Essential Question: How are we and our communities affected by water quality?

In this Lesson: Students will be learning about the water quality issues of Nebraska and the nation. The activities in this lesson are meant to give students historical and present day context on the issues of water quality. The students will gain a deeper appreciation for the importance of water in Nebraska.

It is important for students to understand that there are many issues that impact human beings. Poor water quality is the phenomenon we chose to simply focus students on a single problem and practice skills.

Connection to other lessons: Future lessons will focus on how communities and individuals can improve water quality and protect water. As students learn about how their government works and the civic solutions available to them, they should return to what they learned from this lesson. This lesson should be directly followed for lesson 2, which will focus on what rights students have as citizens and what they could potentially do to solve community issues.

Learning Objectives:

- What are some water quality issues facing Nebraska?
- How do water quality issues affect our daily lives?
- How does the state of Nebraska protect the quality of our water?

Summative Assessment Tasks/Rubrics:

Water Quality Issues Essay
Water Quality Issues Dialogue

NGSS PE

Civics

- ***SS HS.1.2.c*** *Engage and reflect on participation in civic activities.*
- ***SS HS.1.2.f*** *Analyze various media sources for accuracy and perspective.*

Geography

- ***SS HS.3.2.a*** *Analyze physical and human processes that shape places and regions.*
- ***SS HS.3.3.b*** *Evaluate how humans have utilized and adapted to their physical environment.*

History

- ***SS HS.4.2.a*** *(US) Identify and evaluate how considering multiple perspectives facilitates an understanding of history.*
- ***SS HS.4.5.d*** *(US) Synthesize historical information to create new understandings.*

College, Career, and Civic Life (C3) Framework

- ***D3.3.9-12.*** *Identify evidence that draws information directly and substantially from multiple sources to detect inconsistencies in evidence in order to revise or strengthen claims.*
- ***D3.4.9-12.*** *Refine claims and counterclaims attending to precision, significance, and knowledge conveyed through the claim while pointing out the strengths and limitations of both.*
- ***D4.2.9-12.*** *Construct explanations using sound reasoning, correct sequence (linear or nonlinear), examples, and details with significant and pertinent information and data, while acknowledging the strengths and weaknesses of the explanation given its purpose (e.g., cause and effect, chronological, procedural, technical).*

LEARNING PLAN SNAPSHOT

Activity	Duration	Summary
1	5-10 minutes	Students will brainstorm how water affects their lives.
2	10-15 minutes	Students respond to open-ended prompts to think about how water quality affects their lives.
3	10-15 minutes	Students will explore the historical importance of water to the Umo^{n}ho^{n} Nation.
4	5-10 minutes	Students examine a quote to understand the relationship between cause and effect.
5	10-20 minutes	Students will explore cause and effect in their own lives and discuss who is most affected by students' choices.
6	10-30 minutes	Students will design a concept map.
7	20-30 minutes	Students will create a cause and effect organizer related to a water quality issue.

8	20-30 minutes	Students will explore water quality issues through newspaper articles.
9	30-45 minutes	Students will learn about water quality programs on the Nebraska Department of Environment and Energy's website.
10	30-45 minutes	Students will examine the Standing Rock protests of 2016 as a case study of how people may respond to unequal access to clean water.

LEARNING PLAN

Time	Description of Activity	Formative Assessment Strategies + Additional Notes
Activity 1 *(5 to 10 minutes)*	Have students brainstorm about the roles that water provides in their own lives. What are some things that you need water for? How do we depend on water for the following: Transportation? Commerce? Entertainment? Cultural or Religious Ceremonies? Beverage? Health? Exercise? Providing food sources?	**(1)** The teacher (or appointed student) will be at the front of the room at the whiteboard or chart paper. Have the students popcorn (jump from one student to a random next student that is chosen by the previous student) and each student gives a suggestion for one area of life. The person at the board or chart paper documents the student input.
Activity 2 *(10 to 15 minutes)*	Students will respond to some open-ended prompts to gauge what they know about water quality issues and health related effects of poor water quality. **Suggested Prompts** ➔ **What are some environmental (specifically water) problems in Nebraska?** ➔ **How do you know these problems exist?** ➔ **What is the cause of these identified problems?** ➔ **What is the impact of the problems you identified?** ➔ **What do you think should be done to address these problems?** ➔ **How do you think the water quality is for people in inner cities or Indian Reservation? The same quality of water or different from the rest of the State?** Once students have had some time to write, ask them to share some of their opinions with a partner, small group, or the whole class. If students are struggling finding answers, feel free to share an example of poor water quality with them first. Examples of water quality issues can be found at this work cited page.	**(1)** The teacher moves around the room and monitors students to see how they are responding to the questions. Ask questions to build upon students' writing: (1) how do you know that response, (2) have you or someone you know been affected by this issue, (3) how do you think this issue affects local communities? **(2)** As students complete several small written reflections over the course of one to three days, have them write a summary reflection that can go into a project portfolio.

