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GED 2002 Lesson Plan

STORAGE WATER IN CLIFF LAKE RESERVOIR

Areas – Science/Mathematics

Lesson Numbers - Science lessons 8 and 10; Mathematics Lessons 15 and 18

Goal/Objective

Students will analyze a cause and effect in Earth science. Students will learn about the water cycle in an ecosystem. Students will learn about measuring volume and time. Students will learn to apply algebra to real life situations.

Lesson Outline

Introduction

The water we use locally for agriculture is a part of the “water cycle.” During the ice age a glacier eroded a cirque, which filled with water after the glacier left the valley to form Cliff Lake Reservoir. In the early 1900’s the Ouray Park Irrigation Company enlarged the capacity of the lake that had existed since the ice age by adding a dam with a head gate to control the water. The Irrigation Company stores water from the spring run off and use it later in summer when it is needed for crops.

Materials Needed

Map of Cliff Lake Reservoir/Whiterocks River Drainage, geology text or information, pencil and paper, and measuring tape.

Activity

1. Have students locate Cliff Lake Reservoir on a map. Discuss glaciers as erosional forces. Analyze the map and look at photos of Cliff Lake. Point out the erosional features produced by the glacier. Cliff Lake Reservoir lies in a cirque produced by a smaller glacier that joined a larger glacier from the side, forming a “hanging valley.” The stream running from Cliff Lake Reservoir and this valley drop into the main valley in a steep waterfall.
2. Explain the “water cycle.” Heat from the sun causes large amounts of water from oceans and from freshwater sources to evaporate. When the air cools, water vapor condenses, forming clouds. The water droplets in clouds become heavy as the clouds raise to go over the Uinta Mountains where Cliff Lake Reservoir lies. These droplets fall to the Earth in the form of rain or snow. Some of this water “runoff” goes into Cliff Lake Reservoir where it can be stored.

3. The Ouray Park Irrigation Company has made the dam high enough to store 1,128 acre-feet of water. Discuss with the students what an acre-foot is: the volume of water that will cover an area of one acre to a depth of one foot. To help students understand the size of an acre, have them measure off an acre. Have the students figure the area of an acre. After the spring runoff in the year 2000, however it had only filled half way with 564 acre-feet. To use this water it must be released from Cliff Lake Reservoir where it runs into the Whiterocks River. Then the water travels down the Whiterocks River to the Whiterocks/Ouray Irrigation Canal.
4. It is calculated that approximately 10 percent of the water will be lost due to evaporation, plants, etc. To figure this loss we can multiply 564 by 90% (or .90 converted to a decimal) for the water remaining, which would give us 507.6 acre-feet.
5. Next we need to convert the 507.6 acre-feet into cubic feet per second in a 24 hour period by dividing 507.6 by 1.984, which would give us 255.8 cubic feet per second (rounded to the nearest tenth). Discuss with the students what a “cube” is.
6. The Ouray Park Irrigation Company released 25 cubic feet per second from Cliff Lake Reservoir in the year 2000 and needed to determine how many days of water flow they could expect at that rate. Try to have the students visualize a stream of water that has 25 cubic feet flowing past a set point in a second. Have students divide 255.8 cubic feet per second by 25 cubic feet per second a day to find the total of 10.2 days of water for the crops in the Ouray Valley.
7. Have the students write an algebraic expression of the math involved in the Ouray Park Irrigation Company figuring how many days of water they would have from Cliff Lake in the year 2000. For example:
$$\frac{564 * .90}{25 \text{ cfs}} / 1.984$$

Evaluation

In the year 2001 Cliff Lake Reservoir filled clear up with 1,128 acre-feet of stored water. Have the students figure how many days of water the Ouray Park Irrigation Company would have had in this year on their own to let you know if they understand the process.

Real-Life Connection

Have a representative from an irrigation company, a river commissioner, farmer, Geologist, and/or weatherman come and talk to the students.

Extension Activity

Take the students on a field trip to see a reservoir, a glaciated valley, a river, and/ or an irrigation canal.