

Lesson 3:

Think Globally, Eat Locally

Summary

When we hear the common saying, “Think Globally, Act Locally,” food may not be the first thing that comes to mind. Yet, what we choose to eat is connected to a food system. That food system may be very local, such as an apple from a neighboring orchard, or global, such as apples coming from New Zealand, Japan, or Canada. The major goal of this lesson is for us to become familiar with local and global aspects of our food system. The first activity will help us define the terms “local,” “regional,” and “global.” We will then participate in an activity to demonstrate these differences in energy consumed in local and global food systems. Other ideas are offered in the *Going Further* section.

Learning Objectives

Upon completion of this lesson, we will be able to:

- Have an increased understanding of how the steps in the food system are interrelated.
- Explore the concepts of "local," "regional," and "global" food systems.
- Have an increased awareness of how energy is needed and used in the food system.
- Explain how our food choices can affect the community and global system.

Key Concepts

- Local food system (and “localization”)
- Global food system (and “globalization”)
- Regional food system (and “regionalization”)
- Community
- Sustainability
- Food Miles
- Cost versus Price

Activities

1. [Defining the terms “Local,” “Regional,” and “Global.”](#)
2. [Local and Global Food Systems – Energy Comparison](#)
3. [Local and Global Food Systems – Energy Comparison Follow-up](#)
4. [Miles in Your Breakfast](#)
5. [Food for Thought Journal](#)

Activity 1: Defining the terms “local,” “regional,” and “global”

Summary

In order to understand food systems and how they are interconnected, we must first understand the terms used. This lesson will help us define “local,” “regional,” and “global” for future use.

Materials

- Writing board and markers
- Paper and pens/pencils

Before Class

Review [Background](#) material and guiding questions

Class itself

1. Start this lesson by discussing or thinking about the meaning of the terms, “local”, “regional”, and “global.” The distinctions between these different systems are based on the distances between the sources of the food (where it is grown, raised or caught) and the place where it is purchased for consumption.
2. Much of the food found in a grocery store arrived there through a food system that is global. Discuss or think about what the term “global” means. Where do your oranges come from? What areas of the world do other foods you buy come from?
3. Using the guiding questions below, brainstorm to focus your ideas.
4. Once you have generated ideas, we will define the terms for this lesson. Refer to the [Background](#) section for definitions.

Guiding Questions

- What do you think the term “local” means?
- What makes a food a local food?
- What makes up your local area?
- What does the term “regional” mean to you? What is your region?
- What does the term “global” mean to you?

Activity 2: Local and Global Food Systems – Energy Comparison

Summary

To help us learn about the amount of energy and other resources used and outputs generated by the food system, we will compare a local with a global food system. We will first set a number of parameters about either a global or local food system. Then, using a food system worksheet, we will calculate the amount of energy in the food system. For each food system, we will follow the path of a strawberry – in a form they choose and from a place and type of farm that they choose. We will first decide on a food system “scenario” for their strawberries, then using the energy worksheet, calculate the amount of energy used for the kind of strawberry food system we chose. There are examples to give you ideas as well.

The strawberries used in this example could be fresh, frozen or in jam and they could come from a local, small farm or come from across the country. One of the important points in this lesson is that all food systems (local, regional and global) require the input of natural and human resources. Even a very local food system will require some resources and generate some level of output. Food systems, however, vary a great deal in the level of inputs required, the level and kind of outputs generated, and the benefits or costs that result for a given community.

Materials

- Photocopies of [Strawberry food system story](#)
- Photocopy of [“Inquiring Minds”](#) list from Lesson 2
- Photocopies of the [Energy worksheets](#) as needed
- Local and national road maps, if needed
- Writing board and markers
- Paper and pens/pencils

Before class

To prepare for this activity, make copies of the strawberry food system story. Make copies of the local food system. Review the food system model and have a copy of the “Inquiring Minds” list from Lesson 2 on hand to which to refer during the activity. Check with your local cooperative extension to find out where strawberries are grown in your area.

Class itself

1. Think about your experiences with strawberries.
 - Do you eat strawberries?

- Have you ever picked strawberries? If so, where do you pick strawberries?
- What is your local season for strawberries? (When are they ready for picking?)
- Can you pick strawberries here in the winter?
- Where are the strawberries grown that you buy in the winter?
- What are some of the different ways that you can buy strawberries in the supermarket? (Frozen, jam, in yogurt, fresh).

