Unit 06: Earth's Water
UNIT PLAN

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UNIT NARRATIVE

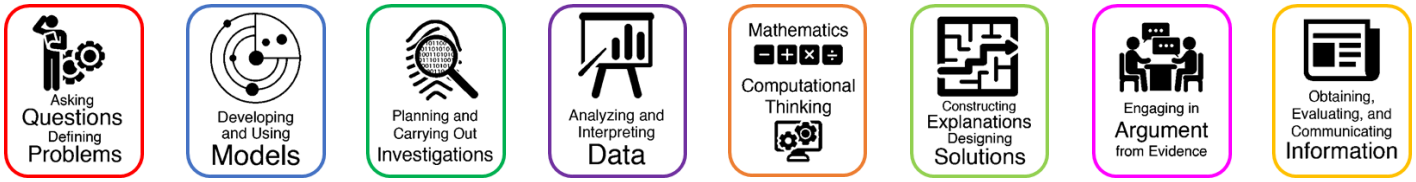
Unit 6 includes 2standards that are all review from 7th grade and focus on Earth's Water There are a total of 2 lessons in this unit but each lesson will take 2 days so there are a total of 4 instructional days.

There is no assessment for this unit as this unit ends just before the semester exam. This content **will not** be on the semester exam.

The best science instruction practice is to remember ABC (activity before concept) and CBV (concept before vocabulary.) Students need to engage in investigation, discourse, reading, and writing to discover science concepts not being told the science content. We want students to be doing science, not memorizing science. This may be counter-intuitive to you and may not be the way you learned science, but research proves this is best practice for instruction and learning

Focus on Disciplinary Literacy

In science, disciplinary literacy is synonymous with the science and engineering practices. The SEPs are the context through which all science concepts should be taught. In the lessons, you will find the Science and Engineering practices icons when the SEPs are being explicitly used by students.



CONTENT

STANDARDS

Below are the standards **taught** and **assessed** in this unit.

Supporting Standards
7.11A analyze the beneficial and harmful influences of human activity on groundwater and surface water in a watershed
7.11B describe human dependence and influence on ocean systems and explain how human activities impact these systems.

UNDERSTANDINGS AND QUESTIONS

Important big ideas and processes for the unit.

Key Understandings
• Human actions can lead to beneficial and harmful effects on groundwater and surface water.
• Humans depend on the oceans for much more than food, from the air we breathe to recreation and medicines the oceans are important to life on Earth.
• Human induced changes in marine ecosystems can have both positive and negative impacts on factors that affect the overall health of the ocean systems.
• Overharvesting food from the ocean creates an imbalance in existing ocean food webs. Other examples of the effects of human activity on oceans include climate change, spread of disease, and introduction of invasive species.

Key Questions
• How do human actions impact surface water and groundwater?
• How are humans dependent on the ocean?
• How do human activities impact the ocean?

Common Misconceptions

- Thinking that all human activities have a negative impact on water resources
- Thinking pollution is the only concern for water resources
- Thinking of watersheds as isolated systems
- Thinking that water pollution only comes from industrial sources
- Assuming groundwater is an unlimited resource and cannot be depleted
- Thinking that groundwater contamination is localized and doesn't affect surface water
- Thinking that groundwater contamination is easily reversible
- Thinking that water pollution only affects aquatic life, forgetting it has far-reaching effects on aquatic and terrestrial ecosystems, human health, and livelihoods
- Thinking that individual actions (e.g., littering or overfishing) have little impact on such large ecosystems in vast oceans
- Thinking that the oceans have the capacity to self-cleanse, eliminating pollution and restoring balance without human intervention
- Thinking that human activities only affect the ocean's surface and coastline, and that the ocean's problems are only relevant to coastal communities
- Thinking that coral reefs are just colorful rocks, and their destruction doesn't have significant consequences
- Assuming that marine-protected areas are sufficient to safeguard ocean ecosystems
- Thinking that human activities only harm the ocean, and there are no benefits to our interactions with it

