Human health and the Environment

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

Course Pacing Guide

Unit	MP/Trimester	Weeks
Biodiversity	1	4
Natural Resources	1	5
Ecology	2	6
Pollution	2	4
Energy	3	6
Agriculture	3	5
Human Health and the Environment	4	4
Climate Change	4	5

Unit Overview

The study of Environmental Science focuses on maintaining a healthy environment specific to human health. As we identify the various activities that compromise the physical and biological components of ecosystems, our recommendations and remediations are established with emphasis on protecting human health. Whether energy use, waste management and pollution, agriculture, natural resource access or climate change, human health has been, and continues to be, compromised by our own actions. Biodiversity has been our greatest measure of ecological health and, by extension, our own well-being. Thus if we wish to protect huamn health and design systems to reduce impact, we must do so while also focusing on biodiversity protection.

Enduring Understandings

Human health is tied to environmental quaility and the state of biodiversity.

We require intact ecological services to support human health and welfare.

Huamn activities have compromised natural systems and thus human health.

We have various ways to assess threats to the environment which can affect human health.

The production of waste in our communities and industries represents a measure of human health compromise.

Integrated waste managemnt is the modern approach to environmentally sound management of our waste.

The EPA is the federal agency that monitors and enforces the laws associated with human health and the environment.

Right to Know laws offer citizens the opportunity to evaluate threats from the environment on human health

Essential Questions

How is human health tied to the state of the environment?

What are the major threats from environmental issues to human health?

How do the properties of a pollutant inform us on human health risk?

What are the ways we monitor and document huamn health risk and the environment?

What is Right to Know and what are examples of our access to environmental quality as it affects human health?

What is the agency and the major laws that address human health concerns regarding environmental quality?

What are the most important strategies one can employ to protect both environmental and human health?

New Jersey Student Learning Standards (No CCS)

9-12.HS-ESS3-1	Construct an explanation based on evidence for how the availability of natural resources, occurrence of natural hazards, and changes in climate have influenced human activity.
9-12.HS-ESS3-2	Evaluate competing design solutions for developing, managing, and utilizing energy and mineral resources based on cost-benefit ratios.
9-12.HS-ESS3-5	Analyze geoscience data and the results from global climate models to make an evidence-based forecast of the current rate of global or regional climate change and associated future impacts to Earth's systems.
9-12.HS-ESS3-1.2.1	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-ESS2-5.3.1	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-ESS3-6.4.1	When investigating or describing a system, the boundaries and initial conditions of the system need to be defined and their inputs and outputs analyzed and described using models.
9-12.HS-ESS3-3.5	Using Mathematics and Computational Thinking
9-12.HS-ESS3-6.5.1	Use a computational representation of phenomena or design solutions to describe and/or support claims and/or explanations.
9-12.HS-ESS3-1.6	Constructing explanations and designing solutions in 9–12 builds on K–8 experiences and progresses to explanations and designs that are supported by multiple and independent student-generated sources of evidence consistent with scientific knowledge, principles, and theories.
9-12.HS-ESS3-1.6.1	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-ESS3-3.7	Stability and change.
9-12.HS-ESS3-2.7	Engaging in argument from evidence in 9–12 builds on K–8 experiences and progresses to using appropriate and sufficient evidence and scientific reasoning to defend and critique claims and explanations about natural and designed world(s). Arguments may also come from current scientific or historical episodes in science.
9-12.HS-ESS3-2.7.1	Evaluate competing design solutions to a real-world problem based on scientific ideas and principles, empirical evidence, and logical arguments regarding relevant factors (e.g. economic, societal, environmental, ethical considerations).
9-12.HS-ESS3-6.ESS2.D.1	Current models predict that, although future regional climate changes will be complex and varied, average global temperatures will continue to rise. The outcomes predicted by global climate models strongly depend on the amounts of human-generated greenhouse gases added to the atmosphere each year and by the ways in which these gases are absorbed by the ocean and biosphere.
9-12.HS-ESS2-6.ESS2.D.2	Changes in the atmosphere due to human activity have increased carbon dioxide concentrations and thus affect climate.
9-12.HS-ESS2-7.ESS2.E.1	The many dynamic and delicate feedbacks between the biosphere and other Earth systems cause a continual co-evolution of Earth's surface and the life that exists on it.
9-12.HS-ESS3-1.ESS3.A	Natural Resources
9-12.HS-ESS3-1.ESS3.A.1	Resource availability has guided the development of human society.
9-12.HS-ESS3-1.ESS3.B	Natural Hazards
9-12.HS-ESS3-1.ESS3.B.1	Natural hazards and other geologic events have shaped the course of human history; [they] have significantly altered the sizes of human populations and have driven human migrations.
9-12.HS-ESS3-3.ESS3.C	Human Impacts on Earth Systems
9-12.HS-ESS3-3.ESS3.C.1	The sustainability of human societies and the biodiversity that supports them requires responsible management of natural resources.
9-12.HS-ESS3-6.ESS3.D.1	Through computer simulations and other studies, important discoveries are still being made about how the ocean, the atmosphere, and the biosphere interact and are modified in response to human activities.
9-12.HS-ESS3-5.ESS3.D.1	Though the magnitudes of human impacts are greater than they have ever been, so too are human abilities to model, predict, and manage current and future impacts.

