

MYP/3D Science Unit Planner

Marietta City Schools

Grade & Course: Environmental Science	Topic: Unit 7: Human Impact	Duration: 6 weeks
Teachers: Env. Science PLC Teachers		
<p>Georgia Standards and Content:</p> <p>SEV4. Obtain, evaluate, and communicate information to analyze human impact on natural resources.</p> <p>a. Construct and revise a claim based on evidence on the effects of human activities on natural resources. Human Activities Natural Resources Agriculture Forestry Ranching Mining Urbanization Fishing Water use Pollution Desalination Waste water treatment Land Water Air Organisms</p> <p>b. Design, evaluate, and refine solutions to reduce human impact on the environment including, but not limited to, smog, ozone depletion, urbanization, and ocean acidification.</p> <p>SEV5. Obtain, evaluate, and communicate information about the effects of human population growth on global ecosystems.</p> <p>d. Design and defend a sustainability plan to reduce your individual contribution to environmental impacts, taking into account how market forces and societal demands (including political, legal, social, and economic) influence personal choices.</p>		
Narrative / Background Information		
<p>Prior Student Knowledge: (REFLECTION – PRIOR TO TEACHING THE UNIT)</p> <ul style="list-style-type: none"> • Ecosystems and Biomes – Understanding different ecosystems (forests, oceans, wetlands) and how they function. • Natural Resources – Differentiating between renewable and nonrenewable resources. • Human Activities and Their Impact – How agriculture, deforestation, mining, urbanization, and pollution affect the environment. • The Water Cycle – How human activities (pollution, water use, desalination) affect freshwater availability. • Air and Water Pollution – Sources and effects of pollutants like smog, acid rain, and wastewater. • Climate Change and Greenhouse Gases – The impact of CO₂ emissions, global warming, and ocean acidification. • Sustainability and Conservation – Principles of reducing waste, protecting biodiversity, and managing resources responsibly. • Population Growth and Carrying Capacity – How human population growth affects ecosystems and resource consumption. • Environmental Laws and Policies – Understanding regulations like the Clean Air Act, Clean Water Act, and conservation efforts. • Market Forces and Environmental Decision-Making – How economic, political, and social factors influence resource use and sustainability efforts. 		
<p>Year-Long Anchoring Phenomena: (LEARNING PROCESS)</p> <p>Human activities have negatively impacted ecosystems, global climate, energy resources, and population.</p>		
<p>Unit Phenomena (LEARNING PROCESS)</p> <p>The Great Pacific Garbage Patch, a mass of plastic garbage twice the size of Texas, has expanded dramatically over recent decades.</p>		
<p>MYP Inquiry Statement:</p> <p>The Great Pacific Garbage Patch, an area in the North Pacific Ocean where marine debris accumulates, has grown exponentially in recent decades. This accumulation of plastic and other waste poses a significant threat to marine life and ecosystems. International groups, governments, local businesses and individuals are looking for solutions to reduce their impact and increase sustainability.</p>		
<p>MYP Global Context:</p> <ul style="list-style-type: none"> • <i>Personal and cultural expression</i> • <i>Fairness and development</i> 		

- *Globalization and sustainability*

Approaches to Learning Skills:

- Research Skills – Collecting and analyzing data on human impact and sustainability.
- Critical Thinking & Analysis – Evaluating evidence on pollution, climate change, and resource depletion.
- Communication Skills – Constructing claims and presenting solutions through written, oral, and visual formats.
- Problem-Solving & Innovation – Designing and refining solutions to mitigate environmental impact.
- Collaboration Skills – Working in teams to analyze data, propose sustainability plans, and discuss environmental challenges.
- Self-Management Skills – Organizing research, managing time for projects, and setting personal sustainability goals.

Science and Engineering Practices

- **Asking Questions & Defining Problems** – Investigating human activities that impact natural resources.
- **Analyzing & Interpreting Data** – Evaluating trends in resource consumption, pollution levels, and population growth.
- **Constructing Explanations & Designing Solutions** – Proposing environmental policies and sustainability plans.
- **Engaging in Argument from Evidence** – Defending claims about human impact using scientific data.
- **Obtaining, Evaluating, & Communicating Information** – Researching case studies, synthesizing findings, and presenting solutions.

