A Partnership for a Sustainable Rhode Island:

The Greene School and AYERSfoundation

TABLE OF CONTENTS

LEARNING EXPEDITIONS…….…….. **2-5**

INTENSIVES …… **5**

CURRICULUM ARTIFACTS

FOOD EXPEDITION FIELDWORK JOURNAL…..…. **7**

LAND CONSERVATION LEADERSHIP ……..…… **8**

FEEDING THE FUTURE EXPEDITION RESEARCH PACKET……..……. **9**

Learning Expeditions in EL High Schools

Expeditions in every tradition and culture are journeys conducted for a definite purpose by individuals employing a range of skills and talents. In Expeditionary Learning schools, students spend most of their time engaged in purposeful, rigorous "learning expeditions." These special expeditions are the core of the curriculum. Although learning expeditions often take students outside of school, unlike the familiar "field trip" or outing, these expeditions are in-depth studies of a single theme or topic. Expeditions vary in length depending on the topic. Most classes will complete two to three expeditions each school year. They are very carefully planned to have a clear set of learning goals - goals consistent with school and school district standards. A plan for an expedition typically describes specific activities, definite final products, specific performance standards, and how students and teachers will measure success in the expedition.

Learning Expedition Plan

Summary
The *Feeding the Future* expedition at The Greene School students explored the topic of food through a variety of lenses. Some examples of the studies across disciplines embedded within this expedition included the history of food, sustainability, soil and nutrient input, carrying capacity, the emergence of monocultures, food security, and food preservation. The final product for this learning expedition was a 100 Mile Locally Prepared and Served Dinner (all of the food came from within 100 miles). Students designed and executed every element of this dinner, which also served as a showcase for their trimester projects.

Environmental Literacy Focus
This exploration of food encompasses the concept of the energy and carbon food print related to agricultural productivity.

Guiding Questions
• What makes a system sustainable? • What is the relationship between economic health and ecological health? • What makes human systems and communities sustainable? • What are the real costs of our consumer choices? • What is the relationship between local foods and community wellness? • What is the origin and historical significance of food? • Why does Rhode Island consume less than 1% of food from their own state?

Standards Assessed in the Learning Expedition	
Discipline	Standards
Reading in history/social studies (CCSS)	Cite specific textual evidence to support analysis of primary and secondary sources; determine the central ideas of information of a primary or secondary sources; analyze in detail a series of events described in a text Determine the meaning of words and phrases as they are used in a text; analyze how a text uses structure to emphasize key points; compare the point of view of two or more authors for how they treat the same or similar topics Integrate quantitative or technical analysis; assess the extent to which the reasoning and evidence in a text support the author's claims; compare and contrast treatments of the same topic in several primary and secondary sources. Read and comprehend history/ss texts in the grades 9-10 complexity band independently and proficiently
Science	E.S. 1.3, P.S. 2.5 Geologic Processes, Energy Transformations, Scientific Method

Case Study/Studies	
1. Case study title	Guns, Germs and Steel- World History and Food
Case study content	Geographic luck, Yali's Question –"Why do all you white men have so much cattle?"
Big Ideas/Broad Concepts	Access to genetic resources (plants and animals) Artificial selection Features of land masses Climate and origins of agriculture Imperialism
Experts	Expert: Monstanto and GMO Foods Clay Vetts (clayton.vetsch@monsanto.com) Albert Kausch- URI Biotechnology Professor (akausch@etal.uri.edu)

Case Study/Studies	
2. Case study title	Heathy Soil, Healthy Food?
Case study content	Most of the food that feeds the 7 billion people on our planet come from soils. This case study explores the identify and development of soils. After learning about the development and importance of soils to sustainable agriculture students travel and interview 4 different local farms and gather data about the inputs and outputs of each farm (nutrients, energy, harvest, residue, etc.) system.
Big Ideas/Broad Concepts	Healthy productive soils require maintenance and are key to sustainable agriculture Biogeochemical cycles
Key standards that drive the case study	Rock cycle Nutrient Cycles (carbon and nitrogen) Scientific Method Analyzing and interpreting data

Case Study/Studies	
4. Case study title	Light: the source of all food?
Case study content	Plants have the amazing ability to convert electromagnetic energy into chemical energy. As omnivores, we either get our energy directly from plants or from animals who ultimately have gotten their energy from plants. This investigation culminates with students applying what they have learned about light and heat transfer into a project where they design and conduct an experiment with a solar cooker.
Big Ideas/Broad Concepts	Energy travels in waves and plants are able to convert electromagnetic radiation and transform it into chemical energy. Light intensity causes seasons.

