

Dams

Civil Engineering

Objective

- Explore the environmental impact of dams.
- Discuss the need for dams, and how environmental engineers mitigate some impacts.

Standards and Objectives

- Earth Systems Standard 4, Objective 1

Learning Outcomes

Students will learn:

- The delicate balance between improving humans' standard of living and environmental impacts.
- The basic concept of constructing a dam.
- To understand the complicated issues surrounding many engineering projects.

Essential Questions

- Why do we need dams?
- What are some of the benefits of dams?
- What are the negative impacts of dams?
- How can we balance the benefits and negative impacts of dams?
- What are mitigation strategies and how do they relate to environmental engineers?

Time Required (Itemized)

- Topic Introduction Worksheet & discussion – 30 minutes

Assessments

- Worksheet (attached)
- Optional: homework assignment – students research one dam and write a one-page paper about the dam, the materials used, the purpose of the dam, and some pros/cons of the dam.

Materials

- None

Lesson Description

Civil engineers construct dams for a range of reasons, and dams provide a variety of services. Dams are built for flooding control, water storage, hydroelectricity production, recreation, irrigation, waterway navigability improvement, and industry. On an

interesting note, many of the small reservoirs around the ski resorts in Big and Little Cottonwood are storing water for snow-making.

Questions to ask students:

- Where/what dams have you seen?
- What did the dams look like, how big were they, where were they located?
- Why do you think the dam was constructed? What is its purpose?
- What are the reasons for dam construction? What are some benefits of dams? Why do we need dams?
- What is the purpose for most of our local dams?

Dams are constructed of many different materials. As students list of different dams they have seen, make sure to ask them about the materials used for construction. Many times, concrete is used for hydroelectric dams and dams over which people drive. Earthen dams are used for water storage, flood control, and irrigation. If a dam does not house machinery, turbines, or other internal structures, then it is typically made of earthen materials.

Questions to ask students:

- What are different materials used in dam construction?
- Why do you think they use different materials?
- What types of materials are most often used in local dams? Why?

Dams can be harmful to the environment. The list of environmental impacts include: habitat destruction, native fish species decline, block fish migration pathways, increase upstream flooding, changes downstream ecosystem because sediment deposition is restricted, increases carbon dioxide production because plants are killed and stored carbon is released into atmosphere, downstream water patterns changed, water temperatures decrease, geological formations covered, and archeological artifacts covered and/or lost. Environmental engineers will assess negative environmental impacts and develop mitigation strategies. Some mitigation strategies include: fish ladders, reconstructing habitat on government land, replanting vegetation, annual water release from dam to resemble channel flooding, build smaller dam, and create new fish habitat for native fish.

Questions to ask students:

- What are some negative impacts of dams?
- How can we lessen the negative impacts of dams?
- How do environmental engineers implement mitigation strategies?

Procedure:

- Introduce topic to students by asking students to discuss dams they have seen. Do not go into too much detail at this point. Simply start students talking about different dams they have seen.
- Have students get into pairs. Hand out the worksheet.
- Ask students to complete activity #1 first.

- Have students share their dam benefits and negative impacts. Write their thoughts on the board.
- Discuss the benefits of dams and give any additional benefits the students did not include
- Discuss the negative impacts of dams. Write their thoughts on the board.
- Discuss the negative impacts and list any additional negative impacts students did not include.
- Ask students to complete activity #2 on their worksheet.
- Discuss the students' mitigation strategies. Give additional mitigation strategies the students may have missed.

Note from the College of Engineering:

The PBS series, American Experience, has an excellent episode examining the construction of the Hoover Dam. It can be an excellent addition to the lesson plan, if time allows. The video is available at <http://www.pbs.org/wgbh/amex/hover/>