**Tanzania… An Example in Battling Climate Change**

**Lesson Plan Topic:\_\_\_\_The Human Role In Environmental Change\_\_\_\_\_**

[**HS-LS2-6 Ecosystems: Interactions, Energy, and Dynamics**](https://www.nextgenscience.org/pe/hs-ls2-6-ecosystems-interactions-energy-and-dynamics)

Evaluate the claims, evidence, and reasoning that the complex interactions in ecosystems maintain relatively consistent numbers and types of organisms in stable conditions, but changing conditions may result in a new ecosystem.

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| **NEXT Generation Content Standard** |
| **Performance Expectations:** Students will make an argument for how Reforestation, and Environmental policy can be used to improve abiotic and biotic factors. Students will argue from evidence ways to establish local policy. |
| **Science & Engineering Practices** | **Disciplinary Core Ideas** | **Cross Cutting Concepts** |
| [**Constructing explanations** and **designing solutions** in 9–12 builds on K–8 experiences and progresses to explanations and designs that are supported by multiple and independent **student-generated sources of evidence** consistent with scientific ideas, principles, and theories.](http://www.nap.edu/openbook.php?record_id=13165&page=67)[**Design, evaluate, and refine** a solution to a complex real-world problem, based on scientific knowledge, student-generated sources of evidence, prioritized criteria, and tradeoff considerations.](http://www.nap.edu/openbook.php?record_id=13165&page=67) | [Moreover, anthropogenic changes (induced by](http://www.nap.edu/openbook.php?record_id=13165&page=154) **[human activity) in the](http://www.nap.edu/openbook.php?record_id=13165&page=154)** [environment—including habitat destruction, pollution, introduction of invasive species, overexploitation, and climate change—](http://www.nap.edu/openbook.php?record_id=13165&page=154)**[can disrupt an ecosystem and threaten the survival of some species.](http://www.nap.edu/openbook.php?record_id=13165&page=154)**[LS4.D: Biodiversity and Humans](http://www.nap.edu/openbook.php?record_id=13165&page=166)[**Biodiversity is increased by the formation of new species (speciation) and decreased by the loss of species** (extinction). (secondary)](http://www.nap.edu/openbook.php?record_id=13165&page=166)[ETS1.B: Developing Possible Solutions](http://www.nap.edu/openbook.php?record_id=13165&page=206)[When evaluating solutions it is important to take into account a range of constraints including cost, safety, reliability and aesthetics and to consider social, cultural and environmental impacts. (secondary)](http://www.nap.edu/openbook.php?record_id=13165&page=206) | [Much of science deals with constructing explanations of how things change and how they remain stable.](http://www.nap.edu/openbook.php?record_id=13165&page=98)There are several cross cutting explanations involved in restoration including Climate Change, Biodiversity, and Anthropogenic Change |

**Key concepts: Ecosystems, Biodiversity, Reforestation, Climate Change, Agricultural Sustainability, Anthropogenic Changes**

**Goals for Understanding**

* What goals for understanding provide the guidance for how you design the lesson

**Vocabulary**

Identify the new academic words that should be taught in your lesson *(content vocabulary)* and the words needed to understand those ideas *(support vocabulary)*

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| **Content Vocabulary** | **Support Vocabulary** |
| **Climate Change** | **Sustainable** |
| **Reforestation** | **Organic** |
| **Sustainable Agriculture** | **Biome** |
| **Biodiversity** |  |
| **Biotic Factors** |  |
| **Abiotic Factors** |  |
| **Anthropogenic Changes** |  |
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**Learning activities**

VR Videos

1. Visit Tanzanian National Parks ([Biodiversity](https://www.thinglink.com/video/1519082220583649282))
2. Visit Tanzanian Plant Restoration Site ([Plant Reforestation](https://www.thinglink.com/video/1519083633481089026))
3. Visit Tanzanian Sustainable Agricultural Coffee Farm (Sustainable Agriculture)

Laboratory: There are 3 labs here, select the one that best fits your students.