Activity 3 *(10 to 15 minutes)*	Students will explore the historical importance of water to the Umo^{n}ho^{n} Nation. Students will explore the Tribes' role in water quality and explore who controls their water supply on an Indian Reservation. For historical details, the teacher can reference the Historical Commerce Transportation slides. The teacher can focus on how water was used for transportation of people or necessary goods. Students should reflect on how the historical importance of water impacts us today.	**(1)** There are several extensions in the slides that are linked to this activity. Students can design a model method of using the Missouri River as transportation.
Activity 4 *(5-10 minutes)*	Post the following quote where students can easily see it; "Cause and effect are two sides of one fact." Ralph Waldo Emerson in Circles Essay (1841). Lead students through a reflection of the quote. **Suggested Prompts** ➔ **What does Emerson mean?** ➔ **How does Emerson's quote relate to issues of water quality in Nebraska and elsewhere?**	**(1)** Ask students to compare their reflection of the quote with a reflection from an earlier activity. For instance, in Activity 1, students brainstormed the roles of water in their lives. How does poor water quality impact students' lives?
Activity 5 *(10-20 minutes)*	The teacher will ask students to list concerns that they have about their lives (i.e. being late for school or job, disagreeing with parents or friends, anxiety and stress). Project the Cause and Effect Organizer to work out possible causes and effects for the concern. Ask students who is most affected by these issues, who has the power to control these issues, and how these issues came to exist.	**(1)** The end of the Cause and Effect Organizer has three questions for reflection. Ask students to respond to these questions in an exit ticket.
Activity 6 *(10-30 minutes)*	*Students may need to do some reading before starting a concept map. Activity 8 will have articles for students to read. You may also find it valuable to have students start a concept map with prior knowledge.* Students will create a concept map of key definitions that they will need to know about water quality and how it affects Nebraskan health. Students can start by identifying terms from prior readings or reflections. The concept map can be put onto a whiteboard, a digital space, or using sticky notes/flash cards on a classroom wall. The teacher can lead students through generation of their own terms related to water quality and health, and/or the teacher can share the term list.	**(1)** Designing a concept map can be a continuous activity throughout the semester. For instance, students can create a whole class concept map that takes up a large space (wall) of the classroom or an area of the school. Students can continue adding definitions, evidence, and reflections to this map to visualize the work they are doing. **(2)** During dialogues, one student can be assigned to keep track of new concepts that the class concept map does not include. At the end of the dialogue, the assigned student can propose additions to the concept map. **(3)** At the end of a lesson in which new concepts were discussed, the teacher can ask the students what they would add to the class concept map (potentially in the form of an exit ticket or informal discussion).
Activity 7 *(20-30 minutes)*	*This activity connects well to Activity 5. Students can also read materials from Activity 8.* The teacher will ask students to choose an environmental concern that affects water and use a Cause and Effect Organizer to link cause and effects. The teacher can move around the room and ask prompts to move students through the organizer.	**(1)** After the small group discussion, students write a reflection over what they learned from their peers. The teacher can cap the reflection writing to five minutes and ask students to turn them in as an exit ticket.