Key standards that drive the case study	Waves Color Theory Electromagnetic Spectrum Thermodynamics Reflection, Refraction, Diffraction

Project(s)	
Project Title	Project summary
Art Centerpieces	Students created three dimensional centerpieces to be auctioned off for the dinner.
Solar Cookers	Students design and build a solar cooker that would be suitable for use in a developing nation as well as here is the U.S. The website, http://solarcooking.org/ had introductory information and plans for solar cookers.
Eaters Manifesto	Students analyze who they are as an eater before and after reading The Omnivores Dilemma. *Who are you as eater? We eat to say alive. If we stop eating we would die. The purpose of this assignment is to identify your current identity as a consumer of food. Use the following prompts to write a narrative about yourself as an eater.*
Soils Research Project	After learning about the development and importance of soils to sustainable agriculture students travel and interview 4 different local farms and gather data about the inputs and outputs of each farm (nutrients, energy, harvest, residue, etc.) system. Students create and test their own hypothesis using data from UMASS cooperative extensions soil testing lab

Expedition kick-off
Hunger Banquet, Stop and Shop (scavenger hunt)

Experts and Partner Organizations
The Ayers Foundation- Max and Ulrike Hence Farmfreshri.org http://svffoundation.org/about/ http://www.coggeshallfarm.org/teachers.html

Fieldwork and service learning	*include all fieldwork journals*
Summary **Summ**	**Contact information**
Hallindale Farm (Westerly)	Max Hence maxhence@aol.com
East West Farm (Charlestown)	Will Sheridan (401) 322-7103 whsheridan@gmail.com
Christine Greene Phd. Nutritionist	dr.cgreene@gmail.com
Casey Farm (Saunderstown)	401) 295-1030 caseyfarm@historicnewengland.org
Manfredi/ Shartners	
SVF Foundation – Rare and Endangered Animal Breeds	Newport (401) 848-7229

Albert Kausch Ph.D Professor Director, Plant Biotechnology Laboratory Department of Cell and Molecular Biology University of Rhode Island	530 Liberty Lane West Kingston, RI 02892 (o) 401-874-7121 (c) 860-287-0485 (f) 401-874-7124 email akausch@etal.uri.edu
www.ciggri.com Bob Sutton Jamestown	

Intensive Collaborations

Intensives in EL High Schools

Intensives are courses lasting 4-8 full school days in which students are engaged in either an in-depth study of a topic or intense, targeted academic support. Schools usually offer intensives at the end of grading periods (usually twice per year). Students who are passing all courses can select from a menu of elective intensives offered. If a student is failing one or more class, he or she will be enrolled in an academic make-up intensive.

Elective Intensives:

- Are credit-bearing courses that give students the opportunity to immerse themselves in a topic. Create an alternative curriculum structure for an in-depth investigation that is more compressed and may focus on a different type of study than they experience during the regular school day.
- Give students the opportunity to earn additional credit.
- Give juniors the opportunity to experience internships.

Academic Make-Up and Support Intensives

- Are designed to help two groups of students: those who have not completed their work and have received failing character grades for unfinished assignments and those who are struggling academically (and who also receive additional academic support throughout the school year).

- Provide students with the opportunity and support they need to earn back credit they did not earn in the previous term by producing work that meets the targets they failed to meet earlier. Students are given a range of support including one-on-one conferences with teachers, small group instruction, ongoing descriptive feedback, and help from ELL or Special Education teachers.

Some teachers will spend the whole intensive supporting students, while others will be teaching elective intensives and need to be freed up periodically to provide such support in their content areas.

Students in the Land Conservation Leadership Project spent the first two days of the intensive learning about the roots of Environmental Education, and the importance of educating for environmental literacy in a global society. Students where then immersed themselves into the ecological function of bottomlands by collecting data about plant communities and freshwater wildlife habitat at Hillandle Farm. After developing this background knowledge students create standard-based lessons local youths. Students learned about the key attributes of an impactful learning experience before setting out to develop their own lesson plans. After researching, developing, and practicing two lesson plans students taught their lessons to their class. The final product of this intensive was a K-8 Curriculum for Hillandale Farm.

December, 2012 **The Future of the Farm Intensive**

In 2011, only 1% of the food consumed by Rhode Islanders was produced locally! Educating people about the importance of local farms is the key to increasing the amount of food produced locally. In December of 20011, fifteen members of The Greene School Community participated

in an intensive class focusing on the future of agriculture in Rhode Island. During the intensive students first did a tremendous amount of research interviewing relevant professionals including: Max Hence (Hillandale Farm), Alicia Storey (Assistant Superintendent of Westerly School District), Charile Panciera (Everbreeze Farm), Tony Spino (Owner of Dunns' Corners Market), Ken Ayars (DEM Div. Chief of Agriculture), Ted Clement (Aquidnick Island Land Trust), Christopher Champagne (Executive Chef and Owner of 84 High St., Paul Servideo (Stone Barns Graduate), Gayle Gifford (Cause and Effect Inc), Christine M. Greene (PHD Nutritionist), Rick Pace (Eco Assets Inc.), Maggie Payne (NRCS Resource Soil Scientist), Joe Collins (Executive Chef at Go Fish) and Frank Panciera (Ocean Breeze Farm).

January 2011, From Farm to Table: The Future and Legacy of the New England Dairy Farm

Have you ever wondered how to turn inedible fibrous plant material into ice-cream? Well, actually you don't have to because we have cows do it for us! In this intensive students will undertake a firsthand investigation about how local foods make it to their kitchens. The main focus of the class will be on dairy farming. Through hands on experiences, students will earn about the current challenges facing New England dairy farms, and how farmers provide care for their cows today. Additionally, they will have the opportunity to participate in a media campaign aimed to increasing teen awareness about how they can become involved in the emerging local foods movement.

