

Climate Change and Its Impact on the World and Its Most Vulnerable Citizens

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Introduction

Over the past century, the climate has changed drastically due to increased consumption of fossil fuels. The planet has warmed which has caused increased strain on the environment. Powerful weather and geological events such as earthquakes, heat waves, and forest fires have become increasingly common, alongside other disruptive side effects from global warming. Climate change is the leading factor in the destruction of the planet and human society; millions of people will lose their homes and livelihoods in the coming years if climate change is not reversed. However, climate change is as much an issue of equality as it is an issue of safety. While climate change will affect everybody, the Earth's poorest and most vulnerable people will be hit with the worst waves of climate change's deadly effects.

The Science of Climate Change

In order to understand climate change one must first understand the composition of Earth's atmosphere and the greenhouse effect. A greenhouse gas is a gas that traps infrared radiation from the Earth's surface.¹ Climate change is the term given to describe the warming and other changes to Earth's atmosphere that occur from these trapped gasses. These changes are primarily due to the release of greenhouse gasses such as carbon dioxide, nitrous oxide, water vapor, and methane into the Earth's atmosphere.² Greenhouse gasses reside in the Earth's atmosphere and as sunlight penetrates this bubble, the gasses trap the heat, keeping the species

¹ Houghton, John . "Global Warming The Complete Briefing Third Edition" Cambridge University Press. 2004

²"Overview: Weather, Global Warming and Climate Change." NASA, 24 Aug. 2021, <https://climate.nasa.gov/resources/global-warming-vs-climate-change/>.

that live on Earth from freezing to death. In order for earth to be livable, electrically charged particles need to be present in the atmosphere in order to contain heat and keep species alive. Most of the gasses in the earth's atmosphere are not electrically charged but the chemical make of these gasses allows them to trap heat; the particles become unbalanced in terms of their distribution of electrons and protons. Most of these gasses' negatively charged electrons are held in one side of the particle. This lends the particles to be able to move back and forth and absorb infrared rays in the atmosphere. Water vapor and nitrous oxide are just two examples of gasses in the atmosphere that are constructed in this way. While methane and carbon dioxide are equally distributed (they are not uneven or lopsided) molecules, when in the atmosphere these particles bump into each other billions of times per second causing them to bend and rotate and in turn causing them to absorb heat. Only one percent of gasses in the atmosphere are heat absorbing molecules, but this small percentage have such a strong heat capturing nature that they manage to capture 90 percent of earth's heat.³ The more greenhouse gas that is in the atmosphere, the warmer the planet becomes.

Some of these gasses are released naturally, however 99.9 percent of peer-reviewed journal articles have agreed that climate change is the result of human actions.⁴ Each of these gasses is released in a variety of different ways and mechanisms. Carbon dioxide is released from volcanic eruptions, respiration, deforestation and the burning of fossil fuels such as coal and oil. The release of nitrous oxide into the air is from soil cultivation and fertilizers, fossil fuel combustion, and the production of nitric acid, as well as the burning of biomass, which is commonly used to clear land to make room for farms and cattle. Methane is an agricultural

³ "How do Greenhouse Gasses actually work". MinuteEarth. May 26, 2016.
<https://www.youtube.com/watch?v=sTvqlijqvTg>

⁴ Ramanujan, Krishna "More than 99.9% of Studies Agree: Humans Caused Climate Change." *Cornell Chronicle*, 19 Oct. 2021,
<https://news.cornell.edu/stories/2021/10/more-999-studies-agree-humans-caused-climate-change>.

by-product from manure and cow burps, it can also be released from waste in landfills. As more of these gasses are released into the atmosphere they trap more re-radiated heat, thereby warming the planet.⁵

The world's most developed countries release the most greenhouse gasses. In a study done in 2017 it was found that China emits 28 percent of global emission, the United States emitted 14 percent and India 7 percent.⁶ Three countries emit a total of 49 percent of the world's total carbon emission. While these countries are the major source of fossil fuel release into the atmosphere, contributing greatly to the progress of climate change, smaller, under-developed countries are the ones who are experiencing the major impacts of climate change and are overall unable to deal with these large- scale events.