* **Climate Change Impact Simulator (**[**link**](https://croadsworldclimate.climateinteractive.org/)**)**
* **NASA Climate Change Lab (**[**link**](https://pmm.nasa.gov/education/sites/default/files/lesson_plan_files/climate%20change%20inquiry/Climate%20Change%20Inquiry%20TG.pdf)**)**
* **Modeling Lab (**[**link)**](https://geo.libretexts.org/Learning_Objects/Visualizations_and_Simulations/ClimateSim%3A_Climate-change_Simulator)
* **Climate Change Video (**[**link**](https://royalsociety.org/topics-policy/projects/climate-change-evidence-causes/basics-of-climate-change/)**)**

Reading:

We are providing a downloadable pdf text to use for this lesson please download here[**(link)**](https://stanford.app.box.com/s/mo89y66wan38ca6oqqq7uckfsgh7gnml)

**Assessment Activities**

**Final Assessments:** Students will record a 2-5 minute Documentary video explaining how Tanzania is engaged in Environmental restoration. Their video will do 4 things: (1) Explain the concepts of Climate Change, Reforestation, Sustainable Agriculture, Biodiversity, Abiotic, Biotic Factors, & Anthropogenic Changes. (2) How can the US follow the Example in Tanzania? (3) What can you do to lead the environmental restoration movement. (4) Make an argument from evidence about why environmental restoration is important?

**FINAL ASSESSMENT RUBRIC**

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| **CATEGORY** | **1 POINT EARNED** | **2 POINTS EARNED** | **3 POINTS EARNED** |
| **Conceptual Accuracy** | The student inaccurately describes 3 or more science concepts. | The student describes 1-2 concepts inaccurate, but all others are accurately explained. | The student accurately describes every science concept accurately. |
| **Explanation of Key Academic Terms** | The student accurately uses and explains 3 to 5 of the 7 key terms of the lesson. | The student accurately uses and explains 5 of the 7 key terms of the lesson. | The student accurately uses and explains each of the 7 key terms of the lesson.  |
| **Accuracy of Tanzanian Case Study** | The student accurately explains how Tanzania can be a model in 1 of 3 categories *(Biodiversity, Reforestation, & Sustainable Agriculture)* | The student accurately explains how Tanzania can be a model in 2 of 3 categories *(Biodiversity, Reforestation, & Sustainable Agriculture)* | The student accurately explains how Tanzania can be a model in all 3 categories *(Biodiversity, Reforestation, & Sustainable Agriculture)* |
| **Description of US Application** | The student describes how the use can develop plans in 1 of 3 categories *(Biodiversity, Reforestation, & Sustainable Agriculture)* | The student describes how the use can develop plans in 2 of 3 categories *(Biodiversity, Reforestation, & Sustainable Agriculture)* | The student descries how the use can develop plans in all 3 categories *(Biodiversity, Reforestation, & Sustainable Agriculture)* |
| **Description of personal application and role.** | The student describes the role they can play without applying it to Biodiversity, Reforestation, and Sustainable Agriculture. | The student describes the role they can plan in 1 of the 3 categories Biodiversity, Reforestation, and Sustainable Agriculture | The student describes the role they can plan in impacting the ecosystem in Biodiversity, Reforestation, and Sustainable Agriculture |
| **Argue**  | The student makes no argument from evidence explaining a rationale for why environmental restoration is important. | The student hints at an argument from evidence explaining a rationale for why environmental restoration is important. | The student makes an argument from evidence explaining a rationale for why environmental restoration is important. |

Possible score = 18/18

**Lesson Plan Agenda**

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| **TIME** | **TASK** | **DESCRIPTION** | **NEEDS** |
| **10 min** | **Google “Environmentalist”** | -To get a sense of who are considered environmentalist, have the students google the word environmentalist. Ask the students to identify the patterns. | - students will need a digital device |
| **5 min** | **Share Out**  | * Have students quickly share what they learned

