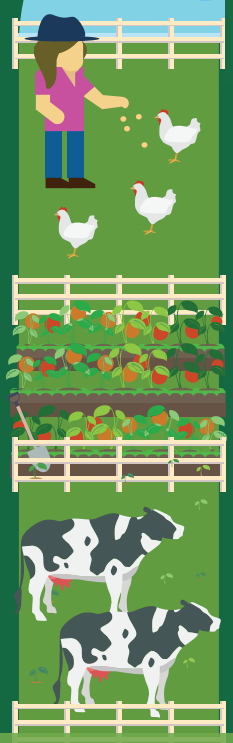

Lesson 6

Turning Toward Sustainability

[Lesson Duration: 45 minutes]

Social Studies

Science

Lesson Overview

Students will explore alternatives to the prevailing industrial model of agriculture and what it means for agriculture to be **sustainable**. They will examine agroecology as an approach to food production that nourishes, rather than depletes, natural ecosystems and human communities. They will imagine what a different agricultural paradigm could look like and share that vision with others.

Learning Objectives

- Describe the core principles of sustainable agriculture.
- Describe some qualities of natural ecosystems that agroecology seeks to mimic.
- Contrast agroecological approaches with industrial agriculture.

Essential Questions

- How does sustainability apply to agriculture?
- How does agroecology support human communities and natural ecosystems?
- What kind of agriculture should we strive toward, and how will we get there?

Materials

- Student handouts
- Presentation slides
- Two sheets of paper
- FoodSpan Infographic

Resources

- *Ecological and Urban Agriculture* primer (www.foodsystemprimer.org/food-production/ecological-and-urban-agriculture/)
- *Out to Pasture* film (www.foodspanlearning.org/films/out-to-pasture.html)

Warm-up: How Does Sustainability Apply to Agriculture?

[10 minutes]

Write the word **sustainable** on the board. Ask: *What do you picture when you hear the word "sustainable"? How would you define "sustainable"?* Write student responses on the board, acknowledging that there are many ways to define sustainable.

Provide this definition of sustainable (either on the board or by displaying the ***Sustainable Definition slide***): ecologically sound, economically viable, and socially just. Ask: *Now that you know what sustainable means, how would you describe sustainable agriculture? What would agriculture look like if it met each of these criteria?* Answers can include:

- **Ecologically sound:** practiced in ways that minimize harms to the environment
- **Economically viable:** allows farmers to make an adequate living and produce sufficient food supplies
- **Socially just:** promotes the health and wellness of food chain workers and communities, and provides all people with safe, nutritious food[1]

Main Activity: Agroecology

Science, Social Studies

[15 minutes]

Students will learn about an approach to sustainable agriculture called **agroecology** (agriculture + ecology). Agroecology strives to mimic qualities of natural ecosystems to increase farm productivity in sustainable ways. Examples of these qualities include:

- **Efficiency:** Agroecology recycles and reuses resources whenever possible, just as natural systems continually recycle rainfall and organic matter.
- **Self-sufficiency:** Agroecology requires minimal inputs beyond what Nature already provides (sunlight, soil, water, and biodiversity).
- **Diversity:** Agroecology makes use of many different species of plants and animals on the same farm, and benefits from their interactions.
- **Resilience:** Agroecology can better withstand and recover from shocks like floods, hurricanes, and droughts.[2]

Write these four qualities on the board and have students consider how each might apply to agroecology, then display the ***slides*** that correspond to each quality. Refer to the ***primer*** for additional details.

Display the ***Duck-Rice-Fish Case Study slide***, distribute the ***Duck-Rice-Fish Case Study Handout,*** and have students read the case study. Have students pair up and discuss: *How does this case study illustrate agroecological qualities?* Students should record their answers in their handouts. Ask students to share their responses.

Share Your Knowledge: *What kind of agriculture should we strive toward? What benefits does agroecology offer? Ask students to tweet their reflections and tag* **#agroecology**, **#sustainableag**, *and* **#foodspan** *to join the conversation.*

Main Activity: Industrial Agriculture Versus Agroecology

Science, Social Studies
[15 minutes]

Students will contrast industrial agriculture with agroecology. Place ***two sheets of paper*** that read "Industrial Agriculture" and "Agroecology" on opposite sides of the room. Read the statements to the right in random order. After each statement, ask students to go to the side of the room that they think corresponds to the statement. For example, for the "Grows the same crop over a large area (monoculture)" statement, students should go to the "Industrial Agriculture" side of the room.