EXPEDITIONARY LEARNING

Feeding the Future: Starting from the Ground Up

The Greene School

Spring 2012 Fieldwork Journal

Name _____

Hillindale Farm

INPUTS Carbon; Macronutrients (N, P, K, Ca, Mg, S); Micronutrients (B,Cu, Fe, Cl, Mn, Zn); Energy (sun, fuel, workers)	OUTPUTS Harvest, Residue, Organic Matter, Carbon dioxide

What is the size of the farm (area)? How many crops are grown?

What types of farming practices are used at this farm?

Are there any specific challenges to this farm system?

Other information learned about this farm:

Ocean Breeze Farm

INPUTS	OUTPUTS
Carbon; Macronutrients (N, P, K, Ca, Mg, S); Micronutrients (B,Cu, Fe, Cl, Mn, Zn); Energy (sun, fuel, workers)	Harvest, Residue, Organic Matter, Carbon dioxide

What is the size of the farm (area)? How many crops are grown?

What types of farming practices are used at this farm?

Are there any specific challenges to this farm system?

Other information learned about this farm:

Manfredi Farm

INPUTS	OUTPUTS
Carbon; Macronutrients (N, P, K, Ca, Mg, S); Micronutrients (B,Cu, Fe, Cl, Mn, Zn); Energy (sun, fuel, workers)	Harvest, Residue, Organic Matter, Carbon dioxide

What is the size of the farm (area)? How many crops are grown?

What types of farming practices are used at this farm?

Are there any specific challenges to this farm system?

Other information learned about this farm:

SOIL SAMPLING

Which of the farms did you participate in the sampling team at? _____

Draw a sketch of the property, indicating where you collected samples.	Describe the appearance, color, texture, and moisture of the samples that your team collected.

	How many samples did your team collect? Were there any noticeable differences between the samples?

Why did you need to take multiple samples and mix them together?

REFLECTION QUESTIONS
Learning Targets addressed today: I can actively and respectfully participate in fieldwork; I can evaluate the practices that lead to sustainable soil; I can analyze the relationship between farming practices and soil health.
Sustainable agriculture implies long-term maintenance of natural systems, optimal production with minimum input, adequate income per farming unit, fulfillment of basic food needs, and provision for the demands and necessities of rural families and communities (Brown et al. 1987; Liverman et al. 1988; Lynam, Herdt 1989). All definitions of sustainable agriculture promote environmental, economic and social harmony in an effort to attain the meaning of sustainability. In order to understand agricultural sustainability we must understand exactly what farms need to be successful.

What differences did you observe about the farming practices at each location?

Do you have any expectations about the results of the soil sampling between farms?

What do you think are the key components of a sustainable farm system?

What challenges do you think that farmers face with regards to agricultural sustainability?

What questions are you left with after your fieldwork experience?

Feeding the Future: Starting from the Ground Up
Expedition Research Workshop Packet

Name:_____ **Date:**_____

Learning Target: I can analyze the relationship between farming practices and soil health

Activating Background Knowledge *Answer individually and then we will discuss.*

1. Why is soil health important to sustainable agriculture?

2. **What farming practices do you think <u>might increase</u> the health of soil?**

Farming Practice	Reasoning

3. **What farming practices do you think <u>might decrease</u> he health of soil?**

Farming Practice	Reasoning

4. **What questions do you have about the relationship between soil quality and farming practices?**

5. **Now take the farming practices that we brainstormed and correlate them with the specific farms. Using our fieldwork journals as a reference. Be sure to include the following at a minimum: Till vs. no till, pesticides, artificial fertilizer, crop diversity (monocrop or diverse), , motorized vehicle use on soil or not, types of organic inputs (compost/manure vs. none)**

Tracking Independent Variable Options

Farm (Basic info)	**Till vs. no till**							
Ocean Breeze Farm (Westerly-Corn Diary)								
Hillindale Farm (Westerly – Intensive Organic Tomatoes)								
Manfredi Farm (Westerly-Conventional Diverse Vegetables)								
Sustainable Aquidneck Community Garden								

Background Research

They text-code (highlight) information that relates to the variables. Use the space below to take notes on your reading and the presentation of your fellow teammates.

Text Title	Notes

Formulating Your Hypothesis

Independent/Experimental Variables: The Factor that you select that is different between two of the farms (from table above)	**Dependent Variables:** The variable that we can measure that you think is changed by the farming practice (the independent). You must only select one. It is provided for you because it is based upon the UMASS soil test.	**Controls:** Variables that are similar between the two farm
(YOU MUST PICK ONE FROM THE TABLE ABOVE)	• **Nitrogen** • **Phospherous** • **Calcuium** • **Magnesum** • **Cation exchange capacity** • **Heaviy Meatals (lead, cadmium, nickel)** • **pH** • **Buffer pH**	

You have approximately 10 minutes to formulate your hypothesis. Make sure each person in your group has their ideas hear before selecting the variables you will be using. Ones you have your variables selected raise your hand and I will approve your decision. WE DO NOT WANT ANY TWO GROUPS TO HAVE THE SAME VARIABLE SO TRY TO BE SECRETIVE!!!!!!

