



Lesson at a Glance

The Inka Empire: What innovations can provide food and water for millions?

Grades

- 5–8

Subjects

- Geography, History, Economics, Environmental Science, STEM (Science, Technology, Engineering, Mathematics)

Length

- Three 50-minute class periods

Key Message

The empire built by the Inka during the fifteenth and sixteenth centuries in South America stands as one of the most remarkable achievements in the history of the world. Using both peaceful assimilation and warfare, the Inka were able to integrate far-flung and diverse communities into a single empire equivalent to the size of California, Nevada, Arizona, New Mexico, and Texas combined. The Inka developed innovative techniques to provide food and water for millions of people and used highly advanced engineering knowledge to link disparate cultures across their vast empire. A new system of government was created based on the redistribution of resources and the Andean principle of *ayni*¹, which allowed the empire to flourish until the Spanish conquest in the middle of the sixteenth century. Today, Quechua and Aymara indigenous communities in the Andes still practice reciprocity and use similar water management and agricultural techniques handed down from their Inka ancestors.

¹ The meaning of *ayni* [pronounced EYE nee] in Andean cultures is akin to “reciprocity.”

Student Outcomes

Students will know that:

- Tawantinsuyu [pronounced tah wahn teen SOO yoo] is the name for the Inka Empire; it means “the four parts together” in the Quechua language.
- Ayni, or reciprocity, informed how the Inka organized and governed their empire.
- Terracing minimizes land erosion and flooding as well as increases the space available for cultivation.
- Irrigation is a method of supplying water to land or crops to help plants grow.
- Colca [pronounced KHOL kah] is a food preservation and storage system.
- Building on thousands of years of domestication of native plants in the Andes, the Inka improved the quality and increased the variety of corn, quinoa, potato and other tubers.

Students will understand that to integrate and sustain millions of people, the Inka developed innovative water management and agricultural systems.

Students will be able to evaluate sources in order to construct an argument about how people can use innovations to address difficult problems and find solutions to challenging situations.

A Note to Teachers: NMAI Education Approach

- This online lesson offers a new way to teach and think about the Inka Empire. Exploring a variety of sources, students evaluate information and use evidence to answer the question, “What innovations can provide food and water for millions?” The lesson is structured yet flexible and respects an educator’s own knowledge and expertise. As such, teacher materials offer suggestions rather than prescriptions for classroom implementation.
- Following a C3 inquiry design, the lesson begins with a compelling question to anchor students’ investigations. Supporting questions develop the academic content necessary to engage students with the concept of innovation in the context of Inka water management and agricultural systems. Featured sources include maps, videos, video fly-outs in the Andes, interactives, images, animations, interviews, and Inka-period and contemporary Andean objects from the NMAI collection to generate student curiosity and build knowledge. Students craft conclusions about the significance of Inka innovations that allowed them to feed and provide water for millions.

The Inka Empire: What innovations can provide food and water for millions?		
Staging the Question	<p>Students begin their inquiry by watching an opening video “Inka Innovative Engineers— Food and Water for Millions.” This video animation features innovative practices used by the Inka and sets the stage for learning about the Inka Empire, water management, and agriculture from the perspective of two middle school students.</p> <p>Students can delve more deeply into the significance of the word “innovation” with an activity that explores the meaning of the word through definitions, characteristics, examples, and non-examples.</p>	
Supporting Question 1	Supporting Question 2	Supporting Question 3
Who were the Inka?	How did the Inka apply innovation to water management?	How did the Inka apply innovation to agriculture?
Formative Performance Task	Formative Performance Task	Formative Performance Task
Students engage in a thematic source exploration of the geography, ways of living, and history of the Inka Empire.	Students use the featured sources to complete a graphic organizer explaining how Inka innovations prevented erosion and managed the power of water for drinking and irrigation. Students use an interactive to construct an Inka terrace.	Students complete a chart identifying challenges that the Inka faced to grow food in the Andes, as well as the innovations utilized by the Inka in agriculture and their relevance today.
Featured Sources	Featured Sources	Featured Sources
<ul style="list-style-type: none"> • Geography: map, “fly-out” video, and photo gallery • Ways of Living: narrated slide show, interactive, and lithographs • History: Timeline 	<ul style="list-style-type: none"> • Videos and animations • 360-degree panoramic • Interactives • Interviews 	<ul style="list-style-type: none"> • Videos and animations • Interactives • Illustrations • Slide Shows • Interviews