ROADMAP

ROADMAP AT A Glance: Unit 5 Changing earth				
Day	**Date**	**TEKS**	**Lesson**	**Lesson Title**
1		7.11A	1	Groundwater and Surface Water
2				
3		7.11B	3	Human Dependence on Ocean Systems
4				

Lesson #01: Groundwater and Surface Water (2 Day Lesson)	Date:

Objective

SWBAT Analyze the effects of human activity on groundwater and surface water in a watershed

Standards

TEKS 7.11A analyze the beneficial and harmful influences of human activity on groundwater and surface water in a watershed;

Vocabulary

Aquifer
Groundwater
Surface water

Science Practices

2. Developing and using models
3. Planning and carrying out investigations
6. Constructing explanations and designing solutions
7. Engaging in argument from evidence

Recurring Themes and Concepts

Instructional Notes

- Students will brainstorm actions that people can take to keep our groundwater safe and actions that people do which cause harm to or contaminate our groundwater.
- Students will create 4 models to show different ways human impact surface water and ground water.
- Students will engage in a reading to learn to deepen their understanding of surface water, ground water and how human actions impact these water systems.
- Students will identify the major watersheds in Texas and analyze the effects of human actions on these watersheds.
- Students will analyze scenarios and describe the impact that the situation described in the scenario will have on the groundwater and surface water.

Lesson Look Fors

Look for teachers to:

☐ Engage students in ABC. (Activity before content) The teacher should stamp key points AFTER students have had the time to engage in the content (productive struggle) and discuss.
☐ Promote the use of partners and whole class discussion.

Look or students to:

☐ Engage in discourse and productive struggle
☐ Justify their reasoning and support their ideas with evidence.

Students Do and Know

- Students will analyze the effects of human activity on groundwater and surface water in a watershed

- Human actions can lead to beneficial and harmful effects on groundwater and surface water.

Lesson #02: Human Dependence on Ocean Systems (2 Day Lesson)	Date:

Objective

SWBAT describe how humans are dependent on ocean systems and describe human actions impact the ocean.

Standards

TEKS 7.11B describe human dependence and influence on ocean systems and explain how human activities impact these systems.

Vocabulary

Science Practices

2. Developing and using models
3. Planning and carrying out investigations
4. Analyzing and interpreting data
5. Using mathematics and computational thinking
6. Constructing explanations and designing solutions

Recurring Themes and Concepts

Instructional Notes

- Students will conduct a card short to determine how humans are dependent on the oceans.
- Students will conduct a modeling activity to simulate overfishing in the ocean.
- Students will watch 2 videos to deepen their understanding of how humans are dependent on ocean systems and the impacts humans have on the ocean.
- Students will describe how human are dependent on ocean systems and describe human actions impact the ocean

Lesson Look Fors

Look for teachers to:

☐ Engage students in ABC. (Activity before content) The teacher should stamp key points AFTER students have had the time to engage in the content (productive struggle) and discuss.

☐ Promote the use of partners and whole class discussion.

Look or students to:

☐ Engage in discourse and productive struggle

☐ Justify their reasoning and support their ideas with evidence.

Students Do and Know

- Students will describe how humans are dependent on ocean systems and describe human actions impact the ocean.

- Humans depend on the oceans for much more than food, from the air we breathe to recreation and medicines the oceans are important to life on Earth.
- Human induced changes in marine ecosystems can have both positive and negative impacts on factors that affect the overall health of the ocean systems.

UNPACKED STANDARDS

Focus standards for this unit.

