

**NAVAJO ACCESS TO CLEAN WATER**

**Curriculum Unit Title: Interpreting and securing Navajo Access to Safe Drinking Water**

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## CONTEXT AND RATIONALE

The topic of Access to Safe Water will be taught to 9<sup>th</sup> grade high school students at Window Rock High School (WRHS) in Fort Defiance, which also serves the surrounding communities of Window Rock, St. Michaels, Hunter's Point, Oak Springs, Sawmill, and Red Lake on the Navajo Nation. The Window Rock Unified School District has about 2,000 students and is 98% Navajo. There are five schools within WRUSD: Tsehootsooi Diné' Bioltah (Navajo immersion school for grades K-6), Tsehootsooi Primary School (K-3), Tsehootsooi Intermediate School (4-6), Tsehootsooi Middle School (7-8) and WRHS (9-12). The selected class to teach this unit is Diné Studies at WRHS, over the course of two weeks in a semester-long class, since it follows the piece on water access of the Navajo Nation. Many students do not give a second thought as to the source(s) of Navajo water. By giving the students the means to comprehend water sources, it can strengthen factors such as access to clean water for the community as a whole. Its importance also follows the traditional outlook of how we as Navajo people see water as a source of sustenance of life.

Window Rock High School just made some changes to its course catalog with the Diné Studies and Navajo Government courses. Originally a course for seniors, it is now moved to a freshman course and also shorted and combined into a one-semester course entitled Diné Studies for a ½ credit. Although new to me as a teacher implementing this subject, I have folded this into a course that focuses on the Navajo history for the first quarter and Navajo Government in the second quarter. This course is also required for the Chief Manuelito Scholarship for seniors seeking to go to an accredited college/university. The Navajo history can also incorporate the traditional creation stories. Whomever teaches this aspect should also heed the time of year when and when not to tell these sacred stories as not to offend students and their families as well as offsetting the balance of long-established tradition(s).

Clean water access can be taught in both parts of the history of the Navajo and in Government. The history segment about Navajo rights to water could be a traditional part of the story but also be part of the historical dealings and issues of granting the Diné people access to water. Much of this written detail would come after the Navajo Treaty of 1868. Various Navajo agents working on behalf of the United States government as well as additional lands and water ways granted mainly by executive orders can also easily cross over into the political side of the Navajo Government class, and then tie into the clean water piece. According to a summary of the Clean Water Act of 1972 by the Environmental Protection Agency (EPA), it states:

The Clean Water Act (CWA) establishes the basic structure for regulating discharges of pollutants into the waters of the United States and regulating quality standards for surface waters. The basis of the CWA was enacted in 1948 and was called the Federal Water Pollution Control Act, but the Act was significantly reorganized and expanded in 1972. "Clean Water Act" became the Act's common name with amendments in 1972. Under the CWA, EPA has implemented pollution control programs such as setting wastewater standards for industry. EPA has also developed national water quality criteria recommendations for pollutants in surface waters. (EPA, 2019).

The students will have to be aware of not just the definition of this law but also its value as well as the many provisions of the law. For example, how does the Safe Drinking Water Act regulate our drinking water, what are public water sources, and what agency of the Navajo Nation oversees the implementation of safe drinking water laws and regulations? Also, the Clean Water Act (1972) regulates pollution that goes into the water, while the Safe Drinking Water Act regulates the water that we drink. Students will learn about both laws, as they both regulate our water. Students will gain a better understanding of clean water by learning about what point and non-point source pollution means (National Oceanic and Atmospheric Administration [NOAA], 2019).

Additionally, with climate change, there is an important connection to having clean water. Drought has impacted the Navajo Nation with less water fall in the form of rain and snow and is likely to continue (Nania and Cozzetto, et. al, 2014). Nania and Cozzetto et. al (2014) further state that,

The Redsteer et al. (2011) study assessing recent drought on the NN through 2010, suggests that the Nation was in a drought from 1994 to 2009 with brief respites in 2004-5 and 2010, making the 1994-2009 drought longer than any other NN drought of the 20th century. The study found that the drought may have originated in the drier western lowlands of the Reservation and then spread. The authors note that the warmer temperatures may have exacerbated drought impacts. Since the Redsteer et al. (2011) study was published, the NN has reaffirmed its drought state of emergency in 2011, 2012, and most recently in 2013, indicating that the drought continues.” p. 43

The impacts of the drought and projections for continued drought could mean that safe drinking water could become more difficult to obtain, making the topic even more important for students to understand.

