



# The Pueblo Farming Project

## Lesson One: The People of Corn

### Session 1: Sustainability Spaceship

### Session 2: The Pueblo Lifeways

**Format:** Two approximately 45 minute sessions

**Grades:** 6, 7, 8

This lesson can be taught to each middle school grade with increasing complexity and detail. To create a unit on Pueblo Agriculture, this lesson should be taught first, as it acts as an introduction to traditional Hopi agriculture, spirituality and sustainability.

**Season:** Winter, Spring, Summer, Fall

### Objectives

- Understand the relationship between Puebloan cultures, and agriculture.
- Understand the connection between corn, agricultural practices and the culture it sustains.
- Identify how Hopi farmers adapted their agricultural practices to become drought resilient.
- Explore *sustainability* as a cultural trait.

### Key Terms

- Hopi
- Ancestral Pueblo people
- Sustainability
- Genetic diversity
- Breeding
- Open Pollinated plants
- Gene pool
- GMO corn plants
- Endosperm
- Dieties

### Materials and Tools

- ☐ Examples of Hopi and other corn varieties, on the cob, to show diversity in size, color, and endosperm texture
- ☐ Diagram of a corn kernel showing the endosperm:  
<http://media.web.britannica.com/eb-media/54/166754-050-8DEB8E13.jpg>
- ☐ Digging sticks ("So'ya" in the Hopi language): traditionally used by Hopi people to plant seeds
- ☐ An example of a canteen gourd: traditionally used by Hopi people as a water container



- ❑ Video/DVD: *Corn is Life* (18 minutes; see “Before You Begin” section):  
<http://www.worldcat.org/title/hopi-corn-is-life/oclc/276931893>
- ❑ Video: *More Than Planting a Seed* (26:56 minutes):  
[https://www.youtube.com/watch?v=2x23FF\\_kUyo](https://www.youtube.com/watch?v=2x23FF_kUyo)

**Video: Length Options**

6th Grade: total of 18 mins of video

0:00 min - 14: 50 mins (Intro to the Hopi)

23:54 mins - end (Conclusion: How the Past Connects to Modern Life)

7th Grade: total of 24 mins of video

0:00 min - 24:30 mins (beginning of video to beginning of conclusion)

8th Grade: total of 26 mins of video

0:00 min - 26:56 (entire video)

- ❑ Article: Kuwanwisiwma, Leigh. (2005). The Hopi Way: Dry Farming. In *Thirst For Survival*, the Hopi Tribe, Kykotsmovi, Arizona. (Provided with this lesson plan as “Kuwanwisiwma2005\_Thirst-for-Survival.pdf” for non-commercial purposes.):  
<https://beyondthemasas.files.wordpress.com/2010/08/thirst-for-survival.pdf>
- ❑ Article: Wall, D. and Masayesva, V. (2004). People of the Corn: Teachings in Hopi traditional agriculture, spirituality, and sustainability. *The American Indian Quarterly*, 28(3–4):435–453. (Provided with this lesson plan as “Wall2004\_People\_of\_the\_Corn.pdf” for non-commercial purposes.)
- ❑ A map of the United States for identifying the Four Corners region
- ❑ Photocopy: “Discussion Questions” sheets (2–3 copies of each if the group is large)
- ❑ White board and markers
- ❑ One piece of chart paper, a pen, and a marker for each student discussion group

**Before You Begin**

- ❑ As the instructor, view/read all of the following resources to become properly prepared to teach about Pueblo history and the Hopi culture.
  - ❑ DVD: *Corn Is Life*
  - ❑ Video: “More Than Planting a Seed”. This video is part of the lesson plan.
  - ❑ Article: *People of the Corn: Teachings in Hopi Traditional Agriculture, Spirituality and Sustainability*. Read the article in its entirety; the segment on the Hopi creation story is a part of the lesson plan
  - ❑ Article: *The Hopi Way: Dry Farming*
- ❑ Print the “Discussion Questions” sheets (2 of each)
- ❑ Ensure map of the United States is available and visible to the students
- ❑ Ensure projector is set up and load video
- ❑ Prepare the white board:
  - ❑ Write the key terms “self sufficiency” and “food security” with space for definitions
  - ❑ Draw a sample outline of a spaceship/rocket



## **SESSION 1**

### **Opening Circle: Questions and Discussion**

**Survey students' understanding and/or opinions by verbally sharing the questions or text in italics. Briefly gather input from the students, while steering the discussion to toward the answers listed below the question.**

