

A Curriculum Guide for
Rising: Dispatches from the New American Shore
By Elizabeth Rush

Prepared by
Maureen Nagle and
George Tsakraklides

On Behalf of
The Rhode Island Center for the Book
Reading Across Rhode Island Selection, 2020

Dear Educator,

It is my pleasure and honor to prepare this curriculum guide for you and your students. When I first read Elizabeth Rush's *Rising: Dispatches from the New American Shore* as part of the Reading Across Rhode Island Selection Committee, we were trying to find just the right book to appeal to a wide range of readers across our state. In my first reading of the book, I had a strong sense that our teenagers in particular would connect with this text. Across the globe we have seen young people working tirelessly and passionately to raise awareness of Climate Change issues and inspire us to pay attention to our planet's future. I can see our students joining the author's journey from Jacob's Point to Jean Charles, wandering among the marshland through the stories of those whose lives are rooted there. Many of our own students live among marshlands but may not yet know and fully understand their value.

When planning this curriculum guide, I considered many factors. First and foremost were the students in my own classroom and how to engage them with high-interest material that will help give context and language to process the vastness of the issues, and also the inspiration to develop their own questions to guide their journey through the complexities to make informed judgments and decisions. Thus, for each of the chapters I have included sections to engage learners with guiding questions and related videos, as well as questions and activities to help them think critically and creatively. And as a teacher myself, I'm always mindful of the difficulty posed by time's pressures to cover the requirements of our courses and realize that for many of us we will need to excerpt selected passages to share with students. Each chapter guide is individualized so you can select the ones most relevant to your course and your students.

It is exciting to consider the many access points into this text: our own personal curiosity about the dynamic nature of our shoreline, our communities' conversations about climate resiliency, the civil engineering involved in rehabilitating land ravaged by storm surges, the ethical decision-making around the management of disaster recovery funding, and the science of weather patterns and storm predictions. My hope is that this guide can be used across disciplines to inspire conversations and creative thinking that will guide how we care for the future of our Ocean State and for each other. I am indebted in particular to science educator George Tsakraklides who eagerly accepted my invitation to collaborate on this guide. His "Carbon Dioxide, the Greenhouse Effect and Climate Change" appears after the chapter-by-chapter guides. George and I are eager to hear how you plan to use these materials, so please be in touch with us!

As a classroom teacher I have learned the value of literature that invites us into the toughest conversations of our time. We have finally shifted from asking *if* we should integrate Climate Change units into our curricula, to *how* are we going to teach students about climate change and offer them the resources to inform their judgments and inspire their decisions. I am indebted to our author Elizabeth Rush for offering to us and our students these personal stories from her shoreline conversations and I eagerly await the classroom conversations to come.

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The Password

Activating: Getting Started

What is a salt marsh? Watch this short video

<https://www.youtube.com/watch?v=3HXyTMnj7ac>, What did you learn and why are marshes important?

Vocabulary: inundate, rampike, invasives, equilibrium, accretion, rhizomes, reciprocity

Questioning: Understanding the Text

1. How did the author become aware of sea level rise?
2. Why is the tupelo tree an important symbol in the chapter?
3. When Cameron McCormick of the Audubon Education Center considers the difficulties the marsh is facing, he shares, "It's a terrifying and wonderful time to do the work that I do." Explain this apparent oxymoron.

Connecting:

Elizabeth writes, "Over the past 200 years, Rhode Island has lost over 50 percent of its tidal marshes due to dyking and developing." What do you think the coastline has experienced such dramatic change? What does this mean for those of us living in the Ocean State today?

Extending: Getting Creative

Watch the "Birds are Cool: Let's Save Them" videos:

<https://asri.org/birdsarecool/birdsarecool.html>. Make your own "It's Your Shoreline: Let's Save it" video based on what you learned in this chapter.

Wondering: Writing

When and how do you observe the world around you? From a bedroom window? At your school's garden? On the park beach during summer? Riding your bike down the street? Where is your favorite place to pay attention to the world? Take your journal to this place or imagine the time you've recently spent there write about what you see, hear, smell and feel.

