



**UNIT 2: FOOD AND
THE ENVIRONMENT**

L.19

AN INTEGRATED LANDSCAPE

Note to Teachers

Resilient farming demands that we move from input thinking—growing one crop with costly chemical inputs—to farming within the construct of the full ecosystem. Thinking this way requires us to understand a local ecosystem and to work within its capacities. While Lesson 17 sought to build students’ vocabulary by providing new language with which to discuss and compare conventional and sustainable farming practices, Lesson 19 gives that new model of the resilient farm a visual form.

Today’s reading profiles one long-enduring integrated system and gives students a chance to think about how and why it works.

Goals *In this lesson, students will*

- understand the many ways an integrated farming system works within the larger ecosystem.
- learn how to map the interrelationships of an integrated system.
- understand that sustainable alternatives have survived the dominant shift to conventional agriculture.

Objectives

- Students will use the framework of a concept map to visualize the operations and benefits of an integrated system.
- Students will use the case study of the Spanish Dehesa to become familiar the landscape, crops and animals produced there.

Materials

- Large sheets of paper (one per pair of students), and as many small (~ 1” x 1”) sheets of paper as needed for each set of students to write out the terms they’ll use
- Reading

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Please use this margin to notate how to best adapt this curriculum to your students.

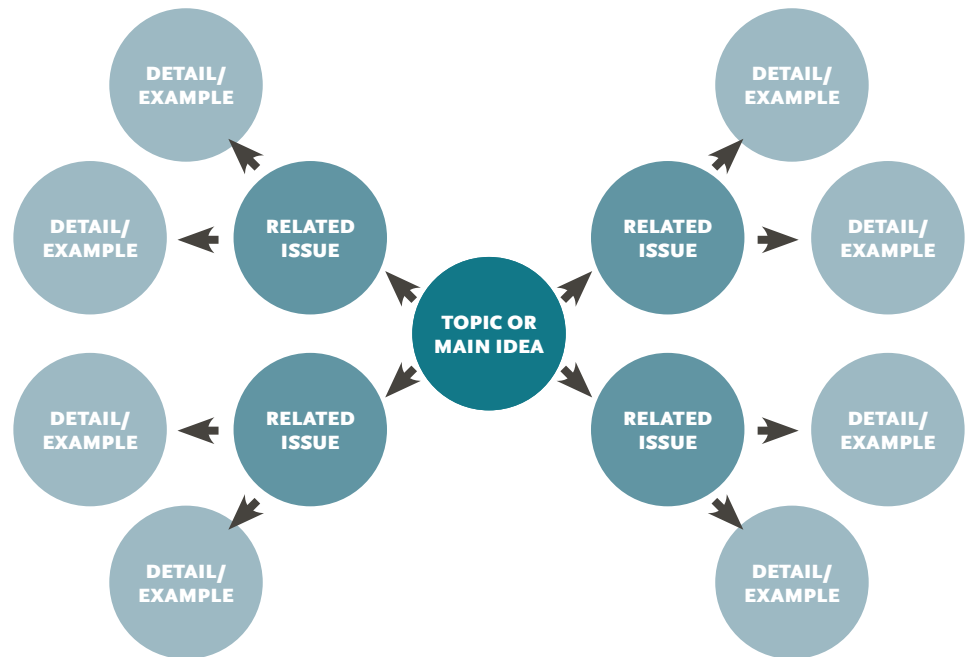
I. Introduction to the Concept Map

Discuss the idea of a concept map: a visual representation of the relationships between ideas, information or things.

In a simple version of concept mapping works, students

- identify a topic or theme (here, the Dehesa), and all of the terms and ideas associated with that topic
- arrange on paper to illustrate their relationships
- use lines, lines, arrows and words to create that relationship

There are many guides for concept maps online. The Appalachian State library website includes a simple schematic for a concept map that might be helpful¹:



A concept map is great exercise for talking about integrated systems in agriculture. Integrated agricultural systems require farmers to think about the relationships among the plants and animals they raise and how those plants and animals relate to and contribute to the ecosystem around them.

