2021 Unit 01: Living World Ecosystems

Content Area: **Science**
Course(s): **Advanced Placement Environmental Science**
Time Period: **September**
Length: **15 periods**
Status: **Published**

Enduring Understandings:

- Ecosystems are the result of biotic and abiotic interactions.
- Energy can be converted from one form to another

Essential Questions:

- How does energy change forms?
- How old is the water you drink?

Lesson Titles:

- Aquatic Biomes
- Energy Flow and the 10% Rule
- Food Chains and Food Webs
- Introduction to Ecosystems
- Primary Productivity
- Terrestrial Biomes
- The Carbon Cycle
- The Hydrologic (Water) Cycle
- The Nitrogen Cycle
- The Phosphorus Cycle
- Trophic Levels

Career Readiness, Life Literacies & Key Skills

WRK.K-12.P.1	Act as a responsible and contributing community members and employee.
WRK.K-12.P.4	Demonstrate creativity and innovation.
WRK.K-12.P.5	Utilize critical thinking to make sense of problems and persevere in solving them.
WRK.K-12.P.8	Use technology to enhance productivity increase collaboration and communicate effectively.
WRK.K-12.P.9	Work productively in teams while using cultural/global competence.

Inter-Disciplinary Connections:

LA.RH.9-10.7	Integrate quantitative or technical analysis (e.g., charts, research data) with qualitative analysis in print or digital text, to analyze information presented via different mediums.
LA.RH.9-10.8	Assess the extent to which the reasoning and evidence in a text support the author's claims.
LA.RH.9-10.9	Compare and contrast treatments of the same topic, or of various perspectives, in several primary and secondary sources; analyze how they relate in terms of themes and significant historical concepts.
LA.RST.9-10.7	Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words.
LA.RST.9-10.8	Determine if the reasoning and evidence in a text support the author's claim or a recommendation for solving a scientific or technical problem.
LA.RST.9-10.9	Compare and contrast findings presented in a text to those from other sources (including their own experiments), noting when the findings support or contradict previous explanations or accounts.
LA.WHST.9-10.1.A	Introduce precise claim(s), distinguish the claim(s) from alternate or opposing claims, and create an organization that establishes clear relationships among the claim(s), counterclaims, reasons, and evidence.
LA.WHST.9-10.1.B	Develop claim(s) and counterclaims using sound reasoning, supplying data and evidence for each while pointing out the strengths and limitations of both claim(s) and counterclaims in a discipline-appropriate form and in a manner that anticipates the audience's knowledge level and concerns.
LA.WHST.9-10.1.C	Use transitions (e.g., words, phrases, clauses) to link the major sections of the text, create cohesion, and clarify the relationships between claim(s) and reasons, between reasons and evidence, and between claim(s) and counterclaims.
LA.WHST.9-10.1.D	Establish and maintain a style and tone appropriate to the audience and purpose (e.g., formal and objective for academic writing) while attending to the norms and conventions of the discipline in which they are writing.
LA.WHST.9-10.1.E	Provide a concluding paragraph or section that supports the argument presented.
	Randomization has two important uses in drawing statistical conclusions. First, collecting data from a random sample of a population makes it possible to draw valid conclusions about the whole population, taking variability into account. Second, randomly assigning individuals to different treatments allows a fair comparison of the effectiveness of those treatments. A statistically significant outcome is one that is unlikely to be due to chance alone, and this can be evaluated only under the condition of randomness. The conditions under which data are collected are important in drawing conclusions from the data; in critically reviewing uses of statistics in public media and other reports, it is important to consider the study design, how the data were gathered, and the analyses employed as well as the data summaries and the conclusions drawn.
	Data are gathered, displayed, summarized, examined, and interpreted to discover patterns and deviations from patterns. Quantitative data can be described in terms of key characteristics: measures of shape, center, and spread. The shape of a data distribution might be described as symmetric, skewed, flat, or bell shaped, and it might be summarized by a statistic measuring center (such as mean or median) and a statistic measuring spread (such as standard deviation or interquartile range). Different distributions can be compared numerically using these statistics or compared visually using plots. Knowledge of center and spread are not enough to describe a distribution. Which statistics to compare, which plots to use, and what the results of a comparison might mean, depend on the question to be investigated and the real-life actions to be taken.
	Decisions or predictions are often based on data—numbers in context. These decisions or predictions would be easy if the data always sent a clear message, but the message is

often obscured by variability. Statistics provides tools for describing variability in data and for making informed decisions that take it into account.

Random processes can be described mathematically by using a probability model: a list or description of the possible outcomes (the sample space), each of which is assigned a probability. In situations such as flipping a coin, rolling a number cube, or drawing a card, it might be reasonable to assume various outcomes are equally likely. In a probability model, sample points represent outcomes and combine to make up events; probabilities of events can be computed by applying the Addition and Multiplication Rules. Interpreting these probabilities relies on an understanding of independence and conditional probability, which can be approached through the analysis of two-way tables.

Connections to Functions and Modeling.

Instructional Strategies, Learning Activities, and Levels of Blooms/DOK:

- Debate: Ask students to develop a strategy to reduce human impact on the nitrogen cycle. Have them develop an argument to support their strategy as a viable solution that shows their understanding of the processes involved in the nitrogen cycle. Students can then debate the merits of the strategy they developed.
- Graph and Switch Have students generate graphs showing net primary production of the world's common ecosystems. Have some students graph productivity measures as kilocalories (kcal) per unit area and others graph total kcal. Then have them discuss and explain why the rankings are different. They should focus on the open ocean to develop their explanation.
- Idea Spinner: Draw an arrow leaving fossil fuels. Where does the carbon go? What is the process that moves it from one sink to another? What is the new form of carbon?

Modifications

Benchmark Assessments

Skills-based assessment

Reading response

Writing prompt

Lab practical

Formative Assessment:

- Anticipatory Set
- Carbon Cycling Activity
- Closure

- Cycles Quiz
- Ecosystems Quiz
- Warm-Up

Summative Assessment:

- Alternate Assessment
- Marking Period Assessment
- Unit 1 Ecosystems Benchmark

Alternative Assessments

Performance tasks

Project-based assignments

Problem-based assignments

Presentations

Reflective pieces

Concept maps

Case-based scenarios

Portfolios

Resources & Materials:

- AP Environmental College Board Site
- Carolina Biological Lab Kit
- Cengage Site
- Exploring Environmental Science for AP® Updated
- Tragedy of the Commons Game