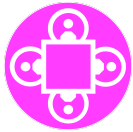


Lift-Off

Unit Essential Question: What are the effects of global temperature rise on San Francisco Bay and what can we do about it?



Groupwork Norms

- Play your role in the group.
- Listen and pay attention to what others are saying.



Part 1: How and Why Does the Sea Level Rise?

Scientists are concerned that global temperatures are changing due to human activity.

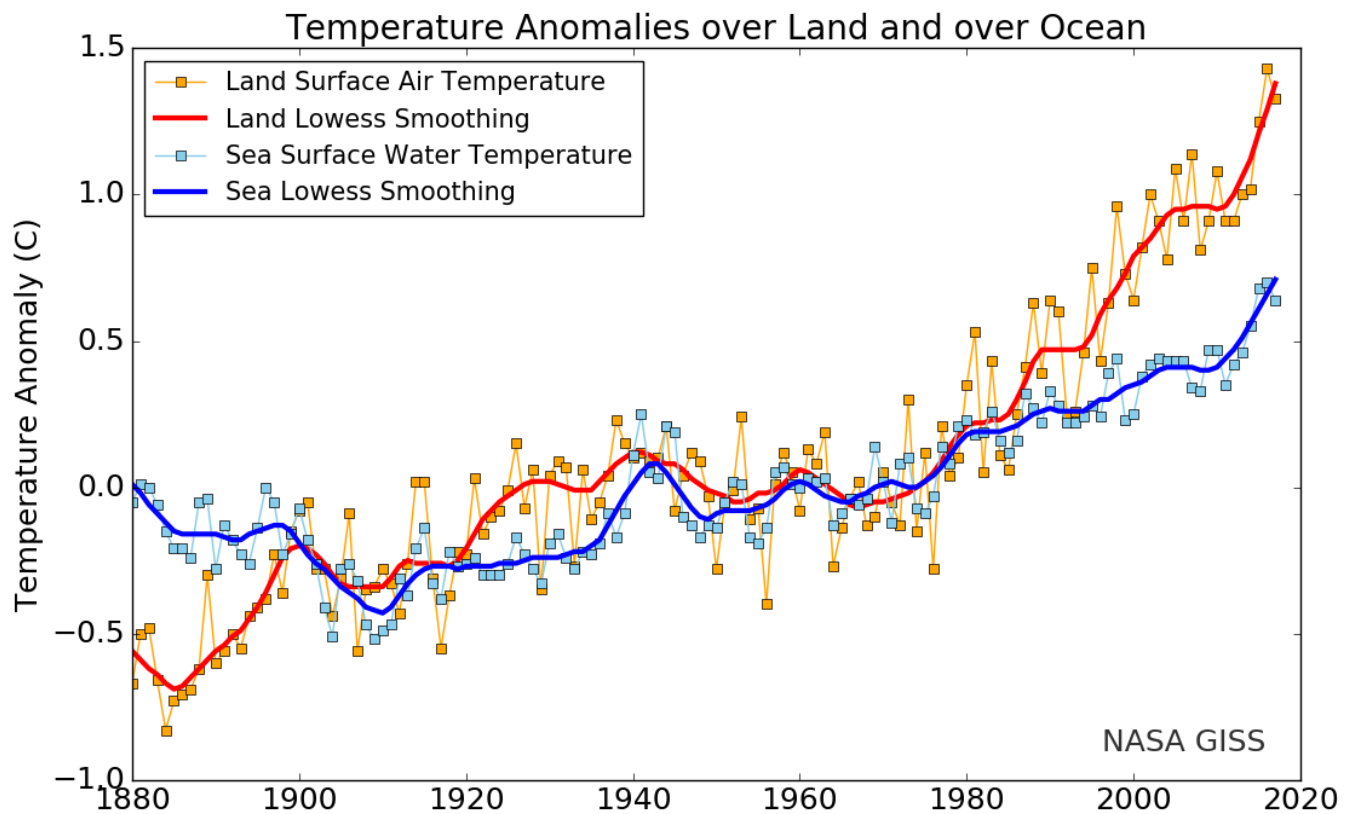


Image via [NASA](#)

In your Science Notebook, respond to the following questions. Be prepared to share your responses.