The concept map asks students to set particular details into the concept of a whole; this conceptual and analytical activity is both challenging and beneficial to students.

If you have time, work through a sample concept map in class. It could be about anything that interests students—the solar system, lunch, a school tradition, etc.

Ask them to identify components to be included in the concept map and then arrange those concepts, using lines, arrows and short descriptions to indicate the nature of those relationships.

¹) Used with permission from Appalachian State University, http://guides.library.appstate.edu/ld.php?content_id=4442921.



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II. Distribute Dehesa Reading

Explain that the Dehesa is an example of a system of agriculture well integrated into its environment. This sustainable model has endured for centuries.

Tell students that they will be working to understand the relationships between the parts of this larger system called the Dehesa using a concept map.

1. Do a read around of the handout.
2. Ask students to go back through the reading as they read/listen to underline terms that should be part of the concept map. In this case, each term will be a component of the Dehesa system.
3. When you have finished reading, ask them to list the terms they have underlined and write them on the board.
 - remind them that the list may not be complete, and that they may find themselves adding terms as they make their concept map. This process is completely fine.
4. Working in pairs, ask students to write each term on a tiny sheet of paper. They can then lay them out on a larger sheet of paper and arrangement them to highlight the relationships.
 - Ask them to play with more than one system of organization before settling on the one they like best.
 - Please remind students that there is no single “correct” concept map! The class benefits from seeing how students have mapped the Dehesa differently.
5. Once students have assembled their terms on the paper, they can add lines, arrows, and terms that explain the interrelationships between terms.
6. Ask students to examine the concept maps of their neighbors, or a gallery walk if you have time.
7. As the last stage of this exercise, ask students to do some writing **FOCUSED FREE WRITE** prompt (5 minutes): What have you learned from your concept map (and your neighbor’s) about what makes the Dehesa sustainable? What relationships do you see between agriculture and the larger ecosystem?
8. Ask students to read their responses, and then open the floor for questions and discussion.

III. Lab

The cooking lab accompanying lesson 19 is the Integrated Landscape Frittata. This recipe incorporates the following elements:

- vegetables and fruits from different plant families (plant families that are part of a crop rotation cycle in a field)
- a cover crop
- eggs and cheese that come from the animals whose grazing, manure and hoof action improves the soil and stimulates plant growth
- olive oil (by no means native, but a reminder of the surrounding woodlands)

Where possible, feel free to include foraged foods like wild spring onions and mushrooms to represent the land surrounding cultivated areas on a farm.



AN INTEGRATED LANDSCAPE

INTEGRATED LANDSCAPE FRITTATA

16 students

Multiply the recipe by two.

Equipment List

- Oven/toaster oven
- Medium pot with lid
- Fine strainer
- Large non-stick frying pan
- Wooden spoon
- Whisk
- Large bowl
- Oven mitts
- 1/3 cup dry measure
- 1 cup wet measure
- 1 cup dry measure

Food Items

- 8 eggs
- 1/4 cup buckwheat groats (kasha)
- 2 cups water
- 3/4 cup carrots
- 1/2 bunch Swiss chard
- 1/2 cup sundried tomatoes
- 1/2 cup grassfed cheddar cheese
- Salt and pepper to taste



AN INTEGRATED LANDSCAPE

DEHESA: AN AGRICULTURAL SYSTEM
IN SOUTHERN AND CENTRAL SPAIN

- A landscape of oak and cork trees dotting pasture land.
- Peasants thinned the trees of ancient forest during the Middle Ages (the 8th through 13th centuries) to gain more pasture land for their sheep.
- Sheep breeders were a very powerful group and passed legislation that protected both pasture and trees—laws that helped the people of the area maintain a strong connection to their land.
- By the 16th c, black Iberian pigs replaced sheep on this land.