Persimmons

Activating: Getting Started

Watch this trailer of Threshold, Season 2, a podcast exploring climate change in the Arctic: <https://www.youtube.com/watch?v=br3h6s8unBA>. Then discuss, who is experiencing the effects of Climate Change?

Vocabulary: undulating, bayou, self-sufficient, adaptation, vulnerable

Questioning: Understanding the Text

1. Over the past 60 years, what has happened to the wetlands surrounding the Isle de Jean Charles?
2. How have the residents responded to the island's dramatic change?
3. What effect did the oil drilling have on the marshland and how does it relate to the presence of dolphins?

Connecting:

The author describes the Isle de Jean Charles residents as Climate Change Refugees. Given how closely connected Chris is to the land passed down from his parents, do you think he will leave? Do you think he has a choice? If you were in his position, what would you do?

Extending: Getting Creative

Humans today depend on infrastructure construction, but this also poses problems to our environment. Look up and draw your own pictures of dams, dykes, levees and berms. Discuss: What are they? What purpose do they serve? How are they constructed? How do they pose problems to the environment? Have you seen any examples in our state?

Wondering: Writing

On page 32, the author explores the history of wetlands in Louisiana and the Native People who originally inhabited the land. Research: Who were the native people of Rhode Island? What was their relationship to the land? Can you make any connections between the experiences of the Narragansetts, Pequots and Wampanoags of Southern New England and the Chitimacha Louisiana?

The Marsh at the End of the World

Activating: Getting Started

Watch this video: The Power of Wetlands <https://www.nature.org/en-us/about-us/where-we-work/united-states/iowa/stories-in-iowa/power-of-wetlands/>

Vocabulary: preternatural, cataclysmic, anoxic, culvert, pestilent, deluge

Questioning: Understanding the Text

1. What is the Science Box and how does it help biologists understand the impact of sea level rise?
2. Why does sea level rise cause a healthy marsh to rot? Why does this cause the release of carbon and contribute to global warming?

Connecting:

Laura Sewall, the eco-psychologist and conservation area caretaker, explained that “we have to get more comfortable with uncertainty.” What is the uncertainty she is referring to? Why are humans uncomfortable with it? Why should we be more comfortable? How do you think people can get more comfortable?

Extending: Getting Creative

Watch this short video about the history of the world, compared to the length of a football field: <https://www.npr.org/2016/11/22/502920622/watch-earths-history-play-out-on-a-football-field>. Design your own Cosmic Calendar using a different analogy, citing the key events from the video.

Wondering: Writing

Read this *National Geographic* article to learn more about methane gas: <https://www.nationalgeographic.com/environment/global-warming/methane/>. Choose one of the images in the slideshow that you find interesting. What do you notice that’s interesting? Use this as inspiration to start a short story.

Pulse

Activating: Getting Started

Watch this PBS NewsHour report from 2018 about the aftermath of Hurricane Florence. You'll meet Harold Wanless, who appears in this chapter:

<https://www.pbs.org/newshour/show/will-climate-change-turn-miami-into-a-future-atlantis>

Vocabulary: tenuous, anomaly, brackish, trophic, innocuous

Questioning: Understanding the Text

1. What is a "meltwater pulse" and how is it different from a human pulse?
2. Legislation plays a key role in land management. What was the Swamp Land Act and what has been its impact?
3. How are spoonbills being affected by changing sea levels?
4. In Shorecrest, the author meets Robert Cisneros. What does she learn about his experience with flooding?

Connecting:

Climate Justice refers to how the issue of global warming and sea level rise affects the most vulnerable populations more severely. Read and discuss this article about local climate justice conversations here in Rhode Island:

<https://www.ecori.org/climate-change/2019/10/7/providence-to-unveil-climate-justice-plan>

Extending: Getting Creative

Does your school have a group of students raising awareness about environmental issues? Watch this short video about one young person's journey taking climate action, then make an infographic to encourage others to consider the environment and inspire change: <https://ourclimateourfuture.org/video/youth-climate-story-climate-justice-and-activism-in-wisconsin/>

Wondering: Writing

On page 90 the author asks Hal, "What comes next?" Read his response on page 91. Do you agree? What's your opinion about "what's next?"