Standard:	7.11A analyze the beneficial and harmful influences of human activity on groundwater and surface water in a watershed
Specificity	**Content Builder**

Cognition: Analyze
Content: the beneficial and harmful influences of human activity on groundwater and surface water in a watershed
Including, but not limited to:
• Watershed – an area of land where all of the groundwater and surface water from the area drains from higher areas to lower areas and into the same body of water
• Groundwater (underground)
  ○ Recharge zones
  ○ Aquifers
  ○ Springs
  ○ Wells
  ○ Water table
• Beneficial influence of human activity:
  ○ Reduce usage
  ○ Low flow toilets
  ○ Repairing water leaks
  ○ Xeriscaping
  ○ Recycling
  ○ Rain barrels
• Harmful influence of human activity:
  ○ Overuse
  ○ Letting water run
  ○ Crop irrigation
  ○ Over watering lawns
  ○ Water pollution
  ○ Runoff
  ○ Fertilizer
	Human activity has both positive and negative impacts on groundwater and surface water in watersheds. It can improve water availability and quality through management and pollution reduction, but it can also harm water resources through pollution and overconsumption. Understanding these influences is crucial for effective water resource management. Students may struggle to grasp how various human actions (e.g., industrial processes, agriculture, urban development, and pollution) can impact both groundwater and surface water in a watershed.
	Watershed: A watershed, also known as a drainage basin, is the area of land that funnels all of its surface water and groundwater into a body of water, such as a stream, river, lake, aquifer, or ocean. Areas of high ground separate watersheds from each other. On a large scale, the area of land bordered by the Rocky Mountains on the west and the Appalachian Mountains on the east is a watershed that drains all of its water into the Gulf of Mexico. Large watersheds such as this one are made up of thousands of smaller watersheds. Harris County has seven different watersheds, which help to drain all of the county's surface water into the Gulf of Mexico. The city of Houston is located within the San Jacinto watershed. All of the surface water in Houston eventually drains into the San Jacinto river, which empties into the Gulf of Mexico.
	Human Activities Human activities can also lead to the pollution of Earth's groundwater and surface waters. Water pollution is classified as point source or nonpoint source pollution. Point source water pollution can be traced back to the source of pollution, for example, a factory that is releasing chemicals directly into a river. Nonpoint water pollution does not have an apparent single source of pollution. Nonpoint source pollution includes runoff of the following pollutants into storm drains: fertilizer, pesticide, herbicide, pet waste, and oil leakage from cars.
	Water pollution can impact our health as well as the health of the environment. To ensure we have enough clean drinking water for future generations, it is crucial that we use our water in a sustainable manner and that we stop water pollution. As humans, we rely on clean drinking water and need to do our part to ensure future generations have a sustainable supply. Simple, everyday actions such as recycling, throwing away trash properly, and being mindful of chemicals can help achieve this goal.

	Instructional Implications

- Motor oil
- Debris

- Surface water (above ground)
  - Rivers
  - Lakes
  - Streams
  - Ponds
  - Gulfs
  - Wetlands
  - Estuaries
  - Swamps
- Beneficial influence of human activity:
  - Proper disposal of waste materials
  - Minimize usage and consumption
- Harmful effects of human activity:
  - Water pollution
  - Runoff

Student Misconceptions

- Thinking that all human activities have a negative impact on water resources
- Thinking pollution is the only concern for water resources
- Thinking of watersheds as isolated systems
- Thinking that water pollution only comes from industrial sources
- Assuming groundwater is an unlimited resource and cannot be depleted
- Thinking that groundwater contamination is localized and doesn't affect surface water
- Thinking that groundwater contamination is easily reversible
- Thinking that water pollution only affects aquatic life, forgetting it has far-reaching effects on aquatic and terrestrial ecosystems, human health, and livelihoods

When you teach this concept, remember to:

- Have students research watersheds, groundwater, and surface water. Introduce key concepts (water sources, hydrological cycles, and the interconnection of water resources) within a watershed.
- Have students analyze case studies, both locally and globally, and examples of human activities that impact water resources. Discuss specific industries, agriculture practices, urban development, and pollution sources that can have both positive and negative influences on groundwater and surface water.
- Highlight that pollution, overconsumption, unsustainable extraction, and alteration of natural water flow patterns are all significant factors that can harm groundwater and surface water.
- Explain that contaminants in groundwater are often not visible to the naked eye, making regular testing and monitoring crucial for identifying pollution.
- Explain that remediation of contaminated groundwater can be challenging, time-consuming, and expensive, and in some cases, complete restoration may not be possible.
- Clarify that groundwater is a finite resource, and excessive pumping can lead to depletion and long-term environmental damage.
- Encourage students to consider the unique challenges and opportunities in their local area as well as global water issues.
- Engage in discussions about water conservation, pollution prevention, responsible land use, and equitable access to clean water.
- Help students see the Recurring Themes and Concepts of cause and effect and parts of a systems and their interdependence in this standard.

