

You are invited

Sunday, November 5, 2023 at 11:00 a.m

A public presentation on climate justice

Sponsored by the United Church of Moscow

“Climate Change Skepticism through the Lens of Climate Justice”

By Dilshani Sarathchandra

Dilshani Sarathchandra is an Associate Professor of Sociology, Assistant Director of the Institute for Modeling Collaboration and Innovation, and Faculty Fellow Distinguished Scholarships Program at the University of Idaho. Her research focuses on decision-making processes in science, public attitudes toward science and technology, and social dimensions of health. Her book “Inside the World of Climate Change Skeptics” with Kristin Haltinner examines the identity roots and ideologies that shape skepticism in the United States.

Climate Justice

“The impacts of climate change will not be borne equally or fairly, between rich and poor, women and men, and older and younger generations. Consequently, there has been a growing focus on climate justice, which looks at the climate crisis through a human rights lens and on the belief that by working together we can create a better future for present and future generations.”

(Cited on 10/12/23 from: <https://www.un.org/sustainabledevelopment/blog/2019/05/climate-justice/>)

Climate Skepticism

“...according to our definition, a climate skeptic is someone who explicitly questions at least one of the following: the existence of climate change, the human contribution to it, the science of climate change and/or its findings, projected trends/consequences of climate change, and/or the adaptation to it.”

(Cited on 10/28/23 from:

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7535043/#:~:text=By%20this%20definition%2C%20a%20climate,its%20political%20and%20economic%20consequences>)

Representative Publications by Dr. Sarathchandra

Book: Inside the World of Climate Change Skeptics, published with Dr. Kristen Haltinner

Journal Article: Sarathchandra, D. and K. Haltinner. 2023. How media, information, and trust shape climate change denial or doubt. Social Currents. doi:10.1177/23294965231168785

Where the presentation will be held

The United Church of Moscow
123 West First Street, Moscow, Idaho
Contact: ucmoscow@gmail.com

Introduction to Climate Justice

Information Compiled by Dale Gentry, October 15, 2023

Defining Climate Change

What is climate change?

“Climate change refers to long-term shifts in temperatures and weather patterns. Such shifts can be natural, due to changes in the sun’s activity or large volcanic eruptions. But since the 1800s, human activities have been the main driver of climate change, primarily due to the burning of fossil fuels like coal, oil and gas.

Burning fossil fuels generates greenhouse gas emissions that act like a blanket wrapped around the Earth, trapping the sun's heat and raising temperatures.

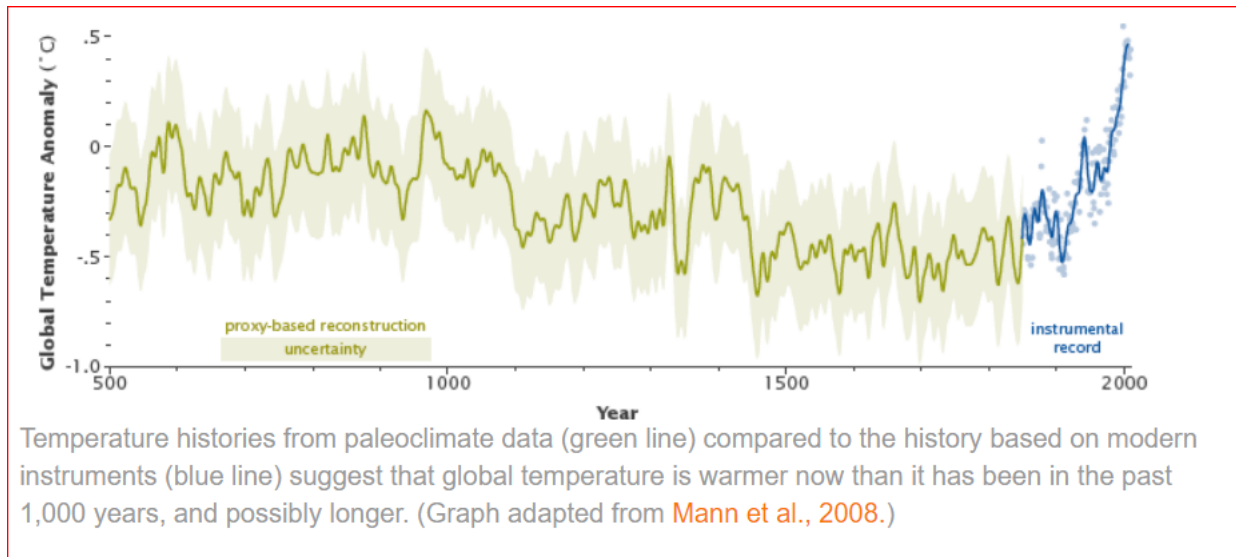
The average temperature of the Earth's surface is now about 1.1°C warmer than it was in the late 1800s (before the industrial revolution) and warmer than at any time in the last 100,000 years. The last decade (2011-2020) was the warmest on record, and each of the last four decades has been warmer than any previous decade since 1850.

