Importance of Water

by

Stacey G. Thomas, Taylor County High School, Taylor County, KY

UNIT OUTLINE

Importance of water

Day 1

What do the students already know about water?

- Write on the smartboard facts that students know about water.

Uses of water

- Write on the smartboard responses to how students use water.

Globe Toss activity to determine amount of water on our planet

Day 2

Water shortage?

- Water activity determining how much usable water is available.

Ways to conserve water:

- Activity to determine water usage in each student's household.

Day 3

- Notes concerning water and the Earth's water tables/cycle.
- Water Cycle
  -Water Cycle Manipulatives

Day 4

Solutions to water shortages

Different types of water bodies:

1) Surface Water
2) Ground Water
3) Rivers and Streams

Day 5

Guest Speaker, Dr. Ritchie Kessler, and the importance of our local waterways and the Green River.

Day 6

Structures affecting water flow and direction:

1) Watersheds
   a. Build a water shed and record observations.
   b. Activity using a water shed map

Day 7

2) Man-made structures
   a. Dams
   b. Highways
3) Karst Areas
   a. Build a sinkhole activity

Day 8

Issues concerning water usage

1) Water rights
   a. Dam construction

i. Positive points
ii. Negative points

2) Industrial development and water usage, i.e. the Colorado River
3) Pollution
   a. Freshwater
   b. Marine

Day 9

Characteristics of a Healthy Stream

1) Chemical Analysis of stream
   a. Define parameters, and discuss the impact on organisms
   b. Practice performing the test on two different samples.
   c. Complete sheet showing test results

- pH
- DO
- Nitrates/Nitrites

Day 10

Characteristics of a Healthy Stream

2) Chemical Analysis of stream
   a. Define parameters, and discuss the impact on organisms
   b. Practice performing the test on two different samples.
   c. Complete sheet showing test results

- Turbidity
- Phosphates
- BOD

Day 11

3) Macroinvertebrate survey
   a. Field Trip to practice

Day 12

   b. Return to room, complete paperwork about the survey and submit to the Kentucky Waterwatch Group.
4) Begin long range stream monitoring project.

Unit of Study
Stacey G. Thomas, Taylor County Hospital

Unit Title: Importance of Water
Length of Unit: 12 instructional days

Organizer:

- **Begin unit with "Taking a Closer Look" activity**

Essential Questions: (3-5)

- **What percentage of all of the water on Earth is available for human consumption?**
- **Why is water important to you?**
- **Since we can turn on a water faucet to get our water, do we really have a water shortage?**

Standards: (write out in full)

- **Academic Expectations**

1.5-1.9 Students use mathematical ideas and procedures to communicate, reason, and solve problems.
2.1 Students understand scientific ways of thinking and working and use those methods to solve real-life problems.
2.3 Students identify and analyze systems and the ways their components work together or affect each other.
2.4 Students use the concept of scale and scientific models to explain the organization and functioning of living and nonliving things and predict other characteristics that might be observed.

- **Program of Studies-**

S-HS-SI-4 use evidence, logic, and scientific knowledge to develop and revise scientific explanations and models.

S-HS-ESS-5 recognize that the Earth contains a fixed amount of each stable chemical atom or element.
S-HS-ESS-6 analyze Earth's chemical reservoirs and recognize that each element can exist in several reservoirs (e.g., carbon in carbon dioxide reservoirs and carbonate reservoirs).

S-HS-LS-9 examine interrelationships and interdependencies of organisms in ecosystems and the factors that influence the interactions between organisms.

S-HS-LS-10 explore how human activities alter ecosystems.

- **Core Content-**

SC-H-2.2.1 Earth is a system containing essentially a fixed amount of each stable chemical atom or element. Each element can exist in several different reservoirs. Each element on Earth moves among reservoirs in the solid Earth, oceans, atmosphere, and organisms as part of geochemical cycles.

SC-H-2.2.2 Movement of matter between reservoirs is driven by Earth's internal and external sources of energy. These movements are often accompanied by a change in physical and chemical properties of the matter. Carbon, for example, occurs in carbonate rocks such as limestone, in the atmosphere as carbon dioxide gas, in water as dissolved carbon dioxide, and in all organisms as complex molecules that control the chemistry of life.

SC-H-3.5.4 Human beings live within the world's ecosystems. Human activities can deliberately or inadvertently alter the dynamics in ecosystems. These activities can threaten current and future global stability and, if not addressed, ecosystems can be irreversibly affected.

SC-H-3.5.5 Interactions among the solid Earth, the oceans, the atmosphere, and living things have resulted in the ongoing development of a changing Earth system. Earthquakes and volcanic eruptions can be observed on a human time scale, but many processes, such as mountain building and plate movements, take place over hundreds of millions of years.