There is also the concern of ensuring access to uncontaminated water, due to mining issues in and around the Navajo Nation (EPA, 2020). Uranium mining, as well as other mining both on or near the Navajo Nation—such as the Gold King Mine spill-- all can have catastrophic consequences to this land and the Navajo people (Chief and Artiola, et. al, 2016). This area used for this unit was picked due to the impending need for safe drinking water access on the Navajo Nation. Due to the immense size of the reservation 27,000 square miles, focus will be on the Defiance Plateau, around the communities of Fort Defiance, Arizona as well as Gallup NM (there is a common water source for both communities). Drinking, cleaning, and providing water for livestock and crops all directly affect the needs of the Diné. Recent national water crises with the Dakota Access Pipeline on the Cheyenne River Reservations in North Dakota and the municipal water supply in Flint, Michigan only strengthens the need to ask the questions about safe drinking water and what laws allow for protection of the Diné People from the possibility of consuming contaminated water. The water we consume in these Navajo communities is assumed to be safe but with other areas in the United States, one must consider that with other tribes and other Americans facing the dilemma of contaminated water, Navajos must be concerned as well.

Another aspect of safe drinking water is the spiritual or Navajo traditional way of what water means to the Navajo people. In doing so, one might further understand the utter importance of

water. It is a necessity and life-giving aspect of the natural world. These are logical and simple beliefs that all people should adhere for the overall benefit of ensuring that water was and will always be important. It should not be just the Navajos and other tribes but all people who should care for the land. Although not directly mentioning water, the Diné Walk in Beauty prayer reminds us everything that should be balanced in our lives; the environment is balanced if the spirit is.

As Navajo adolescents, students may think they have no say in the matters of their land and lives, but this topic should not only make them aware of the water situation but also empower them to take action in what is rightfully their place in the order of Navajo matters/issues, especially for the future. As a teacher with a master's degree in US History, I still have a hard time interpreting not just the laws of the Navajo Nation but also basic Federal Indian Law. While this is not an Indian Law seminar, the fundamentals of regulations that give Navajos the basic human rights to clean water will be examined. The students would have to stop and wonder, "If I don't know the minimal laws which involve our people, how can I teach this to our kids?" This is the first step in the questioning process to get to the big question is, "Where will our water come from and is it clean?"

Like many others, I also took water quality for granted but see the issues that don't just affect the American Indian peoples but also people of other colors and ethnicities. With similar events in North Dakota, Michigan, and more recently Puerto Rico (a protectorate of the United States) pertaining to clean water access, if we, as American Indians don't look out for ourselves, no one else will. The students will need to know the basics of: Navajo Nation water rights, the Clean Water Act and water resources which pertain to said topic. They need to also dissect and comprehend a complicated set of regulations and present solutions, should they arise. The question to ask first is, what are American Indians' rights and entitlements when it comes to clean water? What of the Navajo water rights and the Environmental Protection Agency's guidelines? The students need to know where to look to find these answers and use this information to their advantage and betterment.

One of the issues of the dwindling water supply is, where would the next water source would come from? One aspect to examine is the Navajo-Gallup Water Supply Project. This is a current and enormous endeavor in which a vast pipeline would take water from the San Juan River in Northwestern New Mexico and divert to the communities of the southern Jicarilla Apache Reservation, the community surrounding Gallup and also the Arizona communities of Window Rock and Fort Defiance (Bureau of Land Management, n.d.). Yet as the project is still taking place, there was a toxic spill into that same river. The spill, from the Gold King Mine released approximately 3 million of gallons of toxic metals such as iron and aluminum waste into the rivers of the Animas and San Juan Rivers. I want the students to arrive at the question as to whether this water is safe or not due to the spill in Colorado.

## **CONTENT OBJECTIVES**

The purpose in teaching this unit is to get the students to analyze sources of water and its cleanliness, and what the Clean Water Act provides for Native Americans (and all Americans).

*Navajo Government- Analyze the divergence between economic growth and environmental protection and identify sources of water and determine whether that water is safe for human consumption. Environmental, political, and economic issues are often intertwined and can contradict each other's best intention(s).*

*Hozho'- understand and exhibit the connection of Navajo people to the land and environment, and touch briefly on how the people are tied to their surroundings (environment).*

*ELA- to lend support to our ELA department (school wide at WRHS) in reading and writing. This will entail close reading, note-taking, classifying, writing critical, compare and contrast, generalizing, rationalizing, citing evidence or presenting logical arguments.*

Skill set:

Students must know the skills of research, note-taking, locating said documents/websites, debating, and analyzing the issues of Clean Water.