2. Look at the strawberry food system story.
3. Complete the worksheet, filling in the missing information as you go along. Some of this information will be based on data that you will have ahead of time (i.e. location of strawberry farms nearby) and other information will be a matter of some judgment (i.e. the gas mileage for the truck). [Note: To make this exercise as “real” as possible, to use a location for the market near where the you live and a farm location that is between 50 and 100 miles from your town for the local food system, a few thousand miles away for the global food system.] Decide on the type of farm. There may be other particulars that you think of to add to the worksheet not noted there. This is fine and should be encouraged. To determine distances between specific locations, use a road atlas or [Mapquest](#).
4. Complete the worksheets after all the missing pieces of food system information are added. Calculate the energy and resources used and the amount of CO₂ and garbage generated as “outputs” or “externalities.” Record your results in the appropriate column of the energy and resource score sheet.
5. Once you have completed the worksheets and score sheets, try another scenario (global if the first was local, or vice versa. If there are enough of you, divide into 2 groups and one take the local scenario and one the global). Compare the results of the two sheets so that you can see the differences on energy and resource use between the two systems.

Strawberries: From Farm to Table

If ever there were a taste of summer, the strawberry would be it! The strawberry has become one of the most popular small fruits in the United States. On average, Americans eat about 6 pounds a year. Not only does this fruit taste good, it is good for you. Strawberries are good source of vitamin C, and as a fruit contain no fat.

Most strawberries produced in the United States are grown as **annuals** (plants that are planted each year and last for one **season**) in California and Florida over a long season and then shipped to be sold fresh in supermarkets all over the country from December through October. Strawberries can be found fresh, or processed into juices, jams, jellies, or frozen whole or sliced for use in ice cream, yogurt and toppings. How many of these ways have you had strawberries? There are many different varieties of strawberries. Here in the northeast, several varieties are grown locally to be marketed as fresh berries. There is definitely a “season” for strawberries here in our region. The fruits ripen over a three- to five-week period beginning in late May and ending mid-June. The precise length of the strawberry season will vary depending on the location.

In the Northeast (as in Canada and the Midwest), strawberries are generally grown as **perennials**, that is, they will bear fruit for several years before needing to be replaced with new plantings. Few farms grow only strawberries – most strawberry growers produce other fruits and vegetables as well, because the strawberry season is so short. If this were the only crop a farmer grew, all his/her income from farming would have to be made in a few weeks out of the year!

On a conventional farm, strawberry production can involve inputs of synthetic herbicide (for weed control) and a synthetic nitrogen fertilizer. Weeds are a problem mostly in June, July and early August of the year the plants are planted. On an organic farm, the strawberry fields are usually fruited for only two years, because it is difficult to maintain enough nitrogen from organic sources. Since plants will not produce much fruit without sufficient nitrogen, other crops are planted on the field when strawberries are not planted and manure is used to fertilize the soil.

Labor costs tend to be higher in **organic** production, but chemical (herbicides, pesticides and fertilizers) costs are likely to be lower. Yields also tend to be lower as well. Average organic yields are about 5,000; 4,000; 2,000; and 1,000 quarts per acre in consecutive years on an **organic** farm, where as on a **conventional** farm average yields are about 7,000; 7,000; 4,000; and 3,000 quarts per acre. Organic strawberry

production can be as profitable as conventional production if the price of the organic fruit is about 30% - 40% higher than conventional.

Strawberries can also be grown in controlled, high-technology environments for **off-season** production. These can be plastic tunnels over raised beds in the field or full **greenhouses**. In addition to the building materials for the structures, greenhouses are heated with the input of energy.

Strawberries are extremely perishable. That means they ripen quickly and even faster after harvest. They maintain quality for only a few days at room temperature (that's the strawberry's **shelf life**) and about a week refrigerated – depending on the variety that is grown. This means that once ripe strawberries are picked, they need to be handled carefully, kept cool, and transported quickly to a processing facility or to where they will be marketed fresh.

If a berry is picked before it is fully ripe it will have a longer storage and/or shelf life than those harvested at the fully ripe or overripe stage. Have you seen strawberries with white tips? These not yet fully ripe berries will retain their firmness much longer than those harvested fully ripe (making them better long-distance travelers) and will lose less water during storage. This sounds good, doesn't it? But, the down side of this is that these berries usually do not develop the same intense flavor as fruits harvested at the fully ripe stage. Because berries ripen so quickly, frequent harvesting of the field (once every two days) is critical.

The berries headed for the fresh market (store or farmers' market where they're sold as fresh and whole fruit) are placed into commercial containers. Containers can be made of pulp (inexpensive but stain easily), wood (also stain and are expensive), clear plastic containers, like clamshells (reduce moisture loss but juice can gather in the bottom), or colored plastic mess boxes.

