

## LESSON 6: FOOD CHOICES AND CLIMATE CHANGE

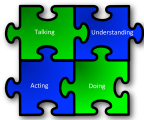
### OVERVIEW:

*Students will review concepts of the energy pyramid focusing on the loss of usable energy as it moves through food chains from producers to consumers. These ideas will then be used to explain pricing variations relative to vegetables and meats. Because more land is required to support a pound of animal vs. a pound of plants and there are limits to land that can be used for agriculture, the importance of food choice will be explored. As a concluding activity, students will calculate the distance that food ingredients for a standard lunch. In this way, students will also account for the added fossil fuels used in agriculture to provide cities with food.*

### SUB-QUESTION:

How do our food choices impact energy use?

### WAYS OF KNOWING URBAN ECOLOGY:



*Students will...*

#### Understand

- Understand how energy transformations in food chains cause the loss of usable energy within the system (*forces and drivers, ecosystem change, and ecosystem state and structure*).
- Identify means by which agriculture contributes to the accumulation of greenhouse gases in the atmosphere (*human impact*).

#### Talk

*No specific goals connected with talking urban ecology in this lesson.*

#### Do

- Calculate the distance traveled by various foods in a given lunch.

#### Act

*No specific goals connected with acting on urban ecology in this lesson.*

### SAFETY GUIDELINES

No specific safety issues are associated with this lesson.

### PREPARATION:

#### Time:

1 class period

#### Materials:

#### **Activity 6.1**

White board or smart board for PowerPoint Presentation

#### **Activity 6.2**

Student Worksheets (map or Google Earth option)

Access to Google Earth

Or  
Access to World and U.S. Maps with Measurement Scale  
Rulers  
Calculators

**Reflection:**  
Student notebooks

## **INSTRUCTIONAL SEQUENCE**

### **Activity 6.1: Energy Transformations in Food Chains – Plants and Animals Require Different Investments**

1. A PowerPoint presentation has been provided in order to introduce the idea of energy loss within a food chain and how the choices we make about the food we eat can affect the amount of greenhouse gases in the atmosphere. Notes have been provided for your use as you present. Time should be given for class discussion around the questions throughout the presentation as well as time given for any additional inquiries.

### **Activity 6.2: How Far Did This Lunch Travel?**

#### **1. Introduce Activity 6.2**

- In introducing this next activity, you can begin by reminding students of the fact that energy is not only passed from producer to consumer, but humans also invest energy in the transportation required to bring food to us from all over the world. Ask students if they know where in the world most of their food comes from. Students can suggest some foods and their country or state of origin. For example, how are we eating oranges and bananas when banana and orange trees don't grow in the Northeast? Other fruits and vegetables can be used as examples in other parts of the country as needed.

#### **2. Students Complete Activity 6.2**

- Have students work in groups using the student sheet as a guide to complete the activity.
- Two different student sheets have been provided depending on the method chosen to calculate distances. If computer access is available, you may choose to have students use Google Earth to make the calculations. If not, students may use scaled world maps and a ruler to complete this activity.

#### **3. Discussion of Activity 6.2**

- Discuss as a class the student responses to how the lunch could be changed to decrease the travel time.

- You may also want to discuss aspects of the activity that students found surprising or noteworthy.

### ***Teacher Background Knowledge***

From an *ecosystems services* perspective, the vegetable plants and fruit trees are providing an important and necessary service to humans: food. However, in transporting these products across the globe, the environment is providing other “hidden” services in the form of carbon-based fuel. Carbon-based fuel, such as gasoline or coal, allows the processing and transportation of foodstuff, and negatively impacts *ecosystem state and structure* with an increase in carbon dioxide and other greenhouse gases in the atmosphere. This has a negative impact on *ecosystem change*.

Buying locally grown and produced food reduces the need for these “hidden” ecosystem services such as carbon-based fuel. As these products do not travel nearly as far, the fuel needed to transport them is far less. In addition, local fruits and vegetables tend to be fresher due to the fact that less time has elapsed between harvest and sale. They are also less expensive as the consumer does not pay for those “hidden” ecosystem services. See LocalHarvest (<http://www.localharvest.org/>) for a directory of places, such as farmers markets, that sell local produce around the United States.

### **Concluding the Lesson**

- As an end of the class reflection, have students consider the following question: How has the growth of cities increased the distance that food travels?
- Let your students know that in the next lesson they will be exploring how trees can reduce the impact of increased carbon in the carbon cycle.