

**Water Sustainability:
Water, water, everywhere and not a drop to drink**

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Introduction

I am the one who runs the water, while I brush my teeth. I am the one who runs the water for the shower until it is warm and take 15 minute showers. I am the one that washed clothes, even if it is a small load or 1 garment. I understand that water is important, but I am aware and know how important it is to value water as a resource and conserve it.

Ecology is a major unit of study for the North Carolina End of Course Biology Test. A portion of the unit focuses on human impact on our environment. When human impact is discussed, it is important to talk about the natural resources and most importantly, how to sustain them. My curriculum will focus on water and sustainability. Other than air, water is the most important resource. The truth is we cannot survive without water. Water is essential to life on Earth and serves as a support system for life. Water plays a major role in the human body. Over 60% of our body is made of water. Body temperature is regulated by water. It keeps the membranes in our body moist.¹ We need it for many of our daily activities. Many species live most or all of their lives in water. Water is finite. The same water that existed on Earth millions of years ago is same water we use today. The water cycle continually recycles the same water around the globe. It is entirely possible that the water you drank for lunch was once used by Mama Tyrannosaurus to give her baby a bath.² Clean water is a renewable resource, but it is limited due to pollution and use of water. Having clean water that is available for consumption exceeds the rate of renewal and we must take care of what we have and use it wisely.

Changes within our Earth's water resources results from our human activities. Nature is not to blame. Human activities are increasing due to population growth and greater per capita resource use. More water is required to satisfy the needs of a growing population It has been estimated that humans have already use approximately 54% of all freshwater available.³ Some scientists believe that the world's population, currently at 6 billion, will double by 2050.⁴

Freshwater resources are water from streams, lakes, rivers, and ground water. Freshwater provide people with most of the water they need every day to live. Each day humans must replace 2.4 liters of water, some through drinking and the rest taken by the body from the foods eaten.⁵ Only 3% of the Earth's water is fresh water. The remaining water is 97% saline (salty), such as in the oceans. The majority of freshwater is ground water. It is below the surface under our feet. 0.3% of freshwater comes from our rivers and lakes.

Some of the human activities that are affecting our water resources are population growth, climate change, land use change and energy choices, and global poverty. These factors are interrelated in a variety of ways. For example, pollution to our environment, such as the use of non-biodegradable products leads to ozone depletion, resulting in global warming. Global

warming causes a global climate change, such as less snow cover and ice free periods of the Arctic, and drought. We can no longer count on the mean of precipitation.⁶ All of these are based on our activities and the more a population grows the more human activities increase.

Another major cause is global poverty. One billion people on earth live on less than a dollar a day.⁷ More than half of the world's water supply is contained in just nine countries: the United States, Canada, Columbia, Brazil, the democratic Republic of Congo, Russia, India, China, and Indonesia.⁸ Poverty and overpopulation in undeveloped countries does not allow the basic water needs of the people, such as bathing and sanitation.

Land use change and energy choice is another example of how human activity affects water resources. People seek to create wealth and develop a better way of life through land resources.⁹ Converting land for agriculture and industrial purposes requires more water and may result in poor water quality. Energy choices such as bio fuels and oil, just to name a few have enormous implications for water. The most recent example is the BP Explosion in April of 2010. Many people were blamed for this disaster (operator of the rig, the government, the contractor to expedite the drilling operation), but none of them are fully responsible. Our addiction to oil is really to blame. This energy source jeopardizes an entire Gulf ecosystem.¹⁰

Water conservation by all is essential. Every little bit that we contribute to water conservation will help. With all the people on Earth relying on such a small percentage of all water on Earth, it only makes sense that we preserve and conserve our water.¹¹

In this curriculum unit, students will be asked to identify the water resources and compare and/or contrast the availability of water as a resource among various countries. The students will summarize the importance of water, and lastly, create solutions to raise awareness of water and sustainability. There will be a variety of ways students can share what they have learned about water and sustainability.