The Impacts of Climate Change

1. Rising Sea Levels

The increase in global temperature has had a number of negative effects on the Earth. Between the years of 1993 and 2016 Greenland lost around 286 billion tons of ice, and in the same time frame Antarctica lost 127 billion tons of ice. Within the last decade, the rate of ice loss in Antarctica has tripled. Using satellite data, scientists have noticed a decrease in snow coverage and every year the snow is melting sooner. Glaciers are melting and causing sea levels to rise. Around the world, oceans have risen eight inches in the last century and the rate of increase has doubled within the past two decades. Since 1880, global sea levels have risen about 8-9 inches, most of this increase happening in just the past two decades. This rise is due to climate change

⁵ "The Causes of Climate Change." NASA, NASA, 30 Nov. 2021, <https://climate.nasa.gov/causes/>.

⁶ "Greenhouse Gas Emission by Country" World Population Review. <https://worldpopulationreview.com/country-rankings/greenhouse-gas-emissions-by-country>

but comes from two different sources. Firstly, as ice sheets and glacier melt this adds substantial amounts of water into the ocean. Secondly, as water warms it expands.

Rising sea level will impact a vast number of the world's population. Eight of the world's largest cities are near a coast line and in the United States alone, 40 percent of the population live in coastal areas. These coast lines are already seeing an increase in flooding, overflow water from storms, and soil erosion as the tide rises. Hurricanes, which already cause flooding near coastlines, will become even more lethal as they sweep closer inland with greater amounts of water nearby. Thousands of jobs and buildings such as power plants, sewage treatment plants, and landfills, as well as vast amounts of infrastructure will be at risk for collapse as water creeps inwards. By the year 2100, sea levels will have risen by 1.8 feet, and by the year 2050, they will have already risen enough to impact over 1 billion people.⁷ These rising sea levels will cause erosion, wetland flooding, and soil contamination, and saltwater intrusion into groundwater.⁸ If drastic measures are not taken, many islands around the world will eventually be non-existent.

Small islands such as Kiribati and Tuvalu are just a few places looking for a new home for their residents. In Kiribati one in four people live below the poverty line and one in three children come from a family living in poverty.⁹ Tuvalu is the fourth most impoverished nation in the world. Kiribati and Tuvalu are part of the Pacific Island regions and the Pacific Islands as a whole produce only 0.03 percent of global greenhouse emissions yet they are suffering drastically.¹⁰ Both countries have purchased land in Fiji and are urging their populations to

⁷ "Our Planet Is Warming. Here's What's at Stake If We Don't Act Now." *WWF*, World Wildlife Fund, www.worldwildlife.org/stories/our-planet-is-warming-here-s-what-s-at-stake-if-we-don-t-act-now.

⁸ Nunez, Christina. "Sea Level Rise, Facts and Information." *Environment*, National Geographic, 3 May 2021, www.nationalgeographic.com/environment/article/sea-level-rise-1.

⁹ Sinha, Tripti. "What are the causes of poverty in Kiribati?". The Borgen Project, October 19, 2017. <https://borgenproject.org/causes-of-poverty-in-kiribati/>

¹⁰ Salem, Saber. "Climate Change and the Sinking States in the Pacific". *E-International Relations*, January 9, 2020.

<https://www.e-ir.info/2020/01/09/climate-change-and-the-sinking-island-states-in-the-pacific/>

relocate. However, this is only a short term solution because soon Fiji will be suffering the same problems as the tide rises. Already there are 40 communities in Fiji that are tagged as danger zones and are undergoing the process of relocation.

