

## Lesson: Sustainable Table

\*Arlington Echo works to continuously improve our lessons. This lesson may be modified over the course of the school year.



**Topic/Essential Questions:** How is the earth's climate changing?

### Content Standards:

- **Science**
  - 3.4.E.1 Recognize food as the source of materials that all living things need to grow and survive.
  - 6.4.B.1. Recognize and describe that people in Maryland depend on, change, and are affected by the environment.
- **Environmental Literacy**
  - 5.A.1. Analyze the effects on human activities on earth's natural processes.
  - 1.A.5.f. Make recommendations supported by data to help address or resolve the issue.

**Lesson Sequence:** This lesson is one of two lessons in the "Our Impact" module based at Arlington Echo Outdoor Education Center. The lesson's focus is on decreasing negative environmental impacts of agriculture and eating habits by encouraging sustainable practices such as eating local, seasonal, whole, and organic food.

**Length of Lesson:** 35 minutes

**Student Learning Outcome:** The students learn that the food we eat plays an important role in determining the size of our environmental footprint. They will follow a recipe to prepare a simple snack using simple, whole ingredients using only the energy from their bodies to power a bike blender.

### Knowledge of the Learner:

- Prerequisite knowledge, skills and processes: Students will complete two lessons in school and conduct research on human impact.
- Student needs, interests, previous learning: Conduct pre-assessment to see level of prior knowledge and address any special needs of students that might need modification.
- Conceptual difficulties: relating production, packaging, transportation, and cooking practices to the cost and ecological impact of food.
- Differentiation: Students are 4<sup>th</sup> graders, with a diversity of backgrounds and skill levels.

**Knowledge of the Content:** Students will be exploring the connection between buying locally grown produce and the impact of sustainability practices on the Chesapeake Bay. Since it involves making something they will eat, students will be engaged the whole time. By choosing local foods, students will be able to make wise choices that impact their health and the health of the bay.

**Vocabulary:**

Sustainable	Compost	Buffer Zone	Organic
Preservatives	Fossil Fuels	Local/Seasonal	Watershed

**Materials:**

Bowls	Knives	Recipe	Lorax Book
US Produce Map	Maryland Seasonal Produce Chart	Kilowatt Meter	Bicycle Blender
Food Package	Ingredients	Cutting Board	

**Supplements:**

- A: True False Game
- B: Vocabulary
- C: US Produce Map
- D: Bike Generator Poster

**Lesson Setup**

Setup varies with the recipe. Lay out recipes, “Basic Kitchen Measurements at a Glance” mats, ingredients, and utensils on the table. Check that all ingredients for recipe are on hand. Have all students wash their hands when they arrive.

**Instructional Delivery**

**Pre-Assessment**

Start asking simple questions to stir interest in the topic: “How many students have a garden at home?” “How many students have been to a farm or farmers market?” “What are students’ favorite fruits and vegetables?” “Where do the student’s families get the majority of their food?”

**Motivation/Warm-up:**

1. Ask the students some questions about where their food comes from? You can use the example of Pizza to break down what actually goes into a recipe. ***Pizza needs grains to make the dough, tomatoes to make the sauce, and dairy to make the cheese. Tomatoes, for example, are a whole food because there is only one ingredient. It doesn’t even need a label because you already know what’s in it.***
2. Now ask the students if all foods are made from whole ingredients? ***No, in order to prevent foods from spoiling during long distance transport and to prolong shelf life we often use chemicals or preservatives to keep our food fresh. For example, this freezer Pizza has a lot more than just dough, sauce, or cheese. (Read ingredients on frozen pizza box and ask students if they know what any of those are). These additives are not only harmful for us to eat, but also increase the amount of resources that food item uses up.***
3. Explain that today we will be preparing a recipe from mostly whole and local ingredients.