To maintain quality after harvest, berries must be stored at low temperatures, with high carbon dioxide and low oxygen levels. Cooling – and doing it quickly! - is probably the most important step to take after harvest to maintain good quality. This is critical for berries that will be transported great distances. Forced air cooling is the most frequent method used. This involves channeling refrigerated air through the containers holding the fruit. Large producers may have a separate forced air cooling facility specifically designed for removing field heat. Smaller forced air units can be improved with a small walk-in cooler and a few fans! Regardless of size, cooling with forced air will require resources for the unit or facility and will use energy to do the cooling. Remember, strawberries are very fragile and need to be handled carefully at every

step along the distribution chain from farmer to consumer. The fewer steps, the less loss from decomposition and rot. The average total loss of strawberries from harvest to the consumer's table is estimated to be more than 40%! A 14% loss occurs from farmer to wholesaler, a 6% loss from wholesaler to retailer, and a 22% loss occurs from retailer to consumer. These losses can be decreased with good handling practices.

If the berries are to be transported great distances, say from California to New York State, many steps are involved. After the berries are transported from the field and pre-cooled, the flats (the wooden crates in which pint-sized cartons of strawberries are placed for transport) might then be wrapped, loaded in a refrigerated truck, transported to a distribution center and unloaded into a warehouse. At some later time, they would then be loaded into a truck, transported to a retail store, unloaded and stacked in the back room, and finally set up on the produce display for sale. Of course, if a farmer plans to sell the berries directly to consumers at a nearby farmers' market, the berries will be picked and placed directly into cartons, kept cold over night, loaded onto a smaller truck along with other products and transported to the market the next morning. Other marketing options include customer harvest (pick-your-own) and processed (frozen, jams, jellies, etc.).

As this story reveals, there are many steps involved in getting strawberries from a farmer's field to your table! And the path can vary quite a bit.

Source for "Strawberries From Farm and Table": Pritts, M. and Handley, D. (Eds.). 1998. Strawberry Production Guide for the Northeast, Midwest, and Eastern Canada. Natural Resource, Agricultural, and Engineering Service. Cooperative Extension. 152 Riley-Robb Hall, Ithaca, NY 14853-5701. 162 pages. NRAES-88; ISBN 0-935817-23-9.

Worksheet: Energy use in the food system – Strawberries

Objectives: To calculate and compare the energy costs of providing strawberries for several food system scenarios*.

Instructions: (refer to example as needed)

- 1) Fill in the blanks in the header of the energy cost worksheet. Choose the type and location of farm that the strawberries come from, the form of berries, the location of the market, the location of the consumer and his/her mode of transportation, and the type of shopping trip. Refer to Table 1: Choosing A Scenario (see below) for guidance.
- 2) Using the Energy Key below, find the energy cost per unit for each stage of the food system appropriate for the strawberry scenario you selected (i.e. farm, berry form, etc.). Enter the appropriate values onto the energy cost worksheet.
- 3) Using a road atlas, determine the approximate distance the strawberries are transported from farm to market and the distance the consumer travels from the home to the market and back. Enter distances onto worksheet.
- 4) Using the Energy Key, determine the length of time the berries will be stored. Enter the amount onto the worksheet.
- 5) Choose the amount of strawberries that will be purchased during the trip (Hint: a quart container of berries weighs approximately 1.3 pounds). Try to be as realistic as possible. Enter amounts onto worksheet. Note that for the “Consumer” stage of the food system, you will enter the total weight of food purchased during the shopping trip. See Energy Key for details.
- 6) Calculate the total energy use in each stage of the system by performing the mathematical operations indicated. Enter values onto worksheet.
- 7) Sum the values for each stage to calculate the total energy used in the food system to provide x pounds of strawberries for the given strawberry scenario (x = the number of pounds of strawberries purchased. Note: if less than a pound is purchased, use a decimal. For example, .5 pounds for a half of a pound).
- 8) Repeat steps 1 through 7 for as many scenarios* as desired. Compare how energy use differs depending on the food choices made (i.e. source of strawberries, form consumed, mode of transportation used by consumer).

* NOTE: A scenario is a hypothetical situation described by several key factors. It is often compared with variations of the same general situation. For example, demographers often compare population projections that are calculated based on different sets of assumptions, such as low, medium and high birth rates. Each set of assumptions is a scenario.

Table 1. Choosing a scenario.

