

Forum: *United Nations Environment Committee (UNEP)*

Issue: *Adapting for inevitable changes in climate (401)*

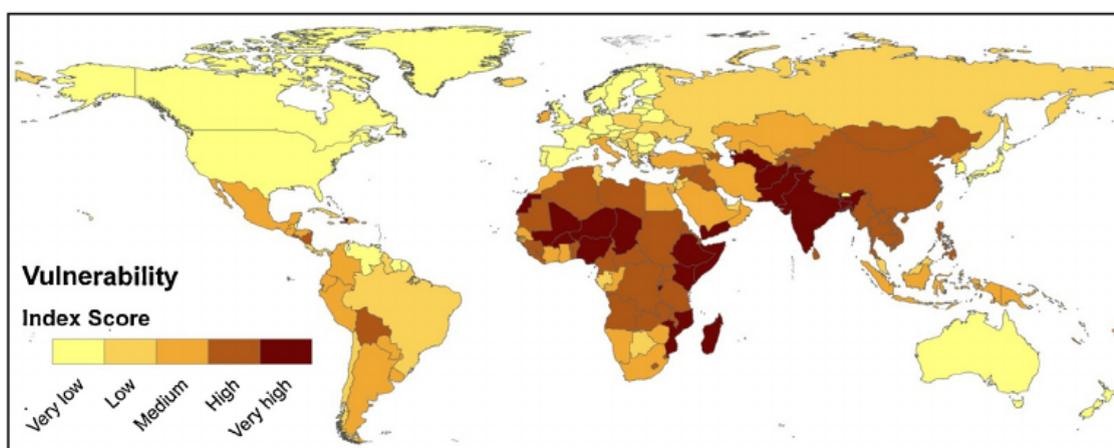
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Introduction

Most discussions on the issue of climate change have focused on measures to reduce change. However, this disregards many of its current effects; even if the world were to immediately cease all carbon emissions, the Earth would still remain irreversibly changed as a result of human activities. As climate change is not predicted to be completely eliminated for many decades to come, it stands to reason that the Earth will undergo even more dramatic changes that endanger human life.

Climate change threatens human life and economic growth through a variety of ways. First, it causes temperatures to tend towards extremes; not only does this render some areas uninhabitable for humans, it also reduces the yields from crops that had been bred to accommodate the original temperature, leading to food insecurity. Second, rising global temperatures lead to a rise in sea levels, submerging many island nations and other low-lying coastal areas. Finally, the rise of extreme climate events due to climate change, such as flooding, drought, and heat waves, can harm humans, destroy infrastructure, and cause crop failure. More than 21.5 million people have been displaced by all of these factors, and this number is expected to rise to 1.2 billion by 2050. Additionally, the number of deaths caused by climate change is estimated to be anywhere from 250,000 deaths per year to 5 million deaths per year. Clearly, actions must be taken to adapt to and mitigate the harmful impacts of climate change.



Caption #0: Climate change vulnerability map

Definition of Key Terms

Climate adaptation vs climate change mitigation

Together, climate adaptation and climate change mitigation are the two ways humans can respond to climate change. Climate adaptation, which this topic focuses on, seeks to capitalize on the positive effects of climate change while taking actions to defend against its negative effects. Climate change mitigation, on the other hand, is focused on reducing and reversing climate change.

Climate change

Climate change refers to the long-term changes to the Earth's climate that have been caused by human activity, especially the emission of large amounts of carbon dioxide (CO₂) into the atmosphere. It has caused temperature changes, extreme weather events, and rising sea levels.

Climate refugee

A climate refugee is an individual who has been temporarily or permanently displaced from their original area of residence due to any of the effects of climate change. These effects include but are not limited to food insecurity caused by crop failures and areas rendered uninhabitable due to flooding or extreme temperatures. Climate refugees also include those who emigrate preemptively in anticipation of harmful effects caused by climate change. However, climate refugees currently are not recognized as refugees by most nations and the UN.

Extreme climate event

An extreme climate event is one that reaches or surpasses the usual range of weather conditions in a given area. These events may include, but are not limited to, heat waves, cold surges, droughts, floods, and storms. They pose a significant threat to both human activity and the environment.