Disciplinary Core Ideas: (KNOWLEDGE & SKILLS)

- Human Activities and Natural Resources
- Solutions to Reduce Human Impact
- Personal Sustainability Plans
- Designing a Sustainable Energy Plan

Crosscutting Concepts: (KNOWLEDGE & SKILLS)

- **Cause & Effect** – How human actions (e.g., pollution, resource extraction) lead to environmental consequences.
- **Systems & System Models** – Understanding ecosystems, carbon cycles, and population growth as systems.
- **Stability & Change** – Examining how ecosystems respond to human activities over time.
- **Scale, Proportion, & Quantity** – Measuring human impact at local, regional, and global levels.
- **Energy & Matter** – Exploring energy use, waste production, and pollution management.
- **Patterns** – Identifying trends in population growth, resource depletion, and pollution.
- **Science & Society** – Exploring the relationship between scientific understanding and policymaking.

MYP Key and Related Concepts:

- *Development*
- *Sustainability*
- *Cause and Effect*
- *Energy*
- *Transformation*

Possible Preconceptions/Misconceptions: (REFLECTION – PRIOR TO TEACHING THE UNIT)

Key Vocabulary: (KNOWLEDGE & SKILLS)

Natural Resources	Ocean Acidification	Wastewater Treatment
Sustainability	Carbon Footprint	Ozone Depletion

Deforestation	Carrying Capacity	Ecosystem (Natural) Services
Urbanization	Overfishing	Market Forces
Pollution	Ranching	Renewable vs. Nonrenewable Resources
Desalination	Agriculture	Desertification
Algal Blooms	Photochemical Smog	Fossil Fuels
Eutrophication	Microplastics	

Inquiry Questions:

Factual

1. What are the major types of natural resources, and how are they used by humans (natural capital)?
2. How does agriculture impact soil, water, and biodiversity?
3. What are the primary causes of deforestation and urbanization?
4. How does mining affect land and water resources?
5. What are the major pollutants contributing to smog and ozone depletion?
6. How does ocean acidification occur, and what are its effects on marine life?
7. What are some methods used in wastewater treatment and desalination?
8. How does overfishing affect marine ecosystems?
9. What is the relationship between human population growth and resource consumption (natural capital)?
10. What are some existing policies aimed at reducing human environmental impact?

Conceptual

1. How do human activities contribute to the depletion of natural resources?
2. What are the long-term environmental consequences of urbanization and deforestation?
3. How does pollution affect ecosystems, biodiversity, and human health?
4. In what ways can technological advancements help reduce human impact on natural resources?
5. How do individual and collective choices influence sustainability efforts?
6. What role does government regulation play in environmental conservation?
7. How can industries balance economic growth with environmental responsibility?
8. How do different ecosystems respond to human-induced environmental changes?
9. What factors influence the effectiveness of sustainability initiatives?
10. How does population growth affect food, water, and energy security?

Debatable

1. Should governments impose stricter environmental regulations on industries, even at the cost of economic growth?
2. Is desalination a sustainable solution to global water (potable) shortages?
3. Should developed countries bear more responsibility for addressing climate change?
4. Are current global efforts to reduce pollution and conserve resources sufficient?
5. Should cities implement strict limits on urban expansion to preserve natural habitats?
6. Is transitioning entirely to renewable energy sources feasible in the near future?
7. Should individuals be legally required to reduce their carbon footprint?
8. Do economic incentives (e.g., carbon taxes) effectively encourage businesses to adopt sustainable practices?
9. Should population control measures be enforced to ensure sustainable resource consumption?
10. Is consumer behavior more influential than government policies in driving environmental change?

