



Environmental Science - Unit 2 - Human Impact

Unit Focus

Students will apply their understanding of Earth's ability to self-sustain as they investigate some of the causes that disrupt Earth's delicate balance. Students will analyze how human population growth and consumption has impacted all spheres and cycles in the environment. Students will uncover the far-reaching consequences of consumption for both needs and wants as they analyze the science that governs these issues. Students will also consider alternate perspectives and interests that influence conversation and policy. Students will take on the role of citizen scientists as they plan and conduct data-gathering experiments at the local level to assess air and water quality. Students will use sensors to assess air quality and use chemical and physical analytical techniques to assess water quality. Students will also tackle specific global environmental issues, from a scientific perspective, in a topic of their choosing, for an Earth Day campaign and an Environmental Symposium.

Stage 1: Desired Results - Key Understandings

Standard(s)	Transfer	
Next Generation Science Standards (DCI) Science: 11 <ul style="list-style-type: none">Current models predict that, although future regional climate changes will be complex and varied, average global temperatures will continue to rise. The outcomes predicted by global climate models strongly depend on the amounts of human-generated greenhouse gases added to the atmosphere each year and by the ways in which these gases are absorbed by the ocean and biosphere. (ESS2.9.D2)Changes in the atmosphere due to human activity have increased carbon dioxide concentrations and thus affect climate. (ESS2.9.D4)Resource availability has guided the development of human society. (ESS3.9.A1)All forms of energy production and other resource extraction have associated economic, social, environmental, and geopolitical costs and risks as well as benefits. New technologies and social regulations can change the balance of these factors. (ESS3.9.A2)The sustainability of human societies and the biodiversity that supports them requires responsible management of natural resources. (ESS3.9.C1)Scientists and engineers can make major contributions by developing technologies that produce less pollution and waste and that preclude ecosystem degradation. (ESS3.9.C2)	<i>Students will be able to independently use their learning to...</i> T1 Evaluate scientific claims and analyze issues to verify the credibility of the source, data, and/or approach. T2 Communicate effectively based on purpose, task, and audience to promote collective understanding and/or recommend actions.	
	Meaning	
	Understanding(s)	Essential Question(s)
	<i>Students will understand that...</i> U1 Global feedback loops govern climate change but can be impacted by humans. U2 Human population influences global energy needs which has an impact on the Earth's systems. U3 Human activities in agriculture, industry, and everyday life have had major impacts on the land, rivers, ocean, and air. U4 The sustainability of human societies and of the biodiversity that supports them requires responsible management of natural resources not only to reduce existing adverse impacts but also to prevent such impacts to the extent possible U5 Citizen scientists are take personal responsibility and action in their local communities an understand the scientific principles that govern environmental wellbeing.	<i>Students will keep considering...</i> Q1 What are the causes and consequences of environmental degradation? Q2 How can I concisely and accurately represent a dynamic environmental issue? Q3 How can I assess environmental quality? Q4 What important steps can be taken to ensure the responsible management of our natural resources?

Stage 1: Desired Results - Key Understandings

- Humanity faces major global challenges today, such as the need for supplies of clean water and food or for energy sources that minimize pollution, which can be addressed through engineering. These global challenges also may have manifestations in local communities. (ETS1.9.A2)

Next Generation Science Standards (content standards)

High School Earth and Space Sciences: 9 - 12

- 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. (HSESS3-1)
- Analyze geoscience data and the results from global climate models to make an evidence-based forecast of the current rate of global or regional climate change and associated future impacts to Earth systems. (HS-ESS3-5)

Madison Public Schools Profile of a Graduate

- Product Creation: Effectively use a medium to communicate important information. (POG.3.2)

Acquisition of Knowledge and Skill

Knowledge

Students will know...

K1 The ocean is a major contributor to our climate.

K2 The ocean is a carbon sink.

K3 The greenhouse effect is a necessary part of sustaining life on Earth, however, if it becomes too much, then the Earth's system can't adjust fast enough to maintain our current climate.

K4 Climate change causes changes in weather patterns that can substantially change the typical weather in a region, meaning, it can become colder, drier, more humid, etc.

K5 The greenhouse effect has been scientifically shown to contribute to global climate change.

K6 As the ocean acidifies, the impact is broad and includes, coral reefs, biodiversity and the amount of oxygen produced and carbon sequestered.

K7 Sea level rises can be attributed to positive feedback loops causing melting of the polar ice caps, increased volume of the ocean due to the increase in water temp.

K8 Sea level rise contributes to erosion, loss of habitat and change in the coastline.

K9 The changes in how people dispose of waste has changed over time, mostly in order to decrease the negative impact on the environment, however, waste itself has increased greatly over the past few decades.

K10 The combustion of fossil fuels is a major contributor to air pollution and the greenhouse effect.

K11 When carbon dioxide and water interact, the result is an increase in the acidity of the water.

K12 The energy budget is askew because of the carbon dioxide blanket that's trapping heat.

K13 Individuals can contribute to data collection and analysis of environmental issues.

Skill(s)

Students will be skilled at...

S1 Collection and analysis of environmental data.

S2 Partaking in authentic environmental activism or event.

S3 Analyze and explain an environmental quality issues scientifically, citing evidence, and consider and acknowledge alternate perspectives.