FARMERS CELEBRATE EARTH DAY, EVERY DAY

LESSON 1: FARMING IS ELEMENTAL

OVERVIEW

In this lesson, students will explore how dairy farmers harness the classical elements (earth, air, water and fire) and work in harmony with nature. They will identify the four classical natural elements and explore how they are essential to, or can have a positive or negative effect on, farming.

TIME

One to two 45-minute classes

OBJECTIVES

In this lesson, students will:

- Describe the four classical natural elements (earth, wind, water and fire) and how each is a necessary element for farming;
- Identify specific ways in which the natural elements, along with the biosphere, can affect a dairy farm; and
- Differentiate between ways farmers can harness the classical natural elements and ways elements can affect a farmer's activities.

STANDARDS

NGSS

MS-LS2-3 Develop a model to describe the cycling of matter and flow of energy among living and nonliving parts of an ecosystem.

MATERIALS

In addition to common classroom materials and an Internet connection, students will need:

- Elements and the Farm PDF

PREPARATION

1. Arrange the classroom to accommodate groups of 4-6 students.
2. Cue up web images and video for the lesson:
   a. Images: Google image search: Nature's Four Elements
   b. Video: What are Earth Systems?
   [Note to teacher: this video includes a Florida-specific example of how the systems interact that can be useful to remind students about when they are creating their farm maps. Also, the video can be stopped at timestamp 4:40, as the rest of the video discusses the organization that created it and Florida in particular.]
3. Review this resource for teacher background and additional teaching ideas:
   - Elements: Earth, Water, Air, and Fire
4. Review student research websites provided and consider whether to have students access them on their devices or whether to print copies for groups to share.

KEY TERMS

In addition to common classroom materials and an Internet connection, students will need:

- **Classical natural element:** one of the substances, usually earth, water, air, and fire, that the ancient Greeks regarded as making up the entire material universe
- **Atmosphere:** the gaseous envelope surrounding the earth; the air
- **Geosphere:** the solid portion of the earth
- **Hydrosphere:** the water on or surrounding the surface of the globe, including the water of the oceans and the water in the atmosphere
- **Biosphere:** the ecosystem comprising the entire Earth and the living organisms that inhabit it
- **Biofilter:** a filter bed in which sewage or other farm waste is subjected to the action of microorganisms that assist in decomposing it

LESSON 1: FARMING IS ELEMENTAL

INTRODUCTION

Ask students:
What is necessary for life to grow on Earth?

Then explain:
In this lesson, you will learn about the classical natural elements, and some of the systems of the Earth that interact with each other to support life, especially life on a farm.

LESSON PROCEDURE

Step 1

Name the four classical natural elements of earth, water, wind and fire. Discuss briefly what each one is and how it might have an effect on the work of a farmer. Show students the Google image search results for "nature's four elements" to spark some ideas for how they might illustrate the different elements.

Have students use the Elements of Farming PDF to create their own graphic images or symbols to represent earth, water, wind and fire. Explain that in this lesson the focus will be primarily on earth, water, and air, and will also incorporate the biosphere, or the parts of the Earth where plants and animals exist.

Step 2

Show students this What Are Earth Systems? video, which describes the way natural elements and Earth systems interact to create and maintain life on Earth. *[Note to teacher: The video can be stopped at 4:40 – See Preparation section for more detail.]*

Have students return to the Elements PDF and add another graphic to represent the biosphere.

Step 3

Arrange students into groups of 4 to 6 depending on class size. Assign one or more students in each group to explore the resources below and use their Elements of Farming PDF to take notes on their element topic. Allow them 15-20 minutes to take notes and review the material.

Let students know that they will not be focusing on the element of fire because it is the least impactful classical natural element in most farming. While prescribed burns are used by some farmers, it is primarily used for environmental benefit on public lands and pastures. Instead, students will focus on the characteristics of the biosphere on the farm in addition to earth, air and water.

Earth

- 4 Ways Farmers Steward the Land
- The Value of Dirt: Dairy Farmers and Soil Health
- A Love Affair with Worms
- Dairy Farmer Austin Allred on Environmental Sustainability

Air

- How and What Trees to Plant for Windbreaks
- Reduce Wind Erosion for Long-Term Profitability
- 5 Ways Dairy Farms Sequester Carbon
- A Growing Number of Farms are Recycling Cow Manure for Green Energy

Water

- Ask a Dairy Farmer: How Do Farmers Reuse Water?
- 10 Ways Farmers are Saving Water
- Water: More Than Just a Refreshing Drink for Dairy Cows
- The Modernization of Dairy Farming

Biosphere

- Meet Our Cows
- How These Dairy Farmers Take a Long View on Sustainability
- Dairy Farmer Austin Allred on Environmental Sustainability

Step 4

Have students "jigsaw" to form new "element groups" by convening with others who researched the same element topic. Give them time to compare notes and build on each other's findings. Then, have the students work together with their element groups to prepare a summary of the information they can share back with their original group.

Step 5

Next, have students return to their original groups and take turns making their summary presentations on each element topic to their group members.

Step 6

After they complete their presentations, give students time to share notes and identify ways in which the elements interact in Earth's systems (e.g., students may note that water conservation helps with soil improvement and fertilization of crops).

Step 7

Finally, have students work in their original jigsaw groups to create a "farm model" (map/illustration) that shows where and how the various elements work separately and together to help farms succeed. They should incorporate some of the symbols they created for each element at the beginning of the lesson.

Items students may want to include on their models/maps are:

- Barn
- Crops
- Fields
- Runoff lagoons
- Livestock
- Sources of water
- Technologies
- Anything else they learned about in their research

REFLECTION

What are some words you would use to describe how Earth systems interact in farming?

ASSESSMENT

Have students create (or draw a plan for) a class terrarium, school or class garden, or other gardening activity. As they work on their projects, have them articulate the various elements at work and how they interact.

EXTENSIONS

Introduce students to the Biosphere 2 project, described as the world's largest controlled environment dedicated to understanding the impacts of climate change.