**MYP
Objectives**

Summative assessment

<p>MYP B- Inquiring and Designing</p> <p>MYP C- Processing and Evaluating</p>	<p>Unit 7 Common Learning experience- MYP C MYP Criterion B CFA CSA</p>	<p>Relationship between summative assessment task(s) and statement of inquiry:</p> <p>Summative assessments and Group presentations will allow students to demonstrate their understanding of unit material. Students will also reflect on the implications of science.</p>
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Unit Objectives:

Learning Activities and Experiences	Inquiry & Obtain: (LEARNING PROCESS)	Evaluate: (LEARNING PROCESS)	Communicate: (LEARNING PROCESS)
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<p>Weeks 1 to 3</p> <p>SEV4a/b</p>	<p>-Case Study Investigation: Human Activities and Resource Depletion – Students will research case studies on how activities like deforestation, mining, or overfishing have affected natural resources. They will collect data, analyze environmental consequences, and summarize findings.</p> <p>Data Analysis: Pollution and Resource Consumption Trends – Students will examine real-world data on pollution levels, water usage, or deforestation rates. They will create graphs and identify trends to determine the long-term impact of human activities on natural resources.</p> <p>- Carbon Footprint analysis Simulation of the tragedy of the Commons Urban heat island Investigation</p> <p>- Car exhaust sampling and analysis activity.</p> <p>- Investigating Smog through Air Quality Data Activity</p> <p>- Investigating Ozone Layer Depletion Data Activity Examine NASA Satellite Images</p> <p>-Urbanization & Its Environmental Impact</p>	<p>Analysis on real-world data on deforestation and land use changes due to agriculture, urbanization and logging.</p> <p>Analysis of the impact of human activities on Carbon emissions.</p> <p>Explore how the overuse of natural resources lead to depletion.</p> <p>Construct and Revise Claims Based on Evidence – After gathering research, students will develop a claim about a specific human activity’s impact on natural resources (e.g., “Deforestation significantly reduces biodiversity and disrupts the water cycle”). They will then refine their claim based on peer feedback and additional evidence.</p>	<p>Public Awareness Infographic or Video – Students will create an infographic or short video that explains the impact of human activities on a specific natural resource and propose actionable solutions. These can be shared with the school community.</p>
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	<p>Compare Urban vs. Rural Areas</p> <p>-Investigating Ocean Acidification How does increased CO₂ affect ocean acidity and marine life?</p>		
<p>Weeks 4-6</p> <p>SEV5d and CSA</p>	<p>Carbon Footprint Calculation – Students will use an online carbon footprint calculator (such as the EPA’s calculator or Global Footprint Network) to measure their personal environmental impact. They will analyze their results and identify the key factors contributing to their footprint.</p> <p>Research on Carbon Emissions and Sustainability Plans– Students will research how human activities (transportation, diet, energy use, waste, etc.) contribute to carbon emissions and explore sustainable alternatives. They will create a sustainability plan.</p> <p>Data Analysis of Population Growth and Resource Use – Provide students with real-world datasets on human population growth, carbon emissions, and resource consumption. They will analyze trends, create graphs, and draw conclusions about how population increases correlate with environmental changes.</p> <p>Review Unit Material with Students</p>	<p>Ecological Footprint Calculation and Reflection – Students will use an online ecological footprint calculator to measure their individual environmental impact. They will reflect on the results and identify specific behaviors that contribute most to their footprint.</p> <p>Sustainability Plan Checkpoint – Halfway through designing their sustainability plans, students will conduct peer reviews to provide constructive feedback on each other’s proposals. They will assess feasibility, potential obstacles, and effectiveness in reducing environmental impacts.</p> <p>Unit Study Guide</p> <p>Unit CSA</p>	<p>Sustainability Plan Presentation – Students will design and present a personal sustainability plan to their classmates, explaining their strategies to reduce environmental impact and how external factors (economic, social, legal) influence their choices.</p> <p>Assessment Results & Recovery Opportunities</p>
<p>Resources (hyperlink to model lessons and/or resources): Discovery Education Science Techbook</p>			

Reflection: Considering the planning, process and impact of the inquiry

Prior to teaching the unit	During teaching	After teaching the unit