

6th Grade
Water Quantity

The Ups and Downs of Your Watershed

LEARNING OBJECTIVE

The student will be able to determine that the amount of fresh water is a limited resource, which is managed through the use of reservoirs.

STUDENT PERFORMANCE OBJECTIVES

- * The student will determine the percent of water present on Earth and the percent of water, which is available for use by plants and living organisms.
- * The student will define a reservoir and other points where water is collected such as aquifers and wetlands.
- * The student will discuss ways in which water is managed and the importance of reservoir management.
- * The student will graph their watershed using both a landsat map and [Arcview?] or a topographic map.
- * The student will discuss water ownership and cost of water usage.

BACKGROUND

Water is a perpetual resource, which constantly cycles in our environment. The water we use today is the same water, which has been used for thousands of years and hundreds of generations. Due to this cycle students as well as adults often believe that the supply of water is unlimited. This is true to the extent that water is continuously present and always will be. However, the amount of water which is usable for drinking, household use and irrigation, is limited.

The Earth is covered with water, 97 percent of which is salt water. Only three percent of the water is available as freshwater and with two percent tied up in glaciers and polar ice caps that leaves only one percent in lakes, rivers, streams or groundwater.

Water evaporates into the atmosphere and is deposited back on the Earth through the hydrologic cycle. Some of this water is deposited in rivers and streams and still more is absorbed into the ground as groundwater. As water runs, underground or downstream, it is deposited in lakes, wetlands, aquifers and oceans.

Reservoirs, usually an artificial lake used to collect and store water, are filled by rain and rivers or streams that flow into them.

Wetlands are the areas between dry land and water. Usually low-lying areas of land that are wet during extended periods of time. These areas occur naturally and have been significantly shaped by the presence of water over time. Left alone these areas often serve to clean and purify many contaminants from the fresh water.

Aquifers begin below the land surface where the water collects in large quantities. Aquifers sometimes provide water to lakes and reservoirs.

All water sources and the land that supplies them are part of a watershed. A watershed is the land area from which water drains into lakes, rivers, streams and reservoirs. Each local watershed is part of a larger watershed which is a part of the global watershed. The activities that we do as well as the components within such as the soil type affect our local watershed.

See other lessons on water, watersheds, where water goes, reservoirs, groundwater and aquifers, and watershed conservation.

<for more>

*Globe beach ball (If rivers are not present on the ball, you may wish to draw them; otherwise, the lake areas will serve as the freshwater in the activity).

* Datasheet [Wqty/6-1]

*Diagram [Wqty/6-2]

* Stream table materials

Flat trough or tray (foil baking pans work great)

Sand/silt mixture

Supply hoses

Supply bucket (bucket with hose coming out of the bottom)

Catch bucket

Pinch clamps (optional)

Brick or block of wood to elevate one end of stream table

* Alternative materials for stream table

squeeze bottle

tray (such as foil baking tray)

sand

* Map of Denton's watershed from Ecoplex ([download Ecoplex map](#)).

* [Landsat map] or Topographical

* [Arcview? software download] *web address to their homepage for this? *

* Protractor (optional)

OPENING

Ask the class:

Where does the water in your homes come from? How do you get that water? Is the water free?

Discuss with the class:

Water covers the majority of our planet; however, freshwater is a precious resource, which is limited.

PROCEDURE

1. Using a globe beach ball to toss around the room, have the students record where their right index finger lands on the ball. Toss the ball 25, 50 or 100 times to get a good sample and to make calculations easier. Students will record in appropriate columns on the datasheet [Wqty/6-1].
2. Students will then answer the questions on the data sheet to calculate the percent of times they recorded Land, Total water, Ocean Water, Ice Cap Water and Available Fresh Water.