Now Write Your Hypothesis Use your newsprint and
Soils that…….will have……because

GROUP PRESENTATIONS Hypothesizes: Use the space below to record other groups hypothesizes as they present.

Group Members	Hypothesizes

-

HOMEWORK- Honors only

Use the formal lab report guideline to write up your group's scientific thinking. You are going to be taking your groups hypothesis and formalizing it.

I. **Question** This section should be 2-4 sentences address the question or the problem you are trying to solve.

II. Background Research This section should contain 3 paragraphs: one addressing existing scientific research about your independent variable (some farming practice, one addressing existing scientific research about your dependent variable (some aspect of soil quality), and a final paragraph about the relationship between these two variables. The readings we used in class may be helpful for this section.

III. Hypothesis This section should be formal hypotheses.

Spring 2011 Fieldwork **Food: Sustaining Us, Sustaining Communities**

Name_____ **Date**_____

Rational: The purpose of this fieldwork is to prepare for the fundraiser dinner that is coming up on Thursday, June 16th (less than 3 weeks!). As the host of a locally prepared meal you must become an expert about our local food system! During today's experience you will be taking on the role of a farmer, a journalist, and a scientist.

Role	**Skills of field.** What does this person do? Describe their behavior and thinking.

TRACKING MY PROGRESS: Trimester 3 (indicate which time of day)

Exemplary Understanding or Proficiency *I have exceeded the target*			
Accomplished Understanding or Proficiency *I have met the target*			
Developing Understanding or Proficiency *I am more than half way there*			
Beginning Understanding or Proficiency *I have started making progress*			
No Understanding or Proficiency *I haven't started making progress yet*			
at Level of Progress Learning Targets	I can compare and contrast local and industrialized (and centralized) food systems.	I can describe the challenges of local and organic farming systems.	I can develop a specific argument about the future of food and feeding the world.

Researching the Meal

Use the space below to create and record the answer to questions about your recipes or about local farming in general. Try to get all of your questions answered by the end of the day.

Fieldwork Guiding Questions Pre-Response (more extended response will be expected after)
Should we eat local? Why or why not?
What and when can we eat local?
What makes a local food system different than a large industrial food system?

WORKSHOP A: Service Learning Workshop at Hillandale Farm

Building Background Knowledge (complete before)

Currently, we use around 10-15 calories of fossil energy to produce one calorie of food energy. In a fuel-scarce future, which experts think could arrive as early as 2012, such numbers simply won't stack up. Studies by the Department for Environment, Food and Rural Affairs over the past three years have shown that, on average, organically grown crops use 25 per cent less energy than their chemical cousins. Certain crops achieve even better reductions, including organic leeks (58 per cent less energy) and broccoli (49 per cent less energy). When these savings are combined with stringent energy conservation and local distribution and consumption (such as organic box schemes), energy-use dwindles to a fraction of that needed for an intensive, **centralized food system**. Moreover, when you have a distributive food system (like we have in RI) you have even more savings, in regard to environmental cost of food consumption. This is why **small organic farms** throughout RI often need to be more efficient and **intensive.**

Reflecting Upon the Experience (complete after)
What did you spend your time doing during this workshop? Could you imagine a machine doing the same work that you did? Respond in complete sentences.
A)Did you use energy and emit CO2 in the process? B) Would a machine running of fossil fuel have used energy? C) Would it have emitted CO2?
What did your service-learning experience teach you about the daily life of (and nature of the work of) a small organic farmer?

What kind of skills and knowledge does farming require? What skills and knowledge did you learn?
What do you see about the relationship between human labor hours and fossil fuel consumption on small organic farms? How might this affect the price of the food?