2. Loss of Biodiversity

Earth is witnessing a rapid increase in the loss of biodiversity (when plants and animals become extinct).¹¹ Ever since humans first started emitting excess levels of CO₂, the oceans have become 30 times more acidic. If climate change does not slow down, people and animals in all corners of the globe will be negatively impacted. Climate change is forcing species to adapt in ways they are not prepared to or capable of. For example, they have to change their life cycles, develop new traits, and move/change their habitat. Climate change is also causing habitat fragmentation which has an important role in biodiversity loss.¹² Habitat fragmentation is when land mass becomes unlivable for a species. This can mean it has shrunk in size and cannot support as many animals or that it might have become too polluted. If species of animals leave their current home this also causes problems for other species. There might not be enough food, or there may be an overpopulation of a certain species because the food chain has been thrown off balance.

As the Earth warms many animal and plant species are at risk of losing their habitats. It is estimated that if the Earth warms 2 degrees celsius (3.6 degrees fahrenheit), then 18 percent of insects, 16 percent of plants, and 8 percent of vertebrates will be affected. With the oceans warming, coral becomes more susceptible to coral bleaching. This is when algae in the coral dies and turns the coral white, which in turn makes it more susceptible to disease and death. Coral

¹¹ Georgina Gustin, John H. Cushman Jr. "Humanity Faces a Biodiversity Crisis. Climate Change Makes It Worse." *Inside Climate News*, 30 Nov. 2020, insideclimatenews.org/news/06052019/climate-change-biodiversity-united-nations-species-extinction-agriculture-food-forests/.

¹² Unit, Biosafety. "Climate Change and Biodiversity." *Convention on Biological Diversity*, Secretariat of the Convention on Biological Diversity, 27 Apr. 2021, www.cbd.int/climate/.

reefs are crucial to the survival of ocean life. They protect seabeds and are the home base for many sea creatures. In addition coral reefs help protect coastlines from tsunamis.¹³ By the year 2100, almost all coral reefs will be dead. Coral reefs are important natural barriers that protect humans and the coast lines from waves, storms, and flooding.¹⁴ Every summer, Arctic ice melts, but with the warming of the planet summers will now be ice free. If the amount of greenhouse gasses being pumped into the air then by the year 2050 the Earth will be on the brink of collapse. Droughts will kill trees causing even more carbon to remain in the atmosphere.

Biodiversity loss is disproportionately affecting poor people all over the world. Roughly 80 percent of the world's most destitute people rely on surrounding land to survive. Additionally, 844 million people live in an area that does not have easy access to clean water. As biodiversity loss continuously accelerates these people's lives will get much more challenging. Healthy soil and wildlife is crucial to good farming and clean water is the number one necessity for survival. Rebecca Shaw, a World Wildlife Foundation chief scientist responded to this crisis by saying: "The communities that we consider to be most vulnerable depend more on natural systems and what natural systems produce in terms of clean air, abundant water, [and] food both from the native habitat but also their managed habitat. They live much closer to nature than most people in developed countries, therefore they're much more vulnerable to the loss of biodiversity".¹⁵ People are being displaced because they are no longer able to survive in their current homes because of biodiversity loss.

3. Climate Refugees

¹³ Natural History Museum. "Why are Coral Reefs Important?"

<https://www.nhm.ac.uk/discover/quick-questions/why-are-coral-reefs-important.html>

¹⁴ US Department of Commerce, National Oceanic and Atmospheric Administration. "How Do Coral Reefs Protect Lives and Property?" *NOAA's National Ocean Service*, 1 Mar. 2014, oceanservice.noaa.gov/facts/coral_p

¹⁵ McCarthy, Joe. "Biodiversity Loss Threatens World Poorest People Most: Report". Global Citizen, September 9, 2020. <https://www.globalcitizen.org/en/content/living-planet-report-biodiversity/>

