

# Home in the Face of Climate Change

## Summary:

This Science On a Sphere® lesson explores the relationship between climate change and forced movement of communities in Alaska and the Pacific Islands. While specifically developed for high-school students and above, this lesson can easily be adapted to any age group. Use the sphere to examine the impacts of climate change at different latitudes, and the different challenges regions face as a result of rising temperatures, while learning from the stories of people who have had to leave home, where they have gone, and the broader national/global efforts in climate adaptation.


## Data Set Playlist (with other images):

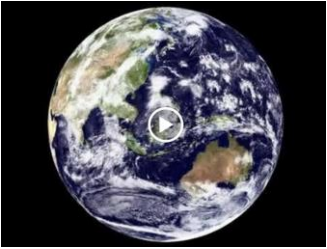

Blue Marble: <https://sos.noaa.gov/datasets/blue-marble/>


Temperature Anomaly: <https://sos.noaa.gov/datasets/temperature-anomaly-yearly-noaa-1880-present/>



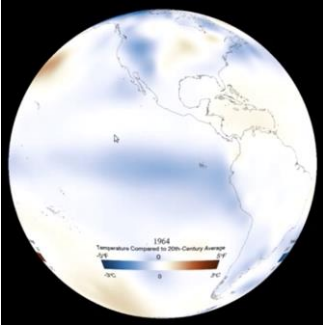
Human Climate Niche 2020 to 2070: <https://sos.noaa.gov/datasets/human-climate-niche-2020-and-2070/>

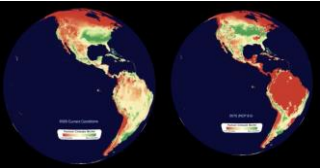
Human Migration 2010 to 2015: <https://sos.noaa.gov/datasets/human-migration-2010-2015/>

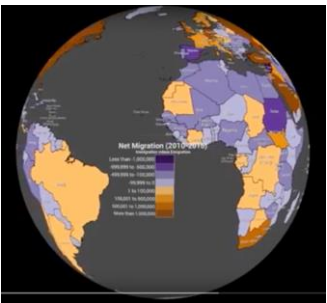
Slides	Thumbnail	Data Sets	Script/d
1		<p>Blue Marble</p> <ul style="list-style-type: none"> <li>• Orient the globe to the poles/equat or</li> </ul>	<p>A. This is a show about the impacts of climate change on communities in the Pacific Island region and Alaska</p> <p>B. [POTENTIAL ACTIVITY SPACE]</p> <p>C. [AUDIENCE QUESTIONS]:</p> <ol style="list-style-type: none"> <li>a. <b>To start off, I have a couple of questions for you guys.</b> <ol style="list-style-type: none"> <li>i. How would you feel if you couldn't stay in your home?           <ol style="list-style-type: none"> <li>1. POSSIBLE ANSWERS:               <ol style="list-style-type: none"> <li>a. Sad</li> <li>b. Angry</li> <li>c. Upset</li> <li>d. Worried</li> </ol> </li> <li>2. <i>Remind the audience that these are all valid</i></li> </ol> </li> </ol> </li> </ol>


			<p style="text-align: right;"><i>emotions to have</i></p> <p>ii. What would you do if you knew you couldn't stay in your home?</p> <ol style="list-style-type: none"> <li>1. POSSIBLE ANSWERS: <ol style="list-style-type: none"> <li>a. Leave or make plans to leave</li> <li>b. Try and build infrastructure to stay longer</li> </ol> </li> <li>2. <i>Tell the audience that those are all understandable plans</i></li> </ol>
2		Blue marble dataset	<p>D. We're an interconnected planet</p> <ol style="list-style-type: none"> <li>i. Any changes to our environment can have impacts everywhere</li> </ol>
3		Incinerator	<ol style="list-style-type: none"> <li>a. That makes the issue of climate change a global issue, both in terms of its cause and its impact. Climate change is caused by the increasing global greenhouse gas emissions from fossil fuel use <ol style="list-style-type: none"> <li>ii. Use of fossil fuels are more prevalent than many might realize, from the plastic water bottles we make to the way we get around town. All of those fossil fuel emissions make their way into our atmosphere.</li> <li>iii. This has implications for rising temperatures worldwide, which in turn has impacts on a host of other weather patterns and people around the globe</li> </ol> </li> </ol>

