

Water Witching: Fact or Fiction?

Grade Level: 10-12

Scale: Local

Keywords: water science, witching, data collection

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Time requirement: 4-50 minute class periods

Overview:

Have you ever wondered how the pioneers and early settlers found water? There were no maps, GIS equipment, or any other technology to find underground water. Today, we have numerous ways of finding that type of information from soil maps to remote sensing, it is easy to find where water is located. Water was just as much of a precious resource back then as it is today. The quality of the underground water can also be greatly impacted by soil health. Conservation tillage, crop rotation, and using cover crops are a few of the ways that farmers can protect the health of the water that is found below the ground.

In this activity, you will be trying your hand at a historical way of locating water underground. Using two rods, you will be looking for underground water around the school. As your group locates water, you will use 1,2,3 Survey to document the exact location of your find. When we go back to school the next day, we will be using GIS technology and local maps to see if any of your water locations are accurate.

Required materials: Two metal rods for each group, phones with navigation applications, local soil maps, and access to 1,2,3 survey and ARCGis mapping system technology.

Student Objectives:

1. Understand how the process of water witching was used to find underground water throughout history.
2. Demonstrate knowledge of using data points to locate water sources on maps.
3. Locate water sources using longitude and latitude on a GIS map.
4. Create a story map of the water locations that they find using this process.

AFNR Standards:

AFNR.HS.3.1.d Apply cartographic skills to natural resources.

AFNR.HS.3.2.g Explain how technology has affected the use of our natural resources

NE State Science Standards:

SC.7.13.5.B Construct a scientific explanation based on evidence for how the uneven distributions of Earth's mineral, energy, and groundwater resources are the result of past and current geoscience processes.

SC.HS.2.2.B Evaluate questions about the advantages of using digital transmission and storage of information.

SC.HS.2.2.E Communicate technical information about how some technological devices use the principles of wave behavior and wave interactions with matter to transmit and capture information and energy.

SC.HS.4.4.F Develop and use a model of two objects interacting through electrical or magnetic fields to illustrate the forces between objects and the changes in energy of the objects due to the interaction

SC.HS.13.3.D Plan and conduct an investigation of the properties of water and their effects on Earth materials, surface processes, and groundwater systems.

Suggested Procedure:

Day One: (15 minutes)

Have students research the concept of water witching and be able to discuss the following questions:

1. How was water witching historically to find water?
2. What is the best method for finding water?
3. How does it work?

Then, divide students into groups and have them locate or load a navigation application on their phone or device. They will need an application that will give them their exact location using longitude and latitude. (15 minutes)

Next, have students watch a short youtube video about the art of water witching:
<https://www.youtube.com/watch?v=C4zHxP1L8O8> (5 minutes)

Ask students what their initial thoughts are about water witching; Has anyone ever heard of it? Is it science or something else? Do you think that only certain people can actually do it? (15 minutes, leave time for additional web searches for more information.)

Conclude with a simple introduction to Survey1,2,3. Explain that students will be performing a simple survey tomorrow to learn how to use this technology.

Day Two: (10 minutes)

Students will be introduced to Survey 1,2,3. Show them how the data they collect will be used to create a map with pin points of each location around the school where they find water. For today, they will be using it to locate the data points for the following landmarks around the school: (Examples: water tower, football scoreboard, school bell, flagpole, and greenhouse.) Use any landmarks that students are familiar with around your school.

Students will collect the data outside, (25 minutes) then show their maps to you for feedback. Be sure to check for understanding that students can connect the longitude and latitude of

actual locations and can see them in the final map that they create. Have students show you the map they created with their collected data points. (10 minutes)

Day Three:

Have each group write a hypothesis about who will be able to find water, and how many data points they will expect to find during the class time. (5 minutes)

Give each student group two L shaped metal rods for locating water lines. Then, take students outside to locations around the school where they can practice witching for water. One student will take both rods, and while walking, have them walk until the rods cross. Wherever they cross, have students collect the longitude and latitude of that specific point. They can record this digitally or on paper. Have students utilize the entire class period to find water. Use local maps to help students get started by giving them actual water line locations. When they know what to look for and how the lines will cross, their group can then explore different locations and find their own water lines to record data for. Make sure students are recording data and mapping in survey 1,2,3. (45 minutes) Students can also take pictures for their final story map project to completed Day Five.

Collect students and have them share if and how many data points they located. (5 minutes)

Day Four: (May need to repeat day three or allow for more time to finish locating data points.)

Have students locate their survey and map. With the map pulled up on a computer, have students find the locations using The USDA's "Web Soil Survey Maps" page. (<https://websoilsurvey.sc.egov.usda.gov/App/HomePage.htm>) (10 minutes)

Then answer these questions: (Include this information in the final story map-30 minutes)

1. Were any of your data points correct? If so, which ones?
2. What could account for an inaccurate data point?
3. What effect did other group members have when finding data points?
4. How would you explain this? (some members could find water, some could not)

Check for questions and allow more time or summarize group answers to questions. (10 minutes)

Day Five:

Students will determine their percentage of accuracy by using this method. They will take the number of correct data points and divide that number by the total number of data points. (10 minutes)

They will then create a story map on ArcGis with their correct underground data points. (<https://www.arcgis.com/home/index.html>)

An introduction to water witching and pictures should be included in their story. Students will share their map and experience with the rest of the class upon completion. Use pictures, maps, and data points to share their experiment. Here they will include the answers to questions from Day four as well. (40 minutes)

Add an extra day for presentations if desired.

Project Rubric

Procedure was followed and students recorded 5 data points (8-10 points)	Procedure was followed, only 4 data points recorded (6-8 points)	Procedure was partially followed, only 2-3 data points. (3-5 points)	No procedure was used, very little data was obtained. (0-3 points)
Map was created using Survey (8-10)	Map was created using Google or other format (6-8)	Map was created with only 2-3 points. (3-5)	No map was generated (0-3)
Comparisons were made between survey map and websoilsurveymaps, both used in story map. (8-10)	Both maps were included in story map, no comparisons made. (6-8)	Only one map was used in the story map. (3-5)	No maps were included in the story map. (0-3)
Hypothesis was used to direct the experiment and included in the story map. (8-10)	Hypothesis was written but not included in the story map. (6-8)	Hypothesis was only included in the story map. (3-5)	No hypothesis was written or used in the story map. (0-3)
Pictures and historical data were used to explain the purpose of water witching, and what happened in the students' experiment which is included in story map. (8-10)	Historical information and experiment were included in the story map but no pictures are found. (6-8)	Pictures and data from the experiment are included in story map, but no historical data. (3-5)	No pictures or historical data, only data from the experiment are included in the story map. (0-3)