Unit 3: Water As A Resource

Content Area: **Science**
Course(s):
Time Period: **Marking Period 3**
Length: **10-12 Weeks**
Status: **Published**

Brief Summary of Unit

Students will develop an understanding of water use and will improve their abilities to make and record observations, use models, and conduct scientific inquiries. Students will investigate the use and the supply of water in public buildings, such as schools, in order to gain an understanding of how water is processed and treated before and after use. Students will investigate the factors that affect the quality of water in their community including the scope of their local watershed and the route by which pollutants can contaminate it. As a result of this investigation, students will develop a better understanding of the unique properties of water and how water moves on the planet. The crosscutting concepts of systems, system models, patterns and cause and effect will provide a framework for understanding the disciplinary core ideas. Students are expected to demonstrate proficiency in planning and carrying out investigations, analyzing and interpreting data, and developing and using models, Students are also expected to use these to use these science and engineering practices to demonstrate understanding of the disciplinary core ideas.

Revision Date: July 2020

CS.6-8.DA	Data & Analysis
LA.L.6.2.B	Spell correctly.
LA.L.6.4.B	Use common, grade-appropriate Greek or Latin affixes and roots as clues to the meaning of a word (e.g., audience, auditory, audible).
LA.L.6.4.C	Consult reference materials (e.g., dictionaries, glossaries, thesauruses), both print and digital, to find the pronunciation of a word or determine or clarify its precise meaning or its part of speech.
LA.L.6.5.B	Use the relationship between particular words (e.g., cause/effect, part/whole, item/category) to better understand each of the words.
LA.W.6.1.B	Support claim(s) with clear reasons and relevant evidence, using credible sources and demonstrating an understanding of the topic or text.
LA.W.6.2	Write informative/explanatory texts to examine a topic and convey ideas, concepts, and information through the selection, organization, and analysis of relevant content.
LA.RI.6.1	Cite textual evidence and make relevant connections to support analysis of what the text says explicitly as well as inferences drawn from the text.
LA.RI.6.2	Determine a central idea of a text and how it is conveyed through particular details; provide a summary of the text distinct from personal opinions or judgments.
LA.RI.6.3	Analyze in detail how a key individual, event, or idea is introduced, illustrated, and elaborated in a text (e.g., through examples or anecdotes).
LA.RL.6.1	Cite textual evidence and make relevant connections to support analysis of what the text says explicitly as well as inferences drawn from the text.
LA.SL.6.4	Present claims and findings, sequencing ideas logically and using pertinent descriptions,

	facts, and details to accentuate main ideas or themes; use appropriate speaking behaviors (e.g., eye contact, adequate volume, and clear pronunciation).
LA.SL.6.5	Include multimedia components (e.g., graphics, images, music, sound) and visual displays in presentations to clarify information.
SCI.MS.ESS1.C	The History of Planet Earth
SCI.MS.ESS2.A	Earth's Materials and Systems
SCI.MS.ESS3.B	Natural Hazards
SCI.MS.ESS3.D	Global Climate Change
SCI.MS-ESS3	Earth and Human Activity
SCI.MS-ESS2-2	Construct an explanation based on evidence for how geoscience processes have changed Earth's surface at varying time and spatial scales.
SCI.MS-ESS3-2	Analyze and interpret data on natural hazards to forecast future catastrophic events and inform the development of technologies to mitigate their effects.
SCI.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.
WRK.9.2.8.CAP	Career Awareness and Planning
TECH.9.4.8.CI	Creativity and Innovation
TECH.9.4.8.CI.2	Repurpose an existing resource in an innovative way (e.g., 8.2.8.NT.3).
	Weather and climate are influenced by interactions involving sunlight, the ocean, the atmosphere, ice, landforms, and living things. These interactions vary with latitude, altitude, and local and regional geography, all of which can affect oceanic and atmospheric flow patterns.
	Graphs, charts, and images can be used to identify patterns in data.
	Because these patterns are so complex, weather can only be predicted probabilistically.
	The complex patterns of the changes and the movement of water in the atmosphere, determined by winds, landforms, and ocean temperatures and currents, are major determinants of local weather patterns.
	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.
	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.
	Tectonic processes continually generate new ocean sea floor at ridges and destroy old sea floor at trenches.
	Examples of factors include human activities (such as fossil fuel combustion, cement production, and agricultural activity) and natural processes (such as changes in incoming solar radiation or volcanic activity). Examples of evidence can include tables, graphs, and maps of global and regional temperatures, atmospheric levels of gases such as carbon dioxide and methane, and the rates of human activities. Emphasis is on the major role that human activities play in causing the rise in global temperatures.
	Global movements of water and its changes in form are propelled by sunlight and gravity.
	Water continually cycles among land, ocean, and atmosphere via transpiration, evaporation, condensation and crystallization, and precipitation, as well as downhill flows on land.