Climate change vulnerability

Climate change vulnerability is a statistic that measures how vulnerable a nation or region is to the negative effects of climate change. It is affected by two general factors: a) how heavily climate change affects the region (ex. geographical position) and b) how well the nation or region is prepared to respond to these effects (ex. economic capabilities, infrastructure sophistication). Due to the second factor, Less Economically Developed Countries (LEDCs) invariably have higher climate change vulnerability scores than More Economically Developed Countries (MEDCs)

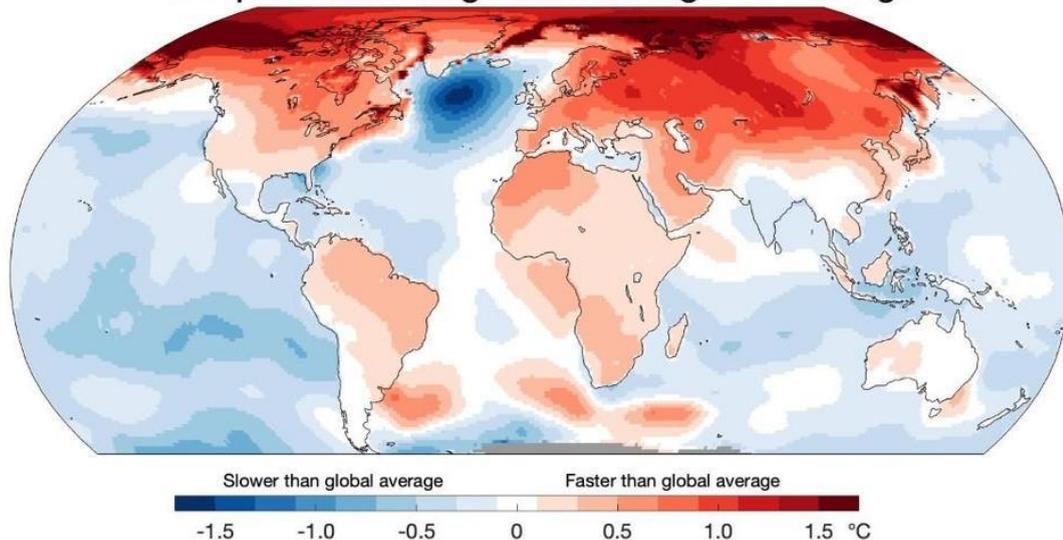
Background Information

Rising Temperatures

It is well-established that the temperature of the Earth has been steadily increasing due to human activity since the start of the Industrial Revolution, when coal-powered machines became prominent in factories and daily life. Today, due to the prevalence of fossil fuels, especially petroleum in electricity generation as well as transportation, more than 35 billion metric tons of carbon dioxide (CO₂), which is a major greenhouse gas, is released into the atmosphere each year, and that number is still rapidly increasing. The overabundance of greenhouse gasses in the Earth's atmosphere means that heat that would otherwise be radiated back out into space is trapped in the atmosphere, increasing the temperature on Earth.

So far, the average global temperature has increased by 1.1 degrees Celsius as compared to pre-Industrial temperatures, and is predicted to reach an increase of 1.5 degrees Celsius by the mid-2030s. Although this change may seem small, it triggers much more drastic effects (which the next paragraphs discuss) for two reasons. First, the global temperature increase is an average between all locations on Earth. As some locations have experienced a decrease in temperature due to global warming, the actual temperature increase in some areas is much more drastic. Second, many plants, animals, and natural phenomena on Earth are acutely sensitive to very small temperature changes. Therefore, even an increase of 0.1 degrees Celsius can lead to much more drastic effects.

Temperature change relative to global average



Caption #1: Temperature change relative to global average temperature

Droughts

While climate change can cause an overabundance of water in some areas, it can also cause scarcity of water in other areas. First, rising temperatures accelerate evaporation, causing surface soil and plants to dry more quickly. Second, even if climate change does not affect the total quantity of water, it may cause precipitation to fall in the form of rain instead of snow. Rain is liquid and quickly seeps into the ground, becoming unusable by humans; on the other hand, snow is solid, can be more easily collected, and can provide a steady source of water as it gradually melts. As snow is replaced by rain, humans lose a steady source of water. Droughts can lead to many problems, including crop failure, increase in the concentration of pollutants, and direct harm to humans due to lack of drinking water.