Divining Rod

Activating: Getting Started

Watch this Guardian video of a reporter talking with a resident of Staten Island who experienced Hurricane Sandy:

<https://www.theguardian.com/world/2012/nov/01/superstorm-sandy-staten-island-forgotten>

Vocabulary: unprecedented, deplored, palpable, exacerbate, serendipitous,

Questioning: Understanding the Text

1. After experiencing the devastating effects of Hurricane Sandy, how did the residents of Oakwood Beach, Staten Island, New York seem to differ from those of Isle de Jean Charles?
2. Why is it problematic to pave over wetlands?
3. What is a divining rod and how does the author compare a tidal marsh to one?
4. How did the buyout process affect neighboring communities?
5. Why are the retreating residents of Oakland Beach more like rhizomes than rampikes?

Connecting:

If time allows, watch this video of the Hurricane of 1938 that devastated Rhode Island: <https://www.youtube.com/watch?v=SJAdKPa5inI>. Or, look through the series of photos of the damage here: <http://www.newenglandhistoricalsociety.com/great-1938-hurricane/>. Discuss the effects of the hurricane on the people and places of southern New England.

Extending: Getting Creative

Read about and look at images of various seawalls designed to protect vulnerable shorelines: <https://www.cnn.com/style/article/staten-island-seawall-climate-crisis-design/index.html>. If you were on the design team, how would you design your seawall?

Wondering: Writing

Watch this 12-minute video about the buyout process:

<https://www.newyorker.com/news/news-desk/hurricane-sandy-retreat-waters-edge>. Consider the complexities of deciding what to do after the storm. What do you imagine you would do? Write a letter to your governor, like the citizens of Staten Island, to explain why you would or wouldn't want to leave your home.

Risk

Activating: Getting Started

Read aloud the short essay before this chapter by Marilyn Wiggins' of Pensacola, Florida. Discuss the tensions she experiences as a black woman living in the Tanyard.

Vocabulary: FEMA, eerily, melting pot, denizen

Questioning: Understanding the Text

1. What is the NFIP and what purpose does it serve?
2. What's are flood maps? How are they used?
3. What is "risk assessment"? How does it connect to climate change issues, and how does it connect to the author's life as a writer and writing teacher?
4. Why does the author quote James Baldwin at the end of this chapter?

Connecting:

The author describes her experience walking into Alvin Turner's home and recognizing "blind spots, biases and responsibilities." What is the conflict for her in that moment and how does she manage it? Have you ever recognized a personal bias or blind spot? What was it and what did you do?

Extending: Getting Creative

The author describes her writing as an act of empathy and shares several quotes about empathy on pages 141 and 142. Watch this short clip of Brene Brown's explanation of empathy (compared to sympathy). Come up with your own definition of empathy and use it to draw a scene to describe what empathy means to you.

<https://www.youtube.com/watch?v=1Evwgu369Jw>

Wondering: Writing

Watch this video about environmental justice: <https://www.nrdc.org/stories/what-is-environmental-justice>.

Then, research an environmental issue in your city, town, state or country. Who is affected by this issue? Do you recognize an injustice? What can we do about it?

Goodbye Cloud Formations Reflected in the Bay

Activating: Getting Started

Chris Brunet has personally experienced the dramatic effects of coastal erosion and he has decided to join others in the relocation process. Read Aloud “On Opportunity” (pages 162-165) and discuss how Chris came to this decision.

Vocabulary: irrevocably, taut, acquiesce, coercive, excavation, elegy, allocate

Questioning: Understanding the Text

1. What is problematic about the conversation between Edison and the two surveyors who have come to talk about relocation?
2. What is the author’s response to the man’s question at the Q&A: “If retreat is a useful adaptation strategy, how can we make more people interested in giving up their homes?” (178)
3. The author takes part in a conference where another presenter shares images of Jean Charles. What does the author notice about the photo the presenter chose for Jean Charles?