1. Introduce students to the term ***self-sufficiency*** by writing it on the whiteboard and reading it aloud. Have students work in small groups of three or four students to discuss the meaning of self-sufficiency. Invite each group to share with the class while guiding the discussion toward the the following definition: *A person or group that is self sufficient is able to provide themselves with what is necessary with little help from others.*  
*Examples: people living in a remote wilderness; people doing an expedition into mountain or ocean environments; astronauts in space.*
2. Ask students the following questions and record their responses on the whiteboard: ***How will humans achieve self sufficiency in the future? For example, how will we make sure we are able to feed the human population as it increases and the health of the planet decreases?*** Point out that being self sufficient on planet Earth requires that we:
  - know our history (how we have taken care of ourselves in the past)
  - carefully craft innovative solutions (how we will take care of ourselves in the future)
3. Have students work in groups of three or four to engage in a discussion about each of the following questions. Present each question one at a time and allow no more than two minutes of discussion per question
  - ***Do you live in an isolated place? What would happen if the town you live in were cut off from receiving food from outside sources? How many roads lead to your hometown?***  
Crow Canyon OR Cortez Middle School can be used as examples: both rely on Cortez, CO for supplies. Only two major roads that can support transport trucks lead to the main street where supplies can be bought: Highway 160 and Highway 491.
  - ***What kind of events could (or have in the past) destroyed or blocked these roads?***  
Flash floods, mudslides, road construction dynamite, wildfires.
  - ***An important aspect of self sufficiency is food. How does your town stock the shelves of the grocery stores?***  
Food is delivered by transport trucks. Towns like Cortez could quickly become isolated from receiving food and materials from outside sources.
  - ***What does it mean to have "food security"?***  
A community has "food security" when safe, nutritious food is available without people or food having to travel great distances.

**Procedure:**

1. Divide students into small discussion groups of 3 to 5 students and rearrange their seating so they are sitting in small discussion circles. Outline the final activity: Each group will work as a team to make Space Travel Self-Sufficiency Plan based on the following hypothetical scenario (read aloud):

***Healthy human life on Earth is no longer possible due to environmental damage. All humans will leave in fleets of spacecraft where they plan to live for 50 human generations or 1000 years. Each spaceship has a population of people that must act as a community. Each community is named after their ship. The first ship to leave will be "Discovery One". It will establish the "Discovery One" community. Each community must decide what what is essential to take with them from among the objects and technologies that currently exist.***

2. Each student group will work together as a spacecraft community for 15 minutes. Distribute to each a piece of chart paper and a marker. During this time, the instructor aids the groups by being a timekeeper. They must accomplish the following tasks to prepare for their escape from Earth:
  - Decide on a name for their ship/community (1 minute)
  - Decide which community member will be: (2 minutes)
    - i. "The Scribe": a person with good handwriting and drawing skills and will draw, write and speak for the group, reading their plan aloud at the end.
    - ii. "The Checker": a person who asks good questions and can focus the discussion on the most important questions about survival.
3. Being guided by The Scribe and The Checker, the groups draw a large, basic outline of a spaceship that takes up most of the chart paper. The scribe fills the outline with words that describe items or technologies they want to bring. ( 5 minutes)
4. At the halfway point in the groups' work time ( approximately 8 minutes into group work time), briefly regroup as a class, and give the students the following clarifications:
  - 6th grade: encourage students to focus on items that will create systems that resemble healthy ecosystems. Remind all groups that they cannot include any technology or inventions that have yet to be invented.
  - 7th & 8th grade: Review the concept that the water cycle is a closed system. Inform students that the items they bring should account for this and other closed systems, like trash/compost/waste, in their spacecraft. Remind all groups that they cannot include any technology or inventions that have yet to be invented.

Students resume planning and make changes to their spacecraft to account for these ideas. (approximately 7 minutes).



### **Closing Circle:**

Invite each group to present their plan of self-sufficiency to the class. Have any of the groups made the connection between their spacecraft and the actual planet Earth we live on? Our spaceship is called Planet Earth. Read the following statement:

***We are already living on a spacecraft; the Earth is spinning through space holding human communities. We are separated from space by a thin layer of atmosphere; the distance from the surface of the planet to outer space is barely 60 miles. Earth is the only planet we know of that sustains human life, despite searching space for 60 years.***

Explain to students that many ancient cultures throughout the world have created agricultural practices that were sustainable and self-sufficient. Point out that over the next couple of weeks students will be learning about ancestral Pueblo people, their farming practices, and how these practices can inform our own sustainable relationship to the land.



## **SESSION 2**

### **Opening Circle: Questions and Discussion**

**Survey students' understanding and/or opinions by verbally sharing the questions or text in italics. Briefly gather input from the students, while steering the discussion to toward the answers listed below the question.**

#### **What is the definition of self-sufficiency?**

*A person or group that is self sufficient is able to provide themselves with what is necessary with little help from others. Examples: people living in a remote wilderness; people doing an expedition into mountain or ocean environments; astronauts in space.*

#### **What does the term “ancestral Pueblo people” mean?**

An ancient Native American culture that spanned the present-day Four Corners region of the United States; the ancestors of today's Pueblo tribes of Arizona and New Mexico. Ancestral Pueblo people were very skilled at self sufficiency. Their material culture and their lifeways reflect the innovations and adaptations they developed to survive in a isolated and challenging desert environment. They were resilient.