1. What sources provide water to Navajos? Look to where the current sources are and what sources are being looked at as potential.
2. Students should begin with what bodies of water are within Navajo land? Geography: Identify tributaries and rivers: Green, Animas, San Juan, Colorado, and Little Colorado. Identify aquifers: Mesa Verde aquifer, the Dakota-Glen Canyon aquifer system, and the Coconino-De Chelly aquifer (students should know that most of our Navajo water does not come from the surface). In fact, 99% of Navajo water comes from underground (<http://navajopublicwater.org/home>)
3. Introduce the videos from the following site on Dig Deep at: <https://www.navajowaterproject.org/project-specifics>. Direct the students to view the websites on St. Boneventure in Thoreau, New Mexico and Navajo Mountain, Utah. Discuss in class, the two videos and compare.
  - Both are rural and have predominately Navajo people residing their areas, even though they are 300 miles apart by roads.
  - Water is limited in both areas.
  - Questions to ask/discuss in class:
    - What are the water sources for each area? Generally, they are the Dakota-Glen Canyon Aquifer for Navajo Mountain and the San Juan Aquifer for Thoreau.
    - What is unique about the issues affecting clean water in each area? Navajo Mt. has the Colorado River nearby but has issues with contamination from coal and coal fired power plants nearby. Thoreau has issues of nearby uranium mines.
4. What are the current events on Navajo land that are relatable issues? Students will brainstorm and reflect on contemporary events. Discussion will follow.
  - Navajo-Gallup Water Supply Project- the forthcoming water diversion development to divert water from the San Juan River in northwestern New

Mexico, which will supply the areas around and including Gallup, NM as well as Fort Defiance and Window Rock, AZ. The issue is that the Gold King Mine in Colorado spilled toxic water upstream in the amount of 3 million gallons. Is that water going to be safe for consumption? What guarantees do the Navajo people have?

- Is there water being wasted? - an uncapped well was spewing water out in the community of Oak Springs in the late 1990's. It makes one wonder if there are other areas of water being wasted.
- Uranium tailings & contamination- since the 1940s, there are many open mine shafts with from the Cold War days of federal mining for uranium. These sights lay in many areas around the Navajo Nation, with some not too far from Fort Defiance/ Window Rock in the north, Cove and Red Valley AZ and east Gallup and Crownpoint, NM. One must ask the question, although not in the direct vicinity of FD/WR, they are also nearby Navajo communities and how does that affect us? (FD/WR).
- Church Rock, NM Spill- in July of 1979, 1100 tons of uranium tailings were released into the Puerco River when a dam collapsed. It was the largest toxic release of radioactive material on American soil in US history. It even surpassed the event at Three Mile Island just a few months earlier but it did not gain as much notoriety. It's also third in magnitude in all time radiation disasters in the world (only the incidents at Fukushima, Japan and Chernobyl, Ukraine rank higher) Why was the disaster scaled back to a status of indifference? How much of the water is affected? How is it affected?

5. What are viable solutions to these issues to secure clean water?

## TEACHING STRATEGIES

Much of this would be geared towards high school students, using Writing, Inquiry, Collaboration, Organization and Reading strategies.

*Writing-* students would have to take Cornell-style notes and use to support their thinking and exhibit comprehension. This of course could be used for analyzing said topic(s) and writing an expository essay for example.

*Inquiry-* Asking critical questions is key to beginning this topic. Many of the area Navajo students have flourishing ideas and just need to organize them. Deeper level thinking is tantamount to thinking, learning, and discussion. Much of this can be done using the AVID *Socratic Seminars* where students not only express their thoughts and ideas but also get to hear what their peers have to say in a controlled setting.

*Collaboration-* If chosen as a team project or presentation, the students can work with the ideas of shared responsibility. They may also use formal and informal discussion. Socratic Seminars

can be used again, as well as Philosophical Chairs, a sharing of different points of view. There are can also be the use of Service Learning Projects.

*Organization-* This is more than just organizing the binders and notes. It is also an exercise in utilizing items such as graphic organizers, being part of a study group or planning a project. They also prioritize and set goals (very good skills to have if you are planning to have a project-based assessment).

*Reading-* to expand in knowledge from literature or various media. Comprehending the written texts also promotes vocabulary building and summarizing. For example, teachers could ask: What are the current issues of our water? (possible answers include: drought, water rights, and contamination). The students chunk the reading into sections. They underline words they don't know and define them, then underline the main ideas, taking notes off in the margins as to what they noted.