Many people think climate change mainly means warmer temperatures. But temperature rise is only the beginning of the story. Because the Earth is a system, where everything is connected, changes in one area can influence changes in all others.”

(Cited from the the United Nations Climate Action website on 10/14/2023: <https://www.un.org/en/climatechange/what-is-climate-change>)

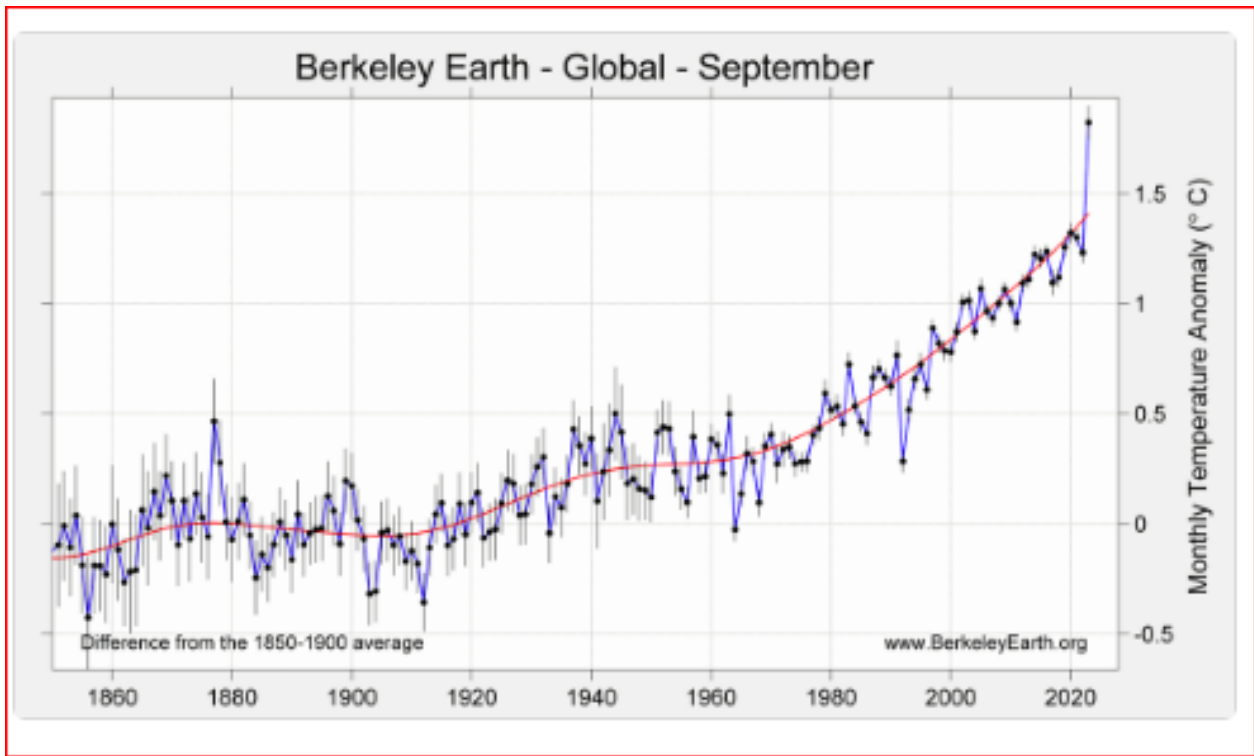
VIDEO: Climate Change Overview with Al Gore: <https://www.youtube.com/watch?v=iOKqYtRDGak>

There are longer-term and shorter term variations in climate. The first figure (below) shows longer term changes in climate as reflected in temperatures over the past 1500 years.