Wildfires

Though wildfires are often started because of chance human behavior, such as throwing cigarettes into forests, climate change plays a large part in spreading and prolonging wildfires. First, rising temperatures cause water from the ground to evaporate, leaving vegetation dryer and therefore more flammable. Similarly, accumulated snow, which provides protection from wildfires by reducing ambient temperature and increasing humidity, is melting a month sooner than before,

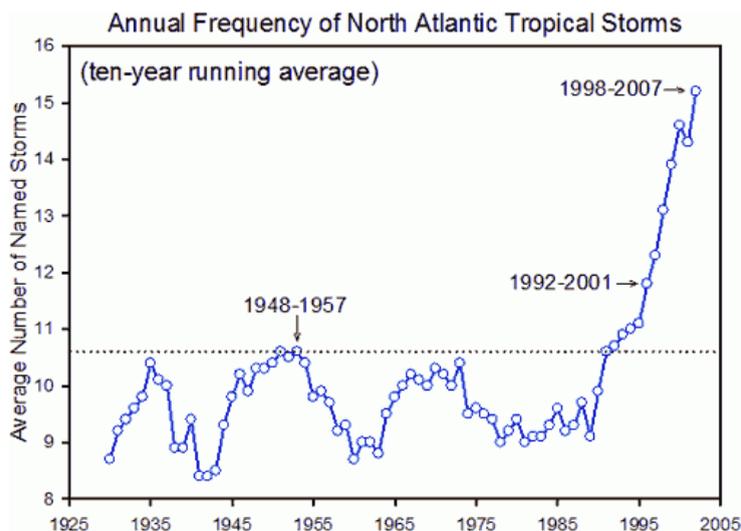
further increasing the likelihood of wildfires. Finally, some meteorological changes caused by climate change are diverting rain during dry seasons away from forested areas. Scientists predict that, in some areas, an increase in temperature by 1 degree Celsius can lead to the area burned by wildfires sixfold.

Rising sea levels

Increasing temperatures lead to rising sea levels because of two reasons: melting glaciers and expanding seawater. First, higher temperatures lead to icebergs, glaciers, ice sheets, and ice caps to melt, increasing the amount of liquid water in the oceans. In addition, as matter expands as its temperature increases, the same amount (mass) of seawater now occupies more volume. The sea level has risen by 16 - 21 centimeters since 1900, and is predicted to continue rising at a rate of 0.3 centimeters per year. (See Appendix I) This is highly dangerous in that rising sea levels can submerge low-lying coastal areas, many of which contain major cities, rendering them uninhabitable. Some small island nations, such as Tuvalu, are currently in danger of being completely submerged by the ocean. Approximately 80 million people's homes are predicted to be submerged or otherwise adversely affected by rising sea levels by 2050.

Flooding and Storms

Due to rising global temperatures, especially at and around the oceans, more water evaporates into the atmosphere, which causes higher precipitation and higher chance of storms. This leads to flooding, which occurs when precipitation provides more water than local bodies of water, such as lakes and rivers, can contain. In addition, climate change makes weather less predictable, making it difficult for meteorologists to predict and warn citizens of upcoming floods. The exact magnitude of the impact of climate change on flooding is still being researched, and may range from a factor of 1.2 to 9. The impact of climate change on storms and similar violent weather, on the other hand, is well-established; scientists estimate that storms that would normally occur twice every century are now twice as likely to happen, while storms that would normally occur once every two centuries are now 4 times as likely to happen.



