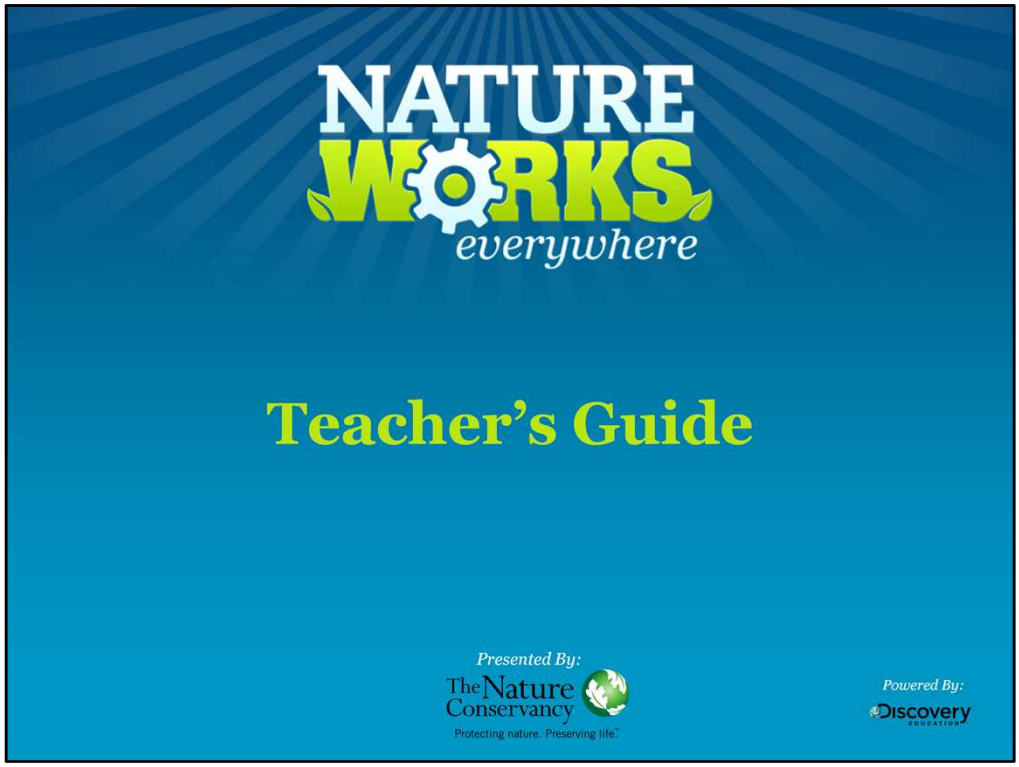


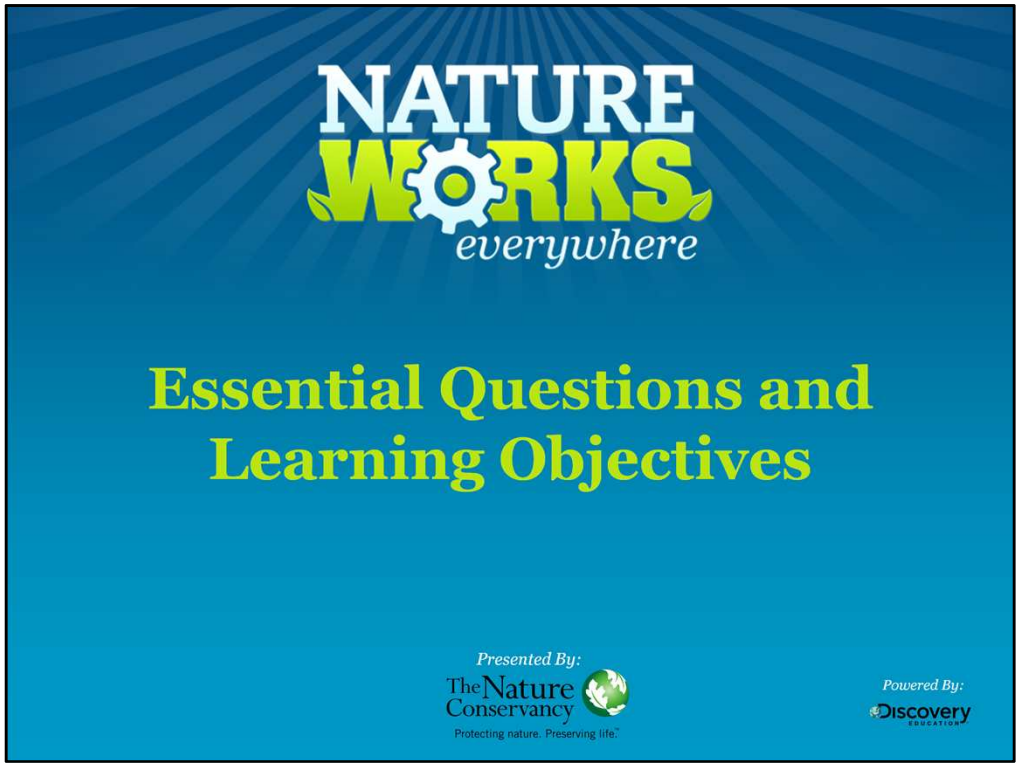
Welcome to your Nature Works Everywhere interactive classroom presentation. This presentation was created with Power Point so that it can be used in a variety of classrooms.

If you are using a laptop with an LCD projector, simply progress through the Power Point by clicking to advance. All of the interactive aspects of the presentation are set to occur on click. The corresponding videos are embedded in the page. Simply hover over the video window to reveal the "play arrow" at the bottom.

If you are using an interactive white board, simply tap on each slide with your finger or stylus to activate the interactive aspects of the presentation. It does not matter where you tap, but you can make it appear as if you are making certain things happen by tapping them.

In the notes for each slide there will be information on how to proceed.

If the note is intended for a laptop/LCD situation it will be labeled LT/LCD
If the note is intended for an interactive white board it will be labeled IWB



ESSENTIAL QUESTION: How to paved areas impact the filtration of rainwater?

Lesson Overview:

Students learn about the importance of water quality for human health and agriculture. They conduct a simple lab activity to demonstrate how natural areas filter water better than paved areas**.**

Learning Objectives:

Evaluation
Solve quantifiable problems related to run-off volume and water quality in natural areas and impervious surfaces.

Synthesis
Contrast features of natural areas and impervious surfaces that lead to differences in runoff volume and water quality.

Analysis
Generalize about the impacts of water quality on human health.
Calculate differences in run-off volume between natural areas and impervious

surfaces.

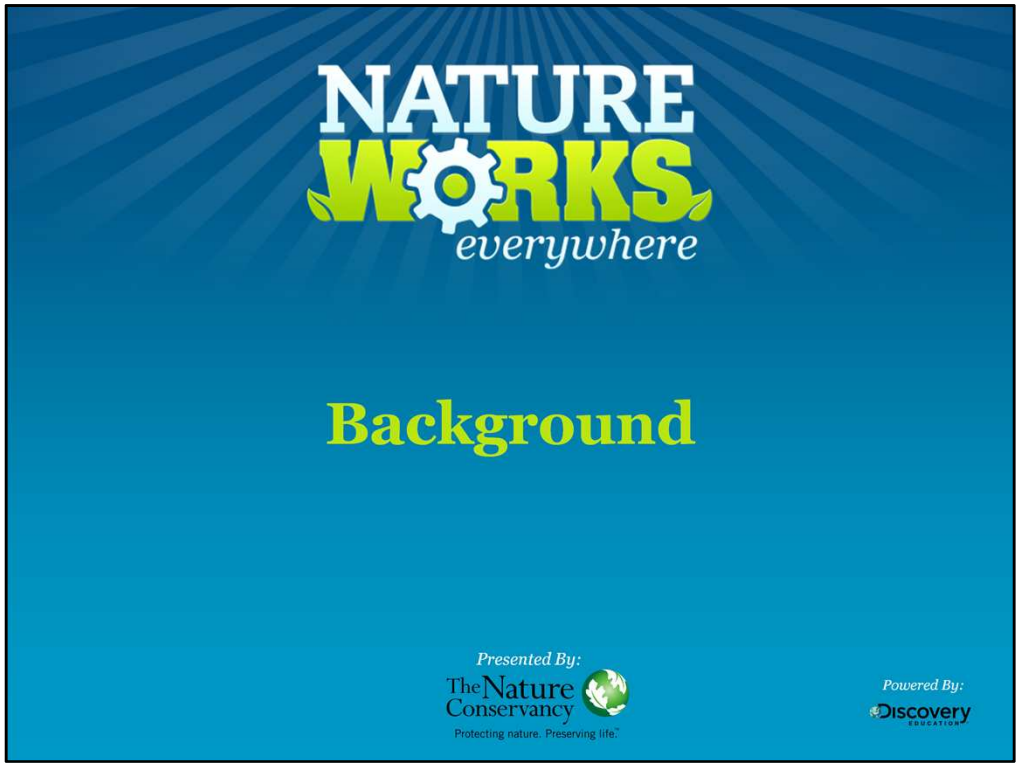
Application
Compare differences in run-off volume and quality between natural areas and impervious surfaces.
Characterize the different parts of the water cycle and how they are impacted by human activity.

Comprehension
Describe the volume of water on Earth in relation to Earth's total volume.
Distinguish between different kinds of impervious surfaces.
Explain the importance of water quality as it relates to water being a limited resource.

Knowledge
Identify the difference between natural areas and impervious surfaces.
Know the key indicators of water quality.
Know the key parts of the water cycle.

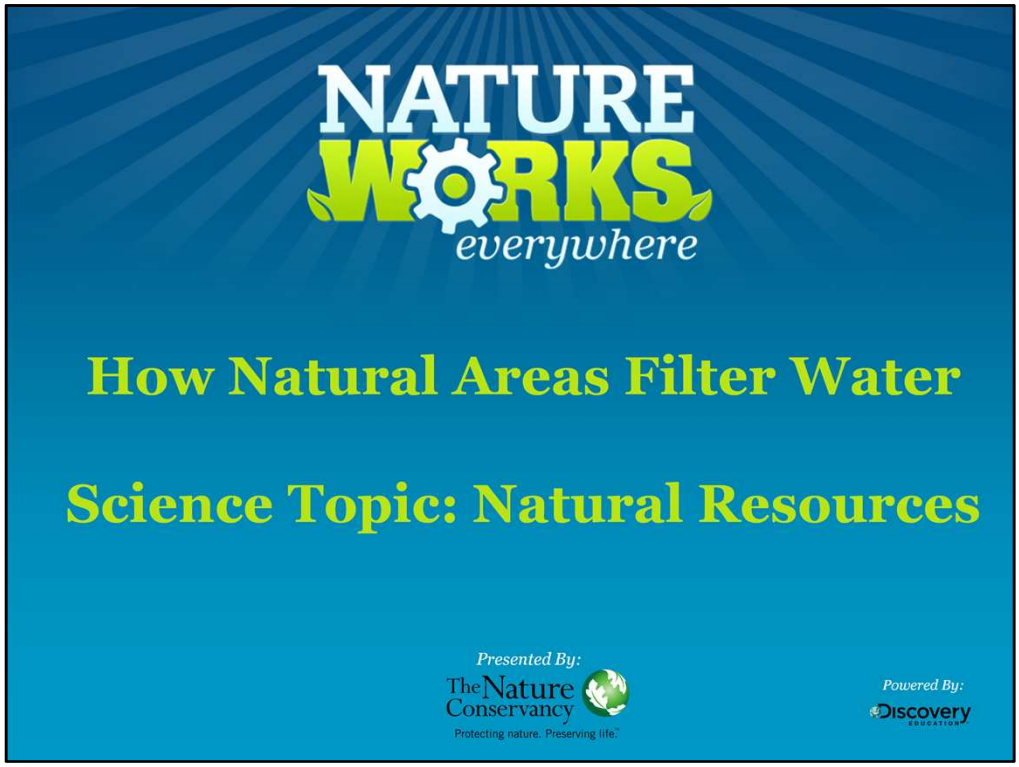
Nature Works Everywhere **Theme:**

Water: Impervious areas increase pollution because runoff does not pass through nature's filtering systems.



