Unit 1: Biomes and Biodiversity
Environmental Science
12 Class Meetings

Rev. June 2019

Essential Questions
• What abiotic and biotic factors characterize the world's biomes?

Enduring Understandings with Unit Goals
EU 1: Biomes are characterized by their climates as well as typical plant and animal life.   • Explain how biomes are characterized by temperature, precipitation, flora, and fauna.   **EU 2:** Ecosystems vary in their rates of net primary production and biodiversity indexes.   • Describe how net primary production varies among biomes.   • Explain why some biomes house greater biodiversity than others.   **EU 3:** Habitat loss, incisive species, pollution, and overharvesting lead to a loss in biodiversity.   • Describe the trends in biodiversity loss and extinction in the past decades.   • Evaluate solutions to loss of biodiversity.

Standards
Next Generation Science Standards (NGSS)   • **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.   **Common Core State**   • **CCSS.ELA.CONTENT.WHST.9-12.9** Draw evidence from informational texts to support analysis, reflection, and research.   • **CCSS.ELA.CONTENT.RST.11-12.1** Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account   • **CCSS.MATH.CONTENT.HSN-Q.A.1** Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays.   • **CCSS.MATH.CONTENT.HSS.IC.B.6** Evaluate reports based on data.

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MSMHS Academic, Civic and Social Competencies

Competency 1. Read and write effectively for a variety of purposes.
Competency 2. Speak effectively with a variety of audiences in an accountable manner.
Competency 3. Make decisions and solve problems independently and collaboratively.
Competency 4. Apply scientific knowledge and concepts to a variety of investigative tasks.
Competency 5. Contribute to a positive learning environment with respect and responsibility.

Unit Content Overview

- Unit Phenomena (such as coral reef bleaching)
- Earth's major biomes:
    - Tropical rainforest
    - Tropical dry forest
    - Savannah
    - Desert
    - Temperate rainforest
    - Temperate forest
    - Temperate grassland
    - Chaparral
    - Boreal forests
    - Tundra
- Aquatic Ecosystems
    - Ocean
        - Coral Reefs
        - Deep Sea
        - Estuaries
        - Continental Shelf
        - Intertidal Zone
        - Open Ocean
        - Arctic Ocean
    - Freshwater
        - Lakes
        - Ponds
        - Rivers
        - Streams
- Climatographs
- Net Primary Productivity (NPP)
- Biodiversity
- Causes of loss of biodiversity

- Human impacts on biodiversity
- Endangered species

Interdisciplinary Connections
- Marine Studies I- marine biodiversity
- Biology-energy processes
- Algebra 1- Graphs

Learning Objectives with *TWPS Activities*

Students will be able to…

- Design a model that explains the unit phenomena
  - *Explain what has happened to the coral reef over the past 20 years.*
- Interpret and describe climatographs depicting temperature versus precipitation.
  - *Analyze the climatograph from Los Angeles. Suppose there is 20 mm of precipitation in July. Explain how this excess precipitation will impact Los Angeles's temperature in July.*
- Explain how biomes are characterized.
  - *Explain how biomes are characterized.*
- Compare and contrast Earth's major terrestrial biomes.
  - *If a Polar Bear (which is from the arctic) was moved into the desert, what are the challenges it would face? Why are those the challenges it would face? What if you took a rattlesnake and placed it in the Tundra?*
- Distinguish among the different marine aquatic biomes.
  - *Explain whether the Great Barrier Reef in Australia faces the same challenges as Bartlett's Reef in the Long Island Sound.*
- Investigate the characteristics of freshwater ecosystems.
  - *Persuade your partner about what the most important characteristic in a freshwater ecosystem.*
- Compare and contrast biodiversity among ecosystems.
  - *How does the biodiversity impact the health of an ecosystem and its individuals?*
  - *What would be the most likely reason for the grasslands having grasses rather than trees as their dominant plant species?*
- Describe how net primary production varies among biomes.
  - *Explain why the net primary productivity in the Great Barrier Reef will be different than Artic Circle (tundra biome).*
- Calculate and predict biodiversity indices.
  - *Predict what the biodiversity will be like on the MSMHS campus.*
- Describe the ecosystem services provided by biodiversity.

> o *You are a Key West city official that is trying to improve biodiversity around the island. Describe the steps that can be taken to improve the biodiversity.*
> - Evaluate the potential solutions to the problem of anthropocentric causes of biodiversity loss.
>   - o An area of land has been cleared to develop a Target store, explain the various steps should have Target officials taken to prevent biodiversity loss?

Instructional Strategies/Differentiated Instruction

- **HLP:** Academically Productive Talk
- **HLP:** Writing to Learn (TWPS)
- **HLP:** Effective Feedback
- Instructional Strategies/Differentiation
- Daily Warm Up Activities
- Power Point Lecture with note-taking
- Flexible grouping
- Foldables
- Exit slips
- Graphic Organizers
- Creating authentic connections for students
- Rephrasing and restatement of information and concepts
- Student use of headphones
- Independent reading
- Outlining of text

Assessments

FORMATIVE ASSESSMENTS:

- Close reading and interpretation of text
- Biome jigsaw presentations
  - o MSMHS Rubric 2: Accountable Talk
- Biodiversity Index at MSMHS Lab
  - o MSMHS Rubric 4: Scientific Research
- Daily check-ins with students
- Accountable Talk Discussion
- Daily Think-Write-Pair Share (TWPS)

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- Homework
- Oral questioning
- Warm ups
- Exit slips

SUMMATIVE ASSESSMENTS:

- Quiz on EU 1 and 2
- Quiz on EU 3
- Biome jigsaw presentations
- Biodiversity Index Lab Report
- Unit Test

Unit Task

Unit Task Name: Biodiversity Index at MSMHS Lab

Description: Students will use information about biomes (EU 1 and 2) and biodiversity (EU 3) to gather species data from two areas of the MSMHS campus. They will compare the biodiversity indexes for each area and communicate their findings in a lab report.

Evaluation: MSMHS Rubric 4: Scientific Research

Unit Resources

- Textbook (Environment Science. Jay Withgott, Pearson Education, Inc. 2011.)
- MSMHS School-wide Rubrics
- Internet databases
- Graphing calculators
- Microsoft Publisher, Power Point, and/or Word
- Laptops