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| **TGC Fellow Unit Template** | | |
| Prepared by: **Floridia Cheung** School/Location:  **King Canyon Middle School, Fresno Unified School District, Fresno, CA, USA** | | |
| Subject: **Sciences**  Grade: **7th Grade Life Sciences**  Interdisciplinary Unit Title: **Climate Change Impacts on Forestry or Ecosystems**  Time Needed: **4 weeks** | | |
| **Unit Summary:**  Due to climate change, students will study statistics on how animal and plant populations are changing all over the world.  This unit will be launched with studying their own local National Parks in the California Sierras, where bark beetles are decimating huge numbers of pine trees in the forests due to the drought. They will learn the science skills of collecting and analyzing data, and then connect how the phenomenon is connected to climate change. The students will then embark on an inquiry project about whether the animal, plant and climate change phenomenon is only in California, or is it happening in other parts of the world as well? Groups will select case studies around the world from various global resources, and identify data evidence from various ecosystems to support whether or not climate change really exists. Students will then communicate their understanding through providing global evidence of climate change. They will create action plans on teaching the public on how to be global citizens in protecting the environment. The summary of their learning will be producing public service announcements that will be distributed through social media, and hopefully distribution will go beyond our state. | | |
| **STAGE 1: Desired Results** | | |
| **ESTABLISHED GOALS AND STANDARDS:**  **NGSS MS-LS1-4** Use argument based on empirical evidence and scientific reasoning to support an explanation for how characteristic animal behaviors and specialized plant structures affect the probability of successful reproduction of animals and plants respectively.  **NGSS MS-LS1-5.** Construct a scientific explanation based on evidence for how environmental and genetic factors influence the growth of organisms.  **NGSS SEP Analyzing and Interpreting Data.** Analyze and interpret data to provide evidence for phenomena.  **NGSS SEP Constructing Explanations and Designing Solutions.** Construct a scientific explanation based on valid and reliable evidence obtained from sources and the assumption that theories and laws that describe the natural world operate today as they did in the past and will continue to do so in the future.  **NGSS SEP Engaging in Argument from Evidence.**  Use an oral and written argument supported by empirical evidence and scientific reasoning to support or refute an explanation or a model for a phenomenon or a solution to a problem.  **NGSS SEP Obtaining, Evaluating, and Communicating Information.** Gather, read, and synthesize information from multiple appropriate sources and assess the credibility, accuracy, and possible bias of each publication and methods used, and describe how they are supported or not supported by evidence.  **NGSS CCC Cause and Effect.** Cause and effect relationships may be used to predict phenomena in natural systems. Phenomena may have more than one cause, and some cause and effect relationships in systems can only be described using probability.  **Common Core State Standards ELA RST.6-8.1.** Cite specific textual evidence to support analysis of science and technical texts.  **Common Core State Standards ELA RST.6-8.7.** Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually.  **Common Core State Standards ELA WHST.6-8.1.** Write arguments to support claims with clear reasons and relevant evidence.  **Common Core State Standards ELA WHST.6-8.2.** Write informative/explanatory texts to examine a topic and convey ideas, concepts, and information through the selection, organization, and analysis of relevant content.  **Common Core State Standards ELA SL.8.5** Include multimedia components and visual displays in presentations to clarify claims and findings and emphasize salient points..  **Common Core State Standards Mathematics 6.RP.A.3** Use ratio and rate reasoning to solve real-world and mathematical problems.  **Common Core State Standards Mathematics 6.EE.C.9.** Use variables to represent two quantities in a real-world problem that change in relationship to one another; write an equation to express one quantity, thought of as the dependent variable, in terms of the other quantity, thought of as the independent variable. Analyze the relationship between the dependent and independent variables using graphs and tables, and relate these to the equation.  **Common Core State Standards Mathematics 6.SP.B.5.** Summarize numerical data sets in relation to their context.  **GLOBAL COMPETENCY:**  ***● Investigate the World:*** *Students will learn about the effects of climate change on various parts of the world. They may also identify how humans impact these changes around the world, particularly with fossil fuels.*  ***● Recognize Perspectives:*** *Students will identify/discuss the effects of climate change abroad through case studies and data. Students will also look at how foreign countries respond to the climate change concern, ranging from lifestyle solutions to legislative actions/inactions.*  ***● Communicate Ideas:*** *Students will work together to analyze and solve problems. Students will share their solutions in both a class presentation and a brief psa video.*  ***● Take Action:*** *Students will use their research to develop a public service announcement on YouTube.*  **TECHNOLOGY USED:**  ***●*** Microsoft Powerpoint with Office Mix  ***●*** Video production equipment such as cameras, microphones, lighting etc.  ***●*** Video editing software  ***●*** Virtual headsets for 360 degree studies on various ecosystems  ***●*** Skype with scientists, university researchers, students around the world who are also studying climate change  **TECHNOLOGY/DIGITAL RESOURCES:**  [**http://www.pnas.org/content/104/50/19697.full**](http://www.pnas.org/content/104/50/19697.full)  **EPA’s Students’ Guide to Climate Change**  [**https://www3.epa.gov/climatechange/kids/**](https://www3.epa.gov/climatechange/kids/)  **World Wildlife Fund**  [**http://www.worldwildlife.org/initiatives/climate**](http://www.worldwildlife.org/initiatives/climate)  **The Geography of Climate Justice**  [**http://www.mrfcj.org/pdf/Geography\_of\_Climate\_Justice\_Introductory\_Resource.pdf**](http://www.mrfcj.org/pdf/Geography_of_Climate_Justice_Introductory_Resource.pdf)  **National Oceanic and Atmospheric Administration (NOAA)**  [**http://www.noaa.gov/climate**](http://www.noaa.gov/climate)  **UN Framework Convention on Climate Change (UNFCC) Essential**  **Background**  [**http://unfccc.int/essential\_background/items/6031.php**](http://unfccc.int/essential_background/items/6031.php)  **UN Climate Change Newsroom**  [**http://newsroom.unfccc.int/**](http://newsroom.unfccc.int/)  **World Bank’s Climate Change Page**  [**http://www.worldbank.org/en/topic/climatechange**](http://www.worldbank.org/en/topic/climatechange)  **Non-American Resources:**  [**World Newspapers**](http://www.world-newspapers.com/)  [**The Big Project**](http://www.thebigproject.co.uk/news/#.Vh6Cs9bDYw9)  [**Onlinenewspapers.com**](http://www.onlinenewspapers.com/)  [**Newspapers Global**](http://www.newspapersglobal.com/)  [**Worldpress.org**](http://www.worldpress.org/gateway.htm)**.**  [**Front Pages from Around the World**](http://www.newseum.org/todaysfrontpages/)  **Video sources: TED, UN videos, Climate Refugees, etc.**  [**http://www.bbc.com/news/science-environment-34555220**](http://www.bbc.com/news/science-environment-34555220)  [**http://yaleglobal.yale.edu/content/global-warming-real-has-conSequences-part-i**](http://yaleglobal.yale.edu/content/global-warming-real-has-conSequences-part-i)  [**http://www.epa.gov/climatechange/basics/**](http://www.epa.gov/climatechange/basics/)  [**http://www.epa.gov/climatechange/science/overview.html**](http://www.epa.gov/climatechange/science/overview.html)  [**http://ngm.nationalgeographic.com**](http://ngm.nationalgeographic.com) **(CC Issue)**  [**http://yearsoflivingdangerously.com**](http://yearsoflivingdangerously.com)  [**http://www.filmsforaction.org/articles/the\_top\_10\_documentaries\_about\_climate\_change/**](http://www.filmsforaction.org/articles/the_top_10_documentaries_about_climate_change/)  **Social Media:**  **Facebook**  **Snapchat**  **Instagram**  **Twitter**  **YouTube** | ***Transfer*** | |
| Students will be able to independently use their learning to...  **T1:** Identify and explain factors for Climate Change  **T2:** Analyze scientific data evidence of ecosystem changes between plants and animals  **T3:** Compare global case studies and evidence for climate change  **T4:** Recognize multiple global perspectives and solutions in dealing with climate change  **T5:**  Create an argument and propose solutions to a global audience by creating a public service announcement to preserve the planet. | |
| ***Meaning*** | |
| **UNDERSTANDINGS**  **U1:** Students will understand how humans are contributing to and are impacted by climate change, which is substantiated by evidence and facts.  **U2**: Different countries and regions contribute to and are impacted by climate change by various ways.  **U3:** Short- and long-term impacts of climate change, which upsets the balance of ecosystem, specifically between humans, animals and plants at different parts of the world.  **U4:** Role of humans in solving the problem of  climate change (prevention, mitigation,  restoration).  **U5:**  Students understand how legislative actions are needed to address climate change. | **ESSENTIAL QUESTIONS:**  **E1:**  What is climate change? What does it look like in different parts of the world? What are the multiple perspectives from different countries?  **E2:** What is the argument against climate change?  **E3:** What are the data evidences for climate change locally and globally?  **E4:** What are the near- and long-term global impacts of climate change?  **E5:** As a world phenomenon, what are some some global actions everyone can take to provide solutions to climate change? How many of those were suggested by other countries? Are there comparative legislative policies that have been enacted by US and foreign countries? |