## **CLASSROOM ACTIVITIES**

Introduce the current sources of water for our area: surface water and aquifers.

Anticipatory set:

Ask where our water comes from? Analyze the source(s) of our Navajo water in the areas of Fort Defiance and Window Rock. (possible answers are the various wells drilled into the aquifer, water caught from the rain and snow run-off, and the on-going Navajo Gallup Water Project which will divert water from the San Juan River in the Window Rock and Fort Defiance communities).

Where does ground water come from? Answers would be the Coconino Aquifer and San Juan River primarily.

Where does the surface water come from? The local community will draw its surface water from the San Juan River.

Are the sources clean? Examine the sources and nearby facilities which can possibly contaminate the water.

How many people are there and how much water is adequate?

**ANSWERS-**

Aquifers, are re-charged by rain and especially by snow fall. Drought and climate change have affected this.

The Navajo-Gallup Water Supply Project-Analyze the source of this project, which will give to the areas of Fort Defiance and Window Rock.

What are current issues involved with the Animas and San Juan Rivers ?

- Answer to be based on the Gold King Mine spill contamination, August 5, 2015. Four years ago at approximately the date of this assignment. This is a great example for discussing clean water, the CWA, and point source pollution.

**Skills for Classroom Use**

Marking the Text- Also called Annotating the Text, is a strategy that helps students read closely for the purpose of identifying and isolating key information in a text. Marking the text is more intentional than “annotating,” which can imply a wide variety of text interactions. When marking the text, students are given a specific set of pre-defined marks to use for their interaction with the text. These marks depend on the reading purpose and are often clarified by educators in the reading task given to students.

Socratic Seminar- The Socratic method of teaching is a form of inquiry-based discourse focused on questioning to spur critical thinking and drive ideation. It is through exploration, dialogue, considering new perspectives, and constant questioning that students develop their critical thinking and problem-solving skills. Through Socratic Seminars, students develop confidence in articulating their ideas to others while providing supporting evidence with reasoned thinking.

**Using these resources, educators will be able to:**

1. Use effective questioning techniques in the classroom to promote students’ critical thinking or higher-order thinking skills.
2. Integrate a collaborative discussion format that supports comprehension.

Philosophical Chairs-With a similar format to that of a debate, Philosophical Chairs is less about competition and more about students providing their perspective on an issue and supporting it with successful rhetoric and articulation. This strategy—rich in inquiry—is built on a prompt to which contradictory positions exist. Participants address these positions through deep, academic discourse in a structured, formal process. The Philosophical Chairs process provides students with opportunities to improve their verbal capabilities and fluency, in addition to developing their use of precise academic and content language. Philosophical Chairs is also a form of team-building, during which a safe environment is formed that encourages students to take risks and share opinions with one another. Through exposure to varied perspectives, cultural worldviews, and personal experiences, students begin to appreciate the diverse nature of their classroom and see it as a source of strength and identity.

**Using these resources, educators will be able to:**

1. Use effective questioning techniques in the classroom to promote students’ critical thinking or higher-order thinking skills.
2. Engage students to think more deeply about a topic.
3. Foster students to support opinions with textual evidence

## **STUDENT ASSESSMENT PLAN**

**Analyze with a short research paper which will address cause and effect. Included should be:**

- Water Quality Project- can use test strips to look for basic contaminants such as lead.
- Where was the source of contamination and what event transpired (Gold King Mine in Silverton, CO was being studied by an EPA employee who inadvertently released 3



million gallons of contaminated water into the Animas River, which feeds into the San Juan River and ultimately the Colorado River.

- Contaminants are 3 million gallons of toxic metals such as cadmium, lead, and other elements
- What repercussions took place? Ecological damage, as well as financial setback. Crop water usage came to a halt. Navajo-Gallup project is still intending to draw its water from this river.
- What can be done to ensure this water is safe for human/livestock/crop consumption?
- Stress the idea of providing solutions as well. What can be done to alleviate or even reverse the trend of our water situation?

## **Ways to Protect Our Drinking Water**

By taking some simple steps in your home or community, **YOU** can play a part in protecting our drinking water sources. **Make it a point of duty to:**

- Dispose of household and other chemicals properly. That is, don't pour chemicals on the ground or down the sink drain, toilet or storm drain.
- Take used motor oil to the recycling center.
- Use only recommended amounts of fertilizer.
- Pump and inspect your septic tank regularly.
- Plant vegetation on bare spots of the soil, particularly on slopes, to prevent erosion and excessive runoff of sediments into nearby water bodies.
- Become involved in drinking water protection activities in your community.