Student Background:

I teach at a school that has a very diverse population of students and various academic levels. During my 14 years of teaching, I have taught various subjects, but mostly biology, in which I am certified. I have had the opportunity to teach all levels. I have taught Standard, Inclusion (students with special needs that are mainstreamed in a regular class), Honors, MYP/IB (Middle Years International Baccalaureate Program), and Advance Placement Biology.

A standard biology class should consist of students taking biology for the first time. These students will mostly be ninth and tenth graders or students coming from another state or school district. There may be a few students that are repeating biology, which are usually eleventh or twelfth graders. Students in my standard class are more "hands on". They want to learn, but you have to keep them interested by engaging them in many activities. Once they are "turned off" with any unit or concept, it is hard to get them to back into learning.

The IB/MYP (International Baccalaureate Middle Years Program) is very similar to an honors biology class. The difference in students in the MYP/IB program is design to facilitate learning by inquiry, which I believe this unit is an easy topic for students to practice inquiry based learning and students to “think outside the box” and develop critical thinking and problem solving skills. There is a separate MYP component that should be used with the biology curriculum. For example, students have to know and be able to apply the areas of interactions (middle years curriculum) to the biological concept. The areas of interaction are like the principles of the IB program. The students are required to do a personal project and community service hours. Students in the middle years program begin this program in middle schools. The middle years program consists of ninth graders and a few tenth graders. I teach the same units at the same time with standard biology and MYP/IB, but the assignments and tasks are different at times based on academic levels.

The AP Biology 2 class is college level course, in which students will take a test and may qualify to place out of the course in college. Students in AP Biology are mostly eleventh and twelfth graders. These students should be independent learners and possess good critically thinking skills. All students will be able to benefit from all activities within the curriculum unit. For example, all students and academic levels can debate solutions or make posters about the importance of water conservation, but criteria for evaluation can be created to meet the needs of various academic levels, such as a rubric.

Rationale

My purpose for creating this unit is to teach the human impact concept of the ecology unit. In teaching these concepts, I hope that students will understand the importance of our natural resources and sustainability, specifically of water. I have found that teaching ecology is often difficult for me. It is not that I do not have the content knowledge to teach it. I feel that the information is scattered when I teach it. It does not flow smoothly as I think it should. I want to be more effective in teaching ecology. Through designing this curriculum with water being the focal point, I hope to be able to connect all of the ecological concepts that the students need to learn in an organized format. I want to spark the students’ interest in ecology by incorporating simple, but engaging activities.

Increased awareness of our students of our impact on our environment and natural resources (water) is just as important as learning the concepts in order to pass the state test. Human impact is a portion of the ecology unit. I want students to experience how we affect our environment and exercise problem solving abilities for water conservation. I hope to raise their awareness of the negative impact (misuse) of our resources and the importance of environmental sustainability by creating activities and promoting involvement in community service. I am one that believes in leading by example. After completing my carbon footprint and finding out that if everyone lived like me we would need 6.39 Earths, I have been more environmentally aware and I am putting forth more effort to change my bad habits. I was one who let the water run while brushing my teeth. I was one that let the water run before I get in the shower and then take a 15 minute shower.

Objectives

Before the unit, students will have covered the characteristics of water during the Biochemistry unit, which I teach before the ecology unit. Human Impact is the last concept of the Ecology unit. Considering that it would have been awhile since water was covered during Biochemistry, I will briefly review the structure and properties of water in the form of a KWL sheet to refresh the memory of the students. I decided to have 3 main objectives. Too many objectives may cause the students to lose interest in the unit. The curriculum unit is designed for 5 days, one objective per day, with the 5th day focused on community service and awareness. The objectives for this curriculum unit are listed below.

Objective One

Students will learn about natural resources and our impact. The students will know the differences between renewable and nonrenewable sources and examples of each type. The activities for this objective will include a FIB notes and pictures in the form of a lap book and a water drop fact or fiction water activity using large chart paper.

Objective Two

Students will be able to summarize the many uses of water and explain how water resources can be managed to meet human needs. Activities will include analysis of data from students keeping track of their water use. Students will also use local and state water use data and video clips of the scarcity of water in other countries.