1. What changes do you notice in this graph?
2. What do you think might be causing these changes?
3. Why might people be concerned about these changes?

One concern scientists have about changes to global temperature is changes in sea levels. Scientists have detected evidence of sea level increases (see image on the left) and have predicted that sea levels could rise by almost 5 feet in some parts of the San Francisco Bay Area by 2100 (see light green areas in the image on the right).

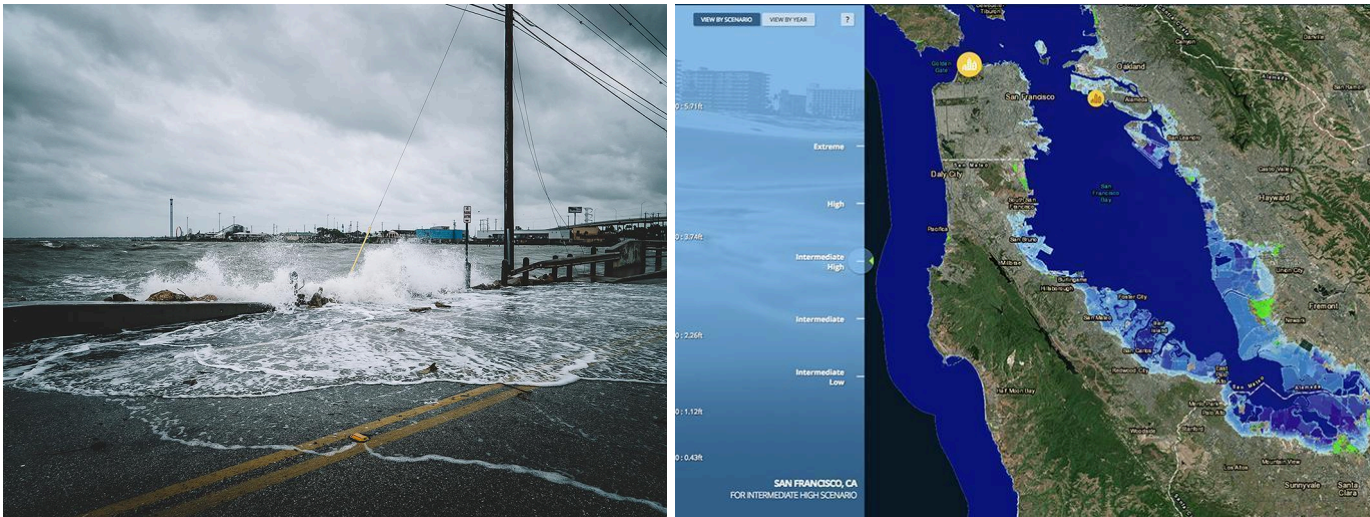


Image via National Oceanic and Atmospheric Association, Office of Coastal Management, [Sea Level Rise Viewer](#)

Scientists think sea level rise has something to do with increases in global temperature, but how could this temperature change lead to a change in sea levels? Where is all this water coming from?

1. In your Science Notebook, use diagrams and words to explain how and why sea levels rise. In your diagram, label and describe how it shows the *causes* of sea level rise.
2. Share your ideas in groups of three using the Listening Triads strategy.
3. Discuss areas of agreement or disagreement and be prepared to share your group's ideas with the class.



The directions for the Listening Triads strategy can be found in Appendix A.



Part 2: Introduction to the Culminating Project

During this unit, you will explore why global temperature is increasing and the effects that this change has on Earth. You will explore some ways that scientists study and gather evidence of climate change. You will also learn about possible actions and solutions that individuals and communities can take to reduce the impact of global temperature rise on Earth.

