Biodiversity

Content Area: **Science**
Course(s): **CP Environmental Science**
Time Period: **Marking Period 1**
Length: **3-4 weeks**
Status: **Published**

Course Pacing Guide

Unit	Quarter	# weeks
Biodiversity	1	4
Natural Resources	1	5
Ecology	2	6
Pollution	2	4
Energy Resources	3	6
Agriculture	3	5
Human health and the Environment	4	4
Climate Change	4	5

Unit Overview

Biodiversity represents the greatest indicator of environmental health. Despite this, a major disconnect exists regaridng human engagement and study of the natural world. There are over 2 million named species, but many taxa are imperiled and anthropogenic species extinction in the 21st century is accelerating. There are various factors that are contributing to species imperilment and pre-mature extinction. These factors are summarized in the acronym HIPPO C. Humans need to realize the many benefits and services provided by biodiversity which includes resource-based uses, aesthetic and spiritual benefits and the very practical ecological services.

In regards to what can be done to reverse the biodiversity crisis, referenced as the 6th Extinction, the main two actions are to protect/ restore habitat and address climate change.

Enduring Understandings

1. Biodiversity exists at various levels - species, genetic and ecological.

2. There are essential ecological services provided by biodiversity.

3. Th state of ecosystems can be determined by assessing the health of biodiversity.

4. The main threats to global biodiversity are anthropogenic.

5. For the health of people and planet we must address biodiversity declines.

Essential Questions

1. How many species are there in the world and to what groups to they belong?

2. Why is biodiversity essential to global ecology and human health?

3. What are the main threats to global biodiversity?

4. What are examples of ecological services?

5. How is biodiversity used to assess environmental health?

6. What are the key actions that need to be taken to reduce the rate extinction and species imperilment?

7. How can citizens take action to support biodiversity?

New Jersey Student Learning Standards (No CCS)

9-12.HS-ESS3	Earth and Human Activity
9-12.HS-ESS3-6.5	Using Mathematics and Computational Thinking
9-12.HS-ESS3-4.7	Stability and change.
9-12.HS-ESS2-2.7	Stability and change.
9-12.HS-ESS3-3.7	Stability and change.
9-12.HS-ESS2-2.ESS2.A.1	Earth's systems, being dynamic and interacting, cause feedback effects that can increase or decrease the original changes.
9-12.HS-ESS2-7.ESS2.E	Biogeology
9-12.HS-ESS3-1.ESS3.A	Natural Resources
9-12.HS-ESS3-3.ESS3.C	Human Impacts on Earth Systems
9-12.HS-ESS3-4.ESS3.C	Human Impacts on Earth Systems
9-12.HS-ESS3-6.ESS3.D	Global Climate Change
9-12.HS-ESS3-4.ETS1.B	Developing Possible Solutions