Climate refugees, refugees who have been displaced from issues related to climate change, will become more and more abundant as land becomes unlivable due to fires, drought, rise in sea levels, and storms. As of 2020, 1 percent of the world is considered an unlivable hot zone. It is predicted that by 2070, 19 percent of the world will be categorized as an unlivable area.¹⁶ Across the globe thousands of people are living in an unpredictable climate. They suffer from food shortages, water shortages, loss of land, and sudden and intense storms. Many people in countries across South America and throughout Africa and Asia who rely on crops and livestock to provide for their families are struggling due to the unreliable rain patterns. The wet and dry seasons have changed and the weather conditions are much more intense. This creates an atmosphere of uncertainty and fear, leading people to migrate and become refugees. People will be forced to either flee their homes or die as the climate crisis worsens, leading to the greatest wave of global migration the world has ever seen. If climate change progresses at the rate it is right now, there will be an estimated 200 million climate refugees by 2050.¹⁷ Currently 90 percent of climate refugees originate from the world's poorest nations. In Bangladesh it is predicted that by 2050, 20 million people will lose their homes and become displaced due to rising sea levels.¹⁸

The mental toll that is taken by a refugee is immense. Refugees experience high levels of stress and anxiety. A political refugee deals with feelings of betrayal from the country. A climate

¹⁶ Lustgarten, Abrahm. "The Great Climate Migration Has Begun." *The New York Times*, The New York Times, 23 July 2020, www.nytimes.com/interactive/2020/07/23/magazine/climate-migration.html.

¹⁷Lavelle, Moira. "By 2050, 200 Million Climate Refugees May Have Fled Their Homes. But International Laws Offer Them Little Protection." *Inside Climate News*, 1 Nov. 2021, insideclimatenews.org/news/02112021/climate-refugees-international-law-cop26/.

¹⁸ Ida, Tetsuji. "Climate Refugees- The World's Forgotten Victims". World Economic Forum, June 18, 2021. <https://www.weforum.org/agenda/2021/06/climate-refugees-the-world-s-forgotten-victims/>

refugee feels betrayed by the whole world and this takes a toll on their mental health. In addition, the uncertainty of their future and the futures of their families also adds on high levels of stress.¹⁹

To many westerners or people living in first world countries, climate refugees may seem like a far away problem that does not impact them. While climate change affects poorer groups much more than wealthier nations, it does not solely harm the impoverished. This past August 200 people died of catastrophic flooding in Europe, wildfires have torn apart homes in Siberia, the Mediterranean, and across the United States and Canada, and heat waves have caused high death tolls in Canada.²⁰ Global warming is raging across the world and upturning lives everywhere.

4. Disease

As temperatures warm many animals that thrive in warmer climates will migrate and expand their living regions. An example of this are mosquitoes. These species of insect thrive in warm, humid conditions. Mosquitos carry many infectious diseases such as Dengue Fever, Malaria, The West Nile Virus, and Chikungunya. Countries around the world that generally do not suffer from these viruses will begin to see these diseases arise alongside the temperatures.²¹ These severe and sudden weather changes from wet to dry have caused excess fruit to grow attracting bats which are thought to carry Ebola. The rapid acceleration with climate change will lead to more and more diseases spreading in similar ways. Also with a heavy strain on food resources, people may have to resort to eating bushmeat such as bats, monkeys, snakes, and rats.

¹⁹ "Traumatic Experience of Refugees". RefugeeHealth, 2011, <https://refugeehealthta.org/physical-mental-health/mental-health/adult-mental-health/traumatic-experience-s-of-refugees/>

²⁰ UN High Commissioner for Refugees Filippo Grandi. "Climate change is an emergency for everyone, everywhere." The UN Refugee Agency, November 9, 2021, <https://www.unhcr.org/en-us/news/stories/2021/11/618a301d5/climate-change-emergency-everywhere.html>

²¹ "How Does Climate Change Affect Disease?" *Stanford Earth*, earth.stanford.edu/news/how-does-climate-change-affect-disease.

