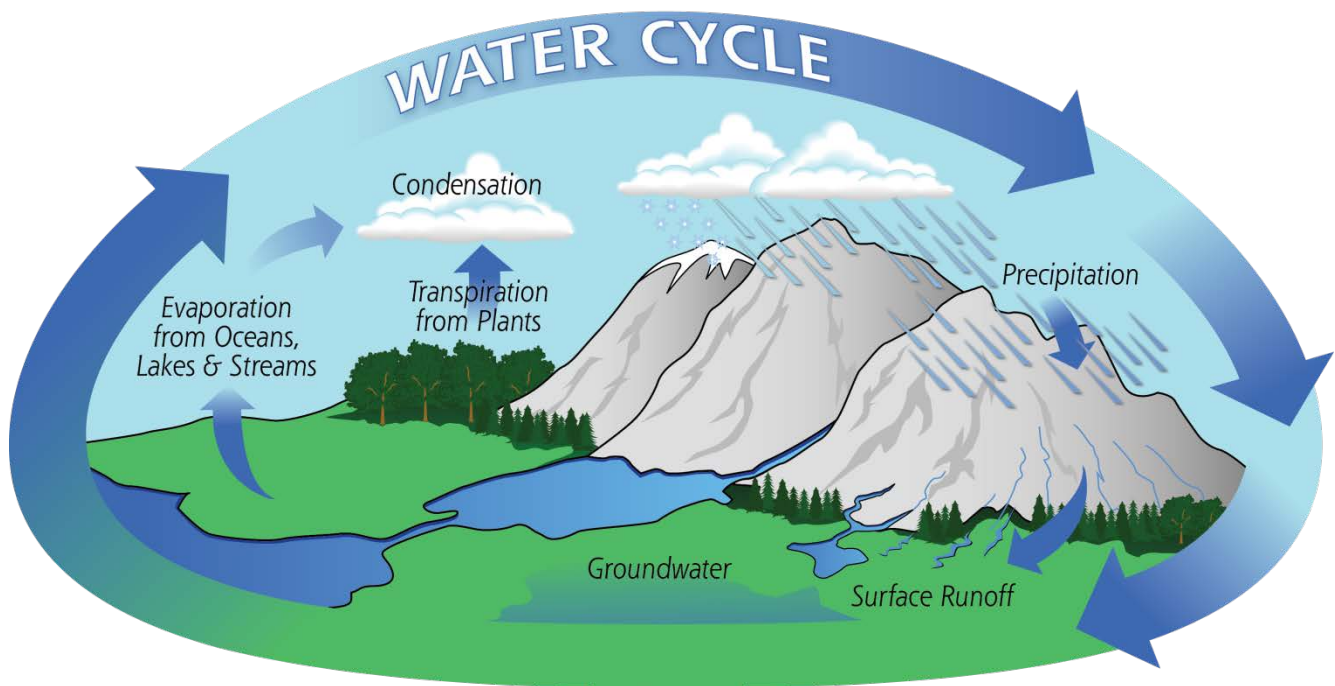


Water Cycle Webquest

In early 2014, NASA will launch an important [satellite](#) that will enable us to learn more about our home planet. The Global Precipitation Measurement mission (GPM), will provide us with the most sophisticated and accurate measurements of global [precipitation](#) ever!



Precipitation is a vital component of how water moves through Earth's water cycle, connecting the ocean, land and [atmosphere](#). Water evaporates from the surface of the land and oceans, rises and cools, condenses into rain or snow, and falls again to the surface as precipitation. The water falling on land collects in rivers and lakes, soil, and [porous](#) layers of rock, and much of it flows back into the oceans. The cycling of water in and out of the atmosphere is a significant aspect of the [weather](#) patterns on Earth.

Scientists study how precipitation moves around the world, how much it rains in local areas, and what kind of rain or snow falls - is it heavy rain from a storm or a just a drizzle? They use what they learn to understand how precipitation impacts streams and rivers, water flowing across the surface of the ground, and [groundwater](#). GPM's frequent and detailed measurements are part of what scientists use to make models of the Earth's water cycle so they can see how it is changing.

The Global Precipitation Measurement (GPM) is an international satellite mission that will provide next-generation observations of rain and snow worldwide every three hours.

Water Cycle Webquest: Student Capture Sheet

Go to <http://pmm.nasa.gov/education/interactive/water-cycle-webquest> to find this webquest. Use this student capture sheet to provide your answers to the questions.

Before you begin this webquest, answer these questions using your background knowledge or browse the Internet to help you refresh your memory.