Show students a map of the United States, and help them to identify the Four Corners region: Utah, Colorado, New Mexico, and Arizona.

View the video, *More than Planting a Seed*:

#### **Video Length Options**

##### 6th Grade: total of 18 mins of video

- ☐ 0:00 min - 14: 50 mins (Intro to the Hopi)
- ☐ 23:54 mins - end (Conclusion: How the Past Connects to Modern Life)

##### 7th Grade: total of 24 mins of video

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##### 8th Grade: total of 26 mins of video

- ☐ 0:00 min - 26:56 (entire video)

Read the following portion of the Hopi creation story:

***After their Emergence into the Fourth World, the clans that would one day comprise the Hopi people approached the Guardian Spirit, Ma'saw, in the region that is now northwest Arizona and asked his permission to settle there.... "Whether you can stay here is up to you," he told them. Masaw warned the clan people that the life he had to offer them was very different from what they had before. To show them that life, Ma'saw gave the people a planting stick (So'ya), a bag of seeds and a gourd of water. He handed them a small ear of blue corn and told them, "Here is my life and spirit. This is what I give you."***

(Wall and Masayesva 2004:435–436)

1. Introduce students to the corn varieties and explore their diversity in size, color, endosperm texture (use a diagram of a corn kernel at this time).
2. Show students the digging stick and gourd and circulate them, along with the corn seed. Allow students to handle and observe them.

### Procedure:

1. Divide students into small discussion groups of 3 to 5 students and rearrange their seating so they are sitting in small discussion circles. Count-off the groups, from 1 to 3, to assign each of them a discussion question number. Read aloud each of the discussion questions to the corresponding groups.
2. Each group should nominate and indicate to the instructor who will be their "Scribe": the person who will begin the discussion by rereading the discussion question to the group, and then record the group's answers, to share with the class. Hand out the correct discussion question sheet and a pen to each scribe.
3. For a total of approximately 5 minutes, groups should discuss their discussion question and report back on their ideas.
4. After about 2 minutes, give the groups a time-check and a reminder: scribes need to record at least a few complete sentence answers to share. At this time, scribes should re-read their discussion question to their group to ensure the discussion is still focused and relevant.
5. Come back together as a group. The "scribe" from each group shares their group's ideas with the class.
6. The instructor helps to *connect* the students' answers with the information presented below, to help them draw conclusions from their group's ideas.

### Question #1:

***Without direct instructions from the Guardian Spirit, Masaw, how did the first Hopi farmers learn how to dryland farm in the southwest?***

Through years of trial and error, agricultural experiments, and long-term observations, they became experts at:

- Understanding plant and animal behavior
- Knowing soil types and measuring moisture content
- Predicting weather patterns
- Predicting and directing water runoff

### Question #2:

***Why is corn, in particular, so important to every aspect of traditional Hopi life?***

***How is corn and agriculture viewed in our modern culture?***

- Corn farming in a drought prone environment is difficult. Helping corn plants to survive becomes a metaphor for how people can survive, as life is often difficult. Dryland corn farming teaches Hopi people the value of patience, humility, respect and cooperation.
- Hopi and Ancestral Pueblo people grew food for their own survival. They knew exactly how their food was grown and where it came from.

- Modern agriculture has disconnected many modern people from an awareness of where and how their food is grown or produced. Many modern people expect their food to be delivered to their towns and houses, already processed, preserved and packaged.
- Many modern farmers view corn as a large scale cash crop; they know that, to produce most corn today, a large water supply (irrigation), fertilizers, and machinery are required.

**Question #3:**

***After examining the different kinds of Hopi corn, why do you think there are so many varieties of traditional corn? What are some of the threats from GMO corn on Hopi corn?***