WORKSHOP B: Farming Systems Workshop at Hillandale Farm

Part 2- Local Agriculture and Food Security: Distribution to Consumers

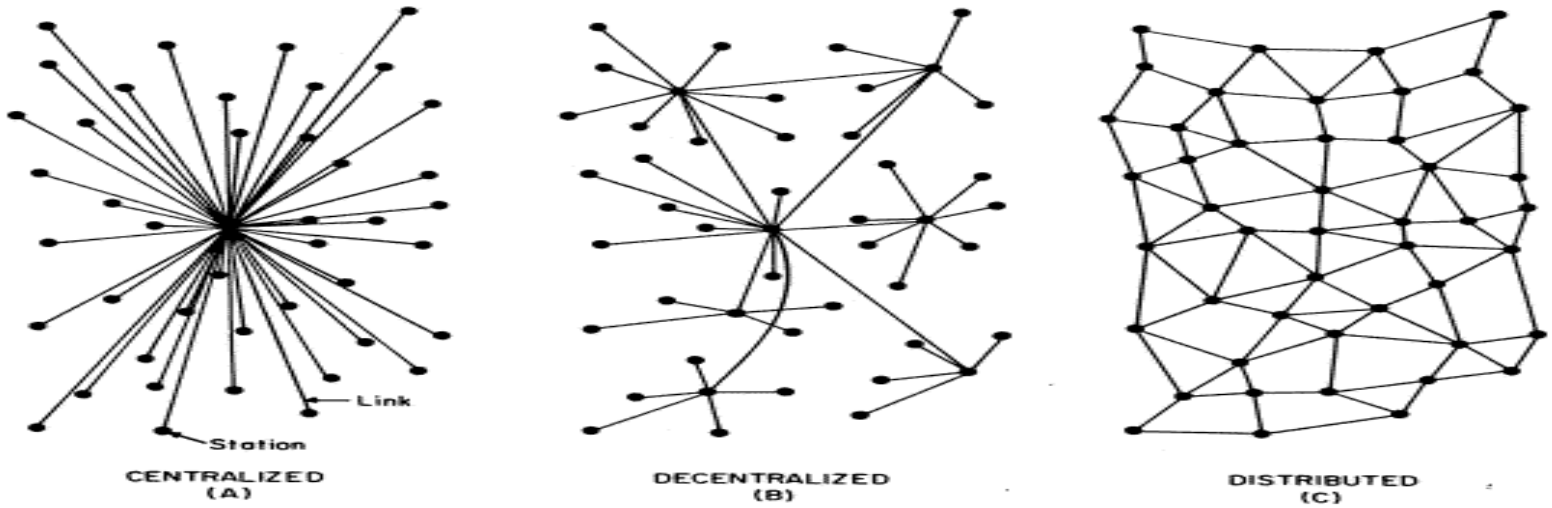
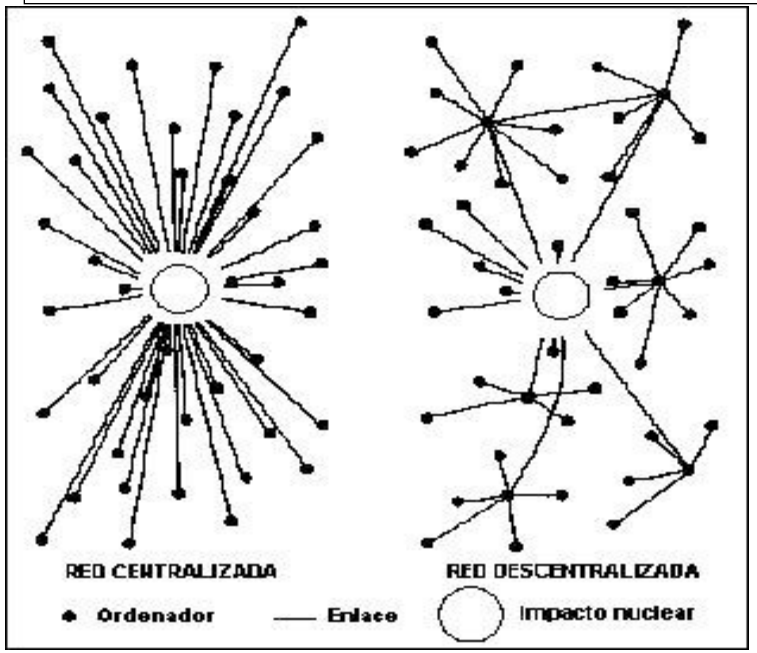
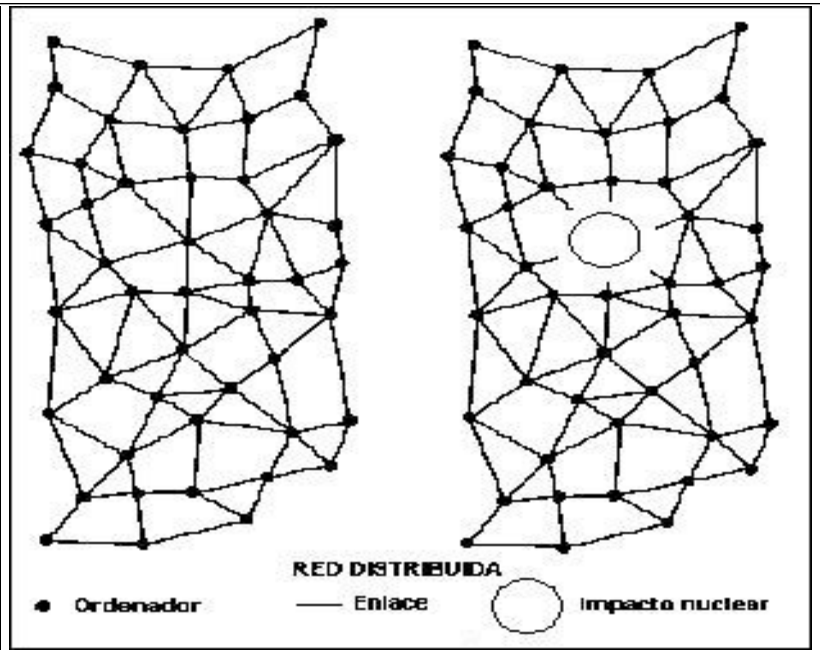


FIG. 1 — Centralized, Decentralized and Distributed Networks

What do you notice about the difference in the systems above? Which look the most stable and secure? Why?
Which system (a,b,c) do you think best represents a **local food system**?Why?
Which system (a,b,c) do you think best represents the industiral food system? Why?





