



Science Fair Logbook

Science Fair - Global Warming & Climate Change

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2/14/2021 - Sunday, feb. 14 2021

I started my project today. Well, I started actual work on my project today. Yesterday I got all the backgrounds and stuff ready. TODAY I did most of my background research. I have 4 DAYS LEFT TO DO THE wHoLe ThInG. That is so gReAt NEWS. T

I got all this stuff.

So what is Climate Change.

Climate change is a long term alteration in the average weather patterns that add up to decide Earth's local, regional and global climates. In simple words, climate change is a long-term shift/change in global or regional climate patterns.

Nowadays, climate change most commonly refers to the increased amount of carbon dioxide in the air (produced by fossil fuels) and its effects on the environment.

"Changes observed in Earth's climate since the early 20th century are primarily driven by human activities, particularly fossil fuel burning, which increases heat-trapping greenhouse gas levels in Earth's atmosphere, raising Earth's average surface temperature. These human-produced temperature increases are commonly referred to as global warming. Natural processes can also contribute to climate change, including internal variability (e.g., cyclical ocean patterns like El Niño, La Niña and the Pacific Decadal Oscillation) and external forcings (e.g., volcanic activity, changes in the Sun's energy output, variations in Earth's orbit)." - <https://climate.nasa.gov/>

Regional Climate Change:

Regional climate change describes a change in the average conditions (e.g. rainfall & temperature) in a region over a long period of time. For example, most of the U.S. was covered in glaciers 20 000 years ago. The U.S. today, there is much warmer climate and there are fewer glaciers. Here is a picture of Alaska's Muir glacier in August 1941 and August 2004. *Credit: USGS, <https://climatekids.nasa.gov/climate-change-meaning/>*



Global Climate Change:

Global climate change describes the average changes over the entire Earth over a long period of time . For example:

- Sea levels rising
- Shrinking and melting mountain glaciers
- Ice melting faster than usual in extra cold parts of the world Greenland, Antarctica and the Arctic Continent.
- Air pollution around the world

And what causes Climate Change.

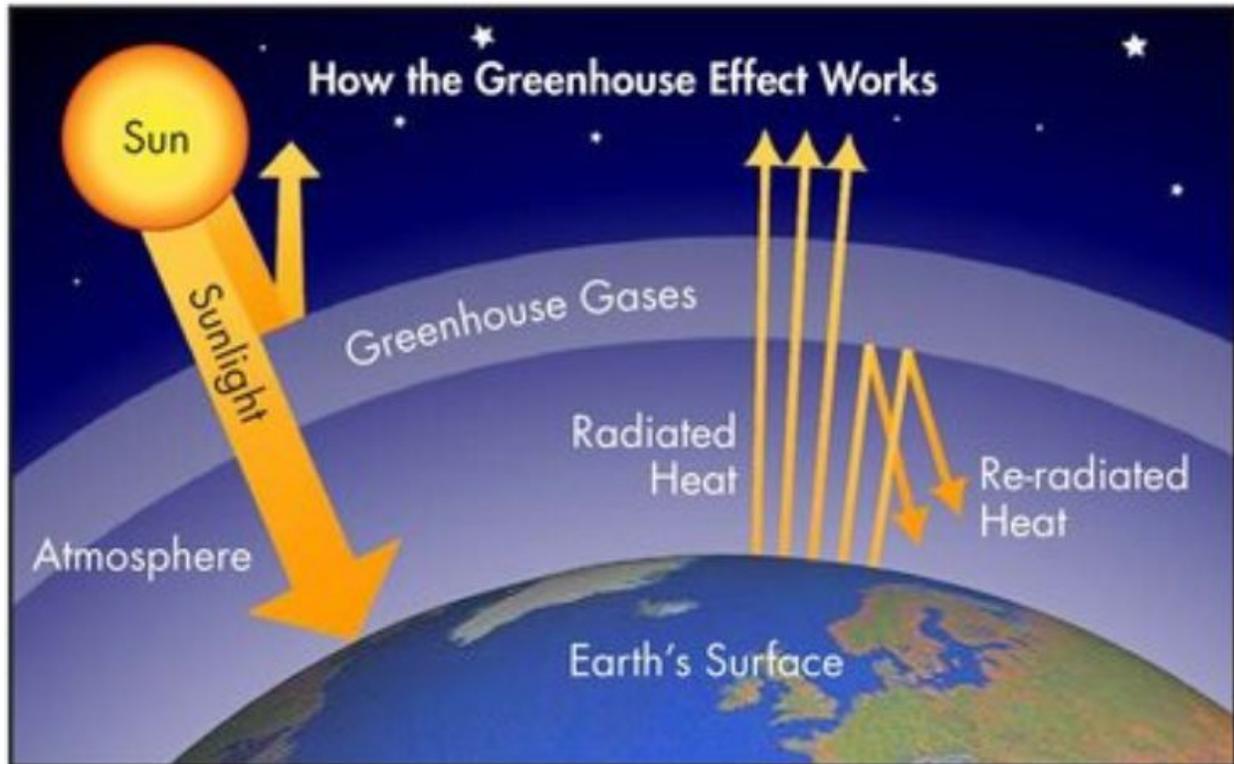


There are many ideas that people think may be causing the climate change and global warming of Earth. These ideas can be divided into two categories:

- Human activities (i am researching about this rn)
- Natural causes

But scientists also do agree on the fact that the Earth has been getting warmer in the past 50-150 years due to human activities. By human activities, I mean like burning fuel to power factories and vehicles like cars and buses. *These* human activities cause more greenhouse gases to enter the atmosphere, which makes Earth warmer and warmer. How? Well, it's because the greenhouse gases build up in the atmosphere over time. And they let the stringer and harmful rays of sunlight pass through into warming earth's surface. Earth radiates this heat energy back into the air. But the gases in the Earth's atmosphere block the heat inside the earth from escaping. This happens over and over, making earth warmer each time. This is called the greenhouse effect. Here it

is:



The main greenhouse gases are: Carbon Dioxide (81%)*, Methane (10%)*, Nitrous Oxide (7%)*, and Fluorinated Gases (3%)*. (*"Percentages may not add up to 100% due to independent rounding." *Percentages as of 2018)

Greenhouse Gas	Sources
Carbon dioxide	Fossil fuels, burning and cutting down forests, volcanoes
Methane	Burning forests, microbes in wetlands and inside cattle intestines
Nitrous oxide	Fossil fuels, burning forests, chemical reactions in soil and ocean
Halocarbons	Old spray cans, certain cleaning fluids, other products
Aerosol particles	Fossil fuels, burning forests, volcanoes
Ozone	Automobiles, power plants
Water vapor	Evaporation, plants

Also this is a good gif picture explain the greenhouse effect:



(I got it from NASA climate kids website. I will put it on my slides and make it bigger.)

Now how greenhouse gases affect the earth.

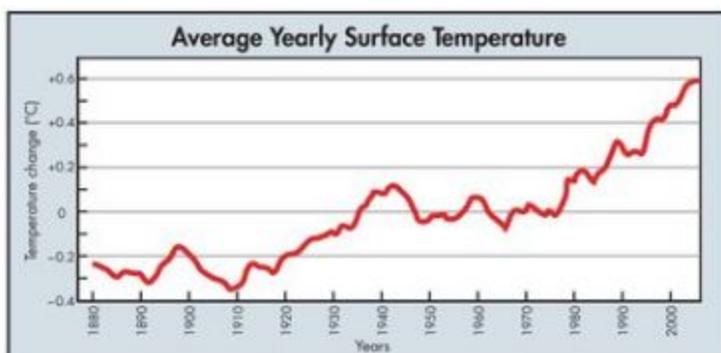
From Carbon Dioxide:

Carbon dioxide is responsible for 81% of all greenhouse gas emissions. Carbon is stored all over the planet - it is in plants, in the soil, in Earth's crust and even in us because it is what we breathe out. We release carbon dioxide into the atmosphere as we breathe, but also by other activities we do. Some impactful ones are through burning fossil fuels (coal, natural gas and oil), cutting down trees (which are supposed to breathe in CO₂), and destroying wetlands (which absorb CO₂).

The greenhouse effect is a natural part of the way Earth works. Without it, Earth would be too cold for liquid water or life. It would be like another Mars. But scientists believe that the *increased* amount of CO₂ being emitted into the atmosphere is warming the Earth faster than it should be doing so.

