

Title: Evaluating the World's Disproportionate Consumption of Water Through Research and Self-Examination

Study Guide Theme: Water

Featured Photos



Dry Lake



Water Well



Man Bathing

Image Titles:

Dry Lake (pg. 274-275): A woman walks on a dry bank of a dam next to a lake that provides water to Islamabad, Pakistan.

Water Well (pg. 47): Crowding Around a communal well in India.

Man bathing (pg. 238-239): A large percentage of the global population has limited access to clean water, and climate change is predicted to increase water scarcity. Here a man uses a broken water pipe in Noida slum, Uttar Pradesh, India, for bathing.

Overview: Water scarcity is a global concern. Students will discover where there is a disproportionate consumption of water across the globe and discover reasons why. Students will determine their water footprint and make lifestyle changes that promote sustainable water use.

Grade level(s): College

Subject(s): Biology

Corresponding National Standards: N/A

Corresponding Global Competency Skills: Investigate the world, and take action

Essential Question(s): What is water scarcity and why should we be worried about it? How can you use water more

sustainably?

Learning Activities:

(Activity 1 in the procedures can be completed in a 75-minute class period. Activity 2 can be completed within two weeks.)

Procedures:

1. Before completing the exercises, students should be familiar with the distribution of Earth's freshwater and our freshwater sources. Students should be familiar with the hydrologic cycle (also called the water cycle) and what a footprint is. Things to keep in mind:

- Water may seem abundant on the planet; however, only 2.5% of Earth's water is considered fresh water and most of it is tied up in glaciers, ice caps, and aquifers. Of the 2.5% of freshwater, 1% of that is surface fresh water.
- Water is recycled and moves through the environment through the hydrologic cycle. The hydrologic cycle shows how interconnected Earth's aquatic systems truly are.
- Students should know what one's water footprint includes. In one of the activities, the student's will determine their water footprint and their water footprint calculation will include industrial water usage (or sometimes called virtual water).
- You may want discuss types of human activities that affect our water sources (water use by sector) prior to starting the activities, and how human activities impact on our fresh water supplies (ex. introduction of pollutants through our agricultural practices). You can even bring in how climate change is affecting freshwater systems.

2. Activity 1 – Clean water:

Learning objectives: Students will define water scarcity. Students will identify and describe the disproportionate consumption of water in different geographic regions.

- Begin with analyzing the photos: Have students analyze each photo using the National Archives and Records Administration's [Analyze a Photograph Worksheet](#).
- After analyzing the photos get an active discussion going to direct students to the topic of water scarcity. You can have this be a writing assignment and they work as table mates, or set this up as a classroom discussion. Examples of questions include: What stood out to you the most in each photo? What do you think the photographer might be trying to convey? What would you say is a common theme among the three photos? What is water scarcity? Do you think water scarcity is limited to certain countries or regions on the planet? If so, which countries and why?
- Show or have students visit the following Worldmapper website to view a cartogram that illustrates the [global disparity of clean water access](#). The shape of the geographic regions are distorted so that countries are mapped proportional to the amount of people who do not have reliable access to clean drinking water.
- Have students work in groups to answer the following questions: What is clean water? Which countries in the cartogram have the most reliable access to safe drinking water? Which countries in the cartogram have the least reliable access to safe drinking water? Does any of this information come as a surprise to you? How does this information relate to the photos? What factors do you think are involved in a country providing its residents with consistent levels of clean water? Do you think having access to clean water is a human right? Why or why not?

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3. Activity 2 – Our water consumption:

Learning objectives: Students will determine their water footprint, and they will compare and contrast their water footprint to other Americans and countries. Through research, students will develop a better understanding of water scarcity in one of the three countries from the photo analysis activity. Students will also track their daily water usage for one day and implement a plan of action to reduce their water usage.

Assignment description:

- Determine your water footprint using GRACE Communications Foundation’s [water footprint calculator](#). Note, your water footprint calculation also includes industrial water usage (or sometimes called virtual water).
 - a. What is your water footprint?

 - b. How does your footprint compare to the average American footprint? Why do you think you are higher or lower than the average American?

 - c. How does your footprint compare to the footprints of [other countries](#). Why do you think you are higher or lower than other countries?

 - d. What are your thoughts on your water consumption? Do you feel you have a moral obligation to reduce your water footprint?