Use the images above to answer the following questions.

Which food system do you think is more sensitive/vulnerable to catastrophic events? Why?
How do you think **food security** relates to local food systems?

Part 2- Understanding Farms as Systems

Sustainable agriculture implies long-term maintenance of natural systems, optimal production with minimum input, adequate income per farming unit, fulfillment of basic food needs, and provision for the demands and necessities of rural families and communities (Brown et al. 1987; Liverman et al. 1988; Lynam, Herdt 1989). All definitions of sustainable agriculture promote environmental, economic and social harmony in an effort to attain the meaning of sustainability. In order to understand agricultural sustainability we must understand exactly what farms need to be successful.

Think-Pair-Share: What are the key components of a sustainable farm system?
(Your individual reflection goes here)

(notes after your pair-share go here)

Venn Diagram Activity Directions: Use your class-wide brainstorm to compare and contrast organic ,conventional and local systems.

Farm System Tracker

Farm Name	Inputs-energy, soil-nutrient, #weekly labor, pest control, biological, water, carbon, etc.	Outputs-level of intensity (space-crop ration), market, economics, removals	Specific challenges to the farm system/other detials

Debriefing the Experience (Back at school)

<u>Create Your Own Label</u> – **You will be required to describe the dish you are creating for the menu. This activity is intended to get you thinking about the quality (type of) and quantity (amount of) of information you would like to include on the menu.**

The Task – **As a consumer, if you had a choice regarding what information should be on the label of food, what would it be? GMO ingredients are an example of what is currently not on labels but typically a part of what you eat every day. Create your list of what to include in your own label below. Feel free to also sketch the design.**

Fieldwork Guiding Questions Post-Response (more extended response)
Should we eat local? Why or why not?

What and when can we eat local?
What makes a local food system different than a large industrial scale conventional system?

CONSERVATION LEADERSHIP BBK Workshop: Why are we doing this?

Name:_____

A. **What is the value of biodiversity and open space?**

What I know now	What I have learned

Ecosystem Services: A Primer Ecological Society of America

Natural ecosystems produce services upon which we are dependent. For example, they:

- *provide us with clean water and air*
- *pollinate our crops and disperse seeds*
- *protect us from extreme weather and ultraviolet light*
- *control pests and disease-carrying organisms*

From the Ecological Society of America (ESA)

Learning Targets
I can design learning experiences that both-meet academic standards and develop environmental literacy.
I can contribute towards the educational vision of Hillindale Farm .

Human civilization depends on healthy ecosystems.

Have you ever considered that the cereal you eat is brought to you each morning by the wind, or that the glass of clear, cold, clean water drawn from your faucet may have been purified for you by a wetland or perhaps the root system of an entire forest? Trees in your front yard work to trap dust, dirt,

and harmful gases from the air you breathe. The bright fire of oak logs you light to keep warm on cold nights and the medicine you take to ease the pain of an ailment come to you from Nature's warehouse of services. Natural ecosystems perform fundamental life-support services upon which human civilization depends. Unless human activities are carefully planned and managed, valuable ecosystems will continue to be impaired or destroyed.

What are ecosystem services?

Ecosystem Services: processes by which the environment produces resources.

Ecosystem Services are the processes by which the environment produces resources that we often take for granted such as clean water, timber, and habitat for fisheries, and pollination of native and agricultural plants. Whether we find ourselves in the city or a rural area, the ecosystems in which humans live provide goods and services that are very familiar to us.

Ecosystems provide "services" that:

These services are extensive and diverse … affecting the quality of our land, water, food, and health.

- moderate weather extremes and their impacts
- disperse seeds
- mitigate drought and floods
- protect people from the sun's harmful ultraviolet rays
- cycle and move nutrients
- protect stream and river channels and coastal shores from erosion
- detoxify and decompose wastes
- control agricultural pests
- maintain biodiversity
- generate and preserve soils and renew their fertility
- contribute to climate stability

- purify the air and water
- regulate disease carrying organisms
- pollinate crops and natural vegetation

What is an ecosystem?

Ecosystems are nature's support systems for life.

An ecosystem is a community of animals and plants interacting with one another and with their physical environment. Ecosystems include physical and chemical components, such as soils, water, and nutrients that support the organisms living within them. These organisms may range from large animals and plants to microscopic bacteria. Ecosystems include the interactions among all organisms in a given habitat. People are part of ecosystems. The health and wellbeing of human populations depends upon the services provided by ecosystems and their components — organisms, soil, water, and nutrients.

What are ecosystem services worth?

Nature's services have financial value.