9-12.HS-LS4-3	Apply concepts of statistics and probability to support explanations that organisms with an advantageous heritable trait tend to increase in proportion to organisms lacking this trait.
9-12.HS-LS1-2	Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.
9-12.HS-LS4-6	Create or revise a simulation to test a solution to mitigate adverse impacts of human activity on biodiversity.
9-12.HS-LS4-6.2	Cause and effect: Mechanism and explanation.
9-12.HS-LS2-8.2	Cause and effect: Mechanism and explanation.
9-12.HS-LS4-4.2	Cause and effect: Mechanism and explanation.
9-12.HS-LS4-2.2.1	students understand that empirical evidence is required to differentiate between cause and correlation and to make claims about specific causes and effects. They suggest cause and effect relationships to explain and predict behaviors in complex natural and designed systems. They also propose causal relationships by examining what is known about smaller scale mechanisms within the system. They recognize changes in systems may have various causes that may not have equal effects.
9-12.HS-LS1-3.3.1	Plan and conduct an investigation individually and collaboratively to produce data to serve as the basis for evidence, and in the design: decide on types, how much, and accuracy of data needed to produce reliable measurements and consider limitations on the precision of the data (e.g., number of trials, cost, risk, time), and refine the design accordingly.
9-12.HS-LS4-3.4.1	Apply concepts of statistics and probability (including determining function fits to data, slope, intercept, and correlation coefficient for linear fits) to scientific and engineering questions and problems, using digital tools when feasible.
9-12.HS-LS4-6.5.1	Create or revise a simulation of a phenomenon, designed device, process, or system.
9-12.HS-LS1-1.6.1	Construct an explanation based on valid and reliable evidence obtained from a variety of sources (including students' own investigations, models, theories, simulations, peer review) and the assumption that theories and laws that describe the natural world operate today as they did in the past and will continue to do so in the future.
9-12.HS-LS1-1.6.1	students investigate systems by examining the properties of different materials, the structures of different components, and their interconnections to reveal the system's function and/or solve a problem. They infer the functions and properties of natural and designed objects and systems from their overall structure, the way their components are shaped and used, and the molecular substructures of their various materials.
9-12.HS-LS1-2.LS1.A.1	Multicellular organisms have a hierarchical structural organization, in which any one system is made up of numerous parts and is itself a component of the next level.
9-12.HS-LS1-3.LS1.A.1	Feedback mechanisms maintain a living system's internal conditions within certain limits and mediate behaviors, allowing it to remain alive and functional even as external conditions change within some range. Feedback mechanisms can encourage (through positive feedback) or discourage (negative feedback) what is going on inside the living system.
9-12.HS-LS2-1.LS2.A	Interdependent Relationships in Ecosystems
9-12.HS-LS2-2.LS2.A	Interdependent Relationships in Ecosystems
9-12.HS-LS2-3.LS2.B	Cycles of Matter and Energy Transfer in Ecosystems
9-12.HS-LS2-2.LS2.C	Ecosystem Dynamics, Functioning, and Resilience
9-12.HS-LS2-7.LS2.C	Ecosystem Dynamics, Functioning, and Resilience
9-12.HS-LS2-6.LS2.C	Ecosystem Dynamics, Functioning, and Resilience
9-12.HS-LS2-8.LS2.D	Social Interactions and Group Behavior
9-12.HS-LS4-2.LS4.B	Natural Selection
9-12.HS-LS4-6.LS4.D	Biodiversity and Humans

9-12.HS-LS2-7.LS4.D	Biodiversity and Humans
9-12.HS-LS4-6.ETS1.B	Developing Possible Solutions
9-12.HS-LS2-7.ETS1.B	Developing Possible Solutions

Amistad Integration

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LA.RI.11-12.10b	By the end of grade 12, read and comprehend literary nonfiction at grade level text-complexity or above.
SEL.PK-12.1.2	Recognize the impact of one's feelings and thoughts on one's own behavior

Holocaust/Genocide Education

Interdisciplinary Connections

List at least one specific standard

No general statements

LA.RL.11-12.1	Cite strong and thorough textual evidence and make relevant connections to support analysis of what the text says explicitly as well as inferences drawn from the text, including determining where the text leaves matters uncertain.
MA.S-ID.A.1	Represent data with plots on the real number line (dot plots, histograms, and box plots).
LA.RL.11-12.2	Determine two or more themes or central ideas of a text and analyze their development over the course of the text, including how they interact and build on one another to produce a complex account; provide an objective summary of the text.
MA.S-ID.B.6	Represent data on two quantitative variables on a scatter plot, and describe how the variables are related.
LA.RL.11-12.9	Demonstrate knowledge of and reflect on (e.g., practical knowledge, historical/cultural context, and background knowledge) eighteenth-, nineteenth- and early twentieth-century foundational works of literature, including how two or more texts from the same period treat similar themes or topics.
MA.S-ID.C.9	Distinguish between correlation and causation.
MA.S-IC.A.1	Understand statistics as a process for making inferences about population parameters based on a random sample from that population.
LA.RI.11-12.2	Determine two or more central ideas of a text, and analyze their development and how they interact to provide a complex analysis; provide an objective summary of the text.
LA.RI.11-12.3	Analyze a complex set of ideas or sequence of events and explain how specific individuals, ideas, or events interact and develop over the course of the text.
MA.S-IC.B.3	Recognize the purposes of and differences among sample surveys, experiments, and observational studies; explain how randomization relates to each.
MA.S-IC.B.5	Use data from a randomized experiment to compare two treatments; use simulations to

	decide if differences between parameters are significant.
LA.RI.11-12.7	Integrate and evaluate multiple sources of information presented in different media or formats (e.g., visually, quantitatively) as well as in words in order to address a question or solve a problem.
MA.S-IC.B.6	Evaluate reports based on data.