Bushmeat is the main source of food for many poorer people in the world²². However, bushmeat is known to carry many diseases and viruses.²³ With more people relying on bushmeat for food, the number of people exposed to these illnesses will cause outbreaks of disease all across the globe. This will also be a cause for migration for many people.

Extreme Weather Events Due to Climate Change

1. Wildfires

Across the globe wildfires are wreaking havoc on millions of people, animals, and acres of land. In this past year alone, the United States has suffered 3.5 million acres of land destruction due to wildfires. Countries such as Turkey, Siberia, and Greece are seeing similar losses. In Turkey there has been over 175,000 hectares of land loss, which is over eight times the average amount of land loss predicted for this year. In Greece, twelve times as much land has been burned compared to the average amount in past years. While Siberia is already prone to wildfires, this season has been the most intense yet. For the first time in history, satellites have tracked smoke from wildfires reaching the North Pole.²⁴

Logging and climate change go hand in hand. When trees are cut down they release all the stores of carbon dioxide that they held. This carbon dioxide contributes to the warming of the atmosphere. As the Earth warms, natural matters such as trees, plants, and soil dry out which becomes fuel for wildfires. In addition, snow is melting about a month earlier causing the dry season to last longer, extending the duration of the fire season. A concept known as “the fire triangle” describes how a wildfire starts. The three elements of this fire triangle consist of fuel,

²² Hall, Jani. “Bushmeat: How Wild Meat Can Be a Threat to Wildlife and Human Health.” *Animals*, National Geographic, 3 May 2021, www.nationalgeographic.com/animals/article/bushmeat-explained.

²³ Kurpiers, Laura A., et al. “Bushmeat and emerging infectious diseases: lessons from Africa.” *Problematic Wildlife*. Springer, Cham, 2016. 507-551.

²⁴ Horton, Jake. Goodman, Jack. “Wildfires: How Are They Linked to Climate Change?” *BBC News*, BBC, 11 Aug. 2021, www.bbc.com/news/58159451.

oxygen, and ignition source. With climate change on the continuous rise these three substances are more readily available, increasing the risk for wildfires. Land and sea temperatures are changing and the contrast between these two colliding temperatures results in increased air pressure. This will propel wind power which in turn provides more oxygen for wildfires and also helps to spread the fires.²⁵

Wildfires pose an increased risk to human populations in at-risk regions. Smoke in the air causes problems with visibility and dry eyes. Burns and other injuries are a threat for those living in these areas. Additionally, air pollutants such as carbon monoxide, nitrogen oxide, and nitric oxide become more prominent and disturb air quality. These air pollutants and overall “Exposure to wildfire particulate matter is associated with an increased risk of respiratory events, including impaired lung function and hospitalizations, emergency department visits, physician visits, and medication use for asthma, chronic obstructive pulmonary disease, and respiratory infection.”²⁶

Between the years of 1986 and 2015 the number of United States forest fires has doubled.²⁷ Generally, Australia and California’s fire season occur during the summer months but, with climate change these seasons have been extended, creating a higher risk for large fires which leads to a greater loss of land. During the Butte County Fire in California in 2018, 56,000 people fled for refuge in hotels, parking lots and campgrounds. Their homes had been burned to the ground and it was too dangerous to rebuild. Around 20,000 of these people were displaced long term because of lack of fire insurance and the risk of returning to their homes. The shock and fear of this intense event that thousands of people have gone through has left 60 percent of

²⁵ Xu, Rongbin, et al. "Wildfires, global climate change, and human health." *New England Journal of Medicine* 383.22 (2020): 2173-2181.

²⁶ Xu, 2020.

²⁷ “Wildfires and Climate Change.” *Center for Climate and Energy Solutions*, 22 July 2021, www.c2es.org/content/wildfires-and-climate-change/.

survivors with mental health issues.²⁸ They have trouble resetting and adapting to the new communities after losing everything they once had.

