



LESSON PLAN

WATER QUALITY & DISTRIBUTION GRADES 3-5

SUMMARY

Students will learn about how water is distributed throughout Earth and where it comes from. They will explore how the quality of water can affect the living things that depend on it and learn about the fate of water after human use.



MS-ESS3-1 Construct a scientific explanation based on evidence for how the uneven distributions of Earth’s mineral, energy, and groundwater resources are the result of past and current geoscience processes.

Science & Engineering Practices	Connections to Classroom Activity
<p>Constructing Explanations and Designing Solutions (MS-ESS3-1)</p>	<ul style="list-style-type: none"> Use evidence to explain the quality of water and where it comes from, as well as how it is distributed throughout Earth.
Disciplinary Core Ideas	Connections to Classroom Activity
<p>ESS3.A: Natural Resources Humans depend on Earth’s land, ocean, atmosphere, and biosphere for many different resources. Minerals, fresh water, and biosphere resources are limited, and many are not renewable or replaceable over human lifetimes. These resources are distributed unevenly around the planet as a result of past geologic processes. (MS-ESS3-1)</p>	<ul style="list-style-type: none"> Describe how the distribution of water throughout Earth impacts human consumption and water quality.

Crosscutting Concepts

Connections to Classroom Activity

Cause and Effect (MS-ESS3-1)

- Describe the different causes of poor water quality and its effect on the environment, particularly involving living things that depend on water for survival.

DURATION

One to two 45-minute classroom periods

PRE-ASSESSMENT QUESTIONS

Please see Discussion Questions located under the video. These can be discussed as a group or answered individually in student science notebooks.



ENGAGE

Begin a class discussion about the benefits of good quality water. Ask students to list the different ways they use water. For example, in their homes water may be used to wash dishes, do laundry, take a shower, and to drink. Then have students list different ways that other living things, besides people, use water. Examples can include plants that need water in order to survive and grow or animals that rely on drinking water to live. Ask students what would happen if the water, which so many things depend on, were of bad quality.



EXPLORE

Explain to students that they will be exploring where water comes from and how it is distributed throughout the Earth. They will also analyze the different causes of poor water quality and what can be done to improve overall quality, such as through the use of a water treatment plant or water filtration system.

MATERIALS

- Science notebooks
- Pencils

Station 1

- One large clear container
- Water
- Sand
- Gravel
- Small and medium sized pebbles
- Slotted spoon

Station 2

- Large open container
- Water
- Small container
- Cooking oil
- Eyedropper
- Blue food coloring
- Spoon

Station 3

- Large water bottle
- Small water bottle
- Water
- Blue food coloring
- Marker

DIY Activity

- Plastic bottle
- Cotton ball
- Sand
- Gravel
- Plastic bag with activated charcoal
- Scissors
- Mallet
- Muddy water
- House plants

STATION 1: WATER POLLUTION

Fill one large clear container with water. Pour sand, small rocks, and large rocks into the container. Have students use a slotted spoon to try to remove the material from the water.

STATION 2: SURFACE RUNOFF

Place a container with water on a table and add blue food coloring to make it visually clear that this is water. Label this container the name of a body of water, such as a lake or river. Next to it, place a smaller container that contains some sort of oil, such as cooking oil. Label this small container "Surface Runoff from a Factory." Using an eyedropper, have students put small drops of the oil into the container with water. Students need to stir the water and oil mixture to observe what happens.

STATION 3: WATER DISTRIBUTION

Pour water into a large bottle and add blue food coloring to indicate this is water. Label this bottle 97% salt water. Pour water into a much smaller bottle and add blue food coloring but label this bottle 3% freshwater. Place them side-by-side for students to observe.

STATION 1

WHICH MATERIAL WAS HARD TO REMOVE FROM THE WATER?

What are some different methods that can be used to clean this water? Answer this question in your notebook. Also, write down anything you observe about removing the material in the water, and how this models what happens when dirty water is cleaned.

STATION 2

WHAT HAPPENED AS YOU MIXED THE OIL AND WATER SOLUTION?

From engine oil to waste from a chemical plant, many chemicals pollute the water we use. This happens when they travel into the water as surface runoff. Observe this model of a body of water being contaminated with surface runoff from a factory. In your notebook, write down your observations after mixing the oil and water. Explain what this tells you about the impact of surface runoff on water quality.

STATION 3

WHAT DIFFERENCE DO YOU NOTICE ABOUT BOTH BOTTLES?

Why would one container have so much more water than the other? How does this represent the distribution of water on Earth? Write your answer in the notebook. As you look at the water content in both bottles, think about how distribution affects how much water living things have access to. Because most living things depend on freshwater, think about what would happen if this water were of poor quality.

Divide students into three groups. Allow the groups to rotate through each station, using their science notebooks to record their observations.



EXPLAIN

After students complete all stations, begin a classroom discussion about the importance of addressing water quality as it relates to water distribution on Earth, and about the need for water for survival. Review the different processes that

are used to clean water, such as a water treatment plant or water filtration system. Explain that Station 1 demonstrated why filtration systems and other treatment processes have stages as a way to ensure the water is fully clean and devoid of particles. Station 2 showed the effect of surface runoff on a body of water, and Station 3 illustrated how water is distributed on Earth.



WATCH THE GENERATION GENIUS WATER QUALITY AND DISTRIBUTION VIDEO AS A CLASS

Then facilitate a class discussion using the Discussion Questions.



ELABORATE

Students can use the DIY Activity to understand how a filtration system is constructed and evaluate the effectiveness of this filtration system at treating muddy water, just like Zoe did. They should be able to correlate each section of their filtration system with the stages of filtration that were discussed earlier in the video.



EVALUATE

Revisit the discussion about the benefits of water in the Engage section of this activity. Have students explain how the water distribution on Earth and water quality can affect whether these benefits are experienced. For example, students can say that the unequal distribution of water on Earth limits just how much water is available for use. They can also say that if water quality is poor, this severely limits the benefits of using water.