Today, the Earth contains 42% more CO₂ than it did before the Industrial Revolution. People started burning humongous amounts of fossil fuels starting from the mid-1800s, when industrialization (which is the use of machinery driven by power) first became common. Earth's surface temperature started to increase from this point in time as well.

Another human activity that is increasing the level of CO₂ in the air is cutting down trees; deforestation. During photosynthesis, trees and plants release oxygen and take in carbon dioxide. So, more trees means less excess carbon dioxide. But when there are less plants to breathe in this excess CO₂, it just builds up in the atmosphere. Planting trees is a great way to reduce the amount of carbon dioxide in the atmosphere.



Here is that graph.

From Methane:

Methane is responsible for 10% of all greenhouse gas emissions. Methane stays in Earth's atmosphere for about 12 years. It is emitted and enters the Earth's atmosphere during the production of coal, natural gas and oil. Methane is also emitted from livestock and other farming methods when organic waste in local manure landfills start to decay and decompose. If the world was filled with cows, there would be way more methane than normal.

Fun fact: It's true, some *people* fart methane. LOL.

From Nitrous Oxide:

Nitrous oxide enters the earth's atmosphere during:

- Mainly farming and industrial works.
- when fossil fuels solid waste is burned
- when wastewater is being treated
- and from chemical reactions in soil and the ocean.

Nitrous oxide has the heat-trapping power 300 times that of CO₂. Nitrous oxide destroys the ozone layer, but has a short life span. This means reducing it could have a quicker, great impact on global warming.

From Fluorinated Gases:

Hydrofluorocarbons, perfluorocarbons and sulfur hexafluoride are called fluorinated gases. They are emitted during many kinds of industrial processes. They are also called F-gases or High Global Warming Potential Gases. Usually these gases are used as substitutes to take away substances that cause damage to the ozone layer, but they are powerful greenhouse gases. Their global warming effect is up to 23 000 times greater than CO₂. Their emissions have been rising rapidly.

This a picture that has all these gases i talked about (i forgot to write hydro for one but i'll fix in in slides)

2/15/2021 - Monday, feb. 15 2021

I have to finish. At least my background research. Because I only have 3 days left. PLUs i have to do the video too and copy paste all of this onto that cysf website. HuRRY UP MYSELF.

I am doing this. I got this. Ya.

Is climate change real? Well I found proof that it is. From raz-kids. But ofc i wrote it in my own words.

We know that global warming is happening. But how do we know? What tells us there is actually something going on with the way Earth is warming up? Scientists have found proof to show that global warming is true. These scientists are called meteorologists, and they study the weather. They have kept careful records of the Earth's surface temperatures since the mid-1800s.

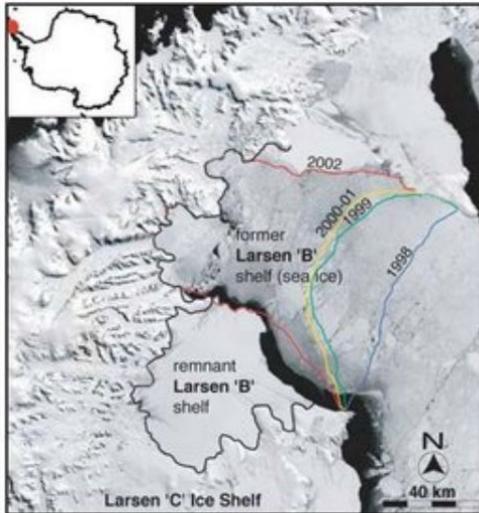
Surface temperatures include the temperature OF THE ground and also the temperature of the ocean surface.

These records that the meteorologists have kept show that Earth's average surface temperature has increased approximately by 0.6 °- 1.0 ° since the late 1800s.



Looking at old photographs and pictures can help scientists figure out more about Earth's warming. Such as the photos of particular mountain glaciers taken around the mid-1900s, which tell scientists that glaciers were much larger ages ago than their size today.

When observing glaciers in Alaska, South America, Europe and Asia, researchers have found that these mountain glaciers are melting and shrinking at a faster rate, and they believe global surface warming is at fault for this.



Melting glaciers helped cause the shattering of the 400-year-old Larsen B ice shelf in Antarctica.

Like this picture right here for example.

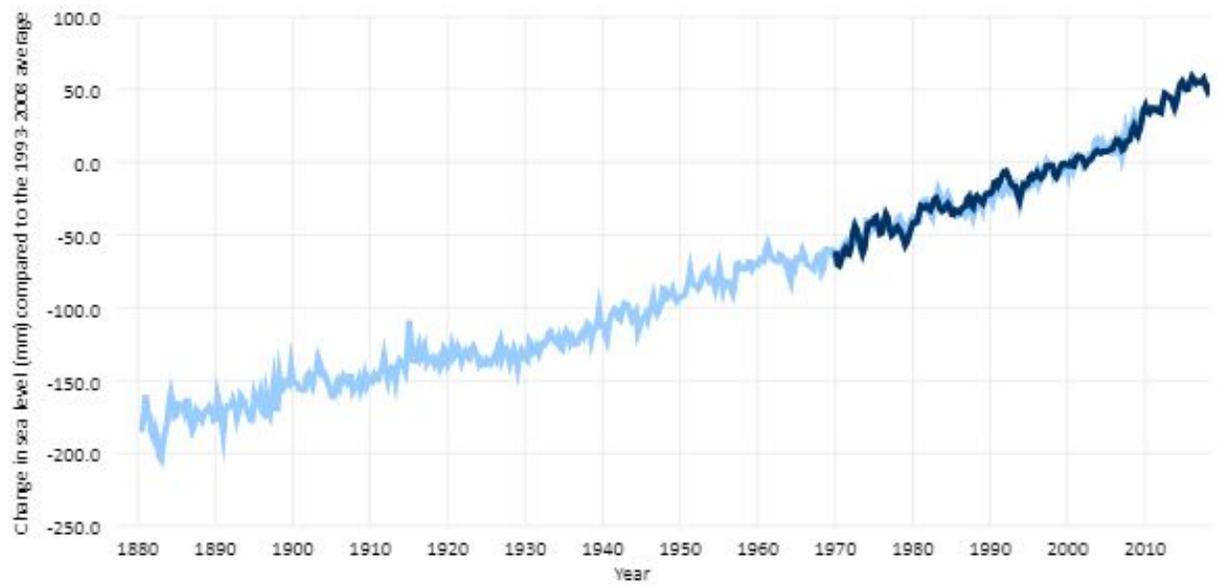
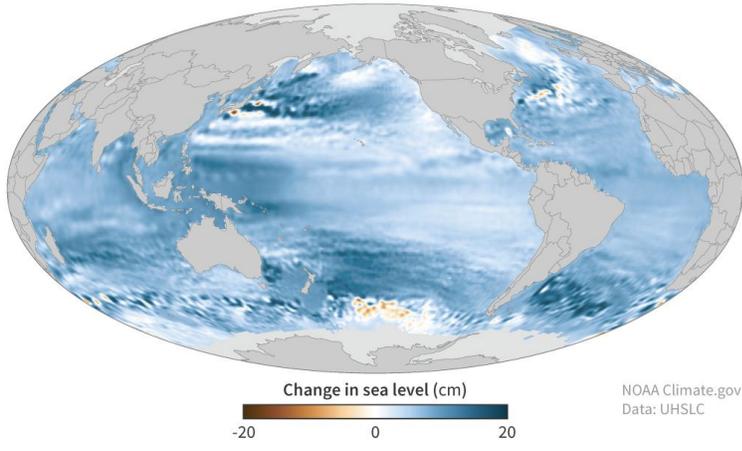
Climate Change and Rising Sea levels.

Scientists have found evidence (through satellites capturing pictures of Earth), that ice around the North & South Poles are shrinking. They discovered that between 2004-2005, a large chunk of ice, as big as Texas disappeared in the Arctic. The melting ice in the Arctic ocean is risking the lives of polar bears. Polar bears need ice floes to stand on for catching fish, but scientists said in 2005 that the number of ice floes are decreasing, which means less polar bears. In the South Pole, satellites revealed that ice sheets & ice shelves in Antarctica are melting. All of this ice melting can contribute to the rise of global sea levels. I also got some pics...



lol this poor polar bear

SEA LEVEL CHANGE (1993-2019)



Where does the heat from global warming go.