Curriculum Web: (how unit integrated with other content areas)

- **MATH:**
  - **Activity "Earth's Water Supply" involved students calculating the amount of available water.**
- **GEOLOGY/GEOGRAPHY:**
  - **Activity: Building a water shed**
  - **Building a Sinkhole Activity**
- **ART AND HUMANITIES:**
  - **Activity: Building a water shed**
- **SOCIOLOGY**
  - **Issues concerning water rights**

Culminating Performance:

- **Students will correctly assess the health of local waterways, and will identify possible reasons for the condition of that particular location.**
- **Students will collect chemical and physical data on local waterways on an ongoing basis.**

Name: Stacey G. Thomas **Lesson Length:** 55 min. **Day 1 of unit**
School: Taylor County High School **Age/Grade:** 10^{th}-12^{th} Grade **# of students:** 22
Subject: Ecology **Topic:** Water as a Resource **# of IEP** – 1- OHI

Objectives: The students will:

- List what is known about water
- Relate facts about water to how it is used in the home
- Correlate water use, water shortages, and conservation of water with individual water use.

Connections:

SC-H-3.5.5 Human beings live within the world's ecosystems. Human activities can deliberately or inadvertently alter the dynamics in ecosystems. These activities can threaten current and future global stability and, if not addressed, ecosystems can be irreversibly affected.

SC-H-2.2.1 Earth is a system containing essentially a fixed amount of each stable chemical atom or element. Each element can exist in several different reservoirs. Each element on Earth moves among reservoirs in the solid Earth, oceans, atmosphere, and organisms as part of geochemical cycles.

Academic Expectations:
2.1 Scientific Ways of Thinking and Learning 2.2 Patterns of Change, 2.3 Systems

Materials/Technology:

- **Textbook**
- **Pen/pencil**
- **Science Notebook/Binder**
- **Smartboard/Smartboard Accessories**
- **12" Inflatable Globe of the Planet Earth**
- **Measuring Cup with ½ cup of water**

Procedures:

1) Students immediately begin with a Do Now Activity (DNA).
2) Discuss DNA
3) Divide the students into groups of three and allow them to brainstorm facts about water.
4) On the smartboard, in the notepad section, Write all the facts that are known about water.
5) Discuss how water is used, and on the other half of the smartboard, allow the students to determine ways in which water is used.

6) Globe Toss Activity
    a. Get students into a circle around the room
    b. Designate one student to keep track of data on board.
    c. Students begin to toss the globe from one person to another
    d. Record whether the persons left hand index finger lands on water or land.
    e. Mid-way through the activity, calculate the percentage of water to land.
        i. The percentage will probably not be at a 75% to 25% ratio if you do not have very many data points. The data will align with the proper ratios with the greater amount of data points.
    f. At the end, show the students the ½ cup of water, and explain that if Earth was the size of this inflated Earth, that the amount of water on Earth would be equivalent to ½ cup of water.

Student Assessment:

1) Production of a list showing water facts and information.
2) Production of a list showing how water is used.
3) Demonstration of the proper 75-25% ratio using mathematical calculations and collected data.

Name: Stacey G. Thomas **Lesson Length:** 55 min. **Day 2 of unit**
School: Taylor County High School **Age/Grade:** 10^{th}-12^{th} Grade **# of students:** 22
Subject: Ecology **Topic:** Water as a Resource **# of IEP** – 1- OHI

Objectives: The students will:

- Calculate how much usable fresh water is available on our planet.
- Calculate how much water is used in the student's individual household

Connections:

SC-H-3.5.5	Human beings live within the world's ecosystems. Human activities can deliberately or inadvertently alter the dynamics in ecosystems. These activities can threaten current and future global stability and, if not addressed, ecosystems can be irreversibly affected.
SC-H-2.2.1	Earth is a system containing essentially a fixed amount of each stable chemical atom or element. Each element can exist in several different reservoirs. Each element on Earth moves among reservoirs in the solid Earth, oceans, atmosphere, and organisms as part of geochemical cycles.

Academic Expectations:
2.1 Scientific Ways of Thinking and Learning 2.2 Patterns of Change, 2.3 Systems

Materials/Technology:

- **Textbook**
- **Pen/pencil**
- **Science Notebook/Binder**
- **Smartboard/Smartboard Accessories**
- **1-Liter Beaker of Water per group**
- **1-250 ml beaker per group**
- **1 medicine dropper per group**
- **1 five ml graduate cylinder per group**
- **Calculator**
- **Copy of "Taking a Closer Look"**
- **Exploration Software**
- **Worksheet**

Procedures:

7) Students immediately begin with a Do Now Activity (DNA).
8) Discuss DNA.
9) Review lesson from previous day.