Students would have collected individual and family data on water usage during the properties of water section in the Biochemistry unit. Students will use this website: [HYPERLINK "http://www.h2oconserve.org" www.h2oconserve.org](http://www.h2oconserve.org) and use the water calculator. The reason for having the students collect data during the biochemistry unit is students may not be as conscience about human impact at that point than if I have them collect data during the human impact unit. You can have the students collect their data a weekend or couple of days before the unit if you choose. Some students may become aware and change their excessive water habits and cut back because they have an idea of what the topic/unit will eventually cover. Just remember to keep the data in a safe place or you may want to go through the data and make a general data table to save time and have the students graph it. I will pass each individual student's their "raw" data so they may use them as a class discussion point.

Objective Three

Students will be able to create logical solutions by way of case studies to demonstrate what they have learned about water and sustainability. Students will be able to perform community service and raise awareness of the importance of water as a resource and our impact and what can be done to sustain it. The documentary "FLOW" will be used to give students an idea of what

should be done for their group project.

Day One: Environmental Resources

Objective: The students will be able to summarize the natural resources and our impact, identify types of renewable and non renewable resources, and create a list of facts about water by group discussion of the misconceptions of water as a resource.

Resources & Impact FIB (fill in the blank notes) (20 minutes)

It is important that the students understand the environmental resources. I use FIB (fill in the blank notes) for notes and lecture. I do not want too much class time to be used copying notes. Some of the notes are based on the text book. You will find a copy of the notes in the appendix. The notes can be modified, if you choose to put them in a foldable or lap book form (see Appendix 1).

Water Fact or Fiction Activity Rotation (45 minutes)

The preparation for this activity is very simple. I will place a water fact or tip in a paper model water drop. A sheet of poster paper will be under the water drop, where students will be able to write comments. Students will get into groups of three. They will rotate around the room and read a statement about water. They will briefly discuss the statement and make a decision as a group. They will put a check if they think it is a true fact, an "F" if they think it is fiction, and a question mark if they think it is half true or not sure. They will write a brief sentence or two explaining their choice. Each group will have 5 minutes for each one. There are many statements that you can use to open up discussion about. A list of water facts and tips is included in the appendix. All the statements are true, but can be changed to make false statements (see Appendix 2).

2 Video Clips (15 minutes)

The student will watch a 2 minute video clip from the diary of Jay-Z: Water for Life by Jay-Z and make a list of the problems or issues and their effects on the people and the country. Jay-Z is a Hip Hop Mogul who through his travels to foreign countries, specifically Africa, seen the scarcity of clean water and how people of these countries deal with not having enough clean water for the most simple things. In the video, there is a woman whose family use 2 buckets of water for the entire day. Jay-Z works with the UN (United Nations) to help improve the water conditions in these countries. I decided to show this video clip because of Jay-Z star status and how that all individuals are aware of the water crisis (see Appendix 3).

The second video clip is a about an organization called water aid. They give examples of the water scarcity in Third World countries (Africa and India) and what they do to support these countries. This video shows how water aid and these countries are working together to supply cleaner water and how these countries have benefited from their help. This video gives more

substance to the unit (see Appendix 3).

Day Two: Our Impact

Objective: Students will be able to see their impact on water as a resource by sharing their water footprint individually and as a class. Students will be able to watch the Video Flow.

What are my water footprints and my impact? (45 minutes)

I will start the class by briefly showing my water footprint. I believe in leading by example. I also feel that if I am open and show what I have learned from my water footprint, the students will be more willing to share. The students will share their water footprints, if they choose to. I will have collected their water footprints ahead of time, so I have the class data prepared for our discussion. As I stated before, I would have the students to complete their water footprint before the unit and give them a completion grade for accountability. Some students may not want to volunteer to share their information, but it will not have an effect on what I need for instruction of the class. After we discuss our water footprints, I will display and briefly discuss the water usage of our city (see Appendix 4).

I will have students to take out the sheet from the video clip of Diary of Jay-Z: Water for life and the video clip from Water Aid (see Appendix 5). I will ask students to volunteer and answer video questions and list some of the problems they saw in the video clip. I will also ask them about how it made them feel to see those conditions and what impact it had on their thoughts of water sustainability. We will brain storm ways to conserve water and make people aware of sustainability.