- **Genes** provide the instructions to build a living thing. If you change one of the genes, you rewrite the instructions.
- Humans have been manipulating the genes of plants for 10,000 years, without harming ecosystems or humans, in a process called **breeding**: mixing and matching the characteristics found within one species of plant. It's resulted in an increase in diversity in crop plants, benefiting human health and increasing the chance that communities will survive environmental challenges like drought.
- **Diversity** is important when growing crops in challenging environments, such as the Hopi do. The Hopi people have survived on their land in part because they have bred over 17 different named varieties of corn, each with special talents for adapting and overcoming threats like drought, and excelling at essential skills like long-term storage.
- **GMO**: this acronym stands for Genetically Modified Organism. They are created by mixing genes from very different species in order to meet a need or fix a problem in agriculture such as resisting disease and pests, surviving frost and drought.
- The **difference** between genetically modifying plants and breeding them:
  - *Breeding crops*: plant species' genes are changed over thousands of years
  - *Genetically modifying crops*: plant species' genes are changed when a gene, sometimes from a non-plant species, is inserted to create a new species that has never before existed on Earth and arrives almost overnight without evolving alongside its environment.
- It is hard to control or predict the mixing of genes plants. Once GMOs are involved, unintended consequences can result. The **impacts** of GMO seed on traditional crops and ecosystems are being actively studied by agricultural scientists. In the meantime, the Hopi must protect their corn's genes from mixing with genetically modified genes. They must protect the purity of the corn varieties that are at the center of their culture.

**Heirloom or  
Ancient Crops and  
Seeds**

- ★ **Increased** Diversity in Corn
- ★ Seed saving provides free, environment-adapted seeds every year

**vs.**

**GMO Crops and  
Seeds**

- ★ **Decreased** Diversity in Corn
- ★ Seed saving can't be done; seed that is not environment-adapted must be bought every year





**Closing Circle: (5 minutes)**

Engage students in a brief discussion to address the following questions:

***What does sustainability mean to you? Do the Hopi/Ancestral Pueblo people meet your ideas of sustainability? Students explain their opinions. Survey the students for their understanding of the following quote:***

*"Indigenous education is really a ten thousand year strategic plan."*

Gregory Cajete

***There are 7.3 billion people riding along on spacecraft Planet Earth. We must COMBINE our ancestral agriculture techniques, materials and principles we relied on in the past WITH the innovative technologies and materials of the future.***

Write on the whiteboard:

Ancestral Methods and Materials and Adaptations

+

Future Methods and Materials and Innovations

=

Self-Sufficiency

Food Security

## PFP/MSTFP and Colorado State Education Standards

	Montezuma School to Farm Project's Garden Education Standards	Colorado Academic Standards
6th	Ancestral Puebloan agriculture practices. Watersheds: connect communities through cause and effect. Applied systems thinking: waste, renewable and nonrenewable resources natural resources.	Science 2.1, 2.2, 3.2, 3.3 Math Health 2.4, 3.1 Phys Ed 3.1, 3.2 Social Studies 1.1, 1.2, 2.1, 2.2
7th	Biodiversity benefits nitrogen, carbon and nutrient cycles. Sustainable water use practices and devices. GMO seed: ecosystem health. Systems thinking: reusing, repairing, re-purposing resources.	Science 2.1, 2.5 Math Health 2.1, 3.1, Phys Ed 3.2 Social Studies 1.1, 2.1, 2.2
8th	Deep understanding of water as a precious and limited resource Changing systems: climate and weather in the Southwest	Science 2.1, 2.2, 3.2 Math Health 3.2 Phys Ed Social Studies 1.1, 2.1, 2.2

For further information in regards to the Colorado State Standards, please follow this link:  
<http://www2.cde.state.co.us/scripts/allstandards/COSTandards.asp>.



The Pueblo Farming Project<sup>1</sup> is a collaboration between the Crow Canyon Archaeological Center,<sup>2</sup> the Hopi Tribe Cultural Preservation Office,<sup>3</sup> and the Montezuma School to Farm Project<sup>4</sup> to understand ancient maize (corn) agriculture in the Mesa Verde region through documenting traditional ecological knowledge, experimental farming, and genetic analysis. The development of this lesson plan was funded by a History Colorado State Historical Fund<sup>5</sup> grant to Crow Canyon.



## HISTORY *Colorado* STATE HISTORICAL FUND

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<sup>1</sup> <http://www.crowcanyon.org/index.php/pueblo-farming-project>

<sup>2</sup> <http://www.crowcanyon.org/>

<sup>3</sup> <http://www8.nau.edu/~hcopo-p/>

<sup>4</sup> <http://www.sanjuanwatershed.org/mancos-cd/projects/mstfp/>

<sup>5</sup> <http://www.historycolorado.org/oahp/state-historical-fund>

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## *Discussion Question #1:*

Without direct instructions from the Guardian Spirit, Masaw, how did the first Hopi farmers learn how to dryland farm in the southwest?

*Notes:*



## *Discussion Question #2:*

Why is corn, in particular, so important to every aspect of traditional Hopi life?

How is corn and agriculture viewed in our modern culture?

*Notes:*



### *Discussion Question #3:*

After examining the different kinds of Hopi corn, why do you think there are so many varieties of traditional corn? What are some of the threats from GMO corn on Hopi corn?

*Notes:*