Global warming affects the polar regions by 2.1%. It affects the continents of the world by 2.1%. It affects earth's atmosphere by 2.3%. And the ocean is affected the most - by 93.4%.

Nono i'll write it like this →

Global warming is affecting the polar regions, the Earth's atmosphere, & our continents, but the most highly affected place is the ocean. Oceans were 0.17 °C warmer in 2017 than in 2000, and they keep warming. More than 90% of global warming occurred in the world's oceans since 1950.

Many coral reefs (and Great Barrier Reef) are dying from coral bleaching due to rising ocean temperatures. As a result, all the life in these coral reefs are dying as well. Ocean warming affects marine mammals fishes by taking away their breeding grounds, which lessens their populations.

Fish are migrating towards the Poles, due to ocean warming, this interrupts fisheries. Rising sea levels are drowning wetlands, coral reefs and seagrass meadows into the ocean. The ocean today absorbs $\frac{1}{3}$ of CO₂ & oxygen we produce, but this is resulting in ocean acidification, because of too much absorption.

The pics:



and i also got a lightning storm pic but it doesn't work here so i'll just put it on the slides right away.

Is Climate change also natural.

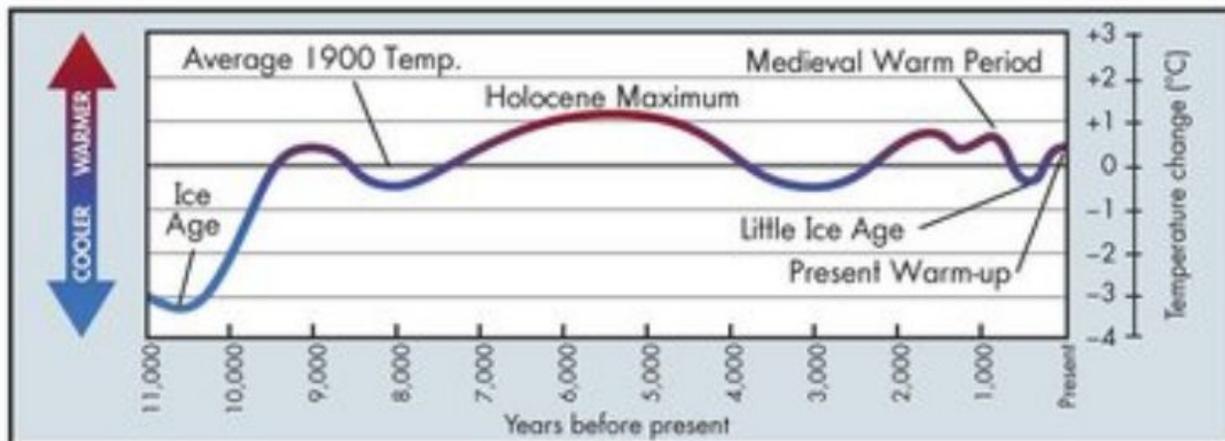
As i said earlier, there are many points that contribute to the climate change of Earth. The main two are human activities and natural occurrences. I have researched about human activities, and now it's time to research for hours and scorch my eyes (nooooo) into the natural occurrences of the Earth....

Some scientists think that global warming doesn't have to be caused by human activities, because global warming and global cooling have happened repeatedly even before people started to burn fossil fuels and cut down trees.

There have been several ice ages during the past hundreds of thousands of years. Ice ages are when Earth's surface was covered in ice. There have also been warm periods

in between these ice ages. According to geologists, the last ice age ended 11 500 years ago, and we are now in a warm period in between two ice ages.

Scientists have more evidence to prove this.



This graph is based on weather records and scientific evidence, to show the years before in time and Earth's average global temperature at those times.

In Europe, the climate cooled between the 'Medieval Warm Period' (~1100 to ~1300) and the 'Little Ice Age' (~1400 to ~1800). The climate started warming again after the 'Little Ice Age' ended.

Since these earlier climate changes had natural causes, some scientists think maybe today's climate change & global warming has some natural causes as well.

BUT>>> I look at the graph and I note that the Earth's climate went significantly up around 11 400,(or the Ice Age) and did not cool down back to that level after.

How do scientists find out about centuries ago though?

Remember when I mentioned that meteorologists have kept careful records of Earth's temperature since only the mid 1800s. Then how do they know about these super earlier Nope! These scientists, called paleoclimatologists, have many ways of figuring out what the world used to be like thousands of years ago. These ways include:

- Studying old tree growth rings
- Studying ice cores

And this pics



My thoughts.

So I learned about Ice Ages and warm periods. And we are in a warm period right now. I actually couldn't finish the bg research so that's not good and I only have 3 days left. I really don'tt waaaaaaaaaaaaana do the videeeeeeeeeeeeeeeeeooooooooooooooooooooo.

But the thing is even if climate change IS natural, earth's temperature had a very high step up after the Ice Age. And it never cooled back down low after that. I can tell this by looking at that graph. Besides, just because some people don't believe in climate change doesn't mean we burn up earth with greenhouse gases and ruin it for the future. We are Earth's most dominant species. We MUST care about our planet.

p.s. If the earth warmed up super high, the water would evaporate away and we wouldn't even survive. And a million other things would change earth into a planet unsuitable for humans. Even if earth turned back to normal after this global warmup, we humans wouldn't be here, we'd be extinct because of global warming in the past. Climate change isn't just about earth, it's also about our chance for survival.

Anyways, I read some of the articles about mars and venus and earth, and found it really cool that some scientists believe that billions of years ago, mars and venus used to have life, but climate change destroyed it all, and that could be the reason mars still has little bits of frozen water on it today.

But I need to make a separate slide about THAT stuff.

Plus, it's 10:04 right now.

2/16/2021 - Tuesday, feb. 16 2021

I ONLY HAVE 2 DAYS left. I STILL have to do the video AND copy paste all of this onto that cysf website. HuRrY uP fAsTeR mYsELf.

I've gOt this.

Finding out about earth before the mid-1800s

Studying old trees' growth rings : Paleoclimatologists can get a lot of information about the climate and Earth's temperature was like hundreds of years back, just by looking at old tree rings. If the climate was wet & warm, those rings would be thicker, and if the climate was cold & dry, those rings would be thinner.



Examining ice cores :

Ice cores are long cylindrical pieces of ice that are drilled out of glaciers and ice sheets (e.g. in Antarctica). They carry chemical evidence about Earth's atmosphere & climate activity. The ice core will be deeper if it formed earlier. Paleoclimatologists can discover temperature shifts, precipitation, volcanic activity, wind patterns, & the atmosphere from thousands of years ago by studying and examining at these ice cores.



Some info i found from nasa climate kids website:

“Jason-3 NASA's Jason-3 satellite measures sea level, wind speed and wave height for more than 95 percent of Earth's ice-free ocean. It helps scientists track Earth's rising seas and enables more accurate weather, ocean and climate forecasts.”

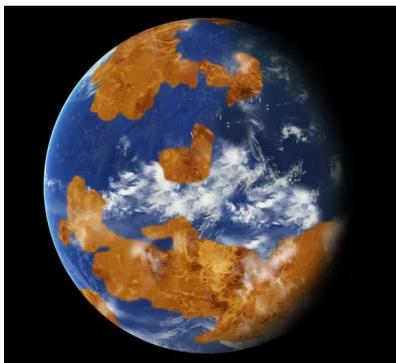
“Suomi-NPP Satellite The Suomi-NPP satellite orbits Earth approximately 14 times per day collecting information about long-term climate change and short-term weather conditions.”

- Scientists say that Earth’s atmosphere used to look a lot like Venus when it first formed.

Climate change on other planets.

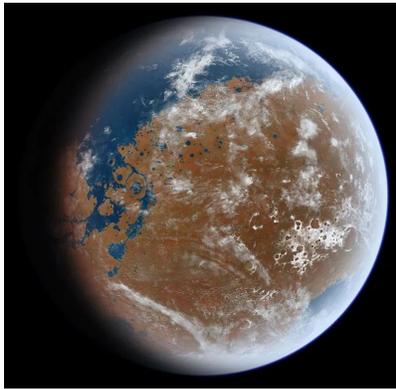
Some scientists say that Venus and Mars may have been able to hold life billions of years ago, but factors like the distance of the Sun, orbital distances, and imprecise rotation periods lead our neighbor planets to uninhabitability.