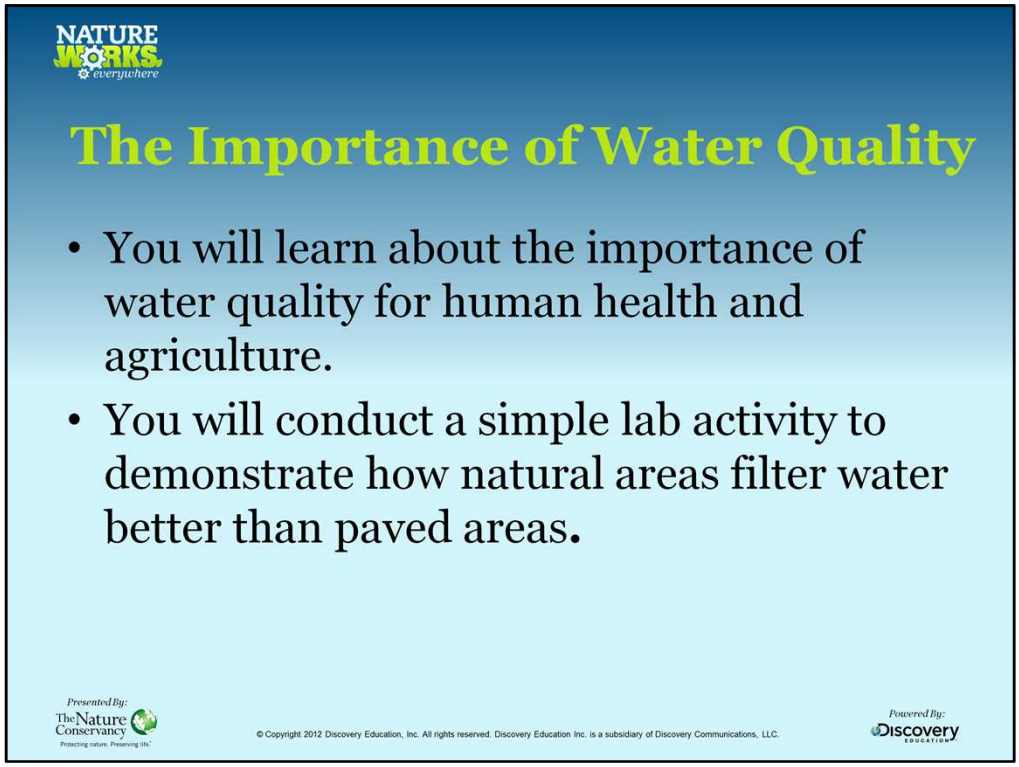
Background for the Teacher:

In this lesson, students learn the value of clean freshwater and the natural processes that ensure an adequate supply of usable freshwater. Nature works to filter water and to release water over time. In this way, nature reduces the amount of artificial treatment needed to filter water and also contributes to prevention of flooding. Students brainstorm the different ways that people use water, from household use to industry and agriculture. Statistics related to the quantity of water on the planet help students understand that water is a finite resource. Students relate their own activities to the water supply to put their own consumption in activities. Students then brainstorm various threats to the water supply. For a hands-on activity, students focus on the role of natural areas as filters that produce clean water. Such natural filters are contrasted with impervious (paved) areas to compare the impact of development on the ability of nature to provide clean freshwater.

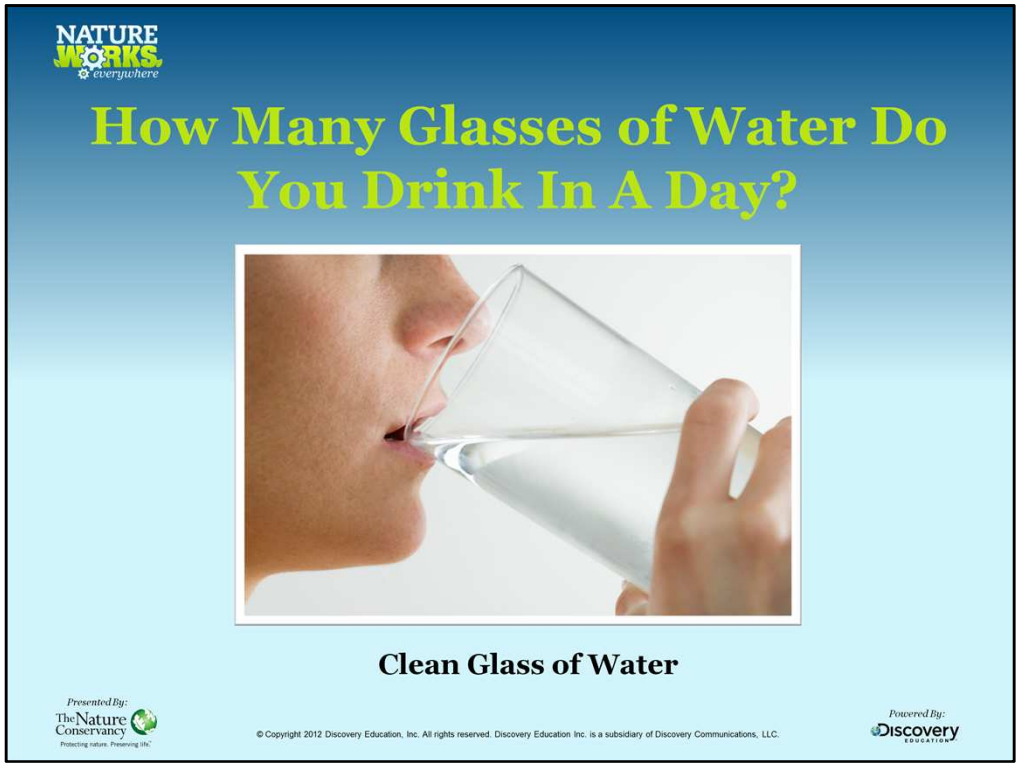


Title page of class presentation

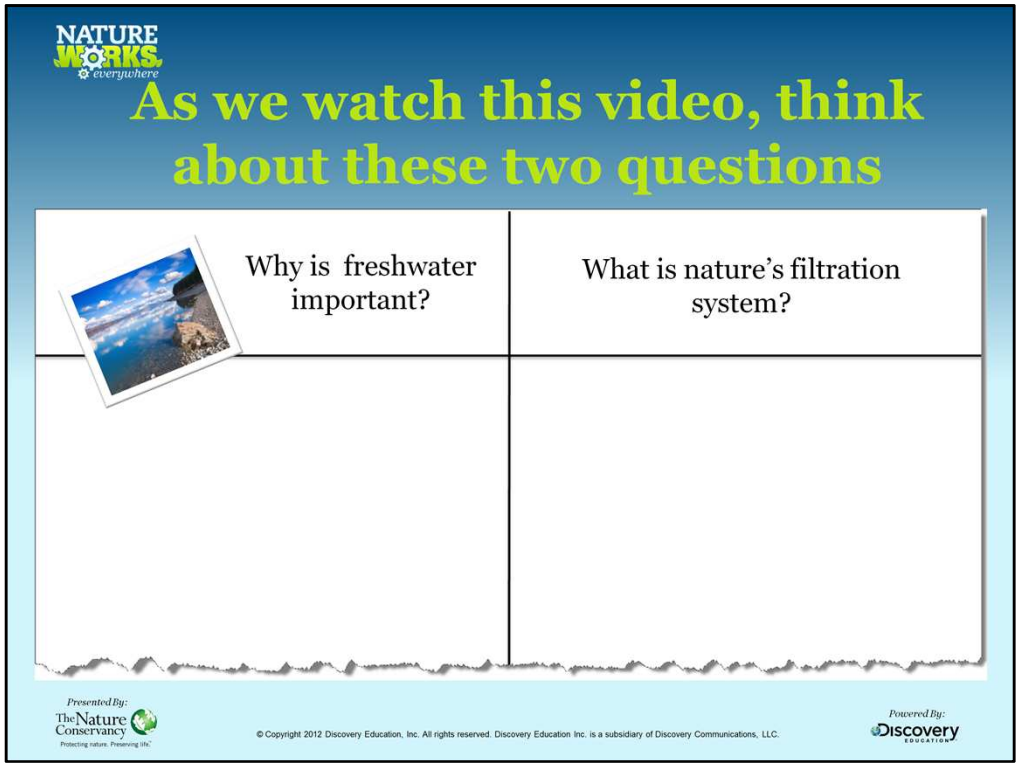
Click or tap to advance



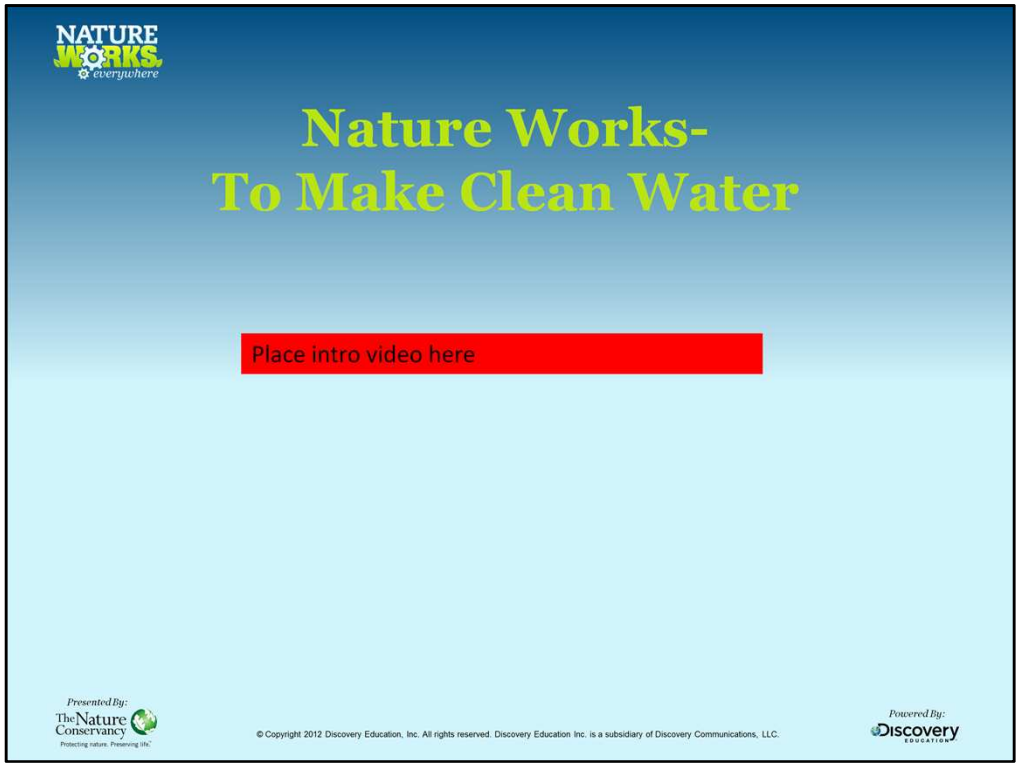
Information to give a quick overview of lesson to students.



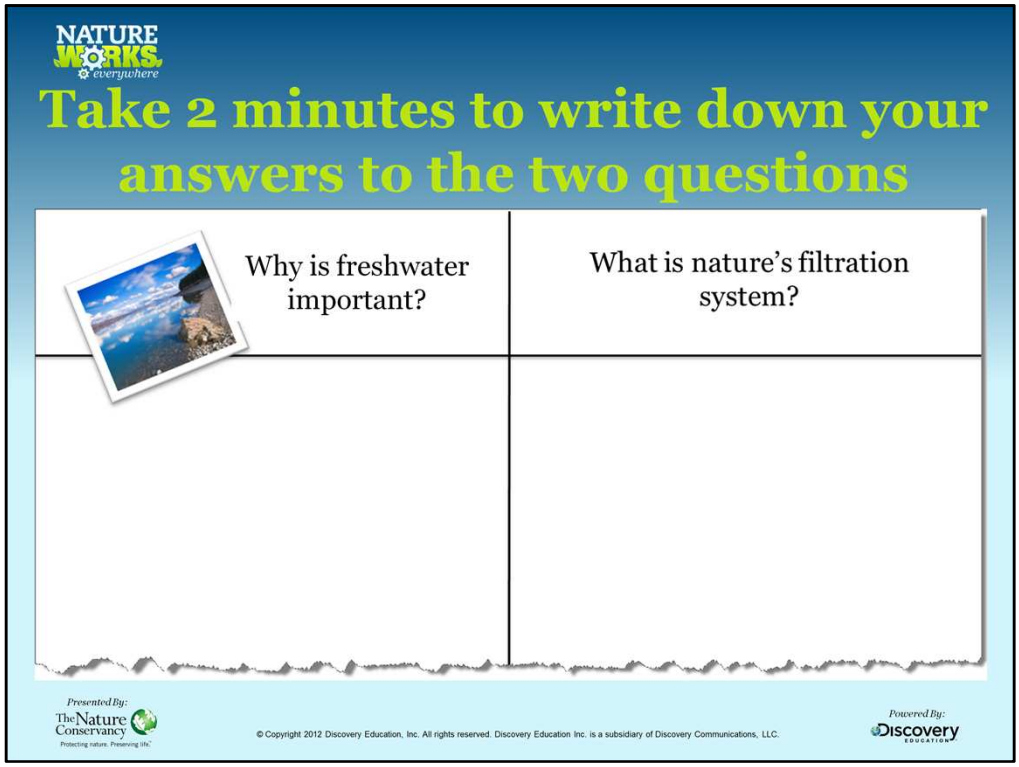
Engage:
Open the lesson with asking the students “How many glasses of water do you drink in a day?” Accept all responses.
Ask the students, “Would you like to drink a clean glass of water?”
LT/LCD: Click once to show image (Clean Glass of Water)
IWB: Tap once to show the image (Clean Glass of Water)
Have students share with a partner how they think we get fresh drinking water each day? 30 second share and then ask for responses.



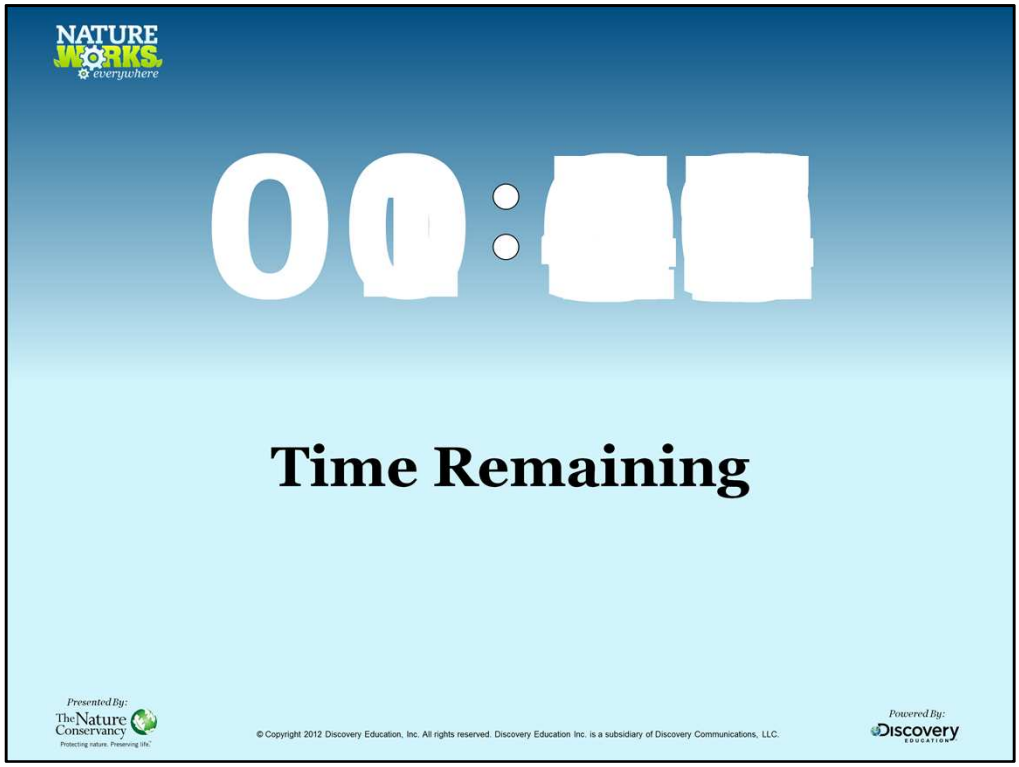
Explain to students that you will be watching a video clip.
Ask students to consider these two questions as they watch; they should not write or record any information while they are watching



The video is embedded.
Hover over the video to reveal the play arrow at the bottom



Instruct students to take 2 minutes to record their answers to the two questions.