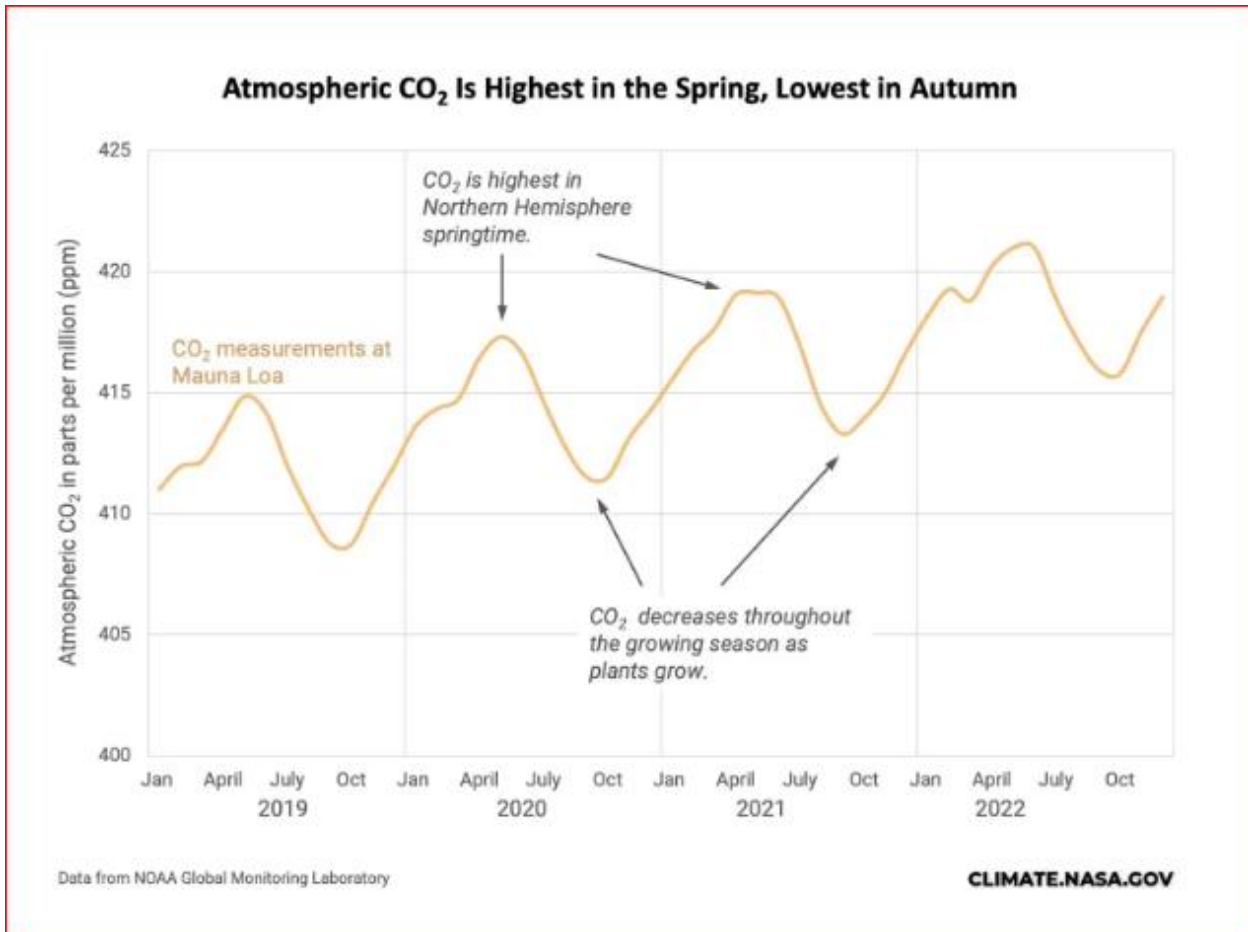
The above chart was taken on October 13, 2023 from: <https://earthobservatory.nasa.gov/features/GlobalWarming/page3.php>

The second figure (below) shows temperature changes since about 1850:



The above graphic was taken on October 13, 2023 from: <https://berkeleyearth.org/>

The third figure (below) shows shorter term variations in atmospheric CO₂.



The above graphic was taken on October 13, 2023 from: <https://climate.nasa.gov/vital-signs/carbon-dioxide/>)

Other Characteristics of Climate Change

The primary and most direct characteristic of climate change is warming of the earth's atmosphere. Then there are derivative characteristics: As the atmosphere warms, other atmospheric and environmental changes occur. Weather and wind patterns change, oceans warm, ocean acidity changes, ocean levels rise, there is more moisture in the atmosphere, ice masses melt and shrink, land mass temperatures rise, and there are more extreme weather events.

What Causes Climate Change

There are two major sources of climate change. One is natural variation in the climate and natural earth related causes (such as volcano eruptions). The second is human causes.

Natural variations:

Some amount of climate change can be attributed to natural phenomena. Over the course of Earth's existence, [volcanic eruptions](#), fluctuations in [solar radiation](#), [tectonic shifts](#), and even small [changes in our orbit](#) have all had observable effects on planetary warming and cooling patterns.