Venus, as you may have heard, is often called Earth’s evil twin. But there is a reason for this nickname. Scientists think that Venus used to be earth-like when our solar system first formed. But greenhouse gases soon took over and boiled Venus water. Because of Venus’s close distance to the sun and its extreme amount of volcano eruptions, Venus was only able to have a chance for life for 200 million years, and is now a fiery, rocky ball to remind us of the effects of greenhouse gases.



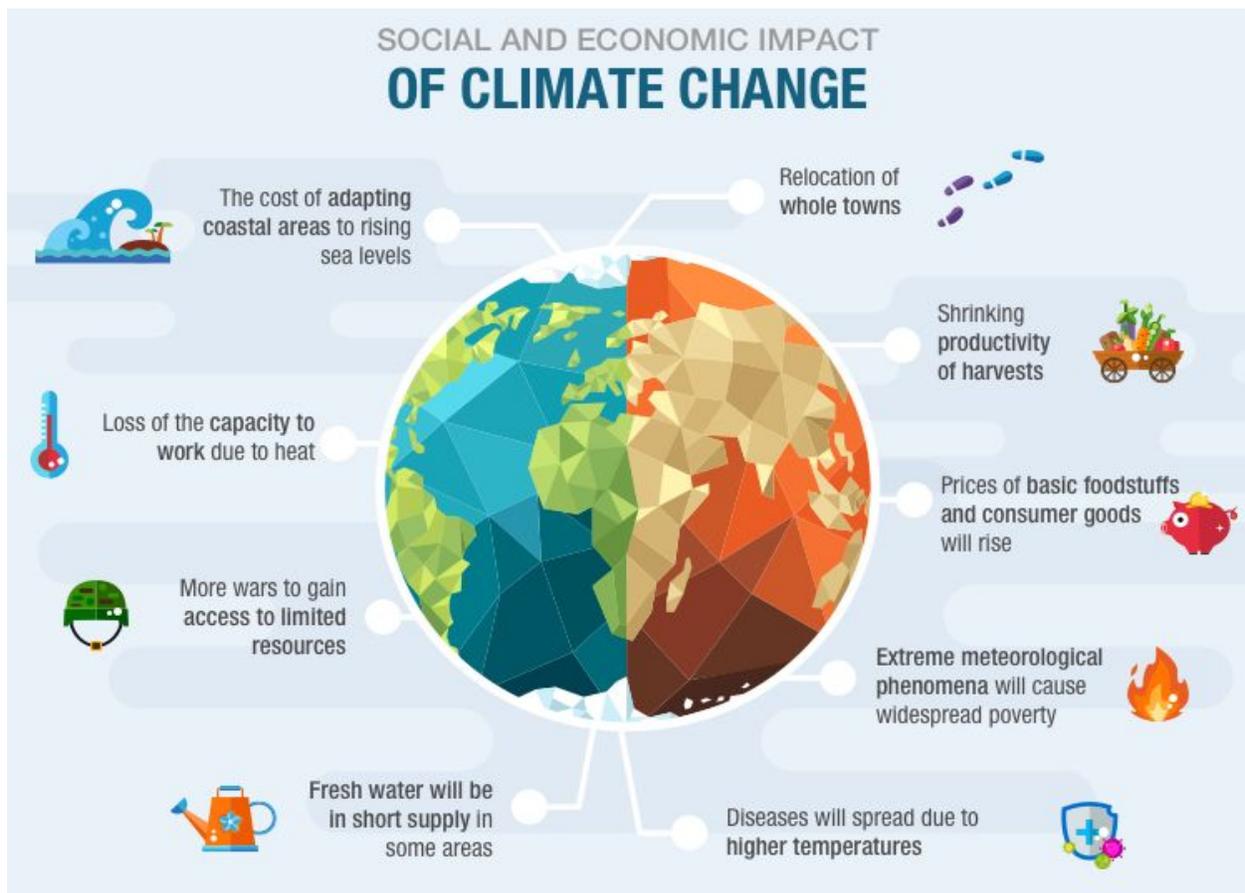
venus when it had water

Mars, on the other hand, was also formed with water on it. Since it was farther away from the sun, greenhouse gases actually helped the red planet to warm up to having water bodies. But Mars had a weak magnetic field, so solarwinds took over and created too much air pressure. This large amount of air pressure killed off any kind of life that may have been alive, and froze the water into ice. Mars had a chance for life for 1.5 billion years before it came to an end. Today, Mars is a cold, barren rocky planet; nothing like it may have once been.



Mars when it had water like Earth

Effects of Climate Change on humans



There. That's what they mean by a picture is worth a thousand words.

FINALLY I'M DONE MY BG RESEARCH.

NOW IT'S TIME TO RESEARCH SOME MORE! YaAaAaAaAaAaAaAaAaAaYy!

My question/problem is:

If Earth has warmed and cooled naturally, why are scientists so concerned about today's global warming?

My hypothesis is:

I think scientists are worried about today's climate change because if the earth warmed up super high and at fast speed, because of human activities, humans would become extinct. Climate change isn't just about Earth, it's also about our chance for survival.

And this is probably why scientists are freaking out about global warming and climate change.

My thoughts:

I have so many thoughts. About the video. Am I supposed to make a video consisting of my google slides, Or, am I supposed to record myself on camera along with my google slides as if I were presenting in real life?

I hope it's not the 2nd one.

Anyways I figured out the question I want to ask and the hypothesis for it so now it time to keep researching.



2/17/2021 - Wednesday, feb. 17 2021

Finding out about earth before the mid-1800s continued.

Analyzing coral reefs :Most coral reefs have been alive since millions of years ago, but they are very sensitive to changing climates. So this means studying coral reefs can give paleoclimatologists big clues on what the ocean was like in the past. As corals grow, they form skeletons by taking calcium carbonate from the ocean water. The density of these calcium carbonate skeletons depends on the water temperature, light nutrient conditions, which changes over time. This creates growth rings on the corals kind of like the ones you'd see in trees. Paleoclimatologists can analyze these rings to gather information. p.s. Coral reefs can be affected by ocean warming & ocean acidification.



a coral reef

Looking at Speleothems : Speleothems are pillars of stalactites & stalagmites. They are formed because of rainwater. During Earth's early water stages, the rain was acidic. When this acid rain went through the soil, the extra minerals formed stalactites & stalagmites (instead of directly becoming groundwater), forming pillars that we now call speleothems. Scientists can study these to find out more about the climate in Earth's early years.



a speleothem cave

There are many other ways, other than listed above, that paleoclimatologists can find out about the Earth's climate conditions years ago. For example, studying sediments.

Paleoclimatologists → are people who study the previous climates of Earth as well as the geology of Earth at those times.

StalacTite: top | StalaGmite : ground | Pillar: When stalactite & stalagmite meet

Speleothem : stalactites & stalagmites pillars are one of the most known speleothems

Action for Water pollution:

During the 1800's, the famous Thames River in London, England, was the most polluted river in the world. It was putrid, foul-smelling, and brown coloured. Sewage and waste would be discharged right into it, and people continued to bathe and drink from it. Several thousands died due to cholera from the polluted river. Then, between 1861-1960's, treatment plants and laws were enforced to clean the Thames River. Today, it is the cleanest river in the world! From this incident, countries like Indonesia (Citarum River), India (Ganges and Yamuna Rivers), China (Yellow River), the U.S. (Mississippi River), Bangladesh (Buriganga River), (and more) who have polluted rivers can realize that the conditions and cleanliness of nature & Earth depends on humans' actions. Indonesia's Citarum River is the most polluted river in the world today. Everyday, about 20 000 tons of waste (especially plastic and textile material) are thrown into this river, which used to be a freshwater source for 80% of Badung, a city in Indonesia. The lead level contained in Citarum River is 1000 times the U.S. standard amount. In November of 2020, the Indonesian government said it decided to start a 7-year clean up program for the Citarum River, hoping to make its water pure and drinkable by 2025.



