Part 3: Intro to Food Systems & Scavenger Hunt

NSF Farm Hub Project

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Modified from Coblyn, Sara (2008) French Fries and the Food System: A year-round curriculum connecting youth with farming and food. Lincoln, MA: The Food Project, pp. 60-61.

Timing within Module:

This activity is an introduction and should be completed prior to the research project.

Goal:

To define, identify key differences between, and understand social and environmental impacts of industrial/global and sustainable/local food systems.

Learning Objectives:

1. To learn differences between sustainable/local and industrial/global food systems
2. To establish working definitions of agricultural terms and soil management methods.
3. To understand concepts in a local context.

Materials:

Section 1: Apple, Knife, Script: The Importance of Caring for the Land (*provided*)
Section 2: Food System Definitions (*provided*)
Section 3: Magnets (*provided*)
Section 4: 7 Laminated Scavenger Hunt Cards and 7 Riddles (*provided*), Tent stakes (*provided*), Pens, Clipboards, Scavenger Hunt Worksheet (*provided*), CUE Farm map (*provided*)
Section 5: Social Action Reflection (*provided*)

Preparation:

This lesson contains four sections to be completed in the following order:

1. The Importance of Caring for the Land (10 minutes) – in-class
2. Food System definitions (10 minutes) – in-class
3. Industrial/global versus sustainable/local food systems (15 minutes) – in-class
4. CUE Farm Scavenger Hunt (30 minutes) – in-class
5. Social Action Reflection (15 minutes) – homework or in-class

Instructors should be familiar with content provided below, particularly the first two sections. Prior to class, instructor should place scavenger hunt cards at the appropriate farm locations.

Length:

A total of 65-80 minutes in-class is needed for this lesson.

For a deepening of your knowledge, attend an Institute at The Food Project
http://thefoodproject.org/institute

Award # 1609219

Section 1: The Importance of Caring for the Land

Pretend that this apple is the planet earth—round, beautiful, and full of good things. Notice its skin, hugging and protecting the surface.

(Cut the apple into quarters)
75% of the earth's surface is covered in water—oceans, lakes, rivers, and streams.
(Toss three quarters away)

What is left represents dry land.

(Cut the quarter in half)
50% of that land is desert, polar or mountainous regions where it is too hot, too cold, or too high to be productive.
(Toss the other half away)

(Cut into four parts)
75% of the remaining land is severely limited by terrain, fertility, and excessive rainfall. It is too rocky, steep, shallow, poor, or wet to support food production.
(Toss three parts away)

(Peel the skin from the final remaining sliver)
The remaining 3%—this small fragment of land area—represents the soil we depend on for the world's food supply, This fragment competes with other needs—housing, cities, schools, hospitals, shopping centers, landfills, and so on.

We must care and protect this small part of the earth to ensure that it remains productive for the life of future generations.

Section 2: Food System Definitions

Review these basic food system definitions with your class.

Food System – A food system encompasses the functions of production, processing, transportation, storage, marketing, preparation, consumption, disposal, and decomposition of food.

Conventional (global) Food System – Conventional food systems operate based upon economies of scale. They use a production model that requires maximizing efficiency to lower consumer costs and increase overall production. These food systems tend to operate in the global marketplace and primarily use industrialized agriculture methods of production, although organic agriculture production methods can also be a part of the conventional food system. Conventional systems are largely based on the availability of inexpensive fossil fuels fossil, which is necessary for mechanized agriculture, the manufacture or collection of chemical fertilizers, the processing of food products, and the packaging of the foods for longer shelf life. Because foods are produced cheaply and are often supported by government subsidies, food is considered more accessible.

Local Food System – Local food systems provide an alternative to conventional food systems in that they operate with reduced food transportation and more direct marketing, connect the farmer directly to the consumer, provide more transparency in how food is produced, and keep food dollars in local communities. Food is most often produced on a smaller scale than conventional food systems, using organic and/or sustainable agriculture practices, and is sold locally at farmers markets, farm stands, etc. Local food systems are considered a good way to revitalize community, however critics suggest that price premiums for locally produced food can be elitist and inaccessible.

