

**WATER, WATER, EVERYWHERE,**  
**BUT NOT A DROP TO DRINK**

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**Project to Fulfill Requirements**  
**for**  
**Fish and Wildlife Management for Educators**  
**Instructor: Mark E. Scott**

## **Introduction**

In reviewing the many facets of water lore, I have decided that I want to expose my students to scenarios that will make them think about the problem of drinkable water for our future. This is a most critical natural resource and when it's gone, we're gone.

## **Objectives of the Project**

Each student will experience four activities from Project Wet while journaling the activities in their Science Lab book. Each student will complete background assignments from their text to help them learn water terminology. After completion of the activities, the student will design a poster to educate the public about our limited resource of water. Each pair of students will, as a team, write and act out a newscast from the future about water "in the news".

## **Identified Goals from the Vermont Framework of Standards**

### **Sustainability**

- 3.9 Students make decisions that demonstrate understanding of natural and human communities, the ecological, economic, political, or social systems within them, and awareness of how their personal and collective actions affect the sustainability of these interrelated systems.

### **Understanding Place**

- 4.6 Students demonstrate understanding of the relationship between their local environment and community heritage and how each shapes their lives.

### **Organisms, Evolution, and Interdependence**

- 7.13 Students understand the characteristics of organisms, see patterns of similarity and differences among living organisms, understand the role of evolution, and recognize the interdependence of all systems that support life.

### **Natural Resources**

- 7.16 Students understand how natural resources are extracted, distributed, processed, and disposed of.

## **Grade Level Expectation Met by this Project**

**S7-8:49** Students will research the impact of different human activities on the waterways and describe the possible effects on the environment and its inhabitants.

**Science Concept:** Fresh water, limited in supply, is essential for life and also for most industrial processes. Rivers, lakes, and groundwater can be depleted or polluted, becoming unavailable or unsuitable for life.

## Class time with Students

### First Day: What is abundant and rare at the same time?

Students: guess and write guesses on board.

**What do we know about water?**

(accept all answers)

**What does this quote mean?**

**“Water, water, everywhere, but not a drop to drink.”**

(accept all answers) Tell where the quote can be found in the Rime of the Ancient Mariner.

Assign: Read pages 292-293 in your textbook. Write all new words and their definitions in your Science Journal. Homework: Answer questions 1-6 from page 293 neatly and completely. Due tomorrow. (Extra credit for wearing a blue shirt tomorrow)

Teacher preparation for tomorrow: Get whistle and make dice. Set up stations. Make 1 page graphic for mapping “molecule’s” travel.

### Second Day: (Collect Homework)

Introduce class with articles on water. **Who would like to read a short article for us?** (discuss)

Demonstrate that heat excites water molecules. Ask for two volunteers to vibrate as they change their distance from a heat source. Review solid, liquid, and gas especially regarding water molecules.

Explain the rules of the Water Molecule Game:

- 1. Record your movements on the map using a solid line for movement as a pair (water) and a dashed line for movement as vapor.**
- 2. Locate the 9 stations.**
- 3. We will have no more than 3 “molecules” per station. Some stations may have 2. (15 students total)**
- 4. Can a molecule of vapor go directly to the Glacier station?**
- 5. A roll of the die determines where the molecule goes. Single file for turns rolling die at the cloud station, pairs for liquids and solids. If you roll “stay”, you go to the end of the line and stay at that station.**
- 6. Partners roll the die once together.**
- 7. Movement will end when you hear the whistle.**

Collect Mappings.

**Third Day: Think about your life as a molecule of water yesterday. Was your Movement circular? (answers) How does this compare to the Water Cycle diagram in your text? (answers)**

**Where are the opportunities to “clean” the water molecules in this system?**  
(List ideas on board)

Read chapter from the Life of Pi regarding Pi’s efforts to obtain drinking water for the Tiger and himself.

Assignment: **Talk to your family and try to estimate how many gallons of water that your household uses in one day. Write a paragraph telling me all of the sources where you use water and how much you estimate you use at each source. Turn this in tomorrow.**

Teacher Preparation: Obtain World Map, 1000 ml beaker, 100 ml graduated cylinder, salt, 10 ml graduated cylinder, cooler with ice, eyedropper, small dish, bucket.

**Fourth Day:** (Collect Assignments)

Define Potable. (Add this to the science journal)

Demonstrate the Availability of Potable water.

**Did you hear the drop go into the bucket?**

**How do you explain a statement that “most of the earth is water”?**

**What one substance do we need to survive on another planet?**

Post the Water Availability Table.

Teacher Preparation: Bring Dixie cups.

Assignment: **Bring in some of your own tap water for your classmates to taste. Be sure you use a clean jar or container. Will you be able to take the taste test challenge and pick your water from two other samples from other homes?**

Teacher Preparation: Make copies of Cool Clear Water and The Bath

**Fifth Day: Make sure your water is labeled on the bottom of the container.**

**I need two volunteers to set up the Dixie cups with 3 different tap waters, and one volunteer to try to tell which one is his/her own tap water.** (Pick a person who has one of the three competing waters) Give students 20 minutes to see how well they can recognize their own water.

