Our Human Connection to the Environment

Suggested Pacing: Approximately 5-7 Blocks

Topics at a Glance:

- Science as a Process
- Human Population Increase at the center of all Environmental Issues
  - Goal = Sustainability
- The Tragedy of the Commons
- Economics Basics
- Policy Overview
- Compare ecology, environmental science, environmental activism, and sustainability.
- The Human Footprint

Stage 1 – Desired Results

Performance Expectations: (PE) (Established Goals / Content Standards)

- Obtain and evaluate data on the rise and fall of various human societies. Use algebraic thinking to examine the data and predict how resource availability has guided the development of human society. (HS-ESS3-1)
- Use principles of population dynamics to evaluate the claim that the rate of change modeled over short and long periods of time indicates that the human population has reached the carrying capacity determined by the availability of living and nonliving resources. (HS-ESS3-3)

Enduring Understandings (1-3 max)
Students will understand that:

- How Earth's limited resources are used affects all living things, human health, and economics.
- Decision making is driven by logical and emotional considerations, but decision-making models including cost-benefit analyses are critical to making informed recommendations.

Essential Questions (1-2 EQ per EU)

- In what ways does Environmental Science affect our lives?
- How do people make decisions?
- What is the environmental impact of individual decisions and societal decisions?

Science & Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Bolded SEP's are a suggested focus for this unit. ● **Ask questions and define problems** ● Develop and use models ● Plan and carry out investigations ● **Analyze and interpret data** ● **Use mathematics and computational thinking** ● Construct explanations and design solutions ● Engaging in argument from evidence ● Obtaining, evaluating and communicating information	**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) **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)	**Bolded CC's are a suggested focus for this unit.** ● Patterns ● **Cause & Effect: Mechanism & Explanation** ● Scale, Proportion, & Quantity ● **Systems & System Models** ● Energy & Matter: Flow, Cycle, Conservation ● Structure & Function ● Stability & Change

Stage 2 – Model Assessments	
Summative Performance Task(s) ● Students will conduct an impact evaluation on a particular school-based activity, product, policy, etc. It should include, risk assessment, cost-benefit analysis, etc. **Criteria:** ● Students will be evaluated with a corresponding rubric.	**Formative Assessments:** ● Student worksheets ● Checkpoint questions and submissions. ● Formative quizzes ● Teacher conferences and check-in's ● Student self-assessment & reflection

Stage 3 – Learning Plan / Road Map (Design to make as student-centered as possible)

Suggested Resources for Planning:

Wason Rule Discovery Test
http://www.devpsy.org/teaching/method/confirmation_bias.html
& https://youtu.be/vKA4w2O61Xo
Population Education:
https://populationeducation.org/curriculum-and-resources/world-population-video/
Gapminder: Don't Panic - The Facts About Population -
https://www.gapminder.org/videos/dont-panicthe-facts-about-population/
The Tragedy of the Commons online simulation
https://blossoms.mit.edu/legacy/tragedy/index.htm
& https://www.ecoocean.de/play-online/
Cost-Benefit Analysis Activity
https://www.youtube.com/watch?v=7tdKkeNClPE
Bozeman Science - ESS3C - Human Impacts on Earth Systems -
https://www.youtube.com/watch?v=lrxZ_UqQKyI
Ecological Footprint Calculator
http://www.footprintnetwork.org/en/index.php/GFN/page/calculators/
Withgott, J., Wiggins, G. P., Lisowski, M., Scotchmoor, J., Thanukos, A., & Pearson Education, Inc. (2011). Pearson environmental science: Your world, your turn. Boston, Mass: Pearson.

Learning Activities:

- Wason Rule discovery activity
- Human population video and data analysis activity
- Student question compilation about necessary resources to sustain human life.
- The Tragedy of the Commons simulation & case study
- Economics and Cost-Benefit Analysis Lessons
- Policy overview Jigsaw Activity
- Compare and contrast themes of environmental science and environmentalism activity
- Ask students to argue different proposals for the same plot by using impact studies and cost-benefit analyses differently.