THS Environmental Science Curriculum Unit Coversheet

Course: Environmental Science

Grades: 10-12

Unit Name: Unit 1: Forests, Ecosystems, and the scientific method

Essential Questions/ Focus Questions

- How do you conduct a scientific survey of a forest?
- What factors make up an ecosystem?
- What are the different types of succession and what are the steps they go through in order to turn into a forest?
- How does carbon affect the environment?

Suggested Time Frame: Approximately 4 weeks

Common Core Standards Covered: N/A

Corresponding HSCS's:

E2.2 Energy in Earth Systems

- E2.2D Identify the main sources of energy to the climate system.

E2.3 Biogeochemical Cycles

- E2.3d Explain how carbon moves through the Earth system (including the geosphere) and how it may benefit (e.g., improve soils for agriculture) or harm (e.g., act as a pollutant) society.

E5.4 Climate Change

- **E5.4A** Explain the natural mechanism of the greenhouse effect including comparisons of the major greenhouse gases (water vapor, carbon dioxide, methane, nitrous oxide, and ozone).

B1.1 Scientific Inquiry (Assessed through Tree survey Letter)

- **B1.1E** Describe a reason for a given conclusion using evidence from an investigation.

L2.P3 Plants as Producers

- **L2.p3A** Explain the significance of carbon in organic molecules. *(prerequisite)*

L2.P4 Animals as Consumers

- **L2.p4A** Classify different organisms based on how they obtain energy for growth and development. *(prerequisite)*
- **L2.p4B** Explain how an organism obtains energy from the food it consumes. *(prerequisite)*

B2.1 Transformation of Matter and Energy in Cells

- **B2.1B** Compare and contrast the transformation of matter and energy during photosynthesis and respiration.

L3.p1 Populations, Communities and Ecosystems

- **L3.p1A** Provide examples of a population, community, and ecosystem. *(prerequisite)*

L3.p2 Relationships Among Organisms

- **L3.p2A** Describe common relationships among organisms and provide examples of producer/consumer, predator/ prey, or parasite/host relationship. *(prerequisite)*
- **L3.p2C** Describe the role of decomposers in the transfer of energy in an ecosystem. *(prerequisite)*

L3.p3 Factors Influencing Ecosystems

- **L3.p3B** Distinguish between the living (biotic) and nonliving (abiotic) components of an ecosystem. *(prerequisite)*
- **L3.p3D** Predict how changes in one population might affect other populations based upon their relationships in a food web. *(prerequisite)*

B3.1 Photosynthesis and Respiration

- **B3.1A** Describe how organisms acquire energy directly or indirectly from sunlight.
- **B3.1C** Recognize the equations for photosynthesis and respiration and identify the reactants and products for both.

B3.2 Ecosystems

- **B3.2C** Draw the flow of energy through an ecosystem. Predict changes in the food web when one or more organisms are removed.

B3.3 Element Recombination

- **B3.3A** Use a food web to identify and distinguish producers, consumers, and decomposers and explain the transfer of energy through trophic levels.

B3.4 Changes in Ecosystems

- **B3.4A** Describe ecosystem stability. Understand that if a disaster such as flood or fire occurs, the damaged ecosystem is likely to recover in stages of succession that eventually result in a system similar to the original one.

L5.p1 Survival and Extinction

- **L5.p1A** Define a species and give examples. *(prerequisite)*
- **L5.p1B** Define a population and identify local populations. *(prerequisite)*

Materials Used:

- Holt Environmental Science Textbook, Unit 1 ES PowerPoint, History of Michigan Forests PowerPoint, Forest PowerPoint, Guided notes, Tree Identification by Leaf book, "How Much Carbon in a tree Worksheet", Forest Survey Activity, Recreation Data Sheet, Wildlife observation sheet, forest health WS, Ecosystem Worksheet, Succession Activity

Major Themes/Concepts

- Factors affecting an Ecosystem
- Carbon and the Forest
- Analyzing a Forest for different things
- Forest Management

Assessments

- Forest Survey Letter/Poster, Forest Quiz, Forest and Ecosystem Test

THS Environmental Science Curriculum Unit Coversheet

Course: Environmental Science

Grades: 10-12

Unit Name: Unit 2: The scientific method

Essential Questions/ Focus Questions

- Why is the scientific method important in science?
- How do you put together an IMRaD Presentation?
- How do you set up a good experiment?

Suggested Time Frame: Approximately 2 weeks

Common Core Standards Covered: N/A

Corresponding HSCS's:

E1.1 Scientific Inquiry

- E1.1 Scientific Inquiry: Science is a way of understanding nature. Scientific research may begin by generating new scientific questions that can be answered through replicable scientific investigations that are logically developed and conducted systematically. Scientific conclusions and explanations result from careful analysis of empirical evidence and the use of logical reasoning. Some questions in science are addressed through indirect rather than direct observation, evaluating the consistency of new evidence with results predicted by models of natural processes. Results from investigations are communicated in reports that are scrutinized through a peer review process.
- **B1.1A** Generate new questions that can be investigated in the laboratory or field. (*Assessed through project*)
- **B1.1E** Describe a reason for a given conclusion using evidence from an investigation. (*Assessed through project)*
- **B1.1h** Design and conduct a systematic scientific investigation that tests a hypothesis. Draw conclusions from data presented in charts or tables. (*Assessed through project)*

B1.2 Scientific Reflection and social implications

- **B1.2A** Critique whether or not specific questions can be answered through scientific investigations. (*Assessed through project)*

Materials Used:

- Outside Forest, Forest Project Rubric, Inquiry Tubes with worksheet, Netbooks

Major Themes/Concepts

- Scientific Method in IMRaD format

Assessments

- Project Presentation

THS Environmental Science Curriculum Unit Coversheet

Course: Environmental Science

Grades: 10-12

Unit Name: Unit 3: Water Resources, treatment, and more

Essential Questions/ Focus Questions

- What is your Water Footprint?
- How is your water cleaned?
- What factors determine water quality?
- Why is water so important to us?

Suggested Time Frame: Approximately 3 1/2 weeks

Common Core Standards Covered: N/A

Corresponding HSCS's:

E4.p1 Water Cycle

- **E4.p1A** Describe that the water cycle includes evaporation, transpiration, condensation, precipitation, infiltration, surface runoff, groundwater, and absorption. *(prerequisite)*

- **E4.p1B** Analyze the flow of water between the elements of a watershed, including surface features (lakes, streams, rivers, wetlands) and groundwater. *(prerequisite)*

E4.1 Hydrology

- **E4.1A** Compare and contrast surface water systems (lakes, rivers, streams, wetlands) and groundwater in regard to their relative sizes as Earth's freshwater reservoirs and the dynamics of water movement (inputs and outputs, residence times, sustainability).
- **E4.1B** Explain the features and processes of groundwater systems and how the sustainability of North American aquifers has changed in recent history (e.g., the past 100 years) qualitatively using the concepts of recharge, residence time, inputs, and outputs.
- **E4.1C** Explain how water quality in both groundwater and surface systems is impacted by land use decisions.

Materials used:

- Chapter 11 powerpoint, Chapter 11 guided notes, watershed activity, aquifer activity, water quality lab, water filtration lab, case studies

Major Themes/Concepts:

- Water as a resource
- The process of filtering water

Assessments:

- water quality quiz, Chapter 11 test