The Holm Oak



Landscape dotted with Holm oaks

- Like cork trees (see below), the holm oak is native to the Dehesa.
- The oak produces acorns that fall from the trees in October and November, and become food for geese and pigs.
- A dense source of nutrition, acorns are key to the delicious fat for which both goose and pork products are known.
- Because the trees are planted some distance apart, pigs and geese gain considerable exercise in search of acorns.
- Trees are thinned to make charcoal.

The Iberian Black Pig



Iberian black pigs grazing

- The Iberian Black pig is native to the region. Pork (pig meat) became significant during the Middle Ages when Catholics ate pork to distinguish themselves from Muslims and Jews, for whom it was forbidden.
- The pigs graze on grass, which becomes very dry and brown during the long summer, leaving them very little to eat. Each pig requires about four acres of Dehesa to keep them from overgrazing.
- By fall, the pigs are ravenous, and acorns are their favorite food. They walk from tree to tree in search of acorns. Exercise oxygenates meat—animal muscle—and gives it deeper flavor. Exercise also makes space in muscles for fat deposits. (Scientists tell us that the fat created by an acorn diet is as good for you as olive oil!)
- These pigs are the source of the famous Jamón Ibérico—a famous Spanish ham eaten in very, very thin slices at the start of a meal. Traditionally, this ham is the food of the peasants who made it, but is now a prestige food as well and is exported across the world.



Jamón Ibérico



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Landscape dotted with Holm oaks



Landscape dotted with Holm oaks



Cork trees



Pile of raw cork drying in the sun

The Iberian Geese

- Iberian geese, like pigs, graze on grasses and also eat insects
- By fall, the geese are ready to gorge, and they love the acorns of the Holm Oak. They walk between trees in search of acorns, and this exercise results in delicious meat.
- Much of the fat they deposit from eating acorns goes into their livers, creating a delicacy known as “foie gras” or “fatty liver.” Foie gras is a controversial food because most farmers force-feed their geese to achieve a very large liver. Farmers in the Dehesa have found that geese naturally gorge in the fall when they have food that they like, so that no force-feeding is necessary.

Sheep and cattle

- Farmers with pigs also generally have either sheep or cows.
- These animals follow after the pigs, grazing on the grasses that the pigs have left behind in their search for acorns.
- Sheep and cattle provide meat, milk, and other resources.
- Many well-known cheeses come from this region, and highly prized beef comes from the Morucha breed of cattle.
- Cattle and sheep provide manure and break down organic material such as leaves with their hooves. Both of these actions create healthier pastures, which in turn provide habitat for insects (like butterflies, ants, and bees), snakes, and the animals that prey on them like rodents and birds.

Cork Trees

- Cork for bottle stoppers is a key part of the economic system of the Dehesa
- Skilled workers strip the bark—which, if done correctly, does not harm the tree.
- A quarter of the world’s wine corks come from the Dehesa



AN INTEGRATED LANDSCAPE

INTEGRATED LANDSCAPE FRITTATA

YIELD: 8 servings

Ingredients

- 8 eggs
- ¼ cup buckwheat groats (kasha)
- 2 cups water
- ¾ cup carrots, small dice
- ½ bunch Swiss chard, leaves and stems thinly sliced
- ½ cup sundried tomatoes, sliced
- ½ cup grassfed cheddar cheese, grated
- Salt and pepper to taste

Directions

1. Pre-heat oven to 375 degrees.
2. In a pot, combine the buckwheat groats and water and bring to a boil. Once boiling, cover the pot and reduce to a simmer. Cook until tender, about 10 minutes. Do not overcook; buckwheat should still look like distinct individual grains. If liquid remains, pour through a fine strainer. Set aside.
3. Place a frying pan over medium heat. Add olive oil and spread around. Add Swiss chard and cook just until wilted.
4. Whisk eggs together in a large bowl until completely blended to an even yellow color. Add carrots, Swiss chard, tomatoes, cheese, salt and pepper and stir to combine.
5. Add buckwheat groats to bottom of a nonstick pan. Pour egg mixture over buckwheat groats.
6. Bake for 12-15 minutes, until top sets.