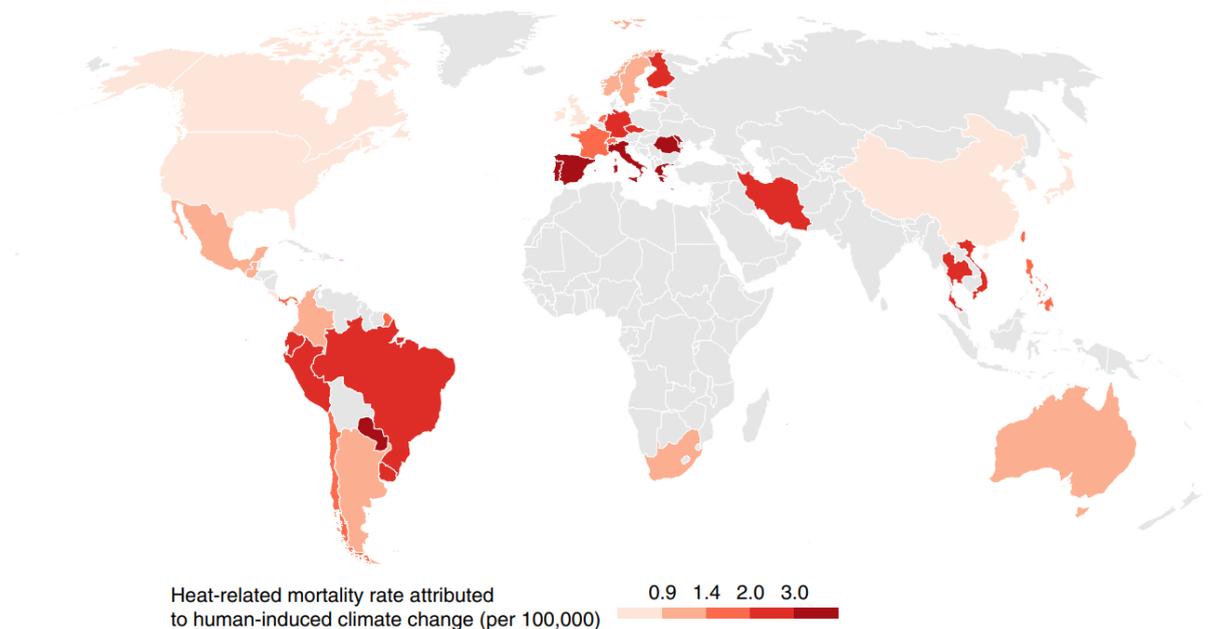
Caption #2: Annual frequency of North Atlantic Tropical Storms

Key Issues

Negative impacts of climate change on humans

Direct harm on humans

While many of the more drastic effects climate change takes on humans are indirect, there are still plenty of ways that human life can be directly impacted by temperature increase alone. For example, researchers have found a correlation between drowning accidents and temperature increase. They hypothesize that warmer winters have led to thinner ice on lakes and ponds in places that would have otherwise been safe to walk on, and unsuspecting individuals who walk or skate on the thin ice have a much higher chance of falling into the water. Though not all drowning accidents end in death, they may have other negative consequences such as emotional trauma and brain damage. In addition, rising temperatures in already-torrid areas can cause an increase in physical conditions such as heat stroke and hyperthermia. This is especially prevalent in poorer areas that cannot afford protections such as air conditioning.

