

Lesson 10

Climate Change



Unit Title: Climate Change	
Theme: Ecosystems & Cycles	Grade Level: 9-10
# of sessions for the unit: class period(s) 4-5 (~45min each)	Session #10: Global Solutions to climate change
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Unit Description

Provided in a separate document. *Please see High School Curriculum Overview.*

Standard(s)

HS-LS2-7. Analyze direct and indirect effects of human activities on biodiversity and ecosystem health, specifically habitat fragmentation, introduction of non-native or invasive species, overharvesting, pollution, and climate change.

Evaluate and refine a solution for reducing the impacts of human activities on biodiversity and ecosystem health.

Unit Goals

Students will understand the causes and effects and possible solutions of climate change with an emphasis on carbon sequestration (capture)

Lesson Objectives & Essential Vocabulary

Students will identify and describe viable global solutions to mitigate rapid climate change.

Essential vocabulary:

- reforestation
- sustainability
- renewable energy
- carbon sinks
- carbon sequestration
- biofuel
- tipping point
- viable
- mitigate
- biotic factors
- biodiversity
- excess
- extract

NOTE:

If you can predict which students may not be able to achieve the goals, then you need to reduce barriers to maximize learning for all.

Note any potential barriers to the lesson – consider variability

vocab/reading ability — provide scaffolding, diagrams to clarify text, vocab assignments: word splash, etc.

Writing skills: solution provide writing prompts or sentence frames

NOTE:

Provide options — refer to the UDL guidelines as a way to ensure that all learners can demonstrate achievement of goals. For ideas: <http://bit.ly/1d5bitS>

Evaluation/Assessment

(directly linked to the goals, i.e., Formative/Ongoing Assessment or Summative/End of Lesson Assessment)

Rubric to assess student generated “Solutions Project”: presentation, poster, video, powerpoint, podcast on solutions researched

Lab Report or answers to guiding questions from Biomass Lab

Rubric to assess the persuasive essay on “Solutions to Rapid Climate Change.

NOTE: Consider the [UDL Guidelines](#) in selecting methods and materials to ensure that you provide options for engagement, representation, and action and expression.

Methods

(e.g., Anticipatory Set, Introduce and Model New Knowledge, Provide Guided Practice, Provide Independent Practice)

1. Preteach vocabulary and activate prior knowledge. Because many terms from the essential vocabulary list above have already been introduced, pre-teach the vocab in the following manner: Give students the list of essential vocabulary from above. Ask students to individually underline the terms that have already been introduced. Have students work in pairs to discuss and compare the terms they have underlined. Next have students discuss the meanings of the underlined terms to check for understanding, refresh knowledge of terms others may have forgotten or confused. Have students return to the vocabulary list and individually highlight in one color new terms they think they know. In a separate color, students should highlight words they absolutely do not know. Return to student pairs, discuss the new terms students are familiar with. Finally, as a class, discuss the unfamiliar terms.
2. Students interpret the The Elephant in the Room/excess carbon in the atmosphere graphic
 - A. <https://reforestthetropics.files.wordpress.com/2016/01/fornewsletter.jpg>
 - B. Other Documentaries showing the effects of rapid climate change include:
 - C. “Before the Flood”
3. National Geographic: “Strange Days on Planet Earth” These should be previewed by the teacher, teacher can then decide to show one in its entirety, or excerpts that enhance and support the lesson.
 - A. Teacher introduces the concept of “tipping point” and leads student discussion.
4. Students could write or develop a pictorial essay on the effects of climate change on biotic factors.
5. Teacher can introduce a Case Study for effective model of Carbon Sequestration through managed reforestation. See Reforest The Tropics
 - A. Hook: Reforestation/Restoration video regarding Hectares in Costa Rica (from Reforest The Tropics)
 - B. Guest speaker: RTT representative, Harry Hintlian
 - C. Optional biomass measurement lab: Measuring trees to calculate biomass
Refer to lesson 4 (Middle School) needs a link

6. Students individually will generate a list of possible solutions. Teacher will assemble students' lists of the student generated solutions on the board. Students will individually rank the solutions. Teacher records results on board. Class discussion of results.
7. Students will research and develop different viable solutions to rapid global climate change based on project guideline and rubric.
8. Students will produce a project: presentation, poster, video, powerpoint, podcast on solutions researched.
9. Alternative activity: Student generates a persuasive essay on researched solution.

Materials

1. Text materials Miller & Levine Biology, environmental science text would suffice, access to online research (chromebooks, laptop cart, library/media center). Point system for solutions, rubric for student generated video/podcast/movie: https://docs.google.com/spreadsheets/d/1yS8oXLDmfl4TqZITVTRv7Og4Cw12Ve1ORxC_hm03RD0/edit?usp=sharing
2. Bozeman science video link: <http://www.bozemanscience.com/ap-es-028-renewable-energy/> there are several other bozeman science videos that would be applicable
3. Documentaries: Before the Flood
4. Strange Days on Planet Earth: The One Degree Factor <https://www.youtube.com/watch?v=K3xCAp1KqAI>

Notes and Comments

Lesson 7,8 &9 are typically executed in conjunction with one another as causes lead to effects.

Grading Guide

Lesson 9 Project Rubric

CATEGORY	4	3	2	1
Purpose	The purpose of the project is clearly identified and stated.	The purpose of the project is identified, but is stated in a somewhat unclear manner.	The purpose of the project is partially identified, and is stated in a somewhat unclear manner.	The purpose of the project is erroneous or irrelevant.
Factual Information	Facts are clearly stated and supported by legitimate evidence/data	Facts are clearly stated and supported by some evidence/data	Facts are stated but lack evidence/data to support	No facts nor evidence/data are present
Organization	The project is well organized, easily understood	The project is somewhat organized and understandable	The project shows little organization and is difficult to understand	The project is disorganized and cannot be understood
Neatness, Spelling and Grammar	The project is very neat, contains no spelling nor grammatical errors	The project is neat, and contains few spelling and grammatical errors	The project is somewhat neat and contains some spelling and grammatical errors	The project is not neat and contains many spelling and grammatical errors.