

Winslow Township School District
Environmental Science CP/General

Unit 4: Human Impact and Sustainability

Overview: In this unit students construct an explanation based on evidence for how the availability of natural resources, occurrence of natural hazards are connected to human activity. Additionally, while students are exploring this idea they apply scientific and engineering ideas to create solutions that can be use do minimize the impacts of natural hazards. They develop a conceptual understanding of the relationships among management of natural resources, the sustainability of human populations, and biodiversity. Students will illustrate the relationships among Earth systems and how those relationships are being modified due to human activity, and evaluate solutions to reduce the impact of human activities on natural systems.

Overview	Standards for Science	Unit Focus	Essential Questions
<p style="text-align: center;">Unit 4</p> <p style="text-align: center;">Human Impact and Sustainability</p>	<ul style="list-style-type: none"> ● HS-ESS3-1 ● HS-ESS3-3 ● HS-LS4-6 ● HS-ESS3-4 ● HS-ESS3-6 ● HS-ETS1-3 ● WIDA 1, 4 	<ul style="list-style-type: none"> ● Identify major air pollutants and their sources. ● Describe the impact of air pollutants on human health. ● List the major water pollutants and their sources and relate them to human and environmental health. ● Describe environmental conditions and human activities that cause groundwater pollution. ● Relate the importance of wetlands to the health of aquatic ecosystems, especially estuaries. ● Identify how land is used and how land use affects ecosystems. ● Summarize the positive and negative effects of urban planning. ● Explain the negative effects of agriculture on the land and the benefits of sustainable agriculture. ● Describe the characteristics of soil composition. ● Identify underlying reasons for solid waste pollution. ● Compare and contrast biodegradable and nonbiodegradable wastes and their significance in landfills. ● Compare and contrast the advantages and disadvantages of nonrenewable and renewable resources. ● List the major types of renewable resources and compare their advantages and disadvantages (solar, wind, water, geothermal, biomass, tidal power, etc.) ● Summarize the recent advances in alternative fuel research. 	<ul style="list-style-type: none"> ● How are human activities influence the global ecosystem? ● Is the damage done to the global life support system reversible? ● How can the impacts of human activities on natural systems be reduced?

Winslow Township School District
Environmental Science CP/General
Unit 4: Human Impact and Sustainability

*Unit 4:
Enduring
Understandings*

- Resource vitality has guided the development of human society.
- Natural hazards and other geologic events have significantly altered the sizes of human populations and have driven human migration.
- Empirical evidence is required to differentiate between cause and correlation and make claims about how the availability of natural resources, occurrence of natural hazards, and changes in climate have influenced human activities.
- Changes in the atmosphere due to human activity have increased carbon dioxide concentrations and thus affect climate.
- Changes in climate can affect population or drive mass migration.
- Changes in the physical environment, whether naturally occurring or human induced, have contributed to the expansion of some species, the emergence of new distinct species as populations diverge under different conditions, and the decline—and sometimes the extinction—of some species.
- Current models predict that, although future regional climate changes will be complex and will vary, average global temperatures will continue to rise.
- 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 ecosystems’ 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.
- Scientist and engineers can make major contributions by developing technologies that produce less pollution and waste and that preclude ecosystem degradation.
- Engineers continuously modify these systems to increase benefits while decreasing costs and risks.
- When evaluating solutions, it is important to take into account a range of constraints, including costs, safety, reliability, and aesthetics, and to consider social, cultural, and environmental impacts.

Winslow Township School District
Environmental Science CP/General
Unit 4: Human Impact and Sustainability

Curriculum Unit 4	Standards		Pacing	
			Days	Unit Days
Unit 4: Human Impact and Sustainability	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.	7	43
	HS-ESS3-3	Create a computational simulation to illustrate the relationships among management of natural resources, the sustainability of human populations, and biodiversity.	6	
	HS-LS4-6	Create or revise a simulation to test a solution to mitigate adverse impacts of human activity on biodiversity.	7	
	HS-ESS3-4	Evaluate or refine a technological solution that reduces impacts of human activities on natural systems.	7	
	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.	7	
	HS-ETS1-3	Evaluate a solution to a complex real-world problem based on prioritized criteria and tradeoffs that account for a range of constraints, including cost, safety, and reliability, and aesthetics, as well as possible social, cultural, and environmental impacts.	7	
	Assessment, Re-teach and Extension		2	

Winslow Township School District
Environmental Science CP/General
Unit 4: Human Impact and Sustainability