Connecting:

When the author returns to Jean Charles, she gifts Edison and Chris ceramic roosters, purchased in Rhode Island, her new home. Why do you think the author chose to gift this particular object to Edison and Chris? What is the rooster a symbol of? Do you have a ceramic rooster in your home, or an object like it that may symbolize something similar?

Extending: Getting Creative

The author describes Edison’s connection to Jean Charles: “he knows that who he is, his very sense of self, is linked to the land where his entire life has taken place” (179). Is there a place you feel a strong connection to? Draw a picture of it and describe why this place is so meaningful.

Wondering: Writing

The idea of retreat is a complicated one. Homes, businesses, industries are rooted into our shorelines. We have seen, however, that shoreline development is environmentally problematic. Storm surges wreak havoc and cause devastating loss of property and life. How can we make sure that we are being environmentally responsible in our shoreline management, while respecting the lives of livelihoods of those who currently live there? Follow-Up: Visit the Rhode Island Coastal Resources Management Council website and explore their purpose and projects: <http://www.crmc.ri.gov/index.html>.

Connecting the Dots

Activating: Getting Started

Watch this short video about the H.J. Andrews Experimental Forest: <https://www.youtube.com/channel/UCFd4IHt3s2nvFNz4NCDr-1g>. What did you see in the video? Why does this research center exist in the Oregon Central Cascades?

Vocabulary: endemic, pervasive, vicissitude, niche

Questioning: Understanding the Text

1. How many long-term ecological research centers exist in the US and what is the need for them?
2. Even though the forest is inland, the author understands its relevance to the shore when she observes the rufous bird. What is the connection?
3. On pages 196-7, the author reaches a profound personal connection to the rufous. What is the connection and why is it so important?

Connecting:

The author hikes into the forest, scribbling in her notebook, "I come to these mountains with my big questions, the way I imagine my ancestors went to god" (193). What is it about the natural world and spending time in it that can cause such a spiritual experience?

Extending: Getting Creative

Listen to the call of the Rufous Hummingbird here: <https://abcbirds.org/bird/rufous-hummingbird/>. What does it sound like? Read about the Rufous Hummingbird, its migration journey and its threatened habitat. The author explains that by 2080 the rufous "will lose 100 percent of its nonbreeding range in the United States" (190). Research other animals whose habitats are threatened by climate change and make an informational poster to inspire others to pay attention and take action.

Wondering: Writing

On page 199 the author writes, "By listening, by returning to the grove time and again, by tuning our ears to the sounds of beings unlike ourselves, we begin to reenter what Thomas Berry, the Catholic eco-theologian, calls 'the great conversation' between humans and other forms of life. What is this "great conversation"? Have you ever experienced this kind of listening? Where is a space that inspires this kind of deep listening? Spend time there, journaling about your experience. Did you reach any meaningful insights like our author did in the forest?"

Moving Backward and Forward in Time

Activating: Getting Started

Watch this video about the habitat restoration projects in the salt ponds along the California coastline in Silicon Valley:

<https://www.youtube.com/watch?v=uBTqIBqhyro>. What was the goal of this project and who will benefit from it?

Questioning: Understanding the Text

1. Why is the South Bay Saltwater Restoration Project so important?
2. The author visits the Exploratorium, a space that inspires her to ask deep questions. What are her take-aways from visiting this museum?
3. John Bourgeois's work involves bridging the divide among the various stakeholder groups managing the wetlands restoration project. On page 234, he finds hope in the consensus building while the author remains skeptical. Why?
4. What is happening in Oro Loma and how is it an example of a "resiliency project"?

Connecting:

Read about the Sachuest Point National Wildlife Refuge

(<https://www.fws.gov/hurricane/sandy/projects/SachuestPoint.html>) then watch this video about its restoration project in Middletown, Rhode Island:

<https://vimeo.com/162151739>. The narrator tells us, "Without these projects, these marshes would start to disappear...When I think about restoration, I think about hope. It's about a dream." Do you think coastal restoration projects like this should be a priority for Rhode Islanders?

