



# Sea the Change

## Virtual Classroom Extension

### **Objective**

This activity is designed to help your at-home student(s) recognize themselves as scientists and think critically about problem-solving. The goal is to help students practice critical thinking skills. As with all lessons provided, please feel free to adapt them according to your students' abilities. Take these ideas, make them your own and your at-home students will have a greater chance at success.

### **Materials**

Paper, writing utensil, crayons, thermometer, drinking glass, measuring cup that can measure 1 cup, hot water, timer, aluminum foil, newspaper, tape.

### **Procedures**

1. Watch the seal and sea lion Virtual Classroom video (<https://resourcelibrary.clemetzoo.com/Area/21>). Cleveland Metroparks Zoo houses both harbor seals and California sea lions. Ask your student which of the two species they want to talk about.
2. Use a questioning strategy to discuss with your students the ecosystem role of the species they chose (harbor seal or California sea lion). Some questions could include:
  - a. In what type of ecosystem does a harbor seal/California sea lion live?
  - b. What do harbor seals/California sea lions eat?
  - c. What eats harbor seals/California sea lions?
3. Energy in an ecosystem always starts with the sun. Producers, such as plants, create their own energy using the energy from the sun. Primary consumers (herbivores) eat the producers. Secondary consumers (carnivores or omnivores) eat the primary consumers. Tertiary consumers (carnivores or omnivores) eat the secondary consumers. Some species have multiple roles. They may be a secondary consumer in some situations and a tertiary consumer in another.
4. Have your students draw a food web that demonstrates the ecological role of harbor seals/California sea lions. In the food web, arrows should point in the direction that the energy in the ecosystem is traveling (ex. producer to consumer). Some of the living things in your food web may have multiple arrows going to and from it. You may have your student look up food web examples online.

5. Explain that the food webs of seals and sea lions are affected by climate change. Climate is the average weather conditions of a place over the course of several decades. It is different from weather because weather is the day to day conditions. Weather can change greatly from day to day, whereas climate remains stable on a daily basis. Climate change is when those average conditions shift to new patterns and conditions. The climate change that is occurring on our planet now is a result of excess carbon dioxide in the atmosphere caused by people burning fossil fuels. This carbon dioxide builds up and acts like a blanket that traps heat around the world, disrupting the climate.
6. Explain that you and your student will conduct an experiment to demonstrate how carbon dioxide warms the planet. Take a drinking glass and fill it with one cup of hot water from the faucet. Ideally the water should be around 105-110 degrees F (around the temperature of a hot shower).
7. Place the thermometer in the water. Hold it so that the tip of the thermometer is in the middle of the water glass. It should not be touching the bottom or the sides of the glass.
8. Record the temperature on a sheet of paper or in the worksheet at the end of this lesson plan.
9. Wait five minutes. As you are waiting, discuss with your student if they think the water temperature will change. If so, what do they predict it to do?
10. After five minutes, take the temperature of the water again. Subtract the second temperature from the first temperature. What is the difference?
11. Empty the water glass. Wrap the glass in several layers of newspaper. Make sure you use at least 3-4 layers. One layer will not give you a large difference. If you have bubble wrap, packaging foam, or some other type of insulation, you may use that instead. Make sure that you do not forget to wrap the bottom of the glass in insulation. You can use tape to help keep the insulation in place.
12. Wrap the insulated glass in aluminum foil. Put some aluminum foil to the side. You will use it to cover the top of the glass after you took the initial temperature of the water.
13. Fill the glass with one cup of hot water. Take the temperature and record it on the worksheet. Cover the glass with the aluminum foil.
14. Wait five minutes. As you wait, discuss with your students what they think the temperature will do. Will it be the same as the first trial? Why or why not?
15. After five minutes have passed, remove the foil from the top of the glass and take the temperature of the water.
16. Record the temperature and subtract it from the initial temperature.
17. Compare the temperature differences between the two glasses. (Depending on the type of glass you used and the amount of insulation, the uninsulated glass should have a larger temperature difference by about 1-3 degrees F).
18. Discuss with your student what they observed. Questions to ask may include:
  - a. Which glass lost the most heat and why do you think so?
  - b. What would have happened if you added more insulation?
  - c. How is the aluminum foil and insulation like carbon dioxide in the atmosphere?

19. Explain that changing temperatures due to climate change can have a lot of affects on ecosystems around the world. Ecosystems are made of biotic (living) and abiotic (non-living) components. The climate is a very important abiotic component of an ecosystem. In some cases, climate defines the ecosystem. For instance, a desert is defined by the amount of precipitation it receives. Deserts are very dry because they get very little rain or snow. If the climate were to change, and it started raining more frequently, it would affect the plants and animals living there.
20. Ask your student to think of a few ways they think that climate change might affect seals, sea lions, and other animals that live in the ocean.
21. After they have come up with a few ideas, explain that seals and sea lions live in ocean and coastal ecosystems. Oceans absorb heat in the atmosphere which can increase the temperature of the water. Fish that live in the ocean like very particular temperatures. If temperatures get too hot, the fish may leave the area.
22. Have your students look back at the food webs they created. If the fish leave the area, what will happen to the seals and sea lions?
23. Discuss with your students about some ways they can help seals, sea lions, and other ocean creatures. Try to focus on ways to reduce home carbon emissions.
24. Create a plan as a family to reduce the amount of fossil fuels that the family uses. Some ideas include:
  - a. Power down and unplug infrequently used electronics. Reduce your screen time and energy consumption.
  - b. Use public transportation, carpool, bike or walk when possible to reduce greenhouse gas emissions.
  - c. Plant your own vegetable and/or herb garden. It's great to know where your food comes from, and it will lower your carbon footprint by saving the process of transport and packaging of items you would purchase at the store.
  - d. If having your own garden isn't possible, shop at a local farmers market for produce instead of a grocery store to reduce your carbon footprint and support the local economy.
  - e. Use your political power: contact your local representatives to advocate for environmental action and sustainable policies.

***Ohio's Learning Standards***

<b>Science Content Standards</b>
Grade 4 Life Science Topic: Earth's Living History <b>4.LS.1:</b> Changes in an organism's environment are sometimes beneficial to its survival and sometimes harmful.
Grade 5 Life Science Topic: Interconnections within Ecosystems <b>5.LS.1:</b> Organisms perform a variety of roles in an ecosystem.



## Insulation Investigation

Glass 1 with no insulation	
Starting temperature (0 minutes)	
Ending temperature (5 minutes)	
Temperature change (starting temp – ending temp)	

Glass 2 with insulation	
Starting temperature (0 minutes)	
Ending temperature (5 minutes)	
Temperature change (starting temp – ending temp)	

Compare the temperature change between Glass 1 and Glass 2. Which glass had the greatest change in temperature?

What does this tell you about the role of insulation?

How is this like excess carbon dioxide in the atmosphere?