Taken from <http://navajopublicwater.org/home>

**Students can also look at current events relating to water availability as this is an ever-changing event.**

## **ALIGNMENT WITH STANDARDS**

### **State Standards**

#### **AZ HS Social Studies Standards -History**

**HS.H1.4** Analyze the impact of cultural diffusion

**HS.H1.7** Analyze how technological innovation and trade has affected economic development and transformed societies.

**HS.H2.1** Explain multiple causes of conflict.

**HS.H4.3** Examine how access to information and technology has been used to influence society.

#### **AZ HS Social Studies Standards -Civics**

**HS.C1.4** Analyze the evolution of civic virtues, democratic principles, constitutional rights, and human rights.

**HS.C4.4** Analyze the purpose, process, implementation, and consequences of decision making and public policies in multiple settings and at various levels

**HS.C4.5** Use disciplinary and interdisciplinary lenses to understand the characteristics and causes of local, regional, and global problems, instances of such problems in multiple contexts, and challenges and opportunities faced by those trying to address these problems over time and place.

**AZ HS Social Studies Standards -Economics**

**HS.E1.1** Evaluate how and why people make choices to improve their economic well-being.

**HS.E2.1** Explain how scarcity results in economic decisions and evaluate their impact on individuals, institutions, and societies.

**HS.E2.2** Analyze how incentives influence economic choices for individuals, institutions, and societies.

**HS.E4.4** Explain the effect of advancements in technology and training on economic growth and standards of living.

**AZ HS Social Studies Standards -Geography**

**HS.G1.1** Use geographic data to explain and analyze relationships between locations of place and regions. • Key tools and representations such as maps, remotely sensed and other images, tables, and graphs.

**HS.G1.2** Use geospatial tools and related technologies to construct relevant geographic data to explain spatial patterns and relationships. • Key tools and representations such as Google Earth, story mapping, wayfaring apps, and other geospatial technologies.

**HS.G2.1** Analyze interactions within and between human and physical systems.

**HS.G2.2** Evaluate how political and economic decisions throughout time have influenced cultural and environmental characteristics of various places and regions.

**HS.G2.3** Evaluate the impact of human settlement on the environment and culture of specific places and regions.

**HS.G2.4** Evaluate the use and sustainability of natural resources.

**HS.G3.3** Evaluate the influence of long-term climate variability on human migration and settlement patterns, resource use, and land uses at local-to-global scales.

**HS.G4.1** Take an active stance on a geographic issue reflecting its scale (local, regional, state, national, or global)

**Department of Diné Education Standards**

**Cultural Standards- 9-12 grades**

***DCS:C2.PO3*** – I will practice respect of nature in my daily life

***DCS:C3.PO2*** – I will research the cultural stories relevant to land and water

***DCS:C4.PO2*** – I will appreciate the significance of water

**Government Standards**

***DGS:C1:Legislative Branch.PO2*** – I will identify the process of rulemaking of NN Council Delegates.

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<https://www.usbr.gov/projects/index.php?id=580>

## **Student Readings**

Laws on safe drinking water:

“The Clean Water Act: A Summary.” <https://www.epa.gov/laws-regulations/summary-clean-water-act>

“Understanding the Safe Drinking Water Act.” <https://www.epa.gov/sites/production/files/2015-04/documents/epa816f04030.pdf>

Point vs. Non-point Water Pollution:

National Oceanic and Atmospheric Administration. (2016). Point vs. non-point source pollution. What’s the difference?” Retrieved from <https://response.restoration.noaa.gov/point-vs-non-point-water-pollution-what-s-difference>

Navajo Water and the Navajo Nation Safe Drinking Water Act:

The Navajo Nation Department of Justice Unit on Water Rights  
[http://nndoj.org/Water\\_Rights\\_Unit.aspx](http://nndoj.org/Water_Rights_Unit.aspx)

National Oceanic and Atmospheric Administration. (2016). “Point vs. non-point source pollution.” Retrieved from

Navajo Water Issues:

Navajo Water Rights  
<http://www.takepart.com/feature/2016/04/22/native-american-water-settlements>

Water plan project-Navajo-Gallup  
<https://www.usbr.gov/uc/progact/navajo-gallup/index.html>

“Public Water Systems and their Categories.” <https://www.navajopublicwater.navajonnsn.gov/PWS>

The Navajo Nation Safe Drinking Water Act. <https://www.navajopublicwater.navajonnsn.gov/NNSDWA#:~:text=Close-,NNSDWA,the%20oil%20and%20gas%20companies.>