NATURE WORKS everywhere
00:
Time Remaining
Presented By:
The Nature Conservancy
Protecting nature. Preserving life.
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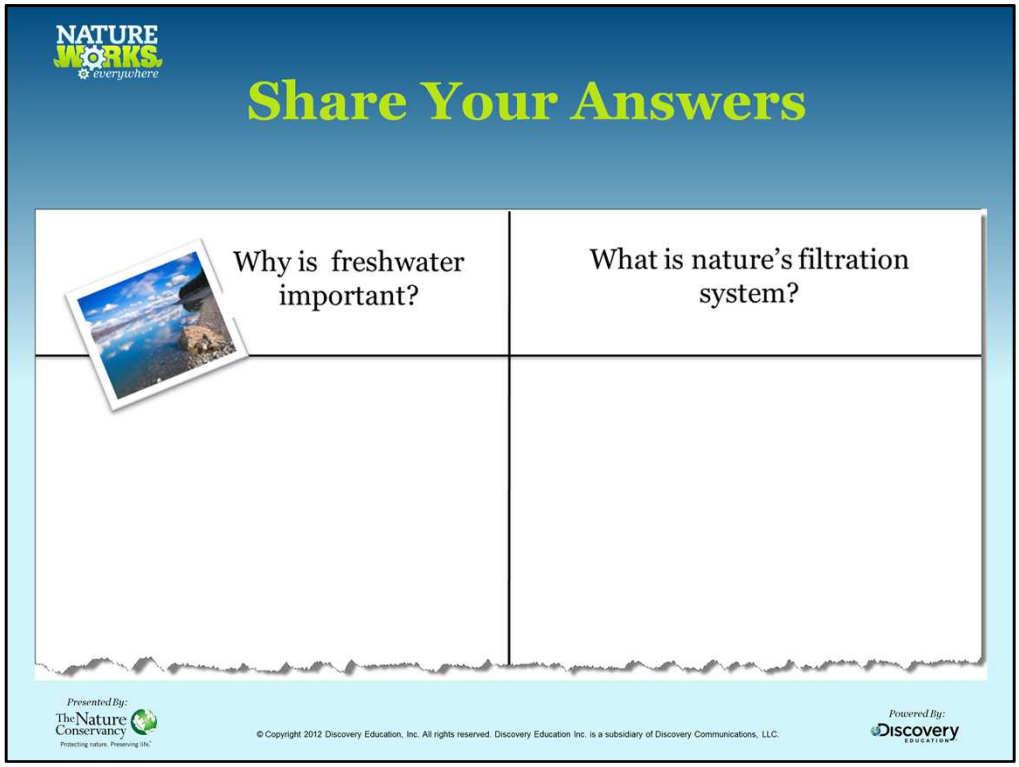
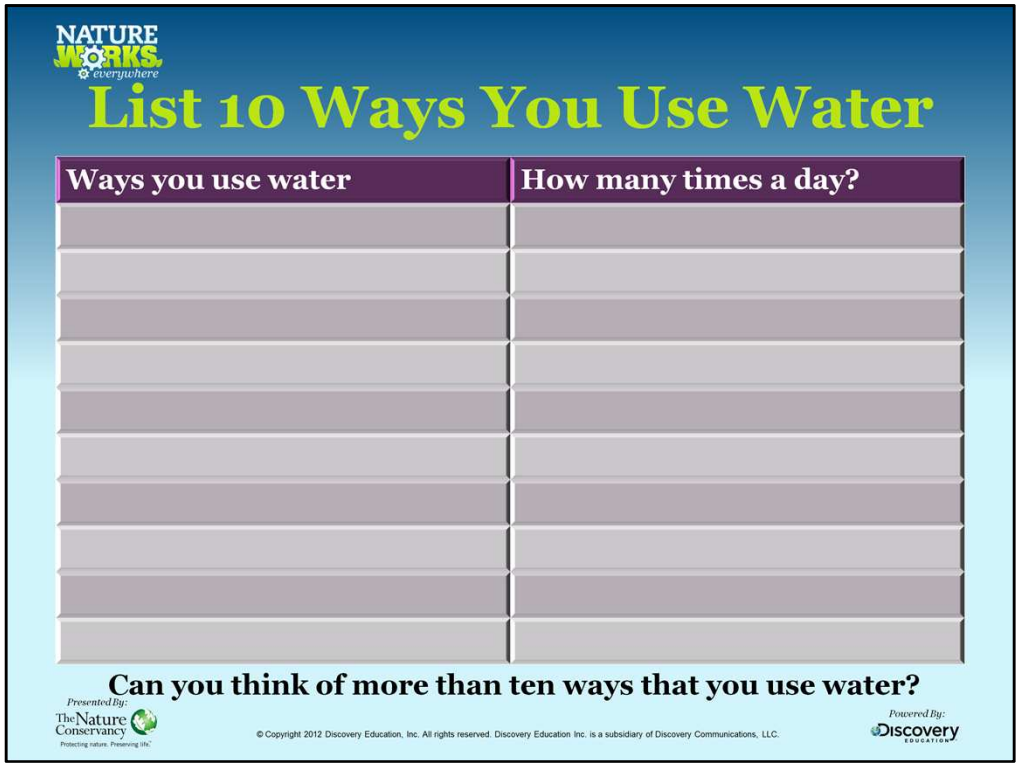
Timer



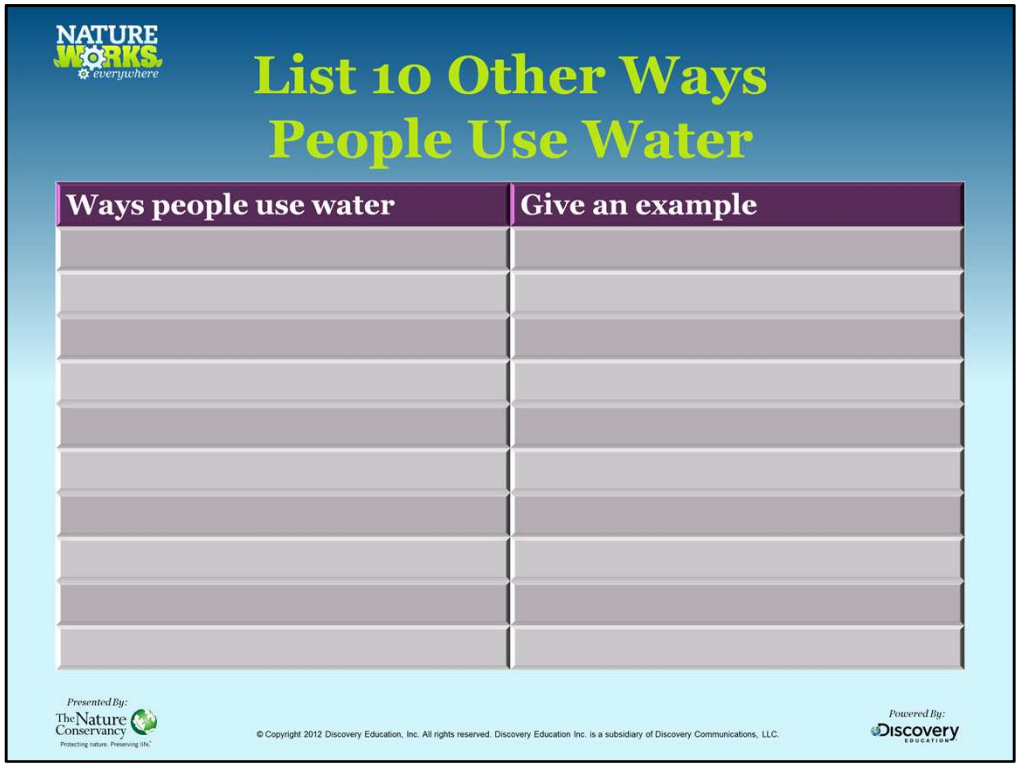
Solicit responses from the students

LT/LCD: If you are projecting onto a white board, you can write the responses on the board so it appears as though you are writing on the slide.
IWB: Use your IWB tools to write in the spaces on the slide.

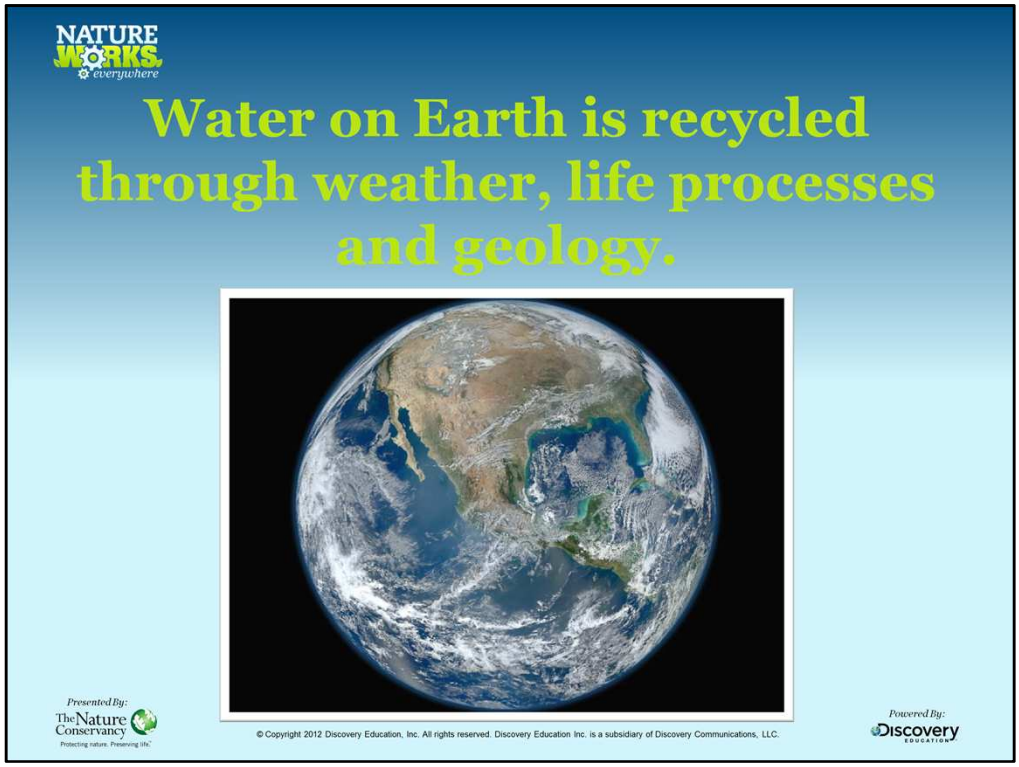
LT/LCD: Click to remove each Earth picture; to reveal the place
IWB: Tap each Earth picture; to reveal the places
This information was contained in the video so the teacher is checking for understanding. Ask the student to recall “What are three types of places that provide a healthy watershed.”



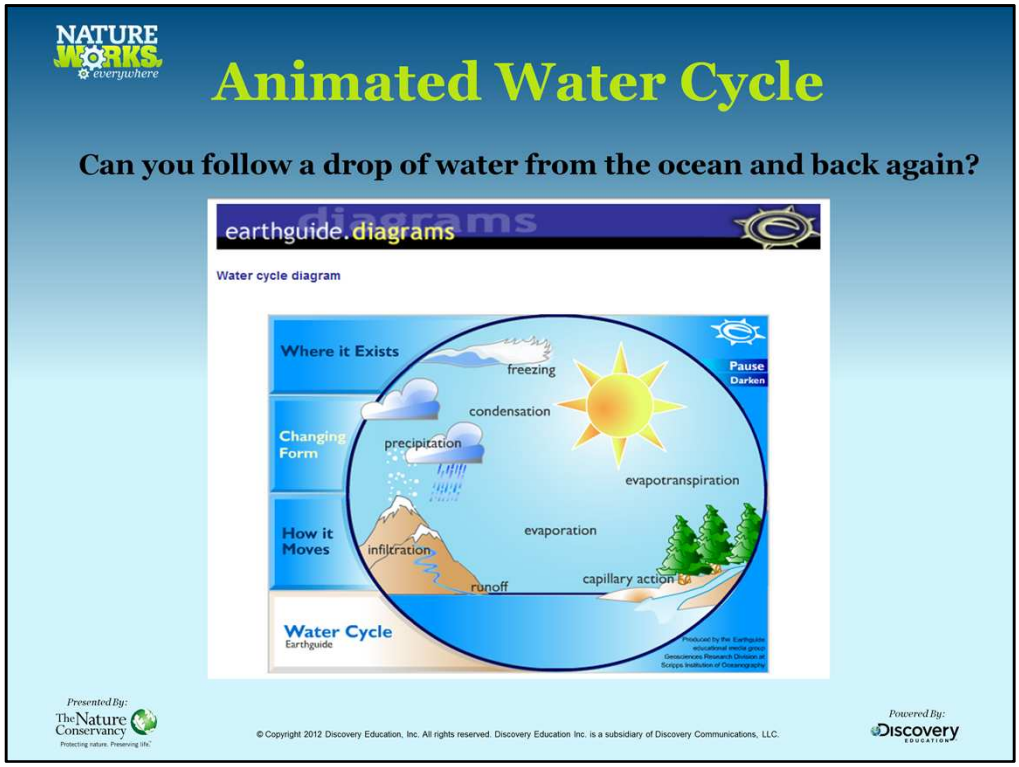
Have students brainstorm the different ways that people use water, from household use to industry and agriculture.



