

5E Lesson Template

Lesson Author(s)	Mike Howard
Lesson Title	Water and Its Usage and Effects on Midwest Crops
Lesson Source	
Technology Needs (if any)	Computers/internet
Date/Time Lesson to be Taught	
School	
Supervising Teacher	
Math or Science?	Science
Lesson Concepts	Water cycle, water scarcity, natural resources
Objectives	
CO State Standards	Science 3.3, 3.2 (2.1), 1.3
Materials List and Advanced Preparation	Computers with internet access Worksheet (attached)
Safety	Necessary measures need to be taken
Accommodations for Learners with Special Needs	Based exclusively on students' needs but may include the following: Preferential seating, Small-group, one-on-one teacher assistance

5Es

1. ENGAGEMENT		Time: Minutes
What the Teacher Will Do	Probing/Eliciting Questions	Student Responses and Misconceptions
Initiate discussion	What is the water cycle? How does water move around the earth? Is water renewable or nonrenewable? Why? What are uses for water? What can cause harm to our water supply (overuse, pollution)?	Students may believe water is finite. Students may believe only harm to water supply is man-caused pollution.
Evaluation/Decision Point Assessment		Student Outcomes
Student participation/engagement		Base level of knowledge of what the water cycle is.

2. EXPLORATION		Time: Minutes
What the Teacher Will Do	Probing/Eliciting Questions	Student Responses and Misconceptions
Allow for exploration on Wri.org (Aqueduct Overall Water Risk Map). Allow for global exploration initially then focus in to United States and finally focus in on Midwest. Stop and ask probing questions every 7-10 minutes.	What information are you finding? What is the data telling you? Where would you like to be/not like to be a farmer? Why? Where would you like/not like to live? Why?	Students may be amazed at how much of the world and U.S. has water risk.
Evaluation/Decision Point Assessment		Student Outcomes
Are students sufficiently able to answer probing questions? Are students accurately recognizing global water stress areas?		A better understanding of global, domestic and Midwest water stress.

3. EXPLANATION		Time: Minutes
What the Teacher Will Do	Probing/Eliciting Questions	Student Responses and Misconceptions
With students still accessing the Water Risk Map start focusing students to crop growth of wheat and corn in Midwest region (previous lesson may be needed to establish student knowledge of these concepts).	Using your Water Risk Maps, click on the "Overall Water Risk" tab in the top right hand corner. What is this information telling us? How at risk is the Midwest region? Why is that problematic? What is the Baseline Water Stress telling us? How does this relate to the Midwest? What is the Groundwater Stress telling us? What are all of the gray areas? Effects on Midwest?	What do they mean by risk? How is groundwater different from precipitation? What are all the gray areas?
Evaluation/Decision Point Assessment		Student Outcomes
Are students able to convey knowledge of water being a vital and limited resource?		Students will recognize the importance of taking care of our water supply. They will recognize that though renewable, water is has extremely high usage.

4. ELABORATION		Time: Minutes
What the Teacher Will Do	Probing/Eliciting Questions	Student Responses and Misconceptions
<ul style="list-style-type: none"> • Repeat above process, but on the Water Risk Map change the “Weighting Scheme” to agriculture. Discuss with students what “agriculture” means. • Ask students what will Midwest farmers do for crops when precipitation is insufficient. • Direct students to hrd.apec.org and search for Ogallala Aquifer. Click on the “The_Ogallala_Aquifer_and_Its_Role_as_a_Threatened_American_Resource” article. • Read as a group • Go to nationalatlas.gov and click on “Mapmaker” in top-left corner. Then on map layers on the right of page click on “Water” and then on “Aquifers.” Once selected, click on the “Redraw Map” button. 	<ul style="list-style-type: none"> • Repeat above. • What will the Midwest do if there’s not enough precipitation? If farmers irrigate (discuss definition), where does that water come from? What is the name of the underground storage of water in the Midwest (Ogallala Aquifer)? • What interesting information are you getting from this article about the Ogallala Aquifer? Is this water source important? Is it renewable? Why do you say this? • How big is the Ogallala Aquifer? How many states does it cover? How important have you found this aquifer to be to the Midwest? To the United States? Why? What were to happen if this aquifer dried up? 	<p>Since water is renewable, we can use all the water from the Ogallala Aquifer that we want. “Wow, I didn’t realize there was such a thing as an aquifer.” Are all aquifers used as much as the Ogallala?</p>
Evaluation/Decision Point Assessment		Student Outcomes
Students will need to be able to use geospatial tools to do analysis.		The Ogallala is vital to Midwest crops AND to the United States.

5. EVALUATION		Time: Minutes
What the Teacher Will Do	Probing/Eliciting Questions	Student Responses and Misconceptions
Hand out worksheet. Students will display mastery by completing worksheet using applicable resources.		
Differentiation		Time: N/A
Students who are behind or need support.	For advanced or gifted students.	
Allow students to work in groups. One-on-one teacher time.	How are aquifers created? What are their layers? What other major aquifers are there in the United States?	

The Water Cycle and () Aquifer Usage

1) Is water mostly a renewable or nonrenewable resource? How do you know this is true? EXPLAIN.

2) Fill in the chart about stages of the WATER CYCLE:

Part of Water Cycle	Definition
	...is the amount of rain, snow, sleet hail, etc in a given area of land (typically measured annually).
Transpiration...	...
	... the process water goes through to go from a liquid to a gas
Evaporation...	...

3) According to the Particulate Model, scientists believe water is found in what 3 forms? A) _____ B) _____ C) _____

4) What is DEPLETION RATE? How does this relate to the Ogallala?

5) What is RENEWAL RATE? How does this relate to the Ogallala Aquifer?

6) Fill in the following blanks: The Ogallala Aquifer underlies most of _____, some of SE _____, some of E _____

_____, a large portion of W & SW _____ and the
panhandles of _____ and _____.

- 7) In the space below draw a scene of the water cycle (be sure to include the Ogallala Aquifer). Include evaporation, transpiration, condensation, precipitation.