

Lesson 4

Water Power

What are the positive and negative impacts of dams on a community?
What are names and locations of dams in Farmington River Watershed?
Why are dams built?

GOAL To understand that there are negative and positive effects of altering the flow of a river.

OBJECTIVES Students will:

- ✓ research facts about dams in the FRWA
- ✓ realize that a dam is an unnatural impoundment and creates diversions that positively and negatively impact the watershed
- ✓ debate the issue

MATERIALS Selected Dams Map (on CD), pencil, paper

CORE CURRICULUM CONTENT STANDARDS

- Language Arts 1(4,5)
- Science 7(6,8), 8(2,3), 12(4), 14(1-4,6-7)
- Social Studies 9(1,2), 12(4,5,7,8), 13(5,7)
- Arts 1(3)

VOCABULARY dam, hydroelectric power, impoundment, turbine, generator

PROCEDURES

1. Begin the lesson by asking students if they know what a dam is. (*strong, thick wall across a river valley to hold back water*). Ask students why they are used to hold back water. (*create lakes, called reservoirs, that store water safely for drinking; flood control; hydropower*). Water can then be gradually released downstream.
2. Continue by asking if they know of any other uses. Ask them if the force of water is able to generate any type of power. (*hydroelectric – “hydro”(water) and electric = waterpower*). Explain that a power station that uses water to make electricity is called a hydroelectric power station. Water from reservoirs behind dams move turbines that make electricity. In the powerhouse at the bottom of the dam, fast-flowing water pushes huge turbines. They in turn drive generators that create electricity. Cables then carry electricity to homes and factories.
3. Ask if they are familiar with names of any dams. (*Hoover*) Determine if they are familiar with any dams in the Farmington River Watershed. (*Saville, Rainbow*). Ask if any of them help generate electricity.
4. Provide the following information to the students. A series of dams or impoundments have been constructed in the Farmington River Watershed. They are as follows (from upper to lower watershed):

- a. **Colebrook Dam** – constructed 1969 – maintained by U.S. Army Corp of Engineers – hydropower facility – flood control – Colebrook Reservoir – recreation – possible drinking water storage
 - b. **Goodwin Dam** – constructed in 1960 – West Branch Reservoir – hydroelectric power
 - c. **Saville Dam** – constructed in 1940 - Barkhamsted Reservoir – drinking water - hydroelectric
 - d. **Richards Corner Dam** – constructed in 1920 – Lake McDonough – recreation – compensating reservoir
 - e. **Nepaug Dam** – constructed in 1916 - Nepaug Reservoir – drinking water
 - f. **Mad River Dam & Sucker Brook Dams** – 1963 & 1970 – Winchester
 - g. **Robertsville Dam** – hydropower (unlicensed) – stream flows not adequately managed
 - h. **Upper and Lower Collinsville Dams** – last major impediment to fish migration – redevelopment would include a fish ladder
 - i. **Hartford Electric Light Company Dam** – 1899 - East Granby – electricity - washed away in flood of 1955 – remnants still obvious – safety hazard below Tariffville Gorge
 - j. **Rainbow Dam** – Rainbow Reservoir – 1976 – hydropower – fish ladder for anadromous (*fish that return from sea or ocean to breed or spawn fish, such as salmon*) – largest generator of electricity on Farmington River
5. Have students break up into groups. Each group will conduct research on one of the dams. Have students use the Farmington River Watershed Association website to research their information. (www.frwa.org). Find the “State of the Watershed” Report. Click on it and go to the body of the report to research information about impoundments or dams. Students will answer the following information and present to the class:
- a. Locate the dam on a watershed map. In what town(s) is the dam located?
 - b. If there is a reservoir, what is the name of the reservoir? What is the carrying capacity of the reservoir?
 - c. When was the dam built? Why was it built? What are its dimensions (if available)?
 - d. Is hydroelectric power available as a result of the dam being built?
 - e. Are there any other unique or interesting facts about the dam?
 - f. As an added option, students may build a model of a dam.

6. Students will debate different sides of the dilemma of building dams. The following information may be provided to students:
 - Dams are constructed for flood control
 - Hydropower can be a result of dams
 - Water storage for drinking water
 - Alters the entire river system
 - Natural flow is eliminated
 - Negatively impacts aquatic life
 - Sediments and nutrients are trapped behind dams, where flowing rivers flush them out
 - Provide reservoirs for recreation
 - Can cause low flows in other parts of the rivers
 - Regulated cold water releases can help support aquatic life and river habitat.
 - Can prevent migrating fish from returning to spawn
 - Fish ladders can help migrating fish
7. Have half the students support the building of a dam and the other half provide the negative effects of building a dam. Students will work together to provide reasons to support their view on the issue. Students may use the information provided above and also conduct additional research. Have students debate in class.

EXTENSIONS

1. Have students visit a dam and/or reservoir in the Farmington River Watershed.
2. Have students explain why the fish ladder at Rainbow Dam is vital to the salmon and shad returning to spawn.

RESOURCES

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

GLOSSARY

dam - a barrier constructed across a waterway to control the flow or raise the level of water
generator - machine that converts mechanical energy into electrical energy
hydroelectric power - the cycle of evaporation and condensation that controls the distribution of the earth's water as it evaporates from bodies of water; also called water cycle
impoundment - the act of accumulating and storing water in a reservoir
turbine - machine in which the kinetic energy of a moving fluid is converted into mechanical energy by causing a bladed rotor to rotate