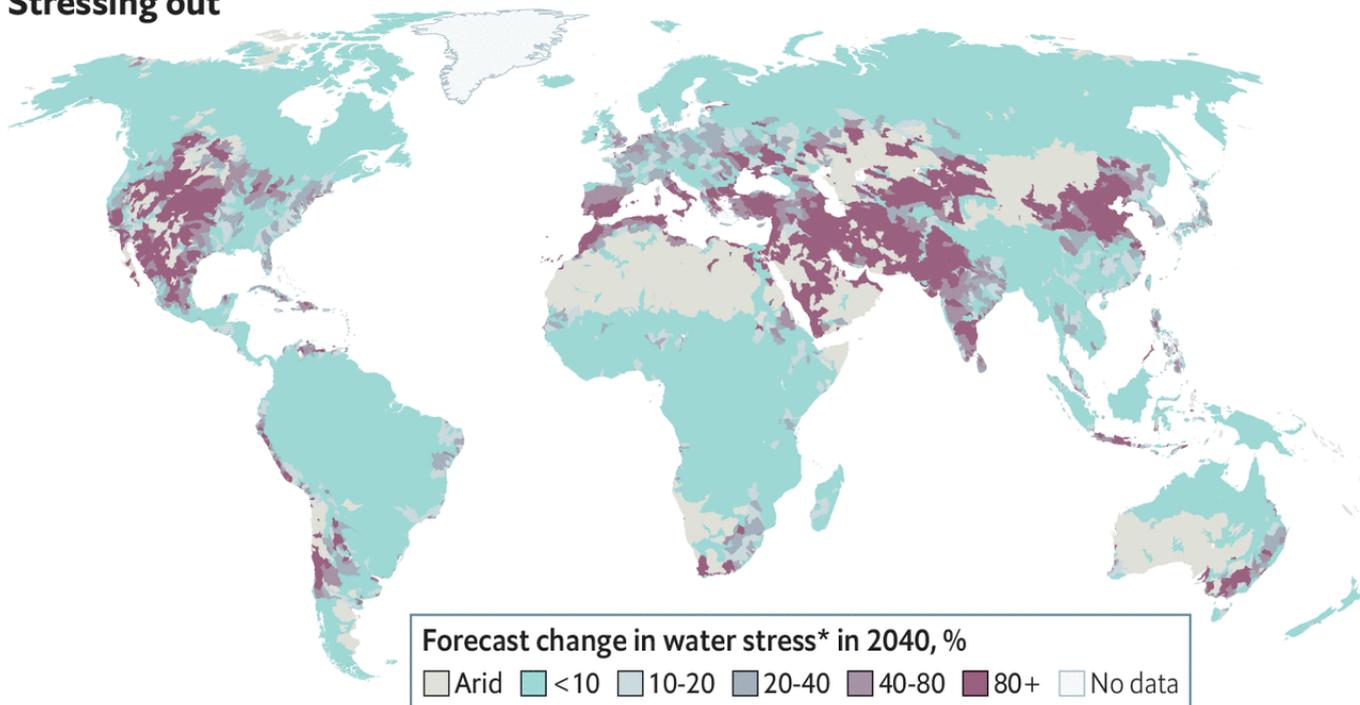


Caption #3: Heat-related mortality rate attributed to human-induced climate change (per 100K)

Water shortage

Water related disasters such as floods and storms can ironically lead to lack of usable water. This is because water that originates from these disasters is usually contaminated and also contaminates otherwise-usable water sources. Other disasters, such as droughts, directly cause water shortage for obvious reasons. In the last two decades, over 74% of natural disasters have led to a decrease in usable water, and the intensity of these events are predicted to increase even more as climate change worsens. In addition to dehydration, water shortage can also lead to more serious problems, such as disease outbreaks or even war. When individuals do not have access to safe drinking water, they may instead turn to contaminated, parasite-infested water to drink, which may cause diseases such as cholera, especially in children. In addition, tensions and aggression will rise when two nations share a crucial body of water on their border, leading to war or exacerbating current conflicts.

Stressing out



Source: World Resources Institute
The Economist

*The ratio of water withdrawal to supply

Caption #4: Forecasted percent change in water stress by 2040

Food insecurity

Due to droughts leading to lack of irrigation, an overabundance of CO₂ in the atmosphere leading to lapses in cellular respiration in plants, and rising temperatures weakening sensitive crops, the chances of crop failure is predicted to be 4.5 times more likely as compared to three decades ago by the year 2030, and is expected to be 25 times as likely by 2050. The change is this drastic for two reasons: first, many of the major staple crops such as corn (maize) and wheat are more sensitive than average to changes in temperature and irrigation, and will reduce their yields if any change is made. Second, of the major breadbaskets of the world, China, the US, India, Brazil, and Argentina, all but the US have high scores in climate change vulnerability.

Infrastructure damage

Extreme weather events, especially floods and violent storms, can wreak havoc on infrastructure. For example, strong winds can disable cell phone towers and entire electricity grids; storms can damage sewage systems and cause contaminated water to flow into homes; and floods and unusually hot weather can weaken roads, bridges, and homes. The cost of repairing infrastructure damage caused by climate change is around \$200 billion per year, in

addition to the incalculable damage done to the people whose livelihoods are dependent on electricity and transportation. This disproportionately affects LEDCs, as their infrastructure is usually less advanced and therefore more fragile. Furthermore, unlike MEDCs, poorer nations are less likely to have funds set aside for updating or reinforcing infrastructure in accordance with climate change.

