

FACILITATOR GUIDE: **Water, Water, Everywhere**

GRADE: 6th - 8th

CONCEPTS & SKILLS:

Science as Inquiry

S.6-8.SI.1 Identify and generate questions that can be answered through scientific investigations.

- Students should develop the ability to refine and refocus broad and ill-defined questions. An important aspect of this ability consists of clarifying questions and inquiries and directing them toward objects and phenomena that can be described, explained, or predicted by scientific investigations.
- Students should develop the ability to connect their questions with scientific ideas, concepts, and quantitative relationships that guide investigations

MATERIALS & RESOURCES:

- Access to internet-
 - [USGS Water Science for Schools-
http://ga.water.usgs.gov/edu/earthrain.html](http://ga.water.usgs.gov/edu/earthrain.html)
 - [Water.org-http://water.org](http://water.org)
 - [USGS Water Science School-http://ga.water.usgs.gov/edu/](http://ga.water.usgs.gov/edu/)
 - [Surf Your Watershed-http://cfpub.epa.gov/surf/locate/index.cfm](http://cfpub.epa.gov/surf/locate/index.cfm)
 - [Iowa's Water & Land Legacy-
http://www.iowaswaterandlandlegacy.org/home.aspx](http://www.iowaswaterandlandlegacy.org/home.aspx)
 - [Local Drinking Water Information-
http://water.epa.gov/drink/local/ia.cfm](http://water.epa.gov/drink/local/ia.cfm)
 - and/or library access for printed rainfall data
- 2 liter plastic pop bottle
- Scissors
- Ruler
- Waterproof marker pen
- Heavy flower pot
- Paper and pencil
- Graph-paper
- Handouts with rainfall data for world and US

PRESENTATION:

Start with a discussion about how we use water at home and at school and in the community. Show the video [Why Care About Water](http://video.nationalgeographic.com/video/environment/habitats-environment/freshwater/env-freshwater-whycare/) (<http://video.nationalgeographic.com/video/environment/habitats-environment/freshwater/env-freshwater-whycare/>) to get started thinking about the issues facing our fresh water supply.

After a short reflection on—

- What they saw in the video.
- How they felt about the information.
- What they want to do next.

DIRECTIONS:

Students go to computers and research water issues in the community and ways they can get involved in the solution.

Follow with hands on activities to address needs for more information as well as civic action—

- Make rain gauges to measure rainfall
- Use the rain gauges to learn how to calculate the amount of water that can be harvested from the school roof or yard.

RAIN GAUGE DIRECTIONS:

1. Cut the top off the plastic bottle with the scissors.
2. Turn the top upside down and wedge it in the bottle to form a funnel. Tape in place with a strong tape.
3. Use a ruler & permanent marker to measure & mark lines on outside of bottle. The lines should match the scale on a ruler beginning with 0 at the very bottom of the bottle. It is only necessary to use English units of measure for this lesson.
4. Place the rain gauge in an open container to prevent it from blowing over. Or dig a hole a few inches deep and place rain gauge in the hole so it can't tip over. It might be helpful for a few students to take rain gauges home so if it rains on the weekend someone can measure and record the amount.

DIRECTIONS: FOR CALCULATING HOW MUCH WATER CAN BE COLLECTED FROM A SPECIFIC AREA

1. Graph the rainfall amounts in a table or on graph paper.
2. Using the data from rain gauges (or historical data from another resource, or even hypothetical data) calculate the potential amount of rainwater that can be harvested from a building roof. (The school building, student's homes, or other building)
3. Using graph paper, plot the perimeter representation of the roof. Then calculate the square footage of the roof. For example; a house/building has a footprint of 20'x40' the area of the roof is 800 sq. ft.
4. Then, using the following information, calculate how many gallons of water could be harvested from a roof.

1" of rainfall on 1 sq. ft. = .62 gal of water

$$\begin{array}{r}
 800 \text{ sq. ft. roof with 1 inch of rainfall} \\
 \times .62 \text{ gal./inch of rain} \\
 \hline
 496 \text{ gal}
 \end{array}$$

5. Using data from Internet or other source compare rainfall in locations in the US and around the world. For weather data: [USGS Water Science for Schools & USGS Water Science for Schools;Precipitation](http://ga.water.usgs.gov/edu/earthrain.html) (<http://ga.water.usgs.gov/edu/earthrain.html>)
6. Using the data from question number 8, calculate the amount of water that could be harvested annually. Use data from the maps in this lesson to calculate how much water could be harvested in various locations in order to get a sense of how much water can be harvested.

Example:

If a similar house in Beijing, China is 800 sq. ft.

800 sq. ft. x .62 gal (1" of rain)= 496 gallons of water per inch of rainfall
Beijing, China receives about 25" of rain annually.

496 gallons x 25" rain per year = 4185 gallons of water that could be harvested annually in Beijing, China from 800 sq. ft. home

Create some problems that include fractions and mixed numbers. If the roof or harvest area is $20 \frac{1}{3}$ ft. x $35 \frac{1}{2}$ ft., how much water will land on the area with a 1" rain? What if it rains $2 \frac{1}{4}$ "?

TIME:

45-90 min. +