| **Acquisition** | |
| *Students will know:*  **K1:** Climate and climate change that is substantiated by evidence and facts.  **K2:**  Causes of climate change.  **K3:** Short- and long-term impacts of climate change, which upsets the balance of ecosystem, specifically between humans, animals and plants at different parts of the world.  **K4:** Role of humans in solving the problem of climate change (prevention, mitigation,  restoration, legislation, etc.). | *Students will be able to:*  **SI:**  analyze data to create an argument that climate change is a concern for the planet.  **S2**: work together in partners or small groups.  **S3:** express differing opinions respectfully.  **S4:**  research various legislative policies nationally and globally that address climate change.  **S5:**  create a public service announcement about climate change.  **S6:** share and articulate solutions with students, teachers,and local climate change experts.  **S7:**  develop solutions and actions plans that meet the needs of a specific region, including cultural considerations. They may also compare US national and foreign legislation in tackling climate change.  **S8:**  if possible, use their bilingual skills to reach a wider audience. |
| **Stage 2 - Evidence** | | |
| **Assessment** | **Evaluation Criteria (Learning target or Student Will Be Able To)** | |
| Assessments **FOR** Learning:  ➔ Assessing Prior Knowledge: Students will share their previous understanding on ecosystems and climate change.  ➔ Science modelling: Explain animal and plant population compete for resources  ➔ Data Analysis: Students will analyze and extrapolate evidence for genetic and environmental factors for ecosystem changes.  ➔ Common Formative Assessments through exit tickets/Plickers/Nearpod/Microsoft Forms/etc.: Students demonstrate fluency in science specific vocabulary such as ecosystems, populations, genetic factors, environmental factors, climate change, etc.  ➔ Socratic Seminars: Discourse reveals student thinking in response to multiple texts  ➔ Discussion Table Groups: Discourse reveals their understanding of various case studies around the world that support/do not support climate change.  ➔ Reflective responses: Individual and metacognitive thinking revealed in scientific notebooks. | **Learning Targets:**   1. Students will be able to demonstrate mastery over science content, specifically being able to define climate, climate change, ecosystems, population, correlation, genetic and environmental factors. 2. Students will be able to research and understanding the global effect of climate change. They will be able to articulate global perspectives about the issue. 3. Students will be able to articulate the argument against climate change. 4. Students will be able to analyze a graph. 5. Students will be able to use statistical evidence to create a scientific argument. 6. Students will be able to study a non-American case study, from a non-American resource, about the impact of climate change on their ecosystems. 7. Students will be able to compare two different ecosystems on the planet, which support the evidence of climate change. 8. Students will look at how different countries respond to climate change. 9. Students will be able to follow agreements for discussions (e.g., listen to one another-pause, paraphrase, probe, consider the perspectives of others, and share your ideas) 10. Students will be able to discuss and work collaboratively, efficiently, and productively in diverse groups. They will understand and recognize diverse perspectives. 11. Students will be able to write reflections on their learning. 12. Students will be able to work in a group to form an action plan. | |
