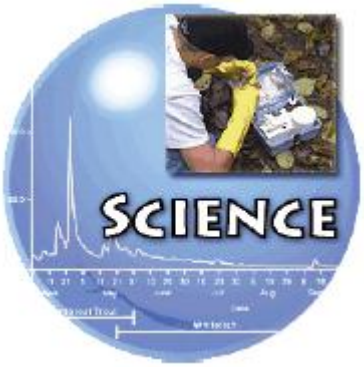
LESSON 6: EFFECTS OF THE ELWHA RIVER DAMS ON SEDIMENTS



ESSENTIAL QUESTION:

What combination of factors both natural and manmade is necessary for healthy river restoration and how does this enhance the sustainability of natural and human communities?

GUIDING QUESTION:

The building of the Elwha River Dams has had a huge effect on the natural sediment transport and sediment structures along the Strait of Juan de Fuca. What benefit will the removal of the dams have to natural and human communities along the Strait of Juan de Fuca as natural sediment transport resumes?

OVERVIEW:

The focus of this lesson is on the effects that building the Elwha River dams had on the natural sediment transport and deposition mechanisms in the Strait of Juan de Fuca. The formation of Lake Mills caused most of the sediment to deposit in a delta at the head of the reservoir, rather than at the mouth of the river. In addition to a large delta, a bed of fine silt covers the lake floor. The loss of this sediment has resulted in severe consequences downstream. Sandy beaches at the mouth of the river, which used to contain rich shellfish beds, have washed away. Salmon spawning beds in the lower five miles of the river have eroded away and sediment transport to Ediz Hook by longshore drift has stopped as well.

TIME:

One class period

MATERIALS:

- **Lesson 6- Effects of the Elwha River Dams on Sediments.pptx**
- **Lesson 6a- Effects of the Elwha River Dams on Sediments.pdf**
- **Lesson 6- Demonstration/Lab Activity Sheet.doc**
- **Dam Breach.pptx**
- **Dan Breach.pdf**
- Stream Table
- Sand
- Blocks or other structures for dam formation
- Reflection Journal pages (printable handout)
- Vocabulary notes (printable handout)

PROCEDURE:

1. Review the essential Question. Introduce the Guiding Question.
2. Students should take a few minutes to respond to the reflection prompts. Discuss their answers and any questions they've generated.
3. Hand out the Vocabulary Notes. Go over the words. Have students define the words as they watch the PowerPoint Lesson. They may need some additional help with definitions.
4. Present the PowerPoint Lesson
5. Run Demonstration on Damming Rivers
6. Run Demonstration on Breaching of Dams
7. Hand out the second Reflection Journal Page. Give students time for a final reflection on the lesson.

WASHINGTON STATE STANDARDS:

SCIENCE

1. **EALR4: 6-8 ES3A** Our understanding of Earth history is based on the assumption that processes we see today are similar to those that occurred in the past.
    a. Describe Earth processes that we can observe and measure today (e.g., rate of sedimentation, movement of crustal plates, and changes in composition of the atmosphere) that provide clues to Earth's past.
2. **EALR 4: 6-8 ES2G** Landforms are created by processes that build up structures and processes that break down and carry away material through erosion and weathering.
    a. Explain how a given landform has been shaped by processes that build up structures and by processes that break down and carry away material.

READING

1. **EALR 1:** The student understands and uses different skills and strategies to read.
    a. **Component 1.2** Use vocabulary (word meaning) strategies to comprehend text.

SOCIAL STUDIES

1. **EALR 5:** The student understands and applies reasoning skills to conduct research, deliberate, form, and evaluate positions through the processes of reading, writing, and communicating.
    a. **Component 5.2:** Uses inquiry-based research.

WRITING:

1. **EALR 2:** The student writes in a variety of forms for different audiences and purposes.

a. **Component 2.1:** Adapts writing for a variety of audiences.

ADDITIONAL RESOURCES AND ENRICHMENT:

DAM REMOVAL

http://www.interactive-earth.com/visualizations/elwha_removal.htm

http://seattletimes.nwsource.com/html/localnews/2001998230_elwha06m.html

http://www.collbett.org/greg/DamWeb.htm

MARMOT DAM REMOVAL

http://or.water.usgs.gov/projs_dir/marmot/index.html

HOW DAMS WORK

http://science.howstuffworks.com/hydropower-plant1.htm

VOCABULARY TERMS:

- **River-dominated delta:** Rivers carrying and depositing great quantities of sediment in the delta will grow outward into the sea as deposition is greater than wave erosion (example Mississippi Delta).

- **Wave-dominated delta:** Rivers carrying and depositing less sediment than what is eroded away by wave action will form rounded fans (such as the Nile delta) or flattened deltas (such as the Klamath River Delta).

- **Long-shore drift:** The movement of sediment down shore in a common direction caused by the combination of the ocean currents, wind direction, tidal movements, and oblique wave action on the shore.

- **Dam:** A barrier constructed across a waterway to control the flow or raise the level of water.

- **Reservoir:** A man-made water containment system often the result of lake filling behind a dam, but also can be water stored in large tanks or underground storage.

Elwha River Restoration
Effects of the Elwha River Dams on Sediments
Reflection Journal 1

Based on what you already know about how sediments are deposited, what do you think happens to natural sediments once a river is dammed?

What questions do you have about sediments and dams?

Elwha River Restoration
Effects of the Elwha River Dams on Sediments
Vocabulary Notes

River-dominated delta:

Wave-dominated delta:

Long- shore drifts:

Dam:

Reservoir:

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Reflection Journal 2

What benefit will the removal of the dams have to natural and human communities along the Strait of Juan de Fuca as natural sediment transport resumes?

When new questions do you have about sediments and dams, or sediments and dam removal?