**Lesson:**

**Cooking:**

1. Refer to US produce map; point out several examples of where our food comes from, show the labels of packaged food provided and have students generate ideas about what needs to be done in order to get that food to Maryland. (*Food must be treated with chemicals such as pesticides and preservatives, and require excessive packaging; it needs to be shipped by truck, train, boat or plane, requiring fossil fuels that release more pollution into the air and on the ground; from West Coast to East Coast is about 3,000 miles*).
2. Now ask how they or their parents usually prepare food at home. What appliances do we use? Stove, oven, toaster, blender, refrigerator for storage, water to wash or cook the food, and anything else they can think of. All of these things use electricity or gas which further increases the environmental impact our food has.
3. Ask them what people used to do before modern technology made its way into our kitchens and supermarkets? People had to cook on fires, catch or grow their own food, and eat fresh, local foods because storage and transportation were not as accessible. (Remind them that ice and refrigerators only became available at home as recently as 100 years ago in 1913).
4. Tell students they will be preparing a dish today at Arlington Echo, but that we will try to reduce our environmental footprint for this snack. Ask the students how they might be able to do that? Today we will be using local and seasonal produce and we will also use a contraption (bike blender) that does produce any pollution from fossil fuels at all!
5. Have the students look at the recipe and ingredients. If you need to multiply the recipe, have students do math to get the correct amounts (use measurement conversion charts).
6. Have students be active participants in the process of measuring and making the food. After the ingredients have been prepared, allow them all to take turns riding the bike blender until everyone has had a chance. If it is a large group, make multiple batches to avoid over blending the snack as the students peddle.
7. Have the students go in pairs to the bike, where each student will complete 20 full rotations of the pedals while the partner counts.
8. Clean up the cooking prep before starting the discussion. If there is compost from peeling or chopping the ingredients, have the students put it in a bucket. Show the students the 3 stages of composted material: recently composted, partially degraded, and finished compost. Explain that when we compost during the meal cleanup that Arlington Echo staff adds it to our compost bins and that we use it in the gardens when it is “finished”.

**Discussion:**

1. Ask the students identify carbon emissions that come from the kitchen (fridge uses electricity that creates carbon emissions, gas stoves emit methane, and the actual food they buy has a carbon cost as well). Remind the students that most home appliances can be compared for energy efficiency. More energy efficient fridges, stoves, microwaves, and other appliances can reduce your monthly electric bills as well as your carbon footprint.
2. Ask students where we can get food that would reduce our impact on the environment? (*Buy food that is produced closer to home. **Local** food means it was grown close to you. The ingredient we used today was grown in \_\_\_\_\_*). Have students point out Maryland

on the map and discuss the shorter travel distance, less pollution, and fresher food that was harvested recently. “What other produce is grown in Maryland?” Use the seasonal produce charts as guides. Discuss why things like bananas, oranges and lemons from outside of the US have a high energy cost, however buying them from the closest place possible (for example Florida or Georgia instead of South America) can help keep your carbon footprint small.

3. Point out that *buying locally does not always mean it’s sustainable; make sure the food was not only local, but also produced without using chemicals like fertilizers, pesticides, or preservatives.*
4. Ask students if they have read/seen “The Lorax”. Read a few sections of the tabbed pages and discuss what is happening and whether or not it’s sustainable (*it is not very sustainable; all the Truffula trees were cut down and destroyed even though only the tops of the trees were needed. “How could they be more sustainable?” (Only harvest the tops of the trees instead of cutting the whole tree down; plant more trees when others are cut down).*
5. Discuss the effects on the environment and habitats when we are not sustainable (*farming can harm the land- chemicals can contaminate soil; large clearings can be susceptible to erosion with no trees to hold soil in place; polluted runoff flows into water sources; without reducing/reusing/recycling more trash is generated and contaminates habitats).*

**\*We know that it is not always possible to buy locally, due to factors including financial restrictions, convenience, seasonal availability, etc. It’s ok that we can’t always go to a farm stand to buy local food, but when possible buying or growing sustainable produce is much better for us and our environment. This is not the only way to be sustainable; every little step we take makes a big difference!\***

### Assessment

- Ask students about the benefits of eating local foods. You may guide the discussion using the following questions.
  - When we buy foods that are imported across the country, how does that impact our environment? (*uses lots of gas, vehicles emit fumes, food is not as fresh due to long travel times so preservatives are added, extra packaging is required to travel farther distances, chemicals are used to make produce ripen).*
  - What options are there to buy produce? (*buy local produce from store, go to a farmer’s market, grow your own).*
  - What can you do at home or at school to make wise food choices to protect the bay and have a “Sustainable Table”? (*Use reusable bags, buy products with less packaging, refuse a bag when not needed, reduce the amount of food waste, and teach others what you have learned).*
- Play the True or False game (**Supplement A**). Have the students stand up. Tell them one side of the table is true and the other false. Use the true/false statements and have the students move to the side of the table that they think is the correct answer. Discuss the answer.
- Between lessons, wash materials (if students ate from them) in Resource Lab sink.

## Supplement A

### True or False

The following are a few True/False statements about local food and sustainability. Feel free to add more questions as you think of them.