Category	Helpful Information
Farm Type:	
Small scale	The farmer raises only a few (2 to 4) acres of strawberries and sells them <i>directly</i> to the customer from a roadside stand or at a farmer's market. Few external inputs are used (e.g., fertilizers, pesticides) and yields are modest.
Retail	The farmer raises a medium acreage (approximately 10 acres) of strawberries and sells them <i>directly</i> to the customer from the farm (a pick-your-own operation) or from a farmers' market. Inputs are greater than small scale and yields are higher.
Wholesale	The farmer raises a large acreage (50 or more acres) of strawberries and sells them to stores or distributors. There is <i>no</i> direct connection with the customer. Yields and inputs tend to be high.
Processing	The farmer raises a large acreage (50 or more acres) of strawberries and sells them to a processing plant to be made into a strawberry product (such as jam). There is <i>no</i> direct connection with the customer. Yields and inputs vary.
Berry Form	Strawberries are available in a variety of forms. They are commonly sold fresh, frozen, or as jams and jellies. The transformation of berries into different forms requires additional inputs of resources.
Market Type	
Roadside stand	A building (often simple) located on a well-traveled road that is on or near the farm.
Farmers' market	A large (often open-air) structure at which many farmers sell produce or other farm products. The market is usually located near a population center.
Cooperative Grocer	A medium sized store that sells produce and hundreds of other food and non-food items. It is usually oriented toward whole foods and health-conscious customers. The market is usually located near a population center.
Supermarket	A large store that sells produce and thousands of other food and non-food items. The market is usually located near a population center. Availability of local produce may be limited.
Consumer Transportation	Though the automobile is certainly the most common mode of transportation, several options may be available. Consumers may be able to walk, bike, or take public transit depending on their proximity to the market and to bus or train service.

**Shopping
Information**

The size of a typical shopping trip can vary greatly, from a short trip to buy milk and bread to a full week's groceries. Examples are shown below.

- Just berries Assumes that the consumer only buys strawberries. Common for a trip to a pick-your-own farm or an impulse shopping trip.
 - Small trip Assumes that the consumer buys strawberries and one-third of the weekly groceries. Common for a trip to a farmers' market where not all foods are available.
 - Week's groceries Assumes that the consumer buys strawberries and an entire week's groceries. Common for a trip to a supermarket or other large grocery store.
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Table 2. Energy Key.

Method	Fossil energy cost per unit	Comments
<i>Production (farm type)¹:</i>		
Small scale	205 kcal/lb	Could be located in any state.
Retail	506 kcal/lb	U-pick operation. Consumer can drive to farm.
Wholesale – CA	321 kcal/lb	Producing season is April through September.
Wholesale – FL	946 kcal/lb	Producing season is January through April.
Wholesale – Northeast	803 kcal/lb	Producing season mid-May through June.
Processing – CA/OR	390 kcal/lb	Processing occurs throughout picking season.
<i>Harvest:</i>		
Hand picked	0 kcal/lb	All strawberries are considered hand picked
<i>Processing²:</i>		
Canning	261 kcal/lb	Assume 1lb berries makes 1lb of jam.
Freezing	825 kcal/lb	Assume 1lb berries makes 1lb frozen.
Fresh	0 kcal/lb	
<i>Packaging³:</i>		
Glass jar	1,023 kcal/lb	For storing jam. Jar holds 16oz (1lb).
Paper box	722 kcal/lb	For frozen berries. Box holds 16oz (1lb).
Plastic bag	559 kcal/lb	For berries frozen at home. Bag holds 16oz (1lb).
Wood basket	69 kcal/lb	For fresh berries. Basket holds 16oz (1lb).
<i>Storage⁴:</i>		
Frozen	120 kcal/lb/mo	Assume berries stored for 6 months.
Refrigerated		Fresh berries refrigerated during each day of transport.
Shelf	0 kcal/lb/mo	Storage for jam.
<i>Transport⁵:</i>		
Truck	0.18 kcal/lb/mi	Trucks used for wholesale and processed berries.
Van / Pick-up	2.24 kcal/lb/mi	Vans/pick-ups used for small scale and retail berries.
<i>Consumer⁶:</i>		

Car (just berries)	1790 kcal/mi	Units purchased = wt berries
Car (small trip)	1790 kcal/mi	Units purchased = wt berries + <u>11</u> lbs/person ⁷
Car (week's groceries)	1790 kcal/mi	Units purchased = wt berries + <u>32</u> lbs/person ⁷
Bike or walk	0 kcal/mi	

1 – Energy costs of producing strawberries are derived from Galletta and Funt (1980). Please note the following: the cost shown for “Wholesale – Northeast” is from the energy budget of Maryland strawberry production (Galletta and Funt, 1980, p. 300); the cost shown for “Wholesale – CA” is an average of the two California energy budgets (Galletta and Funt, 1980, p.302-3); the cost shown for “Processing” is a weighted average from energy budgets of California and Oregon (Galletta and Funt, 1980, p.302-4).