On the other side of the world, Australia is suffering from intense wildfires as well. During the month of December 2019 alone Australia recorded 25,000 displaced persons from wildfires. This is double the number from data recorded the prior year. The fire season has extended longer than its usual duration and caused 10 million hectares and 3,000 homes to be burned to the ground. As vegetation burns, it releases carbon dioxide into the atmosphere continuing the progress of climate change. It is a loop with no end; carbon dioxide increases climate change which increases risk for wildfires which then emits more CO₂ into the atmosphere.²⁹

Wildfires ravish across nations all over the globe. Developed countries can handle the impacts of a raging fire more efficiently and successfully than a third world country. In an area that is unequipped to handle the devastation of a climate change induced wildfire, the consequences are deadly. In Botswana the wet seasons have changed from the impacts of climate change. In 2008 an abundance of grass grew and fires ignited quickly. For 50 days a fire burned through the fragile economy that relies on its national parks of indigenous grazing lands for survival.³⁰ Botswana struggled from lack of resources to control the fire and the damage was intensely problematic to the already delicate economy. A wealthier country has better resources and aid to deal with these greater-scale fires compared to smaller, poorer countries.

2. Typhoons, Heavy Rains, and Earthquakes

²⁸ Bernstein, Sharon. "Refugees in Their Own Country as Wildfire Destroys California Town." *News.trust.org*, news.trust.org/item/20201002090801-2i2dh/.

²⁹ Walden, Max. "Australians among a record 50.8 million internally displaced people worldwide, report says". *NEWS*, April 28, 2020.

<https://www.abc.net.au/news/2020-04-28/25,000-australians-among-50.8-million-internally-displaced/12194308>

³⁰ "Developing Countries Hardest Hit by Wildfires". *The New Humanitarian*, June 28, 2011.

<https://www.thenewhumanitarian.org/report/93072/global-developing-countries-hardest-hit-wildfires>

As research progresses, there is increasing evidence that climate change has an impact on weather events including typhoons and earthquakes. It does not take much to set off a tectonic reaction beneath the ground, a change in climate could be the factors that start it. As the global temperature increases, ice caps and sheets are melting around the Earth. Similarly to a trampoline as the ice melts into the earth it rebounds causing decompression of the crust of the earth. This decompression allows easier access for magma to reach the surface which puts the Earth at greater risk for volcanic reactions. Glacier movements (such as melting) also can be a cause for earthquakes by creating movement in the crust.³¹

In 2019, there were a total of 39,515 earthquakes starting with at least a 2.0 magnitude.³² In 2020, the earth saw a total of 53,495 earthquakes with at least a 2.0 magnitude.³³ In one year, the number of earthquakes over a 2.0 magnitude increased by 13,980 earthquakes. There is a 60 percent increase in ice loss since 1994 leading to an average of 1.2 trillion tons of ice each year. This massive ice loss is a major contributing factor to increase seismic activity.³⁴ In specific regions the impact is being seen. Alaska, for example, has lost a vertical kilometer worth of ice and has seen an increase in seismic activity. This ice loss will impact earthquakes for years on end. There was a recent earthquake in Greenland that occurred as a result of ice loss that happened over 10,000 years ago.³⁵ The top ten countries who have been hardest hit by seismic

³¹Yanes, Javier. "Will Climate Change Trigger Earthquakes, Tsunamis and Volcanic Eruptions?" *OpenMind*, 8 Oct. 2021, www.bbvaopenmind.com/en/science/environment/climate-change-trigger-earthquakes-tsunamis-volcanic-eruptions/.

³²"Earthquake Archive: Past Quakes Worldwide in 2019 - Liste Und Interaktive Karte - List, Stats and Interactive Map." *VolcanoDiscovery*, www.volcanodiscovery.com/earthquakes/archive/2019.html.

³³"Earthquake Archive: Past Quakes Worldwide in 2020 - Liste Und Interaktive Karte - List, Stats and Interactive Map." *VolcanoDiscovery*, www.volcanodiscovery.com/earthquakes/archive/2020.html.

