Unit 3: Water As A Resource

Content Area: **Science**
Course(s):
Time Period: **Trimester 2**
Length: **10-12 Weeks**
Status: **Published**

Brief Summary of Unit

In this unit, students will explore the movement, availability, and quality of water on Earth, focusing on human use and environmental impact. They will develop a thorough understanding of the unique physical and chemical properties of water and how these properties influence water's role in Earth systems. Students will investigate how water is used, processed, and treated in public infrastructure—such as schools—and how it is managed through municipal systems before and after human use. Through modeling and data analysis, students will examine their local watershed, tracing water movement across land and how pollutants can enter and affect the system. Students will also conduct scientific inquiries to assess factors influencing water quality in their community, including land use, human activity, and natural processes. By analyzing real-world water data, creating models, and sharing their findings, students will develop skills in planning and conducting investigations, interpreting data, and forming evidence-based conclusions. Throughout the unit, students will apply crosscutting concepts such as systems thinking, cause and effect, scale and proportion, and patterns to understand complex water systems and human-environment interactions. Science and Engineering Practices will support students in constructing explanations, using models, and designing solutions to promote sustainable water use and protect water resources.

Revision Date: July 2025

Essential Questions

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How does water move through Earth's systems, and why is it important to understand this movement?

What makes water unique, and how do its physical and chemical properties affect its role in the environment?

How is water treated and managed before and after use in public infrastructure, such as schools and cities, and what factors influence the quality of water in our local community?

When pollution enters a watershed, what are the impacts on ecosystems and human health, and how do we protect clean water?

How can scientific models and investigations help us understand and solve real-world water issues?

Enduring Understandings

Water is a finite and essential resource whose movement through the water cycle connects all Earth systems.

The unique properties of water, including cohesion, adhesion, and high heat capacity, make it vital for life and environmental processes.

Municipal water systems treat and distribute water for human use and manage wastewater to reduce environmental harm.

Watersheds are natural systems where water collects and flows, and they can be impacted by land use, pollution, and natural events.

Water quality can be measured and affected by various human and natural factors, and maintaining it is critical for both environmental and human health.

Individuals and communities play a key role in protecting and conserving water resources through sustainable practices.

Students Will Know/Students Will be Skilled At

Students will know the distribution of water on Earth, including the limited availability of freshwater suitable for human use.

Students will know the major sources and uses of freshwater, including agricultural, industrial, and municipal uses.

Students will know the stages of the water cycle, including evaporation, condensation, precipitation, infiltration, runoff, and transpiration, and how water moves through Earth's systems.

Students will know the difference between point-source and nonpoint-source pollution and be able to identify real-world examples of each.

Students will know how natural processes such as infiltration, sedimentation, and percolation help filter and purify water.

Students will know how municipal water systems treat water for human use and how wastewater is treated before being reintroduced into the environment.

Students will be skilled at evaluating the importance of water conservation and proposing strategies to reduce water usage at the individual and community levels.

Students will be skilled at analyzing the impacts of climate change on water systems, including changes in water temperature, availability, and flow patterns.

Learning Plan

Water Use & Conservation: Without any discussion or background information, students will track their activities that involve water for one day.

Class discussion – *How much water did you use? What activity is used the most? Were you surprised? Do you think this is a lot of water for one person to use? Why is it important that we are conscious of our water use? What are some ways we can reduce the amount of water we use?*

Lab Activity – Water of the World: Students are going to rank 6 different water sources based on how much of the Earth's water is found in each place. They are then going to guess the approximate percent of Earth's water that is found in each place. They will be given 2000ml of water and have to figure out how many milliliters will go in each cup based on their predicted percentages. Students will share their models with the class & hear their classmates' arguments. The teacher will then demonstrate the correct percentages & milliliters. Students will discuss the differences & complete analysis questions on the activity (on the worksheet). *Discussion Questions: Why is water important? Why should we conserve? How much water is one Earth? How much is usable? Why can't we use the rest of it?*

Calculations will be higher level for some students, students that need support will get a rubric to help them, and students that require additional support will make visual predictions when pouring the water into each category

Water Cycle: Assess prior knowledge (since this is a topic covered in elementary school). Students will draw and label the water cycle from memory. First by themselves, then with their table. Students will present their results. The teacher will use a student's example and lead the class in drawing and labeling a correct diagram.