My thoughts:

I still need to research:

- Why today's global warming is not natural
- Covid-19 impact on global warming and climate change crisis
- How countries around the world are pushing against global warming.
- Ways to stop global warming
- Difference between today's climate change and climate change in the past.
- IMAGES :



[THIS URBAN FARMING PIC](#)

2/18/2021 -Thursday, feb. 18 2021

I actually only have 1 day left.

I've ToTaLLY got this. So I need to be faster.

Pollution and global warming.

“Human activity affects weather, climate, and the environment. This form of water pollution or through man-made toxic chemical or/and by-products addition may therefore generate some toxic and greenhouse gases, which may subsequently contribute to global warming activities or more severe environmental threats.”

from [3. Water Pollution: Effects, Prevention, and Climatic Impact](#)

Dad told me about

- Nail polish cfc
- Each country do renewable energy suitable for the land
- Chena cultivation
- Pandemic: masks, more packaging products, stores don't encourage reusable bags, this all increases garbage to go end up in the landfill and produce greenhouse gases.

Pollution and global warming.

What's the connection between pollution & global warming? When greenhouse gases deplete Earth's atmosphere, it allows the sun's powerful rays to warm Earth.

PLASTIC POLLUTION:

Plastic is one of the longest living pollutants. It creates greenhouse gases in every step of its lifecycle. Researchers said that the production and incineration of plastic will account for 2.8 million tons of greenhouse gas emissions by 2050. Microplastics destroy plankton, which are tiny organisms responsible for absorbing extra CO₂ from the atmosphere into the water.

AIR POLLUTION:

Air pollution doesn't only cause global warming, it worsens it. Air pollution, from factories & incinerators, rise with large amounts of CO₂, methane, and other greenhouse gases. The greenhouse effect takes place, and BOOM! The world gets warmer.

WATER POLLUTION:

When ocean temperatures rise due to climate change, this affects many marine life. Coral reefs are very important to the ocean. Along with plankton, they provide oxygen to many species of marine life, and 50% of Earth's oxygen produced is from plankton. But global warming is threatening the sealife and the coral reefs.



The developed countries of the world cause global warming mainly because of industries.

Developing countries around the world who cannot provide enough to meet everyone's needs cause global warming too - by littering and pollution. Polluted waters in developing countries are a result of throwing trash and even human waste directly into it. Because of this, the waters smell and the life in them dies away. Meanwhile, waters in industrialized countries are polluted due to chemicals and toxins spilled into the water. And don't forget the plastic by the beaches! This plastic affects ocean life & kills them. The Great Pacific Garbage Patch floating out there is about 1.6 million sq km, 3 times the size of France!

There is more air pollution in developing countries, a result of not having the technology to and resources to fight air pollution. The laws are not applied or brought up. Emission standards aren't in place. Most of the time, in poverty-stricken countries, the education is also less. On the other hand, air pollution in developed countries is mainly from industries and the large amounts of fossil fuels being burned. Ships (that are used for exports, etc.), have a bad environmental impact and are responsible for more than 18% of some air pollutants.



a clean river



some trash

Action for air Pollution.

Copenhagen, Denmark, is famous for having more bikes than people & cars! There are 675 000 bikes and only 120 000 cars in Copenhagen. Out of the whole population in the city, 62% bike to work/school, and only 9% drive. There are over 100 bike centers in the city, and Copenhagen is thought to become carbon- neutral by 2025. Its home country, Denmark, is also the 2021 (and before) cleanest country in the world. Denmark has reached the honor of being the cleanest country with some great effort. The country has some serious policies to reduce greenhouse gas emission & prevent climate change. What can we learn from Denmark? As an industrialized country, Denmark focuses on eco-friendliness, sustainability, healthy living at the same time. Denmark encourages this with eco-friendly hotels, solar-powered boats, and organic food. All other countries (especially China, India, Pakistan, whose air is the most polluted in the world, even during the day time) should take Denmark as a role model. Earth is everyone's responsibility, and the developed countries must play a larger role because they have the resources to do so. Earth's atmosphere is the air around us, so we must keep it as pure as possible to tackle global warming.



people bike in copenhagen

Lights... Camera... Recycle!

Sweden is the 8th cleanest country in the world. It is known for its sustainability, low CO2 emissions, the use of renewable resources and increasing its greenery. Moreover, it is the country that actually imports trash! Every year, Swedes recycle 1.8 billion plastic bottles that would have ended up in landfills and water bodies. Recycling is a law, and must be sorted at home into 7 categories of trash/recyclables, before ending up at the recycling center. The recycling rate in Sweden has been and still is 99%. This country is so close to zero waste, and that's why they need to import trash from other countries. Sweden incinerates garbage to make electricity, (instead of using fossil fuels) to heat 1.2 million homes. Sweden has 33 waste-to-heat incinerators, and uses the imported trash to keep it running. Sweden also converts food waste into eco-friendly biogas. Starting from 2021, food waste collection has become mandatory in Sweden, according to Swedish Waste Management Association. The biogas they produce is used to run transit buses & heat apartments. Sweden is a professional at recycling. Countries like India, the U.S., and even Canada are large garbage producers. Just like Sweden, we should look for ways to reuse and recycle our garbage, so less of it ends up in waterways and landfills, therefore lessening the impact of global warming and climate change.



Saving the trees.

What do trees do for the Earth?

Filter the air and remove excess CO₂

Help reverse climate change by balancing the amount of CO₂ & oxygen in the atmosphere

Store carbon in themselves and the soil

Reduce amount of stormwater runoff, this reduces erosion, flooding and pollution risk

They are a necessary part of a healthy environment.

Given some of the many benefits of trees, they are a very important factor in saving Earth from becoming a greenhouse gas-stricken Venus. Many nations around the world have realized that the natural diversity of their environment are crucial for maintaining a proper climate. There are various tree planting organizations across the globe, and many programs that urge the need of more trees in today's air pollution-increasing world.

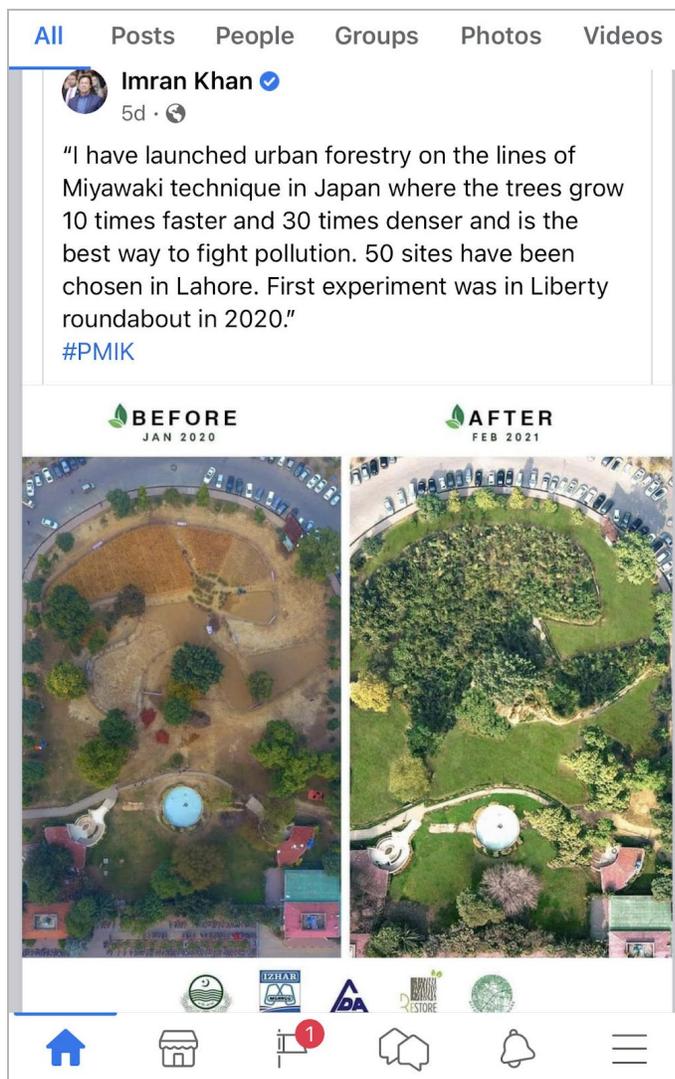
What are countries around the world doing about trees?