Industrial Agriculture – Industrial agriculture is used to produce large quantities of the same product for the global market and is thus tied to the conventional food system. Industrial agriculture techniques include reducing the frequency of fallow years, improving cultivars (often with GMOs), increased use of chemical fertilizers, herbicides, pesticides, antibiotics, and growth hormones, and the mechanization of planting and harvesting. This system is supported by ongoing innovation in agricultural machinery, farming methods, genetic technology, and techniques for achieve economies of scale. This is the primary way food is produced in the U.S. and provides cheap food to the masses however, critics raise concerns of the quality of the food produces, the negative environmental impact of industrial agriculture, mistreatment of farmers and processing plant workers, and lack of transparency in production.

Organic Agriculture - Organic agriculture is present in both conventional and local food systems. Organic produce is grown with reduced chemical, antibiotic, or hormone inputs and provides consumers with transparency and information on how food was produced. Organic agriculture has been criticized for being elitist and inaccessible. Critics also suggest that organic agriculture now mimics industrial agriculture while using pesticides and fertilizers that are organically derived.

Sustainable Agriculture – Sustainable agriculture integrates three main goals—environmental health, economic profitability, and social and economic equity. The farmer must think about the long-term implications of farm practices and make choices based upon the interactions in the whole farm ecosystem including plants, animals, insects, and soil. Sustainable agriculture uses no chemicals, antibiotics, or hormone inputs. The farm is managed as an ecosystem to improve soil, deter pests, and increase productivity. Sustainable agriculture is usually labor intensive, with the management of multiple plant and animal types. Products are typically sold through local markets, although there has been some scaling of sales to regional levels.

Section 3: Industrial/Global versus Sustainable/Local Food Systems

1. Using the magnetic cards provided, place the headers “industrial/global” and “sustainable/local” into two columns on the side of the farm classroom.

2. Note to students that there are many configurations of food systems that exist between these two extremes (for instance local conventional or large-scale organic). Also note to students that many of these terms have been green-washed and may no longer adhere to the original definition. Be an informed consumer!

3. Divide the class into up to seven teams and designate a team leader to take notes. These will be used for the next activity.

4. Hand out smaller magnetic cards with terms to teams and have them take turns placing their term under the correct heading while justifying their decision.

5. Use this activity to begin a discussion with your students to clarify the differences between the two food system extremes.

Section 4: CUE Farm Scavenger Hunt

1. Prior to class start, the instructor should place the laminated scavenger hunt cards at the appropriate farm locations and pin to the ground using tent stakes.

2. Using the same teams (up to seven) used in Section 3, hand out a scavenger hunt worksheet (*provided below*) and one riddle to each group to start the scavenger hunt. This will ensure that each group has a different starting location.

3. Students will find their first location based upon their answer to the riddle.

4. Once students are at the first location, they will answer the questions on the card at that location.

5. Once the questions are answered, they will use the riddle provided on the bottom of the laminated scavenger hunt card to find their next location.

6. Students will know that they have completed the scavenger hunt when their worksheet is complete and they re-encounter their first riddle.

Scavenger Hunt Worksheet

The CUE Farm Manager has suffered a dramatic bout of amnesia and needs your help re-learning some major themes in local, sustainable agriculture! Your quest is to solve riddles that lead you to seven different locations on the farm. At each location, you will find a card with a station number and a series of questions. You must answer these ever-important questions prior to moving on to the next station. Beware of entering answers to the questions under the incorrect station number on this worksheet as this will undoubtedly spoil the quest for knowledge and confuse the Farm Manager!

The answers that lie within this hunt will help you live and lead a more environmentally sustainable world. You have been provided a riddle to get you started on your first location. Best of luck on this honorable quest.

Station 1:

1.

2.

3.

Station 2:

1.

2.

3.

Station 3:

1.

2.

Station 4:

1.

2.

3.

Station 5:
1.

2.

3.

Station 6:
1.

2.

3.

