

2021 Unit 09: Global Change

Content Area: **Science**
Course(s): **Advanced Placement Environmental Science**
Time Period: **April**
Length: **20 periods**
Status: **Published**

Equity Considerations

Asian American and Pacific Islander Mandate

Lessons will include multiple perspectives from the Asian American and Pacific Islander population.

<https://ideas.ted.com/8-asian-americans-and-pacific-islanders-whose-innovations-have-changed-your-life-really/>

- Social

LGBTQ and Disabilities Mandate

Lessons will include multiple perspectives from the LGBTQ and Disabilities population, including Ben Barres (researcher of brain cell development and disease).

LGBTQ:

[Sir Francis Bacon \(1561–1626\)](#)

[Florence Nightingale](#)[Francis Bacon | Philosophy, Scientific Method, & Facts | Britannica](#)(1820-1910)

[George Washington Carver \(1861-1943\)](#)

[Sara Josephine Baker \(1873-1945\)](#)

STEM

[Alan Turing \(1912-1954\)](#)

[Allan Cox \(1926-1987\)](#)

[Sally Ride \(1951-2012\)](#)

[Ben Barres \(1954-2017\)](#)

[Ruth Gates \(1962-2018\)](#)

[Tim Cook \(1960\)](#)

Disabilities:

[Leonardo da Vinci \(1452-1519\)](#)- Dyslexia

[Isaac Newton \(1664-1727\)](#)- Epilepsy

[Thomas Edison \(1847-1931\)](#)- Hearing

[Charles Darwin \(1809-1882\)](#)- Stutter,
Dyslexia

[Alexander Graham Bell \(1847-1922\)](#)- Deaf

[Albert Einstein \(1879-1955\)](#)- Aspergers

[Florence B. Seibert \(1897-1991\)](#)- Mobility

[Stephen Hawking \(1942-2019\)](#)- ALS

[John Forbes Nash \(1928-2015\)](#)-
Schizophrenia

[Temple Grandin \(1947\)](#)- Autism

- Social

Climate Change

A central aspect of environmental science is to understand the global impact of local and regional human activities. Humans can mitigate their impact through sustainable use of resources. Human activities can cause ozone depletion in the stratosphere and increases in the greenhouse gases in the atmosphere. Increases in greenhouse gases can cause human health and environmental problems. These environmental problems include global climate change, ocean warming, and endangered species. Overall, this course provides an opportunity to examine the interrelationships among the natural world and challenges students to evaluate and propose solutions to a variety of environmental problems.

- Social

SCI.HS-ESS3-6

Use a computational representation to illustrate the relationships among Earth systems and how those relationships are being modified due to human activity (i.e., climate change).

Enduring Understandings:

- Local and regional human activities can have impacts at the global level.
- The health of a species is closely tied to its ecosystem, and minor environmental changes can have a large impact.

Essential Questions:

- How can local human activities have a global impact?
- Why are laws created to protect endangered species?

Lesson Titles:

- Endangered Species
- Global Climate Change
- Human Impacts on Biodiversity
- Increases in the Greenhouse Gases
- Invasive Species
- Ocean Acidification
- Ocean Warming
- Reducing Ozone Depletion
- Stratospheric Ozone Depletion
- The Greenhouse Effect

Career Readiness, Life Literacies & Key Skills

WRK.K-12.P.1	Act as a responsible and contributing community members and employee.
WRK.K-12.P.4	Demonstrate creativity and innovation.
WRK.K-12.P.5	Utilize critical thinking to make sense of problems and persevere in solving them.
WRK.K-12.P.8	Use technology to enhance productivity increase collaboration and communicate effectively.
WRK.K-12.P.9	Work productively in teams while using cultural/global competence.

Inter-Disciplinary Connections:

LA.RH.9-10.7	Integrate quantitative or technical analysis (e.g., charts, research data) with qualitative analysis in print or digital text, to analyze information presented via different mediums.
LA.RH.9-10.8	Assess the extent to which the reasoning and evidence in a text support the author's claims.
LA.RH.9-10.9	Compare and contrast treatments of the same topic, or of various perspectives, in several primary and secondary sources; analyze how they relate in terms of themes and significant historical concepts.
LA.RST.9-10.7	Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words.
LA.RST.9-10.8	Determine if the reasoning and evidence in a text support the author's claim or a recommendation for solving a scientific or technical problem.
LA.RST.9-10.9	Compare and contrast findings presented in a text to those from other sources (including

their own experiments), noting when the findings support or contradict previous explanations or accounts.