Extending: Getting Creative

For wetlands restoration to be prioritized, leaders must convince the public that projects like Sachuest point are worth the cost. The author was surprised to learn that in June 2016 nearly "70 percent of Bay Area voters agree[d] to pay a twelve-dollar-a-year parcel tax to fund wetlands restoration" (217). But, as John Bourgeois explains about the Alviso project, taxpayers "spent \$1.3 billion building the new 49ers stadium. If I had that amount of funding I could restore all of San Francisco's wetlands and build horizontal levees at the upland edge of each one." Imagine you were in charge of creating a campaign to encourage Rhode Island voters to prioritize funding for habitat restoration projects. What is your slogan and logo? What are your key ideas and how will they reach the public?

Wondering: Writing

In the essay "On Restoration" Richard Santos explains, "I fight so hard because I'm trying to preserve the history and characteristics of Alviso. The stories we tell about this place are powerful. More powerful than money." Throughout this book, the author has shared MANY powerful stories. As a class, make a list of the stories you remember. Which one is the most powerful to you and why? Write a letter to that person and explain why their story was particularly meaningful.

Carbon Dioxide, the Greenhouse Effect and Climate Change

Our planet is surrounded by an atmosphere that is comprised of many gases. Two of those gases, Nitrogen (N_2) and Oxygen (O_2), comprise 99% of our atmosphere. 78% of what we inhale with every breath here at the surface of Earth is Nitrogen and 21% is Oxygen. The remaining gases make up only 1% of the atmosphere but that does not mean they are not important. Water Vapor ($H_2O_{(g)}$) provides us liquid water and Ozone (O_3) protects us from the harmful energy of solar ultraviolet (UV) electromagnetic waves. Carbon Dioxide (CO_2) is the atmospheric gas that is at the focus of this unit.

CO_2 is a molecule comprised of two Oxygen atoms and one Carbon atom. It is found in trace amounts (less than 1% overall) in our atmosphere. The amount of CO_2 in our atmosphere has varied over time. Learning how and why CO_2 has varied over time is essential to understanding how this gas will vary in the future. The exercise/guide below will help you understand the “behavior” of CO_2 over time.

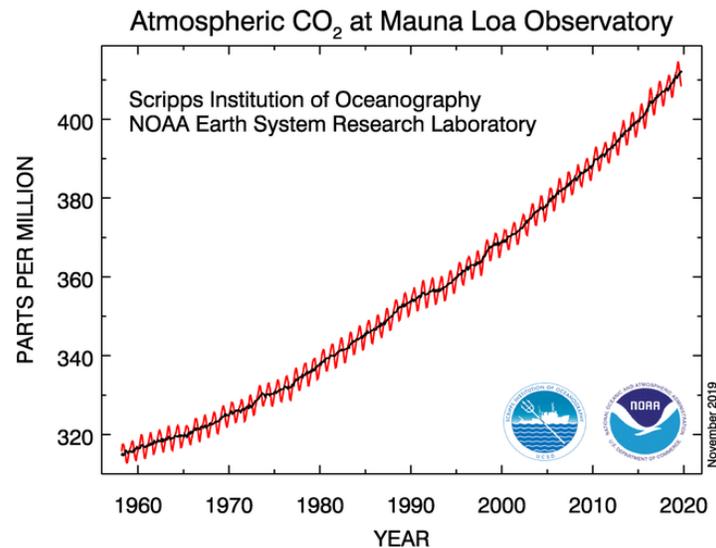
Below you will find data from the Mauna Loa Observatory in Hawaii. The numbers represent CO_2 concentrations in the air above the Observatory (in parts per million, ppm) in the months of January, February, March, April and May for the years 1985, 1990, 1995, 2000 and 2005.