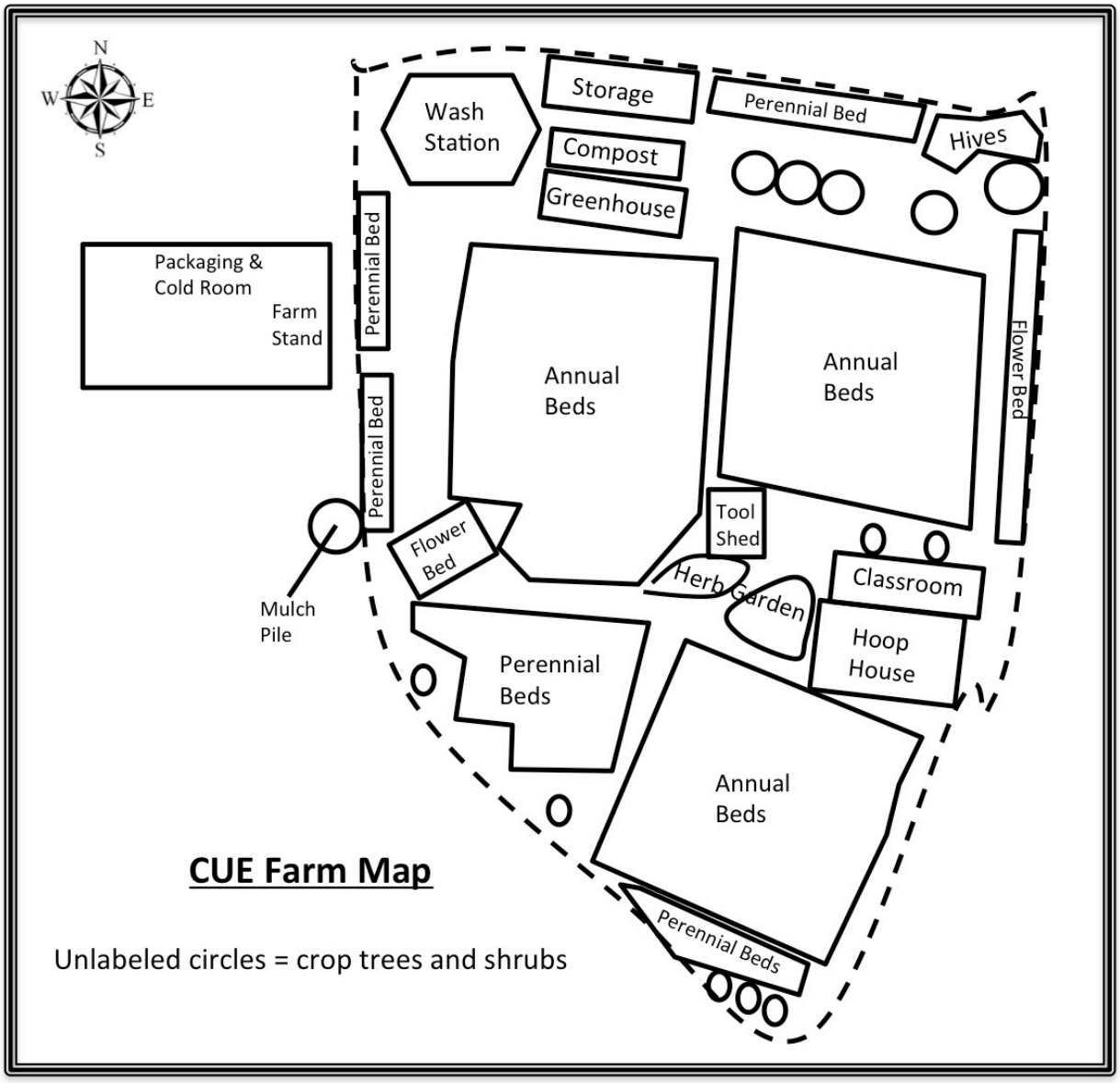
4.

Station 7:
1.

2.

3.

CUE Farm Map


N
W
E
S
Wash Station
Storage
Compost
Greenhouse
Perennial Bed
Hives
Packaging & Cold Room
Farm Stand
Perennial Bed
Perennial Bed
Annual Beds
Annual Beds
Flower Bed
Tool Shed
Flower Bed
Herb Garden
Classroom
Hoop House
Mulch Pile
Perennial Beds
Annual Beds
Perennial Beds
CUE Farm Map
Unlabeled circles = crop trees and shrubs

Section 5: Social Action Reflection

1. What surprised or concerned you the most about the global/industrial food system and why?

2. What aspects of local sustainable agriculture do you think are most valuable or important in today's world? Why?

3. What steps will you consider taking to encourage a more environmentally or socially just food system?

4. How will you share your practice with others and enlist them to participate?

Industrial/Global

Sustainable/Local

Organic Fertilizer

Fertilizer made from various natural sources.