10) Divide students into groups of four, and give each student the worksheet "Taking a Closer Look".
11) Begin "Taking a Closer Look"
    a. Explain to the students that the 1L beaker of freshwater represents all the water on earth.
    b. Walk the students through the calculations of available freshwater.
    c. In the end, the amount out of the 1L beaker of water that is available for human consumption is 1 drop.
12) Smartboard activity going on an "electronic field trip". This activity investigates how much water is used in a daily household, and conservation tips or practices.

Student Assessment:

1) Production of chart showing correctly calculated amounts of water available for consumption.

Taking a Closer Look

➤➤ You will need: one liter of water
10 mL graduated cylinder
dropper

Step 1.
According to the chart, "Water on Earth," what is the total percentage of all available fresh water?

_____

_____

_____

Total: _____%

Step 2.
Looking at the chart "Water on Earth: One Liter," use a dropper to remove from the liter of water the number of milliliters that represent all available fresh water.

_____

_____

_____

Removed: _____**mL**

WATER ON EARTH

Form	Percentage of total
Oceans	97.2
Icecaps and glaciers	2.0
Groundwater	0.62
Freshwater lakes	0.009
Inland seas and salt lakes	0.008
Atmosphere	0.001
Rivers	0.0001

Source: *Project WET*, © 1992 Western Regional Environmental Education Council.

WATER ON EARTH: ONE LITER

Form	Milliliters
Oceans	972.0
Icecaps and glaciers	20.0
Groundwater	6.2
Freshwater lakes	0.09
Inland seas and salt lakes	0.08
Atmosphere	0.01
Rivers	0.001

Source: *Project WET*, © 1992 Western Regional Environmental Education Council.

Name: Stacey G. Thomas **Lesson Length:** 55 min. **Day 3 of unit**
School: Taylor County High School **Age/Grade:** 10^{th}-12^{th} Grade **# of students:** 22
Subject: Ecology **Topic:** Water as a Resource **# of IEP** – 1- OHI

Objectives: The students will:

- Correctly arrange and label the stages of the water cycle.

Connections:

SC-H-3.5.5 Human beings live within the world's ecosystems. Human activities can deliberately or inadvertently alter the dynamics in ecosystems. These activities can threaten current and future global stability and, if not addressed, ecosystems can be irreversibly affected.

SC-H-2.2.1 Earth is a system containing essentially a fixed amount of each stable chemical atom or element. Each element can exist in several different reservoirs. Each element on Earth moves among reservoirs in the solid Earth, oceans, atmosphere, and organisms as part of geochemical cycles.

Academic Expectations:
2.1 Scientific Ways of Thinking and Learning 2.2 Patterns of Change, 2.3 Systems

Materials/Technology:

- **Textbook**
- **Pen/pencil**
- **Science Notebook/Binder**
- **Water Cycle Manipulatives**
- **Worksheet**

Procedures:

13) Students immediately begin with a Do Now Activity (DNA).
14) Discuss DNA.
15) Review lesson from previous day.
16) Begin discussion on the Earth's water tables/cycles
17) Notes on water cycle and water tables.
18) Distribute envelopes to each student. Each envelope contains water cycle manipulatives that must be correctly arranged twice.

Student Assessment:

1) Student correctly arranges the water cycle manipulatives twice. Correct arrangement will be confirmed by the instructor.

Name: Stacey G. Thomas **Lesson Length:** 55 min. **Day 4 of unit**
School: Taylor County High School **Age/Grade:** 10^{th}-12^{th} Grade **# of students:** 22
Subject: Ecology **Topic:** Water as a Resource **# of IEP** – 1- OHI

Objectives: The students will:

- Identify wasteful uses of water
- Determine ways in which water can be conserved and used more resourcefully
- Differentiate between the various types of water bodies.

Connections:

SC-H-3.5.5 Human beings live within the world's ecosystems. Human activities can deliberately or inadvertently alter the dynamics in ecosystems. These activities can threaten current and future global stability and, if not addressed, ecosystems can be irreversibly affected.

SC-H-2.2.1 Earth is a system containing essentially a fixed amount of each stable chemical atom or element. Each element can exist in several different reservoirs. Each element on Earth moves among reservoirs in the solid Earth, oceans, atmosphere, and organisms as part of geochemical cycles.

Academic Expectations:
2.1 Scientific Ways of Thinking and Learning 2.2 Patterns of Change, 2.3 Systems

Materials/Technology:

- **Textbook**
- **Pen/pencil**
- **Science Notebook/Binder**
- **Video**
- **Worksheet**

Procedures:

19) Students immediately begin with a Do Now Activity (DNA).
20) Discuss DNA.
21) Review lesson from previous day.
22) Introduce and explore
23) Distribute envelopes to each student. Each envelope contains water cycle manipulatives that must be correctly arranged twice.

Student Assessment:

2) Student correctly arranges the water cycle manipulatives twice. Correct arrangement will be confirmed by the instructor.