2 – Energy costs of canning and freezing are from Pimentel and Pimentel (1996, p. 188).

3 – Energy costs of packaging are from Pimentel and Pimentel (1996, p. 195)

4 – Energy cost of frozen storage is from Pimentel and Pimentel (1996, p. 188)

5 – Energy cost of transporting strawberries from farm to market based on fuel efficiency, energy value of fuel, and cargo capacity of vehicle. Fuel efficiencies of “trucks” and “vans/pickups” are 1999 estimates from the U.S. Department of Energy, Energy Information Administration (2002). Energy values (in kcal) for diesel and gasoline are from Cervinka (1980, p 15). Cargo capacity is assumed to be 40,000lbs of produce for trucks and 1,000lbs of produce for vans/pickups.

6 – Energy cost of consumer driving to and from market based on vehicle fuel efficiency and energy value of fuel. Fuel efficiencies of “cars” are 1999 estimates from U.S. Department of Energy, Energy Information Administration (2002). Energy values for gasoline are from Cervinka (1980, p 15).

7 – Distributes the energy cost of traveling to/from market amongst all items purchased during a shopping trip (not just strawberries). The amount of weight added to weight of berries based on the average amount of food consumed per capita in the U.S. Food Supply, 1,670lbs per person per year (Putnum, et al, 2000). A “small trip” assumes 1/3 of weekly food purchased during trip. A “week’s groceries” assumes that an entire week’s worth of food is purchased.

Worksheet References:

Cervinka, V. 1980. Fuel and Energy Efficiency. Pages 15-21 in D. Pimentel (ed.) Handbook of Energy Utilization in Agriculture. CRC Press, Boca Raton, Florida. 475pp.

Galletta, G.J. and R.C. Funt. 1980. Representative United States Strawberry Energy Budgets. Pages 297-306 in D. Pimentel (ed.) Handbook of Energy Utilization in Agriculture. CRC Press, Boca Raton, Florida. 475pp.

Pimentel, D. and M. Pimentel. 1996. Food Processing, Packaging, and Preparation. Pages 186-198 in D. Pimentel and M. Pimentel (eds.) Food, Energy, and Society. University Press of Colorado, Niwot, Colorado. 363pp.

Putnam, J., L.S. Kantor, and J. Allshouse. 2000. Per Capita Food Supply Trends: Progress toward Dietary Guidelines. *FoodReview* 23(3): 2-14.

U.S. Department of Energy, Energy Information Administration. 2002. Table 2.8: Motor Vehicle Mileage, Fuel Consumption, and Fuel Rates, 1949-1999. Page 57 in *Annual Energy Review 2000*. U.S. Government Printing Office, Washington, D.C. 379pp. (Available online: <http://www.eia.doe.gov/emeu/aer/aerpdf.html>)

Energy Cost Worksheet:

SCENARIO: Strawberry form: frozen .

Farm information (production type & location): wholesale - central valley, CA .

Market information (type of market & location): supermarket - Ithaca, NY

Consumer information (mode of transportation & location): drives car - Ithaca, NY .

Shopping information (# of people and size of trip): small trip for 2 people .

Stage in food system	Energy cost per unit		Distance traveled (duration stored)		Amount purchased	=	Total energy use
Production	<u>390</u> kcal/lb	×	NA	×	<u>2 lbs</u>	=	<u>780 kcal</u>
Harvest	<u>0</u> kcal/lb	×	NA	×	<u>2 lbs</u>	=	<u>0 kcal</u>
Processing	<u>825</u> kcal/lb	×	NA	×	<u>2 lbs</u>	=	<u>1650 kcal</u>
Packaging	<u>722</u> kcal/lb	×	NA	×	<u>2 lbs</u>	=	<u>1444 kcal</u>
Storage	<u>120</u> kcal/lb/mo	×	<u>4 mo</u>	×	<u>2 lbs</u>	=	<u>960 kcal</u>
Transport	<u>0.18</u> kcal/lb/mi	×	<u>2700 mi</u>	×	<u>2 lbs</u>	=	<u>972 kcal</u>
Consumer	<u>1790</u> kcal/mi	×	<u>5 mi</u>	÷	<u>24 lbs</u>	=	<u>373 kcal</u>
All stages							<u>6179 kcal</u>

Energy Cost Worksheet

SCENARIO: Strawberry form: fresh.