Group Culminating Project: Letter and Presentation

At the end of this unit, your group has the task of writing a letter and creating a group presentation to one of the following agencies:

San Francisco Unified School District (SFUSD) Office of Sustainability	San Francisco Department of the Environment
The SFUSD Office of Sustainability works to reduce energy use, provide alternative transportation, minimize waste, and foster water savings in the SFUSD.	The San Francisco Department of the Environment addresses environmental issues to improve quality of life for San Francisco residents and is run by the city of San Francisco.

Group Letter:

The letter will describe your proposal for actions your school can take to meet the SFUSD energy or transportation goals and explain why you think it is important to make these changes. Your arguments will be based on what you learn and the data you collect throughout the unit. Letters should include two main sections.

- **Section 1: Scientific Explanations**
 - Explanations for the problems we are facing with global temperature and sea level rise.
 - A description of the climate in San Francisco and an explanation of at least two factors that contribute to this climate.
 - An explanation, supported by evidence, for why global temperatures are rising. This should include at least one way that your school contributes to these changes
 - An explanation, supported by evidence, for why sea level is rising and examples of local places that are vulnerable. *Examples of sources of evidence: Tuva datasets, articles, bottle lab simulation, Mauna Loa graph, land-ice simulation, sea level rise simulation, maps, school sustainability data.*
- **Section 2: Proposed Plan**
 - Your plan must include actions your school can take to help meet either SFUSD energy or transportation goals (**choose one from the table that follows**).

- Your plan must include a cause-effect diagram and explanation showing how these actions will help address increasing global temperature and sea level rise.

SFUSD ENERGY GOAL: Reduce energy use by 50% (of 2008–2010 usage) by 2030	SFUSD TRANSPORTATION GOAL: Reduce solo car trips to school by 30% by 2030
● <i>How will you reduce energy use by 50%?</i> ● <i>How will your changes help reduce your school's impact on global temperatures and sea level?</i> ● <i>What are the costs of implementing your plan?</i> ● <i>What are the trade-offs in implementing your plan?</i> ● <i>Are there other benefits to implementing your plan (for example, health, social, environmental)?</i>	● <i>How will you reduce solo car trips to school by 30%?</i> ● <i>How will your changes help reduce your school's impact on global temperatures and sea level?</i> ● <i>What are the costs of implementing your plan?</i> ● <i>What are the trade-offs in implementing your plan?</i> ● <i>Are there other benefits to implementing your plan (for example, health, social, environmental)?</i>

Group Presentation:

- As a group, you will present to the class, in a gallery walk, at least two actions from your plan outlined in your letter.
- As a part of your presentation, you will create a cause-effect diagram that illustrates your ideas.
- During the gallery walk, other students will ask questions and provide feedback to groups.

Individual Culminating Project: Critiquing a Group's Plan

You will choose one of the plans you observed during the gallery walk (it should be the same focus area as your own group's plan) and discuss the benefits and drawbacks of this plan using evidence. Your written feedback will be given to that group to help it make final revisions before sending out the letter. Your feedback should be constructive, organized, respectful and include comments on the following:

- Did you understand the scientific explanations, and is there evidence supporting the explanations?
- Did you understand the plan?
- Does the plan reduce the school's impact on global temperatures and sea level, and is that explained?
- What are the benefits of the plan?
- What are the trade-offs, challenges, or costs of the plan?
- Do you think it is a good plan for the school, and would you be willing to make the changes suggested by the plan?



Part 3: Connections to the Culminating Project

You will use this section of your Science Notebook to keep track of your ideas throughout the unit to help you complete your Group and Individual Culminating Projects. In your Science Notebook, write the following on five pages (front and back) that are next to each other.

- Connections to the Culminating Project: Lift-Off (include two full spreads for this section)
 - Connections to the Culminating Project: Subunit 1
 - Connections to the Culminating Project: Subunit 2
 - Connections to the Culminating Project: Subunit 3
1. With your group, respond to the following prompts and questions in the Connections to the Culminating Project: Lift-Off page of your Science Notebook.
 - a. Which area will your plan focus on (energy or transportation)?
 - b. What questions does your group have about this project?



