Unit 03: Marine Environments

Content Area: **Science**
Course(s):
Time Period: **Marking Period 1**
Length: **3 weeks**
Status: **Published**

Brief Summary of Unit

Students will explore and learn about the various marine ecosystems that exist. Students will learn about the flora and fauna in each marine environment and each area's chief characteristics. Human impact and the effect of climate change on each of these areas will also be explored.

June 2024

Essential Questions

Essential Questions:

What is a marine ecosystem and which factors within marine ecosystems create variables for biodiversity?

Why are there different ecosystems within the ocean?

What are the characteristics and inhabitants of each marine environment?

What geologic forces create erosional and depositional shorelines?

Enduring Understandings:

Variability in conditions and resources creates an incredible diversity of marine environments and ecosystems

Organisms in different marine ecosystems display a variety of adaptations to survival in those conditions

Geologic processes can drastically change marine ecosystems over time

Students Will Know / Students Will Be Skilled At

Students will know and locate the depths at which each zone occurs.

Students will know the various organisms that are located in each life zone and the adapted functional physiology.

Students will know how humans interact and utilize marine environments for sustainability, benefits, and profit.

Students will be skilled at explaining the dynamics of various coastline processes.

Students will be skilled at concepts on marine environments by defining the following key terms: intertidal, supratidal, subtidal, pelagic, neritic, photic, aphotic, salt marsh, mangroves, barrier islands, and coral reefs.

Learning Plan

Meaningful participation in guided question/answer sessions, individual/group discussions, demonstrating an understanding of the purpose of the unit lesson(s), key terms, and concepts.

Preview the essential questions, provide answers, and connect to learning throughout the unit.

Discuss the processes within the intertidal zone.

Activity: How sediment grain size affects settling rates and transport distance.

Explain what defines an ecosystem and the type of adaptations that are made to certain ecosystems.

Video: Geology of Our Coastlines and accompanying worksheet

Google Slides Presentation: Erosional and Depositional Coastlines.

Anatomy of a beach - natural beach processes info packet, diagram and worksheet

Google Slides Presentation: Jetties, groins, seawalls.

Activity: Calculations of longshore drift and beach sand deposition.

Case study: Soft Stabilization - Beach replenishment. Case study reading and analysis worksheet/discussion

Marine Environment stations: Coral Reefs, Estuaries, Salt Marshes and Mangroves.

Differentiate and diagram the different ocean zones.

Differentiate and illustrate factors that influence the intertidal zone.

Case study: Beach replenishment projects along the Jersey shore

Climate Change Lab: the impact of changing ocean temperatures on oxygen content

Evidence / Performance Tasks

Formative Assessments:

Worksheets

Do Nows

Exit Tickets

Class Discussions

Complete daily classwork and regular homework assignments related to the identification of concepts learned in the natural setting, vocabulary, problem solving, and critical thinking.

Compare different life zones at different ocean depths and coastline formations.

Assess the impacts of human activity in every marine ecosystem.

Quizzes

Summative:

Unit test on each ecosystem and its own unique set of flora and fauna.

Bench Marks:

Midterm / Final Exam

Alternative:

Research project on different marine environments and human impact on them.

Materials

Textbook, *Essentials of Oceanography (13th Ed.), Trujillo and Thurman and ancillary materials*