9-12.HS-ESS3-2.ETS1.B	Developing Possible Solutions
9-12.HS-ESS3-2.ETS1.B.1	When evaluating solutions, it is important to take into account a range of constraints, including cost, safety, reliability, and aesthetics, and to consider social, cultural, and environmental impacts.
9-12.HS-ESS3-4.ETS1.B.1	When evaluating solutions, it is important to take into account a range of constraints, including cost, safety, reliability, and aesthetics, and to consider social, cultural, and environmental impacts.
9-12.HS-LS2-8	Evaluate evidence for the role of group behavior on individual and species' chances to survive and reproduce.
9-12.HS-LS4-6.2.1	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-LS2-8.7	Engaging in Argument from Evidence
9-12.HS-LS2-7.7.1	students understand much of science deals with constructing explanations of how things change and how they remain stable. They quantify and model changes in systems over very short or very long periods of time. They see some changes are irreversible, and negative feedback can stabilize a system, while positive feedback can destabilize it. They recognize systems can be designed for greater or lesser stability.
9-12.HS-LS2-8.7.1	Evaluate the evidence behind currently accepted explanations to determine the merits of arguments.
9-12.HS-LS2-8.LS2.D	Social Interactions and Group Behavior
9-12.HS-LS2-7.LS4.D	Biodiversity and Humans
9-12.HS-LS4-6.LS4.D.1	Humans depend on the living world for the resources and other benefits provided by biodiversity. But human activity is also having adverse impacts on biodiversity through overpopulation, overexploitation, habitat destruction, pollution, introduction of invasive species, and climate change. Thus sustaining biodiversity so that ecosystem functioning and productivity are maintained is essential to supporting and enhancing life on Earth. Sustaining biodiversity also aids humanity by preserving landscapes of recreational or inspirational value.
9-12.HS-LS2-7.LS4.D.1	Biodiversity is increased by the formation of new species (speciation) and decreased by the loss of species (extinction).
9-12.HS-LS2-7.LS4.D.2	Humans depend on the living world for the resources and other benefits provided by biodiversity. But human activity is also having adverse impacts on biodiversity through overpopulation, overexploitation, habitat destruction, pollution, introduction of invasive species, and climate change. Thus sustaining biodiversity so that ecosystem functioning and productivity are maintained is essential to supporting and enhancing life on Earth. Sustaining biodiversity also aids humanity by preserving landscapes of recreational or inspirational value.
9-12.HS-LS4-6.ETS1.B.1	When evaluating solutions, it is important to take into account a range of constraints, including cost, safety, reliability, and aesthetics, and to consider social, cultural, and environmental impacts.
9-12.HS-LS2-7.ETS1.B.1	When evaluating solutions it is important to take into account a range of constraints including cost, safety, reliability and aesthetics and to consider social, cultural and environmental impacts.
9-12.HS-LS4-6.ETS1.B.2	Both physical models and computers can be used in various ways to aid in the engineering design process. Computers are useful for a variety of purposes, such as running simulations to test different ways of solving a problem or to see which one is most efficient or economical; and in making a persuasive presentation to a client about how a

given design will meet his or her needs.

