ACTIVITY 6.2

DROPS OF KNOWLEDGE FOR RIVERS OF CHANGE

GLOBAL TEACHING AND LEARNING MATERIAL

A hands-on guide to teaching
and learning about
water, sanitation, hygiene,
and the environment

SWAROVSKI
WATERSCHOOL

ACTIVITY 6.2: INTRODUCTION TO WATER AND ENERGY – CREATING A WATERWHEEL

"Energy" is defined as the capacity for doing work or "usable power," such as heat and electricity, and also refers to the resources for producing such power. As explained by UN Water, "Water and energy are closely interconnected and highly interdependent. Choices made and actions taken in one domain can greatly affect the other, positively or negatively. Trade-offs need to be managed to limit negative impacts and foster opportunities for synergy." [32]

Because water has a high density, pumping and flow require a lot of energy. [33] In natural systems, water travels from a source at a higher elevation (such as a waterfall) to another location due to gravity, which works in "partnership" with air pressure to move the water with relatively low energy expenditure.

There are two kinds of energy: stored (potential) energy and working (kinetic) energy. In many types of energy generation, large amounts of water are used for cooling and to obtain raw materials such as coal or uranium. Hydropower is a clean, renewable, and reliable energy source that converts kinetic energy from falling water into electricity, without requiring that more water be used to power the system.

In this activity, students will build a miniature waterwheel to show how electricity can be made – leading to a discussion of how water is provided to people, the energy it takes to supply water, and ways to produce energy with water.

Time: 50 minutes / **Thematic Areas:** Science, Social Studies / **Goal for Learning:** Provide knowledge on how water generates energy.

Materials: ☐ 8 small plastic spoons, thin, straight stick, or Popsicle sticks / ☐ A large ball (Styrofoam or organic material of similar round shape, i.e.: orange, apple) / ☐ A 45-centimeter (18-inch) wooden dowel or skewer / ☐ Tape or Glue / ☐ Two 2.5-centimeter (1-inch) pieces of plastic drinking straw / ☐ A sink

32 UN Water, The United Nations World Water Development Report 2014: Water and Energy, Vol. 1, Paris: UNESCO, 2014, p. 9. Available at: www.unwater.org/wwd14/home/en. **33** Ibid., p. 24.

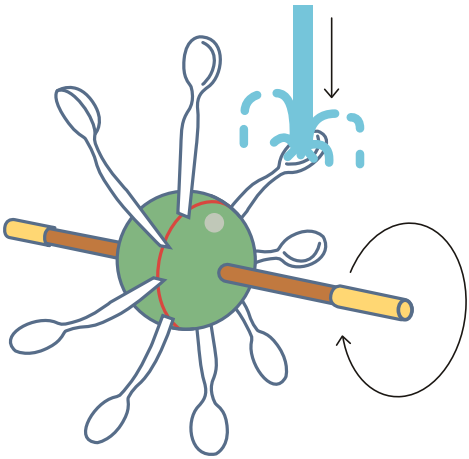
ACTIVITY STEPS:

1. Draw a line around the diameter of the ball, then push spoons into the line, like spokes on a bicycle wheel. The bowls of the spoons should all be facing in the same direction in a line around the middle of the ball. They will represent the blades of the waterwheel.

2. Insert the wooden dowel all the way through the center of the ball and out the other end so that there is an equal amount of dowel on either side of the ball: this is the axle. Tape or glue the axle in place. You have made a waterwheel!

3. Slide a piece of the straw onto each end of the axle. Hold the waterwheel by the straws so that you can see the inside of the bowls of the spoons. Blow on these blades. The blades will catch the wind and turn the wheel.

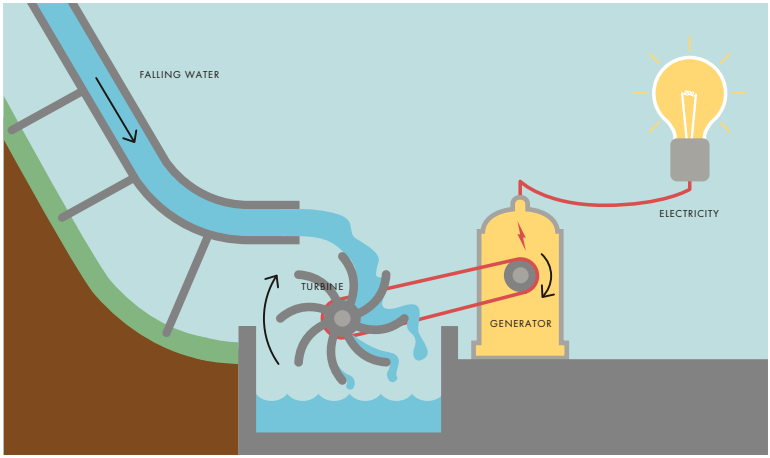
4. Hold your waterwheel by the straws on both ends under running tap water in your sink to see how water moves the blades.



OBSERVATION AND DISCUSSION:

What is the energy source for the waterwheel? How does it work? Discuss how the movement of the water is influenced by the experiment and how it generates energy.

If possible in your area, schedule a class trip to a modern hydropower station, or visit a historic waterwheel that shows how water was used to generate energy in earlier times.



Source: http://water.usgs.gov/edu/hyhowworks.html

ADDITIONAL RESOURCES:

eSchoolToday, "Renewable Energy Sources: Water Power," http://www.eschooltoday.com/energy/renewable-energy/hydro-energy

Hansen, Roger D., "Water Wheels," www.waterhistory.org/histories/waterwheels

TVA Kids, "About Dams," Tennessee Valley Authority, www.tvakids.com/river/aboutdams.htm

U.S. Energy Information Administration, "Energy Kids: Hydropower," Washington, DC: U.S. Department of Energy, www.eia.gov/kids/energy.cfm?page=hydropower_home-basics

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