Movie Documentary: Flow-For Love of Water (60 minutes)

Irena Selina is a well known journalist and documentary filmmaker. Her inspiration for the documentary Flow originated from her becoming a parent and her concern for her children and their well being as they live on earth. She interviews some of the most famous advocates, such as Peter Gleick and their prediction on water and our use and abuse of this resource. Students will learn facts about water, how major companies profit from the resource, such as the bottled water business, and they will gain an understanding about the causes of the scarcity of water, how humans impact the resource, and how important it is to be truly aware of the possibility of not having fresh water to meet the needs of the human population. Students will answer questions while they watch the video. The questions are in order. You can find the questions on a site called New York Science Teacher, which I included in the appendix (see Appendix 5) or you can make your own. You can order the video from amazon.com (used or new).

After the video, I will go through the questions with the students and discuss some of the questions that may be of the student's interest. For example, what part of the documentary sparked their interest the most or do they having any additional questions that may have developed based on something they observed in the video.

Day Three & Four: Case Studies

Objective: Students will be able to show growth of knowledge learned about water and prepare a presentation on a water case study or water issue.

Preparation (90 minutes)

At this point, the students have learned facts about water and resources locally and globally, and our impact. The students will be placed in groups of 4 or 5. They will choose an envelope containing a case study or topic. I will not assign the case studies. I do not want students to feel like I gave one group an easy one or hard one than the other. I will have made arrangements for time in the media center for 2 days. The students will work in their groups brainstorming their presentation and begin research. All students will receive a general outline for presentations, how much they present will depend on their group (see Appendix 6) For example one of the case studies is tap water vs. bottled water. There is a lot of information on bottled water, which may result in more within the presentation. Another issue is the cholera epidemic in Haiti, which is a more recent event and may not have as much information. The students will be evaluated based on individual and group performance. I will make a rubric that will be given out the day they choose their case study. Most students that work on their presentations based on the criteria/rubric are usually more thorough, accurate, and prepared. I will monitor and facilitate all groups by offering suggestions for their presentations while they are working. By the end of the class of day 3 of the unit, the students will turn in a rough draft or outline of the student names within their group and their contribution to the presentation to me. I will return the sheets to the groups with suggestions and ideas and final approval. The second day in the media center, (fourth day of the unit), the students will finalize their presentations, which will include visuals (such as power points, charts, models) and/or rehearsing presentation.

Day Five: Case Studies Presentations & Water Sustainability

Each group will be given 5 to 7 minutes for presentations. There will be a 2 to 3 minute prep time between each group. It will allow the next group to set and I can briefly write down some notes on the group that I will use along with a rubric to determine the final grade.

After all groups have presented, I will conclude the unit by informing the students that part of doing our part for sustainability is making others aware of how important our water resource is. Students will participate in a variety of activities to raise awareness of water sustainability. These activities are listed below.

As a class effort to promote water sustainability, we will design/create a sustainable water system that will be used to water the plants or school garden. There are many types of water systems and ways they can be made. Some are really simple, such as getting a large barrel and allowing rain water to fill the barrel or they can be as complex as a creating a water shed. There are many resources and books that can be used to assist with this activity. I have listed some in

the bibliography of this unit.

The second activity is students will create/design a mini poster illustrating the importance of water sustainability. These posters will be placed around the school in the areas that are designated for school advertisement and events.

The junior/senior level classes (such as an AP or IB class) will support an organization such as water aid by participating with a local organization with in the community. For example, some organizations, such as girl scouts host a walk as a fundraiser. The students may be a part of a club or organization outside of school and they may get their club/organization to sponsor or host a drive or something to support water aid or another organization. Students may want to volunteer in a water aid event. The website for water aid is **HYPERLINK** "http://www.wateraid.org" www.wateraid.org . The students will make a mini scrapbook/journal of their experience. These students will have additional time to complete this assignment.