After each statement, ask a volunteer from each side to explain why they chose their spot. Then reveal the correct answer and make sure students understand before moving on. Add each correct response to a chart on the board that has a column for Industrial Agriculture and a column for Agroecology. At the end of the activity, ask: *Did any of the answers surprise you? How has this activity changed your understanding of the difference between industrial agriculture and agroecology?*

Industrial Agriculture

- Relies heavily on use of **pesticides**, synthetic fertilizers, and fossil fuels
- Uses a lot of heavy machinery
- Grows the same crop over a large area (monoculture)
- Specializes in producing a particular crop or animal
- Uses genetic engineering to alter crop traits

Agroecology

- Looks to natural ecosystems as a guide
- Integrates a diversity of crops and animals
- Raises animals on pasture
- Rotates crops to help control pests
- Accounts for the unique qualities of a growing region (e.g., climate, geology, culture)

"Sustainability is a journey, an ongoing process, not a prescription or a set of instructions. … [Sustainable agriculture] requires that we envision the challenges and changes the future will bring."

– Fred Kirschenmann, farmer and scholar

Wrap-up: Promoting Agroecology

[5 minutes]

Have students write a journal entry in response to the prompt: *What could farmers and policy makers do to promote agroecology?* If time allows, have students share their responses.

Extensions:

Revisiting the Infographic (Social Studies, Science)

Distribute copies of the ***FoodSpan Infographic*** (students may already have their own from previous lessons). Ask students to identify parts that represent agroecology and sustainable agriculture. Ask: *Do these accurately represent what we learned about agroecology and sustainable agriculture? If not, what could we add to make the infographic more accurate?* Working individually or as a class, have students draw their own versions, create a collage, or add images to the existing infographic. Share photos of students' work on social media and tag #foodspan.

Agroecology Case Studies: Gallery Walk (Science, Social Studies)

Divide students into four groups. Distribute the ***Agroecology Case Studies Handout*** and the ***Gallery Walk Handout*** to each group, and assign each group one case study. Instruct students to create a poster for their case study. Each poster should illustrate:

- The farm featured in the case study
- The crops and animals on the farm, and the interactions among them
- How the farm exemplifies qualities of agroecology

Once groups have completed their posters, hang them around the room. Instruct students to walk around the room and take notes on how each farm embodies qualities of agroecology. When they have finished, have students share what they learned about each farm ecosystem and about agroecology.

Film: Out to Pasture (Science, Health, Social Studies)

The Johns Hopkins Center for a Livable Future's original short film, *Out to Pasture* (www.foodspanlearning.org/films/out-to-pasture.html, 34 minutes), explores ecological approaches to livestock production through the eyes of rural communities and pasture-based farmers. A discussion guide is provided. The film is developmentally appropriate for high school students and does not contain graphic imagery.

Evaluating the Sustainability of a Local Farm (Science, ELA)

To explore how sustainable practices are implemented, students will visit a local garden or farm. Ahead of time, students will research sustainable farming techniques and create a checklist of aspects of agriculture (e.g., water use, pest management, waste management) and a list of questions for the farmer about methods (e.g., *How does your farm prevent pests from damaging crops? Do you use pesticides?*). Students will take notes on the farmer's responses. After the trip, students will write a reflection explaining what approaches the farm took and why, how sustainable those approaches are, and what could be done to make the farm more sustainable.

Shop Organic Challenge (Social Studies, Health)

Students will visit their local supermarket to learn what it's like to try to eat only organic food. Provide students with a checklist of organic ingredients that they need to make simple healthy meals for one day. For each item, students will record the price, availability, perceived condition/quality, and ease of locating. After the trip, students will journal about their experience of shopping organic: *Do you think buying organic is something you could or should do every day? Why or why not? How might we address obstacles to buying organic?* Explain that while organic farmers often use some agroecological methods, not all organic farms are good models of sustainability (refer to the *Ecological and Urban Agriculture* primer for context).

Sustainable Design Project (Science)

Students will research different sustainable agriculture approaches, such as agroecology or permaculture, and design a plan for a sustainable garden or farm in their neighborhood.

Teacher Note: *For the* Evaluating the Sustainability of a Local Farm *activity, make sure students are prepared to respect the farmer and ask their questions politely. Students should be sensitive to the fact that most farmers work hard and likely have complicated reasons for using certain agricultural methods.*

1. Ikerd JE. *Crisis & Opportunity: Sustainability in American Agriculture*. Lincoln, NE: University of Nebraska Press; 2008.
2. Magdoff F. Ecological agriculture: Principles, practices, and constraints. *Renew Agric Food Syst*. 2007;22(02):109