Technology Standards

List specific standards that are relevant
No general statements

TECH.8.1.12.A.1	Create a personal digital portfolio which reflects personal and academic interests, achievements, and career aspirations by using a variety of digital tools and resources.
TECH.8.1.12.A.4	Construct a spreadsheet workbook with multiple worksheets, rename tabs to reflect the data on the worksheet, and use mathematical or logical functions, charts and data from all worksheets to convey the results.
TECH.8.1.12.A.5	Create a report from a relational database consisting of at least two tables and describe the process, and explain the report results.
TECH.8.1.12.C.1	Develop an innovative solution to a real world problem or issue in collaboration with peers and experts, and present ideas for feedback through social media or in an online community.
TECH.8.1.12.C.CS1	Interact, collaborate, and publish with peers, experts, or others by employing a variety of digital environments and media.
TECH.8.1.12.C.CS3	Develop cultural understanding and global awareness by engaging with learners of other cultures.
TECH.8.1.12.D.5	Analyze the capabilities and limitations of current and emerging technology resources and assess their potential to address personal, social, lifelong learning, and career needs.
TECH.8.1.12.D.CS2	Demonstrate personal responsibility for lifelong learning.
TECH.8.1.12.E.CS3	Evaluate and select information sources and digital tools based on the appropriateness for specific tasks.

21st Century Themes/Careers

List specific standards that are relevant
No general statements

HPE.2.2.8.A.2	Demonstrate the use of refusal, negotiation, and assertiveness skills when responding to peer pressure, disagreements, or conflicts.
CAEP.9.2.12.C.3	Identify transferable career skills and design alternate career plans.
CAEP.9.2.12.C.4	Analyze how economic conditions and societal changes influence employment trends and future education.
CAEP.9.2.12.C.5	Research career opportunities in the United States and abroad that require knowledge of world languages and diverse cultures.

Financial Literacy Integration

Instructional Strategies & Learning Activities

Lab Report

Biodiversity Inventories

Citizen Science Studies

Drawing and Creating Field Guides

Community Education

Socratic Presentation and Lecture

Case Studies

Million Dollar Species Project

Differentiated Instruction

- Curriculum Map
- Inquiry/Problem-Based Learning
- Learning preferences integration (visual, auditory, kinesthetic)
- Sentence & Discussion Stems
- Tiered Learning Targets
- Relationship-Building & Team-Building
- Self-Directed Learning
- Debate
- Mock Trial
- Student Data Inventories
- Mastery Learning (feedback toward goal)
- Goal-Setting & Learning Contracts
- Game-Based Learning
- Grouping
- Socratic Seminar
- Rubrics
- Learning Through Workstations
- Concept Attainment
- Mentoring
- Assessment Design & Backwards Planning

Formative Assessments

Species Identification assessments

Identification of ecological servcies quiz

self assessment - case studies and lab data sample sets

lab and field investigations

Summative Assessment

Unit and Topic Exams - Biodiversity and Endangered Species

Lab Notebook - Reports on Pitfall traps and invertebrate diversity, freshwater mussel inventory, shorebird studies - citizen science, horseshoe crab rescues on Delaware Bayshores, Tree Species Inventories, Biodiversity Hotspot Rankings

Benchmark Assessments

As Summative

Alternate Assessments

Endangered Species Profile and Promotion

Million Dollar Species Project - students identify a state listed species and create a promotional poster to educate about the species and develop[

Resources & Technology

TECH.8.1.12.B.CS1	Apply existing knowledge to generate new ideas, products, or processes.
TECH.8.1.12.B.CS2	Create original works as a means of personal or group expression.
TECH.8.1.12.C.1	Develop an innovative solution to a real world problem or issue in collaboration with peers

	and experts, and present ideas for feedback through social media or in an online community.
TECH.8.1.12.C.CS3	Develop cultural understanding and global awareness by engaging with learners of other cultures.
TECH.8.1.12.D.CS1	Advocate and practice safe, legal, and responsible use of information and technology.
TECH.8.1.12.D.CS2	Demonstrate personal responsibility for lifelong learning.
TECH.8.1.12.E.CS2	Locate, organize, analyze, evaluate, synthesize, and ethically use information from a variety of sources and media.
TECH.8.1.12.E.CS4	Process data and report results.
TECH.8.1.12.F.CS4	Use multiple processes and diverse perspectives to explore alternative solutions.