Citation from NRDC website on Oct 14, 2023: <https://www.nrdc.org/stories/what-are-causes-climate-change#natural>

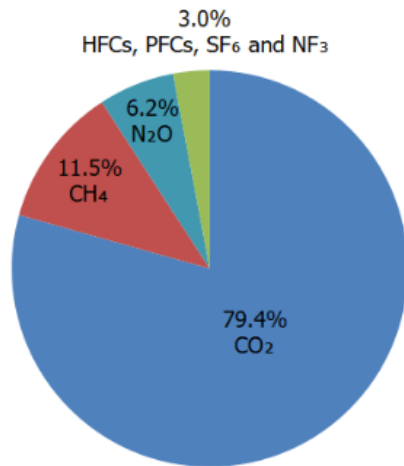
Human Caused Climate Change

Carbon dioxide in the atmosphere is the major cause of global warming.

“The main greenhouse gases that are causing climate change include carbon dioxide and methane. These come from using gasoline for driving a car or coal for heating a building, for example. Clearing land and cutting down forests can also release carbon dioxide. Agriculture, oil and gas operations are major sources of methane emissions. Energy, industry, transport, buildings, agriculture and land use are among the main sectors causing greenhouse gases.” (Citation on October 13, 2023 from : <https://www.un.org/en/climatechange/what-is-climate-change>)

There are other less dominant contributors to greenhouse gasses and therefore global warning. They include nitrous oxide and fluorinated gases. The relative contribution is shown in the graphic below:

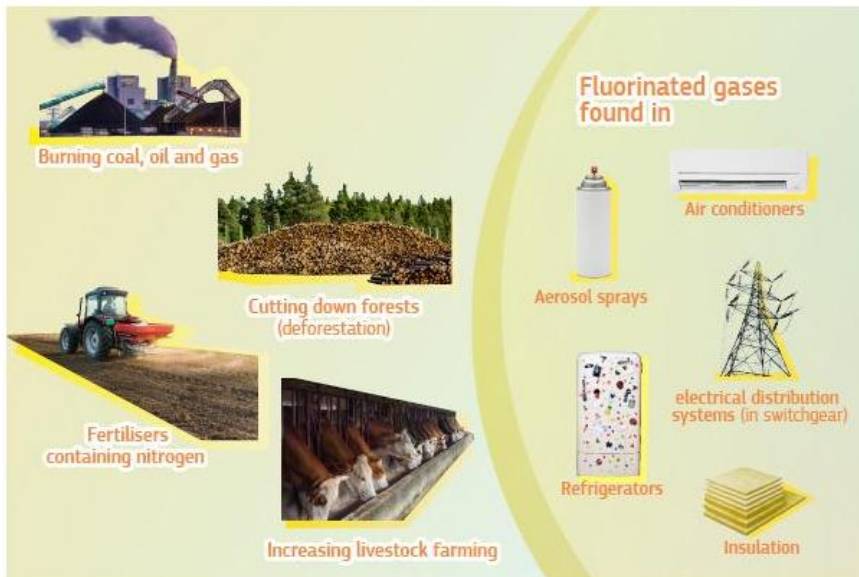
Overview of Greenhouse Gas Emissions



Above graphic taken on October 13, 2023 from: <https://www.epa.gov/ghgemissions/overview-greenhouse-gases>

Specific ways in which human activity contributes to gases in the atmosphere are shown in the following graphic.