- In the Philippines, a new law was passed in the middle of 2019, stating that every student must plant 10 trees if they want to graduate, from elementary school students to college students. The Filipino government believes it is a good way to preserve the natural environment of the Philippines while giving youth an opportunity to take part in action for climate change and build a greener environment for their future. They also estimate that this generation will plant 525 billion trees, which means 175 million trees planted each year.



pic for slides

- In Norway, deforestation is banned, as a way to protect and greenify the environment.
- Bihar, a state of India, banned deforestation (except for on private lands) in 2019.
- In China, in 1978, a tree planting program called the Green Great Wall was started and will continue until 2050. According to its government, China has planted more than 66 billion trees since the project began. The project was put in place to battle the desertification expanding into China's lands.
- Pakistan's Prime Minister, Imran Khan, has a long history of encouraging environmental restoration. In 2017, Khan set a campaign to plant 1 billion trees in Khyber Pakhtunkhwa Province, and the goal was reached earlier than expected. In December of 2020, the government rolled out its first phase of the new tree planting project, (to restore Pakistan's forests), and is planting 3.25 billion trees. The Prime Minister hopes this number will reach 10 billion by 2023, the end of his term in office. As of this year, Khan has launched urban forestry for 50 places in Lahore; his post was discovered on Facebook.



pakistani PM's post.

History of Earth's climate change.

In the past, Earth underwent climate change without our help. We know this because of evidence paleoclimatologists have found. Before the Industrial Revolution, Earth's climate change was due to natural causes such as:

- Sunlight Variations: Alterations of the sun have, over time, increased and decreased the amount of solar energy reaching Earth.
- Earth's orbit: Sometimes, earth wobbled a tiny bit during its orbit around the sun, which changed the time and place of sunlight hitting Earth.

- Volcanic Eruptions: They can cool earth's climate when particles that reflect sunlight brighten Earth. They have also increased greenhouse gases in Earth's past over millions of years, which lead to global warming.

The Earth is forever changing. The same applies for its climate. In just the last 650 000 years, there have been several ice ages and warm periods. The last Ice Age ended about 11 7000 years ago. After that is what we can call the era of human civilization - or what scientists call the modern climate era.

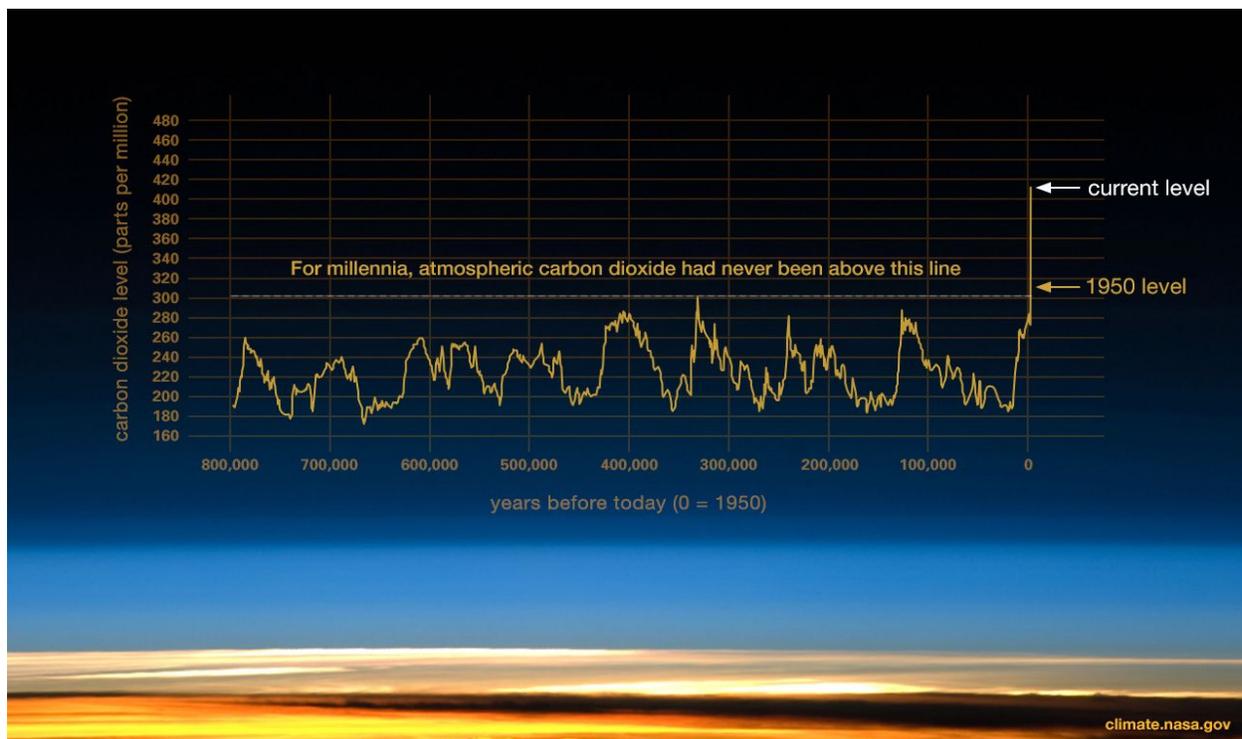


pretty earth pic for slides

Hasn't Earth's Climate Always Changed?

Earth's natural causes for climate change still occur today, but their influence on climate change is too small, or they occur too slowly to explain the fast warming of earth scientists have noted recently. This warming is the kind that is supposed to happen over hundreds of thousands of years, but it's happening in decades, and this simply CANNOT be natural. We can tell this because scientists closely monitor natural, as well as humans' activities that influence climate, with satellites and meteorological stations.

I AM NOT DONE THIS PART.



ARE U A FOSSIL FOOL?

I need lots of time.

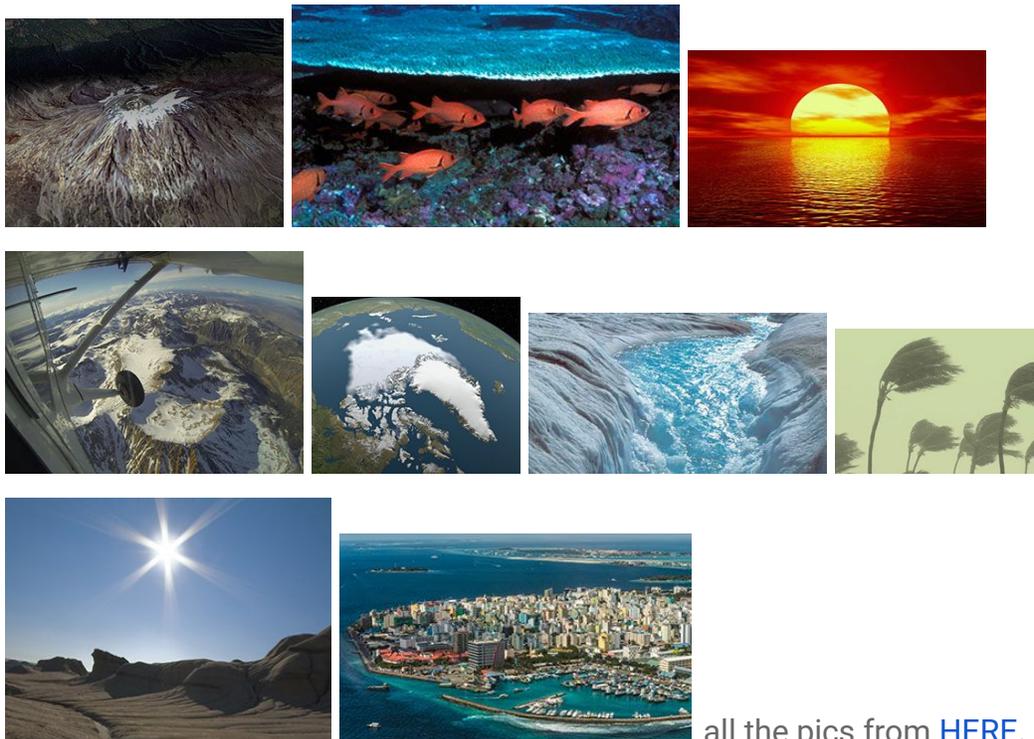
2/19/2021 -Friday, feb. 19 2021

I need to submit today. I have to hurry.