Farm information (production type & location): small scale - central NY

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Market information (type of market & location): farmers' market - Ithaca, NY.

Consumer information (mode of transportation & location): walks - Ithaca, NY

. Shopping information (# of people and size of trip): just buying berries for 2 people.

Stage in food system	Energy cost per unit	×	Distance traveled (duration stored)	×	Amount purchased	=	Total energy use	
Production	_____	×	NA	×	_____	=	_____	
Harvest	_____	×	NA	×	_____	=	_____	
Processing	_____	×	NA	×	_____	=	_____	
Packaging	_____	×	NA	×	_____	=	_____	
Storage	_____	×	_____	×	_____	=	_____	
Transport	_____	×	_____	×	_____	=	_____	
Consumer	_____	×	_____	÷	_____	=	_____	
All stages							=	_____

Energy Cost Worksheet

SCENARIO: Strawberry form: _____

Farm information (type of production & location):

Market information (type of market & location):

Consumer information (mode of transportation & location):

_____ Shopping information (# of people
shopped for & size of trip): _____

Stage in food system	Energy cost per unit	×	Distance traveled (duration stored)	×	Amount purchased	=	Total energy use
Production	_____	×	NA	×	_____	=	_____
Harvest	_____	×	NA	×	_____	=	_____
Processing	_____	×	NA	×	_____	=	_____
Packaging	_____	×	NA	×	_____	=	_____
Storage	_____	×	_____	×	_____	=	_____
Transport	_____	×	_____	×	_____	=	_____
Consumer	_____	×	_____	÷	_____	=	_____
All stages							_____

Activity 3: Local and Global Food Systems – Energy Comparison Follow-up

Summary

After getting an idea of the energy used in both local and global food systems, it is now time to consider some of the questions and problems that arise in trying to eat locally. It is important to remember that this food system exercise is a simulation and is not meant to be an accurate accounting of exactly how much energy and resources are needed and how much pollution or garbage are generated by the systems. It does give a fairly good idea of the various places in the food system where energy is used and is a good approach for showing how food systems differ.

Materials

- Photocopy of [“Inquiring Minds”](#) list from Lesson 2
- Energy worksheets and materials from Activity 2
- Writing board and markers
- Paper and pens/pencils

Before class

Prepare photocopies as needed and review questions.

Class itself

Discuss with someone else the worksheets you filled out in Activity 2. You may want to use the “Inquiring Minds” list to remember each step as you talk about them.

Guiding Questions

- What made the biggest difference between the two systems for energy use?
- How can the food system be changed to decrease the amount of energy used and pollution generated?
- Is it better to eat a local conventionally grown strawberry, or one that is grown organically on a farm 2,500 miles away, packaged, then shipped to a local market?
- What would happen if we only bought strawberries from California?
- What if we only bought strawberries locally?
- If we only buy locally, who will buy strawberries from California?
- Is it always possible to eat locally? Are there foods that we cannot grow in the north that we *have* to eat?
- Assuming you can only purchase local foods at the farmers’ market but you have to buy all your other

groceries at the supermarket, would we still have the same amount of energy consumption for the local system?

- How are the two paths we followed different? Did we compare the same number of strawberries being produced and transported?
- Where do you get your food?
- Have you ever seen any fruits and vegetables labeled in the supermarket so you can tell where it is from?

Activity 4: Miles in Your Breakfast

Summary

Now that you have compared global and local systems with respect to energy consumed, it is time to apply that knowledge to your own daily habits, in this case eating breakfast!

Materials

- Writing board and markers
- Paper and pens/pencils

Before class

Review [Background](#) information as needed

Class itself

1. List all of the foods you have in a typical breakfast. This could be a typical weekday or weekend breakfast. Do not only list the item, for example French toast, but all the ingredients that go into the item – eggs, milk, bread (wheat, etc.) – as well as what goes on it, the syrup, butter, and possibly jam. What beverages are in the breakfast? Orange juice or apple juice? Coffee perhaps? Or hot chocolate?
2. If you are working with a group, once each person has a list of individual food items, construct a master breakfast from these individual lists and put it on a board in front of everyone.
3. Going through each item, think about or discuss with someone else where it was probably grown or raised. Which items are or can be produced locally? Which items are homemade and which are store-bought? (For example, French toast can be made at home but it can also be bought frozen)

Activity 5: Food for Thought Journal

Summary

As an independent assignment, complete the Food for Thought Journal for Lesson 3.