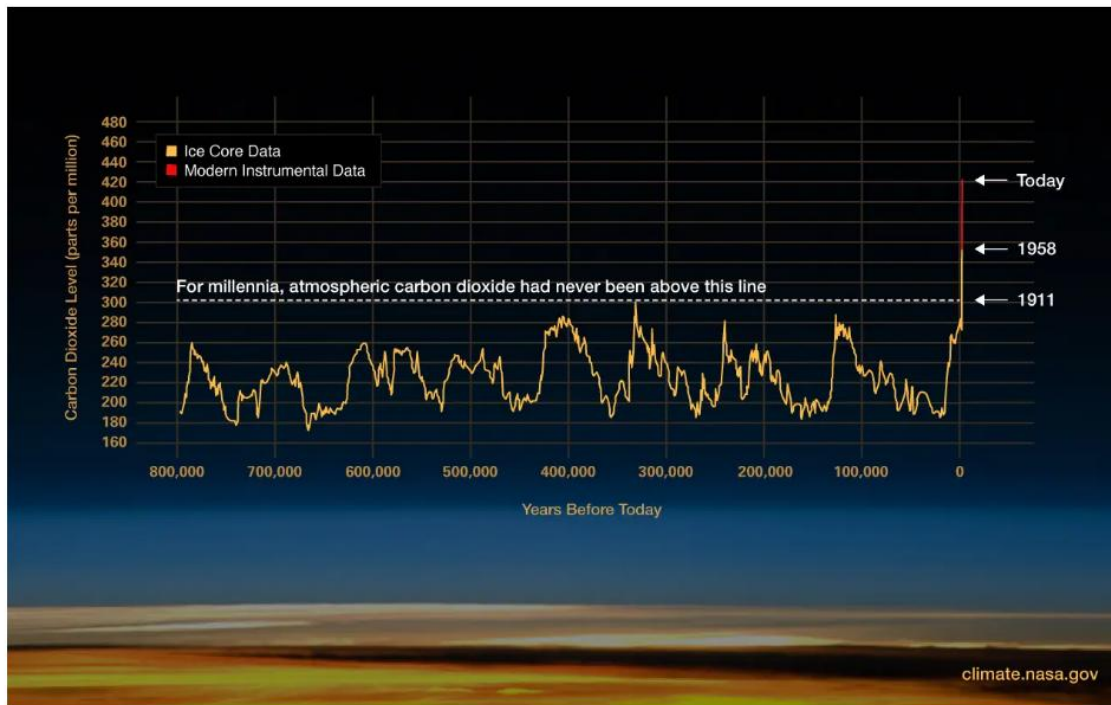
Causes for rising emissions



- **Burning coal, oil and gas** produces carbon dioxide and nitrous oxide.
- **Cutting down forests (deforestation)**. Trees help to regulate the climate by absorbing CO₂ from the atmosphere. When they are cut down, that beneficial effect is lost and the carbon stored in the trees is released into the atmosphere, adding to the greenhouse effect.
- **Increasing livestock farming**. Cows and sheep produce large amounts of methane when they digest their food.
- **Fertilisers containing nitrogen** produce nitrous oxide emissions.
- **Fluorinated gases** are emitted from equipment and products that use these gases. Such emissions have a very strong warming effect, up to 23 000 times greater than CO₂.

(Above information from https://climate.ec.europa.eu/climate-change/causes-climate-change_en)

The following figure shows an example of both longer-term variations in carbon dioxide and its current role as a cause of climate change



This graph, based on the comparison of atmospheric samples contained in ice cores and more recent direct measurements, provides evidence that atmospheric CO₂ has increased since the Industrial Revolution. (Credit: Luthi, D., et al.. 2008; Etheridge, D.M., et al. 2010; Vostok ice core data/J.R. Petit et al.; NOAA Mauna Loa CO₂ record.) [Find out more about ice cores](#) (external site).

(The above graphic was taken on October 13, 2023 from: <https://climate.nasa.gov/evidence/>)

So called “greenhouse gases” are the main source of recent climate change.

“Fossil fuels are by far the largest contributor to the greenhouse gas emissions that cause climate change, which poses many risks to all forms of life on Earth.”

Humans are responsible for global warming

Climate scientists have showed that humans are responsible for virtually all global heating over the last 200 years. Human activities like the ones mentioned above are causing greenhouse gases that are warming the world faster than at any time in at least the last two thousand years.”

(Cited from the the United Nations Climate Action website on 10/14/2023: <https://www.un.org/en/climatechange/what-is-climate-change>)

What is the Evidence

There are two parts to this. One is how do we collect the evidence, and two is what is the evidence.

How we collect the evidence

Information about climate is collected through a variety of means. Scientists study samples of earth materials: ice, rocks, trees, sediment, coral reefs, etc. for information about conditions years or centuries ago. Weather instrumentation has been important. More recently, earth orbiting satellites have provided additional information. Data are analyzed and projected using sophisticated mathematical techniques. The analysis and synthesis of large amounts of data from a variety of sources establishes atmospheric makeup and global temperatures over a long period of time. Models for projecting climate temperatures and related variables into the future are created using mathematical and computer modeling.

The following information was taken on October 13, 2023 from: <https://www.climate.gov/maps-data/climate-data-primer/past-climate>. Reading the entire article will give you a good picture of climate methodology.

Past Climate

Some natural processes record the passage of time: for instance, layers of sediments accumulate over many years, and some of them preserve information about weather conditions during the time they were deposited. Throughout Earth's history, global and regional climate has changed on very long time scales, and many of the past conditions can be discovered by studying natural records.

How Do We Study Past Climates?

Paleoclimatology is the study of climate records from hundreds to millions of years ago. Information for paleoclimate studies come from natural records rather than instruments: these indirect records of climatic conditions are called proxy records.

