# Activity Title: Build Your Own Terrarium (Grade 5 +)

## Recommended Grades

Grade 5, Grade 6
Could be expanded to older grades, e.g., Grade 7 - Interactions and Ecosystems, Plants for Food and Fibre, Planet Earth; Grade 9 - Electrical Principles and Technologies (environmental impacts); Science 10 - Energy Flow in Global Systems; Science 20 - Changes in Living Systems; Biology 20 - Energy and Matter Exchange in the Biosphere, Ecosystems and Population Change, Photosynthesis and Cellular Respiration; Science 30 - Energy and the Environment

## Curriculum Connections

Matter
- 6 – particle model of matter, phase changes

Energy
- 5 – renewable and nonrenewable resources (oil)
- 6 – selection and management of energy resources

Earth Systems
- 5 – climate, conservation agriculture
- 6 – climate change, greenhouse gases

Living Systems
- 6 – photosynthesis, abiotic/biotic components of ecosystems

Scientific Methods
- 5 – variables (light, temperature, moisture)

## Time

15-20 minutes to build

## Skills Focused On

| | |
|---|---|
| • Creativity<br>• Decision-making | • Observation<br>• Resourcefulness |

## Materials Needed

- Glass jar with lid
- Soil – can be bought or collected
- Moss with material it was growing on – can be bought or collected
- Plant with roots – can be bought or collected
    - Examples: Polka Dot Plant, ferns, Nerve Plant, Spider Plant, African Violet
- Spoon, chopsticks, or other utensil
- Water
- *Optional:* Decorations! Rocks, pinecones, shells, plastic figures, etc

## Background Information

Have you ever stepped, or sank, into a peatland? In these special wetlands, plant matter breaks down more slowly than it is added, so it builds up over time. This creates peat, which stores and filters lots of water, creating special habitats for plants and animals. Peat also stores greenhouse gases in the ground so they are not released into the air. When we disturb the ground, for example through oil and gas exploration, this releases these greenhouse gases into the air.

Learn more with Megan Schmidt, former University of Alberta student and current Master's student at the Wetland Soils and Greenhouse Gas Exchange Lab at the University of Waterloo, Ontario, as she introduces you to her field site where she studies how human activity influences greenhouse gas emissions from the peatland: https://youtu.be/OkzBUGBMYdA.

Although you may not be able to see a peatland in person today, you can create your own miniature peatland by building a terrarium!Terrariums are closed ecosystems, which means they don't need anything from the outside. The soil will release carbon dioxide that the plants will use in photosynthesis:

$$\text{Carbon dioxide + water} \xrightarrow{\text{Light}} \text{Sugar (plant food) + oxygen}$$

Or, to be precise (higher grades):

$$6CO_2 + 6H_2O \xrightarrow{\text{Light}} C_6H_{12}O_6 + 6O_2$$

Light will enter the terrarium through the transparent or clear walls. Water is cycled through the system, as it evaporates from the soil and plants and then condenses on the walls of the container where it drips down into the soil to be used again.

## Experimental Steps

1. Before collecting your plant, make sure:
    a. You have permission to collect in that area.
    b. You don't collect the last plant of that kind from an area.
    c. The root system is attached.
2. Remove any labels from your jar so that you can see inside.
3. Place at least an inch of soil in the bottom of the jar.
4. Take some moss that you bought or collected. Make sure that the moss has some of the material that it was growing on. Place it in the jar and use the spoon to place it where you want it. Make sure that the bottom of the moss has good soil contact.
5. Use the spoon to place your plant in the soil, making sure the roots are beneath the soil.
6. Continue to place your plants and moss as you want.
7. Add rocks or other decorations (optional).
8. Add enough water to the jar to dampen the soil. Add this in small amounts at a time. You don't want extra water sitting on top of the soil.
9. Place the jar in a sunny place, but not directly in the sun so that plants don't burn.
10. Once you find the right balance, you will not need to open your jar (other than to trim the plants if they get too large). Until you find that balance, you may need to occasionally open the jar and add a bit more water if the plants are starting to wilt.

## Discussion/Experimental Extensions

Which plants grow best in your terrarium?

Which components of your terrarium are biotic? Which are abiotic?

How does your plant respond to different amounts of sunlight, changes in temperature, and/or changes in moisture?

How might you make your terrarium more like a peatland? Could you recreate other biomes, like a desert, or a rainforest? What materials would you need?

Experiment by making more terrariums with different jars, plants, etc. and compare your results to your first jar. What changed?

Describe how carbon dioxide and water move through your terrarium. Is this a "closed system"? What if you left the lid off your terrarium?

## Additional Resources

"How Does A Peatland Breathe?" experimental video produced by Future Energy Systems - provides background information and instructions for experiment: (https://youtu.be/OkzBUGBMYdA).

Alternative instructions: https://climatekids.nasa.gov/mini-garden/
This activity was developed by Future Energy Systems as part of a larger collaboration with WISEST (Women in Scholarship, Engineering, Science and Technology) and Cybermentor to provide meaningful STEM (science, technology, engineering and mathematics) activities to the Girl Guides of Alberta. This collaboration was made possible through the support of the Natural Sciences and Engineering Research Council of Canada (NSERC) Promoscience Grant.

Learn more about Future Energy Systems (https://www.futureenergysystems.ca/) and access more learning content, including storytimes, lab tours, ask an experts and more (https://www.futureenergysystems.ca/engage/learning https://www.youtube.com/channel/UCJr8N9KyFJ6d-t36TPtUlwg).
Check out the Women in STEAM playlist: https://www.youtube.com/playlist?list=PLwhyRzP6sRaRPX8yerrVVDfxkbHnqDDgN.
Check out the Science playlist: https://www.youtube.com/playlist?list=PLwhyRzP6sRaRksOzDVBJ5VVBAH-09R-bJ
Check out the Environment playlist: https://www.youtube.com/playlist?list=PLwhyRzP6sRaQb1T7w3WNjx2wzsNvp-fiV
Check out the Renewable Energy playlist: https://www.youtube.com/playlist?list=PLwhyRzP6sRaQnhm1Z2oWSe1HYeX0vxVhl

Learn more about the Wetland Soils and Greenhouse Gas Exchange Lab: https://uwaterloo.ca/wetland-soils-and-greenhouse-gas-exchange-lab/#:~:text=Welcome%20to%20the%20Wetland%20Soils,soil%20properties%20in%20wetland%20ecosystems.