Climate refugees

As of 2010, around 21 million people have left their homes because of any of the causes mentioned above or in anticipation of negative consequences of climate change. The most common causes of displacement are rising sea levels subsuming living spaces, which is prevalent in South Asia and small island nations, as well as water or food shortage, which is present in all regions but most common in already water- or food- scarce regions such as South Asia, East Asia, North Africa, and South America. Most climate refugees travel to areas that are not as heavily impacted by climate change (eg. the global North) and / or prosperous nations that are well-equipped to defend against climate change. However, these migrants face a legal obstacle: climate refugees are currently recognized by neither the legal systems of the vast majority of nations nor the United Nations High Commissioner for Refugees (UNHCR). Because of the lack of legal protection, climate refugees face the risk of being detained or rejected when they arrive at their destination.

Opportunities presented by climate change

Despite the plethora of negative consequences caused by climate change, rising temperatures can present an opportunity for growth for some sectors. Most notably, the growing season for some crops is much longer than before due to rising temperatures, and tropical plants can now be grown in previously cold areas. For example, rice yields in East Asia have increased by 25% in recent years due to climate change, offsetting a small part of the food shortage in other regions. However, though some plants do have an affinity for increased heat, too much heat will also drastically decrease the yields of the same species of plant; therefore, even nations that derive some benefit from climate change have reason to mitigate it.

Conflict between climate adaptation and climate mitigation

Many of the solutions for climate adaptation and those for climate mitigation conflict. For example, a simple solution to the more intense heat waves would be to stay inside and use air conditioning; however, this also means an increase in fossil fuel consumption, which leads to an increase in CO2 emissions, contributing to global warming. Though some would argue that climate mitigation

strategies should take precedence because they are more beneficial in the long term, the short-term risks of climate adaptation are also not to be ignored due to the human lives at stake.

Major Parties Involved and Their Views

India

India is one of the most climate change vulnerable countries in the world because of three main reasons: first, its high population translates to a high food demand, making any food shortage a serious problem; second, it is home to 171 million people who reside on low-lying coastlines and are in danger of having their house submerged by rising sea levels; third, more than 50% of its population is employed in climate-sensitive industries, namely agriculture and related industries such as farming, fishing, and forestry. Because of its many challenges, India was one of the first nations to adopt climate awareness and adaptation strategies, and spends a significant 12.5% of its national spending budget on climate adaptation. With this fund, the Indian government subsidizes programs such as crop rotation and diversification, soil and water conservation, irrigation expansion, and flood control. Specifically for the last item, the government has refocused its efforts on flood forecasting and warning systems after several dam failures. There is also ongoing research on floating houses that can keep individuals safe in events of sea level rise and floods, though they are currently too expensive to be purchased by the average citizen.

China

China has greatly increased the national priority of climate mitigation and adaptation in the past decade, partly because of the dramatic sevenfold increase in the frequency of flooding since the 1950s. In addition, due to China's varied climate, it experiences most of the negative impacts of climate change across its vast territory. To adapt to these impacts, the government issues Five-Year Plans every five years, each outlining specific goals such as water infrastructure improvement, stress-resistant crop and animal breeding, or building disaster warning systems. Notably, in order to adapt to flooding increases, China has developed "sponge cities" — cities that incorporate artificial lakes and water-absorbent vegetation — instead of the traditional method with concrete dams and dikes. This is proving to be very effective in mitigating floods, as well as reducing air pollution.

EU

Over the recent decades, European nations have experienced heat waves, flooding, storms, and other climate-caused problems. However, some countries, especially those in Northern Europe, have

also experienced increased crop yields as temperatures become more favorable for crops. As such, the European Union has collectively created a report for each nation in the EU, which includes climate vulnerability, opportunities, and recommended adaptation strategies. (See Appendix II) In addition, although the EU nations, like all other nations, have not granted refugee status to climate refugees, many have adjusted their legislation to grant asylum or temporary residence to those displaced by climate change.

Timeline of Relevant Resolutions, Treaties and Events

Date	Description of event
1896	<p>Climate change is discovered</p> <p>Several scientists publish papers hypothesizing that CO₂ emissions would eventually cause permanent temperature increase due to the greenhouse effect.</p>
1955 - 1975	<p>Concern about climate change increases</p> <p>Though a temporary global cooling briefly decreases interest, concerns regarding climate change grow as its effects are more clearly felt.</p>
23 February, 1979	<p>First UN conference on climate change</p> <p>The first United Nations conference on the subject of climate change is held. Climate change is internationally agreed upon as a major problem.</p>
June 4th, 1994	<p>UNFCCC is signed</p> <p>165 member states sign the United Nations Framework Convention on Climate change. In addition, annual United Nations Climate Change Conventions, better known as COPs, are established.</p>
September 2015	<p>Temperature increase reaches 1 degree Celsius</p> <p>The global temperature change, as compared to preindustrial levels, reaches one degree Celsius. Many nations experience record-breaking heat.</p>
April 22nd, 2016	<p>Paris Climate Accord is signed</p>

174 member states sign the Paris Climate Accord in Paris, and 20 more members would eventually follow suit. The accord includes both mitigation and adaptation strategies.