Appendix: Implementing District Standards

North Carolina Standard Course of Study

Goal

The biology curriculum is designed to continue student investigations and deepen student understanding of the biological sciences. High school instruction should include concepts introduced in grades K-8 at a more abstract level. In-depth study of the following concepts is included: the cell, the molecular basis of heredity, biological evolution, the interdependence of organisms, matter, energy and organization in living systems, and the adaptive responses of organisms. For instruction, the program strands and unifying concepts should be woven through the content goals and objectives of the course. The following explanation introduces teachers to the program strands and unifying concepts. Supplemental materials, providing a more detailed explanation of the goals, objectives, unifying concepts and program strands, with specific recommendations for classroom and/or laboratory implementation, are available through the Department of Public Instruction's Publications Section.

Personal and Social Perspectives

This strand is designed to help students formulate basic understanding and implied actions for many issues facing our society. The fundamental concepts that form the basis for this strand include:

Personal and Community Health

Biology is an excellent context for investigating the factors that affect the health of organisms in general and humans in specific. Persuading adolescents to adopt personal habits that contribute to long-term health is not always easy. Looking at issues such as nutrition, exercise, rest, and substance abuse from the perspective of an organism's needs and responses provides a less emotional atmosphere for considering health issues relevant to teenagers.

Population Growth

Biology students should develop the ability to assess the carrying capacity of a given environment and its implied limits on population growth, as well as how technology allows environmental modifications to adjust its carrying capacity.

Environmental Quality

The role of biological sciences is particularly relevant to areas where humans affect and are affected by other organisms and the non-living environment. The curriculum offers opportunities for students to make decisions based on evidence in the areas of environmental stewardship and economic realities.

Science and Technology in Local, National, and Global Challenges

This part of the science in personal and social perspectives strand examines the involvement of human decisions in the use of scientific and technological knowledge. "Understanding basic concepts and principles of science and technology should precede active debate about the economics, policies, politics, and ethics of various science and technology-related challenges. Students should understand the causes and extent of science-related challenges. They should become familiar with the advances and improvements that proper application of scientific principles and products has brought to environmental enhancement, wise energy use, reduced vehicle emissions, and improved human health.

Competency Goal 5: The learner will develop an understanding of the ecological relationships among organisms.

Objectives

5.01 Investigate and analyze the interrelationships among organisms, populations, communities, and ecosystems.

Techniques of field ecology.

Carrying capacity.

5.03 Assess human population and its impact on local ecosystems and global environments:

Historic and potential changes in population. Factors associated with those changes.

Climate change. Resource use. Sustainable practices/stewardship.

Appendix 1
FIB Notes: Human Impact

Human Impact

Human Activity has become the most important source of environmental change on the planet.

Among human activities that affect the biosphere are:

Hunting & Gathering

Agriculture

Industrial

Urban Development

Renewable & Nonrenewable Resources

Environmental goods and services may be classified as either:

Renewable Resource -can be replenished but may be limited (Water)

Non Renewable Resource -cannot be replenished by natural processes (Coal, Oil, Natural

Gases)

Sustainable Development

A way of using natural resources without depleting them, and of providing for human needs without causing long term environmental harm.

Human Activities can affect the quality and supply of renewable resources such as land, air, and fresh water.

What are ways that we impact these resources?

Appendix 2

Water Facts:

Most of the earth's surface consists of water; there is much more water than there is land. There is the same amount of water on earth as there was when the earth was formed.

There are 2 kinds of water: salt and freshwater

Of all the water on earth, only 2.5 is freshwater. Fresh water is ground water or readily accessible water in lakes, streams, rivers

If all of the world's water were fit into a gallon jug, the freshwater available for us to use would equal only about one tablespoon.

Less than 1% of the water supply on earth can be used as drinking water.

A small drip of water from a faucet can waste as much as 75 liters of water a day.

More than 2 billion people on earth do not have a safe supply of water.

In most cities and towns, drinking water from the tap is treated so that people don't get sick with diseases such as cholera and typhoid, which are caused by bacteria, viruses, or parasites found naturally in the water.

Americans use five times the amount of water that Europeans use.

Humans daily use about 50 gallons of water.

