MYP/3D Science Unit Planner

Marietta City Schools

Grade & Course: Environmental Science	**Topic:** Human Population and Environmental Impact	**Duration:** 4 weeks
Teachers: Env. Science PLC Teachers		

Georgia Standards and Content:

SEV4. Obtain, evaluate, and communicate information to analyze human impact on natural resources.
a. Construct and revise a claim based on evidence on the effects of human activities on natural resources.
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.
c. Construct an argument to evaluate how human population growth affects food demand and food supply (GMOs, monocultures, desertification, Green Revolution).
SEV5. Obtain, evaluate, and communicate information about the effects of human population growth on global ecosystems.
a. Construct explanations about the relationship between the quality of life and human impact on the environment in terms of population growth, education, and gross national product.b. Analyze and interpret data on global patterns of population growth (fertility and mortality rates) and demographic transitions in developing and developed countries.
c. Construct an argument from evidence regarding the ecological effects of human innovations (Agricultural, Industrial, Medical, and Technological Revolutions) on global ecosystems.
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

Narrative / Background Information

Prior Student Knowledge: (REFLECTION – PRIOR TO TEACHING THE UNIT)

Understanding of ecosystems, biodiversity, energy resources, and climate factors. In addition, students have learned about how humans contribute to pollution and climate change through the burning of fossil fuels and creation of waste.

Year-Long Anchoring Phenomena: (LEARNING PROCESS)

Human activities have negatively impacted ecosystems, global climate, energy resources, and population.

Unit Phenomena (LEARNING PROCESS)

There are more retirement communities being constructed in the United States. Why is this the case?

MYP Inquiry Statement:

Changes in human populations require different interactions with the environment that have local and global consequences that affect land, air, water and organisms.

MYP Global Context:
Globalization and Sustainability

Approaches to Learning Skills:	**Disciplinary Core Ideas: (KNOWLEDGE & SKILLS)**	**Crosscutting Concepts: (KNOWLEDGE & SKILLS)**
COMMUNICATION: Communication Skills	Developing Countries Developed Countries	Global Interaction (MYP) Consequences (CC & MYP) Cause and Effect (CC)

SOCIAL: Collaboration Skills SELF-MANAGEMENT: Organization Skills SELF-MANAGEMENT: Affective Skills SELF-MANAGEMENT: Reflection skills RESEARCH: Information literacy skills RESEARCH: Media literacy skills THINKING: Critical-thinking Skills THINKING: Creative-thinking Skills THINKING: Transfer skills **Science and Engineering Practices** Obtain, evaluate, and communicate Develop and use a model Engaging in argument Asking Questions and Defining Problems	Age Structure Diagram Demographic transition Model Agriculture Revolution Industrial Revolution Technology Revolution Medical Revolution Sustainability	Stability & Change (CC & MYP) Patterns (CC) **MYP Key and Related Concepts:** Patterns and Environment

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

Students may only link sustainability to “Going Green”.
Students may link sustainability to lowering our standard of living.
Students may assume that their choices and school based activism, not government intervention offer the most efficient routes to sustainability.
Students may not understand that sustainability should be an ongoing effort as our world changes daily.
Students may believe their actions have no effect on the future global climate.
Students may believe that it is “too late” to solve the global climate crisis.
Students may believe the Earth is reaching its carrying capacity.

Key Vocabulary: (KNOWLEDGE & SKILLS)

Demography
Age Structure
Survivorship
Fertility Rate
Child Mortality Rate
Developed Country
Developing Country
Immigration
Emigration
Life Expectancy
Demographic Transition Model
Hunter-Gatherers
Industrial Revolution
Agricultural Revolution
Medical Revolution
Technological Revolution
Information Revolution
AI Revolution

Inquiry Questions:

Factual

1. Is there a “Green tax” incentive to reduce pollution in all states?
2. What impact did the agricultural revolution have on humanity?
3. Why are developing countries not yet developed countries?

Conceptual

1. What innovations/research have you come across that you believe will have a positive impact on the future sustainability of our planet?
2. What role do you see for the Scientific Community in establishing a sustainable culture?

Debatable

1. What is the appropriate response to rogue nations who refuse environmental sustainability?
2. How much responsibility should lie with individuals to adopt climate friendly lifestyles in developing countries?
3. Who is ultimately responsible for establishing and maintaining sustainable cultures?

MYP Objectives	**Summative assessment**	
Sciences **Sciences** **Design** **Design**	Assessment Task: Criterion A - Unit Summative Assessment Criterion B - Engineering Design Process Criterion D - Group Presentations	Relationship between summative assessment task(s) and statement of inquiry: Summative assessments and Group presentations will allow students to demonstrate their understanding of unit material. Students will also reflect on the implications of science.