³⁴Fox, Alex. Magazine, Smithsonian. "Earth Loses 1.2 Trillion Tons of Ice Per Year, a Nearly 60% Increase From 1994." *Smithsonian.com*, Smithsonian Institution, 29 Jan. 2021, www.smithsonianmag.com/smart-news/earth-loses-12-trillion-tons-ice-year-nearly-60-increase-1994-180976877/.

³⁵Watts, Jonathan, "Our Disappearing Glaciers". *The Guardian*, May 1, 2021. <https://www.theguardian.com/environment/2021/may/01/as-glaciers-disappear-in-alaska-the-rest-of-the-worlds-ice-follows>

activity, apart from Cuba, are all low income countries. A 2018 report from Haiti shows that from the 563 earthquakes in the past 20 years have left 747,000 people dead.³⁶ In 2022, Haiti is in crisis trying to recover from another earthquake that hit in August of 2021. Haiti used to be one of the world's richest colonies but today over 50 percent of the country lives below the poverty line. The Council on Foreign Relations credits this drop in success to foreign intervention and natural disasters.³⁷

Over the past 20 years, the Earth has warmed 1.8 degrees fahrenheit and then subsequently caused the atmosphere to become 4 percent wetter and storms are generating 27 percent more moisture compared to similar storms a century ago. Climate change throws off the natural precipitation cycle causing excess rainfall and snow which leads to flooding. When temperatures rise more evaporation from water sources and land leads to much higher rates of precipitation usually in the form of rain and snow. This also leads to more frequent heavy downpours. However, climate change changes air currents and ocean currents. This means that some areas of the globe will get less precipitation than others who are getting excess.³⁸

3. Heat Waves

Over the past decade the United States sees twice as many record high temperatures opposed to record low temperatures. Studies have shown that if climate change does not slow the number of days with temperatures above 100 degrees fahrenheit will double in comparison with the previous century. In addition, days with a heat index over 105 will triple. By 2050, fifty-five

³⁶ "Disasters: UN report shows climate change causing 'dramatic rise' in economic losses" United Nations, October 10, 2018. <https://news.un.org/en/story/2018/10/1022722>

³⁷ Labrador, Rocio and Roy, Diana. "Haiti's Troubled Path to Development". Council on Foreign Relations, September 17, 2021. <https://www.cfr.org/backgrounder/haitis-troubled-path-development>

³⁸ "Changing Rain and Snow Patterns." EPA, Environmental Protection Agency, archive.epa.gov/climatechange/kids/impacts/signs/precip-patterns.html.

percent of the human population will be exposed to lethal heat conditions at least 20 days a year.³⁹ Extreme heat waves will start to affect 2.7 billion people at least every five years.

With extreme heat comes an array of other issues that pose a threat to human life and well-being. Human health suffers greatly under extreme heat. In a study done in the early 2000's, it was found that over 1300 people a year die from heat each year. When people are in a hot environment their body cannot cool itself because of the humidity of the environment. This can lead to heat stroke and eventually death. In addition, multiple hot days have been found to have correlation with health issues such as cardiovascular and respiratory complications and kidney disease.⁴⁰

Heat waves also have a severe impact on livestock and agriculture. Droughts worsen and become increasingly common and vegetation dries out. Both of these factors are tied to the increase of wildfires. Many plants need cooler environments at night in order to thrive. Animals too do not do well in lengthy hot conditions, eventually they will experience heat stress. Heat stress can lead to many complications in animals. In cattle, for example, cows produce less milk, reduced conceptions rates, and overall slower growth.⁴¹

Leaders across the globe agree that changes and adaptations need to be made in order to cope with the impending climate crisis, specifically heat waves. While developed countries with more resources can implement the changes, developing nations lack the material and necessity to deal with the heat waves that are striking their homes more and more frequently. The Wet-Bulb condition is a factor that contributes to an increasing number of heat related deaths every year.