	Suggested Prompt ➔ **Which people do the issue affect the most? How?** ➔ **Who has the power to shape the issue?** ➔ **How do the issues come to exist?** ➔ **Are there ways of eliminating the issue?** As students complete their graphic organizer, students work in small groups (3-4). The teacher will help the students form groups based on the different environmental concerns they chose to focus on. Students should discuss with one another what they have found and take notes from each other's thoughts.	**(2)** Since student groups are organized around different topics, then they can share with one another. The teacher can Jigsaw the students, placing them in new groups in which all environmental concerns are represented. **(3)** As a whole class, the students can generate a T-chart that links causes to effects. The T-chart should focus on determining which causes are leading to which effects. The students may find that one cause has multiple effects. The whiteboard is a useful tool because students can draw between multiple points and use colors to create categories. **(4)** Have students view an informational video on the Standing Rock water conflict and at least one of the music videos. Hold a discussion regarding why this issue went global and why celebrities felt that it was important enough to go to jail fighting for the cause.. Standing Rock videos
Activity 8 *(30-45 minutes)*	As a class, students will read a variety of stories and newspaper articles which will help them understand the major issues facing water quality and how poor water quality affects public health. Students can find a list of curated news stories at Water Quality Issues Work Cited. There are several articles in this work cited, and depending on the students' cognitive ability, the teacher may want to choose specific articles. **Questions and Prompts** ➔ **Summarize the story** ➔ **What are major problems facing the local communities?** ➔ **What is the major issue affecting water quality?** ➔ **What is causing the major issue affecting water quality?** The teacher may like to use an Organization Table to organize students' findings. The organization table can be used by individual students or as groups.	**(1)** If you want to connect Nebraska water quality issues to a global perspective, then you can have students read the Environmental Impacts of Agricultural Modifications. **(2)** The teacher may use the students' organization tables to assess their prior knowledge of agricultural practices in Nebraska, and thus decide how much time to spend on explaining these practices.
Activity 9 *(30-45 minutes)*	Students will explore the role of the Nebraska Department of Environment and Energy and overviews of different water programs. This website is superb because it describes what is being done to counter poor water quality. Students will need to have access to NDEE Water Programs-Nebraska Water Quality: A Brief Overview. Within the website, students will find different programs in the Water Quality Division, like agriculture, groundwater, surface water, ect. The website is large and contains several different webpages. Students will need time to explore the website; they may need the teacher to model for them how to navigate around the website. A great way to scaffold this activity is to have short timers (5-10 minutes) where students explore each web page and write information. After the timer, ask students to share with a partner, or contribute to a class discussion, or simply write notes.	**(1)** Have students add to the concept map (mentioned in Activity 6) based on their findings from the NDEE website. **(2)** Throughout this activity, students should have been taking some form of notes on what they have learned. Students could use their notes to prepare for the essay or dialogue summative assessment (mentioned at the beginning of this guide). To prepare for these assessments, share the essay or dialogue questions with students and let them choose which ones to answer. Students can turn in a brief reflection to you as an exit ticket or put it in a classroom portfolio.

	Another way to scaffold the reading of this website is to assign students to specific programs, like agriculture, petroleum remediation, wastewater. The students will spend time researching their program and then share what they learn with one another.	
Activity 10 *(30 - 45 minutes)*	To learn more about how water quality issues and legislation affect some groups of people disproportionately, the students will learn about the Standing Rock protests. To get a basic overview of what the Standing Rock protests are, the students will watch this PBS NewsHour video. The students should take notes while they watch the video, summarizing what the problem is and how Native Americans across the country are trying to address that problem. After the students watch the video, the teacher will split them into groups and assign a song about Standing Rock to each group. A list of songs can be found here (under "Music Videos about "Water is Life" or Standing Rock Conflict). The students will listen to their assigned songs and write down notes and reflections about them within their small groups. Finally, the students will participate in a whole class discussion about unequal access to clean water using the prompts below. The students should use their notes from the previous activities to help them. **Suggested Prompts:** ➔ **Why was the Dakota Pipeline rerouted?** ➔ **What are Native American activists doing to protect Standing Rock's water? In what different ways are people participating in the protest?** ➔ **How do water quality issues affect some groups of people more than others? Can you think of any other examples of ways that access to clean water is not always equal?** ➔ **Thinking beyond the science of water quality problems, what social solutions might we promote to address and prevent problems like Standing Rock?**	**(1)** Alternative videos to the PBS NewsHour video can be found here. The teacher may choose to do a Jigsaw activity with these videos, assigning different videos to different groups of students. The teacher could also allow the students to explore these resources and gather information about the protests independently in preparation for the discussion assessment. **(2)** Following the class discussion, the teacher may ask the students to write a reflection or exit ticket about one of the discussion prompts. **(3)** The students may demonstrate what they learned by writing and performing their own songs about local water quality issues that affect their own lives, or about other case studies of unequal access to clean water (i.e. inner city neighborhoods or people of color). If the students would rather choose a different creative outlet, such as drawing, this would serve the same purpose. *This may require the students to do some outside research.*