Unit Objectives:

Learning Activities and Experiences	**Inquiry & Obtain: (LEARNING PROCESS)**	**Evaluate: (LEARNING PROCESS)**	**Communicate: (LEARNING PROCESS)**
Week 1:	Economic Inequality: Differences in Developed and Developing Nations Video & Quiz https://study.com/academy/lesson/economic-inequality-differences-in-developed-and-developing-nations.html	Working in groups, students look at three different villages in various parts of Africa and design economically viable engineering solutions to answer the energy needs of the off-the-grid small towns, given limited budgets. Each village has different nearby resources, both renewable and nonrenewable. Student teams conduct research, make calculations, consider the options and create plans, which they present to the class. Through their investigations and planning of custom solutions for each locale, they experience the real-world engineering research and analysis steps of the engineering design process.*This engineering curriculum meets Next Generation Science Standards (NGSS).* Hands-on Activity: Power for Developing Countries	Students will submit group projects in Schoology for feedback. Some projects will be shared with classes to review solutions and MYP-Criterion B expectations. Students will work on the project throughout the unit. The project will be due during Week 7.

		https://www.teachengineering.org/activities/view/duk_power_activity1	
Week 2:	Population Pyramids TEDEd Video https://www.youtube.com/watch?v=RLmKfXwWQtE Population Pyramid Video on EdPuzzle "A Girls Life" article describing roles of females in different families in an economically developing country (https://www.worldof7billion.org/wp-content/uploads/2014/08/a-girls-life.pdf) Human Population Warm-up PowerPoint	Population Pyramid video quiz Create a Population Pyramid - graphing activity Identify population trends by evaluating Population Pyramids for different nations and predict services needed based on population pyramids Human Population Kahoot!https://play.kahoot.it/v2/?quizId=e1652766-3719-499a-8557-d254c98331a6 Population POGIL https://www.commackschools.org/Downloads/Population%20Growth%20POGIL.pdf	Background Reading: The People Connection https://www.worldof7billion.org/wp-content/uploads/2014/08/the-people-connection.pdf Use Dr. Epstein's ECCO Map to summarize article Day 1 "A Girls Life" article discussion questions - opener day 2 Discussion during card sort - formative assessment - Day 1 Video quiz questions
Week 3:	Demographic Transitions Intro. Demographic Transition Video https://vimeo.com/105146940 Class Discussion : If the world population is 9 billion in 2050, what impact will this have on the environment? Student Article and Handout	Students will use the article to complete the Student Handout https://populationeducation.org/what-demographic-transition-model/ Demographic Transition Student Handout	Transition Quiz Online https://www.internetgeography.net/the-demographic-transition-model-quiz/
Week 4:	Ecological Footprints Class discussion -- what is "the good life" in US culture? "Day Zero" Capetown case study reading/video	Quizizz -- Graphing interpretations Ecological footprint calculator -- students use an online ecological footprint calculator to see the effects of their lifestyle https://calc.zerofootprint.net/	Schoology quiz -- concept of ecological footprint and changes made in Day Zero case study Students discuss as a group and plan how to change their lifestyle to reduce their ecological footprints

	Ecological Footprint transitions around the world -- Guided Notes	Ecological impact changes map -- students map future changes in ecological impact in selected parts of the world based on current trends in consumption in the developing and developed world (This could also be a CER format)	Map presentations and peer assessments
Week 5:	Revolutions Revolutions PPT EdPuzzle - Industrial Revolution https://edpuzzle.com/assignments/5e4eb7d20b78ff413d77aea2/students	Use the data at the link below to create a CER Chart explaining how the revolutions could have possibly affected the three most populated countries in the world. https://www.cia.gov/library/publications/resources/the-world-factbook/fields/335rank.html	https://www.nationalgeographic.org/activity/taking-position-human-activity-amazon-rain-forest/ Students use the MapMaker Interactive to pinpoint the locations of the construction projects and conduct research to develop a position statement on whether or not construction should occur.
Week 6:	Media Center Visit Engineering Design Group Projects are due this week. students will work in Groups to finalize presentations.	Media Center Visit Engineering Design Group Projects are due this week. students will work in Groups to finalize presentations.	Media Center Visit Engineering Design Group Projects are due this week. students will work in Groups to finalize presentations.
Week 7:	Phenomenon: Most great civilizations have fallen after degrading their environments, leaving devastated landscapes behind. People vary in their perception of environmental problems. Gathering: Understanding of the natural environment is increasingly important as society struggles to respond to the implications of a changing climate, pressures on finite natural resources, and their impact on water, energy, food security, infrastructure, health, and biodiversity.	Forging a path with science towards a sustainable future Group Assignment. Students will be placed in groups, each group will have the option to select a Media platform to educate their peers on how to forge a path with science towards a sustainable future. Students will answer the following questions as a team: “How can Data Science and technology enable communities to solve today’s environmental issues?” or Sustainable City Project	Group Data Presentations on Open Science for Sustainability uploaded to Schoology and Presented to the Class.

	https://blog.frontiersin.org/2016/09/30/open-science-for-sustainability/		
Week 8: Remediation	Review Unit Material with Students	Unit Study Guide	Assessment Results & Recovery Opportunities

Resources (hyperlink to model lessons and/or resources):
Discovery Education Science Techbook

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

Prior to teaching the unit	During teaching	After teaching the unit
Make connections to units 1, 2, and 3 in regard to Human Impact on local, national, and global systems. Consider the rate of change in different systems.		