One of the most easily recognized type of paleoclimate records is tree ring data. Trees that grow a single annual ring can preserve a record of the conditions they experienced each year. Rocks deposited by glaciers are another example of proxy records. Scientists can recognize the distinctive pattern of sediments in rocks formed by glaciers. Wherever they find glacial rocks then, they know that glaciers were present in that location at some point in the past. Once they examine fossils and other clues about when the rocks were deposited, they use the information to reconstruct the climate story for that location. Other sources of proxy data for climate include lake and ocean sediments, layers of ice (cored from ice sheets), corals, fossils, and historical records from ship logs and early weather observers.

Evidence regarding climate change

One of the main indicators of climate change is the amount of Carbon Dioxide (CO₂) in the atmosphere. As indicated previously, carbon dioxide in the atmosphere has accelerated dramatically in the past 100 years or so.

In general, there is good evidence for climate change:

- According to the Intergovernmental Panel on Climate Change (IPCC), "Since systematic scientific assessments began in the 1970s, the influence of human activity on the warming of the climate system has evolved from theory to established fact."¹
- Scientific information taken from natural sources (such as ice cores, rocks, and tree rings) and from modern equipment (like satellites and instruments) all show the signs of a changing climate.
- From global temperature rise to melting ice sheets, the evidence of a warming planet abounds.

<https://climate.nasa.gov/evidence/#:~:text=Scientific%20information%20taken%20from%20natural,of%20a%20warming%20planet%20abounds.>

This section on evidence of climate change includes the following and was taken on October 13, 2023 from:

<https://climate.nasa.gov/evidence/#:~:text=Scientific%20information%20taken%20from%20natural,of%20a%20warming%20planet%20abounds.>

Global Temperature Is Rising

The planet's average surface temperature has risen about 2 degrees Fahrenheit (1 degrees Celsius) since the late 19th century, a change driven largely by increased carbon dioxide emissions into the atmosphere and other human activities.⁴ Most of the warming occurred in the past 40 years, with the seven most recent years being the warmest. The years 2016 and 2020 are tied for the warmest year on record.⁵

The Ocean Is Getting Warmer

The ocean has absorbed much of this increased heat, with the top 100 meters (about 328 feet) of ocean showing warming of 0.67 degrees Fahrenheit (0.33 degrees Celsius) since 1969.⁶ Earth stores 90% of the extra energy in the ocean.

The Ice Sheets Are Shrinking

The Greenland and Antarctic ice sheets have decreased in mass. Data from NASA's Gravity Recovery and Climate Experiment show Greenland lost an average of 279 billion tons of ice per year between 1993 and 2019, while Antarctica lost about 148 billion tons of ice per year.⁷

Glaciers Are Retreating

Glaciers are retreating almost everywhere around the world — including in the Alps, Himalayas, Andes, Rockies, Alaska, and Africa.⁸

Snow Cover Is Decreasing

Satellite observations reveal that the amount of spring snow cover in the Northern Hemisphere has decreased over the past five decades and the snow is melting earlier. Image credit: NASA/JPL-Caltech⁹

Sea Level Is Rising

Global sea level rose about 8 inches (20 centimeters) in the last century. The rate in the last two decades, however, is nearly double that of the last century and accelerating slightly every year.¹⁰

Arctic Sea Ice Is Declining

Both the extent and thickness of Arctic sea ice has declined rapidly over the last several decades.¹¹

Extreme Events Are Increasing in Frequency

The number of record high temperature events in the United States has been increasing, while the number of record low temperature events has been decreasing, since 1950. The U.S. has also witnessed increasing numbers of intense rainfall events.¹²

Ocean Acidification Is Increasing

Since the beginning of the Industrial Revolution, the acidity of surface ocean waters has increased by about 30%.^{13,14} This increase is due to humans emitting more carbon dioxide into the atmosphere and hence more being absorbed into the ocean. The ocean has absorbed between 20% and 30% of total anthropogenic carbon dioxide emissions in recent decades (7.2 to 10.8 billion metric tons per year).^{15,16}

Image credit: NOAA

What are the Characteristics and Effects of a changing climate

This whole section that follows was taken on October 13, 2023 from <https://www.un.org/en/climatechange/science/causes-effects-climate-change>

Hotter temperatures

As greenhouse gas concentrations rise, so does the global surface temperature. The last decade, 2011-2020, is the warmest on record. Since the 1980s, each decade has been warmer than the previous one. Nearly all land areas are seeing more hot days

and heat waves. Higher temperatures increase heat-related illnesses and make working outdoors more difficult. Wildfires start more easily and spread more rapidly when conditions are hotter. Temperatures in the Arctic have warmed at least twice as fast as the global average.