Earth Science, Merrill, and ancillary resource materials

Earth Science, Prentice-Hall, and ancillary resource materials

quantitative/qualitative lab equipment for activities, experiments

related oceanography maps, ocean current charts

Informational & interactive Website: noaa.gov

Standards

S.ID.A	Summarize, represent, and interpret data on a single count or measurement variable
L.SS.11–12.1	Demonstrate command of the system and structure of the English language when writing or speaking.
9.4.12.CI.1	Demonstrate the ability to reflect, analyze, and use creative skills and ideas (e.g., 1.1.12prof.CR3a).
9.4.12.CI.2	Identify career pathways that highlight personal talents, skills, and abilities (e.g., 1.4.12prof.CR2b, 2.2.12.LF.8).
L.KL.11–12.2	Apply knowledge of language to understand how language functions in different contexts, to make effective choices for meaning or style, and to comprehend more fully when reading or listening.
9.4.12.CI.3	Investigate new challenges and opportunities for personal growth, advancement, and transition (e.g., 2.1.12.PGD.1).
S.ID.B	Summarize, represent, and interpret data on two categorical and quantitative variables
	Collaboration with individuals with diverse experiences can aid in the problem-solving process, particularly for global issues where diverse solutions are needed.
9.4.12.CT.1	Identify problem-solving strategies used in the development of an innovative product or practice (e.g., 1.1.12acc.C1b, 2.2.12.PF.3).
9.4.12.CT.2	Explain the potential benefits of collaborating to enhance critical thinking and problem solving (e.g., 1.3E.12profCR3.a).
L.VL.11–12.3	Determine or clarify the meaning of unknown and multiple-meaning words and phrases based on grades 11–12 reading and content, including technical meanings, choosing flexibly from a range of strategies.
S.ID.C	Interpret linear models
S.IC.A	Understand and evaluate random processes underlying statistical experiments
S.IC.B	Make inferences and justify conclusions from sample surveys, experiments, and observational studies
RL.CR.11–12.1	Accurately cite strong and thorough textual evidence and make relevant connections to strongly support a comprehensive analysis of multiple aspects of what a literary text says explicitly and inferentially, as well as interpretations of the text; this may include determining where the text leaves matters uncertain.
	Digital communities influence many aspects of society, especially the workforce. The

	increased connectivity between people in different cultures and different career fields have changed the nature, content, and responsibilities of many careers.
RI.CR.11–12.1	Accurately cite a range of thorough textual evidence and make relevant connections to strongly support a comprehensive analysis of multiple aspects of what an informational text says explicitly and inferentially, as well as interpretations of the text.
S.CP.A	Understand independence and conditional probability and use them to interpret data
	Solutions to the problems faced by a global society require the contribution of individuals with different points of view and experiences.
	Digital tools such as artificial intelligence, image enhancement and analysis, and sophisticated computer modeling and simulation create new types of information that may have profound effects on society. These new types of information must be evaluated carefully.
	In order for members of our society to participate productively, information needs to be shared accurately and ethically.
W.AW.11–12.1	Write arguments to support claims in an analysis of substantive topics or texts, using valid reasoning and relevant and sufficient evidence.
	Accurate information may help in making valuable and ethical choices.
W.IW.11–12.2	Write informative/explanatory texts (including the narration of historical events, scientific procedures/experiments, or technical processes) to examine and convey complex ideas, concepts, and information clearly and accurately through the effective selection, organization, and analysis of content.
	Digital tools differ in features, capacities, and styles. Knowledge of different digital tools is helpful in selecting the best tool for a given task.
	Collaborative digital tools can be used to access, record and share different viewpoints and to collect and tabulate the views of groups of people.
HS-PS1-5	Apply scientific principles and evidence to provide an explanation about the effects of changing the temperature or concentration of the reacting particles on the rate at which a reaction occurs.
W.WR.11–12.5	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.
SL.PE.11–12.1	Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with peers on grades 11–12 topics, texts, and issues, building on others' ideas and expressing their own clearly and persuasively.
SL.II.11–12.2	Integrate multiple sources of information presented in diverse formats and media (e.g., visually, quantitatively, orally) in order to make informed decisions and solve problems, evaluating the credibility and accuracy of each source and noting any discrepancies among the data.
SL.PI.11–12.4	Present information, findings and supporting evidence clearly, concisely, and logically. The content, organization, development, and style are appropriate to task, purpose, and audience.
SL.UM.11–12.5	Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest.
HS-LS1-2	Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.
HS-LS2-2	Use mathematical representations to support and revise explanations based on evidence about factors affecting biodiversity and populations in ecosystems of different scales.