Relevant UN Treaties and Events

- Ecosystem-Based Adaptation, 27 June 2014 (**A/RES/1/8**)
- Paris Climate Accord, 4 November 2016
- United Nations Framework Convention on Climate Change (UNFCCC), 19 December 1989 (**A/RES/44/172**)
- National Adaptation Plans, 12 December 2019 (**7/CP.25**)
- The Nairobi work programme on impacts, vulnerability, and adaptation to climate change (NWP), December 2005 (**2/Cp.11**)
- Cancun Adaptation Framework, 10 December 2010 (**1/Cp.16**)

Evaluation of Previous Attempts to Resolve the Issue

In order to control flooding caused by increased rainfall and storms, many nations have **constructed dams and other barriers** meant to prevent water from flowing into residential areas. While this solution may work if the flooding problem is relatively minor, it quickly breaks down when there is a high amount of flood water. Aside from simply flowing over the top of the dam, a high amount of water pressure may lead to the dam leaking or breaking outright, especially if it is not maintained often or poorly built. A dam breakage can lead to much more serious consequences than a normal flood, as people have little warning to evacuate before water flows into homes and other buildings.

Instead of constructing artificial barriers, some nations have **used the natural world to their advantage**. Some flood-prone cities have planted water-absorbent trees next to porous pavements, letting water seep through the pavement to provide water supply to the vegetation. Others have extended national protection to existing coastal forests, particularly mangrove forests, that stabilize soil, soak up water, and reduce impact of coastal waves and erosion. However, while these solutions are effective in the long-run, they may be unrealistic for LEDCs to adopt because of their high cost.

Possible Solutions

As the number of people displaced by climate change continues to grow, **granting legal recognition to climate refugees** is becoming increasingly relevant. Though nations may not be willing

to recognize a new type of refugee altogether, some have already recognized that disasters caused by climate change may displace individuals and that it would be unhumanitarian to send them back to their original nations. The next steps, then, would be to grant such individuals asylum status or temporary residence permits until the danger passes.

Even though the world is working on climate change mitigation, there is no denying that it is nearly impossible at this point to completely reverse the effects of man-made climate change. Therefore, nations must consider long-term solutions that can help them **benefit from climate change**. For example, northern nations can switch to crops that have previously only been suited for hotter and more humid climates. Selectively breeding more resilient or higher-yield crop and animal species is also crucial.

Because it is possible to prevent most natural disasters, the best way to minimize casualties is often to evacuate areas before disasters occur. To do this efficiently, of course, would be to implement **disaster warning systems**. These can range from government-issued text messages to physical sirens playing high-pitched sounds or evacuation instructions. However, for this to be effective, governments must be able to accurately predict disasters ahead of time. In this, geographically close nations can cooperate to develop predictive research, as many disasters impact a large amount of land.

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Appendix or Appendices

- I. <https://sealevel.nasa.gov/ipcc-ar6-sea-level-projection-tool>
 - A. Sea level projection tool
- II. <https://climate-adapt.eea.europa.eu/#t-policies>
 - A. Adaptation policy portal in the EU
- III. <http://unfccc.int/resource/docs/2010/cop16/eng/07a01.pdf#page=4>
- IV. https://unfccc.int/files/adaptation/sbsta_agenda_item_adaptation/application/pdf/nwp_brochure.pdf
- V. <https://www.informea.org/en/decision/ecosystem-based-adaptation>
- VI. https://unfccc.int/sites/default/files/english_paris_agreement.pdf
- VII. https://unfccc.int/sites/default/files/resource/sbi2019_L21E_adv.pdf
- VIII. <https://unfccc.int/resource/docs/convkp/conveng.pdf>
 - A. III - VIII: Previous resolutions on the subject