil, then a layer of greens, topping with another layer of browns.
4. Spray the mixture with water so that it is damp but not soaking wet. Replace the lid.
5. Each time greens are added, add browns on top, spray with water, then shake the bin to aerate the compost mixture. Tip and rock the bin from side to side, then front to back.
6. Shake the compost bin or stir with a small shovel or spading fork every five days to aerate the container. Also, check that the compost is still moist and add water if necessary. The compost should be ready to use as an organic fertilizer in about two months.
7. Discuss: How does composting help reduce waste? What do microbes need to decompose waste? (Hint: Why is it important to turn compost piles?) How can adding compost help soil?

A supplemental activity using the compost bin and a thermometer to measure microbial activity with an accompanying datasheet is available at: www.soils4teachers.org/ews

NGSS CONNECTIONS
SEP: Obtaining, Evaluating, and Communicating Information; Asking Questions and Defining Problems
DCI: Earth's Materials and Systems
CCC: Systems and Systems Models; Influence of Science, Engineering, and Technology on Society and the Natural World

SDG CONNECTIONS
2: Zero Hunger
12: Responsible Consumption and Production
15: Life on Land
Did You Know?
Philosophical Magazine and Journal of Science Publishes Svante Arrhenius' Article as the First Proposing Human Influence on Climate Change, 1896

Did You Know?
Bacteria Capable of Digesting Oil Are Discovered in the Mariana Trench, and Could Be Used to Clean Oil Spills, 2019

Did You Know?
Nimbus 3, the First Satellite to Monitor Comprehensive Global Atmospheric Temperatures, Is Launched from Vandenberg Air Force Base in Lompoc, California, 2009

Did You Know?

Apr. 16–24, 2023: National Park Week

Hybrid Solar Eclipse

Earth Day

Arbor Day
LEARNING ACTIVITY:

Discover Park Strategies for Sustainability

GRADES 6–9

MATERIALS
- Scavenger Hunt worksheet (https://go.nps.gov/FlorissantScavengerHunt)
- Computer with internet access

National parks play an important role in preserving our nation’s heritage for the enjoyment, education, and inspiration of current and future generations. National parks are in the “forever business.” The National Park Service is always looking forward to ensure that what it does is sustainable.

Parks currently are challenged by climate change. For mountainous parks, this could mean loss of remaining glaciers with significant impacts on ecosystems and the downstream waterways. For coastal parks, it could mean increased flooding and loss of beaches and historic buildings. The next generation will face ongoing change in park uses, possibly including a demand for new recreational experiences, adapting to increases in visitation, and adjusting to new technology.

Several parks have adopted sustainable practices to help with today’s challenges and prepare for the future. Parks use sustainable design to cut energy use, save water, and reduce waste. This activity will take you on a scavenger hunt through Florissant Fossil Beds National Monument in Colorado to discover sustainability strategies used there.

PROCEDURE

3. Next, research the state or national park closest to you. What is its name? How far away is it from where you live? What kinds of geologic and ecological features does it have, such as mountains, rivers, and forests? How do people use this park, such as for hiking, biking, or camping?
4. Use the sustainability features you observed at Florissant Fossil Beds National Monument to start a list of what you would like to see in place at the park near you. Add your own ideas as well.
5. If possible, visit the park to find out whether you can locate the sustainable features on your list. Or use Google Earth (https://earth.google.com/web/) to explore the park, conduct research about the park, or contact an employee of the park to get this information.

FURTHER STEPS

- What sustainability feature would you most like to see installed or implemented at the park? Why?
- What might you do to take action and get more sustainable features installed at this park?

NGSS CONNECTIONS

SEP: Asking Questions and Defining Problems; Constructing Explanations and Designing Solutions
DCI: Natural Resources; Human Impacts on Earth Systems
CCC: Energy and Matter; Stability and Change

SDG CONNECTIONS

7: Affordable and Clean Energy
15: Life on Land
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LEARNING ACTIVITY: Seeding Growth

GRADES K–2

MUCH OF THE FOOD THAT PEOPLE EAT IS PRODUCED AS CROPS GROWN FROM SEEDS. WHAT DOES IT TAKE FOR A SEED TO GROW? HOW DOES A SEED START TO GROW? WHAT CHANGES OCCUR AS IT GROWS?