Possible STAAR Stimuli

Demonstration	Diagram	Visual/Image/Illustration
Model	Informational Text/List	Map

Vocabulary

aquifer groundwater infiltration percolate	permeability pollution porosity runoff	surface water water table watershed

Standard:	7.11B describe human dependence and influence on ocean systems and explain how human activities impact these systems.

Specificity

Cognition: Describe
Content: describe human dependence and influence on ocean systems
Including, but not limited to

- Water
- Food – More than half of all people depend on the ocean for their main source of food.
  - Human activity – fishing
  - Influence – overfishing specific types of fish
  - Impact – disrupted food chains
- Oxygen – More than 50% of Earth's oxygen is produced by the ocean.
  - Human activity – crop fertilization
  - Influence – supports the growth of algae
  - Impact – decreases the habitat for other microorganisms in the ocean
- Climate regulation – The oceans cover 70% of Earth's surface and are the main source of evaporation in the water cycle.
  - Human activity – fossil fuel emissions
  - Influence – increased ocean temperatures / rates of evaporation
  - Impact – climactic change
- Transportation – 67% of all U.S. trade involves marine travel.
  - Human activity – oil shipping
  - Influence – oil spills
  - Impact – destroys habitats

Content Builder

Humans depend on oceans for food, resources, transportation, and climate regulation. But our activities can harm these ecosystems. Overfishing, pollution, climate change, and coastal development impact oceans. Understanding and controlling these impacts is vital for sustainability.

Humans depend on the oceans for many aspects of our lives. We gather food, transportation, energy sources, recreation, and other resources from the oceans—sometimes at a cost to the ocean life that resides there. Human reliance on the oceans has had a major impact on the biodiversity of the organisms within these ecosystems.

Positive Effects: One positive impact humans have on the oceans is the implementation of artificial reefs. Many times, these are decommissioned (cleaned) boats, airplanes, or large containers that are sunk offshore to provide bases for new habitats to form. Coral, algae, invertebrates, and fish of all sizes colonize these locations and create new homes.

Negative Effects: Human urbanization increases surface runoff by creating more impermeable surfaces, for example concrete and pavement, which do not allow water to percolate down through the soil and into the aquifer. However, with the impermeable surfaces increasing runoff directly to surface water locations such as lakes, rivers, and ponds, the natural filtration does not occur, and those pollutants reach the ocean. Therefore, these pollutants can have a detrimental effect on the organisms that live in the ocean ecosystem.

Activities such as commercial fishing, offshore wind farms, and oil drilling can disrupt fragile aquatic food webs, often removing whole species from the ecosystem. Not only do these activities impact the food webs, but they also deposit debris into the waters and increase sound pollution which can disrupt ocean life communication channels.

Student Misconceptions

- Thinking that individual actions (e.g., littering or overfishing) have little impact on such large ecosystems in vast oceans
- Thinking that the oceans have the capacity to self-cleanse, eliminating pollution and restoring balance without human intervention
- Thinking that human activities only affect the ocean's surface and coastline, and that the ocean's problems are only relevant to coastal communities
- Thinking that coral reefs are just colorful rocks, and their destruction doesn't have significant consequences
- Assuming that marine-protected areas are sufficient to safeguard ocean ecosystems
- Thinking that human activities only harm the ocean, and there are no benefits to our interactions with it

Instructional Implications

When you teach this concept, remember to:

- Have students research ways humans rely on oceans for various resources and services. Discuss topics such as food sources, energy production from ocean-based sources, maritime trade and transportation, and the cultural and recreational value of coastal areas.
- Explore the diverse range of human activities that impact ocean systems. This may include fishing practices, pollution from land-based sources, coastal development and habitat destruction, climate change and its effects on ocean temperature and chemistry, and the extraction of non-renewable resources from the seabed.
- Explain that human activities don't only affect coastlines, they can also have profound impacts on the deeper layers of the ocean, leading to alterations in temperature, chemistry, and biodiversity. Explain how the oceans play a crucial role in regulating climate, providing oxygen, and supporting biodiversity, which in turn affects global weather patterns and food chains.