Water cycle notes/discussion: Going more in depth with the water cycle, students will follow along with the smart board. *Discussion Questions: What do we notice about he water that is in the water cycle? Where does the water cycle start? Why is the water cycle important? What would happen if the water cycle stopped? Where does your water come from?*

Water Cycle Song/Rap/cheer/chant: Students will work in groups to create a song/rap based on the water cycle. They must include all steps and vocabulary words. *Differentiated assessments will be given and mixed grouping*

Water Sources & Uses: Students will take notes on aquifers, watersheds & river systems. Students will examine & label diagrams.

Watersheds: Students will learn about watersheds further by focusing on flooding. The teacher will refer to Hurricane Irene & ask students about their experiences. Students will watch a quick video about rivers & flooding to gain some background knowledge. Students will work in groups to design ways to prevent or control flooding so that damage and money is saved. Students will have a map of a made-up town to design their solutions around.

students will be given no prompts; students needing support will be given guiding questions

World Water Use Graph: students will analyze the graph and write down three observations and three possible explanations for those observations. Students will share with their table and then the class. Class discussion will lead to notes on world water use.

students who need support will have prompts for the graph and will have a minimum number of observations required

Water Pollution: Students will read an article on pollution & answer questions for homework. The following day class will begin with a discussion of the article. Each table will have to make a list of three things they learned from the article to share with the class. *leveled articles*

Define Water Pollution: Each table will come up with a definition of water pollution. The correct answer will be given on the board for students to get into their notes.

Point vs Non-Point: Students will be given cards with different examples of point source and non-point source pollution. They will not be told what each category is yet, or which cards go in which. They will have to figure out which examples seem to go together and then see if they can figure out the definition of each category from the examples. Students will work with their table & record their final definitions and groupings. Students will share with the class and a final definition will be determined. Students will record examples in their notes.

** mixed grouping **

Chasing Ice Film

Chasing Ice (2012), follows photographer James Balog's mission to capture evidence of climate change through time-lapse photography of melting glaciers. This lesson focuses on climate change, evidence-based reasoning, and the emotional impact of visual storytelling. Students will answer questions and write a reflection after viewing the film.

Earth's Filtration System:

LAB: students will work in groups to design and construct a natural filtration system using rocks, sand, and dirt. Students will add simulated polluted water and check back in a day to assess their models. After checking, students will complete lab analysis questions & a class discussion will follow. *Discussion Questions: Why is natural filtration important? What could disrupt this system? How does this apply to the water cycle? Where would be the best place for humans to harvest water from?* **H mixed grouping **

Weathering and Erosion:

Introduction: Introduction to the topic of weathering and erosion. Quick video to spark interest. *Discussion Questions: What is weathering? What is erosion? Are they good or bad? Why? Can anyone give me examples?* These questions will lead to notes on weathering and erosion. Wrap up notes with glaciers and a short video clip on how glaciers move.

Erosion Investigation LAB: students will work in partners to investigate different aspects of erosion and weathering. Every group will have a different aspect to investigate. (there will be two groups for each investigation, due to large class size) Each group will individually carry out its investigation. They will record their data, observations, and answer questions based on their investigation. Part 2: groups who conducted the same investigation will meet up and share their results. They will fill in a chart with similarities and differences, as well as write down what they learned about erosion from their experiment. Part 3: Students will then teach the class what they did and what they learned from their investigation. Students will be put into four

groups of 6. Each of the 6 group members will have conducted a different investigation and will teach their fellow group members about their investigation and what they learned. Each group member will fill out a chart, writing down what they learned from their group for each different investigation. *Wrap-Up Discussion*: *Students will hand in their labs, and the investigations will be discussed as a class. What was learned overall? How can we apply this to our lives? Did anything surprising happen?*

**Prior to beginning a lab activity, Lab Safety Will Be Reviewed **

Evidence/Performance Tasks

Science courses are designed to promote skill attainment. Student progression and pace through which they proceed through the performance tasks is based on their affinity for and ability to reach skill attainment. The teacher will determine formative and summative skill attainment; alternative assessments will be incorporated for each student based on their strengths and challenges.

