

Lesson 7

Carrying Capacities

What is a reservoir and how is it used?
What is the name of the largest reservoir in Farmington River Watershed?
What are carrying capacities?

GOAL To understand the enormity of reservoir carrying capacities

OBJECTIVES Students will:

- ✓ identify and locate reservoirs on a watershed map
- ✓ conduct calculations to understand the size of a reservoir
- ✓ relate size of reservoir to school gym

MATERIALS watershed maps, paper, plastic gallon jug for five groups, rulers, pencils, calculators

CORE CURRICULUM CONTENT STANDARDS

- Math 1(1,2,4), 2(3), 4(1), 5(1), 7(9)
- Science 8(2,6) 14(1-4, 6,7)
- Social Studies 2(2), 9(1-4),10(1), 11(1,2,4,5) 12(3), 13(2,4,5)

VOCABULARY reservoir, carrying capacity

PROCEDURES

1. Begin by discussing the term reservoir with students. Ask students what they are and their purpose. (*artificial lakes made by impoundments; storage for drinking water*).
2. Discuss carrying capacities of reservoirs (*amount of water they are able to hold*). Explain that the Farmington River Watershed has ten reservoirs and three are used solely for drinking water storage (*Barkhamsted, Nepaug and Whigville Reservoirs*). They are able to store billions of gallons of water. Have students comprehend the enormity of the volume through math calculations.

3. Distribute watershed maps (from CD Selected_Dams_Mapr) and have students identify the locations of the following reservoirs:

Otis Reservoir - 5.8 billion gallons

Colebrook Reservoir - 32.1 billion gallons

West Branch Reservoir - 6.5 billion gallons

Barkhamsted Reservoir - 30.3 billion gallons

Lake McDonough - 2.9 billion gallons

Nepaug Reservoir - 9.5 billion gallons

Mad River Detention Reservoir - 3 billion gallons

Highland Lake - 482 million gallons

Rainbow Reservoir - 4 billion gallons

Whigville Reservoir - 37 million gallons

4. After completing activity, divide students into four groups. Provide each group with one gallon jug, a ruler, paper, pencil and calculator. Assign one reservoir listed above to each of the four groups.
5. Initially, have students practice calculations to determine how much space is needed for the Colebrook Reservoir (32.1 billion gallons).
 - a. Have students calculate how much room is used by 32.1 billion jugs. Have them measure the volume of the gallon jug with a ruler. Measure and multiply the length, width, and depth in inches. For example, if the amounts were 5 inches × 6 inches × 10 inches, the total would equal 300 cubic inches or .17 cubic feet/gallon.* (*300 inches ÷ (12in/ft × 12 in/ft × 12 in/ft) = .17 cubic feet) To calculate the amount of space used by the 32.1 billion containers, have students multiply .17 cubic feet/gallon × 32,100,000,000 gallons. This is an area of 5,457,000,000.
 - b. Have students calculate how many gallons would fit in school's gymnasium. Have them measure the volume of the gym and divide that number by the volume of one jug. For example, if the room is 20ft x 50ft x 50ft, the total volume equals 50,000 cubic feet. 50,000 cubic ft ÷ .17 cubic ft equals 294,118 gallons in one gym.
 - c. Have students measure how many gyms it would take to store the 32.1 billion gallons. 32,100,000,000 gallons ÷ 294,118 gallons = 109,140 gyms filled with gallon jugs. This is the amount of space used by the Colebrook Reservoir to store the 32.1 billion gallons of water.
6. Have student groups continue with the other calculations for the remaining reservoir carrying capacities.

EXTENSIONS

1. Have students visit one of the reservoirs to view its size. Instruct them to research and determine what water-related activities are allowed at each of the five reservoirs.
2. Have students identify wildlife at each of the reservoir locations. Have them indicate if particular species inhabit these areas.

RESOURCES

Farmington River Watershed Association, August 2003, *State of the Farmington River Watershed Report*, Farmington River Watershed Association, Inc.

Haskin, Kathleen M., *The Ways of the Watersheds: An Educators Guide to the Environmental and Cultural Dynamics of New York City's Water Supplies*, 1995, Claryville, NY: The Frost Valley YMCA

GLOSSARY

carrying capacity - the ability or amount that can be held or stored

reservoir - a natural or artificial pond or lake used for the storage and regulation of water