In a 5 minute shower we use 25 to 50 gallons of water.

Today, at least 400 million people live in regions with severe water shortages.

Humans largely influence factors that determine water quality, as they dispose of their wastes in water and add all kinds of substances and contaminants that are not naturally present. Over 70,000 contaminants have been identified.

1 gallon of gasoline can contaminate approximately 750,000 gallons of water.

Each day almost 10,000 children under the age of 5 in Third World countries die as a result of illnesses contracted by the use of impure water.

Freshwater animals are disappearing five times faster than land animals.

About 6,800 gallons of water is required to grow a day's food for a family of four.

It takes 1,850 gallons of water to refine one barrel of crude oil.

To manufacture new cars 39,000 gallons of water are used per car.

Appendix 3

Video Clips Questions:

Diary of Jay-Z: Water for Life

Who is Jay-Z and what did he discover in Africa during a world Tour?

List an example of a water issue that Jay-Z mentioned in the clip.

Who did he work with to bring awareness to this issue?

Water for Life by Water Aid

What is the purpose of water aid?

List 2 of the diseases found in the water of Tanzania.

How far do women have to travel to get water?

What happen to Foibe Mahembe's oldest daughter?
A child dies every _____ seconds as a result of water related illnesses.
What is a solution some countries are using to make their water supply better?
In India, _____ of the population do not have proper toilet sanitation.
What do school children learn in addition to their curriculum?
How much per person does it cost for water aid to provide clean water?
How has Alizeta Sawadogo benefited from clean water?

Personal Reflection:

How does this make you feel when you see how scarce water is in other countries?
Do you feel that we (United States) should be worried about a water crisis? Briefly explain.
What are some solutions that you think would help with the Water Crisis? Think about it locally and globally.

Appendix 4
WHAT'S YOUR WATER FOOTPRINT?

HYPERLINK "http://www.h2oconserve.org" www.h2oconserve.org

Analysis of my Water Footprint:

After you have completed your water footprint on line, print a copy as verification that you completed it. Complete the following below.

Briefly summarize your water footprint. Include what your total water use is and some of you and your family's water habits.
List some things that you plan to do to cut back on your water use.

Appendix 5
Flow Questions (New York Science Teachers)

How many people die each year from water born diseases? _____

What percentage of water are we? _____

How many miles of veins and arteries do we have in our body? _____

How many people might get sick each year from tap water? _____

What are we not removing from the water? _____
How many human made chemicals are there? _____
What percentage of water is used for agriculture? _____
What is the most common pesticide in the U.S.? _____
Where has this chemical been banned? _____
How many pounds are used yearly? _____
How is water being delivered in some parts of the world? _____
How many children in Bolivia die before the age of 5? _____
What are we trying to do before 2015? _____
How much would 10L a day per year cost? _____
California has how many years of water? _____
What rivers don't flow to the sea? _____
Is bottled water safer then tap water? _____
How much money is spent year on bottled water? _____
How much a year do we need to spend to have safe drinking water for the entire planet?

Society once lived on the resources we had. What replaced that idea? _____
What is the global impact of a water reservoir? _____
How many people were displaced in the 20th century due to dams? _____
How much does Nestle pump out of streams a minute in Michigan? _____
How much did they pay for the land for 99 years? _____
What did Coca Cola distribute free to communities? What was it? _____
What are the true solutions to the water problems?

Appendix 6
Case Studies

I included a few questions that may assist students in starting their research. Some groups may base their entire presentation around the questions. Some may create their own and that is welcomed.

Case Study 1: Tap Water vs. Bottled Water

List facts and stats of Tap Water and Bottled Water

Which is better? Tap water or Bottled water? Include evidence to support you're your choice.

How can you illustrate sustainability for this case study?

Case Study 2: Water resources in the West vs. East

List the water resources for countries of the West and East

Include stats/facts on water resources and human impact

List and describe a solution for sustainability for each side

Case Study 3: Irrigation vs. Ground Water

What is irrigation?

How does it work? Process?

What is ground water?

Which is more sustainable? Explain with evidence to support your decision.