What it does: Provides plants with nutrients in a readily available, slow release form.

Limitations: Producing it requires lots of fossil fuels; over-fertilizing can cause nutrient overloads into the watershed; more expensive than conventional fertilizer.

Synthetic Fertilizer

Fertilizer made through a synthetic process from fossil fuels.

What it does: Provides plants with nutrients in an immediate release form (short-term).

Limitations: More likely to cause nutrient overloads because if immediate release; normally contains nitrogen, phosphorous and potassium, which are not the only nutrients plants need to grow; needs activated by water.

Compost

Nutrient-rich humus made from decomposed natural waste (manure, grass, food scraps, etc.).

What it does: Provides plant nutrients in a stable form; holds moisture in soil; recycles products that would otherwise be landfill waste.

Limitations: Need proper proportions of ingredients for decomposition; need reliable sources of uncontaminated materials; much organic matter can decrease available nutrients.

Cover Cropping

Cover crops, like grasses and legumes (plants that add nitrogen to the soil), are planted instead of cash crops.

What it does: Adds organic matter and nutrients to the soil, to increase soil moisture and lighten soil texture, adds nutrients to the soil; prevents soil erosion.

Limitations: Cover crops take up space that can be used for of cash crops (vegetables).

Crop Rotation

Planting crops so that one crop will never be grown on the same piece of land for more than one year.

What it does: Helps with soil nutrients by planting crops that increase soil fertility the year before one that takes a lot of nutrients; helps control pest infestations.

Limitations: Farm must be diverse with many different crops; requires thoughtful planning.

Organic Pesticides

Chemicals derived from natural materials such as plants with natural pest resistance chemicals

What it does: Kills unwanted insects, weeds, and other organisms with naturally-derived chemicals that are considered less toxic than synthetic pesticides.

Limitations: Often less efficient and more costly than synthetic pesticides; can be toxic to human health and environment.

Beneficial Insects

Farms plant a diversity of plants, including native plants that attract beneficial insects such as ladybugs, bees, and spiders.

What it does: Beneficial insects eat harmful insects or promote crop growth through pollination.

Limitations: Requires planting of a diversity of plants, which takes land from cash crops; have to limit use of pesticides.

Synthetic Insecticides

Chemicals sprayed to destroy insects and other organisms harmful to crops or livestock.

What is does: Kills pests to protect crops, typically in a monoculture system where a pest outbreak would wipe out the entire crop.

Limitations: Also kills beneficial insects; fossil fuel intensive; contaminates water sources; may cause health problems to humans; pest resistance exacerbating future outbreaks.

Diversified Crops

Planting a variety of crops for market and/or integrating crops and livestock in a single site.

What it does: Improves soil health; makes farms more resilient to pest outbreaks and weather fluctuations; uses locally adapted plants; diversifies revenue streams.

Limitations: More labor intensive; not subsidized by federal government; requires specialized knowledge.

MonoCropping

Single crops/row crops (soybeans, wheat, corn) grown continuously over many seasons such as commodity crops like soybeans, corn and/or separation of crops and livestock.

What it does: Mechanized production with low labor inputs; larger land area can farmed.

Limitations: High start-up capital, high fossil fuel and chemical use; less resiliency to pests and weather; often subsidized by government.

Natural Weeding

Rotating crops, using mulch, and hand weeding to reduce weeds, pests, and disease.

What it does: Rotating crops so a dense crop is planted before a sparse crop smothers weed seeds; mulching smothers weeds; hand weeding eliminates weeds before going to seed.

Limitations: Labor intensive, mulch costly on large acreage; may require more than one crop type.

Synthetic Herbicides

Use of chemicals to control unwanted plants.

What it does: Selective herbicides kill specific weed species, non-selective kill all plants and can be used to clear sites of vegetation.

Limitations: May stay in soil long-term; toxic; result in water contamination; have been used for warfare.

Ecosystem Approach

Holistic approach to farming that closely mimics a natural ecosystem; 3 objectives: a healthy environment, economic profitability, and social and economic equity.

What it does: Fosters a diverse and healthy ecosystem that benefits native species and crops.