| Assessments **OF** Learning:  ➔Pamphlet/Powerpoint/etc on Bark Beetles and Pine Trees in the California Sierras: Students will prepare an informational text to explain how the drought and climate change have caused an ecosystem phenomenon.  ➔ Class presentation: Presentation of another climate change study from a foreign country’s ecosystem, and how they are responding to the change.  ➔ Public Service Announcement Powerpoint / Video: A social media distributed explanation of climate change, that is supported by evidence from two case studies, and action plans to tackle the global problem. | 1. **Written piece** (Student choice of essay, pamphlet, powerpoint, etc.) with these components.    1. Students will be able to articulate a claim statement about the bark beetle and pine tree phenomenon.    2. Students will be able to utilize climate factors and data to support their understanding of the phenomenon.    3. Students will be able to contextualize how climate change may have caused this phenomenon.   2. **Group class presentation on their global ecosystem research**   1. Students will be able to present their non American ecosystem study to the class. They will provide data to show how climate change may influence the environmental changes. 2. Students will be able to compare the foreign study to the Bark Beetle phenomenon. 3. Students will be able to present how the foreign country tackle climate change. These may include science, lifestyle, or legislative solutions. 4. Students will be able to synthesize their research and present it to the class. 5. Students will be able to critique and respond in class discussions to enhance their research for the PSA.     3. **Public service announcement** (Video or Powerpoint Mix)   1. Students will be able to define climate change. 2. Students will be able to use data evidence from two different ecosystems (one from another country) to support climate change. 3. Students will be to able to propose global solutions to tackle climate change. | |
| **Stage 3 - Learning Plan** | | |
| Summary of Key Learning Events and Instruction  (Make this a useful outline or summary of your unit, your daily lesson plans will be separate)  ***Rationale:*** Students will do a microstudy of a local ecosystem, before they do a macro study of climate change on the entire planet. Then students will study a second foreign ecosystem, where they will make it a comparison to their local ecosystem. This comparative study will support their argument for or against climate change. The culminating project is a public service announcement. They will articulate the climate factors and environmental changes of the two ecosystems that may or may not support the argument for climate change. They will also propose solutions for a more sustainable planet.  **Week One: Climate phenomena with the bark beetle and pine trees in the California Sierras**  Students will be presented with how a climate phenomena is affecting our world. They will then analyze to see how the severe drought has impacted the bark beetles and pine trees population in the Sierra Mountains. They will utilize data evidence to substantiate their claims. They will look at multiple resources and articulate a descriptive written piece of work to demonstrate their understanding.  **Week Two: Climate change**  Students will study climate change, examining evidence supporting supporting the reality. They will look at counter arguments against climate change. They will learn scientific vocabulary and identify the global factors creating environmental concerns, so they understand the macro effects of fossil fuels and human impact. They will look at the argument about how fossil fuels and carbon emissions are a result of humans around the globe that have created this climate change concern. They will examine how various countries and their governments are responding to climate change. They will decide if they will argue for or against climate change.  **Week Three: Global study on another ecosystem**  Students will form groups to study another ecosystem that may be impacted by climate change. They will utilize non-American resource / authors for texts, so they can grasp multiple perspectives and science credibility on the study. There will be an opportunity to identify opportunities with scientists or students from foreign countries for collaboration. They will also inquire about foreign solutions and legislation to tackle climate change.  **Week Four: Climate change public service announcement**  Students will be prepare a public service announcement video that defines climate change, and utilizes two different ecosystem case studies to validate the global concern. They will then communicate and propose multiple solutions in tackling climate change. | | |

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| **TGC FELLOWS UBD Lesson Template** | | |  |
| **LESSON TITLE:** Global Study on a foreign ecosystem  **SUBJECT:** 7th grade Sciences  **PREPARED BY:** Floridia Cheung  **LENGTH OF LESSON:** Five - 1 hour class periods  **MATERIALS NEEDED:** Computer, Microsoft Powerpoint Template  **GLOBAL COMPETENCIES:**  ***● Investigate the World:*** *students will learn about the effects of climate change on the world.*  ***● Recognize Perspectives:*** *Students will discuss the effects of climate change abroad. They will also review how foreign countries respond to the climate change concerns with varying solutions and legislation.* | | |  |