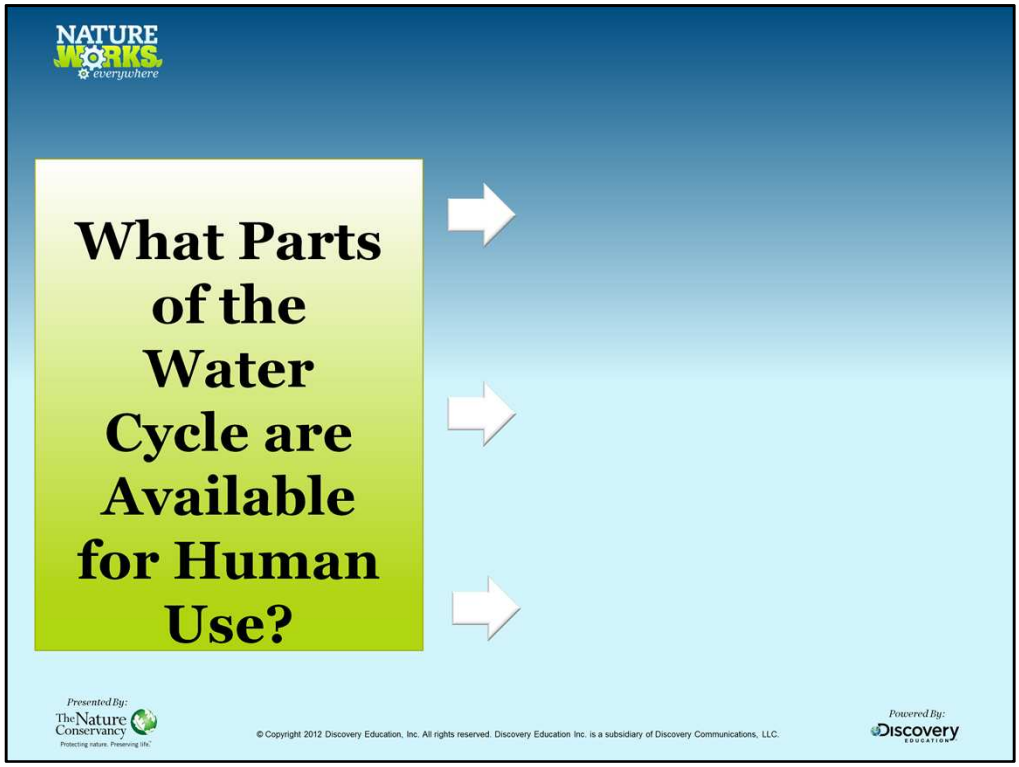
Point out that water is essential for biological processes and for numerous industrial and agricultural activities.
Explain that nature works to filter water and to release water over time and to thereby benefit people.



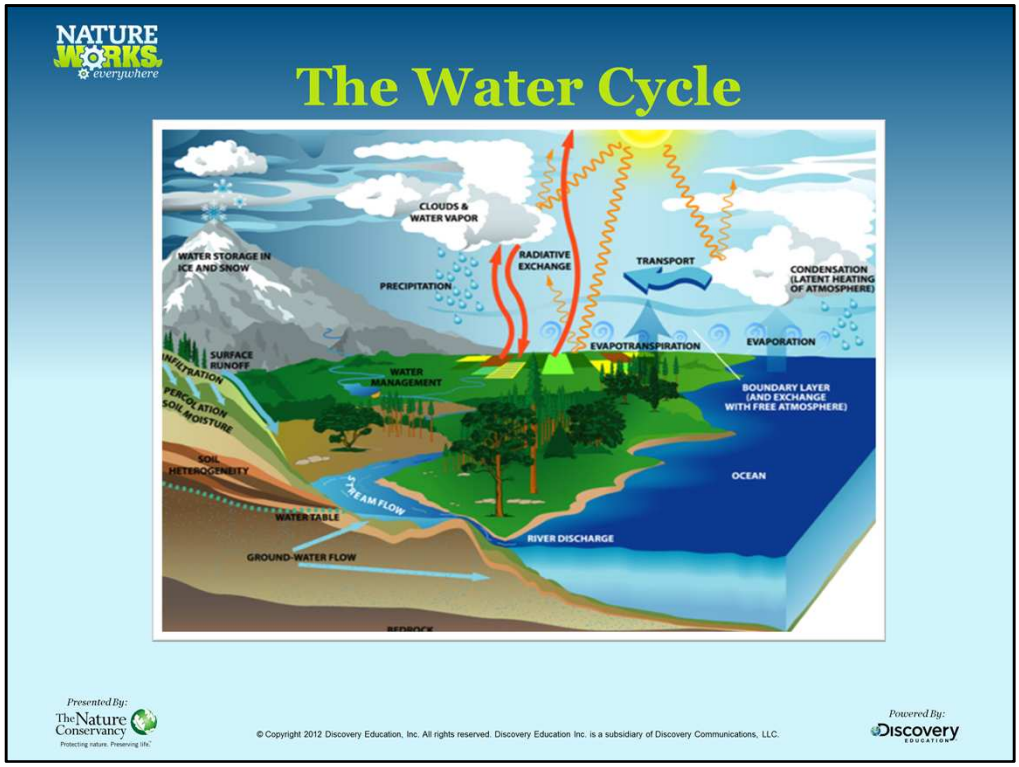
Read informational slide to lead into the water cycle slides. Click on Slide



Show students the animation of the water cycle.
Click on Image to launch hyperlink to site.
http://earthguide.ucsd.edu/earthguide/diagrams/watercycle/



LT/LCD: Click, one at a time to reveal each word.
IWB: Tap each arrow to reveal each word.
Have students consider which part of the water cycle we use the most (from the tab of the water cycle animation). Have students conclude that only a small part of the water cycle is available for human use (groundwater, stream, rain). Ask students why they think such a small percentage of Earth's water is drinkable.
Emphasize that humans use an ever-greater proportion of the available freshwater, and are therefore increasingly impacting the water cycle.

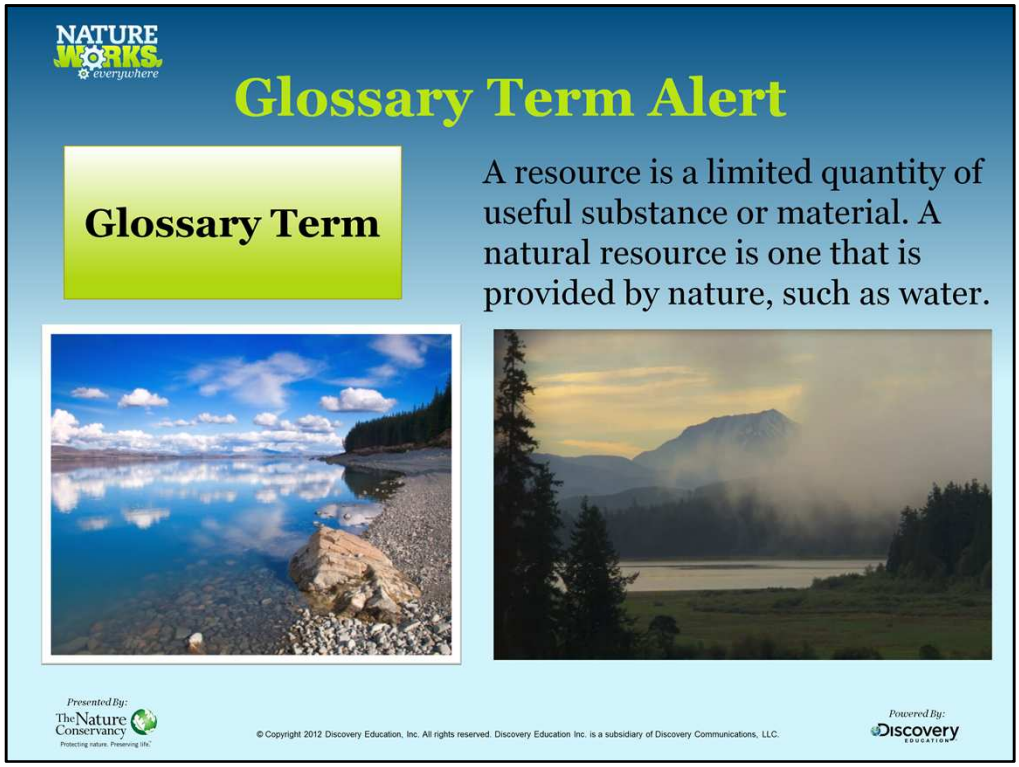


Click on image to go to the site of this image. Show students where the image can be found.
http://www.usgcrp.gov/usgcrp/images/ocp2003/WaterCycle-optimized.jpg

Glossary Term Alert: Title flashes

LT/LCD: Click to make "Glossary Term" disappear, revealing the term "Finite"
Click to bring up the definition
Click to bring up the image
Click to bring up the video
Hover over the video to reveal the play arrow

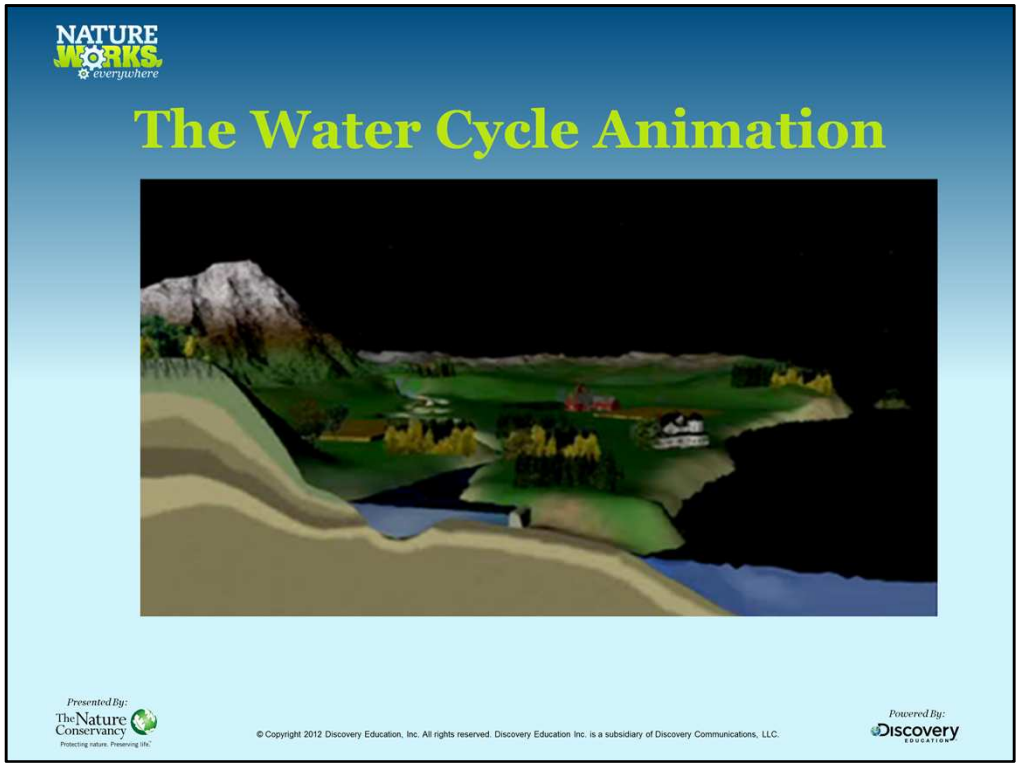
IWB: Tap the green box "Glossary Term" to make it disappear, revealing the term "Finite"
Tap anywhere to bring up the definition
Tap lower left to bring up the image
Tap the lower right corner to bring up the video
Hover over the video to reveal the play arrow