- Oranges, lemons, and bananas are some of the fruits grown locally in Maryland. (F)
- Local foods are always sustainable. (F)
- A typical dinner has traveled 1,500 miles from the source to your table. (T)
- One fourth of all meals consumed in the US are fast food. (T)
- Burning fossil fuels has minimal effects on climate change. (F)
- Food shipped long distances usually needs extra packaging to protect the food and keep it fresher. (T)
- Farming often uses chemicals that damage native habitats. (T)
- Buying locally means shopping at the closest supermarket. (F)
- Trees are important around farmlands and crops to control erosion and filter pollution. (T)
- Food shipped long distances are fortified with ingredients to help preserve and protect the food. (T)
- Crops grown with and without pesticides or preservatives have the same nutrient values. (F)
- Coal, oil and natural gas are fossil fuels. (T)
- Burning fossil fuels releases carbon dioxide into the air. (T)
- We have an unlimited supply of fossil fuels. (F)
- Money spent at farmers' markets does not go directly to the farmers. (F)
- Many supermarkets often sell local foods. (T)
- Recycling can reduce the amount of pollution and litter that goes into the environment. (T)
- A farmers' market usually has locally produced fruits and vegetables. (T)

**Supplement B:**

**Vocabulary**

**Sustainable** – A way of harvesting a resource so that it is not used up or permanently destroyed

**Local/Seasonal** – Local and seasonal food is more sustainable because it reduces the need for our food to be preserved, transported long distance, or refrigerated before it ends up on our plate

**Compost** – The process of using organic food waste to produce nutrient-rich soil

**Buffer Zone/Forest Buffer** – Trees and plants surrounding an area, particularly around a water source, which help to hold soil in place and filter pollution before it gets into the water

**Organic** – Food produced without using any chemical fertilizers, pesticides, or preservatives

**Preservatives** – Chemicals used to prolong the freshness of certain produce, especially when being transported over long distances

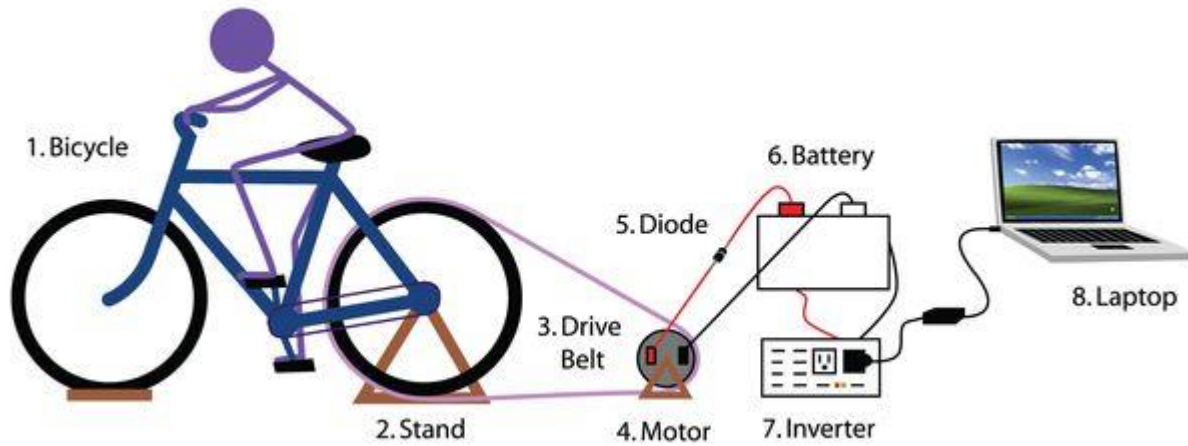
**Fossil Fuels** – Coal, oil, and natural gas produced from the remains of organic matter over millions of years

**Habitat** – A natural environment suited to specifically support life of the plants and animals living in that area; every habitat must have food, water, shelter, and sufficient space for its inhabitants

**Watershed** – An area of land where all water sources flow into a particular body of water



**Supplement D:**



This Bike is a generator build to power our small household appliance for our recipe today.

Through pedaling the bike, we will power the motor to charge the battery. The battery is connected to an inverter that allows you to plug the appliance in to the power source, the battery. Each child in the group will pedal for a minute at an even pace. Once each child has pedaled, you will plug the blender into the inverter. Then turn on your blender with all the ingredients in it and, Voila! Your smoothie has been made!

<http://www.instructables.com/id/How-To-Build-A-Bicycle-Generator/>