³⁹ Specktor, Brandon. "Human Civilization Will Crumble by 2050 If We Don't Stop Climate Change Now, New Paper Claims." *LiveScience*, Purch, 4 June 2019, www.livescience.com/65633-climate-change-dooms-humans-by-2050.html.

⁴⁰ "Climate Change Indicators: Heat-Related Deaths". United States Environmental Protection Agency. <https://www.epa.gov/climate-indicators/climate-change-indicators-heat-related-deaths>

⁴¹ "Heat Waves and Climate Change." *Center for Climate and Energy Solutions*, 28 June 2021, www.c2es.org/content/heat-waves-and-climate-change/.

When a person is in sustained heat of 95 degrees fahrenheit for a sustained period of time the Wet-Bulb condition arises. When this happens the body fails to cool itself down. Just a few hours in this state can lead to death.⁴² While many wealthy countries and communities have access to air conditioning and electricity, millions of people across the globe live without air conditioning. It is predicted that by 2050 3.5 billion people will be without air conditioning in a climate that is unsafe without it.⁴³

Conclusion

An EPA study released in September of 2021 shows that “the most severe harms from climate change fall disproportionately upon underserved communities who are least able to prepare for, and recover from, heat waves, poor air quality, flooding, and other impacts”.⁴⁴ In the United States ethnic minorities will be the hardest hit by climate change but all over the world poorer and underdeveloped countries will experience the worst effects of climate change. All countries will be hit by climate change's devastating impacts but developed nations will be able to handle these hard hits in a much more efficient and superior ways compared to third world nations. Countries that are already poor will struggle to keep themselves afloat. Crisis will ravage their homes and it will be hard for these countries who have few resources and are already living below the poverty line to keep up.

The Covid19 pandemic that has shut down the world for the past two years is evidence of the inability and incapability of poorer countries to cope with extreme circumstances. The world

⁴² Hill, Alice et al. “A World Overheating”. Council on Foreign Relations, October 18, 2021.

<https://www.cfr.org/article/climate-change-world-overheating-how-countries-adapt-extreme-temperature>

⁴³ “Billions could soon live in areas too hot for humans without air conditioning, study says”. CBS News, May 5, 2020.

<https://www.cbsnews.com/news/climate-change-billions-could-soon-live-in-areas-too-hot-for-humans-without-air-conditioning-study-says/>

⁴⁴ “EPA Report Shows Disproportionate Impacts of Climate Change on Socially Vulnerable Populations in the United States”. United States Environmental Protection Agency, September 2, 2021.

<https://www.epa.gov/newsreleases/epa-report-shows-disproportionate-impacts-climate-change-socially-vulnerable>

has seen how “marginalized groups often lack access to the services, resources, and information they need to mitigate and overcome crises”.⁴⁵ Current climate solutions put strain on poorer countries and their citizens. An example of this would be the carbon taxes or limit forestry activities which would put a strain on Indigenous communities that rely on them for income. Millions of people are experiencing the realities of climate change as crises surface.

Climate change is no longer an impending crisis, it is here now and people are suffering. Decades ago humans began to warm the planet and today these actions have caught up with us. Climate change is deadly. As the atmosphere warms, an array of unprecedented events follow. Intense weather events such as heat waves, earthquakes, flood, and wildfires will wrack the earth causing a mass migration of people. Humans will suffer loss of homes and property and will be forced to evacuate, leaving them as refugees. Diseases will spread and sea levels will rise. Humanity will be changed forever because climate change is not a problem of the future, it is a problem of today and people who are already living in desolate and impoverished conditions will suffer the brunt of climate change's deadly impacts.

⁴⁵ Basaninyenzi, Uwi. “Social Dimensions of Climate Change”. The World Bank. <https://www.worldbank.org/en/topic/social-dimensions-of-climate-change#1>