Materials

- Photocopies of [“Food for Thought Journal”](#) (one per student)
- Pens/pencils

Before Class

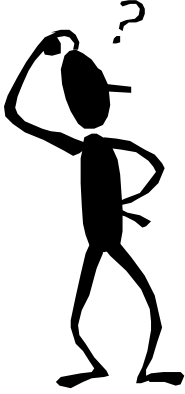
Prepare photocopies as needed.

Class itself

In the journal, you will be able to study one of your own meals and the food system it comes from in terms of the resources needed and used.

Food for Thought Journal

Lesson 3: Think Globally, Eat Locally



Questions of the Day:

- Describe a meal you ate yesterday or today.

- Did you help prepare the meal?

- Where do you think the foods in your meal came from before it was in the grocery store or your cafeteria?

- What are some resources that were used to grow or produce these foods?

- Were any of the foods packaged before you ate them?

- What resources were needed to make these materials

Going Further

If time permits, a good way to put this lesson into the context of your lives is to examine a food you commonly eat. A discussion about pizza is really engaging for everyone. First consider what ingredients go into making a pizza. Make a list of where all of the ingredients come from. If you want to make a pizza, you must collect all of the ingredients and bring them to one place. This uses a lot of energy and resources. How does the food system path of the pizza compare to the path of the strawberry? Could we fit all of the resources and energy into that same bowl? Consider an entire day's worth of food. When you begin to think about it, our food system is very complicated. A lot of resources and energy is used to bring food from the field to table. Even small changes to the system that save resources and energy can have a great effect on our environment.

For an enlightening and fun web-based activity, calculate their "environmental footprint." "Calculate Your Ecological Foot Print" at <<http://www.lead.org/leadnet/footprint/intro.htm>> provides 13 simple questions that will assess your use of nature. The site is sponsored by *Redefining Progress* <<http://www.rprogress.org/>>, a non-profit research and policy organization that develops policies and tools to reorient the economy so that it will value people and nature first.

Commencement Level/ Independent Thinkers

Food for Thought Journal 2

Things to think about:

* How would you describe a food system?

* Using the produce section of your newspaper ads, see if you can discover if produce sold is grown locally, regionally or globally. Record 10 produce items that are being sold this week and record where they are grown.

Produce sold this week	Local	Regional	Global	Specific location
Red Delicious apples			X	Washington State
1.				
2.				
3.				
4.				
5.				
6.				
7.				
8.				
9.				
10.				

Migrant workers are employed by processors and farmers to help get the produce from the farmer to the consumer.

What do you know about the migrant workers?

About their lives?

About their wages?

About their benefits?

How do they affect our food system?

What questions do you now have about our food system?

Where or who would you go to get these questions answered?

Background

Food systems can be characterized as, “local”, regional” and “global.” The distinctions between these different systems are based on the distances between the sources of the food (where it is grown, raised or caught) and the place where it is purchased for consumption. Another important distinction between these systems is the hidden costs and benefits of each that do not show up in the price we pay for food. For example, the global system uses anywhere from 4 to 7 times as much energy (fuel to transport the food), and produces 5 to 17 times more CO₂ (from the burning of the fuel) than a regional or local food system. Local food systems, or “community food systems” are thought to benefit the local economy by keeping food-related enterprises nearby and employing residents of a community, by keeping local farms in business, and by keeping the rural landscapes agricultural. In such a system, there is an emphasis on the development and maintaining of relationships between people in different sectors in the food system – farmers, processors, distributors, and consumer, for example.

Much of the food found in a grocery store arrived there through a food system that is **global** – local supermarkets are supplied by national and international sources. **Regional food systems** are based on the existing state distribution infrastructure. A cooperative network of state farmers that supply state retailers and wholesalers, distributed in large semi-trailer and mid-size trucks, characterizes a regional food system. By contrast a **local food system** is one in which much of the food is marketed directly from farmers to consumers through community supported agriculture (CSA) enterprises and farmers’ markets, or through institutional markets such as restaurants, hospitals, and conference centers, using light, relatively small trucks for delivery. Because food is marketed directly, local food systems are generally confined to a relatively smaller geographic area – what can be delivered by truck within a few hours. Examples of local food systems include farmers’ markets, roadside stands, on-farm sales, U-pick operations, production/processing/retail enterprises, and sales directly to hotels, restaurants, bed-and-breakfast inns, and institutions.