| **W**here is the lesson going?  (Learning Target or SWBAT) | Students in groups will be able to create a case study of a foreign ecosystem with multiple resources, including non-American digital newspapers. They may correspond with a foreign scientist or citizen to confirm this research. They will examine the scientific data that shows an imbalance or change in the ecosystem between humans, animals and plants. They will also identify how those countries are responding to those environmental and climate change concerns.  **Essential Question 1:** What are the genetic and environmental factors that are changing the ecosystem?  **Essential Question 2:** What are the people and government doing to respond to these environmental concerns?  **Essential Question 3:** Does your data prove or disprove climate change? Use quantitative and qualitative data. | |  |
| **H**ook: | | **T**ailored Differentiation: |  |
| ***Is climate change just a local concern, or a global phenomenon? Is there science evidence of climate change in another part of the world? Are there global concerns and collectivity we can do to address these concerns?***  **Group Research:** Students will collaborate to agree on selecting a global study of an ecosystem that is not a part of the United States. Students will be challenged to see if there have been significant changes on ecosystems on other parts of the world, besides in our country. They will identify an ecosystem based on their interest, concern, severity of issue, etc. They will try to see  They will agree on roles in their group:   1. Everyone is a **researcher** 2. **Writer**: Student will prepare most texts 3. **Technician**: Student will organize and format digital presentation 4. **Presenter**: Student will be lead presenter for the class presentation 5. **Project Manager**: Student will make sure everyone is on task, and will fill in for whoever is absent. | | Students will be grouped in fours according to abilities, personalities, skills, interests, etc.  Students will take on roles that are of interest and strength to them.  Students with IEP and SST plans will be accommodated.  Students have a choice in their study.  If they do not want to do a Powerpoint, students have the option to create a different form of presentation, ranging from a poster, triboard, report, etc.  I may ask for additional support or deployment if students cannot complete assignment on time.  I may offer extra time and support after school for tutorials. |  |
| **E**quip: | |  |
| I will suggest a list of ecosystems to study, but groups are allowed to find their own foreign case studies too.  I will create a group Powerpoint template where students have to complete their research. They have to utilize at least two non-American resources or articles. The research information I expect them to find is the following:   1. Where is this ecosystem located in the world? They need a graphic to identify the location of the ecosystem. They need to find at least 10 photos and one video about this ecosystem. 2. Students need to each identify a text resource about the ecosystem, and two of them are non-American resources. Scientific data, specifically quantitative data, needs to be identified to show the change in ecosystem. 3. Students need to each identify one way as to how the country or government is responding or not responding to the environmental concern. 4. Students need to contextualize the study as to whether it supports or does not support climate change. | |  |
| **Rethink and revise:** | |  |
| I will be giving groups ongoing feedback in their Microsoft Powerpoint to check progress and thinking. I will also be able to give them more resources as needed.  I will constantly be physically circulating to check their progress and understanding through informal group discussions.    I will have daily targets and share outs on the development of their research.  Students will post their progress on padlet for everyone to see their storyboards, and they may receive critique or comments.  They will present their Powerpoints to the class at the end of the week. Class will give them feedback, and they will have an opportunity to revise their research. | |  |
| **Evaluate:** | |  |
| Students will present their Powerpoints to the class, and peers can give them critical feedback or tips to enhance their arguments. | |  |
| **NOTES:**  Since this is a student inquiry and project based learning, the lesson plan may seem too unstructured. The Powerpoint template will guide them through research questions and demands, embedded with critical questions. The Powerpoint presentation will be the culminating testimony of their understanding of the ecosystems. | |  |
| **O**rganization: |  |
| Microsoft Teams and Powerpoint are cloud based apps for easy accessibility for students. |  |
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