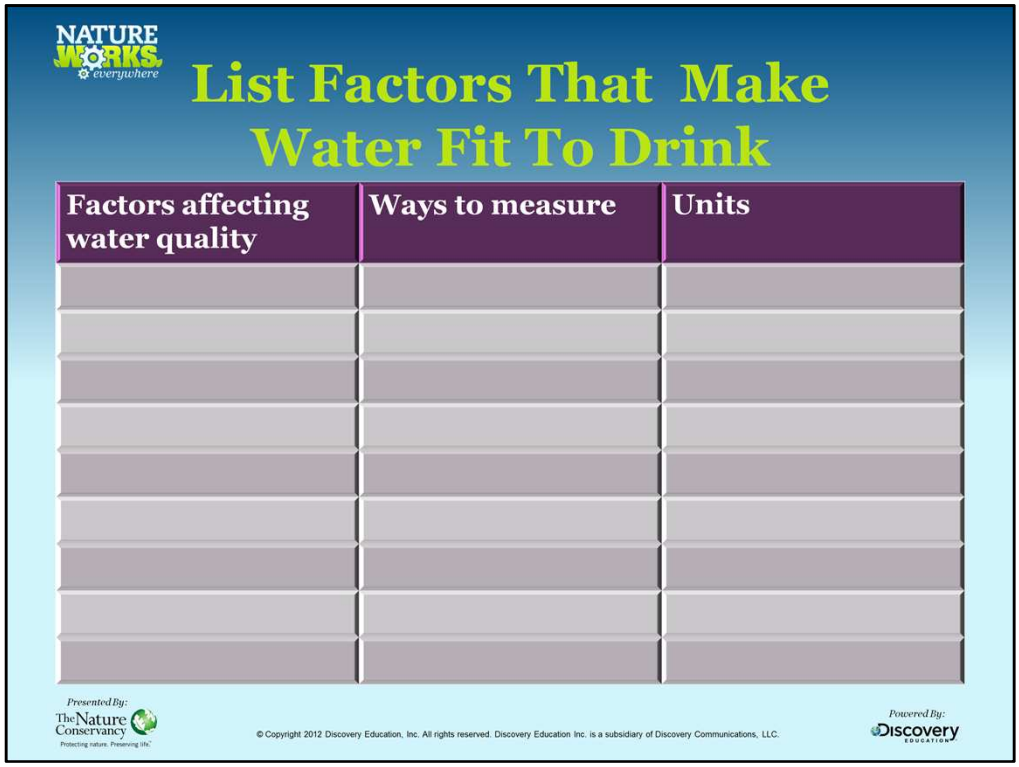
Glossary Term Alert: Title flashes

LT/LCD: Click to make “Glossary Term” disappear, revealing the term “Resource”
Click to bring up the definition
Click to bring up the image
Click to bring up the video
Hover over the video to reveal the play arrow

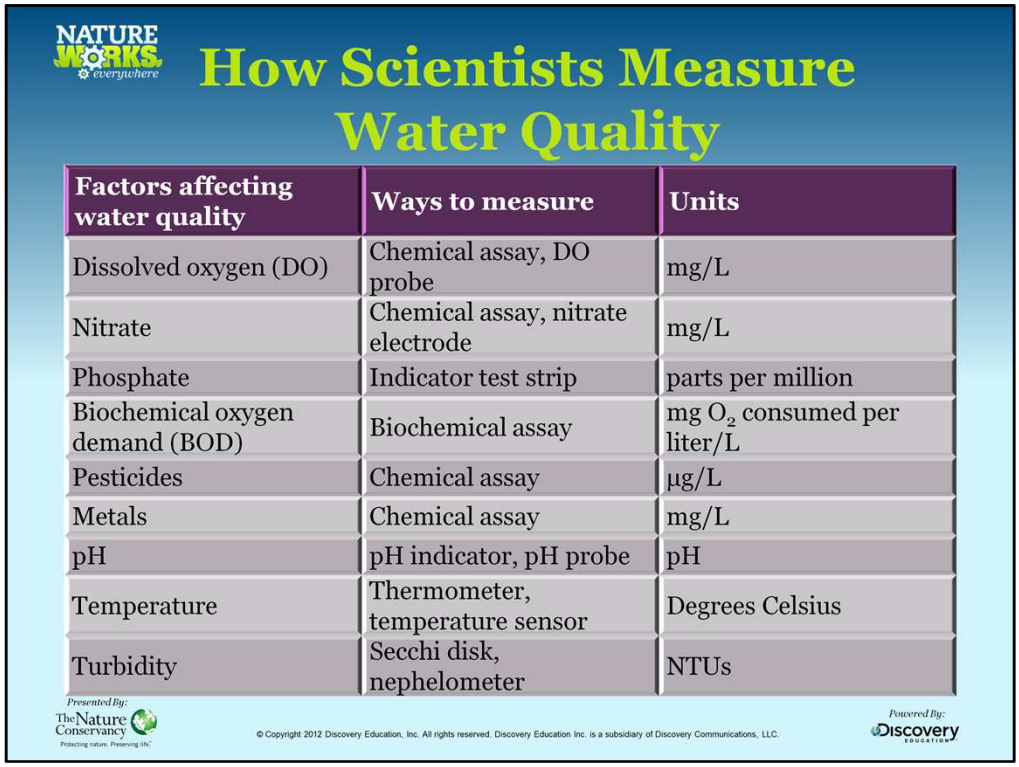
IWB: Tap the green box “Glossary Term” to make it disappear, revealing the term “Resource”
Tap anywhere to bring up the definition
Tap lower left to bring up the image
Tap the lower right corner to bring up the video
Hover over the video to reveal the play arrow



Click or tap on the image to launch the hyperlinked animation on the site.
http://www.nasa.gov/mpeg/136230main_EnergyUncompNotex.mpeg



Have students consider a glass of water and what makes that water fit to drink.
Have students make a list of factors that contribute to water quality.
Have them first brainstorm factors, and then research online.
The list should include how those factors might be measured.
Click to the next slide.



Some of the most important factors that could be measured.

NATURE WORKS everywhere

Lots and Lots of Water!

- Scientists would say there are 1.4×10^9 cubic kilometers of water on Earth
- How much is that really?
- It is about 520,000,000,000,000 Olympic sized swimming pools.
- If an Olympic swimming pool was the size of one cell in your body, that would be enough cells to make five of you.
- Yet, water is a *finite resource*.

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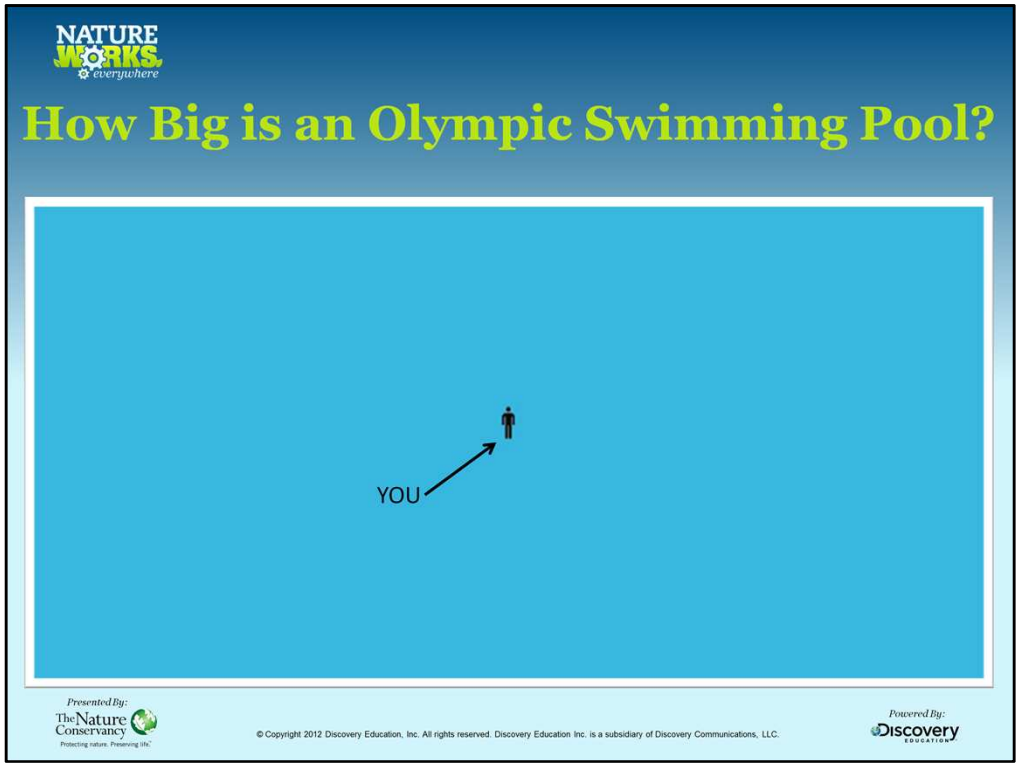
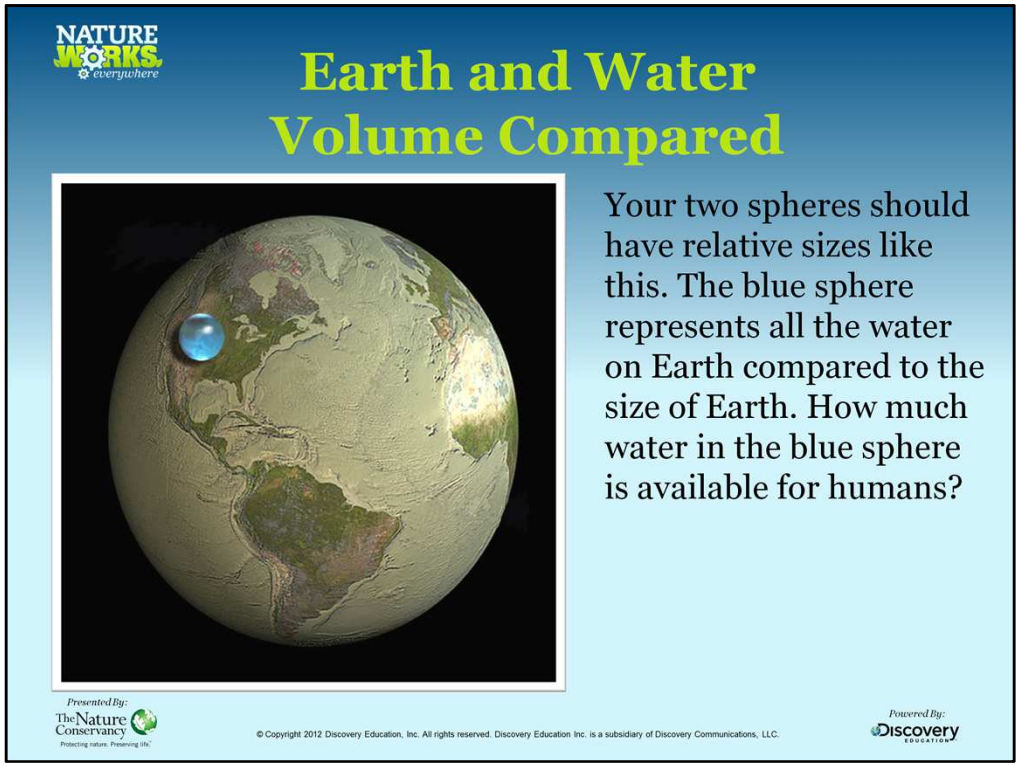
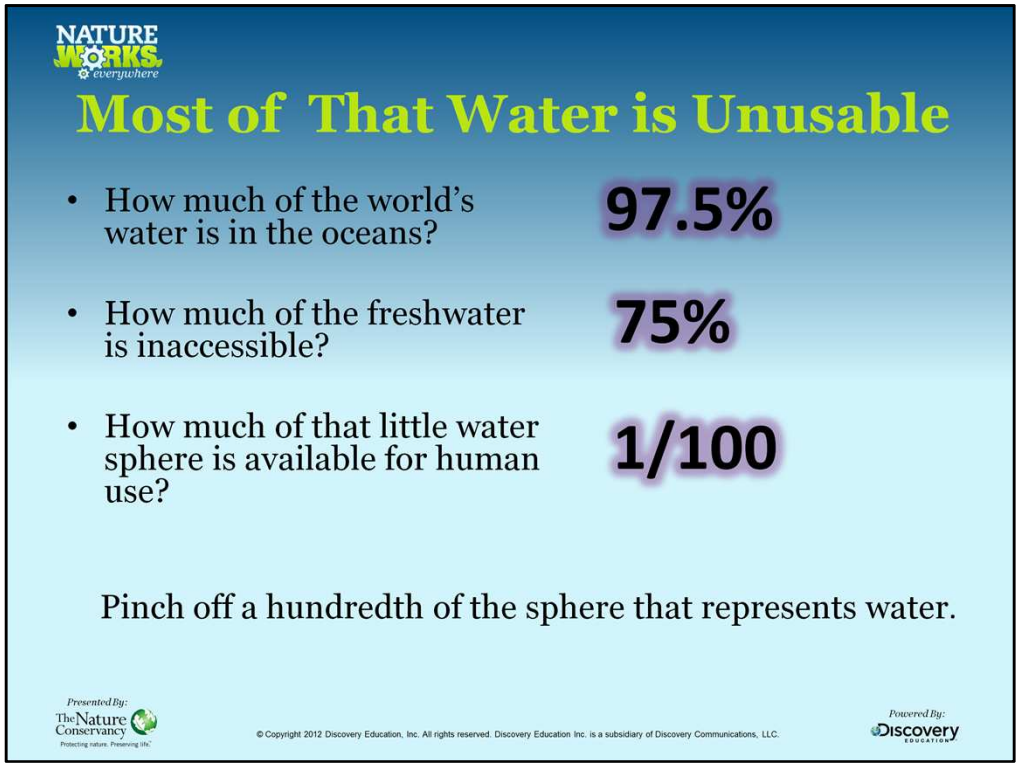


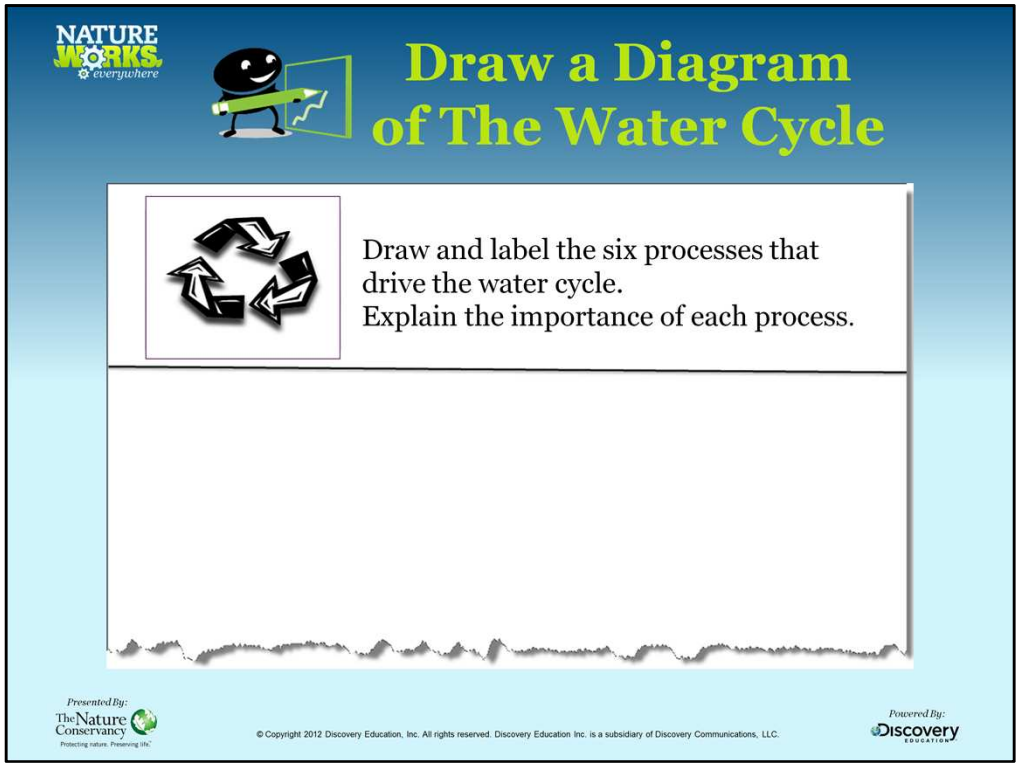
Click to next slide.