Mwanamazingira= Environmentalist in Swahili | * Screen share if distant,
 |
| **10 min** | **What is an Environmentalist & Who Should Be an Environmentalist** | * Have a whole class discussion about who is an environmentalist and who should be an environmentalist
 | -n/a |
| **5 min** | **Understanding Climate Change Video** | Students will watch a short video on climate change. After watching the video they will answer 2 discussion questions: What is causing climate change? What are humans doing to speed up climate change? | [Link:](https://royalsociety.org/topics-policy/projects/climate-change-evidence-causes/basics-of-climate-change/)* Have notes in the handout and on the appropriate slide
 |
| **10 min** | **Teachers Debrief** | The Teacher will review the students’ answered | * n/a
 |
| **10 min** | **Students Brain Storm: What Would it Take to Change Climate Change** | The students will answer a think tank question: How can we reverse the impact of climate change? | Have notes in the handout and on the appropriate slide |
| **15 min** | **A Success Story in Tanzania: Reading** | Reading: Students will read an article on Tanzania’s fight against climate change. Read page 1-4 | * Have readings ready
* Have notes in the handout and on the appropriate slide
 |
| **10 min** | **Reflection:****Discussion** | 1. If your neighborhood was left alone and humans did not build on the land, what types of animals would be thriving in your area?
2. If we want to increase biodiversity in our own community, what can we do?
 | Have notes in the handout and on the appropriate slide |

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| **DAY 2** |
| **TIME** | **TASK** | **DESCRIPTION** | **NEEDS** |
| **15 min** | **Safari Visit** | VR: 360 – To prepare students for the video ask them to identify the animals and how the physical landscape is maintained to support their growth | * Have videos cued
 |
| **10 min** | **Teacher Explanation** | Explain how keeping animals free and limiting human development allow multiple species to thrive in the same area. * Be sure to explain how Reforestation & Biodiversity are connected
 | Have notes in the handout and on the appropriate slide |
| **10 min** | **Group Read** | Read Text Page 5-6: Abiotic vs. Biotic Changes in The Environment | Have reading prepared |
| **10 min** | **Small Group Brainstorm:** | In small groups, student will discuss: (1) What can humans to impact the Abiotic feature of an environment? (2) List 5 ways humans can change the Biotic conditions of an environment? | Have notes in the handout and on the appropriate slide |
| **10 min** | **Share Out** | The teacher will have the students share their responses. |  |
| **10 min** | **Read** | Students will read pages 7-8 about Reforestation in Tanzania. | Have reading prepared |
| **10 min** | **VR- Video Reforestation Project In Tanzania** | Student will watch a brief video about Reforestation in Tanzania. A | Have notes in the handout and on the appropriate slide |
| **10 min** | **Discussion** | The teacher will host a full classroom discussion of the following questions: (1) How would reforestation help climate change? (2) What are the strengths and weaknesses of the approach being used in Tanzania? (3) How can we use similar strategies here? | Have notes in the handout and on the appropriate slide |

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| **Day 3** |
| **TIME** | **TASK** | **DESCRIPTION** | **NEEDS** |
| **10 min** | **Review Big Ideas** | Discuss each of the big ideas: Biodiversity, Abiotic vs. Biotic, Anthropogenic Changes | Have notes in the handout and on the appropriate slide |
| **45 min** | **Laboratory** | Select one of the 3 labs listed above to complete the laboratory. | Select lab from options above |
| **15 min** | **Review results from laboratories** | Students will complete their analysis  | Have notes in the handout and on the appropriate slide |
| **10 min** | **Explain Final Assessment: Documentary** | Explain the final assignment for the students and share the rubric with the student to prepare them  | Have a copy of the rubric prepared |
| **10 min** | **Q&A** | Discuss any question the students have about the science concepts and the case study in Tanzania. | Have notes in the handout and on the appropriate slide |
| **TBD** | **Host a Film Festival**  | Host a film festival where students share their short documentaries. Award the best documentaries a film festival award. Students can vote and score based on the rubric. | Have notes in the handout and on the appropriate slide |