# NASA-Unique Resources to Support the "Importance of Freshwater" Docent-led script

All life relies on the availability of water. Knowing when, where, and how much it rains or snows is vital to understanding how weather and climate impact our environment, and in turn human society. The movement of water and energy around Earth affects agriculture, fresh water availability, and the occurrence of natural disasters.

In many parts of the world, rain is the only source of water for both drinking water and agriculture. Rain also recharges ground water aquifers, and spring snowmelt replenishes rivers and streams for the summer.

This resource guide has been developed to assist docents in providing supplemental lesson plans, videos, data sets, hands-on activities, and other types of resources to educators or other participants who might benefit from having supplemental materials.

## Lesson Plans and Activities

**Freshwater: A Precious Resource:** This lesson plan teaches participants about Earth's water, and helps them to understand how little of this water can be used to meet our needs. http://pmm.nasa.gov/education/lesson-plans/freshwater-resources

**Cleaning Water Activity:** Design and build a water filtration system and collect data to compare water before and after filtration. http://pmm.nasa.gov/education/lesson-plans/cleaning water-activity

**Freshwater Availability Classroom Activity:** This classroom activity will teach students about the value of Earth's freshwater resources and how important it is to study how water is transferred and stored. http://pmm.nasa.gov/education/lesson-plans/freshwater-availability-classroom-activity

**Earth's Water**: This activity was developed to give participants an understanding of Earth's water – how much there is, what forms it takes and where it is found. In this one-hour long activity, students participate in a demonstration showing the distribution and composition of water on earth. Participants also create a map showing where freshwater is located on earth (in streams, ice pack, wetlands, etc.).
http://pmm.nasa.gov/education/lesson-plans/earths-water

**Water Conservation**: This one-hour long activity gets students thinking about how humans use water and how we can conserve water. Students will watch a short documentary describing issues related to safe water availability, analyze water use data and start to think about how they use and can conserve water. This background knowledge will lead to students collecting data about their own water use and finding areas in their

lives to conserve water and hopefully encourage family and friends to do the same. http://pmm.nasa.gov/education/lesson-plans/water-conservation

**What Factors Affect Macroinvertebrate Life in Big Darby Creek?**: In this problem-based data analysis activity, students identify trends and make predictions about the possible influence of climatic factors and vegetative growth on macro invertebrates. http://mynasadata.larc.nasa.gov/lesson-plans/?page_id=474?&passid=86

## Websites

**Precipitation Education**: The Global Precipitation Measurement (GPM) mission's education and public outreach website. The website focuses on four main categories: water cycle, weather and climate, technology, and societal applications. Each of these categories has many educational resources that include descriptions about each resource, information on intended audiences, and a lot of other useful information. http://pmm.nasa.gov/education/

**Safe Drinking Water is Essential**: Over one billion people lack access to safe drinking water worldwide. What can be done? Learn more about this problem and explore possible solutions. http://pmm.nasa.gov/education/websites/safe-drinking-water-essential

**Where the Rain Falls: Can Understanding Rain Enable Change?**: This website describes a study that is being conducted to understand the complexities of rainfall patterns and their effects on food security and human mobility. http://pmm.nasa.gov/education/websites/where-rain-falls-can-understanding-rain-enable-change

**The USGS Water Science School - The World's Water**: This interactive website has many great graphs, charts, and other information to help viewers better understand how we use our freshwater resources. http://ga.water.usgs.gov/edu/earthwherewater.html

## Videos and Data Animations

**GPM: The Fresh(water) Connection**: NASA scientists discuss why it is so important to study and track Earth's freshwater resources, and explain the purpose of the Global Precipitation Measurement mission. (1:24) http://pmm.nasa.gov/education/videos/gpm-freshwater-connection

**Science for a Hungry World: Growing Water Problems:** One of the biggest changes to global agriculture is less about the food itself as it is about the water we use to grow it. In some areas, farmers are using freshwater resources - including groundwater - at an alarming rate. (4:53)- http://pmm.nasa.gov/education/videos/science-hungry-world-growing-water-problems

**India's Disappearing Water:** During the past decade, groundwater beneath the northern Indian states of Punjab, Haryana, and Rajasthan has decreased by more than 88 million acre-feet. Using NASA's twin GRACE satellites, scientists determined the rate of groundwater change in India. This series of 3 videos gives viewers a deeper understanding of this problem. http://pmm.nasa.gov/education/videos/indias-disappearing-water

**Sea Surface Temperature, Salinity and Density:** The animations in this group show the long-term average sea surface temperature, the long term average sea surface salinity, and the long term average sea surface density. http://pmm.nasa.gov/education/videos/sea-surface-temperature-salinity-and-density

## Other Resources

**Using Satellites to Track Water**: In this article, Faisal Hossain, a civil and environmental engineering professor at Tennessee Technological University, uses NASA satellite data to help Bangladeshi authorities monitor their water resources and prepare for water-related disasters. http://pmm.nasa.gov/education/articles/using-satellites-track-water