Natural ecosystems and the plants and animals within them provide humans with services that would be very difficult to duplicate. While it is often impossible to place an accurate monetary amount on ecosystem services, we can calculate some of the financial values. Many of these services are performed seemingly for "free," yet are worth many trillions of dollars, for example:

About 78% of the top medicines used in the U.S. come from nature.

- Much of the Mississippi River Valley's natural flood protection services were destroyed when adjacent wetlands were drained and channels altered. As a result, the 1993 floods resulted in property damages estimated at twelve billion dollars partially from the inability of the Valley to lessen the impacts of the high volumes of water.

- 80% of the world's population relies upon natural medicinal products. Of the top 150 prescription drugs used in the U.S., 118 originate from natural sources: 74% from plants, 18% from fungi, 5% from bacteria, and 3% from one vertebrate (snake species). Nine of the top 10 drugs originate from natural plant products.

- Over 100,000 different animal species — including bats, bees, flies, moths, beetles, birds, and butterflies — provide free pollination services. One third of human food comes from plants pollinated by wild pollinators. The value of pollination services from wild pollinators in the U.S. alone is estimated at four to six billion dollars per year.

It would cost New York City billions to duplicate nature's water filtration system.

New York City is a case in point. Before it became overwhelmed by agricultural and sewage runoff, the watershed of the Catskill Mountains provided New York City with water ranked among the best in the Nation by Consumer Reports. When the water fell below quality standards, the City investigated what it would cost to install an artificial filtration plant. The estimated price tag for this new facility was six to eight billion dollars, plus annual operating costs of 300 million dollars — a high price to pay for what once was free. New York City decided instead to invest a fraction of that cost ($660 million) in restoring the natural capital it had in the Catskills watershed. In 1997, the City raised an Environmental Bond Issue and is currently using the funds to purchase land and halt development in the watershed, to compensate property owners for development restrictions on their land, and to subsidize the improvement of septic systems.

How are ecosystem services "cut off"?

Overpopulation and overconsumption threaten ecosystems.

Ecosystem services are so fundamental to life that they are easy to take for granted and so large in scale that it is hard to imagine that human activities could destroy them. Nevertheless, ecosystem services are severely threatened through

1. growth in the scale of human enterprise (population size, per-capita consumption, and effects of technologies to produce goods for consumption)

2. a mismatch between short-term needs and long-term societal well-being

Many human activities disrupt, impair, or reengineer ecosystems every day including:

- runoff of pesticides, fertilizers, and animal wastes

- pollution of land, water, and air resources

- introduction of non-native species
- overharvesting of fisheries
- destruction of wetlands
- erosion of soils
- deforestation
- urban sprawl

Ecology and ecosystem services

Many questions remain unanswered about the workings of ecosystem services.
Ecologists work to help us understand the interconnection and interdependence of the many plant and animal communities within ecosystems. Although substantial understanding of many ecosystem services and the scientific principles underlying them already exists, there is still much to learn. The tradeoffs among different services within an ecosystem, the role of biodiversity in maintaining services, and the effects of long and short-term perturbations are just some of the questions that need to be further explored. The answers to such questions will provide information critical to the development of management strategies that will protect ecosystems and help maintain the provisions of the services upon which we depend
Conclusion The choices we make today in how we use land and water resources will have enormous consequences on the future sustainability of earth's ecosystems and the services they provide.

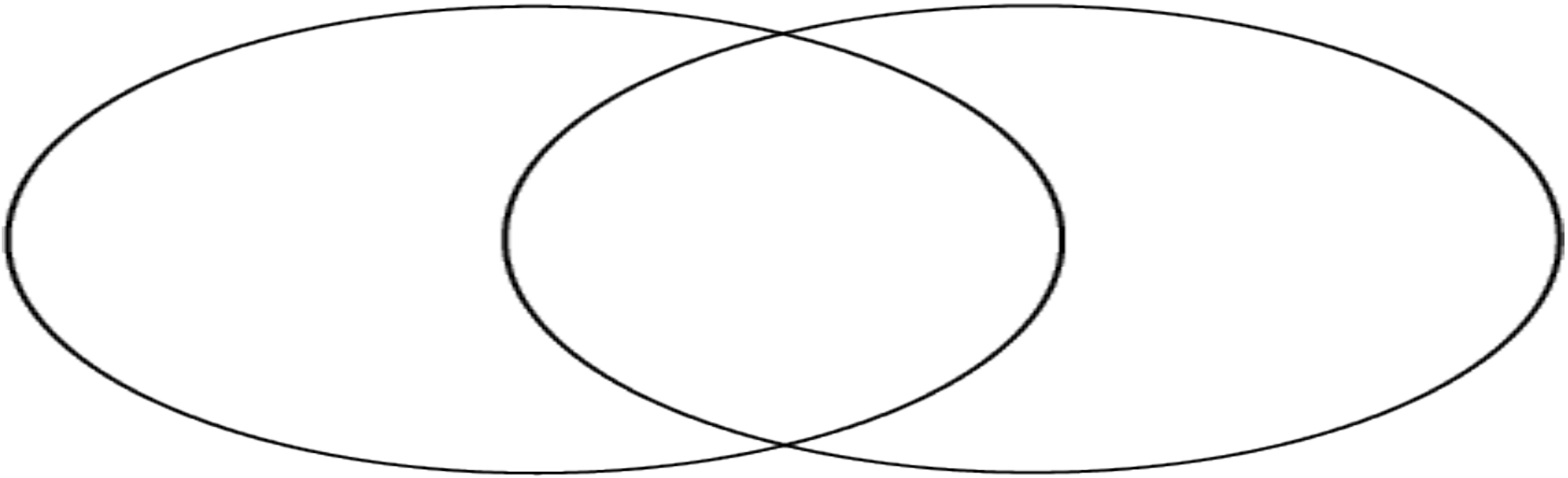
Environmental Education Timeline Activity