Maps of ancient land and water patterns, based on investigations of rocks and fossils, make clear how Earth's plates have moved great distances, collided, and spread apart.

Emphasis is on how these resources are limited and typically non-renewable, and how their distributions are significantly changing as a result of removal by humans. Examples of uneven distributions of resources as a result of past processes include but are not limited to petroleum (locations of the burial of organic marine sediments and subsequent geologic traps), metal ores (locations of past volcanic and hydrothermal activity associated with subduction zones), and soil (locations of active weathering and/or deposition of rock).

Human activities have significantly altered the biosphere, sometimes damaging or destroying natural habitats and causing the extinction of other species. But changes to Earth's environments can have different impacts (negative and positive) for different living things.

The ocean exerts a major influence on weather and climate by absorbing energy from the sun, releasing it over time, and globally redistributing it through ocean currents.

Cause and effect relationships may be used to predict phenomena in natural or designed systems.

Variations in density due to variations in temperature and salinity drive a global pattern of interconnected ocean currents.

Construct an oral and written argument supported by empirical evidence and scientific reasoning to support or refute an explanation or a model for a phenomenon or a solution to a problem.

Water's movements—both on the land and underground—cause weathering and erosion, which change the land's surface features and create underground formations.

Human activities, such as the release of greenhouse gases from burning fossil fuels, are major factors in the current rise in Earth's mean surface temperature (global warming). Reducing the level of climate change and reducing human vulnerability to whatever climate changes do occur depend on the understanding of climate science, engineering capabilities, and other kinds of knowledge, such as understanding of human behavior and on applying that knowledge wisely in decisions and activities.

Relationships can be classified as causal or correlational, and correlation does not necessarily imply causation.

Typically, as human populations and per-capita consumption of natural resources increase, so do the negative impacts on Earth unless the activities and technologies involved are engineered otherwise.

The planet's systems interact over scales that range from microscopic to global in size, and they operate over fractions of a second to billions of years. These interactions have shaped Earth's history and will determine its future.

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.

Computer models can be used to simulate events, examine theories and inferences, or make predictions.

Analyze and interpret data to determine similarities and differences in findings.

Emphasis is on how air masses flow from regions of high pressure to low pressure, causing weather (defined by temperature, pressure, humidity, precipitation, and wind) at a fixed location to change over time, and how sudden changes in weather can result when different air masses collide. Emphasis is on how weather can be predicted within probabilistic ranges. Examples of data can be provided to students (such as weather maps, diagrams, and visualizations) or obtained through laboratory experiments (such as with condensation).

Essential Questions

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How do the properties and movements of water shape Earth's surface and affect its systems?

How do humans depend on Earth's resources?

How do natual hazards and climate change affect individuals and societies?

How do living organisms alter Earth's processes and structures?

Enduring Understandings

Understand the actions they can take to conserve water since there is a limited amount that has not changed since the formation of Earth.

Understand how humans impact water quality by creating water pollution and how to prevent water pollution.

Understand that water quality and sources in their local community and ways they can help .

Most of the water on Earth is unusable because it is found in oceans and glaciers.

The water cycle is an ongoing cycle, water is never created or destroyed, but cycled through, changing from one state to another.

Students Will Know/Students Will be Skilled At

Students will know why conserving water is important and how to conserve it.
Students will know the amount of freshwater available on Earth.
Students will know the steps of the water cycle.
Students will know our main sources of water and main uses of water.
Students will distinguish between point and nonpoint source pollution and list examples of both.
Students will know how the Earth naturally filters water.
Students will know how water is treated for use by humans and how it is treated to be reintroduced into nature.
Students will understand how climate change will effect water temperature, amount and flow on Earth.

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 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. 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?*

Calaculations 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. Teacher will use a student's as an 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 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. 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 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 needed support will have prompts for graph and will have a minumum 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 **

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 quick 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 their 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?*

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

Do Nows

Exit Tickets

Class Discussion

Quizzes:

- *Water Cycle Quiz*
- *Pollution Quiz*

Bench Marks:

Formal Lab Reports/Lab Write-ups:

Earth's Filtration Lab

Alternative:

Water Cycle Rap/Song

Summative:

Water Unit Test

Materials

McGraw-Hill Earth Science iScience Textbooks (ISBN#: 978-0-07-888003-2)

Guided note packets (teacher developed)

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

PowerPoints

Workshets/notes

Youtube/Netflix

Virtual Activities

Safety Equipment

Lab goggles

Graduated cylinders varying in mL

soda bottles

filtration materials