Understanding the growth of seeds can help us understand food production, which is basic to understanding the issue of hunger in the world.

PROCEDURE

1. Use a scale to find the mass of 10 dried beans. Record the mass. Do the same with 10 dried corn seeds.
2. Put the beans you massed in one cup and the corn seeds you massed in another cup.
3. Fill each cup with water.
4. After about 24 hours, remove the beans from the cup and place them on a paper towel.
   a. Place the paper towel and seeds on a plate or tray.
   b. Use the water from the cup to wet the paper towel.
   c. Repeat with the corn seeds on a different paper towel.
5. Compare the soaked beans and soaked corn seeds to some that are still dry. What do you notice about them? How have the soaked beans and soaked corn seeds changed?
6. Measure the mass of the soaked beans and the soaked corn seeds. How has each group’s mass changed?
7. From what you observe and measure, write a statement about how soaking the beans and seeds affected them.
8. Loosely wrap the soaked beans in one wet paper towel and the soaked corn seeds in another.
9. Take the mass of the soaked beans and soaked corn and make observations every day until stems or roots have started to grow out of the seeds. Keep the paper towels moist.
10. What do you observe after several days? When you remeasure the mass of the beans and corn, what do you notice?
11. Place five of the beans back in the wet paper towel. Place the other five in a dry paper towel. Repeat this with the corn seeds.
12. Take the mass of the beans and corn and make observations for 10 more days.

CONSIDER

1. Think about other ways that you could make observations. What could you do to the beans and corn seeds to learn more about the effect water has on them?
2. Did the beans and seeds require water to start growing? Did the beans and corn require water to continue growing? Use your data to support your answers. What does this tell you about the role of water in bean and seed growth?
3. Why do farmers regularly water their crops?
4. Do you think it is possible for plants to get too much water? How would you test this? What observations would you make that would tell you plants are getting too much water? If possible, test out your ideas!

NGSS CONNECTIONS

SEP: Obtaining, Evaluating, and Communicating Information; Analyzing and Interpreting Data
DCI: Earth Materials and Systems; The Roles of Water in Earth’s Surface Processes
CCC: Cause and Effect; Stability and Change

SDG CONNECTIONS

2: Zero Hunger
6: Clean Water & Sanitation
15: Life on Land

www.seg.org/gwb

Geoscientists without Borders® helps communities get dependable water supplies for use in homes and for food production. This is one way that geoscience is helping people work to achieve the Sustainable Development Goals.

Source: Society of Exploration Geophysicists. Adapted with permission.
LEARNING ACTIVITY:  
Climate Change and Resilience

The United Nations advocates for 17 Sustainable Development Goals (https://sdgs.un.org/goals), one of which includes taking urgent action to combat climate change and its impacts. Climate resilience is the capacity of a community, business, or natural environment to retain essential functions before, during, and after changes to climate occur.

Some ways to contribute to the resilience of your community include making choices that reduce greenhouse gas emissions and starting or getting involved in projects that prepare a population or habitat for impacts of climate change. The U.S. Climate Resilience Toolkit (https://toolkit.climate.gov/) is a government site created to help people understand potential climate hazards so they can protect what is important to them.

In this activity, you will consider actions to make your community more resilient. You will use guidance from the U.S. Climate Resilience Toolkit along with a data-based tool to tackle a specific project of interest to your class. Planning and carrying out this community project is one action that you can take to help people move toward a more sustainable world.