			<p>b. Climate change makes conditions more extreme</p> <ul style="list-style-type: none"> <li>i. Give examples of hurricanes, droughts, wildfires</li> <li>ii. Sea level rise outside of Bishop Museum <ul style="list-style-type: none"> <li>1. According to the <a href="#">NOAA Sea Level tracker</a>, the area where the Bishop Museum [or any museum] is is extremely vulnerable to the impacts of sea level rise</li> </ul> </li> <li>iii. [Comparison]: If we compare this to moods, it's okay to be sad once in a while, but you wouldn't want to experience being really really sad all of the time. In the same way, a hurricane every so often is manageable for local policy makers and the community, but hurricanes that are a lot more frequent or really intense will wreck a lot more damage. It's hard for people to keep living in those areas, so they're forced to move.</li> </ul>
4		Alaska & Hawaii	<p>b. Let's examine two vulnerable communities, Alaska and the Pacific Islands</p> <ul style="list-style-type: none"> <li>iv. These two regions are at the coldest and hottest parts of the globe, and are already at the extremes. Climate change will take them even further to the extremes.</li> <li>v. Communities here are particularly vulnerable to being forced to move, better known as displacement</li> </ul>

			<p><b>c. [AUDIENCE QUESTIONS]:</b></p> <ul style="list-style-type: none"> <li>i. What sort of changes do you think we are seeing in Alaska? <ul style="list-style-type: none"> <li>1. POSSIBLE AUDIENCE ANSWERS: <ul style="list-style-type: none"> <li>a. Melting ice</li> <li>b. Permafrost melt</li> </ul> </li> </ul> </li> <li>ii. What sort of changes do you think we are seeing in the Pacific Islands? <ul style="list-style-type: none"> <li>a. Sea level rise</li> <li>b. More hurricanes</li> </ul> </li> </ul>
5		Newtok, Alaska – Coastal Erosion	Take a look at the impacts of climate change on this community along the Alaskan coast, where homes are falling into the water as a result of melting permafrost and rising temperatures
6		King Tide	King tides in Hawaii are an example of greater flooding as a result of sea level rise
7		<p>Temperature Anomaly: Yearly (NOAA) - 1880 - Present</p> <p>*Direct audience to pay particular attention to what is happening at different latitudes (Arctic and Equator)</p>	<p>E. How out of the ordinary are the temperatures we're seeing as a result of climate change? Let's take a look.</p> <p>F. This map shows how much hotter and cooler different areas are from "normal," starting in the late 1800s. Areas that are darker red have much higher temperatures than normal. Areas that are darker blue have cooler temperatures than normal.</p> <p><b>G. [AUDIENCE QUESTION]:</b></p> <ul style="list-style-type: none"> <li>a. What areas have a lot more red? <ul style="list-style-type: none"> <li>i. POSSIBLE AUDIENCE ANSWERS: <ul style="list-style-type: none"> <li>1. Everywhere</li> <li>2. Poles (especially as seen on this map)</li> <li>3. On the continents</li> </ul> </li> </ul> </li> </ul>

			<p>H. As you can see here, we're seeing a lot more red around the equator and the poles, and a lot more red as we move through time because we're seeing more and more of the impacts of rising temperatures</p> <ul style="list-style-type: none"> <li>a. These areas are getting a lot warmer</li> </ul> <p>I. Global temperatures are rising and will continue to rise into the future</p>
8	 <p>Human Climate Niche - 2020 and 2070</p> <p>* Areas in red are more impacted by climate change</p>		<p>J. Now we know that these regions are warming rapidly-- but what does this actually mean for humans?</p> <p>K. Notice what regions are “niche” for human survival</p> <ul style="list-style-type: none"> <li>a. Niche means a comfortable space of position. When talking about climate niches, these are the regions with the ideal temperatures and climate for humans to thrive and live in</li> <li>b. The darker red areas are areas that are unsuitable for humans to live in, while the areas that are darker green are ideal for humans to thrive in <ul style="list-style-type: none"> <li>i. The darker red areas can refer to a host of changes happening <ol style="list-style-type: none"> <li>1. Sea level rise means that coastline areas will be inaccessible <ul style="list-style-type: none"> <li>a. All of the businesses located along the coast will be displaced</li> </ul> </li> <li>2. In most areas, higher temperatures mean that crops can't grow</li> <li>3. Areas could be subject to really extreme weather events, like devastating</li> </ol> </li> </ul> </li> </ul>

