

From Field to Future: Navigating Climate Challenges in Agriculture

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for the STEM Education Center at WPI's Summer 2023 Research Experience for Teachers program

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Subject: General Science

Grade Level: 8

United Nations Sustainable Development Goal 3: Good Health and Well Being

Overview

You are a farmer and over the past several years you have noticed several challenges to ensuring the survival of your farm. You have seen more struggles with planting times, irrigation, and keeping crops alive with the hotter temperatures. With some investigation you have found the challenges you are facing are due to an increase in global temperatures, severe weather events, and droughts. Propose a solution to save your farm from one of the issues that have arisen due to climate change!

Standards & Learning Targets

8.MS-ESS3-5. Examine and interpret data to describe the role that human activities have played in causing the rise in global temperatures over the past century.

Clarification Statements:

- Examples of human activities include fossil fuel combustion, deforestation, and agricultural activity.
- Examples of evidence can include tables, graphs, and maps of global and regional temperatures; atmospheric levels of gasses such as carbon dioxide and methane; and the rates of human activities

Vocabulary	Tier 1 - Everyday	Tier 2 - School	Tier 3 - Classroom
	Data Maps Rise Cause	Interpret Examine Describe Evidence Tables Graphs Rate	Global temperature Human activity Atmospheric levels of gasses
What do students need to KNOW ?	Students will use the following vocabulary words in context: Human activities have played a role in rising global temperatures over the past century		
What do	1.Examine data		



students need to DO ?	2. Interpret data
What will students CREATE ?	Students will create a final presentation highlighting what they have learned about the operations of a farm and how they will save their farm from impacts of climate change.

**ELA Standard: Grade 8 Speaking and Listening Standards [SL]
Presentation of Knowledge and Ideas**

4. Present claims and findings, emphasizing salient points in a focused, coherent manner with relevant evidence, sound valid reasoning, and well-chosen details; use appropriate vocabulary, eye contact, volume, and pronunciation. (See grade 8 Language Standards 4–6 for specific expectations regarding vocabulary.)

Vocabulary	Tier 1 - Everyday	Tier 2 - School	Tier 3 - Classroom
	Eye contact Volume Pronunciation	Evidence Reasoning Vocabulary	Claims Salient points
What do students need to KNOW ?	Students will use the following vocabulary words in context: <ol style="list-style-type: none"> How to effectively present claims and findings How to emphasize salient points in a focused, coherent manner with relevant evidence, sound valid reasoning, and well-chosen details. 		
What do students need to DO ?	<ol style="list-style-type: none"> Present claims and findings Use appropriate vocabulary, eye contact, volume, and pronunciation 		
What will students CREATE ?	Presentation		

Prior Knowledge

Basic understanding of climate change

- What is climate change?
- What has caused climate change?
- What are the impacts of climate change?

Materials/Resources

- Worksheets / learning materials for each activity
- Materials for planting crops
- Materials for irrigation challenge



Timeline of Activities

[Activity Slides](#)

Duration	Activity	Instructions	Product
Class 1	Intro to Course	<ul style="list-style-type: none"> • Get to know each other • Introduction to the course 	
Class 2	What is farming all about?	<ul style="list-style-type: none"> • Brainstorm what do we know about farming • How does our food get to our table activity. <ul style="list-style-type: none"> ◦ Discuss food webs 	Food web - mapping where their food comes from
Class 3	Farming Conditions	<ul style="list-style-type: none"> • Farming conditions activity • Work on farming conditions slides (part of presentation) 	Farming conditions slides
Class 4	Crop Selection	<ul style="list-style-type: none"> • Crop selection activity 	
Class 5	Finish crop selection	<ul style="list-style-type: none"> • Finish crop selection activity • Work on crop selection slides (part of presentation) 	Crop selection choices and slides
Class 6	Planting seeds	<ul style="list-style-type: none"> • Each student plants a crop to grow during the trimester 	Planted crop
Class 7	Soils	<ul style="list-style-type: none"> • Learning about soils • Work on soils slides (part of presentation) 	Soils slides
Class 8	Pest Management	<ul style="list-style-type: none"> • Pest management activity 	
Class 9	Pest Management	<ul style="list-style-type: none"> • Pest management activity • Work on Pest management slides (part of presentation) 	Pest management choice and slides
Class 10	Irrigation	<ul style="list-style-type: none"> • Learn about irrigation • Irrigation slides (part of presentation) 	Irrigation choice and slides
Class 11	Irrigation	<ul style="list-style-type: none"> • Design an irrigation system (lab) 	Model irrigation slides
Class 12	Livestock	<ul style="list-style-type: none"> • Learn about livestock • Livestock slides (part of presentation) 	Livestock choices and slides
Class 13	Design your farm	<ul style="list-style-type: none"> • Digitally or on paper design their farm using all of their farming choices over the past 10 classes 	

