

## Dams and Rivers (STEM Principle: Engineering)

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Have you or your kids ever wondered how a dam works? Engineers build dams for many reasons, like making reservoirs, filtering water, and even making electricity. In fact, the US has more than 2,000 hydroelectric power plants. The largest in this country is the Grand Coulee Dam in Washington state (about 90 miles west of Spokane). In all cases, dams are used to control water. The next time you and your kids find a small stream on a hike, you can make a little beaver dam together and see how they work.

Start by putting big rocks in the water to try and stop the flow. Then fill the spaces with smaller rocks, branches, and bits of mud. Don't be afraid to get a little dirty, this is a hands-on project! As you build, point out to your child how the water flows over, under, and around different rocks. You will notice that no matter how big you make the dam, the water will always find a way around. This water coming out of the dam is referred to as **outflow** since it is flowing out of the dam. Water that is flowing into the dam is called **inflow**.

Now that you have a partially-built dam, point out to the kids how much water is held by the dam. Though lots of water is flowing in and out, there is still a big pool of water behind the dam. This pool of water is called a **reservoir**, which is one of the main uses of real-life dams. A reservoir is a big collection of water that people can use for drinking, bathing, and watering the lawn and irrigating farms.

Next, continue building the dam, but this time remember that water has to flow out of the dam somewhere. By making a path for the water, your kids are creating an **outflow channel**. Have them make a couple spots for outflow on the dam, with different widths. When this is done, point out how fast the water is going through the outflow points. Then, ask them which water flow is faster – the outflow from the narrow channels, or the wider ones?

To test this, you can have them make little boats out of leaves, and have them race one another down the channels. They should notice that the narrower channels carry faster water: this is because the smaller space means more water is pushing on the same spots. This is called **pressure**. By using high-pressure streams of water, engineers can turn water wheels with a lot of power – this powers an electrical generator, which brings electricity to your house and others. The Three Gorges Dam in China generates more hydroelectric power than any other dam in the world – up to 22,000 megawatts at a time!

Finally, you can test your finished dam's filtration. Have your kids drop lots of floating things in the water upstream, and see how many make it past the dam. Lots of leaves will pass through, but with a few changes, you can make it so that most of the leaves get stuck! This process is called **filtration**, and it helps keep outflow water clean. Real filters are good enough to block things as small as dirt, salt, and sand.

When you're ready to leave, make sure you take apart your dam. Changing the water flow for a short time is okay, but if you leave it that way, you might cause problems downstream. It may affect trail drainage and local ecology.