Possible STAAR Stimuli

Visual/Image/ Illustration	Model
Informational Text/List	Map

Vocabulary

agricultural runoff artificial reef coral bleaching dependence	eutrophication fertilizer habitat destruction	ocean system phytoplankton runoff

- Incorporate real-life examples, videos, and case studies to help students understand the real-world impacts of human activities on ocean systems. Highlight success stories of conservation efforts, sustainable practices, and international agreements aimed at protecting and restoring ocean health.
- Explain that responsible and sustainable interactions with the ocean such as ecotourism and marine research can contribute to both the well-being of marine ecosystems and human livelihoods.
- Engage students in discussions and activities that require them to analyze the causes and effects of human activities, evaluate potential solutions, and consider the trade-offs and ethical implications of different approaches.

VERTICAL STANDARDS

This section details the **progression** of key student expectations/standards** in the courses **before** and **after** this course. This will help you understand what **prior knowledge skills to build upon** and guide you in knowing what **skills you are preparing your students** for in the subsequent course.

6th Grade	7th Grade	8th Grade
6.11A research and describe why resource management is important in reducing global energy, poverty, malnutrition, and air and water pollution	7.11A analyze the beneficial and harmful influences of human activity on groundwater and surface water in a watershed; and	
6.11B explain how conservation, increased efficiency, and technology can help manage air, water, soil, and energy resources.	7.11B describe human dependence and influence on ocean systems and explain how human activities impact these systems.	

VOCABULARY GLOSSARY

Domain-specific words and definitions for this unit.

Key Content Vocabulary
List and define key vocabulary terms • **Aquifer** - An underground layer of permeable rock, sediment (usually sand or gravel), or soil that stores water. • **Groundwater** - water held underground in the soil or in pores and crevices in rock. • **Surface water** - water that collects on the surface of the ground.

Consumable Materials and Lab Supplies for Unit 4 (1 per group of 4 students unless noted)

Lesson	Commercial Vendor or Home	Lab Supplies (Science Vendor)
Lesson 01: Groundwater and Surface Water	<u>Station 1</u> • Clear plastic container (3 x 5 x 7) • Balloon • Food coloring • Push pin • Plastic cup • Foam cup • Pebbles • Pump from hand soap dispenser • Strainer or sieve <u>Station 2</u> • Clear plastic container (3 x 5 x 7) • Powdered drink mix • Pebbles • Plastic cup • Foam cup • Strainer or sieve • Plastic wrap • Large sponge <u>Station 3</u> • Clear plastic container (3 x 5 x 7) • Plastic toy cow • Pump from hand soap dispenser • Yellow food coloring • Strainer or sieve • Foam cup • Plastic cup <u>Station 4</u> • Large sheet of white chart paper or butcher paper • Water-soluble markers • Spray bottle	<u>Station 1</u> • Water • Paper towels • 50 ml graduated cylinder <u>Station 2</u> • Water • Paper towels • 50 ml graduated cylinder <u>Station 3</u> • Water • Paper towels • 50 ml graduated cylinder <u>Station 4</u> • Water • Paper towels
Lesson 02: Human Dependence on Ocean Systems	<u>Go Fish (per group)</u> • 4 straws • 4 pieces of string • 1 paper plate • 4 napkins • 1 roll of tape	<u>Go Fish (per group)</u> • 1 roll of tape • 1 cup or beaker

	• 1 cup or beaker <u>Per Teacher</u> • Box of resealable bags • 1 large box of multicolored goldfish crackers (4 colors)	