Class 14	Design your farm / Finalize farming set up slides	<ul style="list-style-type: none"> Digitally or on paper design their farm using all of their farming choices over the past 10 classes Work on farming slides 	Designed farm with farming choices
Class 15	Finalize farming set up slides	<ul style="list-style-type: none"> Work on farming slides 	
Class 16	Intro to Climate Change	<ul style="list-style-type: none"> Learn about climate change 	What is climate change slides
Class 17	Intro to Climate Change	<ul style="list-style-type: none"> Learn about greenhouse gasses 	What are greenhouse gasses slides
Class 18	Intro to Climate Change	<ul style="list-style-type: none"> Greenhouse gasses lab 	
Class 19	Rising temps impact on agriculture	<ul style="list-style-type: none"> Learn about how rising temps impact agriculture 	
Class 20	Severe weather impact on climate change	<ul style="list-style-type: none"> Learn about how severe weather impact agriculture 	
Class 21	Climate data analysis	<ul style="list-style-type: none"> Analyze different forms of climate data to help eventually support proposal to save farm from climate change 	
Class 22	Proposal to save your farm	<ul style="list-style-type: none"> Work on proposal to save your farm from a climate related issue (temps, severe weather, droughts) 	
Class 23	Proposal to save your farm	<ul style="list-style-type: none"> Work on proposal to save your farm from a climate related issue (temps, severe weather, droughts) 	
Class 24	Proposal to save your farm	<ul style="list-style-type: none"> Work on proposal to save your farm from a climate related issue (temps, severe weather, droughts) 	Proposal to save the farm from chosen climate change issue
Class 25	Finalize slideshow	<ul style="list-style-type: none"> Finalize presentation to be ready to present Make changes to farming choices based on proposal to save your farm 	
Class 26	Finalize slideshow	<ul style="list-style-type: none"> Finalize presentation to be ready to present Make changes to farming choices based on proposal to save your farm 	
Class 27	Finalize slideshow	<ul style="list-style-type: none"> Finalize presentation to be ready to present 	Final presentation



		<ul style="list-style-type: none"> • Make changes to farming choices based on proposal to save your farm 	
Class 28	Farming Presentations	<ul style="list-style-type: none"> • Present farming presentation • Listen to others farming presentations 	
Class 29	Farming Presentations	<ul style="list-style-type: none"> • Present farming presentation • Listen to others farming presentations 	
Class 30	Farming Presentations	<ul style="list-style-type: none"> • Present farming presentation • Listen to others farming presentations 	

Attending to Equity - Teaching Strategies

Strategy	Explain how the strategy contributes/relates to the lesson/activity
Make sure feedback is usable/actionable without being prescriptive	Students will be working to create a farm and save it from climate change. Having specific feedback is useful for students to help them gain better insight into what they are learning about and how it can help them make decisions about their farm.
Regularly tell students they belong in your STEM class (we are a team, learning together)	All students belong in STEM. Students are working in a team to complete their project and therefore all students should be able to see themselves in their group and in our class
Make connections to local, national and global community	I teach in a school with students from around the world. Students will be able to choose a location for their farm anywhere in the world and see how climate changes impact on agriculture has an impact on everyone around the world.

Career Connections

There are many STEM careers involved in farming. Some STEM careers students will get to experience through this course are:

- Plant scientist
- Soil scientist
- Agricultural engineer
- Agricultural data analyst
- Hydrologist

Throughout the course I may invite farmers from local farms as well as different scientists that have work/research that relate to agriculture or climate change.

Assessment

Students will show proficiency of the standards through their farming presentation. The farming presentation will highlight the farm they have created and how they intend to save their farm from climate change.

[Project Rubric](#)