HS-LS2-3	Construct and revise an explanation based on evidence for the cycling of matter and flow of energy in aerobic and anaerobic conditions.
HS-LS2-4	Use mathematical representations to support claims for the cycling of matter and flow of energy among organisms in an ecosystem.
HS-LS2-5	Develop a model to illustrate the role of photosynthesis and cellular respiration in the cycling of carbon among the biosphere, atmosphere, hydrosphere, and geosphere.
HS-LS2-6	Evaluate the claims, evidence, and reasoning that the complex interactions in ecosystems maintain relatively consistent numbers and types of organisms in stable conditions, but changing conditions may result in a new ecosystem.
HS-LS2-7	Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity.
HS-LS2-8	Evaluate the evidence for the role of group behavior on individual and species' chances to survive and reproduce.
HS-LS3-3	Apply concepts of statistics and probability to explain the variation and distribution of expressed traits in a population.
HS-LS4-1	Communicate scientific information that common ancestry and biological evolution are supported by multiple lines of empirical evidence.
HS-LS4-2	Construct an explanation based on evidence that the process of evolution primarily results from four factors: (1) the potential for a species to increase in number, (2) the heritable genetic variation of individuals in a species due to mutation and sexual reproduction, (3) competition for limited resources, and (4) the proliferation of those organisms that are better able to survive and reproduce in the environment.
HS-LS4-3	Apply concepts of statistics and probability to support explanations that organisms with an advantageous heritable trait tend to increase in proportion to organisms lacking this trait.
HS-LS4-4	Construct an explanation based on evidence for how natural selection leads to adaptation of populations.
HS-LS4-5	Evaluate the evidence supporting claims that changes in environmental conditions may result in: (1) increases in the number of individuals of some species, (2) the emergence of new species over time, and (3) the extinction of other species.
HS-ESS1-6	Apply scientific reasoning and evidence from ancient Earth materials, meteorites, and other planetary surfaces to construct an account of Earth's formation and early history.
HS-ESS2-1	Develop a model to illustrate how Earth's internal and surface processes operate at different spatial and temporal scales to form continental and ocean-floor features.
HS-ESS2-2	Analyze geoscience data to make the claim that one change to Earth's surface can create feedbacks that cause changes to other Earth systems.
HS-ESS2-3	Develop a model based on evidence of Earth's interior to describe the cycling of matter by thermal convection.
HS-ESS2-4	Use a model to describe how variations in the flow of energy into and out of Earth's systems result in changes in climate.
HS-ESS2-5	Plan and conduct an investigation of the properties of water and its effects on Earth materials and surface processes.
HS-ESS2-6	Develop a quantitative model to describe the cycling of carbon among the hydrosphere, atmosphere, geosphere, and biosphere.
HS-ESS2-7	Construct an argument based on evidence about the simultaneous coevolution of Earth's systems and life on Earth.
HS-ESS3-1	Construct an explanation based on evidence for how the availability of natural resources, occurrence of natural hazards, and climate change have influenced human activity.
HS-ESS3-2	Evaluate competing design solutions for developing, managing, and utilizing energy and

	mineral resources based on cost-benefit ratios.
HS-ESS3-3	Create a computational simulation to illustrate the relationships among management of natural resources, the sustainability of human populations, and biodiversity.
HS-ESS3-4	Evaluate or refine a technological solution that reduces impacts of human activities on climate change and other natural systems.
HS-ESS3-5	Analyze geoscience data and the results from global climate models to make an evidence-based forecast of the current rate of global or regional climate change and associated future impacts to Earth systems.
HS-ESS3-6	Use a computational representation to illustrate the relationships among Earth systems and how those relationships are being modified due to human activity (i.e., climate change).
HS-ETS1-1	Analyze a major global challenge to specify qualitative and quantitative criteria and constraints for solutions that account for societal needs and wants.
HS-ETS1-2	Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering.
HS-ETS1-3	Evaluate a solution to a complex real-world problem based on prioritized criteria and trade-offs that account for a range of constraints, including cost, safety, reliability, and aesthetics, as well as possible social, cultural, and environmental impacts.
HS-ETS1-4	Use a computer simulation to model the impact of proposed solutions to a complex real-world problem with numerous criteria and constraints on interactions within and between systems relevant to the problem.

Suggested Strategies for Modification

https://docs.google.com/spreadsheets/d/1BoXlgGboaurkHWyNqQpnIzl77z6Lb7Dg_ExD7n7FQJw/edit?usp=sharing

Additional modifications may be made based on individual needs of students as stated in student IEP (Individualized Education Program) documentation and as observed by the teacher:

Student directed research/presentation (power point, skit, demonstration) - Recent Scientific Contributions.

Design your own lab experiment

modified tests

cooperative learning groups

one-to-one instruction and assistance

additional time on task

alternative outcome options

individualized student assessment

preferential seating

handouts of class materials

guided notes

visual aides

computer web search