I hope i can finish.

The part I was doing last time I finished it :

Evidence that paleoclimatologists have found shows that, "Today's current warming is occurring roughly 10 times faster than the average rate of Ice-Age recovery warming. Carbon dioxide from human activity is increasing more than 250 times faster than it did from natural sources after the last Ice Age." (- from NASA GLOBAL CLIMATE CHANGE - Vital Signs of the Planet).



all the pics from [HERE](#).

Climate change - Now faster than usual.

The graph on the right shows the increase of Earth's climate temperature from 1880-2020. According to data from NASA, the years 2016 and 2020 are tied for the warmest years we've had since 1880. The 7 warmest years in this record have occurred in the recent 10 years.

The Intergovernmental Panel on Climate Change (IPCC) says, “Human influence on the climate system is clear, and recent anthropogenic emissions of greenhouse gases are the highest in history. Recent climate changes have had widespread impacts on human and natural systems.”

The IPCC estimates that natural factors (separately) in global warming actually lead to a slight cooling over the past 50 years (which hasn't been very noticeable), while humans are responsible for 47%-146% of today's global warming.

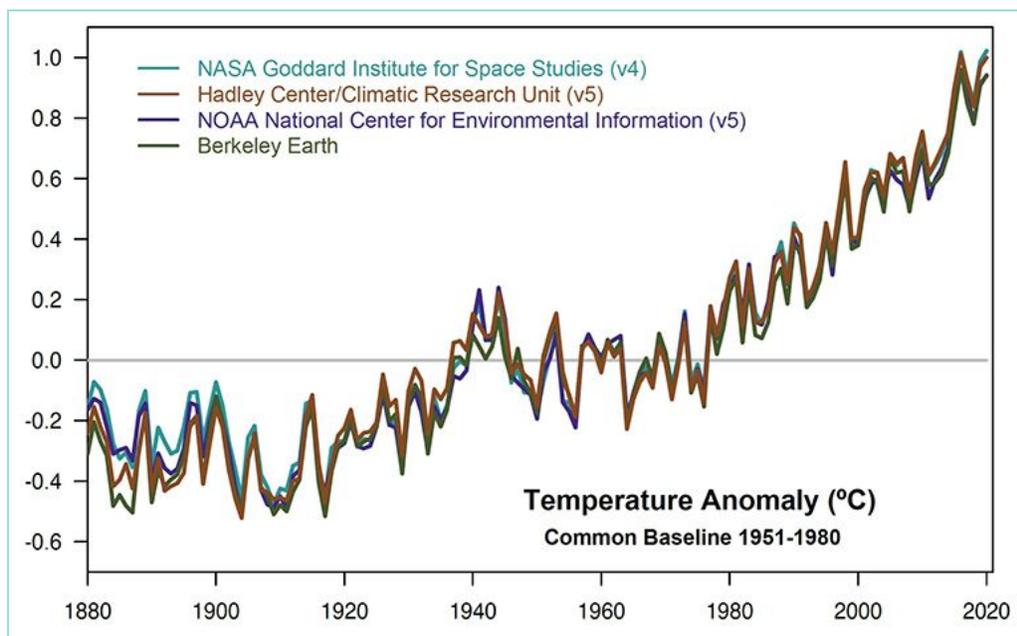


Image - Credit:

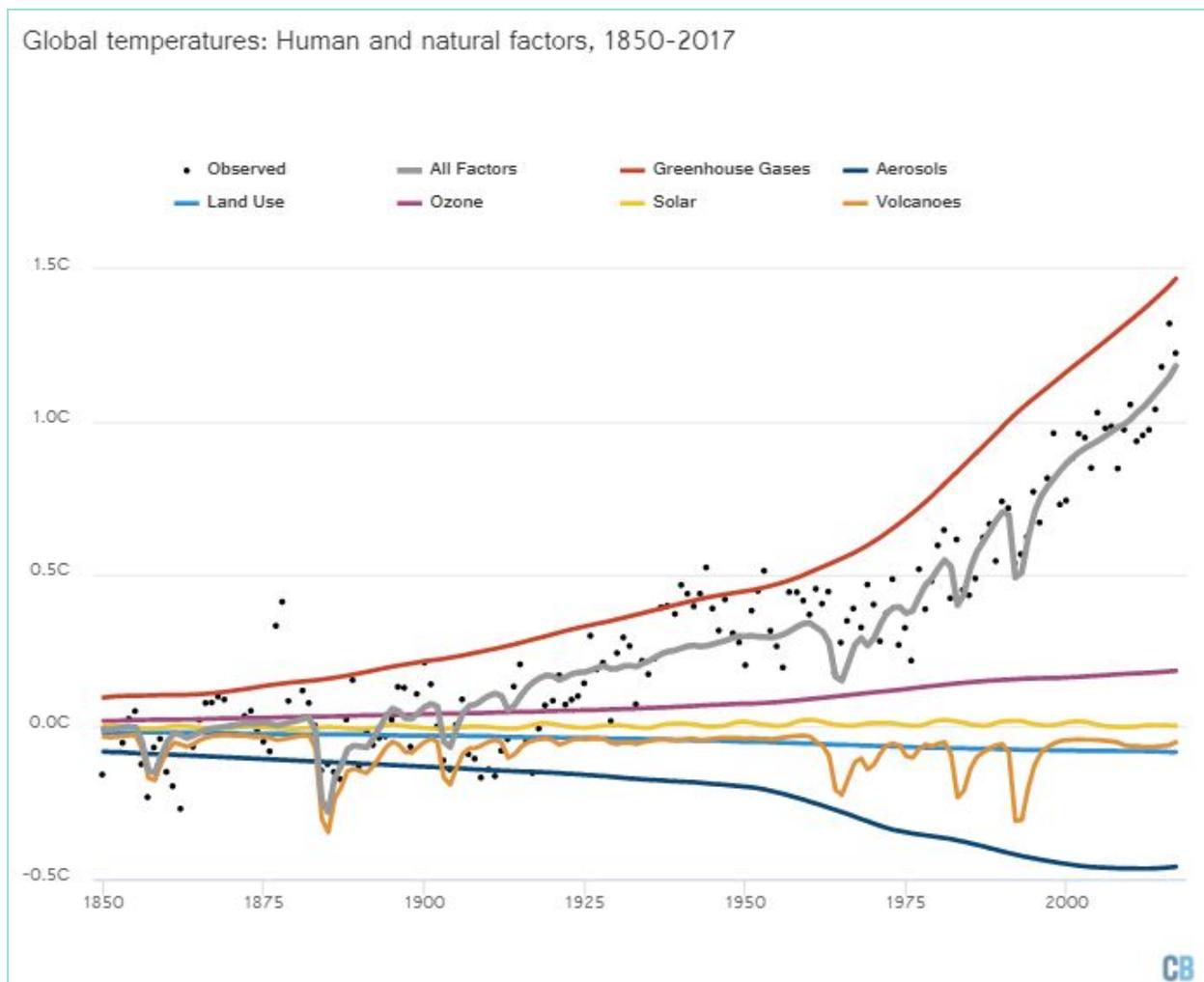
NASA's Goddard Institute for Space Studies.

Factors that change climate change.

Scientists measure many factors that affect the amount of energy entering and remaining on the earth's surface. These factors are called radiative forcings. Radiative forcings include greenhouse gases and aerosols.

But if only greenhouse gases were warming up Earth, we would've seen $\frac{1}{3}$ more global warming than what has already happened. But atmospheric aerosols remove some (not all) of the extra greenhouse gases. They reflect solar rays that reach Earth and increase heat reflecting clouds which cools our planet. Aerosols can be natural, when they come from volcano eruptions - or they can be artificial substances, like particulate air

pollutants and smoke. In 2020, scientists were thinking of spraying sulfate aerosols in the sky to reduce climate change temperature levels, but this can have a very negative effect. Aerosols are naturally produced when a volcano erupts, but spraying them artificially can disturb the natural air currents around the world. The scientists say, "Spraying aerosol in the northern hemisphere would lead to cyclones in the North Atlantic. In sub-Saharan Africa and parts of India, the process could create severe drought."

