Unit 5: Human Populations and Urbanization
Environmental Science

14 Class Meetings

Rev. June 2019

Essential Questions

- How does human population growth affect our future?

Enduring Understandings with Unit Goals

EU 1: Technological advances changed the ways people lived and triggered remarkable increases in population size.

- Describe how advances in agriculture and industry contributed to human population growth.

EU 2: Cities have both a positive and negative impact on the environment.

- Identify the benefits and drawback of urban areas on the environment and quality of life.

Standards

Next Generation Science Standards

- **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-ESS3-4**. Evaluate or refine a technological solution that reduces impacts of human activities on natural resources.

Common Core State Standards

- **CCSS.ELA.CONTENT.WHST.9-12.9** Draw evidence from informational texts to support analysis, reflection, and research.
- **CCSS.ELA.CONTENT.RST.11-12.1** 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
- **CCSS.MATH.CONTENT.MP.2** Reason abstractly and quantitatively.
- **CCSS.MATH.CONTENT.MP.4** Model with mathematics.
- **CCSS.MATH.CONTENT.HSS.IC.B.6** Evaluate reports based on data.

MSMHS Academic, Civic and Social Competencies

Competency 1. Read and write effectively for a variety of purposes.
Competency 2. Speak effectively with a variety of audiences in an accountable manner.
Competency 3. Make decisions and solve problems independently and collaboratively.
Competency 4. Apply scientific knowledge and concepts to a variety of investigative tasks.

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Competency 5. Contribute to a positive learning environment with respect and responsibility.

Unit Content Overview

- Unit Phenomena (such as deforestation of Amazon Rainforest)
- Industrial Revolution
- Infant mortality
- Life expectancy
- Growth rate
- Demography
- Total fertility rate
- Replacement fertility
- Demographic transition
- Land use
- Urban area
- Urbanization
- Infrastructure
- Heat island
- Sprawl
- City planning
- Zoning
- Urban growth boundary
- Smart growth
- Sustainability
- Energy plan
- Renewable vs. Nonrenewable Resources

Interdisciplinary Connections

- Civics- city planning through legislature
- Algebra I- age structure graphs
- English I- writing for a specific audience

Learning Objectives with *TWPS Activities*

Students will be able to…

- Design a model that explains the unit phenomena.

  - *After watching the video, explain how tearing down portions of the Amazon rainforest can be beneficial for people. (https://www.youtube.com/watch?v=hllU9NEcJyg)*
- Describe the role of the Industrial Revolution in human population growth.
  - *After watching the video, describe other reasons that low-income families may have many children (not mentioned in video). (https://vimeo.com/122112096)*
  - *Explain the importance of the industrial revolution on human populations?*
- Identify characteristics of human populations that demographers study.
  - *Describe the relationship between population density and population distribution.*
  - *As people become more concentrated in cities, some pressure on ecosystems in areas that are now less populated eases. Explain why this is the case.*
- Explain how total fertility rate, replacement fertility, age structure, and sex ratio of a population define its potential for growth.
  - *In the United States, Canada, and many European nations, the total fertility rate has fallen below the replacement rate. Explain the economic and social consequences that may result from having below-replacement fertility rates.*
- Discuss demographic transition and how social factors affect population growth.
  - *A nation has a total fertility rate of 2.5. The age structure diagram of this population is fairly balanced. Recently people from neighboring nations have been arriving in masses to escape civil war. Describe how the population will likely increase or decrease in the near future.*
- Discuss ways humans and technology impact the environment.
  - *As developed nations implement ways that reduce their effect on the environment, explain if this will affect quality of life throughout the world.*
- Explain how and where urbanization occurs.
  - *Explain how the populations in urban cities impacted the environment compared to rural/suburban populations?*
- Describe the environmental impact of urbanization.
  - *Refer back to the unit phenomena. Portions of the Amazon rainforest is being destroyed for public housing. Explain how the deforestation of the Amazon rainforest is harming the environment.*
- Evaluate the role of urban sprawl on the environment.
  - *Describe the effect of sprawl on each of the following aspects of a region: transportation, pollution, public health, land use and economics.*
- Describe the components of sustainable city.
  - *Describe ways that city governments can discourage the use of cars in cities.*
- Evaluate green building design of a public building.
  - *As developers are building the housing units where the Amazon rainforest once stood, explain how the developers can make the project more "green"?*
- Discuss the progress toward sustainability some cities have made and its importance to the world.
  - *Read the central case (pg 291 of textbook). Explain the steps that Portland, Oregon should take in order for the city to become more sustainable.*

- Differentiate between renewable and non-renewable resources.
    - *Suppose you were hired by a city to develop land away from the highly populated center of the city (sprawl). One of your concerns is finding the best type of energy that will be used by residents (including businesses and schools). Part of your task is to find the most "environmentally friendly" energy source, but also being cost-effective. Explain what type of energy will you incorporate into the new developed land?*
- Design a city plan that will redevelop a city to be more sustainable.
    - *Although the city is located close to the ocean, the city is lacking the proper amounts of fossil fuels, safe drinking water and foods. Explain what can be done to ensure that all citizens of the city have the proper resources to have a good quality of life?*

Instructional Strategies/Differentiated Instruction

- **HLP:** Academically Productive Talk
- **HLP:** Writing to Learn (TWPS)
- **HLP:** Effective Feedback
- Power Point Lecture with note-taking
- Guided note-taking
- Warm up activities
- Flexible grouping
- Independent reading
- Foldables
- Exit slips
- Graphic Organizers
- Creating authentic connections for students
- Vocabulary word bank
- Rephrasing and restatement of information and concepts
- Tiered instruction
- Alternative test settings
- Student use of headphones
- Student-led instruction
- Homework assignments

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Assessments

FORMATIVE ASSESSMENTS:

- Age Structure Graphs
  - MSMHS Rubric 3: Problem Solving
- Boom. Bust. Build Scientific Poster
  - MSMHS Rubric 4: Scientific Research
- Homework
- Exit slips
- Warm up activities
- Accountable Talk Discussion
- Daily Think-Write-Pair Share (TWPS)
- Oral questioning
- Guided notes
- Close reading and interpretation of text

SUMMATIVE ASSESSMENTS:

- Quiz on EU 1
- Quiz on EU 2
- Age Structure Graphs
- Green Building News Article
- Boom. Bust. Build. Scientific Poster
- Unit Test

Unit Task

Unit Task Name: Boom. Bust. Build Scientific Poster

Description: Students will use information learned in this unit about human population growth (EU 1), as well as urbanization and sustainable cities (EU 2), to investigate and create a plan to make the city more sustainable. Students will create a scientific poster based on MSMHS guidelines and the MSMHS scientific research rubric.

Evaluation: MSMHS Rubric 4: Scientific Research

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Unit Resources
• Textbook (Environment Science. Jay Withgott, Pearson Education, Inc. 2011.) Chapters 8 and 10 • MSMHS School-wide Rubrics • Internet databases • Graphing calculators • Large format poster printer • Microsoft Power Point or Prezi • Laptops