Amistad Integration

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

LA.RI.11-12.1	Accurately cite strong and thorough textual evidence, (e.g., via discussion, written response, etc.), to support analysis of what the text says explicitly as well as inferentially, including determining where the text leaves matters uncertain.
LA.RI.11-12.9	Analyze and reflect on (e.g., practical knowledge, historical/cultural context, and background knowledge) documents of historical and literary significance for their themes, purposes and rhetorical features, including primary source documents relevant to U.S. and/or global history.
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.
PFL.9.1.12.A.8	Analyze different forms of currency and how currency is used to exchange goods and services.
SOC.9-12.1.1.1	Compare present and past events to evaluate the consequences of past decisions and to apply lessons learned.
SOC.9-12.1.1.2	Analyze how change occurs through time due to shifting values and beliefs as well as technological advancements and changes in the political and economic landscape.
SOC.9-12.1.2.1	Construct various forms of geographic representations to show the spatial patterns of physical and human phenomena.
SOC.9-12.1.2.2	Relate current events to the physical and human characteristics of places and regions.
SOC.9-12.1.3.1	Distinguish valid arguments from false arguments when interpreting current and historical events.
SOC.9-12.1.3.2	Evaluate sources for validity and credibility and to detect propaganda, censorship, and bias.
SOC.9-12.1.3.3	Gather relevant information from multiple sources representing a wide range of views (including historians and experts) while using the date, context, and corroborative value of the sources to guide the selection.
SOC.9-12.1.4.1	Take a position on a current public policy issue and support it with historical evidence, reasoning, and constitutional analysis in a written and/or oral format.

Technology Standards

List specific standards that are relevant
No general statements

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.A.CS1	Understand and use technology systems.
TECH.8.1.12.A.CS2	Select and use applications effectively and productively.
TECH.8.1.12.B.2	Apply previous content knowledge by creating and piloting a digital learning game or tutorial.
TECH.8.1.12.B.CS1	Apply existing knowledge to generate new ideas, products, or processes.
TECH.8.1.12.C.CS4	Contribute to project teams to produce original works or solve problems.

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.

Financial Literacy Integration

Instructional Strategies & Learning Activities

Direct Instruction - Lecture

Review of historical data.

Case studies - regional and global imapcts on human health

Small group student summaries of human health imapcts from select topics from content covered - Food production, enery systems, pollution

Inventory of downtown waste management production

Student evaluation of ecological footprint - recommendations for improved environmental quality and human health

Collection of environmental/ human health data - indicator species - lichen diversity study for New Jersey

Modeling of LC50 study - how chemical agents are assessed for huamn health impact.

Review of specific pollutants identified in the Cooper River watershed - summary of huamn activity and potential health risks

Differentiated Instruction

Examples may include:

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

Formative Assessments

Waste Study and Synthesis in Haddonfield Downtown

Quiz on Environmental Hazards

Right to Know Synthesis - water quality reports from American Water

Right to Know Synthesis - airnow.gov synthesis

Hazardous Waste Home Inventory and Report

Summative Assessment

Lab Report - LC50 study and simulation

Lab Report - Waste Management in the town of Haddonfield

Lab Report - Pesticide Use - developing an approach to assessing pesticde application on residential properties

Exam - Hazards, Pollution and Human Health

Benchmark Assessments

See above assessments

Alternate Assessments

see above assessments

Resources & Technology

Text - Spoolman and Miller - Environmental Science - Sustaining your World

Airnow.gov - air quality data source

American Water - drinking water report

Google Earth

GIS - pollution and economics

BOE Approved Texts

Miller and Spoolman - Environmental Science- Sustaining your World

Closure

Such as:

- Gallery Walk - On chart paper, small groups of students write and draw what they learned. After the completed works are attached to the classroom walls, others students affix post-its to the posters to extend on the ideas, add questions.
- Sequence It - create timelines of major events discussed
- Low-Stakes Quizzes - Give a short quiz using technologies like Kahoot or a Google form.
- Have students write down three quiz questions (to ask at the beginning of the next class).
- Question Stems - Have 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.
- Kids answer the following prompts: "What takeaways from the lesson will be important to know three years from now? Why?
- Ask a question. Give students ten seconds to confer with peers before you call on a random student to answer. Repeat.
- 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.
- Have students complete the following sentence: "The [concept, skill, word] is like _____ because _____."

ELL
Such as:

- Alternate Responses
- Advance Notes
- Extended Time
- Teacher Modeling
- Simplified Written and Verbal Instructions
- Frequent Breaks
- E-Dictionaires
- Google Translate

*Add to or remove any of these as you see fit.

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.

*Add to or remove any of these as you see fit.

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

*Add to or remove any of these as you see fit.

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

*Add to or remove any of these as you see fit.

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