Formative Assessments:

Worksheets/Practice Scenarios/Problems

Do Nows

Exit Tickets

Class Discussion

Water Cycle Quiz

Pollution Quiz

Summative:

Water Unit Test

Bench Marks:

Formal Lab Reports/Lab Write-ups:

Earth's Filtration Lab

Alternative:

Water Cycle Song

Check for Understandings

Materials

Elevate Science textbook

Guided note packets (teacher-developed)

Technology (student & teacher laptops, SmartBoard, document camera)

PowerPoints

Worksheets/notes

YouTube/Netflix

Virtual Activities

Safety Equipment

Lab goggles

Graduated cylinders varying in mL

soda bottles

filtration materials

Standards

P.1	Act as a responsible and contributing community members and employee.
1	Make sense of problems and persevere in solving them
L.SS.6.1	Demonstrate command of the system and structure of the English language when writing or speaking.
2	Reason abstractly and quantitatively
9.4.2.CT	Critical Thinking and Problem-solving
P.6	Model integrity, ethical leadership and effective management.

	Critical thinkers must first identify a problem then develop a plan to address it to effectively solve the problem.
9.4.2.CT.1	Gather information about an issue, such as climate change, and collaboratively brainstorm ways to solve the problem (e.g., K-2-ETS1-1, 6.3.2.GeoGI.2).
P.8	Use technology to enhance productivity increase collaboration and communicate effectively.
R	Reading
W	Writing
W.NW.6.3	Write narratives to develop real or imagined experiences or events using effective technique, relevant descriptive details, and well-structured event sequences.
SL	Speaking and Listening
MS-ESS2-1	Develop a model to describe the cycling of Earth's materials and the flow of energy that drives this process.
	Emphasis is on the processes of melting, crystallization, weathering, deformation, and sedimentation, which act together to form minerals and rocks through the cycling of Earth’s materials.
	All Earth processes are the result of energy flowing and matter cycling within and among the planet’s systems. This energy is derived from the sun and Earth’s hot interior. The energy that flows and matter that cycles produce chemical and physical changes in Earth’s materials and living organisms.
	Explanations of stability and change in natural or designed systems can be constructed by examining the changes over time and processes at different scales, including the atomic scale.
MS-ESS2-2	Construct an explanation based on evidence for how geoscience processes have changed Earth's surface at varying time and spatial scales.
	Emphasis is on how processes change Earth’s surface at time and spatial scales that can be large (such as slow plate motions or the uplift of large mountain ranges) or small (such as rapid landslides or microscopic geochemical reactions), and how many geoscience processes (such as earthquakes, volcanoes, and meteor impacts) usually behave gradually but are punctuated by catastrophic events. Examples of geoscience processes include surface weathering and deposition by the movements of water, ice, and wind. Emphasis is on geoscience processes that shape local geographic features, where appropriate.
ESS2.C	The Roles of Water in Earth’s Surface Processes
	Water’s movements—both on the land and underground—cause weathering and erosion, which change the land’s surface features and create underground formations.
MS-ESS3-1	Construct a scientific explanation based on evidence for how the uneven distributions of Earth’s mineral, energy, and groundwater resources are the result of past and current geoscience processes.
ESS3.A	Natural Resources
	Humans depend on Earth’s land, ocean, atmosphere, and biosphere for many different resources. Minerals, fresh water, and biosphere resources are limited, and many are not renewable or replaceable over human lifetimes. These resources are distributed unevenly around the planet as a result of past geologic processes.
MS-ESS3-3	Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment.
MS-ESS3-4	Construct an argument supported by evidence for how increases in human population and per-capita consumption of natural resources impact Earth’s systems.

Suggested Strategies for Modification

See attached document

https://docs.google.com/spreadsheets/d/1wZeK2sYMgTDgqPB3B9-_tnn4GVTjdlgfbgsWmnSKX2E/edit?usp=sharing