LA.WHST.9-10.1.A

Introduce precise claim(s), distinguish the claim(s) from alternate or opposing claims, and create an organization that establishes clear relationships among the claim(s), counterclaims, reasons, and evidence.

LA.WHST.9-10.1.B

Develop claim(s) and counterclaims using sound reasoning, supplying data and evidence for each while pointing out the strengths and limitations of both claim(s) and counterclaims in a discipline-appropriate form and in a manner that anticipates the audience's knowledge level and concerns.

LA.WHST.9-10.1.C

Use transitions (e.g., words, phrases, clauses) to link the major sections of the text, create cohesion, and clarify the relationships between claim(s) and reasons, between reasons and evidence, and between claim(s) and counterclaims.

LA.WHST.9-10.1.D

Establish and maintain a style and tone appropriate to the audience and purpose (e.g., formal and objective for academic writing) while attending to the norms and conventions of the discipline in which they are writing.

LA.WHST.9-10.1.E

Provide a concluding paragraph or section that supports the argument presented.

Random processes can be described mathematically by using a probability model: a list or description of the possible outcomes (the sample space), each of which is assigned a probability. In situations such as flipping a coin, rolling a number cube, or drawing a card, it might be reasonable to assume various outcomes are equally likely. In a probability model, sample points represent outcomes and combine to make up events; probabilities of events can be computed by applying the Addition and Multiplication Rules. Interpreting these probabilities relies on an understanding of independence and conditional probability, which can be approached through the analysis of two-way tables.

Randomization has two important uses in drawing statistical conclusions. First, collecting data from a random sample of a population makes it possible to draw valid conclusions about the whole population, taking variability into account. Second, randomly assigning individuals to different treatments allows a fair comparison of the effectiveness of those treatments. A statistically significant outcome is one that is unlikely to be due to chance alone, and this can be evaluated only under the condition of randomness. The conditions under which data are collected are important in drawing conclusions from the data; in critically reviewing uses of statistics in public media and other reports, it is important to consider the study design, how the data were gathered, and the analyses employed as well as the data summaries and the conclusions drawn.

Connections to Functions and Modeling.

Decisions or predictions are often based on data—numbers in context. These decisions or predictions would be easy if the data always sent a clear message, but the message is often obscured by variability. Statistics provides tools for describing variability in data and for making informed decisions that take it into account.

Data are gathered, displayed, summarized, examined, and interpreted to discover patterns and deviations from patterns. Quantitative data can be described in terms of key characteristics: measures of shape, center, and spread. The shape of a data distribution might be described as symmetric, skewed, flat, or bell shaped, and it might be summarized by a statistic measuring center (such as mean or median) and a statistic measuring spread (such as standard deviation or interquartile range). Different distributions can be compared numerically using these statistics or compared visually using plots. Knowledge of center and spread are not enough to describe a distribution. Which statistics to compare, which plots to use, and what the results of a comparison might mean, depend on the question to be investigated and the real-life actions to be taken.

- Ask the Expert (or Students as Experts) Divide students into groups. Each group will become experts on a case study involving a classic invasive species (e.g., zebra mussels, cane toad, and black rats). Then have students rotate through the groups to learn about each invasive species
- Debate Provide students with the following scenario: There is a proposal to construct a new mall. The mall would be located in a 20-acre wetland estuary near a wooded section adjacent to the school. Divide the class into two teams. One team argues that biodiversity will not be affected by the mall; the other team argues that it will. The debate should focus on the impact of the eliminated waterway.

Modifications

Benchmark Assessments

Skills-based assessment

Reading response

Writing prompt

Lab practical

Formative Assessment:

- Anticipatory Set
- Closure
- Quizzes on Ozone, Greenhouse Effect, Climate Change, Changes in the Ocean, Invasive and endangered species
- Warm-Up

Summative Assessment:

- Alternate Assessment
- Marking Period 4 Assessment
- Unit 9 Global Change Benchmark

Alternative Assessments

Performance tasks

Project-based assignments

Problem-based assignments

Presentations

Reflective pieces

Concept maps

Case-based scenarios

Portfolios

Resources & Materials:

- AP Environmental College Board Site
- Carolina Biological Lab Kits
- Cengage
- Exploring Environmental Science for AP® Updated