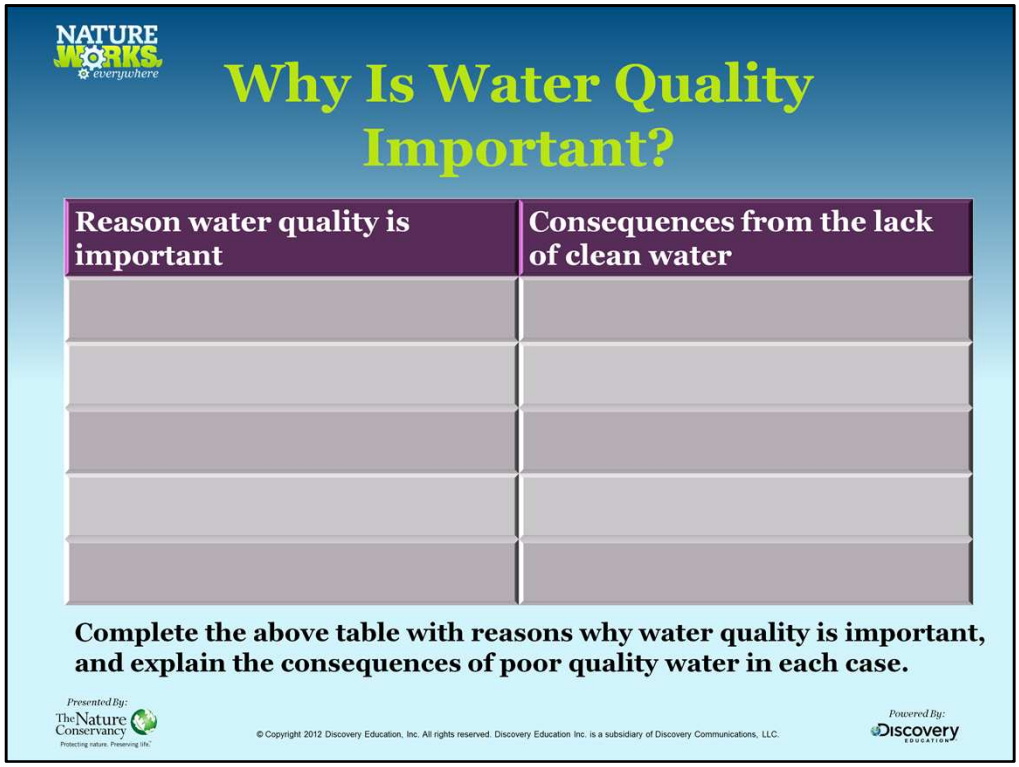
When their models are complete show students the computer-generated image of the Earth compared with the volume of water.
Explain that the small clear sphere is the volume of all of Earth's surface water relative to Earth itself.



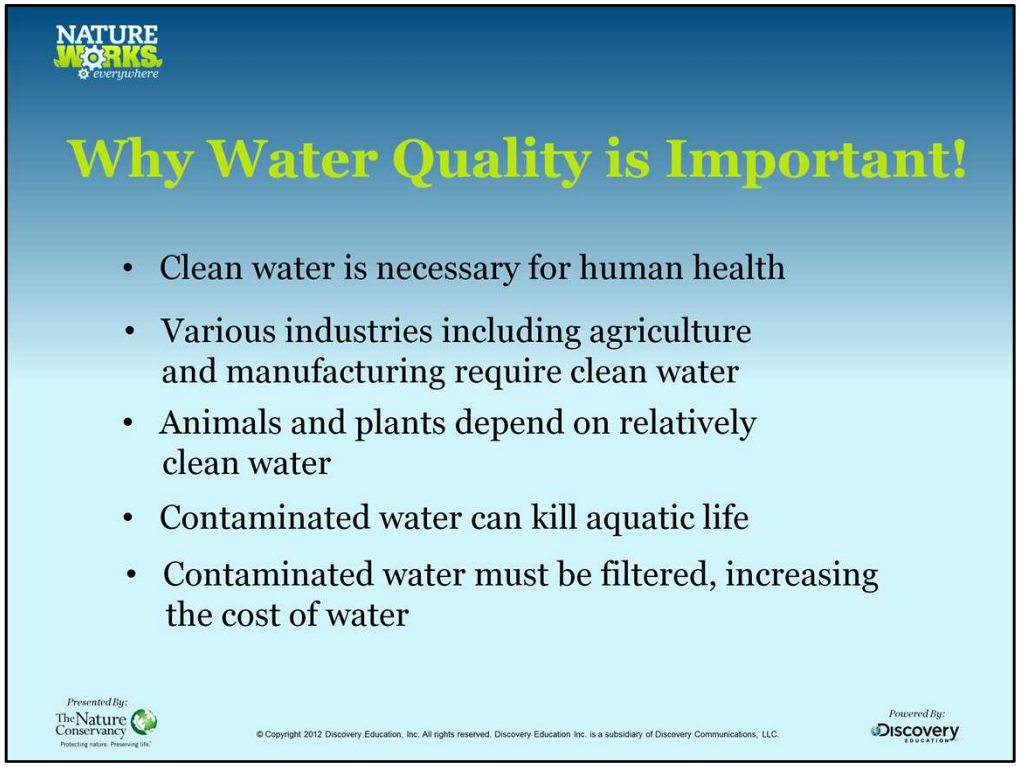
Click or Tap to reveal the amounts after the students estimate what they think?
Of even this small amount most water is unavailable for human use. Have students consider how much water in the sphere is available for humans. They might think half or a quarter. But more than 95% is in the oceans. Of the 2.5% of the freshwater almost three-quarters is inaccessible, locked up in ice-caps or deep underground aquifers. Therefore less than a hundredth (< 1%) of the little water sphere is available for human use. Have students try to pinch off a hundredth of the sphere of clay that represents water volume. That is why water quality is so important. Even though water seems abundant, it is a relatively scarce resource. Moreover easily contaminated or wasted. As human population increases, demand on that tiny amount of freshwater increases.



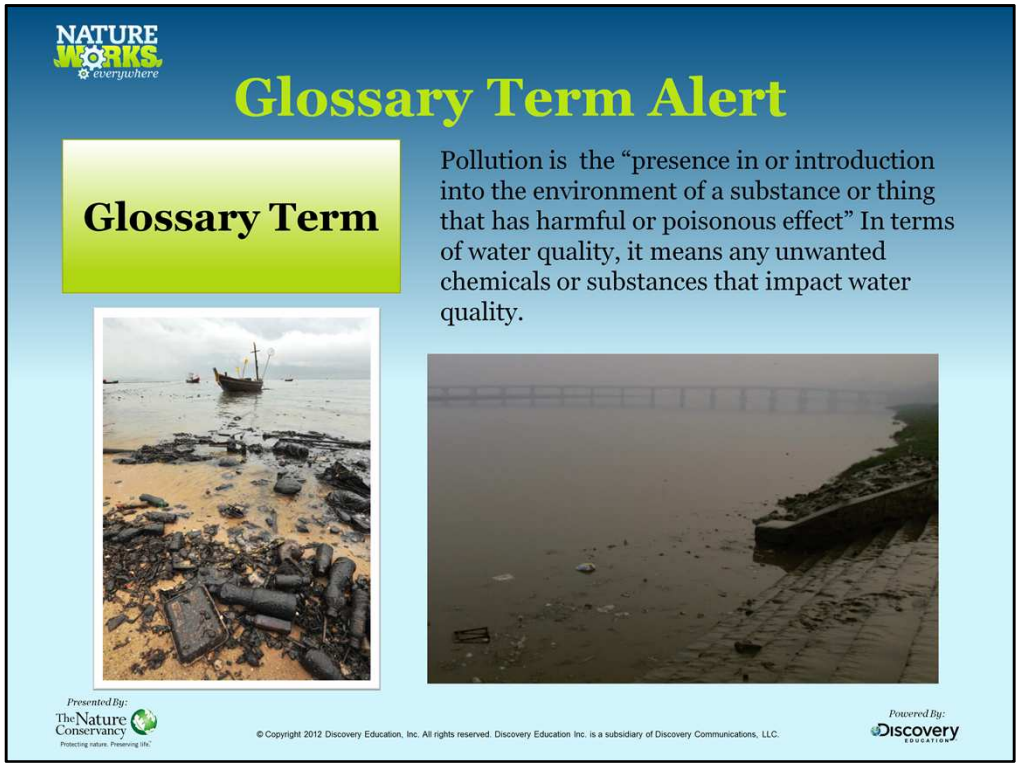
Explain:
Have students draw, label and explain the importance of the water cycle.



Have students create a list of reasons why water quality is important and explain the consequences of poor quality water in each case.
After they are done review and discuss then click to the next slide and clarify any misconceptions.



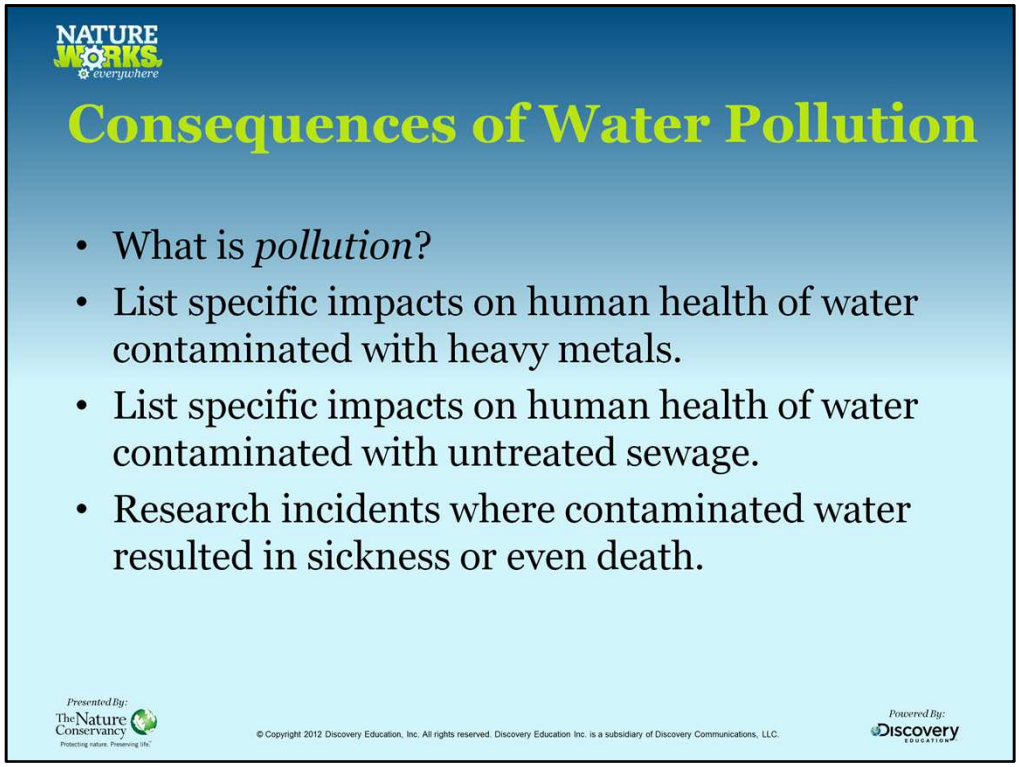
After the students have made their lists then compare their list to this list. Make sure all important facts have been shared.
LT/LCD: Click one at a time for the list of statements to appear.
IWB: Tap on the board for one at a time for the statements to appear.