Part 4: Constructing a Know, Wonder, Learned (KWL) Chart

It is important that the science you learn in this unit informs the development of your plans. Over the course of the unit, you will investigate the answers to the following three questions:

Subunit 1 Essential Question:	What factors affect a region's climate?
Subunit 2 Essential Question:	Why have global temperatures risen over the past century and how do we know?
Subunit 3 Essential Question:	What actions can we take against rising temperature and the effects of sea level rise?

1. Turn to the Connections to the Culminating Project: Subunit 1 section in your Science Notebook. On the first page, turn your Science Notebook sideways and draw the headings of the KWL chart as shown. You will add other people's ideas, so it is important to give yourself enough room. An example is shown for the Subunit 1 Essential Question.

Subunit 1 Essential Question: What factors affect a region's climate?		
Know: What are my initial ideas?	Wonder: What questions do I have?	Learned: What have I learned?
I think that _____ because _____.	How might _____ affect _____? What causes _____? What evidence do I need to _____?	(Keep blank for now.)

- In the “Know” column, write down your initial response to the Subunit 1 Essential Question in your Science Notebook. It is not important that you have the “right answer” at this point. Share what you know right now.
- In the “Wonder” column, write down what questions you have about the Subunit 1 Essential Question. Are you not sure about some ideas? Do you need evidence to support your ideas? What additional information do you need to answer this question?
- Leave the “Learned” column blank for now. You will revisit each Subunit Essential Question at the end of each subunit. This will be the place where you document what you learned and how your ideas have changed or developed.
- Repeat these steps for each Subunit Essential Question in the unit.

Part 5: Driving Question Board

The goal of this group discussion is to identify areas of agreement, record those ideas on sticky notes, and post your questions on the Driving Question Board. Repeat these steps for each subunit.

- Identify common ideas and questions.**
 - Read the Listening Triads Role Cards in **Appendix A** and decide who will be the first Talker, Questioner, and Listener.
 - The Talker will share their initial ideas and questions. The Questioner will ask questions. The Listener will listen to the presented ideas and record common ideas and questions.
 - As you hear your group members' ideas and questions, add them to your KWL chart.
 - Switch roles when the Talker is done sharing ideas.
- Create sticky notes for common ideas and questions.**
 - Record on sticky notes your group's responses to each Subunit Essential Question and post them on the Driving Question Board.
 - Combine similar questions on a sticky note. If a group member has a question that is not shared by others, write that question on a separate sticky note.

3. Post your group's common responses to the Driving Question Board.
4. Post your group's questions to the Driving Question Board. Look at the questions that your classmates have already posted before posting your own. If you see questions that are the same, do not post the duplicate question.



Part 6: Personal Glossary

A Personal Glossary can help support your understanding of the vocabulary terms you learn in your science class. Follow these directions to set up a Personal Glossary at the end of your Science Notebook that you will use throughout the unit.

1. Return to your Personal Glossary.
2. Create a table like the one shown. List each term you wish to understand or remember in the left column.
3. In the column on the right, include information to help you understand each term:
 - a. **Pronunciation** (optional): Add a note on how to say this word if you need help remembering.
 - b. **Definition**: Write a definition of the term based on information from class, in readings from the Student Book, and other resources you decide to use. Make sure to use your own words in your definition.
 - c. **Picture/Drawing**: Draw a picture or diagram that helps you understand the meaning of the term and will help you remember it.
 - d. **Personal Connection**: Add a sentence (or a few) that describe how this term is connected to your own life.

Personal Glossary

Term	Glossary Entry Include this information: a) Pronunciation (optional) b) Definition c) Picture/Diagram d) Personal Connection

4. Add terms from today's lesson to your Personal Glossary.