Notes:

Takeaways:

Discussion Note-Template

Traditional Education	Environmental Education



B. What is the value of environmental education (children experiencing nature first hand)

What I know now	What I have learned

Reflection Questions from Mr. Van-Dexter

1. What is eco-psychology? How does it relate to education? How does it relate to environmental literacy?

2. What is the relationship between observation and environmental sensitivity? How does this connection relate to our project?

A READING: An Allegory or a Fairy Tale?

Once upon a time a proud people lived on the top of a mountain. From that summit, it seemed, they could see everything everywhere. Daily clouds obscured the distant horizon, but occasionally they would glimpse a huge mountain far in the distance. These momentary revelations notwithstanding, they were content in believing that the whole world was what they could see on their own mountain. Because of
this they did not realize that their mountain was in reality a foothill, one of many that circled the huge mountain in the distance. Nor did they know that people on other foothills shared the same belief that what they saw from their own summit was the whole world, everything everywhere, even
though it was but one of many foothills. One day a terrible cataclysm struck the land. A violent tremor shook the foothills until they began to
crumble. All the proud people had to descend from their particular mountain to seek refuge in the lowlands at the base of the huge mountain. There
they discovered that other people from other foothills had also descended to the lowlands to escape the wrath of nature. Now suddenly the land
became quiet, the clouds lifted, and all the people could see for the first time the huge mountain in all of its towering glory whereas before they had

known it only in part through a fleeting glimpse. But nature was not finished with these people. A great flood came thundering into the valley, and all
the people scrambled onto the higher land on the side of the huge mountain to escape the deluge. Day after day the flood waters rose. All of the people realized that they would need to ascend the mountain together to save themselves. But as they began to climb, great disputes broke out between the different people, for each had their own idea about how best to climb the mountain. After all, each of the people had long believed that they had seen everything everywhere and therefore they knew everything everywhere. It was difficult for them to admit they had seen only a portion of the huge mountain and only from the angle of vision of their particular foothill. As the flood waters continued to rise, the clamorous disputes yielded to the urgencies of survival. Despite their different points of view, they had one thing in common: they had to climb the hill to
survive. As they debated their dilemma, they came to a new revelation. Each of the different people knew a different part of the huge mountain — one knew where the rockslides were, one knew where water was to be found, another knew the passage
through difficult terrain. Now they came to a new vision of everything everywhere, a new vision of truth. They realized that they had been looking
differently at the same mountain, and, once they exchanged views with the common purpose of climbing to the mountaintop of truth, they developed a more complete understanding of the mountain than any of them had developed separately. They formed a community of climbers and began the difficult ascent. They are still climbing and we do not know the end of the story.

Wong, F.F. 1991. Diversity and community: right objectives and wrong arguments. Change: The Magazine of Higher Learning, July/ August.
Heldref Publications, Washington, DC. Reprinted with permission.

Guiding Questions:
What does the article say about the need for environmental literacy in a global society?

Place-Based Education as a Bridge between Traditional and Environmental Education

Place-based education is the process of using the local community and environment as a starting point to teach concepts in language arts, mathematics, social studies, science and other subjects across the curriculum. Emphasizing hands-on, real-world learning experiences, this approach to education increases academic achievement, helps students develop stronger ties to their community, enhances students' appreciation for the natural world, and creates a heightened commitment to serving as active, contributing citizens. Community vitality and environmental quality are improved through the
active engagement of local citizens, community organizations, and environmental resources in the life of the school.

How could you imagine Hillindale Farm as a place that could be used as a starting point to teach concepts in language arts, mathematics, social studies, science?

Research Project-Existing Models of Environmental Education Centers My Center:_____

Location	Notes/Ideas/Comments/Cool

Day 1 Fieldwork @ Hillindale Farm

<u>Key Concepts:</u> sense of place, wetlands, plant communities, invasive species, ecosystem services,

Historical	Observation	Insight/Comment
Ecological		

Sociological		
Other		

Thanks to look for: *Types of habitat (forest, grassland, wetland, pond, aquatic) , wetlands, spring, Invasive Specicies, history, human impact*

Hillindale Farm Lesson Plan Brainstorm

Math	**Science**	**Art**	**History**

Walk to Water-Fall Hike Reflection

What is the relationship between observation and environmental sensitivity?

How does it mean to "leave no trace"?

What connections can you make between your experience here today and with the lesson Mr. Van-Dexter taught yesterday?