Read Cool Clear Water and The Bath from Easy Street in Project Wet.

Assignment: **Ask your grandparents about water availability when they were growing up. Report orally to class tomorrow.**

Teacher Preparation: Copy Drought Days Simulation and Water Use Calculations, calculators.

**Sixth Day: Water is Limitless. True or False?**

Allow time for students to work through Drought Days Simulation and Water Use Calculations.

**How could you get along with less water usage per day?** (answers)

**We're going on a camping trip to an island. All of our belongings have to be taken 4 miles from shore by canoe. We are staying for 4 days and 4 nights. There is no water on the island and the lake water is not safe to use. What are some of the things that you would need water for? At what points could you get double use out of the same amount of water?**

Teacher Preparation: Glass baking dish, sand, grape flavored drinking powder, spray bottles, sharp pencils, copies Data Set 2 (page 313) and the Community Map from A Grave Mistake, Project Wet. (page 315)

**Seventh Day:** Define Ground Water and put it in Science Journals. Demonstrate a Plume with the sand and spray bottle and buried powder. Define plume and put it Science Journal.

**What types of situations may cause pollution in wells?** (List on board)

**You are being handed a scenario where a physician has a mystery. Read it.**

**Are there any words that we need to define?** ( Possibilities include preservatives, chronic, contaminated, parts per billion, existence)

**Here is a Community Map. Let's look it over and get an understanding of the symbols and areas. What is the point of highest elevation? What is the point of lowest elevation? Which way will ground water move?**

**Now look at your contamination data (data set 1) on the right side of your map and plot the data from the southern border of the map upward. Use colored pencils to mark the well with its number of parts per million.**

Color Code on Board:

- Light Blue = 0 ppm
- Dark blue = 1-9 ppm
- Light green = 10-15 ppm
- Dark Green = 16-20 ppm
- Yellow = 21-25 ppm
- Orange = 26-30 ppm
- Red = 31 and over ppm

Skip Race Against Time, Wait for all 15 students to finish coloring.

**What is your opinion about who is polluting?**

**What should your town do with this information?**

**What options will the factory be given in light of this information?**

(Remember if the factory shuts down, your family's jobs will end.)

Announce: **The factory has proven that it is not responsible for the contamination. What should be done now? (answers)**

**Eighth Day:** Hand out data set 2 with new test drillings results. Allow time for students to map these.

**Map these new test sites. Make anything over 50 ppm a very dark red.**

When everyone is done, ask them what evidence of pluming they have.

**What do you see as a source of some kind of contaminant from your mapping of the test results? This is called pluming. It involves the ground water.** (Review terms)

Read "Background Information from page 311. Define pesticides, seepage, hazardous, natural concentrations, embalming, degrade, acute, chronic, ingests.

Sidetrack: Reason for embalming? Dead Ringer meaning.

Assign: **From sometime in the future, you and a partner are to write a script for two news anchors about water. It can be good news or bad news but include a lot of details and some talk between you and your news partner. You will perform this skit for the class in 3 days.**

**Ninth and Tenth Day:** Allow time for students to write and practice their skits.

**Eleventh Day:** Students perform their skits. The class and the teacher fill out and evaluation form.

**Twelfth Day:** Today you will design a poster, using color and detailed drawings/ art to educate the public about an aspect of the water cycle, ground water, potability, pollution, etc. Use your imagination and creativity. Look through your notes for a concept that you want to educate about. (Hand out materials)

**Thirteenth Day:** Water Games Day. Water balloons, squirt gun fights, Dunking booth, Swing a bucket of water, Fishing game, Ice Cube Races, etc. This is to be a celebration of water.

## Evaluation

1. **Completeness of Text Questions (6 points)**
2. **Paragraph about types and volumes of household water use. (10 Points)**
3. **Paragraph on History from Grandparent(s) or older person (10 Points)**
4. **Water Cycle Map (5 Points)**
5. **Tap Water comparisons (5 points)**
6. **Water Use Calculations (5 points)**
7. **Community Map of Arsenic Pollution (10 points)**

**Total Points possible for Excellence on these items: 51 points.**

### **Rubric for Skit on Water News from Future**

Yes	No	Student worked well with partner, exchanging dialog.
Yes	No	Student demonstrated knowledge about water by using vocabulary words in the newscast.
Yes	No	Student was creative in thinking of future news item.
Yes	No	Student spoke loudly and clearly, using vocal expression that showed this was rehearsed.
Yes	No	Student used props or had some way of making the newscast interesting.

### **Rubric for Poster on Education of the Public about Water**

Yes	No	Student used color and pictures to catch the eye.
Yes	No	Student spelled all words correctly.
Yes	No	Student spaced the items on the poster well.
Yes	No	Student made his/her point well.

*“Water is a traveler on the blue planet. Flowing water carves monuments from rock, alters boundaries between land and sea, and frozen in the form of glaciers, scours the landscape. Water weaves together all living and nonliving things in an intricate tapestry of color, light, and movement. So much a part of us and our routines that we often take it for granted and forget that water---a gift of nature---is life.”*

- WATER: A Gift of Nature

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