

# Unit Title: Climate Change: Science, Society, and Solutions

## Grade Level: 9th Grade Physical Science or Biology

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### NGSS Standards:

- HS-ESS3-5: Analyze geoscience data and the results from global climate models to make an evidence-based forecast of the current rate and scale of global or regional climate change.
- HS-ESS3-4: Evaluate or refine a technological solution that reduces impacts of human activities on natural systems.
- HS-ETS1-3: Evaluate a solution to a complex real-world problem based on prioritized criteria and trade-offs.

### Disciplinary Core Ideas (DCIs):

- ESS3.D: Global Climate Change
- ESS3.C: Human Impacts on Earth Systems
- ESS2.D: Weather and Climate
- ETS1.B: Developing Possible Solutions

### Enduring Understandings:

- Climate change is a scientifically supported phenomenon influenced by both natural processes and human activities.
- Scientific models and data provide tools to understand and predict climate change.
- Addressing climate change requires understanding scientific, ethical, economic, and political perspectives.
- Societal responses to climate change involve trade-offs, equity, and shared responsibility.

### Science and Engineering Practices (SEPs):

- Analyzing and interpreting data
- Constructing explanations and designing solutions
- Engaging in argument from evidence
- Obtaining, evaluating, and communicating information

### Crosscutting Concepts (CCCs):

- Cause and Effect – Understanding how human actions impact climate systems.
  - Systems and System Models – Viewing Earth's climate as a complex, interconnected system.
  - Stability and Change – Examining how small changes can cause major system shifts.
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## Essential Question:

- What roles do humans play in causing and responding to climate change?

## Objectives: *Students will be able to...*

1. Analyze climate data to identify trends contributing to climate change.
2. Analyze and interpret data from a scientific figure to form conclusions.
3. Describe the greenhouse effect and its link to fossil fuel use.
4. Propose solutions to reduce carbon footprints at individual and societal levels.
5. Analyze climate data to determine communities who will be most affected by climate change.
6. Communicate evidence of climate change to a non-scientific audience.

## Summative Assessments:

- Economic Impact CER: Using the trends students have identified students will complete a Claim-Evidence-Reasoning paragraph on the economic impacts of climate change for at-risk communities.
- Climate Change Children's Book: Students choose one of the topics they have explored in the unit to design a children's storybook around.

## Formative Assessments:

Assignment	How is it being graded?
<input type="checkbox"/> Completed Pre- and Post- SLO Ratings	Complete
<input type="checkbox"/> Carbon Cycle Game Data, Parts 1 &2 -	Complete, Select questions correct
<input type="checkbox"/> GHG Model Drawn	Complete, Relationships between components are correct
<input type="checkbox"/> HHMI Coral Bleaching WKST	Complete, Select questions correct
<input type="checkbox"/> Ecological Footprint Calculated	Complete and Correct
<input type="checkbox"/> Ecological Footprint Comparison Table	Complete and at least ¾ relationships are correct
<input type="checkbox"/> Glacial Retreat Data	Complete, Select questions correct
<input type="checkbox"/> Disaster Events	Complete, Two trends correctly identified
<input type="checkbox"/> Thingamabob Game Data	Complete
<input type="checkbox"/> ISEF Abstract Jigsaw	Complete, 4-6 Abstracts summarized
<input type="checkbox"/> Storybook Outline	Participation

## Potential Student Misconceptions:

<b>Misconception</b>	<b>Ways to Reframe Them:</b>
"Weather and climate are the same thing."	Clarify that weather is short-term and local, while climate is long-term and global.
"Global warming means every place gets hotter."	Address regional differences and climate variability.
"If it's cold today, global warming can't be real."	Use data to separate anecdotal evidence from climate trends
"Scientists disagree about climate change."	Share statistics on scientific consensus.
"There's nothing individuals can do."	Emphasize the power of collective and systemic change.
"Plants and oceans will fix it on their own."	Introduce carbon cycle limits and feedback loops.