	Jan	Feb	Mar	Apr	May
1985	348.37	348.77	349.27	350.24	350.45
1990	356.36	356.83	357.37	358.41	358.64
1995	362.62	363.13	363.73	364.86	365.15
2000	371.59	372.06	372.65	373.75	373.95
2005	381.20	381.77	382.45	383.70	384.05

Plot Concentration of CO_2 vs. Time for the data listed above. The independent variable should be on the x-axis.

Draw the best-fit line (or curve) through the data. This is the long-term trend. What does your best-fit line tell you about the concentration of CO_2 over time? What do you think the concentration of CO_2 is going to be in 2025? What about 2050 and 2100?

Aside from the long-term trend that you observed with your best-fit line, is there also a short-term trend? Connect your data points. Does the concentration of CO₂ vary within a year?



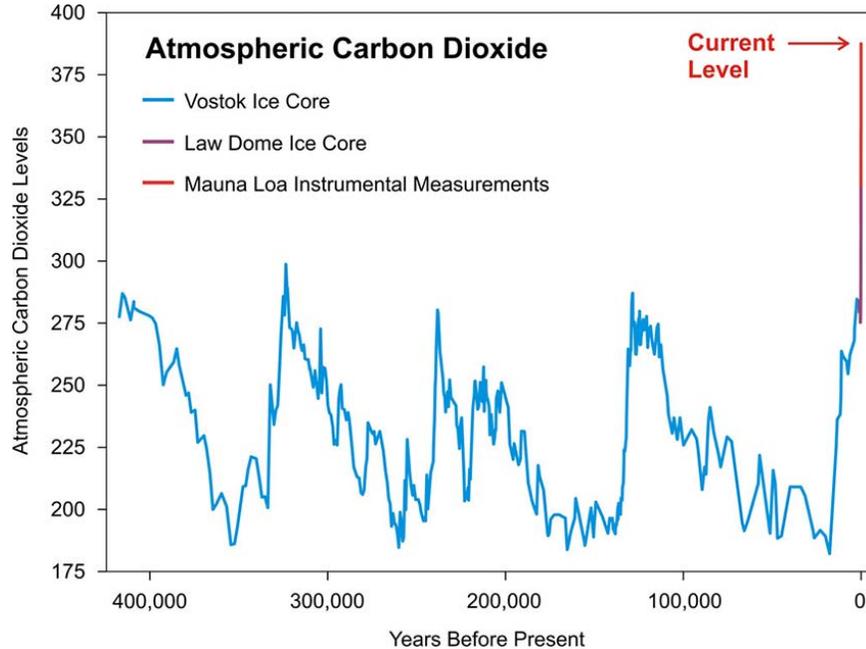
<https://www.esrl.noaa.gov/gmd/ccgg/trends/>
Concentration of CO₂ at Mauna Loa Observatory

This is what the graph looks like for the period 1959-2019. CO₂ concentrations have been steadily increasing, reaching a record value of 415ppm at Mauna Loa in 2019. There is no doubt that the amount of CO₂ in our atmosphere is increasing. Mauna Loa is in Hawaii, just north of the Equator, in the middle of the Pacific, away from any centers of industry. If the concentration of CO₂ is increasing there, then it must be increasing everywhere. This is most likely a result of human activity. This will be discussed in detail further on.

Why does CO₂ concentration also vary in the short term though? It clearly increases and decreases within a year so what is causing this? This is an effect of vegetation! Plants grow in the warm months, leaves grow on trees. During these months plants use CO₂ during photosynthesis. Thus the amount of CO₂ in the atmosphere decreases. In the cold months the reverse happens and the amount of CO₂ increases. This is a natural cycle. No human influence here. It is interesting to note that even though Hawaii is near the equator the natural cycle of CO₂ is influenced by the Northern Hemisphere calendar. The Northern Hemisphere contains most of the large landmasses of our planet (Asia, North America, Europe, Northern Africa) and therefore most of the vegetation as well. The natural trend in CO₂ is dominated by the Northern Hemisphere vegetation cycle. It is also important to notice that gases travel in our atmosphere. They do not stay at the location at which they were added.

