"Imagining the Future City" Outline

Overview

Climate change is altering our environment. Human activities add additional carbon dioxide emissions to the atmosphere which leads to an increased mean global temperature, increased storm severity, drought, mudslides, and wildfires. Additionally, we need to account for climate variability because regional areas are beginning to experience drier or wetter environments during a typical season which in the short-term is manageable, but in the longer term, this may have greater problems like leading to uninhabitable areas. The actions taken to combat climate change should be done in a coordinated plan/effort with many different stakeholders as they share common and overlapping goals like in the Green New Deal. In this activity, we will examine what we can do about climate change, what is being done about climate change, and what the students would want a future sustainable city to look like in their ideal world.

Subject
Science

Suggested Level
Middle School

Learning Objectives
- Understand climate change leads to warmer global temperatures
- Analyze current adaptation and mitigation strategies to combat climate change
- Understand the difference between climate change and climate variability

NGSS
- [3-ESS3-1 Earth and Human Activity](#)
- [4-ESS3-1 Earth and Human Activity](#)
- [4-ESS3-2 Earth and Human Activity](#)

Materials Needed
- Paper
- Drawing utensils
  - Markers, crayons, colored pencils, pens, etc.

Background Information
An important distinction the instructor should make is the difference between climate change and climate variability, but also the importance of both climate change and climate variability. Any predictions of climate change and climate variability are used to inform our decision making in the short-term and in long-term planning. Climate variability is more short-term like planning for a drought whereas climate change requires long-term planning for how people will adapt to new changes in their environment. These plans go further than just planning your ideal city, they are solutions to future climate change issues. Eradication of pollution by removing power plants

from your city doesn't just improve your city's air quality or aesthetic value, it helps people see that renewable energy is a feasible option for the future and there is less reliance on oil, natural gas, or coal, paving the way for solar or wind energy. It is important to emphasize that these decisions overlap and do not occur in a vacuum. One city changing their energy by adding solar panels or creating more green areas for their citizens to connect with the natural world can inspire other locations to do the same as they see the benefits these changes have on the people who live in the city.

Additional Reading/Resources
- Template Examples
  - [Template 1](#)
  - [Template 2](#)
  - [Template 3](#)
  - [Template 4](#)
- [Student Sample Drawings](#)
- [Recording of Activity Conducted over Zoom](#)

Activity 1 - Climate Change Presentation
Time Required: 25 minutes
First we need to examine what is climate change and how that impacts people. The atmosphere is composed of different gases including carbon dioxide. This naturally occurring gas is exhaled by people but also the byproduct of human activities like burning fossil fuels. Human activities are adding more carbon dioxide and other greenhouse gases into the atmosphere leading to the greenhouse effect. The greenhouse effect is when the blanket of gases in the atmosphere surrounding Earth trap more sunlight that would ordinarily be reflected back into space, warming the earth like a greenhouse. This is tipping the natural balance of the earth and several thresholds are being passed like 400 ppm of carbon dioxide in the atmosphere and this increase in carbon dioxide truly began during the Industrial Revolution, but it has rapidly increased with the invention of the car and oil drilling.

Everyone is impacted by climate change, not just in the far future but at present. There are more intense storms, increased storm severity, more droughts lasting longer, more intense flooding, sea level rise, mudslides, and wildfires which in turn lead to infrastructure destruction in communities and cities, food availability issues, and thousands of displaced people. There are multiple ways people can combat climate change and several of these solutions are being implemented today. Prevention, mitigation, and adaptation are the strategies being employed because several of the climate issues cannot be reversed, but we can try to adapt and provide a better world for future generations like our children and grandchildren. Some of those ways to provide a better world can be done in the home, in a community, in the country, and in the world. In New York City, there are many modes of public transportation like the bus or subway, Citi bikes available for individuals to rent, and many places are accessible by walking. Farmer markets are a great resource for people to buy locally grown food or searching local foods in a

grocery store reduces the carbon footprint of importing or transporting food from farther away. In the United States, electric cars are becoming more popular as are solar panels to produce renewable energy. Globally, the food we eat does not always come locally and the carbon impact of shipping foods is high, and there needs to be sustainable solutions that benefit both the farmers and the people that need the food. There are small scale changes available to people in their personal lives to levy the impact of climate change and the consumer should continue to question whether there is more to be done. For example, can grocery stores reduce the excessive packaging and cut down on plastics? Can we make sure we do not buy more than we consume?

Certain innovations are being produced right now that we could never have seen as possible in the past. Wetland restoration acts as a buffer against sea level rise. Certain cities are relocating their residents to higher, more inland ground to avoid storm surge. Someone even had the idea of creating an immensely tall skyscraper that purifies the air while also allowing additional housing for people impacted by climate change. These were all visions at one point people had for the future and now they are reality.

The instructor should now take several polls and have a discussion about these questions:
1. Which image closely resembles the environment you live in?
    a. Template 1, Template 2, Template 3, Template 4
    b. The instructor should explain the landscape each of the templates represent. The first is a sparsely populated, rural area. The second is more developed, but still a more natural landscape, closely resembling a suburb. The third template is a city like New York and the fourth is an extremely densely populated area surrounded by smokestacks and powerlines.
2. What do you want for a future city where everyone can live in an ideal world post climate change to live in?

Activity 2 - Drawing Your Sustainable City
Time Required: 15 - 20 minutes
Students will draw the future they want to envision for their city. The available four templates can be used, but the students are encouraged to draw inspiration from anything they want. Previous examples will be shown and discussed for the first few minutes while the students begin drafting their cities.

Discussion/Wrap Up
1. Why did you choose to add certain elements to your sustainable city? What did you remove from your current city, if any, and why did you remove it?
2. What are the next steps necessary to enact your future vision of your city?

The instructor should emphasize that there is no perfect solution or plan to solving climate change, it is all a holistic system much like the climate system is not based on a single component. That makes it difficult to address climate change but also provides some

opportunities for people to innovate and look at from different angles. Climate affects society and society can affect climate change.

Connections with Other Subjects

English → This lesson could be paired with science fiction books that look at future civilizations and cities like Octavia's Brood: Science Fiction Stories from Social Justice Movements edited by Adrienne Maree Brown and Walidah Imarisha.

Social Studies → The industrial revolution is a huge historical time period that influenced climate change and a lesson on the impacts of industrialization can be coupled with this activity.

Art → The amount of time given to the students to draw their future cities can be expanded. Additionally, famous paintings about future worlds could be shown and discussed between Activity 1 and Activity 2. The art could also be a collage, pinterest board, use any computer software to make their ideal city, the media they chose to do it in is not set in stone.