A **community food system** is a food system in which food production, processing, distribution and consumption are integrated to enhance the environmental, economic, social, and nutritional needs of a particular geographic location (Garrett and Feenstra. 1999). Since food-producing businesses are located within the community they are also stakeholders in the healthfulness of their food production practices. Due to this close relationship between the food production industries within a community, many inputs necessary for food production, processing, transportation and distribution are reduced.

In addition to the environmental benefits to local food production, there are many community benefits to a strong local food system as discussed in the [Community Food System Primer](#). Although it may not be possible in some areas of this country, in the Northeast it is possible to eat local and regional foods year round and maintain a balanced and varied diet. This means that most of the northeastern communities are capable of creating strong community food systems. Community food systems support local economy, food security and maintain healthy green spaces within the community.

Since certain areas of the country can produce large quantities of particular foods at low prices, much of the market for those foods has shifted to the global food system. When viewing the global system as a whole, it appears that production has increased to meet the demands of the population. Along with these changes, the distribution of farms and agricultural business has shifted as well. While the local food systems are participants in the global food systems, their contribution is diminishing because many smaller businesses are unable to compete with larger production farms in the country. The issues surrounding the globalization of our food system are complex and extensive. There are significant benefits to our global community while our local communities may experience many of the drawbacks of globalization (Harmon et al. 1999).

In the past 30 years there has been a significant global increase in fossil fuel use. One reason for the rise in U.S. fossil fuel use is the increased use of trucks to transport goods. In 1965, there were 787,000 combination trucks registered in the United States, and these vehicles consumed 6.658 billion gallons of fuel. In 1997, there were 1,790,000 combination trucks that used 20.3 billion gallons of fuel. Many of these trucks transport food throughout the country. A study conducted by the Center for Agricultural Business indicated that in California alone more than 485,000 truckloads of fresh fruit and vegetables leave the state every year and travel from 100 to 2,100 miles to reach their destinations.

The supply of fossil fuel to meet this increasing demand is one issue (the peak in oil production is predicted to occur in 5 to 20 years), but another important issue is the carbon dioxide (CO₂) and other gases that are released when fossil fuels are used. These gases absorb heat and may contribute to an increase in global warming. As fuel use goes up, so does the release of CO₂ and other gases. Total U.S. greenhouse gas emissions in 1997 were 11.6% higher than in 1990. The largest source of CO₂ and overall greenhouse gas emissions in the United States was fossil fuel combustion, accounting for 80% of the global warming potential.

For more information about Community Food Systems, see the [Community Food System Primer](#) included with these lessons.

About the lesson...

The basic concept used in this lesson is to create a model of the food system that will demonstrate how interconnected many aspects of the food system are. We hope to demonstrate how complicated the system is that brings food from the field to our table. In order to help you understand this complex system we used a simplified model that we can experience and touch. This technique allows us to understand the complexities beyond the model more easily. While the preparation may seem complicated, in practice this lesson will provide an interactive, exciting learning tool that will enable us to explore complex aspects of the food system.

A **Food Mile** is the distance food travels from where it is grown or raised to where it is ultimately purchased by the consumer or other end-user. One 1969 estimate of miles traveled by food in the United States cited an average distance of 1,346 miles. Calculations in another study examining transportation and fuel requirements estimated that fresh produce in the United States traveled an estimated 1,500 miles. An analysis of the USDA Agricultural Marketing Service's 1997 arrival data from Jessup, Maryland, found that the average pound of produce distributed at the facility traveled more than 1,685 miles, with the average distance for fruits being 2,146 and the average for vegetables 1,596 miles.

Energy vs. Resource

In the lesson we refer to both "Energy" and "Resources". This can be confusing since energy is a resource. *Resources* in the context of this lesson are meant to be any inputs necessary, other than energy resources necessary for the step in the food system. A resource may be water, paper, soil, or glass, for example. *Energy* should be discussed as the input of electricity (from fossil fuels or otherwise), gasoline, or other sources of power needed for the step in the food system. They are distinguished from one another to make it easier to observe the differences in energy inputs for the local and global systems versus the other inputs. We need to be aware that to produce many of the *Resource* inputs, energy is required. For example, an initial energy input is required to prepare cardboard for cardboard boxes. In order to make the lesson manageable we need to put some limitations on how energy consumption is represented. Therefore we do not consider the energy required to produce the inputs into the system.

One website of interest on this subject is:

<http://www.ag.iastate.edu/centers/leopold/pubinfo/papersspeeches/ppp/intro.html>