What about the long-term CO₂ trend?

Why does the concentration of CO₂ vary over long periods of time?



<https://www.co2.earth/co2-ice-core-data>

Vostok Ice Core Data

The above graph depicts atmospheric CO₂ concentrations going back 400,000 years. The data was collected by analyzing drilled ice cores from Vostok, Siberia. The air trapped in the ice has not been disturbed for hundreds of thousands of years since it has been trapped under newer layers of ice. The above graph is an excellent measure of the amount of CO₂ in our atmosphere over a long time.

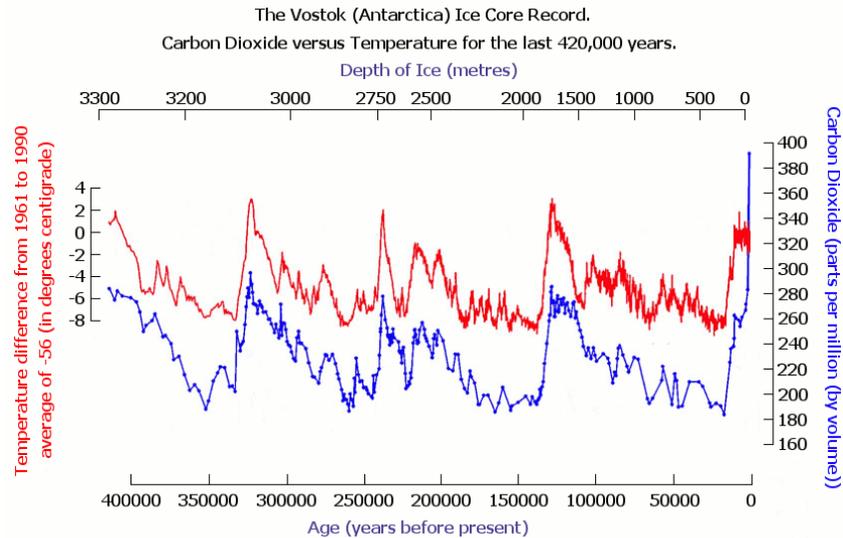
It is clear that CO₂ concentration has varied widely over the last 400,000 years. Why has this happened? CO₂ is added to the atmosphere by volcanic eruptions, forest fires, the weathering of rocks and the decomposition of organisms. The oceans absorb and store CO₂ and thus reduce the atmospheric concentration. As all of the above vary over time so does the concentration of CO₂.

Look carefully at the above graph. Focus on the years near present. What do you see? How does the recent concentration of CO₂ compare to historical levels?

It is clear to the vast majority of scientists that the recent record CO₂ concentrations are not related to the natural processes listed above. They are the result of human influence. The invention of the combustion engine and the use of fossil fuels to power our machines has led to this increase. CO₂ is produced when gasoline is used by cars, when oil is used to heat homes or coal is burned to power a turbine. I hope it is also clear to you that as more of the world becomes industrialized the higher the concentration of CO₂ will rise.

So why is all of this important? In the next section you will see how the concentration of CO₂ affects the temperature at the surface of the planet.

CO₂ and Temperature



<https://andthetheresphysics.wordpress.com/vostok-temp-vs-co2/>

Vostok Ice Core Data

Look at the above graph. The red data corresponds to surface temperature while the blue data is the measured CO₂ concentration discussed above. How are the two related? What happens to the temperature when CO₂ increases or decreases? I hope that the relationship between the two is obvious.

There is absolutely **NO** argument that when CO₂ concentration increases so does the temperature at the surface of our planet.

CO₂ is a Greenhouse Gas and its effects are well known to the scientific community.

CO₂, Temperature and the Greenhouse Effect

Our planet's atmosphere formed as soon as the first gases were emitted by volcanic activity. CO₂ has been in our atmosphere for billions of years. So has Water Vapor and so has Methane (CH₄). These three gases are the major Greenhouse Gases. They contribute the most to our atmosphere's natural Greenhouse Effect. The Greenhouse Effect has always been a part of our planet's atmosphere. Contrary to popular opinion, the Greenhouse Effect is not a bad thing. It is a part of nature and in many ways is beneficial to life on the planet. How does it work?