			<p>hurricanes or wildfires, more and more often</p> <p>c. Look at how the map changes between 2020 and in 50 years, 2070. Because of climate change, in 50 years, some areas will become far less suitable for humans to live in as we currently plan for our current climate when designing infrastructure instead of a future climate.</p> <p>L. <b>[AUDIENCE QUESTION]:</b></p> <p>a. Where do we see darker red colors?</p> <p>M. Other regions, in comparison, become more suitable</p> <p>a. <b>[AUDIENCE QUESTION]:</b></p> <p>i. If you were a person in an area that is getting much darker red on the map, where do you think you would go?</p>
9		<p>Human Migration - 2010 - 2015</p>	<p>N. On a global scale, we're seeing migration happening around the world</p> <p>a. Purple areas are areas where people are moving away from, while brown areas are areas that people are moving to</p> <p>b. U.S. took in 4.5 million people throughout this time</p> <p>c. Numbers will only go up because of climate change</p> <p>d. According to the Internal Displacement Monitoring Centre, around 17 million people were displaced as a result of natural disasters in 2009; a decade later, that number has risen to about 25 million</p> <p>i. Look at <a href="#">Internal Displacement Monitoring Centre</a> for more data</p> <p>O. <b>[POTENTIAL ACTIVITY]</b></p> <p>P. On a personal and individual level, even if you aren't forced to move as a result of climate change, it still impacts how you eat, sleep, and</p>

			<p>breathe.</p> <ul style="list-style-type: none"> <li>a. You might not have access to the same foods you love, like vanilla or chocolate ice cream. Because of rising temperatures, a lot of foods that we love won't be able to be grown and shipped to us. It might become so hot that you can't sleep, and the air might have so much pollution in it that it makes it hard to breathe.</li> <li>b. Still see the impacts of climate change on the local community</li> <li>c. Provide example of sea level rise in Hawaii from the sea level <ul style="list-style-type: none"> <li>i. Example of King Tides and tracker</li> </ul> </li> </ul>
10		Action dataset	<ul style="list-style-type: none"> <li>Q. One planet, experiencing different impacts <ul style="list-style-type: none"> <li>a. <b>[AUDIENCE QUESTION]</b> How would you want your neighbors to help if you were forced to move? <ul style="list-style-type: none"> <li>i. A message of hope -- we can take action to both support people who are forced to move because of climate change and climate change itself <ol style="list-style-type: none"> <li>1. Use your vote to elect legislators that take the issue of climate change and displacement seriously</li> <li>2. Talk to politicians about how this is an issue you're worried about</li> <li>3. Reduce your own personal carbon footprint to reduce climate change impacts <ul style="list-style-type: none"> <li>a. Biking</li> <li>b. Walking</li> <li>c. Not using plastic</li> </ul> </li> <li>4. Raise awareness by talking about</li> </ol> </li> </ul> </li> </ul> </li> </ul>

			climate change and displacement with your friends and family
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**Potential Activities** (optional; to be used where marked on the script)

Drawing your family migration story

Goal: to have students reflect critically about where their own families have moved to and the reasons why they moved

Materials needed:

- Map of Blue Marble image/[of the globe](#)
- Colored pencils/markers/crayons

Instructions:

1. Hand out [maps of the globe](#), and of the state/country you are giving the presentation in
2. Ask students to work with their parents to identify where their family has moved in the past 100 years, and draw a line connecting those different places
  - a. i.e., if someone's grandparents immigrated from Poland to Jackson, Mississippi, but their parents live in San Francisco, California, instruct the person to draw a line from Poland to Jackson, Mississippi and then to San Francisco, California
  - b. If their family has lived in the same general state/country/region for the past century, ask them to draw where the different houses have been within that region
3. Ask 1-2 people to quickly share out their maps and the route they drew
4. Ask the group to consider how different their family's story would be if they were forced to leave because of a deadly wildfire or sea level rise. What would change about how you tell this story?

What is your favorite thing about home?

Goal: To have students identify their favorite thing about home, and discuss how those things might be in jeopardy because of climate change

Materials needed:

- White paper
- Colored pencils/markers/crayons

Instructions:

1. Hand out white paper and colored pencils



2. Ask students to draw their favorite thing about home, whether that's their favorite food, their toys, their bed etc...
3. Ask participants how they think climate change might impact the things they drew.
4. Share out answers for 1-2 minutes