Unit 4 - Environmental Science CP/General		
Disciplinary Core Ideas	Indicator #	Indicator
<p>ESS3.A: Natural Resources Resource availability has guided the development of human society. (HS-ESS3-1)</p> <p>ESS3.B: Natural Hazards 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. (HS-ESS3-1)</p> <p>ESS3.C: Human Impacts on Earth Systems The sustainability of human societies and the biodiversity that supports them requires responsible management of natural resources. (HS-ESS3-3) Scientists and engineers can make major contributions by developing technologies that produce less pollution and waste and that preclude ecosystem degradation. (HS-ESS3-4)</p> <p>ESS3.D: Global Climate Change 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. (HS-ESS3-6)</p> <p>LS4.D: Biodiversity and Humans 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. (HS-LS4-6)</p> <p>ETS1.B: Developing Possible Solutions 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. (HS-ETS1-3)</p>	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.
	HS-ESS3-3	Create a computational simulation to illustrate the relationships among management of natural resources, the sustainability of human populations, and biodiversity.
	HS-LS4-6	Create or revise a simulation to test a solution to mitigate adverse impacts of human activity on biodiversity.
	HS-ESS3-4	Evaluate or refine a technological solution that reduces impacts of human activities on natural 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.
	HS-ETS1-3	Evaluate a solution to a complex real-world problem based on prioritized criteria and tradeoffs that account for a range of constraints, including cost, safety, and reliability, and aesthetics, as well as possible social, cultural, and environmental impacts.

Winslow Township School District
Environmental Science CP/General
Unit 4: Human Impact and Sustainability

Unit 4 – Environmental Science CP/General	
Assessment Plan	
<ul style="list-style-type: none"> • Exploratory activities • Warm-up/Ticket Out activities • Class discussions • Student Participation • Teacher Observations • Virtual/Hands-On Labs • Self-Test Assessments • Scientist Timeline Activity • Clinical Case Study Analysis 	<ul style="list-style-type: none"> • Quizzes and Tests • Authentic assessments and projects • Exploratory activities • Presentations • Lecture Notes • Think-Pair-Share • Graphic Organizers • Study Questions at the end of each chapter • Multiple Choice and Critical Thinking at the end of each chapter
Diversity, Equity & Inclusion Educational Resources	Activities
<ul style="list-style-type: none"> • Chromebooks • Textbook (“Genetics: A Conceptual Approach, 6th ed by Benjamin A. Pierce) • Web Quests • Virtual Field Trips • Video Streaming • BrainPOP • Puzzlemaker: Game Based Learning Discovery Education 	<ul style="list-style-type: none"> • Use various forms of expository writing-procedural writing, narrative writing, descriptive writing, labeling, as well as to create visuals, graphs, tables, diagrams and charts. • Use scientific argumentation with exercises on writing claims, using evidence to support your claim and explaining the reasoning behind their claim. • Mini-lessons • Independent reading • Films • Website exploration • Discussions, dialogues • Debates • Laboratory experiments • Partner or small group work • Student presentations, reports, journals, reflections • In-class assessments • Written reports, essays, research, and homework

Winslow Township School District
Environmental Science CP/General
Unit 4: Human Impact and Sustainability

Instructional Best Practices and Exemplars

- | | |
|---|--|
| 1. Identifying similarities and differences | 6. Cooperative learning |
| 2. Summarizing and note taking | 7. Setting objectives and providing feedback |
| 3. Reinforcing effort and providing recognition | 8. Generating and testing hypotheses |
| 4. Homework and practice | 9. Cues, questions, and advance organizers |
| 5. Nonlinguistic representations | 10. Manage response rates |

Winslow Township School District
Environmental Science CP/General
Unit 4: Human Impact and Sustainability

9.1 Personal Financial Literacy, 9.2 Career Awareness, Exploration, Preparation and Training & 9.4 Life Literacies and Key Skills

9.2.12.CAP.3: Investigate how continuing education contributes to one's career and personal growth.

9.4.12.CI.1: Demonstrate the ability to reflect, analyze, and use creative skills and ideas

9.4.12.CT.1: Identify problem-solving strategies used in the development of an innovative product or practice

9.4.12.CT.2: Explain the potential benefits of collaborating to enhance critical thinking and problem solving

9.4.12.DC.8: Explain how increased network connectivity and computing capabilities of everyday objects allow for innovative technological approaches to climate protection.

9.4.12.GCA.1: Collaborate with individuals to analyze a variety of potential solutions to climate change effects and determine why some solutions (e.g., political, economic, cultural) may work better than others

9.4.12.IML.5: Evaluate, synthesize, and apply information on climate change from various sources appropriately

9.4.12.TL.2: Generate data using formula-based calculations in a spreadsheet and draw conclusions about the data.