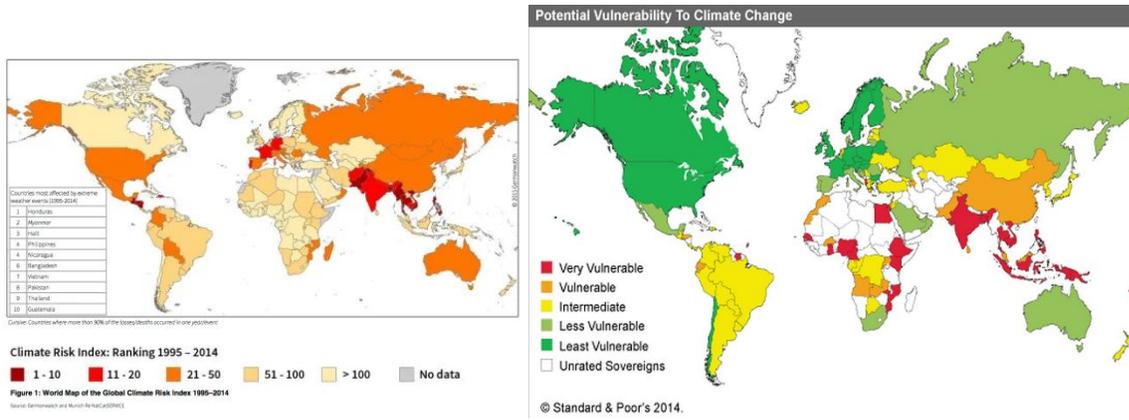


This chart shows the average global surface temperatures (black dots), and modeled influence of different radiative forcings (colored lines), as well as the combination of all forcings (grey line) from 1850 to 2017. Credit: Carbonbrief

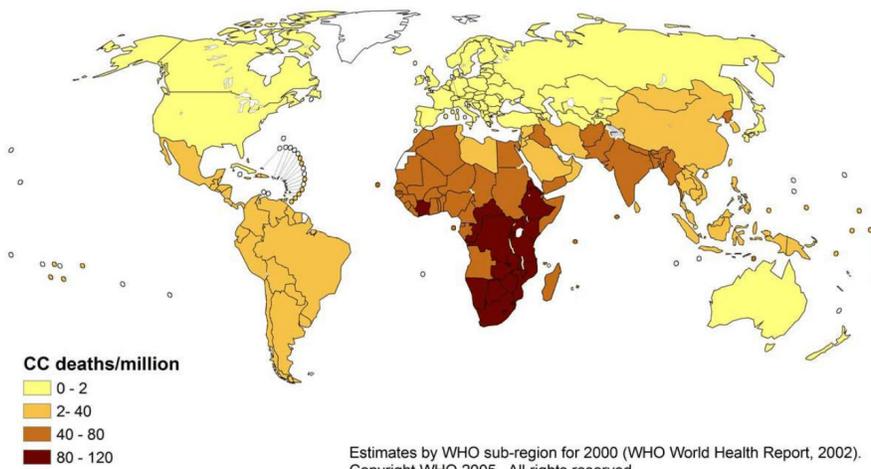


image from that website about aerosol spray into sky

Some maps:



Deaths from climate change



Every action matters.

There are nations taking action for climate change around the world. Protecting Earth is our responsibility. We can't save the whole world, but we can think globally, act locally. Here are some ways we ordinary people can help save earth from global warming and climate change:

Take care of nature.

Start a backyard garden, this reduces your carbon footprint

Plant a tree! If everyone in the world planted 1 tree, that would be 7,874,965,825 new trees!

When in a park or a nature reserve, don't litter or walk on the grass.

Water conservation...

Wetlands, lakes and rivers hold a lot of freshwater and also store $\frac{1}{3}$ of the world's CO₂.

To help protect water bodies:

Wash dishes by hand instead of using machine

Take quick showers

Don't litter near water bodies



cont...

RECYCLE: You can recycle, but only if reducing and reusing don't work. Because recycling is a big process and takes a lot of energy to accomplish. You can recycle paper, plastic, glass, & coke cans/bottles.

RETHINK : Think about your impact on the environment. Try to buy essentials only, and buy less packaged products. Use both sides of a paper, or switch most of your paper works to online.

RENEW : Use renewable energy whenever you can, and use things you don't need to throw to replace

REDUCE : Reduce the amount that you consume & waste. Start a compost bin for your kitchen waste so it doesn't end up in landfills/waterways. And save energy! Turn off your faucet & lights when not in use.

REUSE : Reusing saves money & is good for the environment. Find new ways to reuse your old things, or donate them as charity

Fun Fact: Glass is 100% recyclable & can be recycled endlessly, without losing its quality!

And most importantly.

Educate, and act now!

This is very important. How is anyone going to save the world if they don't know how to? We have to educate the public and raise awareness about climate change. There are many myths; some people think that climate change is a hoax or it is a future problem, or that the CO2 level nowadays is normal because plants breathe CO2 at night. We need to educate people because many have misunderstood the reality of global warming. When people understand the importance of it, they will be willing to get involved and help protect it. We cannot leave climate change for the future generations to solve, this will only harm Earth more. There are many earth awareness days that can catch public attention:

Earth Day : April 22

World Environment Day: June 5

International Day of Forests: March 21

World Water Day: March 22

World Oceans Day : June 8

...and many more!



The way to a greener world.

To achieve our goal of having a greener planet to live in, we have to turn around our lifestyle a bit. Think about it... to make one burger, you need 2393 litres of water! There

are some things in our life that use up more of Earth's limited resources, and we can change these habits.

Hybrid cars are a great way to lessen extra greenhouse gas emissions. They help the environment, and there are many brands you can choose from nowadays.



Switch your diet to plant-based foods. Livestock use up a lot of water, but this water can be used for plants, since they can grow us food and clean the air both at once.



Urban cities should use the Japanese Miyawaki urban forest method, where trees native to the area are grown in the urbs. This urban forest method assures that there is greenery even in cities.



Switch your home energy source to renewables. Solar energy, Wind energy, hydroelectricity, and sea waves energy are all renewable ways to power your home. They have a way smaller impact on the environment than gas.



Green belts are policies to protect some natural land around developed areas from becoming urbanized. In the UK, there are many green belts. Major cities, like in China and India, should devise similar plans to help protect their own natural lands. There are also other types of green belts, called green lines, in which the greenery/trees go through the urban area instead of circling around it.



In countries in which the land has been affected by desertification, crops suitable and able to withstand the extreme conditions should be grown. The UN is helping countries in Africa to grow appropriate crops to reduce food shortage.



High rise forests. In Italy, there is a high rise building called Bosco Verticale. The building has trees in large containers that are built securely in a way. The idea is a great way to build greenery and buildings in densely populated areas, while improving air quality and fighting climate change.

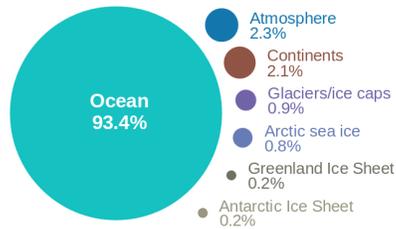


Rooftop Gardens - Sustainability. Montreal, Canada, is home to the world's largest urban rooftop garden, Lufa Farms. It is a veggie farm the size of 3 football fields, and the farm

sells its veggies in the grocery store under the rooftop. This is sustainability.



Where is global warming going?



pic add in other slide →

Conclusion.

According to my research studies, I found out that my hypothesis was correct...because today, climate change & global warming is happening faster and higher. This has never happened in the history of Earth's climate change; it took thousands of years for Earth to warm up 3 to 5 °C more. But we could witness this in only 80 years, if we keep emitting greenhouse gases at the rate we do nowadays. Humans are misusing, overusing and wasting natural resources. In addition to that, increasing global population leads to more deforestation, industrialization, fossil fuel usage and more pollution. Already, there are many bad effects like pandemics, other life-threatening illnesses (e.g. cancer), natural disasters (earthquakes, hurricanes...), water scarcity and food shortage. Without water, any living things wouldn't survive. Even if Earth turned back to normal after this global warmup, we humans wouldn't be here, we'd be extinct because of global warming in the past

Also, the effects of climate change lead to less and less proper resources to sustain life on our planet. In the end, earth will slowly die.

Here is a list of all the links I used :

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