



Unit 3 Bend 1 Ecosystems

High School Biology

Unit Length and Description:

15 Instructional Weeks

- **Bend 1:** Students will investigate the case of the rapid increase and decline of the buffalo population in the Serengeti. Students will be motivated to ask questions and develop initial hypotheses for what could have changed in the ecosystem to create such drastic population changes. Students will then analyze data from many populations of organisms in the Serengeti to figure out how population changes are the results of predator-prey relations, migrations, climate, human impact, and how disease eradication in the 1960s led to the major changes we see in the Serengeti today. Students will explore the changing buffalo populations and their effects on the Serengeti ecosystem.
- **Bend 2:** Students will evaluate the claim that trees store carbon and can reduce climate change impact. Students figure out how photosynthesis and cellular respiration are key mechanisms to explaining the role of trees in climate mitigation. Finally, students will explore and compare climate change mitigation solutions.

Science Standards:

- HS-LS1-2** Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.
- HS-LS1-3** Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis in living organisms.
- HS-LS1-4** Use a model to illustrate the role of the cell cycle and differentiation in producing and maintaining complex organisms.
- HS-LS1-5** Use a model to illustrate how photosynthesis transforms light energy into stored chemical energy.
- HS-LS1-6** Construct and revise an explanation based on evidence for how carbon, hydrogen, and oxygen from sugar molecules may combine with other elements to form amino acids and/or other large carbon-based molecules.
- HS-LS1-7** Use a model to illustrate that cellular respiration is a chemical process whereby the bonds of food molecules and oxygen molecules are broken and the bonds in new compounds are formed, resulting in a net transfer of energy.
- HS-LS2-4** Use mathematical representations to support claims for the cycling of matter and flow of energy among organisms in an ecosystem.

HS-LS2-1	Use mathematical and/or computational representations to support explanations of factors that affect carrying capacity, biodiversity and populations of ecosystems at different scales.
HS-LS2-4	Use mathematical representations to support claims for the cycling of matter and flow of energy among organisms in an ecosystem.
HS-LS2-6	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.

Enduring Understandings- Unit Anchor Phenomenon:	Essential Questions- Reflective Summaries:
<p>Bend 1: Since the 1960s, populations of herbivores in the Serengeti have fluctuated. The populations experienced a rapid increase followed by a rapid decline.</p> <p>Bend 2: Trees can mitigate climate change.</p>	<p>Bend 1:</p> <ul style="list-style-type: none"> • Describe factors that affect carrying capacity, biodiversity, and populations in Serengeti at different scales. • Make a claim supported by evidence of cycling of matter and flow of energy among organisms in Serengeti. • Describe how complex interactions in ecosystems maintain relatively consistent numbers and types of organisms in stable conditions, but changing conditions may result in a new ecosystem. <p>Bend 2:</p> <ul style="list-style-type: none"> • Use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms. • Make a claim supported by evidence that feedback mechanisms maintain homeostasis in organisms. • Use a model to illustrate the role of the cell cycle and differentiation in producing and maintaining complex organisms. • Use a model to explain how photosynthesis transforms light energy into stored chemical energy. • How do carbon, hydrogen, and oxygen from sugar molecules combine with other elements to form amino acids and/or other large carbon-based molecules? • Use a model to illustrate that cellular respiration is a chemical process whereby the bonds of food molecules and oxygen molecules are broken and the bonds in new compounds are formed, resulting in a net transfer of energy. • Describe how complex interactions in ecosystems maintain relatively consistent numbers and types of

organisms in stable conditions, but changing conditions may result in a new ecosystem.

- Describe how stress may reduce the impacts of human activities on the environment and biodiversity.