- Optional) Familiarize yourself with the extent of water scarcity we are currently facing by reading an article on the global water crisis. An example of an article is: <https://news.nationalgeographic.com/2018/03/world-water-day-water-crisis-explained/>.
- Choose one of the pictures from activity 1 that you would like to research water scarcity in that country. You are going to write a paper on water scarcity and also reflect on your usage of water. Your paper must include the following:
 - An introduction to the global water scarcity problem humanity is facing as a whole and research on one of the countries from the three pictures we discussed in class. Address the following in your introduction:
 - Briefly describe the factors that have contributed to the country’s water scarcity problem and address whether or not they are facing a water crisis.
 - What measures are currently in place to improve water conditions for their citizens?
 - Has the government been successful in improving water conditions? If not, why have they been unsuccessful?
 - How does your daily household water usage compare to other Americans and other countries? To do this, you are going to track and present your water usage for one day using a table or graph. You must keep track of all the water you use in one day, whether it be to brush your teeth, wash your clothes, or do the dishes. You can use [Pacific Institute’s WECalc Your Home Water-Energy-Climate Calculator](#) to help you in estimating

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your water household usage for that day. This DOES NOT include, for example, how much water you use a day to cook with, to have a cup of tea with, or to refill a water bottle.

- Come up with a plan of action to reduce your daily household water usage. Implement your plan of action for one day. Track and present your water usage using a table or graph. (You must share what your plan of action was in your paper.)
- Write a conclusion on your data. In your conclusion, compare and contrast your household water usage pre-action plan and post-action plan. Your conclusion should also include a reflection on your water usage compared to the average daily water usage in your country and other countries (for example, the country you chose to research). Use the [data](#) that was published in the Human Development Report 2006 (Figure 1.2, page 34) to help you. (1 Liter = 0.26417 US gallons) Keep in mind, you only determined your daily household water usage. Imagine if it included all the other ways you consume water every day. Remember what got factored into determining your water footprint?
- You must cite your sources in APA format.

4. Learning Extension – Be daring:

(The learning extension activity is a three-week exercise.)

Learning objectives: Students will further evaluate their water consumption by challenging themselves to cut their daily water usage in half. Students will encourage others to reduce their consumption of water by organizing a water usage group challenge among family and friends.

Assignment directions:

- This assignment has two parts:
 - You are going to challenge yourself one more time. This time you are going to try to reduce your daily water consumption by half for one day. (The number of gallons you will be reducing by half is your average daily water consumption you determined pre-action plan.) You are going to present this data and write a conclusion in the Water Usage discussion board forum. You will reply to two other students' original posts, and you must reply on different days so that we can get an active discussion going. Your original post must include the following:
 - Your water usage data plan and after your efforts to reduce your daily consumption by half.
 - Answers to the following questions:
 - Compare and contrast your results to your typical average daily water usage.
 - Would you conclude that you were successful in cutting your water usage by half? If you do not feel you were successful, what do you think affected your ability to reduce your water usage by half?
 - What did you find most difficult in completing this exercise?
 - Now that you have experience reducing your water consumption, let's get loved ones involved. Create a Facebook water usage challenge with your family and friends. You will challenge them to reduce their water usage by 25% for one day. In your Facebook post, you will need to include a link to the [Pacific Institute's WECalc Your Home Water-Energy-Climate Calculator](#) to help them estimate their water usage before and after the water challenge, as well as suggestions on how they can reduce their water usage. Make sure you give your water challenge a name! Monitor your Facebook water challenge for a week and then submit a short conclusion on how it went.

Assessments:

Photo analysis

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Group discussion
Writing assignments

Materials:

1. Students will need a computer and access to the internet.
2. Overhead projector.
3. Copies of the photo analysis worksheet - <https://www.archives.gov/education/lessons/worksheets/photo.html>
4. Suggested readings/resources related to the study guide include:
 - Biointeractive video on the water cycle in Gorongosa National Park - <https://www.hhmi.org/biointeractive/gorongosas-water-cycle>
 - National Geographic's Earth's freshwater Teacher Guide - <https://www.nationalgeographic.org/media/earths-fresh-water/>
 - U.S. Geological Survey's (USGS) Water Science School - <https://water.usgs.gov/edu/>
 - World Health Organization's Global Health Observatory (GHO) data - http://www.who.int/gho/mdg/environmental_sustainability/en/
 - UN-Water's water scarcity facts - <http://www.unwater.org/water-facts/scarcity/>
 - Food and Agriculture Organization's AQUASTAT - http://www.fao.org/nr/water/aquastat/water_use/index.stm#db
 - Water Use Calculator - <https://www.swfwmd.state.fl.us/conservation/water-use-calculator>

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