Case Study 4: Desalination of Water

What is Desalination of water?

Describe the process?

How can this be used as water sustainability?

Case Study 5: Lots of water, but not enough clean water

Choose 2 countries with a scarce amount of water

List facts/stats about the water resource of the country

Describe the affects that not enough water has on the country

Develop a solution that can make the country more sustainable and contribute to a better water supply.

Case Study 6: How do natural disasters affect water supply and sustainability?

The type of natural disaster

Which has a greater affect on an environment (specifically water)

Research an actual event such as Cholera in Haiti or Hurricane Katrina

Water Sustainability Case Studies Evaluation Sheet

Group Members

Contribution

Pts

Group Evaluation:

Organization of Presentation	_____
	10
Content of Presentation	_____
	40
Visual	_____
	20
Poise	_____
	10
Overall Presentation	_____
	20
Total	_____
	100

Additional Comments:

Individual Evaluation:

How well does the student understand their portion of the presentation?	/20
Are they poised in speaking?	/10
How well do they work with the group?	/10
Overall Presentation	/10
Total Points	_____
	50

Bibliography

"Water Treatment and Purification - Lenntech." Water Treatment and Purification - Lenntech. <http://www.lenntech.com> (accessed November 1, 2010).

List of water facts and other information about water

"ActionBioscience - promoting bioscience literacy." ActionBioscience - promoting bioscience literacy. <http://actionbioscience.org> (accessed October 11, 2010).

A good resource for ideas for water sustainability

Dodds, Walter K.. *Humanity's footprint: momentum, impact, and our global environment*. New York: Columbia University Press, 2008.

Gardner, Robert, and Henifer Mead. *Water: the life sustaining resource*. New York: Julian Messner, 1982.

Includes information on how all living things are dependent on water, the water cycle, and how can water supply be increased.

Jakab, Cheryl. *Water supply*. Mankato, Minn.: Smart Apple Media, 2010.

Good book for information on water resources

Noss, Charles I., and Robert P. Carnahan. *Gray water treatment systems*. Tampa, Fla.: University of South Florida, College of Public Health, 1988.

I used this for general information about gray water

Selina, Irena. *FLOW: for the love of water*. DVD. USA: Oscilloscope, 2008.

An awesome video/documentary. It covers all areas if the unit.

Sobey, Edwin J. C., and Bill Burg. *Wacky water fun with science: science you can float, sink, squirt, and sail*. New York: McGraw-Hill, 2000.

I decide to include this book to give ideas or other activities to use in place of others listed in the unit

Villiers, Marq. *Water: the fate of our most precious resource*. Boston, MA: Houghton Mifflin, 2001.

Chicago formatting by BibMe.org.

Notes

¹ How Stuff Works, Inc. (HYPERLINK "<http://science.howstuffworks.com/environmental/earth/geophysics/h2o1.htm>"
<http://science.howstuffworks.com/environmental/earth/geophysics/h2o1.htm>)

²Perlman, Howard. USGS/Water Science for Schools (HYPERLINK "<http://ga.water.usgs.gov>"
<http://ga.water.usgs.gov>)

³ National Water Research Institute
Schnoor, Jerald. Water Sustainability in a Changing World. The 2010 Clarke Prize
Lecture

⁴ How Stuff Works, Inc.
(HYPERLINK "<http://science.howstuffworks.com/environmental/earth/geophysics/h2o1.htm>"
<http://science.howstuffworks.com/environmental/earth/geophysics/h2o1.htm>)

⁵ Howard Perlman.

⁶ National Water Research Institute

Schnoor, Jerald. Water Sustainability in a Changing World. The 2010 Clarke Prize Lecture

⁷ National Water Research Institute

⁸ World Business Council for Sustainable Development (HYPERLINK "<http://www.wbcsd.org>"
www.wbcsd.org)

⁹ National Water Research Institute

¹⁰ National Water Research Institute

¹¹ Why Conserve Water? (HYPERLINK "<http://www.farnellfamily.com/cfarnell>"
<http://www.farnellfamily.com/cfarnell/why/default.html>)