Limitations: Relies on farmer management, skill & knowledge; time intensive; small- to medium-scale farms.

Production Approach

Focused on innovation and efficiency; large capital investments; large-scale farms.

What it does: Produces large amounts of the same crop using standardized and mechanized methods.

Limitations: Requires the use of machinery, synthetic chemicals, fossil fuels, and potentially GMO plants; low plant diversity; low resiliency; high initial investment; large corporations

Hand Tended

Little to no machinery is used to break up the soil, add nutrients, weed, and harvest.

What it does: Enables the farmer to select only the highest-quality produce; enhances soil texture; minimizes fossil fuel use and costs of machinery; easier to see potential problems.

Limitations: Time intensive; more labor required; higher worker wages; smaller land area

Mechanized

Use of agriculture machinery for preparing the land, planting, and harvesting in order to increase efficiency.

What it does: Improved production efficiency; less labor, lower wages

Limitations: Fewer jobs and lower pay to workers (often migrant workers); high initial investment, harvesting of diverse crops cannot be mechanized.

Community

Production as important as supporting the local community.

What it does: Increased cooperation among farmers; preservation of farm traditions and rural culture; farmwork viewed as rewarding; farming a way of life and a business.

Competition

Farming is viewed as a business only with others competition.

What it does: Lack of cooperation among farmers; promotion of self-interests; farm traditions and rural culture not valued; farmwork a limitation that is minimized; farming is a business only.

Pasture-raised, Free Range

Pasture-raised and free range animals roam freely in a natural environment

What it does: Animals are free to roam on land that is herbicide, pesticide, and artificial fertilizer free.

Limitations: larger land area required

Confined Feeding Operation

Livestock is confined to a small fenced area that is typically devoid of plant cover.

What it does: Allows the automated production of meat products in massive quantities.

Limitations: Often mistreated and can hardly move due to the number of animals in a small area; livestock requires antibiotics to stay healthy; number of individuals per unit area.

Short Supply Chain

Supply chain from producer to consumer involves very few intermediaries.

What it does: Direct marketing; enterprise diversification; specialty and value added products; fresher product; lower transport costs; greater transparency; more money to farmer.

Limitations: Requires farmer to find markets; more time spent by farmer selling; small scale

Long Supply Chain

Supply chain from producer to consumer has many intermediaries: processing, transport, packaging, storage, wholesale, retail.

What it does: Creates jobs; reduces work of farmer to sell product; guarantees sales.

Limitations: Dependency on commodity supply chains; subsidized to keep food costs low; less fresh, processed product; less transparency; larger carbon footprint; less money to farmer.

Low Fossil Fuels

Food is produced with lower energy inputs in the form of fossil fuel.

What it does: Farmers minimize the use of machinery and synthetic chemicals, hormones, and antibiotics; sales to local or regional customers minimize food miles.

Limitations: more labor intensive; smaller land area cultivated; limits sales to local/regional.

High Fossil Fuel

Food is produced with higher energy inputs in the form of fossil fuel.

What it does: Farmers use machinery and synthetic chemicals, hormones, & antibiotics to increase efficiency; global sales require energy intensive transport, processing, and storage.

Limitations: more up-front costs; negative environmental impacts; reliance on large corporations.

Non-GMO

Foods that have not been genetically altered via other species' DNA.

What it does: Creates a food system where foods do not contain other unrelated species DNA.

Limitations: Can be cross-contaminated by GMOs; do not produce their own pesticides; not resistant to herbicides.

GMO

Genetically modified organisms are made in the lab where genes from one species' DNA are extracted and artificially transferred into the genes of another species.

What it does: Creates an organism that is resistant to pests and herbicides.

Limitations: Heavy duty chemicals used for cultivation; can cross-contaminate non-GMOs.

Grass-Fed

Livestock eats natural grass instead of grain.

What it does: Livestock eats the food its species evolved to eat instead of cheap, subsidized grains produced via industrial agriculture; lower fat and richer flavor of resulting meat.

Limitations: More land areas required; market demand may be greater than what land area can support.

Grain-Fed

Livestock fed an unnatural diet of cheap, subsidized grains instead of grasses they evolved to eat.

What it does: Fattens up livestock quickly; requires less land area and land stewardship; higher fat content in meat.