More severe storms and other weather events

Destructive storms have become more intense and more frequent in many regions. As temperatures rise, more moisture evaporates, which exacerbates extreme rainfall and flooding, causing more destructive storms. The frequency and extent of tropical storms is also affected by the warming ocean. Cyclones, hurricanes, and typhoons feed on warm waters at the ocean surface. Such storms often destroy homes and communities, causing deaths and huge economic losses.

Increased drought

Climate change is changing water availability, making it scarcer in more regions. Global warming exacerbates water shortages in already water-stressed regions and is leading to an increased risk of agricultural droughts affecting crops, and ecological droughts increasing the vulnerability of ecosystems. Droughts can also stir destructive sand and dust storms that can move billions of tons of sand across continents. Deserts are expanding, reducing land for growing food. Many people now face the threat of not having enough water on a regular basis.

A warming, rising ocean

The ocean soaks up most of the heat from global warming. The rate at which the ocean is warming strongly increased over the past two decades, across all depths of the ocean. As the ocean warms, its volume increases since water expands as it gets warmer. Melting ice sheets also cause sea levels to rise, threatening coastal and island communities. In addition, the ocean absorbs carbon dioxide, keeping it from the atmosphere. But more carbon dioxide makes the ocean more acidic, which endangers marine life and coral reefs.

Loss of species

Climate change poses risks to the survival of species on land and in the ocean. These risks increase as temperatures climb. Exacerbated by climate change, the world is losing species at a rate 1,000 times greater than at any other time in recorded human history. One million species are at risk of becoming extinct within the next few decades. Forest fires, extreme weather, and invasive pests and diseases are among many threats related to climate change. Some species will be able to relocate and survive, but others will not.

Not enough food

Changes in the climate and increases in extreme weather events are among the reasons behind a global rise in hunger and poor nutrition. Fisheries, crops, and livestock may be destroyed or become less productive. With the ocean becoming more acidic, marine resources that feed billions of people are at risk. Changes in snow and ice cover in many Arctic regions have disrupted food supplies from herding, hunting, and fishing. Heat stress can diminish water and grasslands for grazing, causing declining crop yields and affecting livestock.

More health risks

Climate change is the single biggest health threat facing humanity. Climate impacts are already harming health, through air pollution, disease, extreme weather events, forced displacement, pressures on mental health, and increased hunger and poor nutrition in places where people cannot grow or find sufficient food. Every year, environmental factors take the lives of around 13 million people. Changing weather patterns are expanding diseases, and extreme weather events increase deaths and make it difficult for health care systems to keep up.

Poverty and displacement

Climate change increases the factors that put and keep people in poverty. Floods may sweep away urban slums, destroying homes and livelihoods. Heat can make it difficult to work in outdoor jobs. Water scarcity may affect crops. Over the past decade

(2010–2019), weather-related events displaced an estimated 23.1 million people on average each year, leaving many more vulnerable to poverty. Most refugees come from countries that are most vulnerable and least ready to adapt to the impacts of climate change.

Based on various UN sources

What is Climate Injustice

The following section was prepared by Generative AI. Generative AI is experimental. Info quality may vary.

Climate injustice is the impact of climate change on different groups differently. It can be demonstrated by the countries hit hardest by climate change, versus the countries who have contributed most to greenhouse gas emissions.