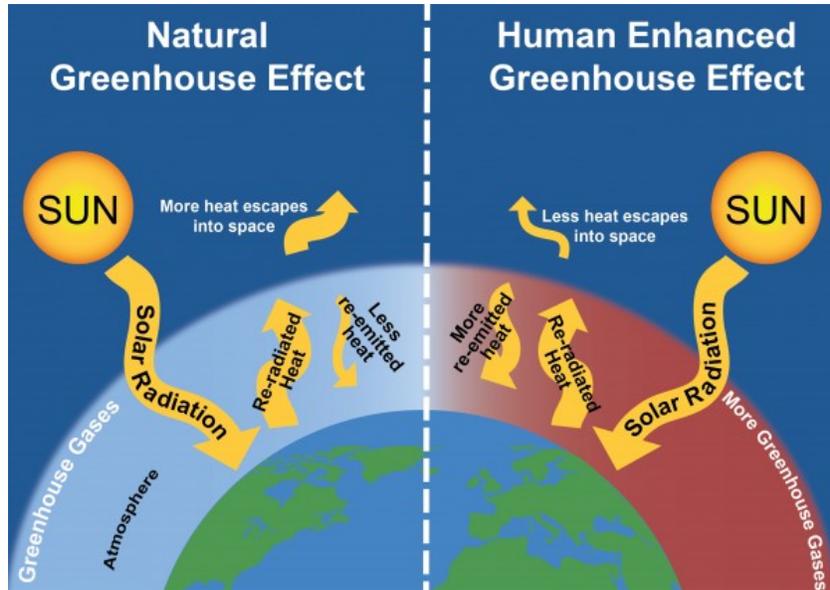
Our Sun constantly emits electromagnetic waves that eventually reach our planet. The majority of those electromagnetic waves pass through the atmosphere and reach the surface of our planet. Their wavelength is too short to interact with the gases in the atmosphere. Our planet absorbs a lot of the energy transferred by these short wavelength electromagnetic waves. Our planet then emits a lot of that energy outwards. It is this energy that warms up our atmosphere. This outgoing terrestrial energy is of a longer wavelength than the incoming solar energy. This energy is now the right wavelength to interact with the Greenhouse Gases in the atmosphere. The Greenhouse Gases absorb the energy of the terrestrial electromagnetic waves (mostly Infrared waves, IR) and then reemit that energy (again mostly IR). Part of that energy goes back out towards space but part of it is redirected back towards our planet, thus heating up our planet. This process is what we call the Greenhouse Effect. It keeps the surface of our planet about 30 degrees Celsius warmer than it would be without it. The average surface temperature of our planet is about 15 degrees Celsius. What would it be without the Greenhouse Effect, in Celsius and Fahrenheit? What would the life on our planet look like if the temperature on the surface of our planet was a lot lower? Would life be easier or harder for humans?

This is the Greenhouse Effect. This is nature. It has nothing to do with us. It has been doing its thing for a very long time. Human activity began to affect the Greenhouse Effect in the 1800s with the invention of the combustion engine and the start of the Industrial Revolution.

The Enhanced Greenhouse Effect

By emitting CO₂ into our atmosphere (as discussed above) there is now more absorption of outgoing energy and therefore more reemission back towards our planet. Therefore, the surface temperature of our planet is higher by more than the "natural" 30 degrees Celsius. As the concentration of CO₂ increases so will the planet's surface temperature. In turn, this will lead to many other changes. List some changes that you think will occur as the planet warms up. What do you think will happen to the amount of clouds in the sky? What do you think will happen to the temperature of the surface of the oceans? What do you think will happen to the weather where you live?

This effect is what we have named Global Warming and Climate Change. It is the result of the Enhanced (Human Influenced) Greenhouse Effect.



<http://css.umich.edu/factsheets/climate-change-science-and-impacts-factsheet>
The Greenhouse Effect