BOE Approved Texts

Miller and Spoolman - Environmental Science - Sustaining your World

E.O. Wilson - Half Earth

Closure

Such as:

- Have students write down three quiz questions (to ask at the beginning of the next class).
- Students write questions about the lesson on cards, using question stems framed around Bloom's Taxonomy. Have students exchange cards and answer the question they have acquired.
- Have students dramatize a real-life application of a skill.Ask a question. Give students ten seconds to confer with peers before you call on a random student to answer. Repeat.
- Have kids orally describe a concept, procedure, or skill in terms so simple that a child in first grade would get it.
- Direct kids to raise their hands if they can answer your questions.
- Have kids create a cheat sheet of information that would be useful for a quiz on the day's topic.
- Kids write notes to peers describing what they learned from them during class discussions.

ELL

Such as:

- Alternate Responses
- Advance Notes
- Extended Time
- Teacher Modeling
- Simplified Written and Verbal Instructions

- Frequent Breaks
- E-Dictionaires
- Google Translate

Special Education

List is not inclusive but may include examples such as:

- Shorten assignments to focus on mastery of key concepts.
- Shorten spelling tests to focus on mastering the most functional words.
- Substitute alternatives for written assignments (clay models, posters, panoramas, collections, etc.)
- Specify and list exactly what the student will need to learn to pass.
- Evaluate the classroom structure against the student's needs (flexible structure, firm limits, etc.).
- Keep workspaces clear of unrelated materials.
- Keep the classroom quiet during intense learning times.
- Reduce visual distractions in the classroom (mobiles, etc.).
- Provide a computer for written work.
- Seat the student close to the teacher or a positive role model.
- Use a study carrel. (Provide extras so that the student is not singled out.)
- Provide an unobstructed view of the chalkboard, teacher, movie screen, etc.
- Keep extra supplies of classroom materials (pencils, books) on hand.
- Maintain adequate space between desks.
- Give directions in small steps and in as few words as possible.
- Number and sequence the steps in a task.
- Have student repeat the directions for a task.
- Provide visual aids.
- Go over directions orally.
- Provide a vocabulary list with definitions.
- Permit as much time as needed to finish tests.
- Allow tests to be taken in a room with few distractions (e.g., the library).
- Have test materials read to the student, and allow oral responses.
- Divide tests into small sections of similar questions or problems.
- Allow the student to complete an independent project as an alternative test.
- Give progress reports instead of grades.
- Grade spelling separately from content.
- Allow take-home or open-book tests.
- Show a model of the end product of directions (e.g., a completed math problem or finished quiz).
- Stand near the student when giving directions or presenting a lesson.
- Mark the correct answers rather than the incorrect ones.
- Permit a student to rework missed problems for a better grade.
- Average grades out when assignments are reworked, or grade on corrected work.
- Use a pass-fail or an alternative grading system when the student is assessed on his or her own growth.

504

Examples of accommodations in 504 plans include but are not limited to:

- preferential seating
- extended time on tests and assignments
- reduced homework or classwork
- verbal, visual, or technology aids
- modified textbooks or audio-video materials
- behavior management support
- adjusted class schedules or grading
- verbal testing
- excused lateness, absence, or missed classwork
- pre-approved nurse's office visits and accompaniment to visits
- occupational or physical therapy

At Risk

Examples may include:

- Use of mnemonics
- Have student restate information
- Provision of notes or outlines
- Concrete examples
- Use of a study carrel
- Assistance in maintaining uncluttered space
- Weekly home-school communication tools (notebook, daily log, phone calls or email messages)
- Peer or scribe note-taking
- Lab and math sheets with highlighted instructions
- Graph paper to assist in organizing or lining up math problems
- Use of manipulatives
- No penalty for spelling errors or sloppy handwriting
- Follow a routine/schedule
- Teach time management skills
- Verbal and visual cues regarding directions and staying on task
- Adjusted assignment timelines
- Visual daily schedule
- Immediate feedback
- Work-in-progress check
- Pace long-term projects
- Preview test procedures

- Film or video supplements in place of reading text
- Pass/no pass option
- Cue/model expected behavior
- Use de-escalating strategies
- Use peer supports and mentoring
- Have parent sign homework/behavior chart
- Chart progress and maintain data

Gifted and Talented

Focus on effort and practice

Offer the Most Difficult First

Offer choice

Speak to Student Interests

Allow G/T students to work together

Encourage risk taking