(Approximately 75% of the Earth is covered in water. Ocean water makes up approximately 97% of all water, Ice caps 2% and Available Fresh Water makes up approximately 1%)

3. Students will create a pie graph to display their data according to the directions on the data sheet. You may want to have them use a protractor to accurately display their percents on the graph.
4. Have the students compare the amount of Land with the amount of Total water on the Earth. Discuss with the students that Ocean Water contains too much salt to drink or use for our plants and animals on land.
5. Discuss with the class that fresh water is a limited resource and must be conserved and managed.
6. Ask the students where do we find our Fresh Water? Have the students brainstorm where our water comes from.
7. Review the water cycle with the students and discuss how water cycles in the environment.
8. Discuss the path of freshwater from the beginning of a stream into a reservoir. Have the students draw and label the path of a stream using the topographical map of Denton ([download Ecoplex map](#)).
9. Have the students work in groups to create a stream table to demonstrate the path of the stream (see diagram [Wqty/6-2]).
 - a) Set tray or trough on table
 - b) Add sand/silt mixture to one side of the tray (it may cover up to $\frac{3}{4}$ of the tray).
 - c) Create a stream in the sand/silt mixture.
 - d) Elevate the sand and stream side of the tray on a brick or block of wood.
 - e) Place a supply bucket on the sand side of the tray so that it is elevated above the stream table.
 - f) Place the supply hose at the beginning of the stream.
 - g) Place the catch bucket at the bottom and below the reservoir end of the stream table.
 - h) Place the catch hose with one end in the reservoir of the stream table and the other end in the catch bucket to siphon out the water.

(Optional: Use the pinch clamps to control the flow of water into the stream)
10. Have the students observe how the flow of the stream affects the reservoir and the land forms.
11. Discuss how water gets into the streams (rain, drainage, etc.).
12. Discuss how the amount of water in a stream affects how much water goes into the reservoir.
13. Define a watershed as an area of land that drains into a reservoir or water basin. The watershed is the land area from which water

drains into lakes, rivers, streams and reservoirs. Show the students a map of Denton's watershed ([download Ecoplex map](#)). Explain that most of Denton is in the Pecan Creek watershed which is a part of the larger watershed known as Elm Fork.

14. Have the students graph their watershed using a landsat map or topographic download map and determine the water areas using Arcview? software.
15. Discuss the characteristics and uses of a reservoir and other components within their watershed.
16. Define and discuss other areas where water is collected naturally in the environment such as aquifers and wetlands.
17. Discuss the importance of the management of reservoirs, aquifers, wetlands, streams and other components of their watershed.
18. Have the students determine that the watershed and reservoir must be managed and discuss who manages it and why.
19. Discuss that different cities own different parts of the water and we buy our water in order to pay for the management of this resource.

Have the students come up with a law to assist in the management of Denton's watershed.

SO WHAT? (LIFE APPLICATION)

CURRICULUM EXTENSIONS

Math:

Have the students calculate the rate at which water flows through the stream table (example: depth in centimeters per second)

Language Arts:

Have the students write a letter telling a friend how the water that they see going through the storm drains gets into the streams (like Pecan Creek) which end up in our reservoir.

Technology:

Have the students create a database to chart the flow (depth in feet or inches per second) of the creek in their watershed over a period of time.

Have them create a section for rainfall and compare the rate of flow to the amount of rain in the same time period.

Compare the water in the creeks and the rainfall to the water levels at Lake Lewisville from the [Ecoplex web site](#).

Art/Music:

Have the students draw and label the different parts of their watershed.

Science:

Have the students play a water rationing game to determine the

importance of reservoir management. (A good example would be AIMS: Water Island; Water Precious Water, Book A pp 74)

Social Studies:

Have the students look up all of the streams and creeks that drain water into our reservoir Lake Lewisville. Have the students discuss who which city or cities use the water in Lake Lewisville and how managing that lake is a big responsibility to make sure that all cities can have access to the water they need.

TEKS: 6.1(B), 6.6(C)

Denton ISD SPO: S7.2, S6.1, S5.3S1.3

RESOURCES

[ECOPLEX WEB SITE](#)

<http://www.ias.unt.edu/projects/pecanecreek/pc.jpg>

<http://www.ias.unt.edu/projects/elmshead/ef.gif>

<http://www.epa.gov/surf3/counties/48121>

<http://www.4j.lane.edu/partners/eweb/ttr/curriculum/watershd.html>

http://water.usgs.gov/outreach/poster4/middle_school/Page1.html

<http://www.und.nodak.edu/instruct/eng/fkarner/pages/hands.htm>