Additional Sources	
<ul style="list-style-type: none"> • “The Inka Empire—Tawantinsuyu:” An essay offers additional background and context. • Resistance and Adaptation: Images, videos, and text showcasing the resiliency of Inka descendant cultures in the Andes today. • The Inka Empire’s Impact on the World: Examples of how Inka foods, minerals, medicines, and engineering have affected our world. • Inka Innovation in Masonry: 3D viewer interactives showcasing Inka innovations in stone work. 	
Summative Task	<p>Using evidence from the featured resources, students build an argument from what they’ve learned about Inka water management, agriculture, and engineering innovations in the Inka Empire.</p> <p>To support students’ application of evidence in building an argument, this culminating activity features an interactive digital news-article generator, <i>The Andean Messenger: Making the Case for Innovation</i>. Students can build a news article by constructing a written argument to answer the compelling question: What innovations can provide food and water for millions? After selecting a predesigned template, students determine what featured sources from the inquiry best support their argument. Students will be able to write captions, quotations, headlines, body text, and bylines.</p>
Taking Informed Action: Reciprocity—Andean Style and in Your Community <i>Optional but recommended</i>	<ul style="list-style-type: none"> • Students use videos, images, and other sources featuring contemporary Andean cultures to investigate the concept of ayni, or reciprocity, and how it is still relevant today. • Students take informed action by looking for reciprocity in their community and investigate local efforts where they can participate.

Suggested Pacing

Standard Inquiry: Three 50-minute class periods.

Taking Informed Action (Optional but Recommended): One (50-minute) class period.

	Stage of Inquiry	Sources
Day 1	<p>Engaging with the Compelling Question: What innovations can provide food and water for millions?</p> <p>Supporting Question 1: Who were the Inka? (Formative Performance Task and Featured Sources)</p>	<p>Featured Sources: The video “Inka Innovative Engineers—Food and Water for Millions” provides background on Inka innovative practices presented from the perspective of two middle school students.</p> <p><i>Student Worksheet:</i> <u>The Meaning of Innovation</u></p> <p>Explore the meaning of “innovation” through definitions, characteristics, examples, and non-examples.</p> <p>Featured Sources on three themes—Geography, Ways of Living, and History: Map, Photo Galleries, “Fly-out” Video, Origin Story, History Timeline, Astronomy Interactive, Lithographs, and Interviews. Additional resources, including a background essay on the Inka Empire, provide additional context.</p> <p><i>Student Worksheet:</i> <u>Who Were the Inka?</u></p>
Day 2	<p>Supporting Question 2: How did the Inka apply innovation to water management? (Formative Performance Task and Featured Sources)</p>	<p>Featured Sources: Engineer an Inka Terrace—Build Your Own Terrace Interactive, Tipón Video, Water Management Interactive, and Interviews with Local Experts.</p> <p><i>Student Worksheet:</i> <u>Inka Water Management</u></p>

<p>Day 2</p>	<p>Supporting Question 3: How did the Inka apply innovation to agriculture? (Formative Performance Task and Featured Sources)</p>	<p>Featured Sources: Videos, Terracing Slide Show, Microclimate Diagram, Andean Foods Slide Show, Colca Video, Colca Interactive, and Interview with Local Expert.</p> <p><i>Student Worksheet:</i> <u>Agricultural Innovation</u></p>
<p>Day 3</p>	<p>Summative Task: Using an interactive newspaper, students build an argument from what they've learned about the Inka Empire and engineering innovations in water management and agriculture to answer the Compelling Question: What innovations can provide food and water for millions?</p>	<p>After selecting a predesigned newspaper template, students determine what featured sources from the inquiry best support their argument. Students will be able to write captions, quotations, headlines, body text, and bylines.</p>
<p>Day 4</p>	<p>Taking Informed Action (optional): Look for reciprocity in your community.</p>	<p>Featured Sources: Images and text of contemporary Andean cultures and the concept of <i>ayni</i>.</p> <p>Students investigate local community efforts of reciprocity (e.g., food banks; river, waterway, and community cleanups; and water conservation) and find ways to participate.</p>

Checking for Understanding

After completing this lesson, students will have a richer understanding of the remarkable empire built by the Inka in South America in the fifteenth and sixteenth centuries. They will be familiar with the innovative techniques in water management and agriculture that enabled the Inka to connect disparate cultures across a vast empire and provide food and water for millions. Moreover, students will have an appreciation for the fact that these innovations, developed by Native people more than five hundred years ago, can be applied today to manage and sustain the world's valuable resources.