# 01 UNIT 1 -The Living World Ecosystems, Biodiversity and Populations

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

## Standards

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| | Stability and Change |
| | Analyzing and Interpreting Data |
| | Cause and Effect |
| | Constructing Explanations and Designing Solutions |
| | Developing and Using Models |
| | Energy and Matter |
| HS-LS2 | Ecosystems: Interactions, Energy, and Dynamics |
| HS-LS3-3 | Apply concepts of statistics and probability to explain the variation and distribution of expressed traits in a population. |
| HS-LS4 | Biological Evolution: Unity and Diversity |
| HS-LS4-4 | Construct an explanation based on evidence for how natural selection leads to adaptation of populations. |
| LS4.D | Biodiversity and Humans |
| HS-ESS2 | Earth's 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). |
| | Asking Questions and Defining Problems |

## Enduring Understandings

1. Environmental science uses the process of science to monitor the impacts humans have on the environment.
2. The environment is made of both abiotic and biotic components which interact with each other.
3. Matter and energy both flow through ecosystems.
4. Unequal heating leads to different climate patterns on our globe.
5. Similar climates support similar types of animals and plants in different biomes.
6. Biodiversity is caused by evolution and can be studied at many levels of organization
7. Environmental change can alter the distribution of species.

8. Populations can be described based on survivorship patterns, life history strategies and demographics
9. The carrying capacity of a population is controlled by environmental pressures
10. Populations can change in response to human and natural disturbance.

## Essential Questions

1. How are matter and energy transformed in ecosystems?
2. In what ways are the systems on our planet interconnected?
3. What determines the distribution of biomes on our planet?
4. How can we measure/describe biodiversity?
5. Why is biodiversity essential to stability and survival on our planet?
6. How do populations respond to change in the environment?
7. What are the different growth patterns that can be used to describe populations?
8. How does the environment affect the growth of a population?

## Knowledge and Skills

Knowledge:

1. Students will know how to define a system and explain the inputs and outputs of the system. They will be able to analyze a problem using a systems approach and use inputs and outputs to identify positive and negative feedback loops.

2. Students will know how Environmental Science uses inquiry to investigate the role of humans and changes in the environment. The scientific process is a cycle of questioning and experimentation.

3. Students will know how energy and matter move through ecosystems via biogeochemical cycles and food webs. Biogeochemical cycles covered will include: carbon, nitrogen, water, sulfur, and phosphorus.

4. Students will know that matter and energy are conserved. Matter and energy cannot be destroyed, only transformed. Students will apply this to understanding both the biogeochemical cycles and the 10% rule.

5. Students will know why there is uneven heating on our planet and its effect on climate patterns. Uneven heating leads to both atmospheric and oceanic convection currents.

6. Students will know how the structure of the atmosphere and ocean help move heat and precipitation around the globe. The layers of the atmosphere and ocean are defined by their density and changes in density control the movement of these layers.

6. Students will know the similarities and differences for the terrestrial and aquatic biomes on our planet. Climate differences control what plants and animals can be found in each biome.

7. Students will know how to describe and measure biodiversity. Biodiversity will be described at the genetic, species, and population level.

8. Students will know the different mechanisms that drive evolution and result in biodiversity. Students will know about natural and artificial selection.

10. Students will know how to count and describe populations.

11. Students will know changes in the environment affect population growth and changes in populations. Disturbance can be both natural and human driven, but populations respond to both disturbances in measurable ways.

Skills:

1. Design and interpret experiments.
2. Interpret diagrams such as trophic pyramids, biogeochemical cycles, population growth pattern graphs and pyramids.
3. Construct and interpret graphs using data like population growth.
4. Collect and analyze data in laboratory experiments.
5. Apply scientific reasoning to develop an argument based on evidence.

## Modifications

https://docs.google.com/document/d/1ODqaPP69YkcFiyG72fIT8XsUIe3K1VSG7nxuc4CpCec/edit?usp=sharing

## Assessments

https://docs.google.com/document/d/1wR7bQF-8AQoRrt0g4C3hKja0yjwDjC9_BiAmONWbTcI/edit?usp=sharing