The implementation of the 21st Century skills and standards for students of the Winslow Township District is infused in an interdisciplinary format in a variety of curriculum areas that include, English language Arts, Mathematics, School Guidance, Social Studies, Technology, Visual and Performing Arts, Science, Physical Education and Health, and World Language.

Additional opportunities to address 9.1, 9.2 & 9.4:

Philadelphia Mint

<https://www.usmint.gov/learn/kids/resources/educational-standards>

Different ways to teach Financial Literacy.

<https://www.makeuseof.com/tag/10-interactive-financial-websites-teach-kids-money-management-skills/>

Winslow Township School District
Environmental Science CP/General
Unit 4: Human Impact and Sustainability

Modifications for Special Education/504

Students with special needs: The students' needs will be addressed on an individual and grade level using a variety of modalities. Accommodations will be made for those students who need extra time to complete assignment. Support staff will be available to aid students related to IEP specifications. 504 accommodations will also be attended to by all instructional leaders. Physical expectations and modifications, alternative assessments, and scaffolding strategies will be used to support this learning. The use of Universal Design for Learning (UDL) will be considered for all students as teaching strategies are considered.

- Small group instruction
- Audio books/ Text-to-speech platforms
- Leveled texts/Vocabulary Readers
- Leveled informational texts via online
- Modeling and guided practice
- Read directions aloud
- Repeat, rephrase and clarify directions
- Extended time as needed
- Break down assignments into smaller units
- Provide shortened assignments
- Modify testing format
- Repeat directions as needed
- Graphic organizers
- Study Guides, Study Aids and Re teaching as needed

Winslow Township School District
Environmental Science CP/General
Unit 4: Human Impact and Sustainability

Modifications for At-Risk Students

Formative and summative data will be used to monitor student success. At first signs of failure, student work will be reviewed to determine support. This may include parent consultation, basic skills review and differentiation strategies. With considerations to UDL, time may be a factor in overcoming developmental considerations

- Audio books and Text-to-speech platforms
- Leveled texts/Vocabulary Readers
- Leveled informational texts via online
- Extended time as needed
- Read directions aloud
- Assist with organization
- Use of computer
- Emphasize/highlight key concepts
- Recognize success
- Provide timelines for work completion
- Break down multi-step tasks into smaller chunks
- Provide copy of class notes and graphic organizer

Winslow Township School District
Environmental Science CP/General
Unit 4: Human Impact and Sustainability

English Language Learners	Modifications for Gifted Students
<p>All WIDA Can Do Descriptors can be found at this link: https://wida.wisc.edu/teach/can-do/descriptors</p> <p>Grades 9-12 WIDA Can Do Descriptors...</p> <p><i>Listening...</i></p> <ul style="list-style-type: none"> • Process <u>recounts</u> by... <ul style="list-style-type: none"> ○ Categorizing perspectives of multiple speakers ○ Identifying important information on specific event & concept from lecture/presentation • Process <u>explanations</u> by... <ul style="list-style-type: none"> ○ Recognizing specific language used to enhance clarity and precision ○ Recognizing and following language related to the same event or phenomenon throughout presentations • Process arguments by... <ul style="list-style-type: none"> ○ Identifying strengths, limitations, and potential biases from oral presentations ○ Organizing claims and counter claims presented in debates <p><i>Speaking...</i></p> <ul style="list-style-type: none"> • <u>Recount</u> by... <ul style="list-style-type: none"> ○ Adjusting presentation style, degree of formality, word choice, tone, and information to the context and audience ○ Presenting information that follows discipline specific organization (e.g., orientation to topic, sequence of events, conclusion) • <u>Explain</u> by... <ul style="list-style-type: none"> ○ Providing precision and accuracy in classifications, procedures, processes, and accounts using abstraction, technical language, and a variety of active/passive verb forms ○ Following discipline-specific organization (e.g., orienting the reader, details, conclusion) and supporting presentations with graphs, formulas, quotes or other media • <u>Argue</u> by... <ul style="list-style-type: none"> ○ Organizing claims and counter claims in debates with evidence from multiple sources ○ Negotiating differing cultural perspectives in pairs or small groups <p><i>Reading...</i></p> <ul style="list-style-type: none"> • Process <u>recounts</u> by... <ul style="list-style-type: none"> ○ Analyzing and comparing how authors use language for specific purposes and audiences ○ Identifying how authors develop and maintain cohesion by connecting ideas or events in extended texts • Process <u>explanations</u> by... <ul style="list-style-type: none"> ○ Recognizing discipline-specific patterns (e.g., orienting the reader, part-whole classification, neutral/ authoritative tone) ○ 	<p>Students excelling in mastery of standards will be challenged with complex, high level challenges related to the topic.</p> <ul style="list-style-type: none"> • Raise levels of intellectual demands • Require higher order thinking, communication, and leadership skills • Differentiate content, process, or product according to student’s readiness, interests, and/or learning styles • Provide higher level texts • Expand use of open-ended, abstract questions • Critical and creative thinking activities that provide an emphasis on research and in-depth study • Enrichment Activities/Project-Based Learning/ Independent Study <p>Additional Strategies may be located at the links:</p> <ul style="list-style-type: none"> ❖ Gifted Programming Standards ❖ Webb’s Depth of Knowledge Levels and/or Revised Bloom’s Taxonomy ❖ REVISED Bloom’s Taxonomy Action Verbs