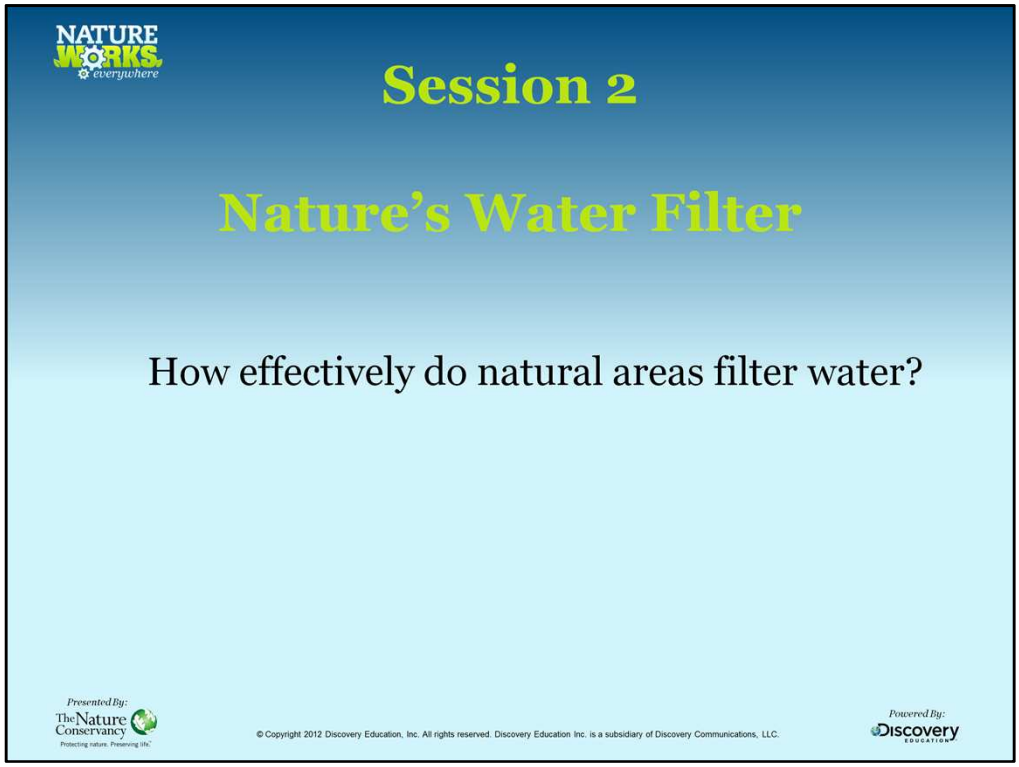
Glossary Term Alert: Title flashes

LT/LCD: Click to make "Glossary Term" disappear, revealing the term "Pollution"
Click to bring up the definition
Click to bring up the image
Click to bring up the video
Hover over the video to reveal the play arrow

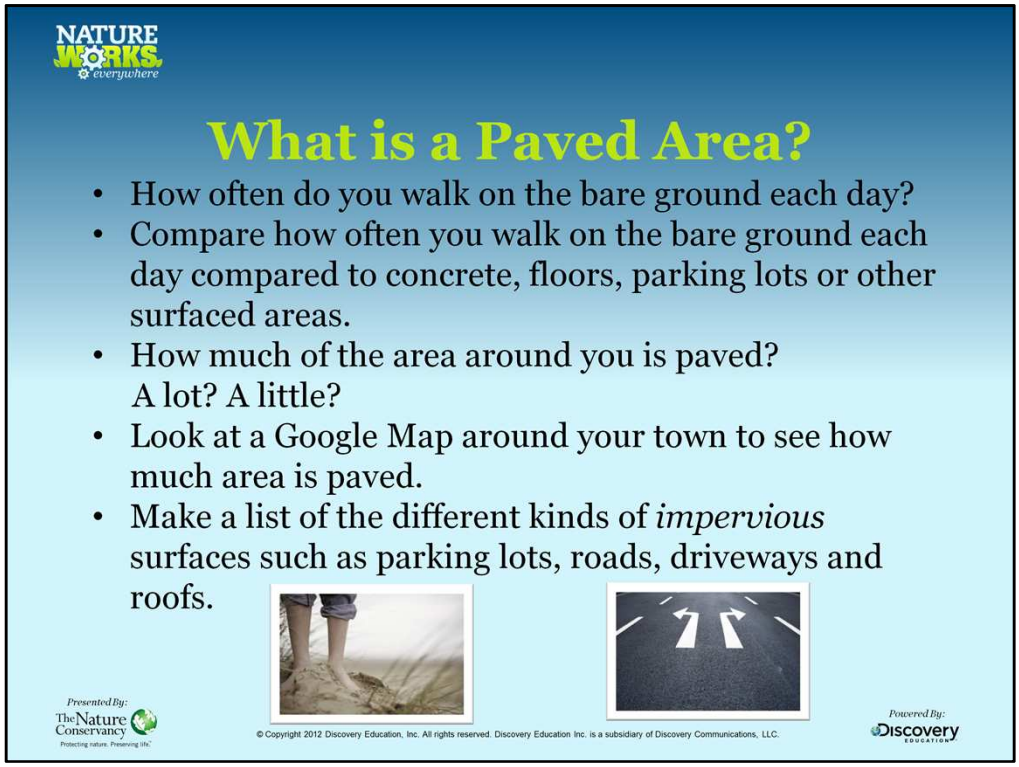
IWB: Tap the green box "Glossary Term" to make it disappear, revealing the term "Pollution"
Tap anywhere to bring up the definition
Tap lower left to bring up the image
Tap the lower right corner to bring up the video
Hover over the video to reveal the play arrow



Extend:
Have students consider consequences of water pollution and wastage. They can list the impacts on human health of water contaminated with heavy metals (e.g., mercury or lead poisoning) or untreated sewage (e.g., typhoid, cholera, etc.).
Have students research incidents where contaminated water resulted in sickness or even death. (For example, the 2008 United States salmonellosis outbreak was traced to contaminated irrigation water used on peppers. In 1999, contaminated water at the Washington County Fair in Easton, New York resulted in 71 hospitalizations and two deaths.)



Title slide for Session 2



Engage

Ask students how often they walk on the bare ground each day.

Have students discuss how often they walk on bare ground compared to concrete, floors, parking lots or other surfaced areas.

Have students discuss how much of the area around them is paved. A lot? A little?

Have students look at a Google Map around their town to see how much area is paved. Have students categorize the different kinds of impervious surfaces such as parking lots, roads, driveways and roofs.

Glossary Term Alert: Title flashes

LT/LCD: Click to make “Glossary Term” disappear, revealing the term “Impervious”
Click to bring up the definition
Click to bring up the image
Click to bring up the video
Hover over the video to reveal the play arrow

IWB: Tap the green box “Glossary Term” to make it disappear, revealing the term “Impervious”
Tap anywhere to bring up the definition
Tap lower left to bring up the image
Tap the lower right corner to bring up the video
Hover over the video to reveal the play arrow

Images to show the two different surfaces.
As water seeps, water is filtered naturally, ensuring aquifers are replenished with clean freshwater. Explain that nature works to reduce the amount of artificial treatment needed to filter water and also contributes to prevention of flooding, thereby benefiting humans.

NATURE WORKS everywhere

Types of Impervious Surfaces

Type of surface	Material

Complete the above table with types of <u>impervious</u> surfaces around your neighborhood and town. Indicate the material used for each type.

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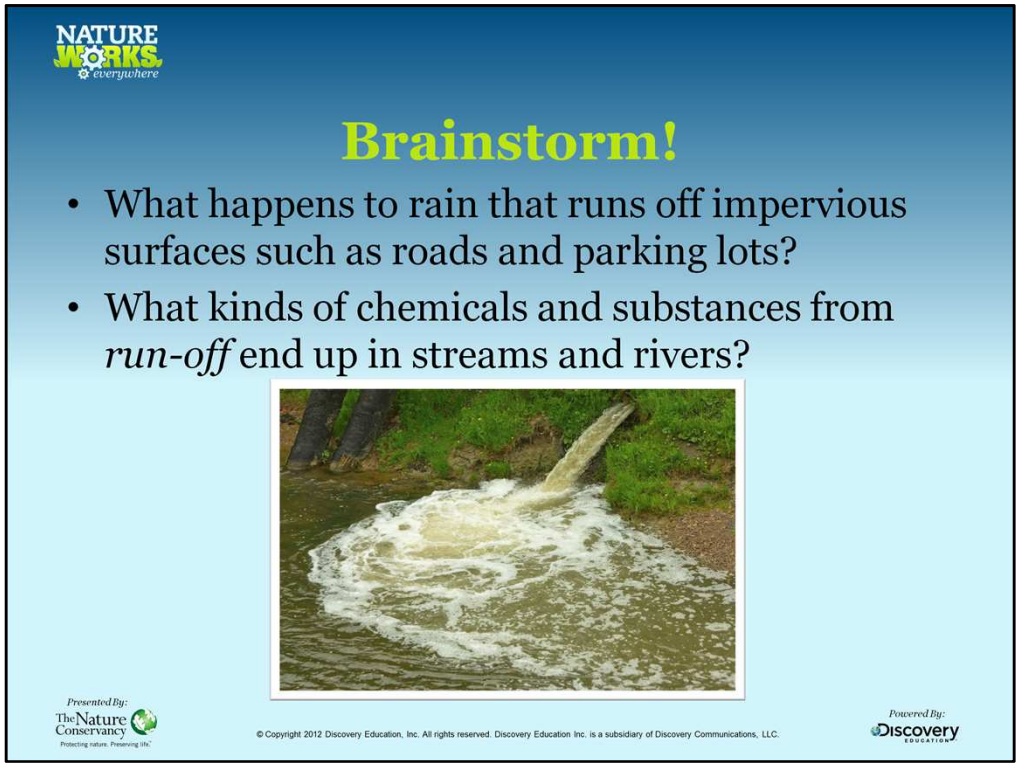
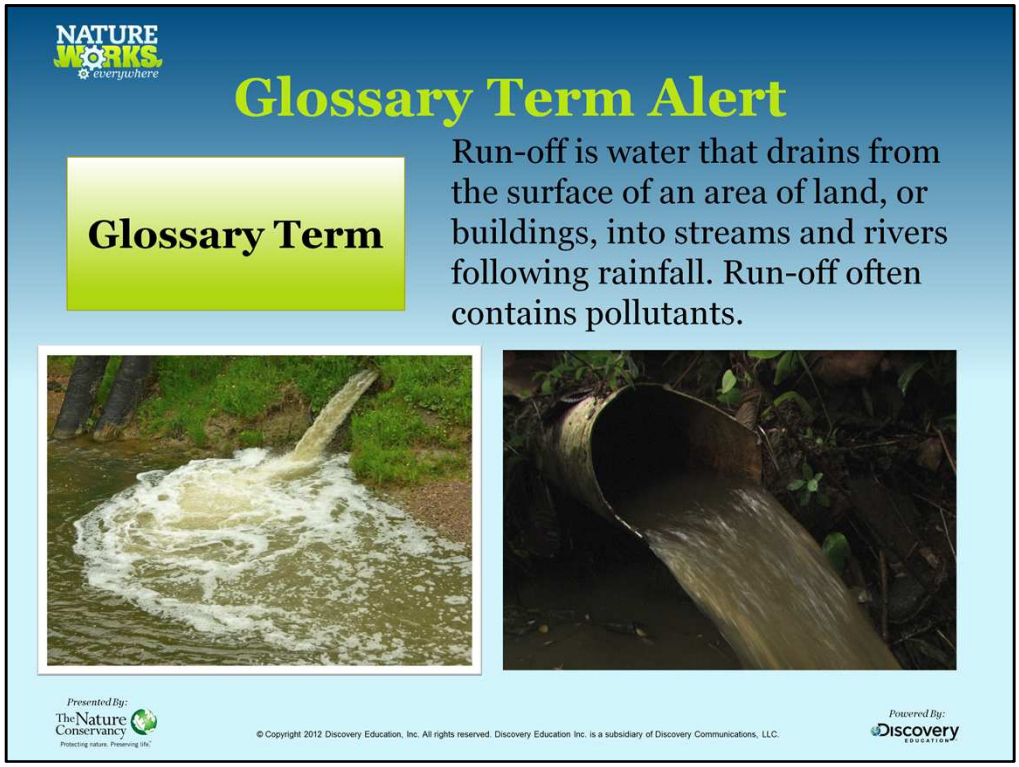


Have students brainstorm what happens to rain that runs off roads and parking lots. Most of this water does not water plants or natural areas, but is transported in drains along with chemicals and trash that pollute streams, rivers, lakes and the ocean. Have students consider the kinds of chemicals that end up in streams from run-off. Oil and gasoline residue from parking lots are washed into streams and rivers.
Have students consider how impervious surfaces reduce water supply. Water is transported along gutters and drains instead of seeping into the ground.