Limitations: Livestock given medicine to help digest grains; farmers reliant upon large corporations; large fossil fuels; milder flavor.

Appendix B

Scavenger Hunt Riddles

Hand out one riddle to each group to start the scavenger hunt. This will ensure that each group has a different starting location.

I am a wooden home where billions of invisible organisms divide and transform past lives into parts to build new lives upon the year's renewal.

What likes the colors purple, blue, yellow, and white, is a messy eater, and dies if it gets too angry?

I grow in the forest, but have been brought to the farm in tiny pieces to keep the farm floor healthy.

Like a black watersnake, I am long and slender and I like the water. My plastic skin helps to slither water from bed-to-bed, water dripping through my scales.

I am a house of a certain color, but have no color. I have no lights, but I am filled with light.

I am opposite to the definition of my name because I collect and store items.

As a major architectural element from ancient Rome, I am neither turret nor steeple, I am a _____. Hint: rhymes with "Rome".

Laminated Scavenger Hunt Cards

Place a laminated card at each station and pin to the ground with tent stakes.

Station 1: This is where natural waste products are composted and broken down into rich compost that can then be added to the soil.

1. List five ingredients in the compost pile.

2. What other sustainable method is used to add organic matter and nutrient to the soil, particularly before winter?

3. On an industrial farm, what would a farmer add to the soil to enhance plant growth?

Clue to Next Station: What likes the colors purple, blue, yellow, and white, is a messy eater, and dies if it gets too angry?

Station 2: Yes, the CUE Farm has bees! These honeybees help to pollinate the plants.

1. How many "homes" do you see? What are these structures called?

2. Why do farms need pollinators? Why?

3. How do sustainable farms rid of insect pests? How would insects be controlled on an industrial farm?

Clue to Next Station: I grow in the forest, but have been brought to the farm in tiny pieces to keep the farm floor healthy.

Station 3: Wood mulch can be acquired cheaply because it is a waste product. Other waste products can be used for mulch beyond fallen trees.

1. Name two other types of items that can be used as mulch?

2. Name three benefits of mulching.

Clue to Next Station: Like a black water snake, I am long and slender and like the water. My plastic skin helps to slither water from bed-to-bed, water dripping through my scales.

Station 4: This black plastic tubing is placed at the base of plants and is connected to the nearest waterspout.

1. What is this plastic tubing used for? What is it called?

2. What part of the plant do you think receives the water first?

3. Why do you think this tube system is used instead of sprinklers to water plants on a sustainable farm?

Clue to Next Station: I am a house of a certain color, but have no color. I have no lights, but I am filled with light.

Station 5: This first-ever mobile greenhouse was designed and built by undergrads at Ball State. Pretty cool, huh?

1. How does this structure help plants grow quickly and earlier in the season?

2. Why is the greenhouse clear?

3. What do you think is the ideal daytime temperature inside the greenhouse?
    a. Less than 40 degrees F
    b. 45-55 degrees F
    c. 75 to 85 degrees F
    d. 100+ degrees F

Clue to Next Station: I am opposite to the definition of my name because I collect and store items.

Station 6: Sustainable farms often require very little storage space for tools. Peek inside to see what tools are used on the CUE Farm.

1. Name 3 tools you see in the tool shed.

2. Why do you think a variety of tools are needed for sustainable agriculture? How many different types of plants do you see planted nearby?

3. How do these tools differ from those used in industrial agriculture?

4. Do you think sustainable agriculture tools use more or less fossil fuels? Why?

Clue to Next Station: As a major architectural element from ancient Rome, I am neither turret nor steeple, I am a _____. Hint: rhymes with "Rome".

Station 7: This is where the CUE Farm brings produce after harvest to prepare it for market with washing and packaging.

1. How do you think the CUE Farm sells its produce? Is it locally sold, nationally sold, or globally sold?

2. If a cucumber is sold for $1, how much of that dollar do you think goes directly back to the CUE Farm? How much do you think goes to other companies for processing, packaging, transportation, and wholesale?

3. Below is an image of how a dollar is distributed in the industrial/global food system. How much goes back to the farmer in this food system type?

How has the value added (costs) to the food dollar by each industry group changed over time?

Clue to Next Station: I am a wooden home where billions of invisible organisms divide and transform past lives into parts to build new lives upon the year's renewal.