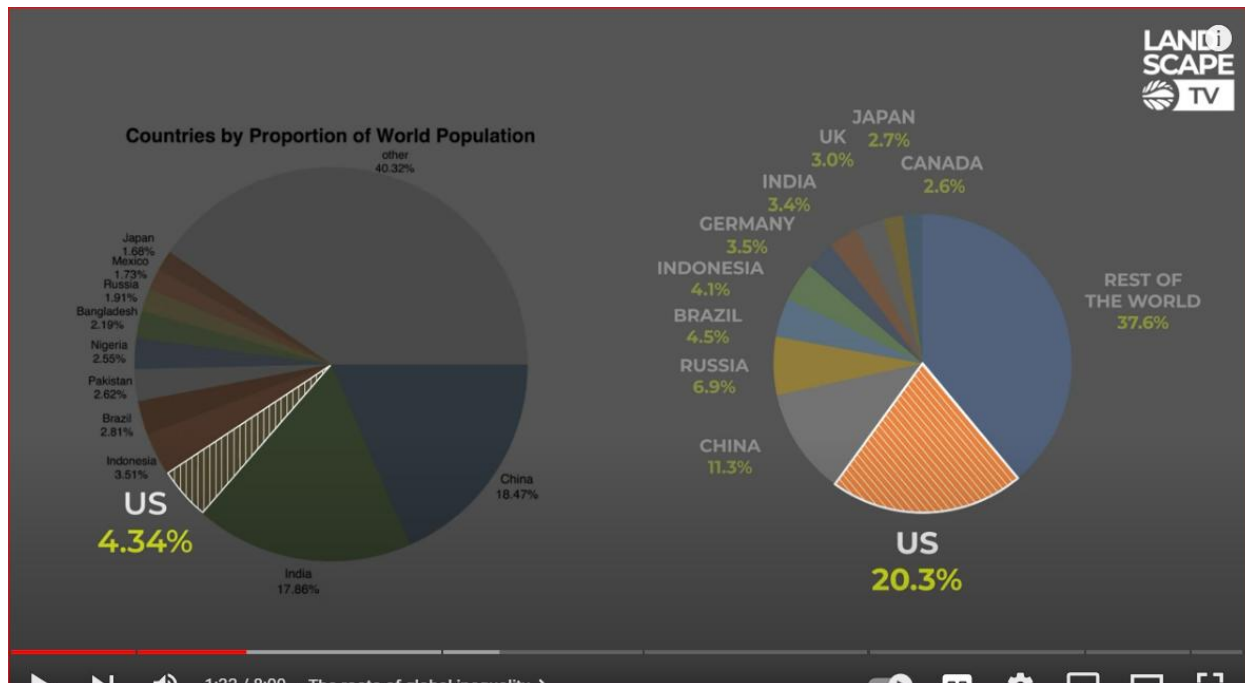
Climate injustice recognizes the disproportionate impacts of climate change on low-income and BIPOC (Black, Indigenous and People of Color) communities around the world, the people and places least responsible for the problem.

Climate injustice can be described as encompassing a set of rights and obligations, which corporations, individuals and governments have towards those vulnerable people who will be in a way significantly disproportionately affected by climate change.

Some causes of climate injustice include:

- Different countries, industries, and businesses have different levels of responsibility for causing the climate crisis
- Fossil fuels are responsible for over 75% of global greenhouse gas emissions and 90% of CO2 emissions

Discrepancy of population vs greenhouse gas emissions



Video of Climate Change Justice:

https://www.google.com/search?q=climate+injustice+video&og=climate+injustice+video&gs_lcrp=EgZjaHJvbWUyBggAEEUYOTIHCAEQIRigATIHCAMQIRirAjiHCAQQIRirAtIBCjEwOTAYajBqMTWoAgCwAgA&sourceid=chrome&ie=UTF-8#fpstate=ive&ip=1&vld=cid:992e83a9,vid:VdjPS4G7q80,st:0

The Remaining Question: What can we do?

External Information 1 - Factors outside the earth's atmosphere that can affect climate (taken from <https://education.nationalgeographic.org/resource/earths-changing-climate/>)

Natural Causes of Climate Change

Climate changes happen for a variety of reasons. Some of these reasons have to do with Earth's atmosphere. The climate change brought by El Niño, which relies on winds and ocean currents, is an example of natural atmospheric changes.

Natural climate change can also be affected by forces outside Earth's atmosphere. For instance, the 100,000-year cycles of ice ages are probably related to changes in the tilt of Earth's axis and the shape of its orbit around the sun. Those planetary factors change slowly over time and affect how much of the sun's energy reaches different parts of the world in different seasons.

The impact of large meteorites on Earth could also cause climate change. The impact of a meteor would send millions of tons of debris into the atmosphere. This debris would block at least some of the sun's rays, making it cold and dark. This climate change would severely limit what organisms could survive. Many paleontologists believe the impact of a meteor or comet contributed to the extinction of the dinosaurs. Dinosaurs simply could not survive in a cool, dark climate. Their bodies could not adjust to the cold, and the dark limited the growth of plants on which they fed.

Plate tectonics also play a role in climate changes. Earth's continental plates have moved a great deal over time. More than 200 million years ago, the continents were merged together as one giant landmass called Pangaea. As the continents broke apart and moved, their positions on Earth changed, and so did the movements of ocean currents. Both of these changes had effects on climate.

Changes in greenhouse gases in the atmosphere also have an impact on climate change. Gases like carbon dioxide trap the sun's heat in Earth's atmosphere, causing temperatures on the surface to rise. Volcanoes—both on land and under the ocean—release greenhouse gases, so if the eruption only reaches the troposphere the additional gases contribute to warming. However, if the eruption is powerful enough to reach the stratosphere particles reflect sunlight back into space causing periods of cooling regionally.

External Information 2 - Major Causes of Climate Change: Go to the following website to see the entire article on human initiated major causes of climate change:

<https://www.nrdc.org/stories/what-are-causes-climate-change#natural>