Glossary Term Alert: Title flashes

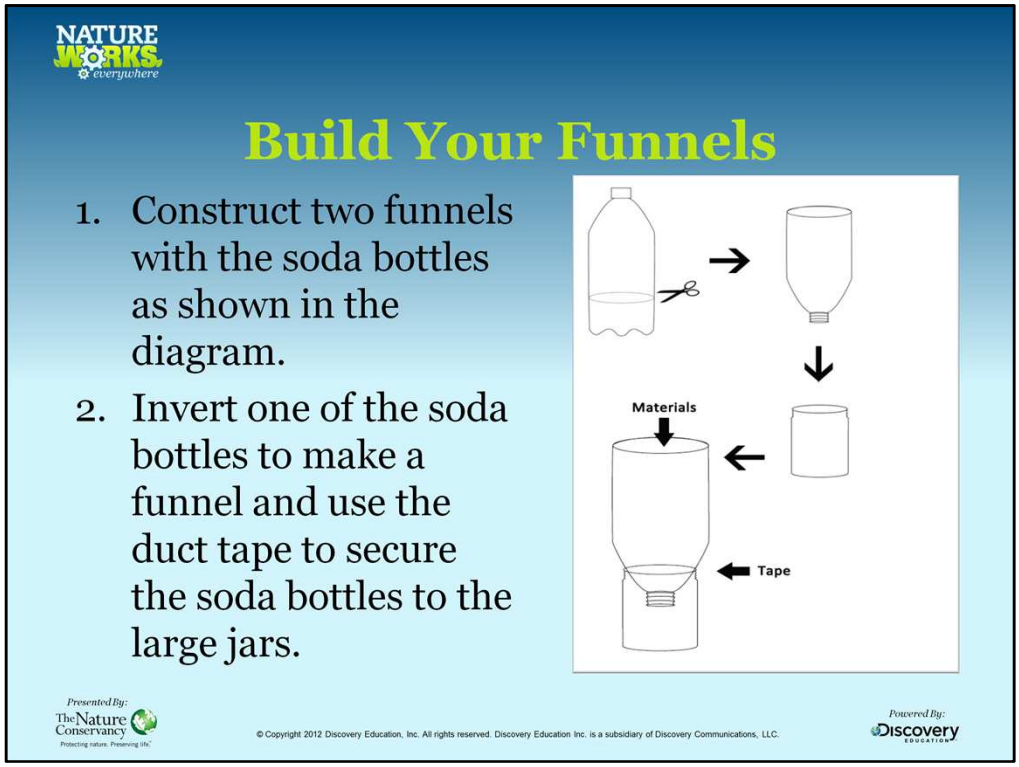
LT/LCD: Click to make “Glossary Term” disappear, revealing the term “Run-off”
Click to bring up the definition
Click to bring up the image
Click to bring up the video
Hover over the video to reveal the play arrow

IWB: Tap the green box “Glossary Term” to make it disappear, revealing the term “Run-off”
Tap anywhere to bring up the definition
Tap lower left to bring up the image
Tap the lower right corner to bring up the video
Hover over the video to reveal the play arrow

Students will use a model to compare water that is filtered through a natural system versus water that runs off from an impervious surface.
Show students the YouTube video that demonstrates a simplified version of the activity.

It's Time to Ask the Scientist

Click or tap to make the oval disappear
Click or tap to make the question disappear and video appear
Click on the video image to launch to YouTube for the video.
http://www.youtube.com/watch?v=Dw9p8jEB7m0



Have students construct two funnels with the soda bottles as shown in the diagram. Invert one of the soda bottles to make a funnel and use the duct tape to secure the soda bottles to the large jars.

Have students mix together a handful or so each of the garden soil, sand, gravel, leaves and moss. The quantities are not important, but try to keep the amounts of each material about equal. Set aside a small handful of moss. Place the small handful of moss in the neck of the funnel. Add the mixture to the funnel. Ensure the material is packed firmly but not too tightly. This funnel represents soil through which water filters in natural areas.

In the other funnel, students place the pieces of concrete, to the same volume as the soil-filled funnel. Loosely crumple the old newspaper into various sized pieces and crush the plastic cups. Add the newspaper and plastic cups into the funnel. This funnel represents areas across which water drains in paved areas. The newspaper and cups represent trash which may collect in the drains of paved areas.

Students mix together a small amount of the garden soil with 2 liters of water and add two cups of the vegetable oil.

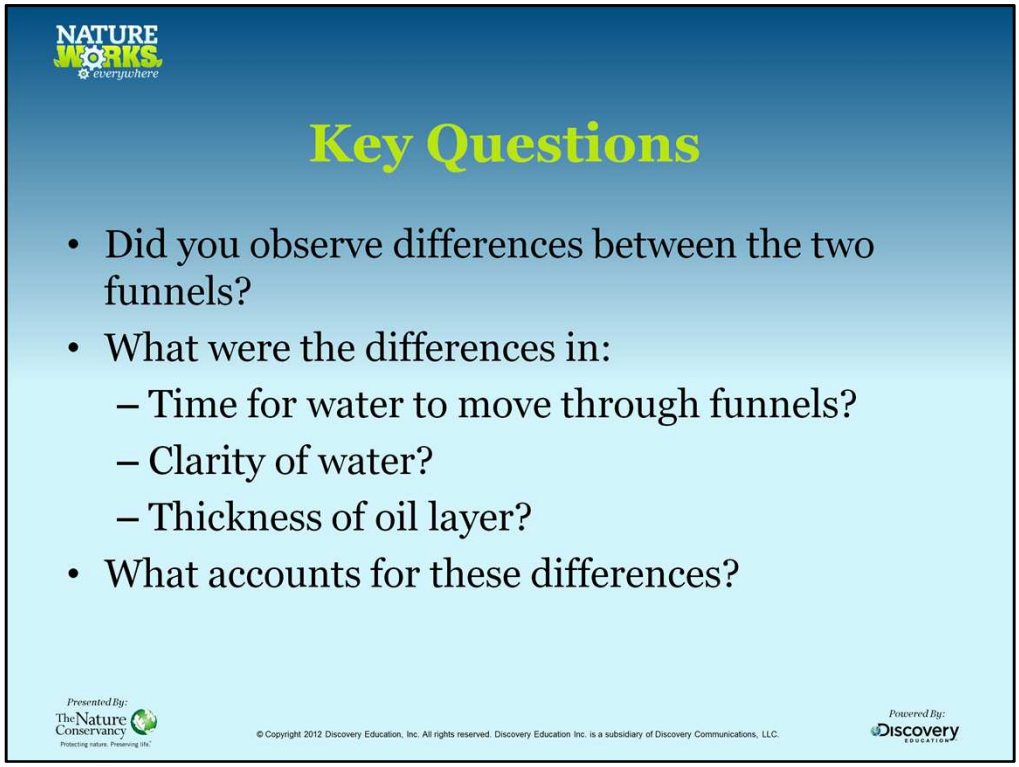
Have students add 1 liter of this mixture to the pouring jug.

Have students pour the mixture into the soil-filled funnel.

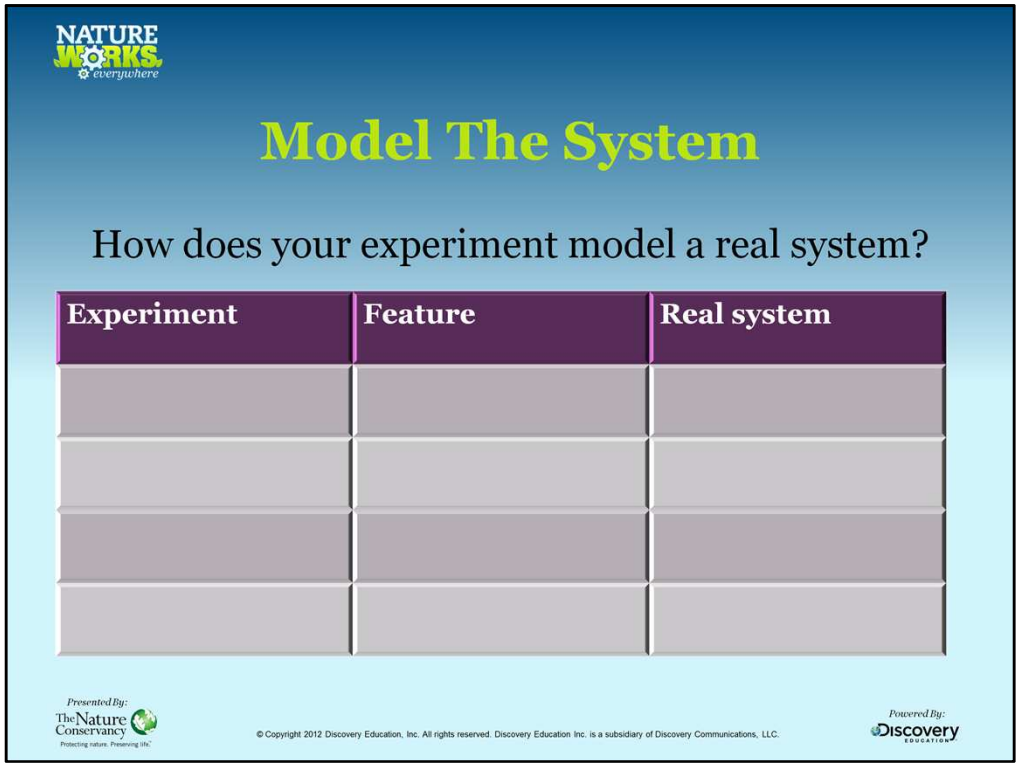
Have students record how long it takes for the water to drain through and their observations.

Also have students measure the height of the oil layer that rises to the top of the water once it has filtered through.

Repeat the above step for funnel filled with pieces of concrete.



Record in journals and then discuss as a class.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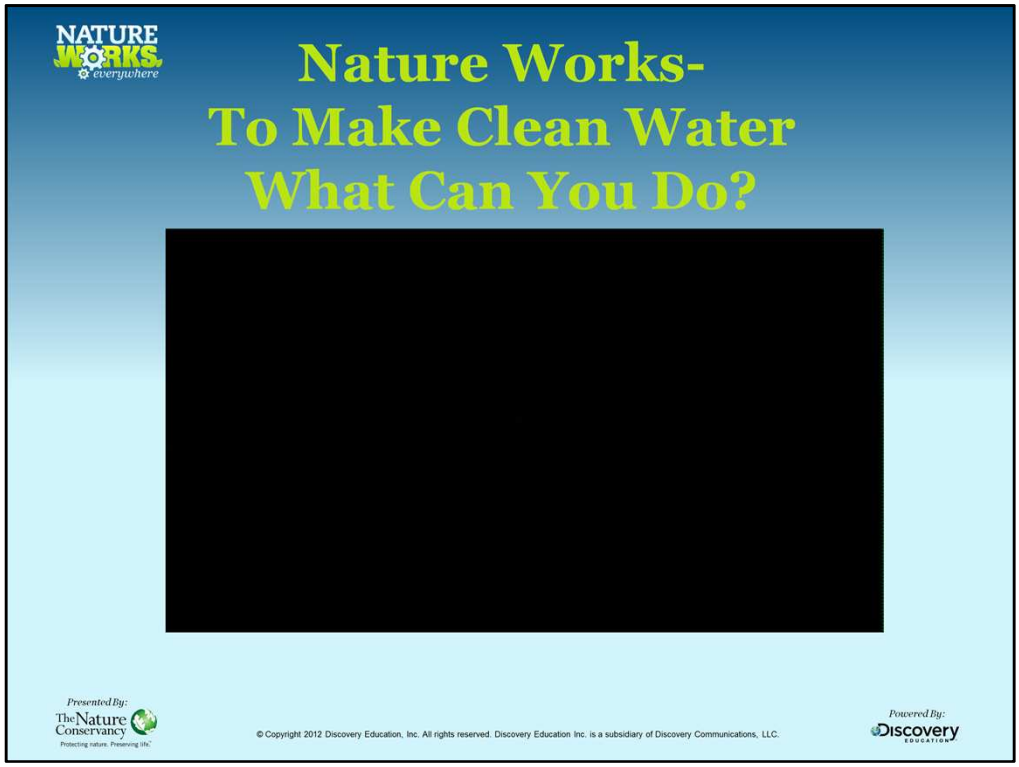
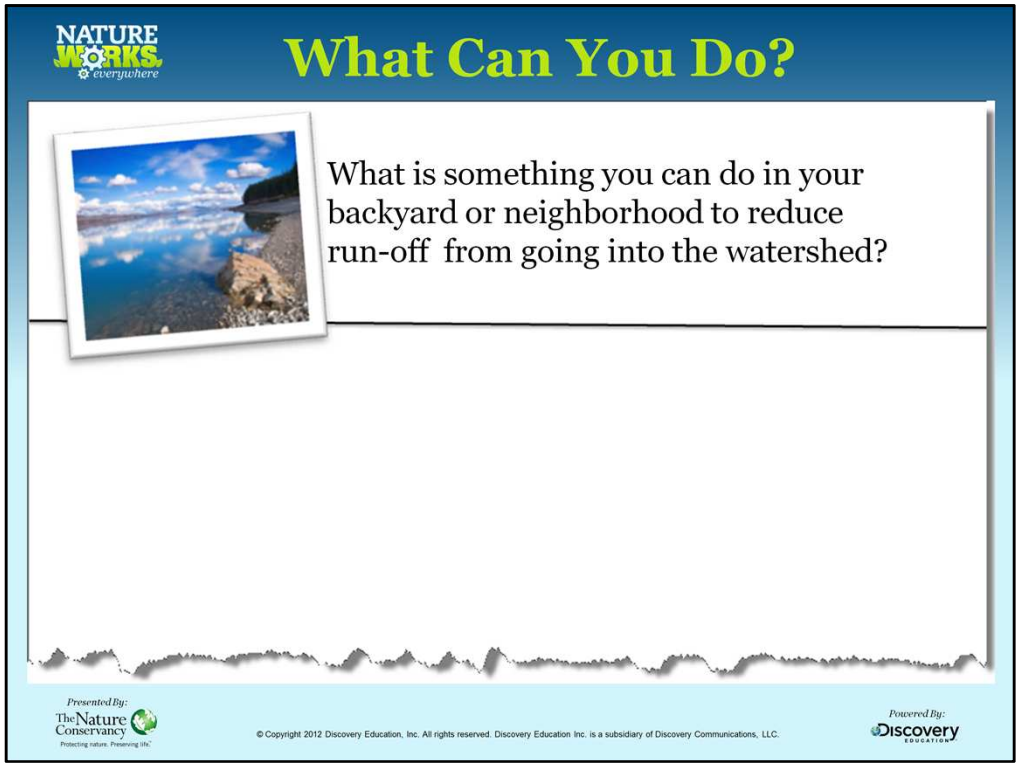


Review this video again keeping in mind how you might be able to make a difference in your backyard or community.
The video is embedded
Hover over the video to reveal the play arrow at the bottom



Solicit responses from the students to write about what they can do to make a difference in the world.