People of the Plains: Using the Abundant Wind to Provide Water

PPHM: Field Trip Plan

The Big Questions:
1. What the sources of water in the Texas Panhandle?
2. Why have people created windmills?
3. What are the positive and negative consequences of using water from the aquifer?

Materials: (the placards will be provided by PPHM).
1. Placards 8½ x 11 size with vocabulary terms for arid, semi arid, playa lake, aquifer, & technology
2. Placards 4x6 size with pictures of the various water containers in the Most Precious Resource exhibit. There should be one set for about every four students.
3. Placards 4x6 size with the questions listed in part 3.
4. Placards 4x6 size with questions for the windmill room listed in part 8. Each placard should combine question 5 with one of the other questions.
5. Small stickers of some kind that can be easily removed. Two colors are needed. There should be enough for each child in a group to have one sticker of just one color. (Stickers will be provided by PPHM).
6. Clipboards with the note taking form attached and pencils. (clipboards and pencils will be provided by PPHM).

The Field Trip:
1. Engagement: Pass out clipboards with the note taking form attached as well as pencils. Gather your students at the beginning of the People of the Plains permanent exhibit under the sign entitled Experiments in Living.
   a) Identify the necessities of life: food, shelter, clothing, & water
   b) Ask students the places where we can get water. (streams, lakes, rain, wells) Unless a student brings it up, do not mention aquifers as a water source until later.
   c) Students answer the first question on their note taking form.

2. Move to the Living on the Land exhibit.
   a) The Panhandle has an arid to semi-arid climate. (Show the placard with the definition).
   b) Lead the students in a discussion which leads to the conclusion that living in the Texas Panhandle has always been dependent upon having a dependable water source.
c) Ask the students to decide which of the water sources they named earlier are dependable all the time. *There may be a drought, so rain is not dependable.* Most students should be able to know from personal experience that many streams and lakes in the Panhandle are often dry or almost dry. So, the most dependable source we have is wells.

3. **Exploration:** Move to the *Most Precious Resource* exhibit. You will need the water container pictures and question cards for this exhibit.

   a) Divide the students into ability groups with about 3-4 students per group. Direct them to align the pictures of the water containers in a timeline of when they have been used.

   b) Give each group copies of the question cards. Assign each group the responsibility to present to the class their answer for 1-2 questions appropriate for their ability.

      i) Why is it important to be able to carry water with you?
      ii) How did you know where to place the objects in your timeline?
      iii) Why do you think the museum put these water containers on display?
      iv) Which containers were probably made by the user and which were manufactured? How can you tell?
      v) What materials have been used to make these containers?
      vi) What changes have occurred in the kinds of materials that have been used to make water containers?

   c) Direct students to complete the water container section on their notes.

4. Move to the large floor map of the panhandle and surrounding area.

   a) Identify the water sources on the map. *Notice there are no lakes.* This map depicts the Panhandle prior to the formation of reservoirs such as Lake Meredith.

   b) Have a student trace the path of the Canadian River. Explain that this was the only stream that flowed year round in the days of the Native Americans and pioneers.

   c) Flip through the pictures on the stand. Notice the picture showing Antelope Creek. Find it on the map and identify it as one of the oldest places in the Panhandle where people lived.

   d) Locate Antelope Creek on the map. Place one of the removable markers there.

   e) Give out markers to about half of the class to place on the map at locations that seem to be good locations for permanent settlements. Students need to explain why there choice is a good location. Their answer should relate to a dependable water source.
f) Give out markers (different color) to the remaining students to place on the map. These markers go at places that would be poor locations for a permanent settlement. Students need to explain why their location is a poor choice. Explanations should relate to the lack of a dependable water source.

5. **Explanation:** Move to the *Cool Drink of Water* exhibit.
   a) Amarillo is located near a **playa lake**. (Show the placard with the definition).

   b) What is the name of this lake?

   c) See the nearby window display to identify the plants and animals common to a playa lake.

   d) Students write a definition for a playa lake in their notes using their own words.

6. Move to the map of the Ogallala Aquifer.
   a) In part 1 of the field trip, water sources were named. Only one is dependable, wells.

   b) People can dig or drill wells to get water. The water we get from wells comes from an **aquifer**. (Show the placard with the definition of aquifer).

   c) Refer to the map and ask, "How much of the Texas Panhandle sits atop the aquifer?"

   d) Students write a definition for aquifer in their notes using their own words.

7. Move over to the windmill model
   a) People are able to build towns, farms, and ranches in places where no natural water sources exist because of **wells and technology**.

   b) The technology to remove water from the aquifer consistently at a low cost came in the form of the windmill.

   c) Ask students to give a definition of **technology**. Show the placard with the definition.

   d) Ask students to describe the parts of the windmill.

   e) Have students operate the windmill and explain how it works to pump water.

8. **Elaboration:** Move to the windmill room
   a) Why take up a whole room with windmills? *Windmills changed the way people live in the Texas Panhandle. Windmills made it possible for people to move into the Panhandle without a nearby water source such as stream. The windmill allowed many more people to live here.*

   b) Slowly turn the windmill set up at the entrance to the room. Have students watch the shaft slowly go up and down and compare it to the model in the previous room.
c) Have students make a simple sketch in their notes and write an explanation in their own words of how a windmill works.

d) Send students out with one of these questions on a placard:
   i. Do windmills come in sizes? How big is the largest windmill in this room?
   ii. Are there brands like we have in soft drinks or cars? What are the brand names?
   iii. What materials are windmills made of?
   iv. Are all windmills used to pump water?
   v. Which is your favorite? Why?

9. Move to the *Ogallala – Hidden Waters* exhibit

   a) Students explain the water cycle as it works on this exhibit.
   b) How have people figured out ways to get water into the Panhandle?
   c) What are the positive and negative effects? Complete the final portion of the notes.

10. Back to the windmill room

   a) Ask students, "When and how much does the wind blow in the Panhandle?"
   b) Refer students back to the first question in their notes and ask them to revise their answer using the new information they have learned in this field trip.

11. **Evaluation:** This portion is to be completed back at school.

   a) The point of the field trip: Before electricity, water pumps were available. The scarce resource of water was provided to the Panhandle by our abundant resource, wind. In some cases windmills are still in use to pump water in remote areas.

   b) Assign students to create an illustration of the water cycle that includes a windmill pumping water from an aquifer. Appropriate labels should be included.

12. **Accommodations**

   a) Suggestions for special needs students
      i) For note taking encourage picture drawing before writing their own definitions.
      ii) Be prepared to help with reading.
      iii) Match these students with the appropriate questions in part 3

   b) Suggestions for G/T students
      i) For note taking encourage use of vocabulary learned today
      ii) Match these students with the appropriate questions in part 3
iii) In part 4, be sure these students are evenly split between the 2 sticker colors you hand out. The questions in this section are designed with G/T students in mind.