



Missouri River Detectives Lesson Plan 4

Lesson Title: Why Do People Build Dams on the Missouri River?

Grade: 4th Grade

Theme: Dams Have Positive & Negative Impacts on the Health of the Missouri River

Topic: Energy Resources, Dams, and Habitat Loss

Length: 45 minutes

Overview: In this lesson, students will learn about the major uses of dams by investigating the Missouri River’s Fort Peck Dam. Students will be able to determine the cause and effect relationship that exists between different natural resources and the environment.

Student Outcomes:

- Understand how dams derive energy from the Missouri River to address a human energy need.
- Know the effects of habitat loss on the Missouri River from using dams as a source of energy.
- Be able to describe the relationship of energy resources and the environmental effects of using dams as an energy source on the Missouri River.

Next Generation Science Standard: 4-ESS3-1. Obtain and combine information to describe that energy and fuels are derived from natural resources and their uses affect the environment.

Columbia Public School Standards:

- Social Studies Standards: 4.EG.5.C.a Identify and compare physical characteristics of specific regions within the nation, such as climate, topography, relationship to water and ecosystems.

Getting Ready:

- Materials: Projector, computer, speakers, paper and pens/pencils for students.
- What to Print:

Number of Copies	Item to Print	Page #
# of Students	Missouri River Detectives: Lesson 4 Worksheet	Attached

- Open the Missouri River Detectives: Lesson 4 video file and have lesson plan available for reference. The video is (9:29) minutes in length.

- Be sure that the computer device and projector used to display the Missouri River Detectives: Lesson 4 video has a working audio system.
- Space Requirements: It is best to have the classroom arranged in a way that allows space for students to be able to view the screen and be able to write down any thoughts, questions or answers that come to mind on their sheet of paper.

SCRIPT:

Slide 1: Welcome

Slide 2: Beaver Dam Identification

Welcome Missouri River Detectives, to a new investigation brought to you by Missouri River Relief. I want you to take a look at this image. What do you notice? Exactly, there's a dam that has been built across the water. Does anyone know who might be responsible for this construction?

Slide 3: Beaver

Beavers! Maybe you have seen one of these furry friends around before, but I wouldn't be surprised if you haven't. Beavers are actually nocturnal, which means that they normally are awake during the night and sleep during the day. They are easily identified by their big paddle tail and can be found roaming around bodies of water.

Slide 4: Beaver Working on a Dam

Here we can see a busy beaver at work, dragging a newly cut stick back to one of their constructions. Many of us have heard that beavers build dams or cause blockages in flowing water, but I want to discuss why beavers actually build dams in the first place.

Slide 5: Beaver Dam

A dam is a structure that controls the flow of water. Beavers build dams which causes the water to be stalled and flood an area around their home. This prevents predators from easily accessing their dens – which are separate from the dams. A beaver den can be found either built into the banks of the river or built up in the middle of the flooded area.

Slide 6: Man-made Dams

What about these dams? Who do you think built them and what purposes do they serve? Like a beaver who builds a dam to control the flow of water and protect their den from predators, humans also build dams as a way to control and manage the flow of rivers.

Slide 7: Why Build Dams?

There are three main reasons people build dams. To store the water for future use behind the dam, to control flooding and to generate electricity.

Slide 8: Missouri River Dams

Most people in Missouri don't know this but there are several dams built on the Missouri River. These dams are located across several states including Montana, North Dakota, South Dakota and Nebraska. These dams on the Missouri River work together to manage the river. The dam that we will be learning about today is the Fort Peck Dam. The Fort Peck Dam was built in 1933 by the U.S. Army Corps of Engineers. In order to make room for what would become the lake behind the dam, many residents of the area were forced out by the government who purchased the land from them at market value. Unfortunately, the Great Depression had greatly impacted the cost of land and so many were unhappy with the forced sales.

Slide 9: Fort Peck Dam History

Since the Fort Peck Dam is located in Montana and the highest of the major dams located along the Missouri River, its main purposes are to help control flooding downstream of the dam and to generate hydroelectric power. When an excessive amount of rain falls, the dam withholds water from flowing downstream and overwhelming the banks of the channelized Missouri River. But how does a dam like this generate electricity? How are we able to use the naturally available river water to power cities and towns?

Slide 10: Natural Resources

To understand hydroelectric power and how can create electricity, we need to understand the relationship between natural resources and the generation of power. There are two types of resources: Renewable and Nonrenewable. Renewable resources are those that are able to be renewed or reused infinitely, like wind, solar and hydro (also known as water) power. Nonrenewable resources are those which are limited and will not be restored within our lifetime. Minerals, oil and gas are examples of nonrenewable resources.

Slide 11: Pros and Cons

Let's take a look at the pros and cons of renewable and nonrenewable resources. First, the pros or positive features. Renewable resources are often much safer for the environment than nonrenewable resources and are unlimited in supply. But nonrenewable resources are cheaper, primarily because people have already built structures to collect them. Nonrenewable resources are also more reliable. Now, the cons. Renewable resources are not as reliable. For example, it's not always windy, sunny, or rainy. And, because humans are still experimenting with how best to use these resources, collecting renewable energy is expensive. Nonrenewable fossil fuels have a negative impact on the environment. For example, oil can leach into the water supply and harm humans, plants and animals. Another issue is that the amount of fossil fuels is limited. When it's gone, it's gone. To avoid running out of fuel, more countries are working to develop renewable resources. As more structures are built, the cost of renewable energy will go down making it more competitive with nonrenewable resources.

Slide 12: Fort Peck Dam

The Fort Peck Dam is an example of using hydropower. If we take a look back at the main purposes for the building of Fort Peck Dam, generation of electricity was one of them. The dam uses hydropower to create this electricity.

Slide 13: Hydroelectricity

Dams are able to take the physical motion of a turning mechanical propeller and transform it into electricity. The water that is built up behind the dam flows down into an area call the penstock. Here it pushes on a turbine, or large propeller that is connected to a generator. The turbine turns as the water flows past its propellers. This action transforms the movement of the water into electrical power in the generator which leaves the dam in the powerlines and makes its way to our homes. If there is not enough water flowing through the penstock, then the propeller won't turn and electricity will not be produced.

Slide 14: Billboard

Many people near Fort Peck Dam use the electricity generated from the dam's hydropower, but many don't know how the energy comes from the Missouri River or what impact the dam has on the environment.

Since many people drive past Fort Peck Dam and its large reservoir lake, we are going to create a billboard advertisement to share how their electricity is connected to this natural resource. The key to good advertisements is to catch the attention of the audience and to clearly share your message. Here is an example. Think about what types of images or slogans you might want to include on your billboard.

Slide 15: Billboard Activity (*OPTIONAL PAUSE*)

You will have a couple of minutes to design your billboard advertisement. Feel free to draw a picture or just use words that you think might catch the eye of your audience and fill out the billboard sign on your worksheet.

(There is some time built into the video for discussion at this slide, teachers are welcome to pause the video in order to allow students more time or, alternatively, students may finish this activity after the video is completed.)

Slide 16: Resource Reflection

Energy and fuel come from natural resources which in turn have an impact on the environment. Wasteful use of our resources can not only be expensive, but can cause harm not only to ourselves and others. One should always be mindful to not needlessly waste electricity. Brainstorm some ways that you might be able to save electricity in your day to day life.

Slide 17: Closing Statements

Thank you all for joining Missouri River Relief on this investigation into how dams work along the Missouri River. See you on the River!

Slide 18: Credits

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