- How much of Earth's surface is covered by water? _____
- How much of the water on Earth's surface is actually freshwater? _____
- Where does the water that we use to meet our everyday needs come from? _____

GPM is an unmanned satellite that will be launched in February 2014. Here is an introductory video to give you a sense of what it will do and why the science behind the mission is so important. <http://pmm.nasa.gov/education/videos/gpm-freshwater-connection>

- Where does the water that we drink come from? _____

Why is it important for scientists to measure how much precipitation is falling across the world?

- How could that information be used to help society?

Let's begin by following a molecule of water as it makes its way through the water cycle in this short animation. <http://pmm.nasa.gov/education/videos/tour-water-cycle>

- Is there a specific beginning or end in the water cycle? Why or why not? _____

- What "powers" the water cycle? _____

Scan the article titled, "The Water Cycle" from the following link to answer the questions below:
<http://earthobservatory.nasa.gov/Features/Water/>

- How much of Earth's water is found in our oceans? _____

- How much water is stored in polar icecaps, glaciers, and permanent snow? _____

- How much water is stored in groundwater, lakes, rivers, soil, and streams?

- Why is the amount of freshwater on Earth important for human needs?

Next, use the image at the top of the page and the information you have learned to do the following:

- Look at the diagram of the hydrologic cycle, and use it to help you to write a paragraph that explains how a droplet of water that falls as rain can move through the atmosphere, the biosphere, the geosphere, and the hydrosphere. Be specific as you explain the processes (evaporation, condensation, transpiration) that occur because of interaction between Earth's spheres.

In your response, be sure to...

- *Give the state of matter that water is in as it moves through Earth's systems*
- *Describe what processes occur to change water from one state of matter to another*

Let's learn more about how our water cycle is able to distribute both water and heat as it moves through the water cycle: <http://pmm.nasa.gov/education/videos/earths-water-cycle>.

- Where is more than two-thirds of Earth's freshwater stored?

- Why is there more evaporation in the tropics?

- Why do you think that clouds and water vapor act like "insulators" from the sun"?

- What are three things that water variability affects for us?

At this website, <http://pmm.nasa.gov/education/videos/water-cycle-heating-ocean>, you will find out more about how the oceans impact the water cycle.

- How are the land, air, and water heated each day?

- Look at the second animation. Explain the differences that the data shows between the heating of the land and the water during the day and night cycle.

- Look at the third animation. Explain how the movement of warm currents might affect the climate in Florida.

The next website will focus on how evaporation and winds combine to move water from the oceans to the land. <http://pmm.nasa.gov/education/videos/water-cycle-steaming-air>

- How does the ocean lose water to the air?

- Why doesn't the water vapor just stay over the ocean?

- Why don't the oceans simply reabsorb the water that evaporates?

- Why does more water evaporate off of oceans than off of land?

- About how long does water vapor remain in the air?

- As you watch the animations depicting wind and evaporation data over the world, describe what you notice about the patterns the winds and clouds follow: Do clouds and wind appear to follow the same patterns? Can you find any patterns in the direction that they move? _____

We know that everything needs freshwater to survive. Go to this site and find the answers to these questions:

http://www.epa.gov/WaterSense/our_water/water_use_today.html

- Where does the freshwater that you use in your home come from?

- About how much water does the average American family of four use per day in their home?

- What percentage of water do we use for washing our clothing?

- What percentage of water do we use for flushing our toilets?

Look at the pie graph depicting how freshwater is used for industrial, agricultural, and electric water use, and use that information to answer these questions.

- What percentage more of water is used to provide us with electricity versus for irrigation? _____

- Do we use more freshwater in our homes or to provide us with electricity? _____

At this website, <http://pmm.nasa.gov/education/videos/water-cycle-watering-land> you will find out the processes of condensation and precipitation. Read the description, and then answer these questions.

- How do clouds form?

- What role do clouds play in regulating Earth's energy balance?

- About how much of Earth is covered by clouds at any one time?

- What is the ratio of water that falls on land as compared to the amount that falls onto the oceans? _____

As you watch the animations, watch the direction that the wind is blowing in.

- Does the direction change in different regions of the world?

- How does the direction that the wind is blowing in affect how much precipitation the Eastern seaboard of the United States gets per year?

- Why do you think the northern part of Africa doesn't receive very much precipitation per year?

Now sit back and enjoy this video about the water cycle and the importance of water to life on Earth. <http://pmm.nasa.gov/education/videos/water-water-everywhere>

Use the information to answer these questions-

- What is special about water as a compound?

- How does water regulate climate?

- What drives water evaporation?

- Why is the water vapor fresh water when it rises from the ocean?

- Why might freshwater in the form of snow take longer to enter the water cycle again than liquid precipitation?

- What is an aquifer?

- What role do people play in the water cycle?