Winslow Township School District
Environmental Science CP/General
Unit 4: Human Impact and Sustainability

- Identifying authors' precision and accuracy in classifications, comparisons, accounts, or procedures as a result of clear language choices
- Process arguments by...
 - Evaluating word choice and nuance as tools for distinguishing facts, claims, reasoned judgment, and opinions
 - Identifying the logical connections among claims, counterclaims, reasons, and evidence

Writing...

- Recount by...
 - Summarizing content-related notes from lectures or readings
 - Producing research reports using multiple sources of information
- Explain by...
 - Developing ideas about phenomena with relevant and sufficient facts, extended descriptions, concrete details, or quotations
 - Maintaining discipline-specific patterns that bridge across key uses (e.g., explanation to argument in history, explanation to recount for information reports)
- Argue by...
 - Evaluating positive and negative implications associated with various positions (e.g., historical events, scientific discoveries, individuals)
 - Organizing information logically and coherently to represent contrasting views

Oral Language...

- Discuss by...
 - Identifying and reacting to subtle differences in speech and register (e.g., hyperbole, satire, comedy)
 - Producing coherent oral discourse appropriate to task, purpose, and audience
 - Synthesizing and sharing information from a variety of sources and perspectives

Students will be provided with accommodations and modifications that may include:

- Relate to and identify commonalities in Social Studies and science in student's home country
- Assist with organization
- Use of computer
- Emphasize/highlight key concepts
- Teacher Modeling
- Peer Modeling
- Label Classroom Materials - Word Walls

Winslow Township School District
Environmental Science CP/General
Unit 4: Human Impact and Sustainability

Interdisciplinary Connections

English Language Arts/Literacy

1. Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account. **RST.11-12.1** (HS-LS2-1),(HS-LS2-2),(HS-LS2-6)
2. Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem. **RST.11-12.7** (HS-LS2-6)
3. Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information. **RST.11-12.8** (HS-LS2-6)
4. Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible. **RST.11-12.9** (HS-ETS1-1),(HS-ETS1-3)
5. Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes. **WHST.9-12.2** (HS-LS2-1),(HS-LS2-2)
6. Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. **WHST.9-12.7** (HS-LS1-3)
7. Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation. **WHST.11-12.8** (HS-LS1-3)
8. Draw evidence from informational texts to support analysis, reflection, and research. **WHST.9-12.9** (HS-LS1-1)
9. **WIDA Standards 1** English language learners communicate for social and instructional purposes within the school setting
10. **WIDA Standards 4** English language learners communicate information, ideas, and concepts necessary for academic success in the content area of science
11. Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest. **SL.11-12.5** (HS-LS1-2)

Winslow Township School District
Environmental Science CP/General
Unit 4: Human Impact and Sustainability

Mathematics

1. Reason abstractly and quantitatively. **MP.2** (HS-LS2-1),(HS-LS2-2),(HS-LS2-6)
2. Model with mathematics. **MP.4** (HS-LS2-1),(HS-LS2-2)
3. Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays. **HSN.Q.A.1** (HS-LS2-1),(HS-LS2-2)
4. Define appropriate quantities for the purpose of descriptive modeling. **HSN.Q.A.2** (HS-LS2-1),(HS-LS2-2)
5. Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. **HSN.Q.A.3** (HS-LS2-1),(HS-LS2-2)
6. Represent data with plots on the real number line. **HSS-ID.A.1** (HS-LS2-6)
7. Understand statistics as a process for making inferences about population parameters based on a random sample from that population. **HSS-IC.A.1** (HS-LS2-6)

Integration of Computer Science and Design Thinking NJSLS 8

8.1.12.DA.1: Create interactive data visualizations using software tools to help others better understand real world phenomena, including climate change.