PROCEDURE
2. Go to https://bit.ly/toolkit-resilience to watch the “Steps to Resilience” video for an overview of an approach you can use to help address impacts of climate change.
3. With your teacher’s help, divide your class into teams of four to five students.
4. Watch the “Step 1: Explore Hazards” video at https://bit.ly/toolkit-hazards. Identify what your community cares about. These include specific people, services, and places (such as neighborhoods, historic sites, schools, and tourist attractions) that make your community special or unique. These are called assets.
   a. Type in your city or county, then choose Climate Graphs. Explore the Observations, Modeled History, and projected scenario data for Lower Emissions and Higher Emissions.
   b. Use the drop-down menu at the top that is defaulted to Average Daily Maximum Temperature (°F) to switch and explore other variables.
7. Choose an asset that is being affected by a hazard that you can impact, such as a building, business, park, or road.
   a. How is this asset being affected by a hazard?
   b. Discuss with your team members how vulnerable and at risk your asset is.
   For example, is there a roadway near a hospital that often floods during extreme rainfall events?
8. Come together as a class and select one team’s asset-hazard pairing that will become the focus of your community project. Investigate options and consider potential solutions for your asset-hazard pairing. Develop a plan. Finally, if possible, implement that plan.

NGSS CONNECTIONS
SEP: Defining Problems, Analyzing and Interpreting Data, Designing Solutions
DCI: ESS3D: Global Climate Change; Human Impacts on Earth Systems
CCC: Patterns, Cause and Effect
SDG CONNECTIONS
11: Sustainable Cities and Communities
13: Climate Action
Plastic Free July

Federal Holiday: Independence Day

July 19–21, 2023: Geoscience Event: NSTA STEM Forum & Expo, National Science Teaching Association, Detroit, Michigan

Did You Know? NOAA Reports July as the Hottest Month Ever Recorded, 2021
WHAT IS EARTH SCIENCE WEEK?

The American Geosciences Institute has organized this annual international event since 1998 to help people better understand and appreciate the Earth sciences and to encourage responsible stewardship of the planet. Earth Science Week takes place October 9-15, 2022, celebrating the theme “Earth Science for a Sustainable World.”

Visit the Earth Science Week website — www.earthsciweek.org — to learn more about how you can become involved, events and opportunities in your community, the monthly Earth Science Week newsletter, highlights of past Earth Science Weeks, and how you can order an Earth Science Week Toolkit.

You are invited to help keep the spirit of Earth Science Week alive all year long by posting this calendar in your classroom, office, or home. Whoever you are and wherever you go, you can celebrate Earth science!

AGI MEMBER SOCIETIES

- AASP - The Palynological Society
- American Association of Petroleum Geologists
- American Geophysical Union
- American Institute of Hydrology
- American Institute of Professional Geologists
- American Meteorological Society
- American Rock Mechanics Association
- Association for the Sciences of Limnology and Oceanography
- Association for Women Geoscientists
- Association of American State Geologists
- Association of Earth Science Editors
- Association of Environmental & Engineering Geologists
- Clay Minerals Society
- Council on Undergraduate Research
- Geo-Institute of the American Society of Civil Engineers
- Geochemical Society
- Geological Association of Canada
- Geological Society of America
- Geological Society of London
- Geoscience Information Society
- History of Earth Sciences Society
- International Association of Hydrogeologists/U.S. National Chapter
- International Medical Geology Association
- Karst Waters Institute
- Mineralogical Society of America
- Mineralogical Society of Great Britain and Ireland
- National Association of Black Geoscientists
- National Association of Geoscience Teachers
- National Association of State Boards of Geology
- National Cave and Karst Research Institute
- National Earth Science Teachers Association
- National Speleological Society
- Paleontological Research Institution
- Paleontological Society
- Petroleum History Institute
- Seismological Society of America
- SEPM (Society for Sedimentary Geology)
- Society for Mining, Metallurgy & Exploration
- Society of Economic Geologists
- Society of Exploration Geophysicists
- Society of Independent Professional Earth Scientists
- Society of Mineral Museum Professionals
- Society of Vertebrate Paleontology
- Soil Science Society of America
- United States Permafrost Association

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EARTH SCIENCE WEEK

October 9–15, 2022

FUTURE DATES

October 8–14, 2023
October 13–19, 2024
October 12–18, 2025

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